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

Case Number: T 0763/91 - 3.2.5

Application Number: 84104203.9

Publication Number: 0122623

IPC: D01F 1/10

Language of the proceedings: EN

Title of invention:
Antistatic fiber and its production

Patentee:
Toyo Boseki Kabushiki Kaisha

Opponent:
Hoechst Aktiengesellschaft

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step (yes)"

Decisions cited:
-

Catchword:
-

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the interlocutory decision of the Opposition Division concerning the European patent No. 0 122 623.

The Opposition Division had found that the patent in the amended form according to the request of the Proprietor of the patent met the requirements of the Convention, having regard to the following documents:

- D1: "Handbuch der Textilhilfsmittel", by A. Chwala and V. Anger, Verlag Chemie (1977), pages 218 and 219;
- D2: DE-B-1 228 025;
- D3: Katalog VEB Spinnmaschinenfabrik Gröbzig (1976), pages 40 and 41;
- D4: "Polyesterfasern" by H. Ludewig, Akademie-Verlag Berlin, 1965, pages 142 and 143;
- D5: EP-A-0 038 429.

II. During the appeal proceedings the Appellant referred to the following further prior art documents:

- D4a: "Polyesterfasern" by H. Ludewig, Akademie-Verlag Berlin, 1965, pages 156 and 157;
- D6: "Polyesterfasern" by H. Ludewig, Akademie-Verlag Berlin, 1975, pages 244 to 246.

III. Oral proceedings were held on 15 December 1993.

- (i) The Appellant requested that the decision under appeal be set aside and the European patent No. 0 122 623 be revoked.
- (ii) The Respondent (Proprietor of the patent) requested that the appeal be dismissed and the

patent be maintained in amended form on the basis of the following documents:

Claims: 1 to 14, filed during the oral proceedings;

Description: page 2, filed during the oral proceedings;
pages 6 and 12, filed 25 May 1991;
pages 3 to 5, 7 to 11 and 13 to 16 of the patent as granted;

Drawings: Figures 1 to 3 of the patent as granted.

(iii) Claim 1 reads as follows:

"A process for preparing an antistatic non-hollow fibre having a half life time of electric charge leakage of not more than 150 seconds before and after weight decreasing treatment with a weight decreasing agent by melt spinning a fibre-forming thermoplastic polymer containing at least one of polyoxyalkylene glycol and its derivatives in an amount of 0.5 to 7% by weight through a spinneret having one or more orifices, wherein each of the orifices has an opening area of 0.2 to 1.5 mm², and satisfies the relationship:

$$S \geq 0.02 Q^2 + 0.2$$

wherein S is the opening area (mm²) and Q, the throughput (g/min) per orifice, is from 0.1 to 5 g/min."

The independent Claim 8 reads as follows:

"An antistatic fibre prepared by the process according to Claim 1."

(iv) The Appellant essentially argued as follows:

The process according to Claim 1 differs from the process according to document D2, which has to be considered as representing the closest prior art, substantially in that a certain range of values of the opening area S of the spinning orifice, a certain range of values of the throughput per orifice Q and a relationship between the values of S and Q is claimed.

These differentiating features do not involve an inventive step, since the claimed range of throughput values was normally used in melt spinning, as was admitted by the Patentee himself in the granted patent, since the claimed range of opening area values covered the major part of opening areas which were normally used in melt spinning of fibre forming thermoplastic polymers, as could be learnt from documents D3, D4 and D4a, and since the relationship between S and Q as claimed did not constitute a real further restriction of the claimed ranges of the opening area values S and the throughput values Q .

The person skilled in the art, who carried out the process according to document D2 by using normal spinning opening sizes and throughputs, inevitably worked within the scope of the process claimed in Claim 1 of the contested patent.

Also document D5, although concerning hollow fibres, showed that throughputs and opening areas as claimed in Claim 1 of the contested patent were, in fact, already used in a process for producing antistatic fibres.

