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Bezeichnung der Erfindung:
Title of invention:
Titre de l'invention : Process for melt spinning acrylonitrile polymer fibres

Klassifikation / Classification / Classement : D 01 F 6/38

ENTSCHEIDUNG / DECISION

vom / of / du 13 November 1986

Anmelder / Applicant / Demandeur :

Patentinhaber / Proprietor of the patent / Titulaire du brevet : American Cyanamid Co. (respondent)

Einsprechender / Opponent / Opposant : Hoechst A.G. (appellant)

Stichwort / Headword / Référence : Melt-spinning/CYANAMID

EPÜ / EPC / CBE Articles 52(1), 56, 114(1) and 114(2) EPC

Kennwort / Keyword / Mot clé :

"Inventive step - Obvious to try" -
"New documents introduced by opponent in appeal proceedings"

Leitsatz / Headnote / Sommaire

A reference filed in the appeal proceedings for the first time by an Opponent with his Statement of Grounds, is not submitted in due time under Art. 114(2) EPC unless representing the effective counterevidence to a newly emphasized reason given in the decision of the Opposition Division. However, it is within the discretion of the Board under Art. 114(1) EPC to admit such a document into the proceedings in view of its relevance and to consider the document or to remit the matter to the previous instance for further consideration under Art. 111(1) EPC (following "Silico-aluminate/RHONE-POULENC, T 273/84, OJ 10/1986, 346).

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Case Number : T 49 /85

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 13 November 1986

Appellant : (Opponent)
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Representative :

Respondent : (Proprietor of the patent)
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Representative :
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Decision under appeal : Decision of Opposition Division of the European Patent Office dated 3 December 1984 rejecting the opposition filed against European patent No. 8853 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : P. Lançon

Member : G. Szabo

Member : F. Benussi

Summary of Facts and Submissions

I. European patent No. 8853 was granted on 4 August 1982 with 6 claims in response to the European patent application No. 79 301 311.1 filed on 6 July 1979 claiming the priority of the earlier applications (US-938 196, 938 197 and 938 202) of 30 August 1978. Claim 1 was worded as follows:

"A process for melt-spinning an acrylonitrile polymer fiber by providing a homogeneous fusion melt of a fiber-forming acrylonitrile polymer and water at a temperature above the boiling point of water at atmospheric pressure and at a temperature and pressure which maintains water in single phase with said polymer, and extruding said fusion melt through a spinnerette assembly containing a spinnerette plate directly into a stream-pressurized solidification zone maintained under conditions such that the rate of release of water from the nascent extrudate avoids deformation thereof, characterized in that said spinnerette plate has an orifice density of at least 18 per square centimeter of spinnerette plate extrusion surface".

II. The opponent filed notice of opposition against the European patent on 3 May 1983 requesting that it be revoked on the ground of non-patentability because lack of inventive step. This ground was supported by:

(1) DE-B-1 303 038
(2) DE-A-2 403 947, and
(3) JA-A-53-52731 (1978).

Later in the procedure the following documents were also cited by the opponent:

(4) DE-A-1 905 509
(5) DE-A-1 905 501

(6) DE-A-1 940 621
(7) DE-A-2 632 429
(8) DE-A-2 416 847
(9) DE-B-2 607 665

III. The opposition was rejected by the Opposition Division in a decision on 3 December 1984. The reason for the rejection was that any improvement of productivity by the increase of orifice density was associated with the problem of preventing the premature contact of filaments with each other in order to avoid their sticking together. The relevant citations from the state of the art suggested that the orifice density could only be increased if a quenching fluid was applied.

The patented process, however, related to the melt-spinning of a homogeneous fusion melt of an acrylonitrile polymer (PAN), in which different conditions prevailed (2). The disclosure about the original fusion melt process for such filaments mentioned that drying or cooling to room temperatures had led to microvoids and the deformation of the PAN fibres. The contradiction between such conditions and those which otherwise existed in association with increased orifice density rendered the latter inapplicable for the process according to the patent-in-suit. For these reasons a prejudice existed against the case of high density orifices in such circumstances. In any case the skilled person would have expected no higher than 16 orifices/cm^2 from the specific disclosures on melt-spinning.

IV. The opponent filed an appeal against this decision on 4 February 1985 with the payment of the fee and submitted a Statement of Grounds on 22 May 1985. This referred to further documents in support of the appeal, namely

(10) US-A-3 984 601
(11) US-A-3 873 508
(12) US-A-4 049 605 and
(13) DD-A-13500.

V. An oral hearing was appointed for the 13 November 1986. Although invited in accordance with the regulations, the respondent elected not to be represented and informed the Board accordingly in a letter dated 13 October 1986.

VI. The appellant submitted in the proceedings and at the oral hearing substantially the following arguments:

(a) Whilst it was true that polyamide and polypropylene fibres require quenching in the melt-spinning process, this was not a necessity only because of the risk of fibres sticking together. Documents (4) and (5) showed the heating of the orifice area was also recommended to prevent overcooling. Whilst indeed too much drying and overcooling to room temperature had to be avoided according to the disclosure in (2), the slow temperature drop in the pressure chamber provided conditions, which were in effect, similar to those of ordinary melt-spinning and represented no increased risk for the fibres to stick together.

