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D E C I S I O N
of 4 May 2000

Case Number: T 1031/96 - 3.3.3

Application Number: 90118298.0

Publication Number: 0423509

IPC: C08K 3/30

Language of the proceedings: EN

Title of invention:
Highly filled thermoplastic polyester molding compositions

Applicant:
GENERAL ELECTRIC COMPANY

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 54, 56

Keyword:
"Amendments - added subject-matter (no)"
"Novelty - new combination of features (yes)"
"Inventive step - non-obvious combination of known features"

Decisions cited:
T 0606/89, T 0795/93

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 1031/96 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 4 May 2000

Appellant: GENERAL ELECTRIC COMPANY
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 11 June 1996 refusing European patent application No. 90 118 298.0 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: C. Gérardin
Members: B. ter Laan
J. De Preter

Summary of Facts and Submissions

I. European patent application No. 90 118 298.0, filed on 24 September 1990, claiming priority of 20 October 1989 from an earlier application in the USA (US 424749) and published on 24 April 1991 under No. 0 423 509 was refused by a decision of the Examining Division of the European Patent Office dated 11 June 1996. That decision was based on a set of twelve claims filed on 17 October 1994, Claim 1 reading:

"A molding composition which comprises:

(a) from 15-30% by weight of said composition of polybutylene terephthalate resin;

(b) polyethylene terephthalate resin; and

(c) from 50-75% by total weight of said composition of barium sulfate."

Dependent Claims 2 to 11 referred to preferred embodiments of the moulding composition according to Claim 1, Claim 12 was directed to an article moulded from the composition according to any one of the preceding claims.

II. The Examining Division held that the claimed subject-matter did not satisfy the requirements of Articles 123(2), 54 and 56 EPC. In particular, it was found that D4 (JP-A-1 110 561, considered in the form of an English translation) as a whole anticipated the subject-matter of Claim 1. D2 (US-A-3 953 394) was considered as the closest prior art since it described the polymer blend, contrary to D5 (US-A-4 043 971),

mentioned by the Applicant, which disclosed polybutylene terephthalate containing barium sulfate. No comparative examples containing the polymer blend without any filler were provided, so that the problem to be solved could only be formulated as to provide further compositions based on polybutylene terephthalate/polyethylene terephthalate blends. In the light of D3 (Handbook of Fillers for Plastics, edited by H.S. Katz and J.V. Milewski, Van Nostrand Reinhold Company, New York, 1987, pages 235, 238, 239 and 241) where the effects of adding barium sulfate to polymers were described, the claimed subject-matter was not inventive.

III. On 1 August 1996 a Notice of Appeal was lodged against that decision, together with payment of the prescribed fee. With the Statement of Grounds of Appeal filed on 14 October 1996, the Appellant (Applicant) submitted a set of 13 claims as the main request and indicated the basis of an auxiliary request, without however properly formulating these alternative claims.

IV. After a communication from the Board in which several objections under Articles 123(2), 84, 54 and 56 EPC were raised, on 6 April 2000 two new sets of claims were filed replacing the claims then on file.

At the oral proceedings before the Board, held on 4 May 2000, after further objections by the Board, those claims were again replaced by a new set of twelve claims as the sole request. Claim 1 of the main request reads a follows:

"A molding composition which comprises based on the total weight of the composition:

(a) from 5-65% by weight of polybutylene terephthalate resin;

(b) from 5-65% by weight of polyethylene terephthalate resin; and

(c) from 30-85% by weight of barium sulfate."

Dependent Claims 2 to 11 refer to preferred embodiments of the moulding composition according to Claim 1, Claim 12 is directed to an article moulded from the composition according to any one of the preceding claims.

V. The Appellant's arguments submitted in writing and during oral proceedings can be summarised as follows:

(i) Regarding Article 123(2) EPC, the application as originally filed provided an adequate basis for the amendments.

(ii) Regarding Article 84 EPC, the present wording of the claims provided a clear definition of the claimed subject-matter, particularly from a quantitative viewpoint.

