BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

14.

A		B		C	X

File Number: T 917/92 - 3.3.1

Application No.: 89 306 590.4

Publication No.: 0 349 307

Title of invention: Pitch-based carbon fibres superior in compressive physical properties and process for producing same

Classification: C10C 3/00

D E C I S I O N
of 6 May 1993

Applicant: Nippon Oil Co., Ltd.

Headword: Carbon fibres/NIPPON

EPC Article 84

Keyword: Clarity of claim (yes)

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 917/92 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 6 May 1993

Appellant : Nippon Oil Co., Ltd.
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Tokyo (JP)

Representative : Cropp, John Anthony David et al
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Decision under appeal : Decision of the Examining Division 029 of the European Patent Office dated 19 May 1992 refusing European patent application No. 89 306 590.4 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : K.J.A. Jahn
Members : R.W. Andrews
J.-C. Saisset

Summary of Facts and Submissions

I. European patent application No. 89 306 590.4 (publication No. 0 349 307) was filed on 29 June 1989.

II. By a decision dated 19 May 1992 the Examining Division refused the application on the ground that Claim 2 filed on 20 April 1991 did not comply with the requirement of Article 84 EPC with respect to clarity. In the Examining Division's opinion the expression "two moles or more of hydrogen per mole of pitch" which served to distinguish the present process from that disclosed in GB-A-2 168 996, was not clear in the absence of any indication whether the molecular weight of the pitch was its number-average, weight-average or z-average and of the method used to determine it.

The Examining Division also expressed doubts with respect to the scope of protection conferred by Claim 1 filed on 20 April 1991 since the parameters used to define the carbon fibre claimed therein are unusual.

III. An appeal was lodged against this decision on 18 July 1992 with payment of the prescribed fee. In his Statement of Grounds of Appeal filed on 8 September 1992, the Appellant contended it was unnecessary for the definition of the average molecular weight and the method of its determination to be set out in the application in order for the skilled person to know without doubt how to determine the amount of hydrogen to employ to achieve the required ratio of at least two moles of hydrogen per mole of pitch. The Appellant's contention was supported by the affidavit of Hiroaki Takoshima who is fully conversant with the techniques used in the art for measuring the molecular weight of pitch.

IV. The Appellant requests that the decision under appeal be set aside aside and that case be remitted to the Examining Division for further prosecution on the basis of Claims 1 and 2 filed on 8 September 1992. These claims read as follows:

"1. A process for producing a pitch-based carbon fiber, comprising hydrogenating a carbonaceous pitch in the presence of a hydrogenation catalyst to add to the pitch two moles or more of hydrogen per mole of pitch; then, heat-treating the hydrogenated pitch at atmospheric pressure or under reduced pressure to obtain an optically anisotropic pitch; collecting from said optically anisotropic pitch a component which is insoluble in an organic solvent having a solubility parameterat 25°C of 7.4 to 9.0 and soluble in an organic solvent having a solubility parameter at 25°C of 9.2 to 11.0 to obtain a spinning pitch having an optically anisotropic phase content of 5% to 40% by volume; then, spinning said spinning pitch; and thereafter making the resulting pitch fibre infusible and then carbonizing and thus-infusiblized pitch fibre.

2. A process according to Claim 1 in which the carbonaceous pitch is hydrogenated at a temperature in the range of 150°C to 450°C, a pressure in the range of 30 to 250kg/cm^2.G and a space velocity (LHSV) in the range of 0.15 to 3.0."

Reasons for the Decision

1. The appeal is admissible.

2. There are no objections under Article 123(2) EPC to the present claims. In particular, Claim 1 corresponds to Claim 2 as originally filed apart from the amendment of "two moles or more hydrogen per pitch molecule" to read "two or more moles of hydrogen per mole of pitch". In its letter of 29 October 1991, the Examining Division allowed this amendment under Rule 88 EPC. The Board sees no reason to disagree with this finding.

Claim 2 is based on the paragraph bridging pages 4 and 5 of the application as filed (cf. also column 2, lines 50 to 54 of the printed patent application).

3. This appeal is solely concerned with the question of whether the present Claim 1 satisfies the requirement of Article 84 EPC with respect to clarity.

3.1 Since pitch is a complex mixture of organic compounds, the molecular weight of any particular pitch sample is an average value. However, there are three commonly used averages, number-average or arithmetic mean (Mn), weight-average (Mw) and z-average (Mz) where Mn < Mw < Mz.

In view of the affidavit sworn by Hiroaki Takashima submitted with the grounds of appeal and in the absence of any indication to the contrary, the Board is satisfied that the skilled addressee would apply the number-average molecular weight of the pitch in order to calculate the amount of hydrogen required to satisfy the requirement that at least 2 moles of hydrogen should be introduced into the pitch during the hydrogenation stage.

3.2 There are several methods available for measuring the average molecular weight, such as, for example, light scattering, ultracentrifugation, end-group analysis, viscosity measurements, osmometric techniques and gel

permeation chromatography. However, some of these methods only allow the determination of a one particular average molecular weight. For example viscosity measurement enables the viscosity-average molecular weight (Mv) to be determined. The weight-average molecular weight may be measured by light scattering or ultracentrifugation. The methods suitable for determining the number-average molecular weight includes end-group analysis and osometric methods. Since end-group analysis could not be applied to a pitch sample, this method can be ruled out of consideration.

Gel permeation chromatography may be used to determine both the number-average and weight-average molecular weights.

Therefore, the skilled person wishing to determine the number-average molecular weight of a pitch sample has, in practice, two methods available to him; osmometric and gel permeation chrmoatography.

Having regard to the statement in the above-mentioned affidavit that there is no significant difference in the results obtained by these techniques, the Board is satisfied that it is not necessary to specify in the application which of the two techniques are used to determine the average-number molecular weight of the pitch.

4. Therefore in the Board's judgement, the present Claim 1 satisfies the requirement of Article 84 EPC with respect to clarity.

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 for further prosecution on the basis of Claims 1 and 2 filed on 8 September 1992.

The Registrar: The Chairman:

E. Görgmaier K.J.A. Jahn

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