

Publication in the Official Journal Yes / No

File Number: T 227/89 - 3.3.3
Application No.: 81 107 495.4
Publication No.: 0 048 483
Title of invention: Flame retarding polyester composition

Classification: C08L 67/02

D E C I S I O N
of 25 September 1991

Proprietor of the patent: TORAY INDUSTRIES, INC.
Opponent: BASF Aktiengesellschaft, Ludwigshafen

Headword:

EPC Article 56

Keyword: "Presence of inventive step confirmed"
"Distinguishing between effects crucial to inventive step and
merely accidental (so called "bonus") effects"

Headnote



Case Number : T 227/89 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 25 September 1991

Appellant :
(Opponent)

BASF Aktiengesellschaft, Ludwigshafen
- Patentabteilung - C6 -
Carl-Bosch-Strasse 38
W - 6700 Ludwigshafen (DE)

Respondent :
(Proprietor of the patent)

TORAY INDUSTRIES, INC.
2, Nihonbashi-Muromachi 2-chome
Chuo-ku
Tokyo 103 (JP)

Representative :

Kador & Partner
Corneliusstrasse 15
W - 8000 München 5 (DE)

Decision under appeal :

Interlocutory decision of the Opposition Division
of the European Patent Office dated 10 March 1989
concerning maintenance of European patent
No. 0 048 483 in amended form.

Composition of the Board :

Chairman : F. Antony
Members : H.H.R. Fessel
J.-C. Saisset

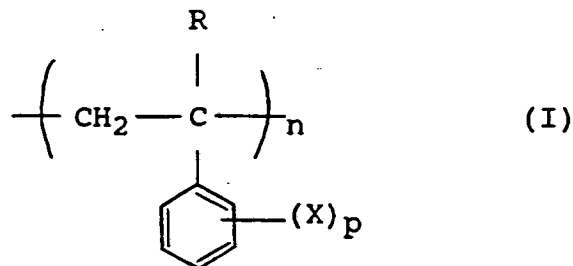
Summary of Facts and Submissions.

- I. The mention of the grant of European patent No. 0 048 483 in respect of European patent application No. 81 107 495.4 filed on 21 September 1981 and claiming a Japanese priority of 22 September 1980 was announced on 9 January 1985 (cf. Bulletin 85/02).
- II. On 24 July 1985 a Notice of Opposition was filed, in which the revocation of the patent was requested on the ground that its subject-matter did not involve an inventive step. The opposition was supported inter alia by documents:
 - (2) DE-A-2 515 473 and
 - (4) DE-A-2 363 758 (filed after the expiry of the opposition period).
- III. By an interlocutory decision dated 10 March 1989 the Opposition Division held that the patent in suit could be maintained on the basis of the documents specified in the communication pursuant to Rule 58(4) EPC dated 28 October 1988.

These documents contain eight claims, wherein the only independent Claim 1 reads as follows:

"A flame retarding polyester composition which comprises

- (a) 3 to 45 parts by weight of a halogen containing polystyrene and/or a halogen containing poly- α -methylstyrene represented by the formula (I)



wherein R represents a hydrogen atom or methyl group, X represents a bromine or chlorine atom, p is an integer of 1 to 5, and n is an integer larger than 2,

- (b) 1 to 20 parts by weight of antimony trioxide, and
- (c) 0.1 to 10 parts by weight of an epoxy compound selected from the group consisting of glycidyl esters of aliphatic or cycloaliphatic carboxylic acids and ethylene-glycidyl methacrylate copolymer,

the amounts of (a), (b) and (c) being based upon 100 parts by weight of polyester in the polyester composition."

The Opposition Division held that the claimed subject-matter involved an inventive step since the use of a halogenated polystyrene and/or halogenated poly- α -methylstyrene (component (a)) as flame retarding agent (FRA) instead of the halogenated FRA known from (4) provided polyester compositions which were flame resistant, exhibited good tensile strength, elongation at break and thermal stability and showed also good blooming properties. With regard to the information provided by (2), a man skilled in the art when aiming at flame proof polyester compositions without blooming got a clear incentive to replace the low molecular weight FRA (a') in (4) by the halogenated polystyrenes known from (2). However, since the other improvements were held to be surprising with regard to the cited prior art, existence of an inventive step was acknowledged.

- IV. An appeal was lodged against that decision on 31 March 1989, together with payment of the prescribed fee and with a Statement of Grounds of Appeal.

In said Statement and during Oral Proceedings held on 25 September 1991, the Appellant mainly argued that

- (a) the provisions of Article 113(1) EPC were violated by the Opposition Division; that
- (b) the problem of blooming was solved in an obvious manner with regard to (2); and that
- (c) any improvements of other physical properties, existence of which improvements had been contested, would constitute mere "bonus effects" which could not establish an inventive step.

The Appellant also argued that, in view of the first two examples of Table 4 of (4), it was to be expected that the addition of an epoxy compound would lead to an improvement of the elongation at break. It would have been obvious for a man skilled in the art to improve the poor physical properties of a composition as given in (2) by the addition of epoxy compounds, in view of the clear teaching given in (4) that physical properties such as elongation at break would be improved by the addition of the specified epoxy compounds.

- V. The Respondent argued that from both (2) and (4) it was known that important physical properties were deteriorated by addition of FRA. In the patent in suit, the problem was to provide a composition having a combination of characteristics as shown in the experimental data provided with this letter of 2 March 1987. In view of (4), column 5, lines 40 to 43, only the prevention of a deterioration of the elongation at break was to be expected when epoxides are used. The balance of properties achieved by a specific combination of FRA's and epoxy compounds as specified in Claim 1 was unexpected.

Moreover, a man skilled in the art would not combine the teaching of documents (2) and (4) since neither (2) nor (4) dealt with such a balance of properties.