(iii) Regarding novelty, D4 disclosed a composition containing polyethylene terephthalate, polybutylene terephthalate and zinc oxide, as well as a composition containing barium sulfate and polyamide-12, but no combination of polyethylene terephthalate/polybutylene terephthalate/barium sulfate as now claimed. Hence the claimed subject-matter was novel.

(iv) As regards inventive step, D5 was the closest document since it referred to the use of barium sulfate-filled polybutylene terephthalate, whereas D2 concerned mixtures of polyethylene terephthalate/polybutylene terephthalate which could contain reinforcing fillers. Barium sulfate, which was not a reinforcing filler, was not mentioned in D2. The amount of filling agent as well as the nature of the filler of D2 were different from the present compositions. Since the choice of the filler was critical for overall performance, D5 was the closest prior art document. Neither D2 nor D5, nor any of the other documents cited by the Examining Division, referred to gloss in connection with barium sulfate-filled polymers. Therefore, none of those documents could render the claimed subject-matter obvious.

VI. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 12 and description pages 1 to 12 as filed during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Article 123(2) EPC

2. The amendments to the claims are in conformity with the requirements of Article 123(2) EPC.

2.1 Claim 1 differs from the one as originally filed in

that the amounts of the polymers are now specified. Support for these amounts can be found in original Claim 8 and on page 3, lines 13 to 17 of the description as originally filed.

2.2 The other amendments in the claims are of an editorial nature.

2.3 The amendment on page 4, line 6 of the description regarding the size of the barium sulfate particles finds its support in original Claim 4.

2.4 The other amendments in the description (page 3, lines 7 to 17 and page 4, lines 19 to 23) concern an adaptation to the new claims.

Clarity and support

3. The Board is satisfied that the present wording of the claims provide a clear definition of the claimed subject-matter, in particular as regards the amounts of the composition components, and that the amended description provides adequate support for the claims.

Novelty

4. D4, according to its English translation, describes a composite resin composition for a motor rotor comprising (A) a thermoplastic resin and (B) a metal filler at a weight ratio ranging between 10:90 and 70:30 (Claim 1). The resin can be, among many others, polyesters, of which polyethylene terephthalate and polybutylene terephthalate are specifically mentioned (page 5, line 1 to page 8, line 14, in particular page 6, lines 20/21). Two or more resins may also be

combined (page 8, lines 15/16). The filler can be in the form of a metal, metal compound or metal alloy. Oxides of the metals can also be used (page 8, line 17 to page 9, line 2). Other fillers can be added to the metal fillers; barium sulfate is mentioned as one of the possible other fillers (page 11, lines 4 to 19, in particular lines 10/11). Of all 42 worked examples, only Example 38 mentions a mixture of polyethylene terephthalate/polybutylene terephthalate without however indicating their relative amounts. The use of barium sulfate is only disclosed in a comparative example, in combination with polyamide-12 (Comparative Example 7). Therefore, although the possible use of barium sulfate in combination with polyethylene terephthalate/polybutylene terephthalate is encompassed by D4, there is no actual disclosure of that specific combination, so that the claimed subject-matter is novel over D4.

5. The Examining Division also acknowledged novelty of the claimed subject-matter over the other documents on file and the Board concurs with that view.

Closest document

6. The application in suit concerns highly filled thermoplastic polyester moulding compositions. Filled polyester compositions are described in both D2 and D5. The Examining Division considered D2 to be the closest prior art document, whereas the Appellant used D5 as the starting point for the definition of the problem to be solved.

6.1 D2 discloses a thermoplastic, stable blended composition that is rigid at a temperature of 75°F-90°F

comprising

a. from about 1 to about 99 parts by weight of a poly-(ethylene terephthalate) resin and

b. from about 99 to about 1 part by weight of a poly-(1,4-butylene terephthalate) resin or a copolyester thereof with a minor amount of an aliphatic or aromatic dicarboxylic acid or an aliphatic polyol (Claim 1).

To that mixture additives may be added such as reinforcing fillers (e.g. fibrous glass filaments; column 6, lines 6 to 36) and flame retardants (e.g. such containing bromine; column 7, lines 9 to 15 and 42 to 57).

