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D E C I S I O N
of 18 December 2001

Case Number: T 0746/96 - 3.3.6

Application Number: 88304257.4

Publication Number: 0292186

IPC: D01F 6/94

Language of the proceedings: EN

Title of invention:

Novel monofilaments, process for the preparation thereof and fabrics thereof

Patentee:

SHAKESPEARE COMPANY

Opponent:

Hoechst Trevira GmbH & Co KG

Headword:

Non-halogenated olefin polymers/HOECHST

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step: yes - incorporation of non-halogenated olefin polymers not suggested in the prior art"

Decisions cited:

-

Catchword:

-



Case Number: T 0746/96 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 18 December 2001

Appellant: Hoechst Trevira GmbH & Co KG
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 5 July 1996
concerning maintenance of European patent
No. 0 292 186 in amended form.

Composition of the Board:

Chairman: P. Krasa
Members: G. N. C. Raths
C. Rennie-Smith

Summary of Facts and Submissions

I. This appeal is from an interlocutory decision of the Opposition Division to maintain in amended form European patent No. 0 292 186 relating to novel filaments, a process for the preparation thereof and fabrics made therefrom.

The independent Claims 1, 9 and 13 as maintained read:

"1. A monofilament formed from a homogeneous blend of two resins and comprising from 50 to 99 parts by weight of a linear polyphenylene sulphide, and from 50 to 1 parts by weight of a melt extrudable polymer selected from non-halogenated olefin polymers, ionomer resins, and poly-m-xylylene adipamide.

9. A process for making monofilaments, which comprises extruding a polymer blend as set forth in any of claims 1 to 8 to form a monofilament and then drawing the monofilament to a ratio of from 3:1 to 6:1.

13. A fabric containing or consisting of monofilaments according to any of claims 1 to 8."

II. The notice of opposition, based on insufficiency of disclosure and lack of inventive step of the subject-matter then claimed (Articles 100(a), 56, 100(b) EPC) cited, inter alia, the following documents:

(1) US-A-4 610 916

(2) EP-A-0 166 368

(3) EP-A-0 189 895

(4) EP-A-0 158 989

(5) US-A-4 528 335

III. In its decision the Opposition Division held that the patent in suit complied with the requirements of Article 83 EPC.

Further, the Opposition Division held that the subject-matter as defined in the set of 13 Claims filed by the Respondent (Proprietor) with its letter of 28 May 1996 as main request complied with the requirements of the EPC and especially that it involved an inventive step over the cited prior art, in particular over document (1).

IV. The Appellant (Opponent) lodged an appeal against the decision; it argued in essence

- that when evaluating inventive step the redefinition of the problem with respect to document (1) should have included documents (2) to (5);
- that the broad range of 1 to 50 parts by weight of the melt extrudable polymer as component (2) of the patent in suit could not serve as a basis for recognising inventive step with respect to the compositions disclosed in document (3)(page 10, lines 17 to 21, and page 10, line 33 to page 11, line 6);

- that document (2) disclosed polyarylene sulphides (PAS) which may, for instance, be mixed with polyolefins so that fibres having great strength and stretchability can be produced (page 1, lines 15 to 21, page 5, line 32 to page 6, line 2; page 19, lines 6 to 11 in combination with page 19, lines 12 to 15 and line 21);
- that the Opposition Division erred when concluding from the results of the examples of the patent in suit that an improvement of the knot strength had been obtained as compared to the results of document (1);
- that the examples of the patent in suit tended to suggest an obvious optimisation of the process conditions;
- that the results of the patent in suit were not comparable with the results of document (1) since the non-mixed Ryton® monofilaments (made of polyphenylene sulphide (PPS)) of document (1) having a tensile strength of 4.13 kg (see Table I, Example 2) would differ from the non-mixed Ryton® monofilament of the patent in suit having a tensile strength of 3.44 kg (patent in suit, Table II, control);
- that document (4) should have been taken into consideration because the skilled person would have considered both cracking resistance and knot strength when trying to improve the physical properties of PPS compositions;
- that the poly-m-xylylene adipamide of Claim 1 of

the main request was a compound similar to those disclosed by document (5);

- that it was not clear which measures had to be taken in order to obtain the effects advanced by the Respondent in support of inventive step;
- that in the case of both Examples 4 and 5 and Examples 6 and 7 of the patent in suit different mechanical properties were achieved although in each pair of examples the compositions of the monofilaments were the same;
- that the embodiments according to Claims 2 to 13 also lacked an inventive step.

V. The Respondent disputed the Appellant's arguments.

VI. The Respondent, in reply to an inquiry from the Board, stated that it was not prepared to discuss novelty.

Oral proceedings took place on 18 December 2001.

VII. The Appellant requested that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the appeal be dismissed or, alternatively, that the patent be maintained in amended form according to the auxiliary request filed with its letter dated 24 October 2000.