(b) It was very significant that the patentee admitted (cf. specification, page 2, lines 24-26) that the basic homogeneous fusion melts, i.e. the closest prior art according to (2), can be "effectively spun into fibre using spinnerette plates similar to those employed in **conventional melt-spinning**" (emphasis added). The fact that the closest art establishing the homogeneous fusion melt process in the presence of a melt assistant was silent about the orifice density confirmed the

impression that there was no problem for the skilled person in applying the usual orifices. He had no choice but to try this and optimise the density by routine adjustments according to the actual conditions.

(c) There was no prejudice against the use of high density orifices. The Opposition Division erred when stating that the skilled man had only been encouraged to use very low densities in view of the specific disclosures in the relevant citations. Both documents (6) and (7) referred to densities substantially higher than $16/cm^2$.

VII. The respondent argued in the proceedings substantially as follows:

(a) The late filing of references (10) to (13) was unacceptable. It would be detrimental to opposition proceedings if such documents could be introduced as late as the appeal stage. The balance between Article 114(1) and Article 114(2) EPC should be exercised against the appellants. There was no new ground involved and the question of obviousness could be adequately dealt with on the basis of other cited references.

(b) As to the issue of the appeal, the advantages of using spinnerettes with a high density of orifices were considerable. It was highly surprising that this was possible with PAN fibres. It was well known that crowded orifices could only be used with processes providing the most rapid solidification.

(c) The difficulties arising in consequence of melt-spinning was explained in (1) and the only solution was quenching to avoid adhesion. The patented process was discovered in spite of the established prejudice to use orifices with high density without rapid cooling. None of the examples of citation (6), which was also concerned with the problem of fibres sticking together, had densities exceeding 16 which confirmed that the prejudice still prevailed after 20 years.

VIII. The appellant explained that he was aware of the relevance of document (10) before the opposition was lodged but had been under the impression that the other citations were adequate to demonstrate lack of inventive step. Only after the theory about prejudice emerged in the decision of the Opposition Division, it appeared that this document was better than (2) in showing an equally close art and also the absence of prejudice. The other documents (11) to (13) either showed that PAN was known to be processed under conditions similar to the patent-in-suit with similar results or that the features of subsidiary claims were not novel either. The appellant should be allowed to further develop his submissions in the light of the actual and possible reactions from the respondent.

IX. The appellant requests that the impugned decision be set aside and that the patent be revoked. The respondent requests that the appeal be rejected. Alternatively, the patent should be upheld with a main claim limited to the version where no special precautions are taken to prevent adhesion.

Reasons for the Decision

1. The appeal complies with Article 106 to 108 and Rule 64 and is, therefore, admissible.

2. As regards a reference filed for the first time by an opponent with his Statement of Grounds for the appeal, it is the view of the Board that such document is not submitted in due time under Article 114(2) EPC unless representing the effective counter evidence to a newly emphasized reason given in the decision. However, it is within the discretion of the Board under Art. 114(1) EPC to admit such document into the proceedings in view of its relevance and to consider that document or to remit the matter to the earlier instance for further consideration under Article 111(1) EPC (cf. "Silico-aluminate/RHONE-POULENC, T 273/84, OJ 10/1986, 346 and "Portable box/ETAT FRANCAIS, T 258/84. 18 July, 1986, to be reported). Since none of the newly cited documents (10) to (13) falls within the category where the Board would have felt that its consideration was justified or necessary from any point of view, their contents will hereinafter be disregarded.

3. The patent relates to a process for melt-spinning a PAN fibre from a homogeneous fusion melt of such polymer and water under specified conditions. The closest state of the art is represented by document (2) which describes all features and conditions of such process except the actual density of the orifices in the spinnerette. According to the disclosure in the patent-in-suit the spinnerette plates usual for ordinary melt-spinning were to be used. Whilst it was also recognised that the maximum capacity of such spinnerettes was limited by the filaments sticking together, the only technical problem for the skilled person was to select those densities which achieve an increase of productivity in this respect.

4. The solution of the problem was to apply at least 18 orifices per square centimeter of the spinnerette plate extrusion surface. The examples of the patent show that the extrusions were successful with as much as 337 orifices per cm^2 (Ex. 17), and that no difference in quality could be observed when the density was increased from 5 to 67/cm^2 (Examples A and 1) under otherwise identical conditions. In no case did the PAN fibres stick together when processed according to the patent whilst polypropylene free from melt assistant produced extrudates which adhere under the same conditions (Example B). The aimed increase in productivity was therefore achieved by using the suggested orifice densities. The claimed solution is not specifically described in association with fusion melts in the cited documents and the novelty of the process was consequently not disputed by the appellant.