D2 concerns the usefulness as moulding and extrusion resins of poly(ethylene terephthalate) and poly(1,4-butylene terephthalate). It reports that poly(ethylene terephthalate) crystallizes very slowly and causes brittleness in thick parts of the products moulded from it (column 1, lines 18 to 24). By adding nucleating agents or applying specific measures, that problem could be overcome, but these compositions were complicated and expensive to produce (column 1, lines 25 to 34). Poly(1,4-butylene terephthalate) resins, by contrast, crystallize very rapidly from the melt, thus providing excellent moulding compositions having superior chemical resistance, thermal stability, product appearance, superior strength, stiffness, low friction and wear properties as well as good resistance to brittle fracture (column 1 lines 44 to 54). However, the material has a significantly higher cost of manufacture. The combination of the two polyesters,

which are unexpectedly compatible with each other, not only overcomes the problems in relation to the individual polymers, but also leads to products having properties ranging between those obtained with compositions containing either resin alone (column 3, lines 1 to 5) or even superior to those of either of the components (column 1, line 63 to column 2, line 27). In compositions containing a higher amount of polyethylene terephthalate the use of a nucleating agent is nevertheless recommended; such agent can be, amongst many others, sulfates of Group II of the Periodic Table of Elements, to be used in amounts of 0.1 to 3 % based on the amount of polyethylene terephthalate (column 13, lines 28 to 41). Barium sulfate as such is not specifically mentioned.

Therefore, D2 describes in detail the properties of compositions containing polyethylene terephthalate/polybutylene terephthalate (Examples and Tables), which compositions solve the problems caused by using each of its components separately (column 3, lines 13 to 17), and mentions the possibility to incorporate conventional additives, without however disclosing the addition of barium sulfate.

6.2 D5 discloses moulding compositions of polybutylene terephthalate having improved tracking resistance and containing as fillers calcium sulfate, barium sulfate or mixtures thereof in amounts of from 5 to 60% by weight of the total weight of the composition (Claim 1). The use of polybutylene terephthalate instead of polyethylene terephthalate is to be preferred in view of its desirable injection moulding properties (column 1, lines 13 to 27). In some applications however, the rigidity and tensile strength

of that material is inadequate and compensated by the use of reinforcing agents, which, however, reduce the tracking resistance of the polymer (column 1, lines 30 to 39). The above-indicated fillers lead to an excellent tracking resistance of the moulding composition (column 1, lines 43 to 47). Apart from the fillers, also other additives may be present (column 2, lines 3 to 4 and 26 to 32).

Hence, D5 describes the effects of adding barium sulfate on the tracking resistance of polybutylene terephthalate.

6.3 From the above analyses of D2 and D5 it is clear that, from a compositional point of view, both documents are equally close: both lack one of the components of the composition as now claimed. The composition of D2 does not contain any barium sulfate, whereas the composition according to D5 does not contain any polyethylene terephthalate.

6.3.1 However, for the determination of which document is the closest, the number of common features is in general not decisive. According to the established jurisprudence of the Boards of Appeal, generally, the claimed invention should be compared with the art concerned with a similar use which requires the minimum of structural and functional modifications. This involves not only comparing the claimed compositions with those of the prior art, but also giving consideration to the particular properties which render the compositions suitable for the desired use. Therefore, a document serving as the starting point for evaluating the inventive merits of an invention should relate to the same or a similar technical problem or,

at least, to the same or a closely related technical field as the application in suit (see decisions T 606/89 of 18 September 1990 and T 795/93 of 29 October 1996, neither published in OJ EPO).

6.3.2 According to the description of the application in suit, the surface of polybutylene terephthalate filled with 60 %, by total weight of the composition, of barium sulfate, lacks gloss and is not suitable for the preparation of articles requiring a smooth surface (page 1, lines 20 to 25). Therefore, the problem to be solved as arising from the description is to improve the surface properties of highly barium sulfate-filled polybutylene terephthalate, using D5 as the starting point (page 1, lines 25 to 29 and page 2, line 24 to page 3, line 4).

