BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File No.: T 0089/92 - 3.3.3

Application No.: 86 113 700.8

Publication No.: 0 218 215

Classification: CO8L 67/00

Title of invention: Utraviolet light stable flame retarded polycarbonate blends

D E C I S I O N
of 8 October 1993

Applicant: General Electric Company

Opponent:

Headword:

EPC: Art. 54, 56

Keyword: "Novelty (yes), after amendment" - "Inventive step (yes), after amendment"

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0089/92 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 8 October 1993

Appellant: General Electric Company
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 21 August 1991 refusing European patent application No. 86 113 700.8 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. Gérardin
Members: R. Lunzer
F. Benussi

Summary of Facts and Submissions

I. European patent application No. 86 113 700.8, publication No. 0 218 215, was filed on 3 October 1986, having a priority date of 7 October 1985 derived from US application No. 0 785 115.

II. By its written decision of 21 August 1991 the Examining Division refused the application, holding that Claim 1 as amended in accordance with the Appellant's letter of 27 May 1991 did not satisfy the requirements of Article 123(2) EPC because, unlike the application as originally filed, the flame retardants were not confined to halogenated flame retardants. In view of the more significant substantive objections, however, this was regarded as a minor point.

In addition, attention was directed to the following prior art documents which were relevant to the issues of novelty and inventiveness:

(1) EP-A-0 186 250 (published 2 July 1986)
(2) EP-A-0 065 777
(3) EP-A-0 118 706
(4) US-A-4 388 443
(5) DE-A-2 622 412.

In relation to those documents, the Examining Division held that the alleged invention defined in Claim 1 lacked novelty within the meaning of Article 54(3) EPC in the light of the disclosure of document (1). It also lacked novelty in the light of the disclosure of document (2), and further lacked any inventive step having regard to the disclosure of documents (2), (3), (4) and (5), all of which related to polycarbonate compositions containing fire retardants.

The independent Claims 1 and 14 as considered by the Examining Division were in the following form:

"1. A flame retarded composition comprising a flame retardant and a polymer selected from polycarbonate resins and poly(carbonate ester) resins, **characterized in that** the composition further contains a polyester resin comprising an aliphatic polyster in a weight amount of from 0.5 to 20 parts per 100 parts of total resin.

14. A flame retarded aromatic carbonate polymer composition having improved color stability to UV radiation comprising

a. an aromatic carbonate polymer selected from the group consisting of aromatic polycarbonate and aromatic poly(ester-carbonate);

b. an effective amount of a brominated aromatic flame retardant; and

c. a color stabilizing amount of at least one effective aliphatic polyester."

III. An appeal against that decision was lodged on 18 October 1991, the appeal fee was paid on the same day, and the Grounds of Appeal were filed on 23 December 1991.

IV. Together with its Grounds of Appeal the Appellant filed as its sole request a revised Claim 1, together with 7 dependent claims. A communication from the Board dated 9 July 1993 suggested that the claim as then formulated did not meet the requirements of Article 84 EPC. Together with its letter of 13 September 1993 the Appellant filed a set of 8 claims including a revised Claim 1 which took into account the objections

previously raised by the Board, and also an amended page 2 of the description, bringing it into conformity with the amended Claim 1. Claim 1 as finally considered by the Board took the following form:

"A flame retarded composition consisting of an aromatic polycarbonate or poly(carbonate ester), and a halogenated aromatic flame retardant, characterized in that it further contains an aliphatic polyester having hydroxy end groups in the amount by weight of 0.5 to 20 parts per 100 of total resin."

V. The Appellant requested that the decision under appeal be set aside, and a patent granted on the basis of Claims 1 to 8 filed on 14 September 1993 and following description:

- pages 1 and 4 to 27 as originally filed
- page 2 filed on 14 September 1993
- page 3 filed on 23 December 1991.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of Amendments*

In the view of the Board, the amendments to Claim 1 are admissible for the purposes of Article 123(2) EPC, because it is now confined to a composition consisting of the three essential constituents, each of which was clearly disclosed in the application as filed. In particular, the polycarbonate, or poly(carbonate ester) is now properly limited to aromatic polymers according to the original definition, and the flame retardant is

now properly defined as a halogenated aromatic flame retardant as in the application as originally filed. Further, the presence of hydroxy end groups in polyesters can be inferred from the two methods of preparation described on page 13, line 20 to page 17, line 12 of the original application. Dependent Claims 2, 3, 5, 6, 7 and 8 correspond respectively to Claims 4, 6, 9, 10, 11, and 13. As to Claim 4, it is supported by page 14, lines 21 to 25, and page 15, lines 22 to 25, which specify that poly(ε-caprolactones) and reaction products of an aliphatic diacid and an aliphatic diol are suitable polyesters.

3. *Novelty*

Although in the view of the Board the Examining Division rightly regarded the alleged invention as then defined, which comprised, but was not limited to, the three essential constituents, as lacking in novelty in the light of the disclosure of documents (1) and (2), both of which disclosed compositions comprising the combination of an aromatic polycarbonate, a flame retardant, and an aliphatic polyester, now that the claim is confined to a composition consisting of those three ingredients, the objection has been overcome. The compositions of document (1) include as essential ingredients both a metal oxide in an amount which enhances the flame retardant effect of halogen containing flame retardants, as well as a phosphorus containing compound as there defined (see claims of document (1)). Equally, the objection of lack of novelty in relation to document (2) is overcome, because it relates to compositions containing as an essential constituent antimony trioxide treated with an alkoxysilane compound, as will appear hereinafter.

