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Datasheet for the decision of 5 June 2008

Case Number: T 0747/04 - 3.3.07

Application Number: 98928218.1

Publication Number: 0979320

IPC: D01F 6/60

Language of the proceedings: EN

Title of invention:
Process for making solution-dyed nylon fibres

Patentee:
BASF SE

Opponent:
RHODIA PERFORMANCE FIBRES

Headword:
-

Relevant legal provisions:
EPC Art. 56

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step - no (obvious combination of known features)"

Decisions cited:
-

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0747/04 **-** 3.3.07

D E C I S I O N
of the Technical Board of Appeal 3.3.07
of 5 June 2008

Appellant: (Opponent)	RHODIA PERFORMANCE FIBRES Avenue de l'Ermitage F-62053 Saint Laurent Blangy (FR)
Representative:	Esson, Jean-Pierre Rhodia Services Direction de la Propriété Industrielle Centre de Recherches de Lyon BP 62 85, avenue des Frères Perret F-69192 Saint-Fons Cédex (FR)
Respondent: (Patent Proprietor)	BASF SE D-67056 Ludwigshafen (DE)
Representative:	Bieller, Vera BASF SE Global Intellectual Property GVX - C 6 D-67056 Ludwigshafen (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted 22 April 2004 concerning maintenance of European patent No. 0979320 in amended form.**

Composition of the Board:

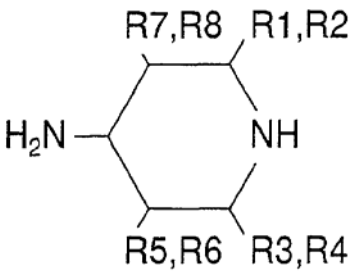
Chairman: S. Perryman
Members: B. ter Laan
B. Struif

Summary of Facts and Submissions

I. The appeal by the opponent lies against the interlocutory decision of the opposition division to maintain the patent in amended form.

II. Mention of the grant of European patent No. 0 979 320, based on European application No. 98 928 218.1, originating from international patent application PCT/EP98/02411 (filed on 23 April 1998 and published on 12 November 1998 under No. WO 98/50610), was published on 27 March 2002. The patent was granted on the basis of 22 claims, the independent claims reading:

"1. A process for making stabilized solution-dyed fiber comprising:
melting a polyamide which is amide monomers polymerized in the presence of at least one mono or dicarboxylic acid chain regulator and at least one hindered piperidine compound having the formula:

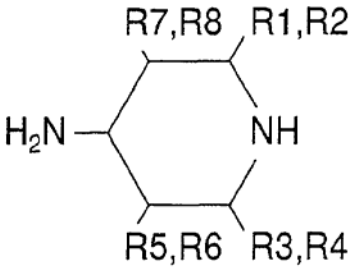


where R1, R2, R3 and R4 are not hydrogen, but any alkyl group having up to 20 carbon atoms, and R5, R6, R7 and R8 may be alkyl substituents such as those present in R1-R4 or hydrogen;
coloring the melted polyamide with a colorant selected from the group consisting of:

pigments that are not pure iron oxide pigments;
dyes;
mixtures thereof; and

spinning the colored polyamide into fibers that have 40% or better retained tenacity after 2125 kJ exposure to xenon arc radiation as per AATCC Test Method 16-1993, "Colorfastness to Light," Option E and no more than 10 ppm uncomplexed copper."

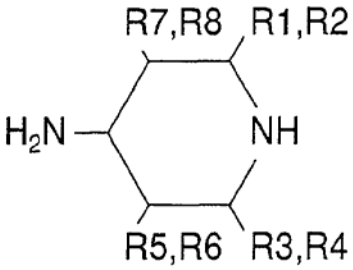
"11. An improved process for spinning solution-dyed nylon fibers comprising:
coloring a molten polyamide, which polyamide is ε-caprolactam polymerized in the presence of at least one mono or dicarboxylic acid chain regulator and at least one hindered piperidine derivative having the formula:



where R1, R2, R3 and R4 are not hydrogen, but any alkyl group having up to 20 carbon atoms, and R5, R6, R7 and R8 may be alkyl substituents such as those present in R1-R4 or hydrogen; and
spinning the colored polyamide into fibers that have 40% or better retained tenacity after 500 hours exposure to xenon arc radiation as per AATCC Test Method 16 -1993, "Colorfastness to Light," Option E wherein said spinning is at least 0.5 % more efficient than spinning solution-dyed fibers colored with the same colorant from a polyamide which is not polymerized

in the presence of said at least one mono or dicarboxylic acid chain regulator and said at least one hindered piperidine derivative."