VIII. At the end of the oral proceedings the Chairman announced the Board's decision.

Reasons for the Decision

1. *Main request*

1.1 Articles 84 and 123 EPC

The Board is satisfied that Claims 1 to 13 meet the requirements of the above mentioned Articles; as no objections had been raised in this respect, a detailed reasoning is not necessary.

1.2 Article 54 EPC

The patent had been opposed under Article 100(a) EPC on the ground that the claims lack an inventive step. The Opposition Division had made a passing remark that the claimed subject-matter was novel. Without commenting on the question whether the Opposition Division was entitled to deal with this issue at all under Article 114(1) EPC, the Board had no power to deal with novelty, which would be a fresh ground of opposition, in the absence of the Respondent's agreement (G 7/95, order; G 1/95, reason 5, order).

1.3 Article 56 EPC

1.3.1 Claim 1

1.3.1.1 According to the patent in suit, the technical problem to be solved was to develop a range of PPS blends which are suitable for melt extrusion and which give monofilaments with improved fatigue resistance and increased tenacity without sacrificing chemical resistance or significantly reducing the use temperature (patent in suit, page 3, lines 6 to 8).

Also, due to the high level of crystallinity of PPS, monofilaments thereof tend to be brittle and are difficult to work with. In particular, knot strength, loop strength and fatigue resistance of PPS monofilaments are all low and result in problems during their processing, especially when the monofilament is woven into fabrics (patent in suit, page 2, lines 18 to 21).

- 1.3.1.2 The problem of brittleness of monofilaments and the aim of improving their extrudability are also addressed in document (1) (column 1, lines 24 to 32 and column 1, line 65 to column 2, line 4). Both parties took document (1) as the starting point for evaluating inventive step. The Board can agree.

The question is whether the problem to be solved has to be reformulated and if so, how it will be reformulated.

- 1.3.1.3 The Appellant objected that there was no improvement with respect to document (1), that at most the improvements achieved in the patent in suit were as good as in document (1), and that the Opposition Division was wrong to state that the examples of the patent in suit showed an improvement in knot strength. This statement was in contradiction to the definition of the problem which the Opposition Division said was to provide alternative polymers to those of document (1).

The Board cannot agree.

- 1.3.1.4 The results submitted by the Respondent in Tables 1 and 2 of its letter of 2 June 1997 show that many

examples of the patent in suit exhibit higher increases in loop strength than in the examples of document (1). Further, many examples in the patent in suit exhibit increases in loop strength and knot strength without any decrease in tensile strength.

As both the patent in suit and document (1) each have a control example it is possible, even if not on exactly the same basis, to evaluate quantitatively the improvements with respect to the control examples and thus to compare the respective improvements obtained. It was shown that actually the results in knot strength achieved with the compositions according to the patent in suit were higher than with those according to document (1) (see letter of 2 June 1997, Table 2). It is true that when compared to the results according to document (1), not all the invention's examples show higher increases in loop strength.

Therefore, for evaluating inventive step, the problem to be solved in respect to document (1) can be defined as the provision of an alternative monofilament comprising polyphenylene sulphide.

1.3.1.5 The results of the physical properties displayed in Table II of the patent in suit (pages 9 and 10) prove that the monofilaments formed from a homogeneous blend of two resins comprising PPS and one of the melt extrudable polymers according to Claim 1 credibly solve the problem as mentioned at point 1.3.1.4.

1.3.1.6 The question is whether the addition of a polymer selected from non-halogenated olefin polymers,

ionomer resins or poly-m-xylylene adipamide to PPS involves an inventive step.

- 1.3.1.7 The difference between the patent in suit and document (1) lies in the type of the component to be added to PPS; according to document (1) it is a copolymer consisting of an olefin and a halogenated monomer whereas in the patent in suit it is a non-halogenated olefin polymer, a ionomer resin or a poly-m-xylylene adipamide.

It has to be examined whether a skilled person having regard to the state of the art represented by the other documents cited above would have suggested one or all of these melt extrudable polymers.

- 1.3.1.8 The Appellant submitted that document (3) would teach adding polyamide (page 10, line 35) and polypropylene or polyethylene (page 11, lines 2 and 3) as a second component to phenylene sulphide resin compositions comprising the poly-p-phenylene sulphide (I), poly-m-phenylene sulphide (II) and a phenylene sulphide block copolymer (III). Polyamide and polypropylene or polyethylene were listed together with tetrafluoroethylene copolymers, ie halogen containing copolymers. As document (1) disclosed that monofilaments are made of linear PPS and copolymers consisting of an olefin and a halogenated monomer, the skilled person would have considered polyamide and polypropylene or polyethylene as possible candidates for replacing the halogen containing copolymers. Consequently, such replacement of a halogen containing copolymer as achieved in the claimed monofilaments was obvious to a person skilled in the art.

