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D E C I S I O N
of 21 December 1998

Case Number: T 0671/96 - 3.3.3

Application Number: 90307417.7

Publication Number: 0407216

IPC: C08L 81/02

Language of the proceedings: EN

Title of invention:
Impact modified polyphenylene sulfide

Applicant:
Hoechst Celanese Corporation

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2)

Keyword:
"Amendment - broadening of claim (yes)"

Decisions cited:
T 0860/93

Catchword:
-



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Boards of Appeal

Chambres de recours

Case Number: T 0671/96 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 21 December 1998

Appellant: Hoechst Celanese Corporation
Route 202-206 North
Somerville, N.J. 08876 (US)

Representative: De Minvielle-Devaux, Ian Benedict Peter
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 1 March 1996
refusing European patent application
No. 90 307 417.7 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: P. Kitzmantel
J. A. Stephens-Ofner

Summary of Facts and Submissions

- I. This appeal, which was filed on 24 April 1996, lies against the decision of the examining division dated 1 March 1996, refusing European patent application No. 90 307 417.7 in the name of Hoechst Celanese Corporation filed on 6 July 1990, claiming the priority of 7 July 1989 from a US-application, and published under No. 0 407 216. The appeal fee was paid simultaneously with the Notice of Appeal and the Statement of Grounds of Appeal was filed on 3 July 1996.
- II. The decision under appeal was based on two sets of each 21 claims both filed on 22 March 1995, one set (A) for AT, BE, CH, DE, DK, FR, GB, GR, IT, LI, LU, NL and SE, the other set (B) for ES.

Independent Claims 1 and 21 of set (A) read as follows:

"1. An impact resistant polyarylene sulfide composition comprising polyarylene sulfide and an impact strength improving amount of a functionalized selectively hydrogenated block copolymer of the formula $B_n(AB)_oA_p$ where $n = 0$ or 1 , $o = 1-50$, $p = 0$ or 1 , each A is predominantly a polymerized monoalkenyl aromatic or vinyl arene hydrocarbon block and each B prior to hydrogenation is predominantly a polymerized conjugated diene hydrocarbon block, to which block copolymer has been grafted at least one graftable functional molecule selected from carboxyl functional groups and carbon dioxide, said carboxyl functional groups being selected from carboxylic acids, their salts and esters, wherein substantially all of said graftable molecules are grafted to the block copolymer in the monoalkenyl aromatic or vinyl arene block."

"21. A process for the production of a molded article which comprises subjecting the composition of any of claims 1-20 to a molding operation."

Claims 2 to 20 of set (A) were dependent upon Claim 1.

The wording of the claims of set (B) was different from that of the claims of set (A) only by the change of the category of Claims 1 to 20 to "A process for the production of an impact resistant polyarylene sulfide component" and by a consequential language adaptation.

III. The decision under appeal held that the claimed subject-matter was novel but did not involve an inventive step over documents

D1: EP-A-0 085 115,
D2: EP-A-0 215 501, and
D3: US-A-4 436 865,

because it was obvious to replace in the polyarylene sulfide compositions according to D1 the carboxylate-grafted hydrogenated block copolymers of vinyl aromatic monomers and conjugated diene monomers used as impact modifiers by the similar carboxylate-grafted hydrogenated block copolymers disclosed in D2 as impact modifiers for thermoplastic polyesters and polyamides; the Applicant's allegation of a surprisingly improved impact strength of the claimed compositions was not established by the available evidence.

Furthermore, that decision mentioned a number of deficiencies under Article 84 EPC; among these the meaning in Claim 1 of the word "predominantly" was considered to be vague and of ambiguous scope.

IV. With the Statement of Grounds of Appeal the Appellant, attempting to establish conformity of the claims with the requirements of Article 84 EPC, submitted a single set of 20 claims (no separate set for ES), independent Claims 1 and 20 reading as follows:

"1. An impact resistant polyarylene sulphide composition comprising polyarylene sulphide and at least 5 wt% of a functionalized selectively hydrogenated block copolymer of the formula $B_n(AB)_oA_p$ where $n = 0$ or 1 , $o = 1-50$, $p = 0$ or 1 , each A comprises a polymerized monoalkenyl aromatic or vinyl arene hydrocarbon block and each B prior to hydrogenation is predominantly a polymerized conjugated diene hydrocarbon block, to which block copolymer has been grafted carbon dioxide or at least one graftable carboxyl functional group selected from carboxylic acids, their salts and esters, wherein substantially all of the carbon dioxide or of said carboxyl functional groups are grafted to the block copolymer in the monoalkenyl aromatic or vinyl arene block."

"20. A process for the production of a moulded article which comprises subjecting the composition of any of claims 1-19 to a moulding operation."

Claims 2 to 19 are dependent on Claim 1.

V. The arguments of the Appellant regarding the issue of inventive step may be summarized as follows:

- (i) In view of the satisfactory results reported in document D1 there was no incentive for the skilled person to use a different impact modifier.