Also contested was the assertion of the Appellant that the amount of the FRA was not relevant, because the inflammability depended exclusively on the amount of halogen incorporated into the composition.

VI. The Appellant requests that the decision under appeal be set aside and the patent be revoked. Moreover, he requests reimbursement of appeal fee under Rule 67 EPC.

The Respondent requests that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible (cf. items III and IV).
2. The amendment of Claim 1 made during opposition proceedings does not give rise to any objection under either Article 123(2) EPC or 123(3) EPC because it amounts only to the deletion of one alternative type of epoxy compounds out of a group specified in Claim 1 of the patent in suit.
3. Closest prior art; objective problem and its solution
 - 3.1 The Opposition Division considered document (4) to be the closest prior art (section II/3 of decision under appeal), although it did consider the alternative of starting from document (2) (cf. section II/7). In the Board's view, however, (2) is a more suitable starting point, since flame resistant polyester compositions having good blooming properties were previously known, the partial

problem of improving such properties hence having been solved already.

3.2 Document (2) discloses a composition containing a linear polyester such as polybutylene terephthalate (PBT); a FRA such as a halogenated styrene oligomer having a degree of polymerisation between 3 and 20; and a synergist such as antimony trioxide (cf. Claims 1, 2, 3, 5 and 6). With this composition good blooming properties of articles made therefrom are achieved having, at the same time, good burning characteristics such as dripping. This document is silent on other characteristics such as tensile strength, elongation at break and thermal stability.

In the Board's judgment a man skilled in the art would, however, expect that the use of such halogenated aromatic compounds as FRA would lead to a certain impairment of physical properties (cf. e.g. column 1, line 67 to column 2, line 21 of (4)).

3.3 In the light of this closest prior art the technical problem underlying the patent in suit can be seen in providing a flame retarding polyester composition having improved tensile strength, elongation at break and thermal stability with a good balance of said properties. With regard to such a problem, the Appellant's argument of a mere "bonus effect" is unsuccessful. While the blooming problem has been solved in an obvious manner, the Board cannot accept that any improvements in other, mechanical properties, such as tensile strength, elongation at break, and in thermal stability, would be mere "bonus effects", which could not contribute to an inventive step. In determining which effect is crucial and which is merely accidental (so-called "bonus effect"), a realistic approach has to be taken, considering the relative technical and practical importance of those effects in the

circumstances of a given case. In the present case, tensile strength, elongation at break and thermal stability are at least as important as the blooming properties for the overall value of the compositions in question, and any improvements thereof cannot therefore be disqualified as being merely accidental.

- 3.4 According to the disputed patent, the above defined technical problem is proposed to be solved by a composition comprising a FRA as specified under (a) in Claim 1; antimony trioxide, a generally known synergist, (cf. item (b) of Claim 1); and an epoxide as specified under item (c) of Claim 1.

- 3.5 In view of the experimental data provided in the proceedings, the Board is satisfied that this technical problem is indeed solved (cf. Table 2 of the patent specification as granted, in conjunction with Example 4 and comparative Example 10 received 2 March 1987).

4. The Board is satisfied that the combination of ingredients (a), (b) and (c) as set out in Claim 1 of the disputed patent is novel with respect to the cited prior art. Since novelty was not contested, it is not necessary to give detailed reasons for this finding.

5. It remains to be decided whether the claimed subject-matter involves an inventive step.

- 5.1 Document (2) taken by itself is silent on characteristics such as tensile strength, elongation at break and thermal stability and can thus not contribute to the solution of the given problem.

5.2 According to prior art referred to in document (4) (cf. Column 1, line 65 to column 2, line 21), flame-retardent properties are conferred to polyesters such as PBT by means of a combination of decabromodiphenyl and Sb_2O_3 , or of brominated diphenyl and brominated diphenyl ether, this however leading to poor surface characteristics and impaired physical properties, especially elongation at break (without specifying other properties that may be affected). Document (4) teaches that such disadvantages could be avoided by adding to a polyester composition the polymer component of which is predominantly PBT, a combination of a narrowly defined halogenated lower molecular diphenyl ether; the specific compound, decabromodiphenyl; an antimony compound; and a diepoxy compound (Claim 1, read in conjunction with Example 1). There is no basis, in the Board's view, for extending that teaching so as to cover the use, instead of the halogenated compounds of (4), of halogenated polymers of the polystyrene type (patent in suit, Claim 1, part a), and/or to the selection of the specific epoxy compounds referred to in the patent in suit, Claim 1, part (c). Expressed in different terms, the skilled person having document (2) as his starting point, and confronted with the existing technical problem (balance of properties; see point 3.3 above), would not derive any incentive from (4) for solving the said problem by the substitution of features (a) and (c) in Claim 1 of the patent in suit, for features B and C, or B, C and D, of document (4). Hence, the claimed subject-matter involves an inventive step.

Contrary to the arguments provided by the Appellant, in the Board's opinion it is not detrimental to the above finding that a skilled man seeking to improve surface characteristics and elongation at break of a flame retardant polyester composition, such as e.g. one known

from (2), could try to use a diepoxide as known from (4), since he would not do so when trying to get a good balance of physical properties. The arguments provided in this context appear to be hindsight.

6. Subject-matter of Claim 1 being patentable, the one of dependent Claims 2 to 8 is patentable as well.

7. Rule 67 EPC provides for the reimbursement of appeal fees in the event of interlocutory revision as where the Board of Appeal deems an appeal to be allowable, if such reimbursement is equitable by reason of substantial procedural violation.

Since in the present case the appeal is not allowable, the question of an alleged procedural violation need not to be discussed.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:


E. Gorgmaier

The Chairman:


F. Antony