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D E C I S I O N
of 20 January 2004

Case Number: T 0102/01 - 3.2.6

Application Number: 91303307.2

Publication Number: 0458455

IPC: D01D 5/084

Language of the proceedings: EN

Title of invention:
High speed spinning process

Patentee:
E.I. DU PONT DE NEMOURS & COMPANY INCORPORATED

Opponent:
Honeywell International, Inc.
Trevira GmbH & Co.

Headword:
-

Relevant legal provisions:
EPC Art. 52(1), 54(1), 56, 83, 100(a),(b)

Keyword:
"Sufficiency of disclosure - yes"
"Novelty and inventive step - yes"

Decisions cited:
-

Catchword:
-



Case Number: T 0102/01 - 3.2.6

D E C I S I O N
of the Technical Board of Appeal 3.2.6
of 20 January 2004

Appellant: Honeywell International, Inc.
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Respondent: E.I. DU PONT DE NEMOURS & COMPANY INCORPORATED
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Further party: Trevira GmbH & Co.
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted 5 December 2000
rejecting the opposition filed against European
patent No. 0458455 pursuant to Article 102(2)
EPC.**

Composition of the Board:

Chairman: P. Alting van Geusau
Members: G. C. Kadner
M. J. Vogel

Summary of Facts and Submissions

- I. The mention of grant of European patent No. 0 458 455 in respect of European patent application No. 91 303 307.2 claiming a GB priority from 22 May 1990 and filed on 16 April 1991 was published on 29 October 1997.

The only claim reads as follows:

"A process for the melt spinning of polyethylene terephthalate or polyhexamethylene adipamide into a filamentary yarn in which the spinning threadline is passed through a heated shroud located immediately below the spinneret, the threadline is cooled by an air current and then taken up at a speed of 7 km/min or more, characterised in that the temperature of the environment within the shroud, and in consequence the temperature of the filaments themselves, is progressively reduced, before the filaments in the threadline are cooled by the air current such that the neck draw ratio which occurs in the filaments is 3,0 or less."

- II. Two notices of opposition were filed against this patent with requests for revocation based on the grounds of Article 100(a) and (b) EPC.

By decision announced on 18 October 2000 and posted on 5 December 2000 the Opposition Division rejected the oppositions.

The Opposition Division was of the opinion that the invention was disclosed in a manner sufficiently clear

and complete for it to be carried out by a skilled person. Moreover, the subject matter of the claim was novel and involved an inventive step since the relevant prior art neither disclosed the claimed process nor led to it in an obvious manner.

- III. Notice of appeal was lodged against this decision by the Appellant (Opponent 01) on 23 January 2001 together with payment of the appeal fee.

The statement of grounds of appeal was filed on 6 April 2001.

- IV. In a communication pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal dated 14 October 2003 sent together with the summons to oral proceedings the Board submitted that it did not tend to a different opinion from that of the Opposition Division in respect of sufficiency of disclosure and novelty.

- V. Oral proceedings were held on 20 January 2004. Opponent 02 did not attend, as announced in a letter dated 29 October 2003. Of the documents cited in opposition proceedings, only

D2: US-A-4 491 657

D6: EP-B-0 095 712

D7: W. Dietrich et al.: Untersuchungen zum Schmelzspinnprozeß bei Abzugsgeschwindigkeiten von 5000 - 10000 m/min

D11: A. Ziabicki et al.: High Speed Fiber Spinning, John Wiley and Sons, 1985, pages 383-385 and 393-397

D12: EP-A-0 244 217

D13: F. Durst et al.: Principles and Practice of Laser-Doppler Anemometry, Academic Press, 1976, pages 46-49

were discussed again.

The Respondent additionally cited page 297 of the book mentioned under D11.

During the oral proceedings the Appellant filed a sketch together with a calculation of the neck draw ratio according to Figure 5 of the opposed patent.

The Appellant requested that the decision under appeal be set aside and that the European patent No. 0 458 455 be revoked.

The Respondent (Patentee) requested that the appeal be dismissed and that the patent be maintained as granted.

VI. In support of its requests the Appellant essentially put forward the following submissions:

The invention was not disclosed in a manner sufficiently clear for it to be carried out by a skilled person because the value of the neck draw ratio could not be determined exactly enough so as to arrive at a reproducible result and to give a competitor the opportunity to establish whether what he himself was doing fell within the scope of the claim or not. As could be derived from the sketch filed during the oral proceedings, only the lower point of the "neck" was clearly defined, whereas the upper value was

indifferent owing to the converging extent of the threadline, which did not have a clearly definable maximum point in the gradient of its curvature.