- (ii) Even if the skilled person had considered the use of an alternative impact modifier, he would not, in the expectation of some improvement or advantage, have instead employed the impact modifiers used according to D2 for different polymer compositions.
- (iii) Quite unexpectedly, the available evidence demonstrated that the impact modifier used according to D2 was also very effective in polyarylene sulfides.
- (iv) The Examining Division's criticism of the experimental data in the specification was unjustified, since these would all be based on standard ASTM methods and related to compositions only differing from those according to the invention by the use of other impact modifiers.
- (v) As to the evidence in Exhibits A and B, submitted during the examination stage with the Applicant's letter of 20 March 1995, these would clearly show that it was impossible to forecast the performance of the impact modifiers used according to D2 (and according to the invention) in polymer compositions other than those disclosed in this document.
- (vi) In order further to strengthen this point, the Appellant, with the Statement of Grounds of Appeal, filed the further Exhibits C, D and E.

(vii) Moreover, he complained that the refusal of the application "was not justified" and requested a refund of the appeal fee; in this respect, he pointed to an alleged inconsistency of the decision under appeal with the stance of another Examining Division in an allegedly closely related case.

VI. In a communication dated 19 August 1998 the Board made the following main comments:

"1. The request for refund of the appeal fee (point 28 of your Statement of Grounds of Appeal) cannot be granted, because the decision under appeal did not involve a substantial procedural violation (Rule 67 EPC). A (possibly) wrong assessment of the prior art and/or of evidence would only amount to an error of judgment (cf. T 860/93, OJ 1995, 047). This state of affairs is not affected by possible inconsistencies, in the reasoning of the decision under appeal, with conclusions arrived at by different employees of the EPO during the prosecution of another patent application of the same Applicant directed to similar subject-matter.

2. Article 123(2) EPC

.....

2.1 The replacement in Claim 1 of the words "is predominantly" by the word "comprises" is not allowable, because the latter term extends the scope to hydrogenated block copolymers which do not predominantly consist of the monomers specified in this claim (i.e. may contain only minor amounts). Although "predominantly" is an undesirable vague term, in the present case, it must be maintained (cf. Guidelines C-III 4.5).

.....

4. Inventive step

4.1 It appears that the conclusion of obviousness drawn in the decision under appeal was correct with regard to the defined object to be solved by the application, i.e. the provision of further impact resistant polyarylene sulphide compositions. The fact that D1 provides satisfactory results cannot prevent the skilled person from looking for alternatives, nor can the fact that D2 does not suggest the use of the aryl grafted impact modifiers in polyarylene sulphides dissuade the skilled person from this use. Contrastingly, he would, on the basis that polyamides and thermoplastic polyesters are among the preferred thermoplastic polymers to be used according to D1 (bridging sentence pages 9, 10; Claims 4, 5), assume that these impact modifiers, which according to D2 provide good results in polyamides and polyesters, will also display their beneficial effects in polyarylene sulphides, because the latter polymers belong to the same group of polar thermoplastic polymers specified in D1 which group includes polyamides and thermoplastic polyesters. The disclosure of D3 can be regarded as a further incentive to replace the impact modifiers used according to D1 by those described in D2, because the impact modifiers disclosed in D3 are structurally similar to those of D2 (aryl block grafting).

4.2 A different conclusion could possibly be arrived at, if the available evidence would demonstrate that the impact strength of the claimed polyarylene sulphide compositions was surprisingly improved. Since the only feature distinguishing the polyarylene sulphide compositions of the present invention from those disclosed in D1 resides in the different grafting position of the carboxylic grafting monomer (invention:

on the vinyl aromatic block; D1: on the diene block), it would, however, be necessary for the evidence to show that any surprising improvement was caused by the change of the grafting position only. In order to satisfy this requirement it is indispensable that there are either no other differences between the "inventive" and "comparative" compositions than the change of the grafting position or that any other differences are such that they have no major influence on the impact strength of the compositions.

4.3 It is in the latter respect, that the available evidence appears to be defective:

4.3.1 The "inventive" impact modifier used according to Sample No. 2 in Table 1 is characterized as "SEP-Carboxyl (<1%)"; the "comparative" impact modifier used according to Sample No. 5 of the same table is characterized as "SEP-Maleanated (<1.0%)".

There is no information concerning:

4.3.1.1 the respective structure and molecular weights (cf. point 4.3.2.1 below) of the SEP backbone polymer (please also explain, in which way SEBS and SEP can be considered as hydrogenated styrene/diene [EB, EP?] copolymer blocks),

4.3.1.2 the kind of carboxyl functionality of the "inventive" impact modifier; was this also maleic acid/anhydride or, was it - in line with the preferred embodiment of the claimed invention - carbon dioxide? In the latter case, what is the influence of the different grafting monomers on the impact strength?

4.3.1.3 the meaning of "<1%" (= smaller than 1%) ? This could mean that the degrees of functionality in the "inventive" and the "comparative" compositions were quite different: e.g. one close to 0%, the other one close to 1%;

4.3.1.4 the question whether the "comparative" impact modifier "SEP - Maleanated (<1.0%)" used according to Sample No. 5 of Table 1 corresponds to a particular Kraton^(R)? If yes, which one? Any one of the Kratons^(R) 1651, 1650, 1652 used according to Tables 3, 4, 5, 6 ?

