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D E C I S I O N
of 15 December 1993

Case Number: T 0740/91 - 3.3.3

Application Number: 83201537.4

Publication Number: 0107887

IPC: D01F 11/08

Language of the proceedings: EN

Title of invention:
Adhesive-coated multifilament yarn of an aromatic polyamide and a method for the manufacture thereof

Patentee:
Akzo N.V.

Opponent:
Hoechst Aktiengesellschaft
Asahi Chemical Industry Co., Ltd.

Headword:
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Relevant legal norms:
EPC Art. 54, 56, 123(2)

Keyword:
-

Decisions cited:
-

Catchword:
I. A numerical value disclosed in error in an application as filed may in appropriate circumstances constitute a disclosure for the purposes of Article 123(2), and thus be relied on as a basis for permitting an amendment.

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0740/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 15 December 1993

Appellant: (Opponent 01)
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-

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office dated 16 April 1991 issued in writing on 22 July 1991 concerning maintenance of European patent No. 0107887 in amended form.**

Composition of the Board:

Chairman: C. Gérardin
Members: R. Lunzer
M. Aúz Castro

Summary of Facts and Submissions

I. Mention of the grant of patent No. 107 887 in respect of European patent application No. 83 201 537.4 filed on 26 October 1983, having a priority date of 2 November 1982 derived from Dutch Application No. 8 204 243, was published on 21 January 1987 on the basis of 32 claims, Claim 1 reading as follows:

"A multifilament yarn which entirely or substantially consists of an aromatic polyamide and is provided with an adhesive coating of a cured epoxy compound having on average 2 to 4 epoxy groups per molecule, characterized in that the yarn has a tenacity of 10 to 35 cN/dtex or higher, an elongation at rupture of 1 to 10% and an initial modulus of 200 to 1300 cN/dtex or higher, the amount of cured epoxy compound present on the yarn being 0,01-5% by weight and the free epoxide content being not higher than 10 mmoles/kg."

Claims 2 to 32 were related to that claim in that they concerned (i) preferred yarns according to Claim 1 (Claims 2 to 12), (ii) a yarn package containing a continuous length of multi-filament yarn according to Claim 1 (Claims 13 and 14), (iii) a cord made by twisting together one or more bundles of multi-filament yarn according to Claim 1 (Claims 15 to 20), (iv) a fabric and a fibre-reinforced object obtained from a yarn according to any of Claims 1 to 12 or from a cord according to any of Claims 15 to 20 (Claims 21 and 22), and (v) a process for the manufacture of a multi-filament yarn according to any of Claims 1 to 12 (Claims 23 to 32).

II. Oppositions were filed within the prescribed period by three opponents, seeking revocation of the patent on the ground of Article 100(a) EPC, alleging lack of novelty (Article 54 EPC), and lack of any inventive step (Article 56 EPC). Although a large number of documents was cited by the three Opponents, only the following document

(1) JP-A-143724/1975

in the form of one out of two English translations, identified more specifically as (1a), played a major role in the discussion of patentability in the appeal.

III. By its interlocutory decision given orally on 16 April 1991, and issued in writing on 22 July 1991, the Opposition Division held that no valid grounds of opposition existed to the maintenance of the patent, as amended in accordance with the letter from the Respondent of 28 November 1989, the amendments being (i) an indication that the epoxy compound had been applied to the yarn and cured while the yarn had a twist of fewer than 10 turns per meter, and (ii) the change of the upper limit of the amount of cured epoxy compound present on the yarn from 5.0% to 0.6%. Regarding the upper limit of 0.6% by weight, it was stated that this value was actually disclosed in Examples III and IV of the patent in suit, and that from the Table on page 6 of the written submission filed on 29 November 1989 it appeared clearly that the other experimental values were within the new range. This amendment conferred both novelty and an inventive step on the claimed subject-matter, since Example 2 of document (1a) mentioned an amount of cured epoxy compound on the yarn of 1% by weight, and there was no incentive to reduce this amount in order to increase tenacity and initial modulus.