(v) The Respondent essentially argued as follows:

The teaching according to Claim 1 of the contested patent did not result in the use of commonly known spinning orifices and throughputs in the process known from document D2. On the contrary, all ranges of values claimed in Claim 1 constituted a selection from known ranges and the application of these selected ranges in combination with each other resulted in the production of non-hollow fibres having excellent antistatic properties, as was demonstrated by the examples and comparative examples of the granted patent.

There was no suggestion in the prior art documents which would incite the person skilled in the art to the teaching according to Claim 1 of the contested patent.

Reasons for the Decision

1. Amendments

The subject-matter of the amended new Claim 1 is disclosed in the originally filed Claims 1 and 13, and the originally filed description, page 14, last two lines, page 16, lines 14 to 19 and page 17, lines 8 to 11.

With respect to Claim 1 of the granted patent the new amended Claim 1 has been restricted by the indication that the fibre should have a half life time of electric charge leakage of not more than 150 seconds. Moreover, the one-part form has been chosen for the amended Claim 1, in order to avoid an incorrect delimitation against the closest prior art.

The description of the granted patent has been adapted to the new Claim 1.

No objection under Article 123(2) and (3) EPC arises with respect to the amendments.

2. *Novelty*

Documents D1 and D2, which refer to a process for preparing an antistatic non-hollow fibre by melt spinning a fibre-forming thermoplastic polymer containing at least one of polyoxyalkylene glycol and its derivatives, are silent about the spinning conditions, like size of the spinning orifices, throughput or flow state within the spinning orifices.

Documents D3, D4 and D4a give some general information about spinnerets and/or spinning conditions used in the production of thermoplastic fibres, and recommend diameters of spinning orifices in the range of 0.1 to 1.2 mm. However, these documents do not refer to the production of antistatic fibres.

Document D5 refers to **hollow** antistatic polyester fibres containing a polyoxyalkylene glycol and discloses in Example 1 a process for producing the same. However, document D5 does not disclose a process for preparing a **non-hollow** fibre comprising the features of Claim 1 of the contested patent.

Document D6, which was only cited by the Appellant in order to demonstrate that in the production of hollow fibres the sum of the areas of the individual ring segments constituting a ring opening has to be considered as the "orifice of the opening area", does not disclose any of the features of Claim 1.

Therefore, the subject-matter according to Claim 1 is new.

3. *Inventive step*

3.1 The parties agree that document D2 discloses the closest prior art.

This document describes a process for preparing an antistatic non-hollow fibre by melt spinning a fibre-forming thermoplastic polymer containing polyoxyalkylene glycol in an amount of 3 to 15% by weight through a spinneret (see Claim 1, column 1, lines 29 to 32, and examples of document D2). However, document D2 is silent about the spinning parameters, like size of the spinning orifices and throughput.

3.2 The problem underlying the contested patent consists in the improvement of the antistatic properties of thermoplastic non-hollow fibres containing polyoxyalkylene glycol, e.g. fibres known from document D2, without impairing other fibre properties, like the light resistance of dyed fibres (see page 2, lines 38 to 41 and examples of the granted patent).

3.3 According to Claim 1, this problem is solved by a process for preparing an antistatic non-hollow fibre having a half lifetime of electric charge leakage of not more than 150 seconds before and after weight decreasing treatment with a weight decreasing agent, which process

is characterised by the combination of the following features:

- (a) the polyoxyalkylene glycol content lies within the range of 0.5 to 7% by weight of the fibre-forming thermoplastic polymer;
- (b) the opening area S of each spinning orifice lies within the range of 0.2 to 1.5 mm²;
- (c) the throughput Q per spinning orifice lies within the range of 0.1 to 5 g/min; and
- (d) the opening area S and the throughput Q satisfy the relationship

$$S \geq 0.02 Q^2 + 0.2.$$

3.4 The Appellant argues that the use of the features (a) to (d) in a spinning process according to document D2 does not involve an inventive step, since the person skilled in the art inevitably would work within the claimed ranges for polyoxyalkylene glycol content, opening area and throughput, if he carried out the process according to document D2 using spinnerets and throughputs which are normally used in spinning of thermoplastic fibres, as described in documents D3, D4, D4a.