"16. A light stabilized solution-dyed nylon fiber comprising a polyamide host polymer, which is amide monomers polymerized in the presence of at least one mono or dicarboxylic acid chain regulator and at least one hindered piperidine derivative having the formula:



where R1, R2, R3 and R4 are not hydrogen, but any alkyl group having up to about 20 carbon atoms, and R5, R6, R7 and R8 are alkyl substituents such as those present in R1-R4 or hydrogen; and
a non-white colorant dispersed throughout said host polymer;
said fiber having less than 10 ppm uncomplexed copper."

III. A notice of opposition against the patent was filed on 23 December 2002, in which the revocation of the patent in its entirety was requested on the grounds of Article 100(a) EPC (lack of novelty as well as lack of an inventive step), and Article 100(b) EPC (insufficient disclosure).

The opposition was, *inter alia*, supported by:

D1 WO-A-95/28443,
D3 EP-B-0 704 560,

D6 DE-A-195 37 614.

IV. The interlocutory decision posted on 22 April 2004 was based on claims 1 to 22 as granted (main request) and on claims 1 to 15 as granted (sole auxiliary request). The opposition division decided that claim 16 of the main request lacked novelty, but that the auxiliary request, filed during the oral proceedings on 1 April 2004, fulfilled the requirements of the EPC.

The reasoning can be summarized as follows.

(a) Claim 16 of the main request was not novel over D1, the claims of the auxiliary request however were novel.

(b) As regards inventive step, the process according to the patent in suit was distinguished from D1, the closest prior art document, in the addition of titanium dioxide after polymerization but before spinning, so that it was not present during the formation of the polymer. In D1 titanium dioxide instead was added before polymerization. The process of D1 had a number of disadvantages concerning the influence of the colorant on the polymerization process and the properties of the resulting polymer. Apart from solving those problems, the patent also aimed at providing an inexpensive, environmentally friendly method for making a variety of colours in solution-dyed stabilized nylon fibres, resulting in fibres having sufficient heat and light resistance and good mechanical properties. Further objects were to improve the spinning efficiency of the process

and to prevent the build up of stabilizer in the melt spinning lines. All of the properties would depend more or less on the addition of the colorant to the melted polyamide, so that each and every aspect had to be taken into account for assessing the presence of an inventive step.

D1 by itself did not suggest to add the colorant to the melted polyamide. D3 described pigmented thermoplastic fibres stabilized by a synergistic combination of a HALS (Hindered Amine Light Stabilizer) and a UV stabilizer. The polymer could be polyamide or another polymer, preferably a polyolefin. The addition of a pigment prior to fibre formation was mentioned, but other possibilities of adding the colorant were also disclosed, without however indicating the specific problems each of the methods would solve. Therefore, there was no incentive for the skilled person to combine the specific features of the opposed patent. In view of the vast variety of possibilities presented in D1 and D3, the skilled person would not necessarily have arrived at the present combination of features. Moreover, D3 had only shown beneficial results for polyolefins and it was doubtful whether those would also be valid for polyamides. As D3 also suggested to add copper stabilizers to polyamides, the requirement in claim 1 in respect of the presence of a restricted amount of copper in the fibre would not have been met. Therefore, the claimed subject-matter was inventive.

V. On 21 June 2004, the opponent (appellant) lodged an appeal against the above decision. The prescribed fee was paid on the same day. With the statement setting out the grounds of appeal filed on 20 August 2004, arguments were submitted and four further documents were cited, amongst which "Fourné: Synthetische Fasern", 1995, pages 629 to 634 (D13). In response to a communication by the Board pointing out the issues to be discussed during oral proceedings, the appellant filed further arguments.

By letter dated 9 March 2005 the patent proprietor (respondent) filed comments on the grounds for the appeal.