IV. An appeal against that decision was filed by the Appellant (Opponent 01) on 26 September 1991, the appeal fee was paid on the same day, and the Statement of Grounds of Appeal was filed on 27 November 1991. In that Statement, and during oral proceedings held on 15 December 1993, the Appellant maintained its argument that the alleged invention was lacking in both novelty and inventiveness having regard to the disclosure of document (1a), and that the amendment to introduce an upper limit of 0.6% for the amount of cured epoxy compound on the fibres was not admissible because that limit was not disclosed in the application as filed.

V. The Respondent (Patentee) argued in its counterstatement, filed on 18 March 1992, and during the oral proceedings, that document (1a) did not deprive the alleged invention of novelty, since it did not disclose using as little as 0.6% of cured epoxy compound, nor was there anything in its teachings which could have made the alleged invention obvious. There was sufficient disclosure in the application as filed to support the upper limit of 0.6%, notably in Example III. Although there the figure of 0.6% was given in relation to the quantity of epoxy compound applied, and not the quantity remaining after curing, there was in fact little change in the very short curing period of 4 - 5 seconds at 170°C. The actual figure of 0.57% had simply been rounded up to 0.6%.

VI. The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 107 887 be revoked.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of Amendments*

2.1 The only amendments introduced by the Respondent are the two further limitations in Claim 1, that the epoxy compound is applied to the yarn and cured while the yarn has a twist of fewer than 10 turns per meter, and the replacement of the upper limit of 5% of cured epoxy compound by the much lower limit of 0.6%. The first of these two limitations was not subject to any dispute, having been clearly disclosed in the application as filed at page 5, lines 18 to 21, corresponding to page 3, lines 47 to 49 of the granted patent. Although it was argued by the Appellant that the 0.6% limit is not disclosed in Example III, which refers to the yarn prior to heating having picked 0.6% by weight of uncured epoxy compound, suggesting that the amount of the cured compound must have been significantly less due to loss by volatilisation, the Respondent, while accepting that some small loss could occur, maintained that the true level of 0.57% had legitimately been rounded up to the single figure of 0.6%, which corresponded with the single figure given at page 3, line 45 for the amount of uncured epoxy compound applied.

2.2 In the absence of any firmer justification for the 0.6% upper limit, the Board would have been prepared to accept that argument. As is clear from the Table at page 6 of the Respondent's letter of 28 November 1989, the patent in suit includes a total of 14 Examples of applying an epoxy compound in accordance with the alleged invention, and in all of them the amounts fall within the range of 0.32% to 0.60%, albeit that the

actual value of 0.6% given in Example III was accepted by the Respondent at the oral proceedings as having been rounded up to that figure.

2.3 The Respondent did not seek to rely on the disclosure of Example IV, explaining that although there was an explicit disclosure at page 9, line 63 that:

"The yarn thus treated [i.e. in the cured condition] contained 0.6% by weight of resin."

their laboratory records, details of which were contained in the above-mentioned Table, showed that that figure was not correct, and that the true figure was 0.49%. The figure of 0.6% given in the patent in suit was admitted by the Respondent to have been inserted in error in place of the true figure of 0.49%.

2.4 That gives rise to the issue of law, of whether an actual disclosure in an application as filed, if later accepted by the patentee as having been included in error, can nonetheless legitimately be used as the basis for making an amendment. Looking at the wording of Article 123(2) EPC, it is observed that the test which has to be applied is to ask whether the amendment has the effect that the patent when amended contains subject-matter which extends beyond the "**content of the application as filed**". In relation to the present Example IV, what was in the application as filed was an explicit disclosure of an amount of epoxy compound on the fibre after curing at a level of 0.6%. The fact that the figure given in that Example was wrong does not alter the situation that it was actually disclosed, and credibly disclosed, in the application as filed. In these circumstances the Board holds that it may be relied on as the basis for the new upper limit in Claim 1.

2.5 This interpretation of Article 123(2) EPC is consistent with the underlying intention of that Article, which is to protect the public from being faced at a later stage with claims which are wider in their scope than what was disclosed in the application as filed, and published for the information of the public, including the applicant's competitors.