3.5 The Board does not agree with this view, for the following reasons.

Although the claimed range for the spinning orifice opening area of from 0.2 to 1.5 mm² partially overlaps the normally used range disclosed in documents D3, D4 and D4a, Claim 1 contains a further restriction with respect to the opening area, namely the relationship

$$S \geq 0.02 Q^2 + 0.2$$

This relationship defines the flow state of the spinning dope within each spinning orifice in the sense that a relatively low flow velocity of the spinning dope should be obeyed in order to produce fibres with the required antistatic properties, as is explained on page 3, lines 6 to 60 in connection with the Figures 1 and 2 of the contested patent.

None of the documents D3, D4 and D4a nor any of the other documents cited by the Appellant gives any hint to the person skilled in the art that the flow state of the melt spinning dope within the spinning orifice has any significance for the antistatic properties of polyoxyalkylene glycol containing thermoplastic fibres.

Furthermore, with respect to the content of polyoxyalkylene glycol, the teaching of Claim 1 points to lower contents of polyoxyalkylene glycol than the process according to document D2. Whereas document D2 recommends a content in the range of 3 to 15%, Claim 1 excludes contents of higher than 7% and includes contents of lower than 3% down to 0.5%. Lower contents of polyoxyalkylene glycol are desirable in order to avoid impairing of fibre properties, like light resistance, as is demonstrated by the examples of the patent specification.

Although in Example 1 of document D5 the content of polyoxyalkylene glycol, the spinning orifice opening area and the throughput happen to fall within the scope of the conditions set out in Claim 1 of the contested patent, there is no hint in document D5 that in the production of **non-hollow** antistatic fibres the selected ranges of polyoxyalkylene glycol content, spinning

orifice area and throughput according to Claim 1 of the contested patent must be observed.

The specification of the granted patent demonstrates by means of numerous examples that all the above-mentioned conditions (a) to (d) must be observed simultaneously in order to solve the problem underlying the contested patent and to produce fibres having excellent antistatic properties, which properties are defined by a half lifetime of electric charge leakage of not more than 150 seconds before and after weight decreasing treatment with a weight decreasing agent.

In conclusion, although in the process according to the invention amounts of content of polyoxyalkylene glycol and values for the spinning opening area and for the throughput are used which may be *per se* commonly used in the melt spinning of fibres, nothing can be found in the documents cited by the Appellant which would incite the person skilled in the art to select the claimed specific ranges from these *per se* known amounts or values and to correlate the same in the manner as is claimed in Claim 1, in order to obtain the desired antistatic fibre.

Therefore, the process as defined in Claim 1 is a specific non-obvious selection from the process according to document D2, relating both to the process parameters and to the product obtained thereby.

3.6 Therefore, the process according to Claim 1 has to be considered as involving an inventive step in the meaning of Article 56 EPC.

4. Consequently, Claim 1 is allowable under Article 52(1) EPC.

5. Claim 1 being allowable, the same applies to the dependent Claims 2 to 7 which concern preferred embodiments of the process according to Claim 1, as well as to Claims 8 to 14, which are drafted as product-by-process claims and relate to the fibre directly obtained by the process according to Claim 1.

Order

For these reasons, it is decided that:

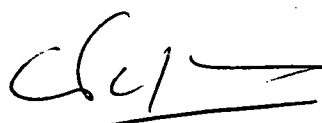
1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent in amended form on the basis of the documents mentioned under point III(ii) of this decision.

The Registrar:



A. Townend

The Chairman:



C. Payraudeau