From points 6.1 and 6.2 above it appears that neither D2, concerned with the mouldability and extrudability of polyester compositions, nor D5, concerned with mechanical properties and tracking resistance of products made from filled polyester compositions, mention the surface properties of the end products made from the respective compositions, which the application seeks to improve. For that reason, neither of the two documents qualifies as a proper starting point for the evaluation of the inventive merits of the claimed subject-matter.

6.4 Nevertheless, if a choice should be made between D2 and D5 to serve as the closest prior art, there are some good reasons in favour of D5.

6.4.1 First, like the present application, D5 concerns the properties of articles made from the polyester

composition, whereas D2 relates to the moulding properties and extrudability of the polyester composition itself.

6.4.2 Secondly, whereas D2 mentions only small amounts for the possible use of Group II sulfates nucleating agents (column 13, lines 33 to 40: from 0.1 to 3% based on the amount of polyethylene terephthalate), the amounts of barium sulfate used in D5 range from 5 to 60% by weight (column 1, lines 64 to 66).

6.4.3 Finally, the patent application in suit itself uses D5 as its starting point (original page 1, lines 25 to 29). Usually, the definition of the problem to be solved as described in a patent application can be accepted unless there are good reasons to depart from it.

In the present case, according to the impugned decision, the reason to start from D2 instead of D5 for assessing the inventive step, was that it was well known that blends exhibited quite different properties compared to the individual polymers forming the blends. Not only is this argument questionable in view of D2 itself, where the possibility to obtain compositions of poly(ethylene terephthalate) and poly(1,4-butylene terephthalate) alone is clearly envisaged (column 3, lines 1 to 5), but, in the Board's view, the same can be said for highly barium sulfate-filled polybutylene terephthalate, which, according to D5, has an unexpectedly improved tracking resistance (column 1, lines 43 to 63).

6.4.4 For the above reasons, the Board considers D5 as the closest prior art document.

Problem and solution

7. As elucidated above (point 6.2), the polyester compositions of D5 have a good mechanical properties, but the surface properties of articles made out of those compositions leave to be desired. Therefore, the technical problem underlying the present application can be defined as the provision of highly barium sulfate-filled polybutylene terephthalate compositions which when moulded will have a smooth and glossy surface without impairing the mechanical properties.

8. According to the patent in suit this problem is solved by a composition comprising a combination of polybutylene terephthalate and polyethylene terephthalate with barium sulfate in the amounts specified in Claim 1.

9. The examples in the application demonstrate that the problem is effectively solved. In particular, Example 1, compared with Comparative Examples 1A and 1B, shows a significant improvement of the gloss of a composition according to Claim 1 without deterioration of the mechanical properties.

Obviousness

10. It remains to be decided whether the claimed subject-matter is obvious having regard to the documents on file.

10.1 D5 dissolves the problem of the reduction in tracking resistance of polybutylene terephthalate due to the incorporation of reinforcing fillers. It teaches to use barium sulfate or calcium sulfate as fillers in order

to solve that problem (see point 6.2 above). Since D5 contains no reference to surface properties or how to improve them, the document by itself cannot render the present combination of features obvious.

10.2 D2 teaches that polyethylene terephthalate and polybutylene terephthalate are compatible so that moulding compositions can be formed easily and in an economical way (see point 6.1 above). Surface properties are not mentioned and there is no hint of improving them.

10.3 Since neither of D2 and D5, nor any of the other cited documents mentions surface properties, the skilled person could not infer that those could be improved by the combination of compounds as now claimed.

10.4 For the above reasons, the Board comes to the conclusion that the subject-matter of Claim 1 involves an inventive step.

11. The above considerations also apply to independent Claim 12 since its subject-matter is based on the same combination of features as in Claim 1.

12. As Claim 1 of the main request is allowable, the same goes for dependent Claims 2 to 11, the patentability of which is supported by that of Claim 1.

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 to grant a patent on the basis of the documents submitted at the oral proceedings i.e. Claims 1 to 12 and description (pages 1 to 12).

The Registrar: The Chairman:

E. Görgmaier C. Gérardin