The Board does not agree for the following reasons:

The description of document (3) contains separate sections with the following headings:

Compositions

Films, Yarns

Extrusion or Injection Molded Products

Composition; and

Fabricated articles (pages 8 to 11).

The relevant passage to which the Appellant referred is under the heading "Composition":

"The composition of the invention can be melt mixed with powdery inorganic fillers...or fibrous fillers.... Furthermore, the composition of the invention can be blended with compatible resin materials such as..., polyamides, polypropylenes, polyethylenes..., and tetrafluoroethylene copolymers to obtain diverse compositions. In addition to these fillers,..."(page 10, line 28 to page 11, line 8).

The words "In addition to these fillers...." imply that polyamides, polypropylenes and polyethylenes are to be considered as fillers, and not as a second component, in this context. The interpretation has to take into consideration the remaining passages of the previous paragraphs under the headings "Compositions" and "Films, Yarns":

Compositions

"The phenylene sulfide resin composition of the invention comprises a mixture of components (I) through (III). The term "comprises a mixture" herein means that various auxiliary materials (including

resins, the details of which are described hereinafter) other than the three essential components can be contained, unless they unduly have adverse effects on the characteristics due to the three essential components. When the "auxiliary materials" are resins, the three essential components, viz. p-, m- and p/m-polyphenylene sulfides, should preferably comprise the majority of the resinous component." (page 9, lines 19 to 30).

Films, Yarns

"...Also, the composition can be processed into stretched filaments by extruding the composition through nozzles for spinning and then stretching the resulting filaments 2 to 20 times the original length ..."(page 10, lines 2 to 6).

Fillers are mentioned together with extrusion or injection moulded products (page 10, lines 16 to 26). The paragraph relating to yarns and filaments (page 9, line 34 to page 10, line 15) does not mention the use of fillers; so polyamide, polyethylenes and polypropylenes, mentioned in the context of fillers, are not to be considered as additives for yarns and filaments.

Whereas "the composition of the invention" of document (3) can be blended with fillers such as polyamide, polypropylene, and/or polyethylene when "extrusion or injection molded products" are prepared, "Films, yarns" are prepared from these "compositions of the invention" as such, without the incorporation of a filler.

The monofilaments made of compositions of Examples 1,

2 and 3 displayed in Table 1 contain a mixture of components I (poly-paraphenylene sulphide), II (poly-metaphenylene sulphide), and III (phenylene sulphide block copolymer) (page 16). There is no disclosure of a filler.

The Board concludes that monofilaments according to document (3) do not contain non-halogenated polyolefins. There was also no suggestion in document (3) of including non-halogenated polyolefins in the monofilaments. In the Board's view, there was no incentive for a skilled person to turn to document (3).

- 1.3.1.9 The Appellant also argued that documents (2), (4) and (5) should have been taken into consideration by the Opposition Division in evaluating inventive step.

However document (2) does not disclose monofilaments, let alone their loop and knot strength.

Document (4) is concerned with reinforced poly(arylene sulphide) compositions suitable for mouldings; it is not concerned with monofilaments. Loop and knot strength are not mentioned in document (4) which, therefore, has no bearing on the question of inventive step of the subject-matter claimed in the patent in suit.

Document (5) did not disclose poly-m-xylylidene; the Appellant's argument that poly-m-xylylidene is a structurally similar component to the polyamides used in document (5) cannot succeed since the exemplified amorphous polyamides indicated by reference to their starting monomers would not encourage the skilled

person to fall back on this specific component (document (5), column 3, lines 28 to 47). Therefore there was no incentive for the skilled person to turn to document (5).

1.4 The Board concludes that none of the cited documents (2) to (5) would have suggested the addition of a non-halogenated olefin, an ionomer resin or poly-m-xylylene adipamide to a linear polyphenylene sulphide to form a monofilament.

1.5 As the conditions such as pressure and/or the draw ratio are not always the same in the examples, the Appellant objected that it was not clear which measures have to be taken to achieve the obtained results; the measures to be taken would at the most be optimisation measures.

In the Board's opinion, the process variations would be routine to the skilled person who would need no ingenuity to execute the invention.

1.6 For all these reasons, the Board holds that the cited prior art documents either alone or in combination do not render obvious the claimed solution of the present technical problem, and concludes that the monofilament according to Claim 1 of the patent in suit is based on an inventive step as required by Article 56 EPC.

Claims 9 and 13, directed to a process and a fabric, respectively, refer back to Claim 1. Therefore, these claims also satisfy the requirements of Article 56 EPC. Dependent claims 2 to 8 and 10 to 12 are based on the same inventive concept and derive their

patentability from the independent claims 1 and 9.

2. *Auxiliary requests*

In the light of the above findings there is no need to consider the auxiliary requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

P. Krasa