4.3.2 The following further issues with respect to the experimental data reported in the application in suit need clarification:

4.3.2.1 Do all PPS/SEP compositions used in Tables 1 to 6 comprise identical PPS-polymers and identical carboxyl grafted SEP copolymers?

If yes, then the SEP impact modifier contained in the composition according to Sample No. 2 of Table 1 has a molecular weight of 70000. Is this correct?

4.3.2.2 In which way can the SEP impact modifiers used according to the various tables be regarded as carboxyl group grafted Kratons^(R)? Is there any evidence able to show that the styrene/diene backbone of the "comparative" Kratons^(R) is identical to that of the "inventive" SEP impact modifiers?

4.3.2.3 Is it correct that the Sample Nos. 1 to 10 in Table 4 correspond to the same Sample Nos. in Table 3?

4.3.2.4 Is it correct that the data contained in Table 6 are an extract of those according to Table 4? This assumption is based on the fact that the HDT, notched Izod, Total Energy and Peak Force data of Sample Nos. 5, 8, 9 and 10 in Tables 4 are identical to those according to Table 6.

....."

VII. In his submission of 18 November 1998 the Appellant's Representative stated:

"I am advised, however, that the Applicant does not intend at present to file further submissions in respect of this case.

Accordingly, the Board of Appeal is respectfully invited to come to a decision on the basis of the written documents on file."

VIII. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the set of claims submitted on 3 July 1996.

The Appellant also requested interlocutory revision under Article 109 EPC and reimbursement of the appeal fee.

Reasons for the Decision

1. The appeal is admissible.
2. *Interlocutory revision (Article 109 EPC)*

The Examining Division refused to rectify the appealed decision. Consequently (Article 109(2) EPC), the case was remitted to the Boards of Appeal, of which the Appellant was informed by a communication of the Board's registry dated 2 August 1996.

3. *Amendments (Article 123(2) EPC)*

- 3.1 In the initial statement of original claim 1:

"An impact resistant polyarylene sulfide composition comprising polyarylene sulfide and an impact strength improving amount of a functionalized selectively hydrogenated block copolymer of the formula $B_n(AB)_oA_p$, where $n = 0$ or 1 , $o = 1-50$, $p = 0$ or 1 , each A is predominantly a polymerized monoalkenyl aromatic or vinyl arene hydrocarbon block ..."

the words "each A is predominantly a ... block" have been replaced in operative Claim 1 by the statement:

"each A comprises a ... block"

- 3.2 The replacement in Claim 1 of the words "is predominantly" by the word "comprises" is not allowable under Article 123(2) EPC. The latter term extends the scope of Claim 1 to polyarylene sulfide compositions comprising functionalized selectively hydrogenated block copolymers of the formula $B_n(AB)_oA_p$, the units A of which are not **predominantly** a polymerized monoalkenyl aromatic or vinyl arene hydrocarbon block, but which

hydrogenated block copolymers may contain this block in **only minor amounts**, because, as opposed to the word "predominantly", the word "comprising" does not impose any quantitative limitation (cf. point 2.1 of the Board's communication dated 19 August 1998 as referred to in Section VI supra).

Since there is no basis for this amendment in the application as filed, the requirement of Article 123(2) EPC is not complied with by the subject-matter of Claim 1.

Therefore, for this reason alone the application in suit is not allowable under the EPC.

4. *Further matters*

4.1 It has been set out in great detail in point 4 of the Board's communication dated 19 August 1998 that, on the basis of the available evidence, the subject-matter of the application in suit, when starting from D1 as closest prior art, must be considered as an obvious solution of the problem of providing a **further** impact resistant polyarylene sulphide composition (cf. Section VI supra). It did not require inventive skill to replace the impact modifiers used in the polyarylene sulphide compositions disclosed in D1 by the similar impact modifiers used according to D2, thus arriving at the subject-matter of present Claim 1.

4.2 Since the Appellant, in his letter dated 18 November 1998, did not submit any information able to refute the Board's preliminary position on inventive step, but rather stated that he would not submit any further

evidence and that the case should be decided on the basis of the existing written documents, the Board sees no reason to deviate from the reasoned opinion referred to in the preceding paragraph.

5. *Reimbursement of the appeal fee*

Since the appeal is not allowed, the appeal fee cannot be reimbursed (Rule 67 EPC).

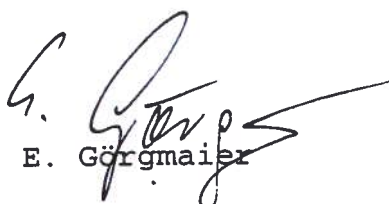
Moreover, for the reasons given in point 1 of the Board's communication dated 19 August 1998 (cf. Section VI supra) reimbursement would not be equitable, because no substantial procedural violation had occurred.

Order

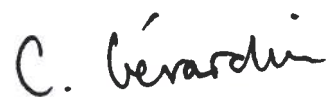
For these reasons it is decided that:

The appeal is dismissed.

The Registrar:


E. Görgmaier

The Chairman:


C. Gérardin