The claimed process lacked novelty when compared with the process known from D6.

If found novel, the claimed process at least did not meet the requirement of inventive step. As a matter of principle, features which did not contribute to the solution of the problem were to be left out of consideration for the purpose of assessing whether a combination of features involved an inventive step. The value of the neck draw ratio was indefinite and therefore this feature should not be taken into consideration. It should also be disregarded because no relation had been established between the neck draw ratio and the problem set out in the patent in suit, which problem consisted in the reduction of the filament break rate.

In any case, when compared with the prior art teachings, in particular in view of D6, D7 or D2, the skilled person having general knowledge in the art was led to the subject-matter of the claim in an obvious manner without the involvement of an inventive step. Although the shroud according to D6 was heated to only one temperature level, the temperature within the shroud, and consequently the filament temperature, was progressively reduced from about 300°C at the spinneret to the set temperature of 250°C when the filament left the shroud (e.g. in example 1). A profiled decreasing temperature level was already known from D2, and D7 taught the skilled person to reduce the winding forces

which caused the filament breaks by delayed cooling or other temperature effects on the threadline which automatically led to a progressively reduced temperature level within the shroud, this being the simplest possibility to achieve the desired effect.

For these reasons the patent should be revoked.

VII. The arguments of the Respondent are summarised as follows:

The disclosure of the patent in suit was complete and clear enough to enable a skilled person having general knowledge in the field of melt spinning to carry out the invention. Measurement of the speed of the threadline could be performed according to the method disclosed in D13. The definition of neck formation was described in D11, which was a basic handbook in this technical field. The sketch presented by the Appellant was inaccurate because the check point at about 2700 m/min according to Figure 5 was left out, and the density of PET varying with the winding speed was disregarded. Moreover Figure 2 in D7 showed clearly that the higher the winding speed, the more distinct the neck formation. Therefore the onset of neck formation and its finish was clearly determinable, and accordingly the neck draw ratio could be calculated unambiguously.

The claimed process was without any doubt novel and also inventive when compared with the prior art. Starting from D6, which dealt with a high speed spinning process at 7000 m/min, the skilled person would not take D2 into consideration because at speeds

of up to 5000 m/min no fully orientated polymer could be obtained. Moreover, the method disclosed in D2 was different from that of the patent in suit since a heating step was included before the temperature of the threadline was progressively reduced.

D7 did not refer to the neck draw ratio, but dealt with draw stress and the gradient of the drawing speed. These parameters could be influenced by applying heat along the threadline, but there was no indication of a decreasing temperature after the exit from the spinneret.

The skilled person considering problems in connection with high speed spinning would not be led to the claimed solution by the cited prior art.

Reasons for the Decision

1. The appeal is admissible.
2. *Sufficiency of disclosure (Article 100(b) EPC)*

The Board considers the reasons given in this respect by the Opposition Division to be correct. According to D11, a technical handbook, a neck draw ratio of about 4 can be determined. D13 discloses a method for measuring of the velocity of the polymer stream of the threadline, which changes in reverse proportion to its cross section. With the help of these teachings the skilled person is able to carry out the invention within the usual range of measurement inaccuracies

common in the art and to determine a defined value for the neck draw ratio as claimed.

For the following reason the sketch and the calculation provided by the Appellant cannot put in doubt the feasibility of the process claimed:

As was convincingly argued by the Respondent the contour shown for the threadline, which reproduces the values in Figure 5 of the patent, is not correct. The calculation is made for the check point of about 2000 m/min (1900 m/min), but the value representing the point at 2700 m/min is missing. If the curve had been drawn so as to include this point, the transition from the small diameter to the increasing diameter would have a stronger curvature, allowing the upper diameter of the "neck" to be determined.

Moreover, according to the general knowledge represented by the handbook D11, a draw ratio across the "sharp neck" of about 4 can be determined. The skilled person is therefore able to reproduce such a measurement when carrying out the teachings of the invention (Articles 83, 100(b) EPC).