VI. Oral proceedings before the Board were held on 5 June 2008.

VII. The appellant's arguments can be summarised as follows:

(a) Dl was considered as the closest prior art document. It disclosed a polyamide that had been prepared in the presence of a dicarboxylic acid and triacetone diamine, resulting in a stabilized polyamide that fell within the definition of the polyamide of present claim 1. Because the polyamide of D1 was stabilized in the same manner as in the patent in suit, it necessarily fulfilled the tenacity requirement of claim 1 and also the higher spinning efficiency mentioned in claim 11.
The requirements regarding the type of colorant were also met. In D1 titanium dioxide was however present during the polymerization, so that the

only difference between the claimed subject-matter and D1 resided in the point in time of the addition of the colorant.

(b) The problem to be solved was to provide nylon fibres with a variety of colours.

(c) D13 referred to the general knowledge in the field of colouring synthetic fibres. It disclosed the advantages of adding the colorant to the polymer after polymerisation but before spinning, as opposed to adding it before polymerization, in particular pointing out the flexibility of the system. Therefore, D13 suggested the solution to the problem to be solved in the patent in suit.

(d) The teaching of D13 applied to the polymer described in D1 resulted in the subject-matter being claimed by the patent in suit, which was therefore not inventive. Hence, D13 was sufficiently relevant to be admitted to the proceedings.

VIII. The arguments of the respondent can be summarized as follows:

(a) Although the polyamide described in D1 fell under the terms of the polyamide of present claim 1, the claimed process differed in a number of ways, such as the addition of the colorant to the melted polymer (not before polymerization), the tenacity of the spun fibre, which was improved by the addition of the colorant to the melted polymer, the amount of copper in claim 1 and the spinning

efficiency in claim 11. Those differences should be taken into account, in conformity with the standard jurisprudence of the EPO (Case Law of the Boards of Appeal of the European Patent Office, 3rd Edition, 1998, II.B.1.2.2). There was, however, no direct comparison with D1 in the patent in suit to show the specific advantages brought about by those differences.

(b) D13 had been filed only at the stage of the appeal proceedings, without any reason being given for such late filing. Since the claims had not been amended during the entire opposition proceedings, D13 could have been filed earlier. It should therefore not be admitted into the proceedings.

(c) However, should D13 nevertheless be admitted to the proceedings, its combination with D1 did not render the claimed subject-matter obvious as D13 showed even more differences with the claimed subject-matter than did D1.

IX. The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed.

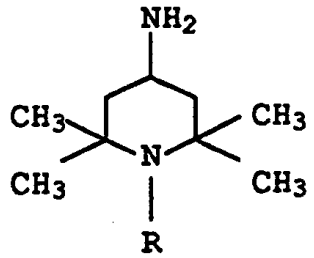
Reasons for the Decision

1. The appeal is admissible.

Inventive step

2. The patent in suit concerns solution dyed nylon fibres. In the patent specification (paragraphs [0009] and [0011]) specific reference is made to D1, which the parties and the opposition division considered to be the closest prior art document. The Board sees no reason to take a different view.

2.1 D1 discloses a process for the preparation of polyamides characterized in that the polymerisation or polycondensation, resp., of the starting monomers is carried out in the presence of at least one triacetonediamine compound of the formula



(I)

where R is hydrogen or a hydrocarbon group having from 1 to 20 C-atoms, preferably an alkyl group having 1 to 18 C-atoms or a benzyl group (claim 1). During the polymerisation or polycondensation a pigment may also be present (claim 2). In examples 2, 4 and 5 caprolactam is polymerized in the presence of terephthalic acid, and triacetonediamine and titanium dioxide. In all examples the fibres are free of copper. Hence, the stabilized polyamide according to D1 contains a dicarboxylic acid chain regulator, a hindered piperidine compound and a pigment and therefore falls within the definition of present claim 1.

2.2 According to the patent in suit itself, many of the fibres spun from unstabilized nylon already have a retained tenacity well above 40% after UV exposure at 2125 KJ (comparative examples 1 and 5, in particular comparative example 1A - in which titanium dioxide is present -, with a value of 58). A comparison between the samples of example 3, illustrating the claimed process, and those of comparative example 1 shows that there is an important improvement in the retained tenacity due to the presence of the hindered piperidine compound stabilizer during the polymerisation of the nylon. Even in the presence of copper as a stabilizer, a positive effect on the retained tenacity can still be seen when fibres are spun from stabilized nylon instead of unstabilized nylon (comparative examples 2 and 4).