2.6 Any such competitor of the present Respondent, who had read the application as first published, and who formed the view that the originally claimed range of 0.1 to 5% was too wide in the light of the prior art, such as document (1a), and who thought that the broad claim could not validly be sustained, would then have needed to consider what figure might reasonably be introduced as an upper limit. He would have seen at once that the highest figure for the cured epoxy resin given in any Example was the 0.6%, clearly disclosed in Example IV, and therefore could not have been taken by surprise if the upper limit of 5% were later to be reduced to 0.6% as a result of a limiting amendment, whether made during examination or in the course of any later opposition. The fact that the figure was wrong would be unknown to competitors, and therefore could not influence their judgment.

2.7 It follows that the Board accepts the 0.6% upper limit as being substantiated both by the rounding up of the true level in Example III, and more particularly by its specific disclosure in Example IV.

3. *Novelty*

3.1 Novelty is challenged in the light of the disclosure of document (1a). Example 2 of that citation describes the preparation of poly-p-phenyleneterephthalamide fibres from the polymer solution. These fibres are described as

being provided with a surface coating of an epoxy resin, which is obtained from an aqueous solution containing 2.5% of triglycidylisocyanurate. After a squeezing step, the amount of epoxy compound is said to be about 1% based on the dry weight of the fibre.

3.2 According to the general description in document (1a) (page 15, paragraph 2), the solution or dispersion of the epoxy compound may have a concentration of 1 to 10%. As argued by the Appellant, by using a concentration of 1%, instead of the 2.5% disclosed in Example 2, one would expect to obtain a significantly smaller amount of epoxy compound on the fibre than the 1% there disclosed, and possibly as little as 0.6% or less. Thus novelty was lacking.

3.3 In answer, the Respondent contended that the concentration of the aqueous solution ought not to be considered in isolation. There was no basis for the assumption that, e.g., a 50% reduction in concentration of the epoxy compound in the coating solution would result in the amount of cured epoxy compound on the yarn being reduced by 50%. That such an assumption is invalid is demonstrated by comparing Example 2 with Example 1. In Example 1, an aqueous dispersion containing 15% of an epoxy compound (i.e. 6 times as much as in Example 2) was used, but the amount of cured epoxy compound on the fibre was only 1.5%, i.e. only 50% more. This shows that by carrying out Example 2 using a solution having a lower proportion of epoxy compound, the amount of epoxy resin deposited on the fibre may well be less than 1%, but there is no evidence that the amount could be as little as 0.6% or less. In the absence of any experimental evidence directed to this issue by the Appellant, the Board follows the decision T 219/83 "Zeolites/BASF" OJ EPO 1986, 211 (Reasons point 12, paragraphs 4 and 5), in holding that where a party fails

to substantiate an allegation of fact, and the Board is unable to establish the facts of its own motion, it is that party who loses thereby. Accordingly, this issue has to be resolved against the Appellant, and the objection that there is a lack of novelty on the basis of an inevitable result when carrying out a modified variant of Example 2 must be rejected.

3.4 In fact it is very doubtful whether in the context of document (1a) it is legitimate at all to treat the general teaching at page 15 of using 1 to 10% concentration of the solution or dispersion of epoxy compound as being of general applicability to each and every one of the wide variety of fibres and epoxy compounds disclosed in that citation. As is evident from the wording of Claim 1 of document (1a) and the description (page 5, paragraph 3 to page 9, paragraph 1) the multifilament yarns can be obtained from an aromatic polyamide as well as from an aromatic polyhydrazide. Moreover, the list of epoxy compounds regarded as suitable (page 10, paragraph 4 to page 11, paragraph 1) includes several classes of polyepoxides, such as polyglycidyl ethers of aliphatic polyols, polyglycidyl ethers of polyphenols, epoxidised unsaturated cycloaliphatic compounds, and heterocyclic compounds containing epoxy groups. This broad definition contrasts with the specific type of compounds envisaged in the patent in suit (page 3 lines 17 to 21) and used in all its examples, viz., polyglycidyl ethers of aliphatic polyols.