None of the other cited documents is any more relevant to the issue of novelty, and the Board is therefore satisfied that the alleged invention is novel for the purposes of Article 54 EPC.

4. *Closest prior art*

The application in suit concerns flame retarded polycarbonate blends which are resistant to yellowing upon exposure to ultraviolet radiation. Such blends are described in document (2), which the Board regards as the closest prior art. More specifically, the preferred compositions disclosed in this citation comprise

(A) 100 parts by weight of a thermoplastic aromatic polycarbonate, optionally together with a linear polyester derived from terephthalic acid or an ester-forming derivative thereof,

(B) 0.1 to 30 parts by weight of an organic halogen compound,

(C) 0.1 to 20 parts by weight of antimony trioxide treated with an alkoxysilane, and

(D) up to 30 parts by weight of an organic ester additive, especially an at least partially terminal-blocked polycaprolactone

(Claims 1, 3 and 5; page 4, lines 17 to 28; page 9, line 37 to page 10, line 6; page 10, line 34 to page 11, line 7). These compositions exhibit optimal flame retardancy, as evidenced by the V-0 values obtained in the flammability tests (UL-94 test method) in the examples. Although the properties actually reported in Tables 11 to 13 concern the appearance of the surface of the moulded articles, the excellent thermal stability

reported on page 1, first paragraph, suggests that these prior art compositions have in fact a satisfactory colour stability.

On the basis of that assumption, the technical problem underlying the application in suit may thus be seen to be the provision of further blends exhibiting both optimal flame retardancy and good resistance to yellowing.

According to Claim 1 of the application in suit, this problem is solved by a composition consisting of an aromatic polycarbonate, an halogenated aromatic compound, and 0.5 to 20 parts by weight of an aliphatic polyester having hydroxy end groups per 100 parts by weight of the total resin. In view of the experimental results in the application in suit, in particular the yellowness index and the colour index shown in the tables, the Board is satisfied that the above-defined technical problem is effectively solved.

5. *Inventiveness*

It remains to be decided whether the solution as defined in the main claim involves an inventive step.

5.1 In spite of a certain similarity between the compositions according to the application in suit and according to document (2), the latter teaching cannot lead to the compositions as now defined. In particular, the role and the function of the ester additive as described in document (2) do not suggest any influence on colour stability. Depending upon its definition and the amount used, this component may be added

(i) to enhance the flowability when the resin is being moulded,

(ii) as a releasing agent,

(iii) as a plasticiser for imparting ductility,

(iv) as a crystallisation promoting agent, or

(v) to improve toughness (page 8, lines 11 to 18; page 9, lines 31 to 36; page 13, lines 4 to 25).

None of these effects can be related to resistance to discolouration, which means that the skilled reader would not regard this component as essential for the solution of the above-defined problem. By contrast, the skilled reader would reach the opposite conclusion regarding component (C), since this additive is described as a flame-retarding assistant (page 7, line 32 to page 8, line 4) ensuring thermal stability besides good mechanical properties of the moulded articles (page 21, lines 6 to 9; page 29, lines 7 to 10; page 37, lines 1 to 5). There would thus be no reason to depart from that teaching when attempting to prepare further compositions having both good flame retardancy and good colour stability.

5.2 Equally, it cannot be said that the other documents referred to in the search report make the claimed compositions obvious.

Document (3) is concerned with compositions consisting of three essential components, aromatic polycarbonates (10-95%), PVC (5-90%), and aliphatic polyesters (1-40%) whereby ductility is improved (see Claim 1; page 1, lines 16 to 22, and page 2, line 19 to page 3, line 6). At page 4, line 25 there is a casual mention of flame retardants included in a list of common additives. This document contains no indication at all of how to combine

high flame retardancy properties with good colour stability.

Document (4) deals with still more remote polymer compositions, which have as essential constituents a polycarbonate, a polylactone, and a rubber-modified styrene-maleic anhydride copolymer (Claim 1). Although there is a bare mention of flame retardants at column 2, line 32, this document deals in fact with compatible polyblends which can be moulded into articles having tailored toughness (column 1, lines 19 to 21; column 3, lines 12 to 20).

Document (5) deals with polycarbonates containing as an essential ingredient 0.1 to 0.95% of polycaprolactone, which is said to improve the melt stability of the polycarbonate. The mere mention of the inclusion of additives known to increase the resistance of polycarbonates to heat and UV-radiation cannot assist the skilled reader.

5.3 A further point which needs to be taken into account is the requirement in the application in suit that the polyester should contain hydroxy end groups. Although document (2) regards polycaprolactones with hydroxy end groups as suitable, at least 50% and ideally all of these groups should be blocked (page 11, lines 5 to 17). Since the presence of terminal hydroxy groups is not considered at all by the other documents, this feature must be regarded as non-obvious and, therefore, as contributing to the inventiveness of the claimed subject-matter.

5.4 For these various reasons, the Board concludes that the combination of compositional features as defined in Claim 1 involves an inventive step.

6. Claim 1 being allowable, the same applies to dependent Claims 2 to 8, which are directed to preferred compositions according to Claim 1 and whose inventiveness is supported by that of the main claim.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order that a patent be granted on the basis of Claims 1 to 8, filed on 14 September 1993, and following description:

   - pages 1 and 4 to 27 as originally filed
   - page 2 filed on 14 September 1993
   - page 3 filed on 23 December 1991.

The Registrar: The Chairman:

E. Görgmaier C. Gérardin