D1 also contains clear information regarding the improved stability of fibres spun from the stabilized nylon. As can be seen from the examples, fibres spun from the product of D1 have improved heat stability (tables 1 to 3) and light stability (table 7) as compared to fibres made from unstabilized nylon. In table 5 the superior spinning efficiency is indicated (low failure rate). Example 5, table 7, shows the effect of 28 days of Xenon exposure: the retained tenacity is still 68% of the original value.

In view of the above it can be accepted that the incorporation of a stabilizer into the polyamide in accordance with D1 results in improving the retained tenacity of the fibres as well as the spinning efficiency of the process to such an extent that fibres spun according to D1 have the retained tenacity

and spinning efficiency required by the subject-matter now being claimed.

2.3 Therefore, the only difference between the claimed subject-matter and D1 lies in the moment at which the colorant is added: according to the patent in suit it is added after polymerization but before spinning, whereas in D1 the colorant is added before polymerization, so that it is present during the formation of the polymer.

3. The patent in suit aims at providing a method that improves the spinning efficiency of solution-dyed fibres and at providing an inexpensive method for making a variety of colours in solution-dyed nylon fibres that are stabilized with respect to the polyamide and to the colorant. Further objects are to provide a process for making a light-stabilized solution-dyed fibre, to provide improved spinning efficiency for traditionally difficult to spin solution-dyed fibres and to eliminate or significantly reduce stabilizer build-up in melt spinning lines and also to provide an environmentally-friendly, efficient process for producing solution-dyed nylon fibres. (paragraphs [0012] to [0018]).

3.1 As can be seen from point 2.2 above, the stabilized polyamides and their properties as defined in present claims 1 and 11 had already been described in D1, so that the objects relating to stabilisation and spinning efficiency had already been achieved. There is no evidence in the patent in suit, nor in the file, to suggest that adding the colorant after polymerization to the melted polyamide, just before spinning, would

have any beneficial effect on the retained tenacity and spinning efficiency as compared to adding the colorant before polymerization.

3.2 Therefore, the problem remaining to be solved by the patent in suit only relates to the colouring and may be formulated as to provide an inexpensive method for making a variety of colours in stabilized nylon fibres, in conformity with paragraph [0013] of the patent specification.

3.3 That the subject-matter now being claimed effectively solves the above-defined problem had not been contested by the appellant and the Board, also in view of the disclosure of D13 (see point 3.4 below), sees no reason to deviate from that view.

3.4 Therefore, the question remains to be answered if the solution to the problem as defined in the claims was obvious from the cited prior art.

D13 is a handbook; it provides an overview of the possibilities to delustre and colour fibres in relation to various moments of the spinning process. On page 629, point 6.8, the addition of titanium dioxide to synthetic material before spinning is described. It is stated that some materials do not colour well when in the form of textiles, so that they are mixed with the colorants in their melted form, and then spun. Also, the addition of colorants already to the monomers results in pollution of the plant and causes problems when changing the additive. Due to those problems, the addition of those additives during polymerization has been given up and the actual practice is to add those

additives as late as possible in the process. Under point 6.8.3 on page 631, an overview is given of the various possibilities of adding colorants to polymers to be spun, the addition from a sideline extruder to the main extruder being described in detail. In Tables 6.8 and 6.10, nylon is specifically mentioned as one of the polymers. D13 therefore discloses the addition of a colorant to melted polymer, such as nylon, thus preventing pollution of the plant and problems when changing the additive. For that reason, it is obvious for the skilled person, desiring to provide a simple method for making a variety of colours in nylon fibres, to add the colorant to the melted polymer rather than to the monomers.

Hence, claims 1 and 11 of the main request are not inventive (Article 56 EPC).

4. As can be seen from the above, D13 plays a decisive role in the argumentation why the patent in suit lacks an inventive step. Its high relevance is therefore immediately clear so that the document is admitted into the proceedings. Furthermore, since D13 had been cited in the grounds of appeal, at the beginning of the appeal procedure, together with arguments based upon it, the respondent had sufficient time to prepare their counter-arguments, so that the requirements of Article 113(1) EPC are fulfilled.

5. Since the claims of the patent as granted according to the sole request therefore do not comply with the requirements of the EPC, the patent has to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

Registrar | Chairman

C. Eickhoff | S. Perryman