3. *Novelty*

Novelty was denied with regard to D6, which discloses a high speed process for spinning polyethylene terephthalate filaments at a speed of 7000 m/min. Since a value for the "neck draw ratio" is not mentioned in D6, the Appellant presented a calculation using values from D6 to show that the process in D6 also involved a neck draw ratio of 3.0 or less. The

calculation is based on runs 14 to 17 according to table 9 of D6, and, with respect to the completion of the fining point when shrouds of different lengths are used, a completion of fining point is assumed without shroud (see grounds of appeal, page 7 to 8). However, there is no indication as to whether the gradient of the curve connecting the points in the diagram is linear or progressive, so the assumption of the value of 300 mm for completion of fining point without shroud lacks a sufficient basis. Since the calculation is based on an unproven assumption, it cannot be accepted as evidence leading to a lack of novelty objection.

No other prior art documents were cited by the Appellant, and in the absence of any other pertinent prior art the Board concludes that the process according to the claim meets the requirement of novelty (Article 54(1) EPC).

4. *Inventive step*

4.1 The closest prior art is represented by D6, which according to the precharacterising portion of the claim discloses a process for melt spinning of polyethylene terephthalate.

4.2 Starting from this prior art the underlying technical problem to be solved, which is derivable from the patent in suit, consists in an improvement of the known melt spinning process in respect of processability and reduction of the filament break rate.

4.3 These problems are solved by a process involving the combination of features of the claim.

The Appellant took the view that the patent did not disclose a relation between the problem and the claimed neck draw ratio of 3.0 or less and that this feature should be disregarded in the assessment of inventive step. However, the description of the patent in suit (page 2, line 54 to page 3, line 9; "examples 3 to 6", page 3, line 43 to page 4, line 31) makes it clear that there is a relation between the solution of the problem and the features according to the characterising portion of the claim. It follows from these disclosures that the claimed process leads to a reduced neck draw ratio by progressively reduced heating of the threadline before cooling air is applied, which results in improved processability and a satisfactory break rate. In this connection it is also clear that "processability" means nothing other than the practicability of the process and not, as the Appellant supposed, the further treatment of the filaments after the melt spinning process.

- 4.4 The Appellant submitted that, in the process according to D6, the temperature had to be progressively reduced between the spinneret and the end of the shroud (3) (heating cylinder). However, neither the general description nor the examples give any indication of a controlled decrease in temperature. Additionally, since the reduction of filament breakage is solved by different means, namely by bundling of the group of filaments by a bundling guide arranged in the threadline after the filament-finishing completion point, that document does not provide any indication which would lead the skilled person to the combination of features of the claimed subject-matter. Thus with

respect to D6 the subject-matter of the claim was not arrived at in an obvious manner.

- 4.5 In the melt spinning processes described in D7 the winding speed is in the same range as in the patent in suit. Stable spinning conditions are maintained by controlling the stress at break by holding the gradient of the winding speed under a critical value (page 614, left column). Generally the conditions can be influenced by delayed cooling or other temperature effects along the threadline.

This document discloses neither a draw ratio nor the use of a heated shroud, and still less the progressive reduction of the temperature within the shroud. Therefore, since D7 contains no hint of the claimed solution, even when combined with D6, it does not lead to the method claimed.

- 4.6 In the process according to D2 the winding speeds are in the range up to 5000 m/min. The skilled person having a general knowledge of melt spinning processes is well aware that at these winding speeds a highly orientated polymeric filamentary yarn in a directly usable as-spun condition cannot be obtained and that the neck draw ratio at these speeds is not generally as critical as in high speed processes at 7000 m/min. For that reason D2 would be left out of consideration in the search for improvements to the high speed spinning process according to D6. The process known from D2 includes the step of heating the filaments after they have left the spinneret and subsequently lowering the temperature progressively (column 4, line 53 to column 5, line 3). Even if the skilled person were to

adopt that step it would not lead to the process of the patent, where the temperature of the threadline is not raised after it has left the spinneret. D2 also does not mention a neck draw ratio value and therefore also gives no indication of the claimed solution.

4.7 The further documents not cited again by the Appellant are more remote from the invention than the prior art discussed above. Consequently the process according to the claim cannot be obvious in respect of other documents either and therefore involves an inventive step within the meaning of Article 56 EPC.

4.8 In view of the above findings the Board comes to the conclusion that the proposed solution of the technical problem underlying the patent in suit as defined in the claim is novel and inventive and complies with the criteria for patentability (Article 52 (1) EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

P. Alting van Geusau