5. As regards the inventive step, the closest prior art is silent about the only characteristic feature in the main claim of the patent, the specific orifice density. A plurality of orifices is implied by the disclosure (page 22, lines 12-22, and Fig. 1 of the drawings in (2)) but no density is given. The fibres enter a pressure chamber which has a temperature above 90°C they may become spongy (pages 9 and 12). It is clear that such conditions would provide a slower and more gradual evaporation of the water phase and thereby solidification than a sudden drop to atmospheric pressure generating a two-phase system instantaneously. There is no suggestion that the document (2) is not an enabling disclosure in the absence of particular guidance about the orifice density and it is therefore assumed that the skilled person would have had no difficulty in finding appropriate values for practicing the method. After choosing the other conditions for the process he would have adjusted this last parameter appropriately,

unless of course there is some prejudice against higher densities. He would have also had in mind that it was a known desideratum to achieve better productivity by using an increased density.

6. The specification of the patent-in-suit suggests that the skilled person was aware of the possibility of using spinnerettes usual in melt-spinning processes. Contrary to the reasoning of the Opposition Division the documents cited in this respect describe densities substantially above the 18/cm^2 level specified in the claims. For instance (1) suggests medium distance of 1.524 mm between the orifices, implying a density of more than 40/cm^2 (col. 5, line 65). The example in the document implies a density of 62.5/cm^2. Similarly, the general description in citation (6) refers to the possibility of a distance of at least 0.125 mm or preferably 0.25 mm from the periphery of one orifice to another. This means no less than 98 or 128 holes per cm^2 with the maximum orifice size of 0.76 mm, or more with smaller orifices. In any case, the citation shows how close the fibres can run to each other without sticking together. It is wrong to assume that the information content of document (6) is confined to the examples, which only use a density of 8 orifices/cm^2. There was no need to illustrate maximum or optimum orifice densities in this document, since the disclosure was concerned with an invention associated with a different feature. That orifice densities above 18/cm^2 were normal in melt-spinning is also shown in citation (7) which describes 25/cm^2 in Examples 4 and 5 for ordinary melt-spinning.

7. It has been suggested that a kind of prejudice existed in the state of the art against the use of higher orifice densities unless there was quenching involved. It was also explained in the decision of the Opposition Division that according to the same disclosures low densities were

actually preferred in practice. The two suggestions are somewhat contradictory and the latter one is, in any case, not convincingly supported by the citations, as explained above. Furthermore, it may also be observed that even if it were the case that high orifice densities are applicable in consequence of quenching, the inference that the opposite must be valid for methods without quenching is logically not justified, unless the latter condition necessarily involves an increased risk for the fibres to stick together. There was no disclosure in (2) supporting such view, and the conditions of solidifications in the fusion melt-spinning were not so radially different from those of ordinary melt spinning. The latter involves gradual solidification of the one-phase system by cooling but this need not be instantaneous so as to involve overcooling (cf. (4) and (5)). The present case is concerned with a two-phase system where the cooling and the pressure conditions can be and are carefully controlled to achieve a similar solidification in the pressure chamber.

8. A prejudice would mean that within a certain area of conditions something disadvantageous is expected. The overcoming of such prejudice implies that the inventor discloses that he could avoid the disadvantage although operating somewhere within the same area of discouraging circumstances. The more the present process conditions resembled the earlier ordinary melt-spinning the more high-density orifices were the natural choice. The fact that drastic cooling would create microvoids and deformation (cf. (2), page 12) is irrelevant since this is exactly why the new fusion melt technique used 90°C for cooling under pressure. If, on the other hand, new circumstances come into play in comparison with ordinary fusion melts, e.g. changes from polypropylene to PAN or from one-phase melt to a two-component system, there is no reliable rule as to what is possible, and the skilled

person is free and obliged to optimize his missing parameter in the absence of any satisfactory basis for predictions. In neither case was there a prejudice in the real sense since no expected disadvantage was avoided.

9. Since the patentee himself felt that no maximum density need be specified in the claim, the conclusion must be that it is somewhat natural for the skilled person to find out himself with trial and error how far he can go and the same should then also apply to the lower limit. There is nothing special about the lower limit in the sense that above the 18/cm^2 orifice density something unexpectedly different happens which would not be the case below that value, since the discovery was that virtually "anything goes", with the higher ones being of course preferred for reasons of productivity. It was "obvious to try" these. The result was, as already explained above, inevitably available to the skilled person in the absence of good reasons for him not to attempt the 18 orifice/cm^2 density or some of those somewhat above such value. No inventive step can therefore be recognised for the subject-matter of Claim 1.

10. The same applies to the tentatively suggested amendment of the claim which would refer more explicitly to the process as to be "operated without any special precautions being taken to prevent adjacent extruded fibres sticking together". Apart from the possibility of lack of direct support and of clarity for such a statement, since precautions must in any case be taken in order to adjust the orifice density to a value below the maximum and also to select the temperature and pressure to avoid this happening, the skilled person would have found such characteristic of the process in an obvious manner as he

did the 18 orifice/cm^2 "minimum" value itself. None of the dependant claims contains subject-matter which appears to be imparting inventiveness to the claimed subject-matter either.

Order

For these reasons,

it is decided that

The patent is revoked.

The Registrar: Rückerl

The Chairman: Lançon