3.5 It is therefore reasonable to assume that the wide range of concentration of 1 to 10% at page 15 takes into account the many embodiments encompassed by the disclosure of document (1a), and it is therefore not legitimate to interpret the specific figures given in

Example 2 as being subject to modification in accordance with the full breadth of the general teaching at page 15.

3.6 For these reasons the Board concludes that the figure of 0.6 in Claim 1 in the patent in suit is a distinguishing feature over the disclosure of document (1a). There is therefore no overlap between the claimed subject-matter and the disclosure of document (1a), and consequently the present case is not comparable with the situation dealt with in the decision T 12/90 (23.8.1990) referred to by the Appellant's representative at the oral proceedings, where such overlap was found to exist (Reasons point 2.12).

4. *The Closest Prior Art*

Like the Opposition Division and the parties, the Board takes the view that document (1a) represents the closest state of the art. As mentioned above when dealing with the issue of novelty, the amount of cured epoxy compounds on the yarns described in Examples 1 and 2 of document (1a) is 1.5 and 1% by weight. Although these multi-filament yarns are said to have good bundling properties which make them suitable for reinforcing applications (page 4, paragraph 3 and page 20, paragraph 2), their mechanical properties are not optimal; in particular the tenacity, elongation at rupture, and initial modulus cannot be regarded as satisfactory.

5. *The Problem*

In view of this shortcoming, the technical problem underlying the patent in suit can be regarded as the provision of a multifilament yarn of aromatic polyamide

showing an improvement of the above-identified mechanical properties.

6. *Its Solution*

6.1 According to the patent in suit, this is achieved by reducing the amount of cured epoxy compound on the yarn to a range between 0.1 and 0.6% by weight. Both in its written and oral arguments, the Appellant has contended that this problem cannot effectively be solved by the claimed subject-matter.

6.2 Together with the statement of grounds of appeal, the Appellant filed a separate experimental report in which yarns obtained from an aromatic copolyamide prepared from terephthalic acid, p-phenylenediamine, bis(aminophenoxy)benzene and dimethylbenzidine were treated respectively with epoxy compositions containing the following ingredients:

A: 50% by wt. of a mixture of di- and triglycidylether of glycerine,
44.4% by wt. Leomin OR (Trade mark),
5.6% by wt. piperazin as hardener.

B: 50% by wt. of tetraglycidyl ether of tetrapropylene glycol,
44.4% by wt. Leomin OR (Trade mark),
5.6% by wt. piperazin as hardener.

6.3 These two compositions were each applied to 6 test yarns at such rates that the amounts of cured resin on the test yarns were 0.85%, 0.70%, 0.55%, and 0.40%, there being comparative runs with uncoated yarns, one subject to, and the other not subject to, the same heat treatment as the coated yarns.

to be expected, that a positive effect on the mechanical properties of the yarn could be obtained by using a smaller proportion of epoxy compound than had previously been suggested. The Board has not lost sight of the fact that document (1a) was published some six years before the priority date of the application in suit, and that throughout that period, the incentive to minimise the use of epoxy compound on the ground of their potential toxicity must have existed. If the step proposed in the patent in suit had been obvious, the Board would have expected the beneficial effect on the meachanical properties of the yarn to have come to light sooner.

7.3 By finding that reducing the amount of epoxy compound on the fibres is capable of producing an unexpected positive effect, and by finding a solution to the problem identified above, the Respondent made a worthwhile contribution to knowledge in this art, which merits recognition as an inventive step. The Board is therefore satisfied that Claim 1 of the patent in suit involves an inventive step.

7.4 Claim 1 being inventive, the same applies to dependent Claims 2 to 12, which are directed to preferred multi-filament yarns according to Claim 1, further to Claims 13 to 22, which concern various objects obtained from the yarn as defined in Claim 1, as well as to Claims 23 to 32, which deal with a process for the manufacture of a multi-filament yarn according to Claims 1, and whose patentability is supported by that of the main claim.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin