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D E C I S I O N
of 18 June 2003

Case Number: T 0037/01 - 3.3.3

Application Number: 94915412.4

Publication Number: 0696304

IPC: C08L 77/00

Language of the proceedings: EN

Title of invention:
Mineral filled copolyamide compositions

Patentee:
E.I. DU PONT DE NEMOURS AND COMPANY

Opponent:
BP Corporation North America Inc.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84, 88(2), 100(b), 123(2), 123(3)

Keyword:
"Novelty (yes)"
"Clarity (yes)"
"Sufficiency of disclosure (yes)"
"Inventive step (yes)"

Decisions cited:
T 0301/87, T 0182/89, T 0943/93, T 0352/97

Catchword:
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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0037/01 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 18 June 2003

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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 10 November 2000 concerning maintenance of European patent No. 0696304 in amended form.**

Composition of the Board:

Chairman: R. Young
Members: C. Idez
J. Van Moer

Summary of Facts and Submissions

I. The grant of European patent No. 0 696 304 in the name of E.I. Du Pont de Nemours and Company in respect of European patent application No. 94 915 412.4 filed on 28 April 1994 and claiming US priorities of 30 April 1993 and 19 April 1994 (US 08/054208 and US 08/230052 respectively) was announced on 4 March 1998 (Bulletin 1998/10) on the basis of 20 claims.

Independent Claims 1, 18 and 19 read as follows:

"1. A polymeric composition comprising (a) a first polyamide prepared from an aromatic carboxylic acid component and an aliphatic diamine component, said aliphatic diamine component being a mixture of hexamethylene diamine and 2-methyl 1,5-pentamethylene diamine; (b) a second polyamide selected from an aliphatic polyamide, a semiaromatic polyamide different from said first polyamide, or mixtures or blends thereof; and (c) a mineral filler.

18. A fiber formed from the composition of Claim 1.

19. A molded article formed from the composition of Claim 1."

Claims 2 to 17, and 20 were dependent on Claims 1 and 19, respectively.

II. On 4 December 1998, a Notice of Opposition was filed by Amoco Corporation in which revocation of the patent in its entirety was requested on the grounds of lack of

novelty and lack of inventive step (Article 100(a) EPC), of insufficiency of disclosure (Article 100(b) EPC) and extension of subject-matter (Article 100(c) EPC).

The objections were supported *inter alia* by the following documents:

D2: US 08/054208 (1st priority document);

D3: US 08/230052 (2nd priority document);

D4: WO-A-95/20630;

D5: English translation of JP 072162223 and priority document JP94/006937;

D6: US-A-5 064 716;

D7: WO-A-91/15537;

D8: WO-A-92/10525;

D9: US-A-4 607 073;

D10: US-A-4 937 315; and

D11: US-A-4 937 322.

III. By a decision announced orally on 12 October 2000 and issued in writing on 10 November 2000, the Opposition Division held that the grounds of opposition did not prejudice the maintenance of the patent in amended form, the amendments consisting in the incorporation of the

expression "crystalline or partially crystalline" before "first polyamide" in Claim 1 as granted.

IV. The decision explicitly mentioned that the main request did not contravene Articles 123(2), 123(3) and 84 EPC. It held, in particular, that the statement that the semiaromatic polyamide (b) was different from polyamide (a) was merely a clarification, which emphasized the fact that (a) and (b) were different polyamides, as their label as first and second polyamide already suggested. It thus concluded that this amendment could not contravene Article 123(2) EPC.

Concerning Article 100(b) EPC, the decision held that, although the designation of the component (a) in the Examples as 50/50% 6T/DT might be taken as referring to a blend of homopolyamides 6T and DT in equal amounts, it was clear from Examples 1 to 17 read in combination with lines 44 to 46 on page 5 of the patent and from the reference to the comparative polyamide ARLEN C2000 defined as 66/6T (55/45%) and said to be a copolyamide (cf page 5, lines 51 to 53 of the patent), that the component (a) to be used was a copolyamide and not a blend. The decision further held that Claim 9 did not suggest that the component (a) might be a homopolyamide. Thus, the disputed patent and the invention it concerned were considered as sufficiently disclosed to be carried out by a person skilled in the art.

Concerning the objection of lack of novelty, the decision stated that the patent in suit was entitled to the priority of the first priority document D2 and that therefore document D4 could not be considered as an

intermediate document according to Articles 54(3) and (4) EPC. It further stated that novelty was given over document D6, since that document did not refer at all to crystalline or partially crystalline polyamides.

Concerning inventive step, the decision mentioned that there was agreement that document D8 should be considered as closest state of the art. The subject-matter of the patent in suit was distinguished from that of D8 in that D8 did not teach to admix a second polyamide of aliphatic or semiaromatic type in the polyamide composition.

Starting from D8, the technical problem was then seen as to improve thermal properties i.e., the Tg, the exothermic cold crystallization peak temperature (Tcc) and the surface appearance of the polyamide composition while reducing its moisture sensitivity.

The decision stated that documents D9, D10 and D11 which all taught to modify the monomeric components of the polyamide by replacing terephthalic acid by other aromatic acids such as isophthalic acid (cf. D9) and/or by replacing the hexamethylene diamine by longer chain diamines (D9) or sterically hindered diamines (D10, D11) in order to improve the moulding properties of polyamides could not suggest the blending of different polyamides for solving the technical problem underlying the patent in suit.

Thus, the Opposition Division came to the conclusion that the object of the patent in suit involved an inventive step.

V. A Notice of Appeal was filed on 9 January 2001 by the Appellant/Opponent (the name of which had been changed from Amoco Corporation to BP Amoco Corporation, later BP Corporation North America, Inc) with simultaneous payment of the prescribed fee. With the Statement of Grounds of Appeal filed on 20 March 2001, the Appellant submitted a new document referred to as D12 (English translation of the Japanese patent application JP-A-61-162 550). It also argued essentially as follows:

(i) Concerning Article 100(b) EPC:

(i.1) According to Claim 1 as maintained, component (a) was a copolyamide. Claim 9 on the other hand suggested that a homopolyamide might be present in component (a).

(i.2) In the Examples of the disputed patent the polyamide (a) was defined as 50/50% 6T/DT. This was likely to denominate a mixture of two distinct polycondensates rather than a copolycondensate.

(i.3) The reference made by he Opposition Division to lines 44 to 46 on page 5 of the patent was not convincing since it might refer to the second polyamide.

(i.4) The further reference made by the Opposition Division to ARLEN C2000 was not convincing either in view of the ambiguous definition given on page 4, lines 28 to 31 of the patent for component (b).

(i.5) Thus the patent in suit did not unambiguously define the component (a) to be used in the claimed composition.

(i.6) Furthermore, only terephthalic and isophthalic acids were mentioned as aromatic acids for component (a). The patent specification was therefore not enabling in respect of the other aromatic acids to be used in component (a) of the claimed composition.

(ii) Concerning novelty:

(ii.1) According to priority document D2, the polyamide (a) was based on terephthalic/and or isophthalic acid and the polyamide (b) should be an aliphatic polyamide.

(ii.2) Thus Claims 1 to 20 enjoyed only the second priority date of 19 April 1994, and D4 belonged to the state of the art according to Articles 54(3)(4) EPC.

(ii.3) Document D4 disclosed a polyamide composition comprising a polyamide resin (I) derived from terephthalic acid or a mixture thereof with isophthalic acid, hexamethylene diamine and 2-methyl pentamethylene diamine, an aliphatic polyamide resin and an inorganic filler. Thus, it destroyed the novelty of Claim 1 of the opposed patent.

(ii.4) D6 would also be novelty destroying for the subject-matter of Claim 1. The fact that D6 taught to not use crystalline polyamides implicitly informed the skilled person that the possibility existed that component (a) could be crystalline or at least partially crystalline.

(iii) Concerning inventive step:

(iii.1) Document D8 could be considered as the closest state of the art. It appeared, however, that the technical problem defined by the Opposition Division was not effectively solved by the compositions according to the patent in suit, since no data concerning the moisture sensitivity had been reported and since the compositions according to Examples 12 and 16 exhibited a worse surface appearance than that of control 5 (prior art).

(iii.2) Thus, only an improvement of Tg and crystallization temperature Tcc should be taken into account in the formulation of the technical problem.

(iii.3) Mixing and blending of polyamides for tailoring properties thereof was usual practice. It would also be expected that the Tg and Tcc of blends of miscible polyamide would be between the respective values of the individual components.

(iii.4) The aim of document D9 was to develop a polyamide composition having good thermal, mechanical and chemical properties and good moulding properties. D9 encompassed the possibility to combine two semiaromatic polyamide resins.

(iii.5) Thus, in view of D9, it was obvious for the skilled person wishing to improve the properties of the compositions of D8 to add a second semi aromatic polyamide resin thereto.

(iii.6) The combination of D8 with either D10 or D11 would also suggest to add an aliphatic polyamide resin in the composition of D8. Document D12 further taught to mix aromatic polyamides with mineral fillers.

(iii.7) Thus, Claim 1 lacked inventive step. The same conclusion would apply to Claims 2 to 20.

VI. The arguments presented by the Respondent in its letter dated 27 September 2001 may be summarized as follows:

(i) Concerning Article 100(b) EPC:

(i.1) The nomenclature used in the patent in suit for defining the polyamide 6T/DT was conventional in the art for polyamide copolycondensates. In that respect, the polyamide ARLEN C2000 was also a copolycondensate.

(i.2) It was thus clear that the polyamide (a) to be used was copolycondensate and not a blend.

(i.3) It was acknowledged that there was a clerical error in Claim 9, which should be in fact dependent on Claim 2. In view of the statements in the description of the patent (cf. page 3, lines 26 to 28 and page 4, lines 1 to 2), it was, however, clear that the requirements of Article 83 EPC were met.

(i.4) The skilled person would have no difficulty in adapting the process disclosed for isophthalic and terephthalic acids to other aromatic acids used in the manufacture of polyamides.

(ii) Concerning novelty:

(ii.1) It was clear that subject-matter within the scope of Claim 1 of the patent in suit relating to compositions comprising a first polyamide prepared from isophthalic and/or terephthalic acid, hexamethylene diamine and 2-methyl pentamethylene diamine, an aliphatic polyamide and a mineral filler was entitled to claim priority from D2. Such compositions were the only compositions described in D4. Thus, it followed that D4 was not novelty destroying for the subject-matter of Claim 1.

(ii.2) Document D6 was totally silent about the use of a semi crystalline or crystalline polyamide as component (a) and could not be prejudicial to novelty of Claim 1.

(iii) Concerning inventive step:

(iii.1) The problem to be solved was to provide compositions having Tg and Tcc in the right range for moulding without loss of high surface gloss. This problem was solved by blending a semi aromatic or aliphatic polyamide with the 6T/DT copolyamide.

(iii.2) In that respect it was surprising that the values obtained for Tg and Tcc were significantly lower than would be expected from a linear interpolation. Furthermore all the examples but one showed an excellent surface gloss.

(iv.3) None of the cited documents suggested blending with a second polyamide as a solution to the technical problem. D7, D8, D9, D10 and D11 relied on chemical modification of a single polyamide to improve moulding properties of polyamide compositions. D12 did not appear to add anything to the teachings of D7 and D8. Thus the claims of the opposed patent involved an inventive step.

VII. With letter dated 16 April 2003, the Representative of the Respondent informed the Board that it would be

accompanied at the Oral Proceedings by Mr. William Hamby, a registered US patent attorney and by Mr. Giorgios Topoulos as a technical expert and that Mr Hamby and Mr Topoulos might address the Board under the Representative's supervision and control concerning legal arguments and technical aspects, respectively. With letter dated 16 June 2003 the Respondent further filed two sets of claims representing a first and a second auxiliary request, respectively.

VIII. Oral proceedings were held on 18 June 2003. At the beginning of the oral proceedings, the Respondent filed a further set of claims representing a third auxiliary request.

During the oral proceedings the Appellant referred in substance to its arguments submitted in the Statement of Grounds of Appeal, but it also made further submissions concerning the clarity of Claim 1 of the set of claims on which the decision of the Opposition Division was based and the sufficiency of disclosure of the invention, which may be summarized as follows:

(i) Concerning clarity:

(i.1) According to D6 (cf. column 5, lines 4 to 17) copolyamides based on hexamethylene diamine, terephthalic acid, isophthalic acid, and 2-methyl pentamethylene diamine might be amorphous, even if the level of terephthalic units was high.

(i.2) In that respect, Claim 1 contained no limitation concerning the respective amounts

of terephthalic acid, hexamethylene diamine, and 2-methyl pentamethylene diamine and no indication of a level of crystallization, which might be very low. Thus, it was not clear where the border should be placed between an amorphous polyamide according to D6 and a partially crystalline polyamide according to the patent in suit, both being based on the same constituents.

(i.3) Thus, the expression "partially crystalline" used in Claim 1 was vague and did not clearly define the matter for which protection was sought. It could not be used to distinguish the claimed subject-matter from document D6.

(ii) Concerning Article 100(b) EPC:

(ii.1) It could not be excluded that transamidation reaction occurred between the polyamide components. Thus it was not clear whether the composition must in fact contain only one copolyamide resulting from the reaction of (a) with (b), or a blend of (a) with (b).

(ii.2) It was further unclear as to whether the component (a) should be a semiaromatic copolyamide or a blend of two polyamides. The reference to lines 23 to 32 on page 4 of the patent in suit, which defined the component semiaromatic polyamide (b) as the polycondensation product of an aromatic dicarboxylic acid and an aliphatic diamine

and the further reference to blends or mixture of semiaromatic polyamides and aliphatic polyamides (cf. page 4, lines 28 to 31) showed that the nomenclature used for the product Arlen C2000 (i.e. 55/45% polyamide 66/6T; cf. page 7, line 31) indeed might also refer to blend of polyamides. Since a similar nomenclature had been used for defining the polyamide (a) used in the examples of the patent in suit (cf. page 7, line 23) it was not clear whether this component should a be semiaromatic copolyamide or a blend of two polyamides.

The Respondent, while essentially relying on its written submissions, presented further arguments concerning the issues of clarity, sufficiency of disclosure, novelty and inventive step which may be summarized as follows:

(i) Concerning clarity:

(i.1) The expression "partially crystalline" had the same meaning as semicrystalline, which was well known in the art. Amorphous polyamides could indeed be clearly distinguished from such semicrystalline polyamides in that they did not exhibit a level of crystallinity which could be detected by conventional methods (e.g. Differential Scanning Calorimeter).

(i.2) Thus no lack of clarity arose from the incorporation of the expression "partially crystalline" in Claim 1.

(ii) Concerning Article 100(b) EPC:

(ii.1) Even if some transamidation might occur in the preparation of the claimed composition, the blend of components (a) and (b) was still detectable in the final product.

(ii.2) It was also clear in view of lines 29 to 31 on page 4 that the semi aromatic polyamide (b) might be a copolyamide. This was further exemplified by the use of the product Arlen C2000.

(ii.3) The nomenclature used for designating this product corresponded to the one used in the art for copolyamides. Since the same nomenclature had been used for designating the component (a) used in the examples of the patent in suit, it was clear that this component was a copolyamide and not a blend.

(iii) Concerning novelty:

(iii.1) Firstly, document D6 made no reference to the use of a crystalline or partially crystalline semiaromatic copolyamides and, secondly, it did not disclose the incorporation a mineral filler in the polyamide blend.

(iii.2) Thus D6 could not be considered as a novelty destroying document.

(iv) Concerning inventive step:

(iv.1) Documents D7 or D8 could be used as starting points for the assessment of inventive step.

(iv.2) These documents related to semiaromatic polyamides compositions having high heat distortion temperature (HDT), high Tg, and high strength. These compositions were, however, difficult to mold since their Tg and Tcc were too high.

(iv.3) Starting from D7 or D8 the technical problem was to improve the moulding properties of these compositions, while maintaining good thermal, mechanical and surface aspect properties.

(iv.4) All the examples of the patent in suit showed that this technical had been effectively solved. In addition, Examples 1 to 15 illustrated that the use of an aliphatic polyamide as component (b) led to an unexpected increase of the surface gloss of the moulded parts, while Examples 16 to 17 showed that the use of a semi aromatic polyamide resulted in moulded parts having an acceptable surface appearance and an improved coefficient of linear thermal expansion (CLTE).

(iv.5) Even if *prima facie* it could be considered as obvious to add a further polyamide to obtain blend having a Tg and a Tcc between the respective values of the polyamides used, the crystallization behaviour of such blends, the miscibility of the components as well as the influence of transamidation reaction could not have been foreseen.

(iv.6) Furthermore, the values obtained in the compositions according to the patent in suit for Tg and Tcc did not correspond to a mere interpolation from the respective values of each polyamide component.

(iv.7) As previously submitted in the letter dated 27 September 2001, documents D9 to D11 could not suggest the solution proposed by the patent in suit. The same was true for late filed document D12, which merely taught to combine a semiaromatic polyamide resin containing a very specific amount of aromatic components with a specific amount of filler in order to obtain compositions having good moulding and thermomechanical properties. In particular, D12 contained no suggestion of blending with a second polyamide resin.

IX. The Appellant requested that the decision under appeal be set aside and the patent be revoked.
The Respondent requested that the appeal be dismissed, or, in the alternative, that the patent be maintained on the basis of the first or second auxiliary requests

filed with letter of 16 June 2003, or of the third auxiliary request filed at the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Article 123(2) EPC*

2.1 Claim 1 differs from Claim 1 as originally filed by the incorporation of the feature (i) that the semi-aromatic polyamide used as second polyamide (b) is different from the first polyamide (a), and of the feature (ii) that the first polyamide (a) is crystalline or partially crystalline.

2.2 Although feature (i) has no explicit basis in the application as originally filed, it is however implicit from the expression "first polyamide" and "second polyamide" used for qualifying respectively the polyamide (a) and the polyamide (b) that these polyamide resins must be different. Thus, in the Board's view, the incorporation of the term "different" merely emphasizes this fact and does not provide a technical contribution to the subject-matter of the claimed invention.

2.3 Amendment (ii) finds its support on page 3, lines 15 to 16 of the application as originally filed.

2.4 Claims 2 to 20 correspond to Claims 2 to 20 as originally filed.

2.5 Thus, it follows from the above that Claims 1 to 20 meet the requirements of Article 123(2) EPC.

3. *Article 123(3) EPC*

3.1 Claims 1 to 20 differ from Claims 1 to 20 as granted only by the fact that the feature (ii) as indicated in paragraph 2.1 above has been incorporated in Claim 1.

3.2 Since the incorporation of this feature amounts to a limitation of the claimed subject-matter in comparison to that of the granted patent, no objection under Article 123(3) EPC arises in respect of Claims 1 to 20.

4. *Clarity*

4.1 When amendments are made to a patent during an opposition, Article 102(3) EPC requires consideration as to whether the amendments introduce any contravention of any requirement of the Convention, including Article 84 EPC. However, Article 102(3) EPC does not allow objections to be based upon Article 84 EPC, if such objections do not arise out of the amendments made (cf. also T 301/87; OJ EPO 1990, 335).

4.2 In the present case the only amendment made in the course of the opposition was the incorporation of the expression "crystalline or partially crystalline" before the term "first polyamide" in Claim 1 as granted.

4.3 Thus, the question boils down as to whether this expression introduces unclarity in Claim 1.

4.4 The introduction of the term "crystalline" was not disputed by the Parties and the Board sees no objection of lack of clarity arising from the introduction of this term in Claim 1.

4.5 At the oral proceedings the Appellant submitted that the feature "partially crystalline" introduced unclarity since, in its opinion, no clear distinction could be made between an amorphous polyamide and a partially crystalline polyamide. In its view, the relative term "partially" did not define a lower limit of crystallinity, and such a vague term could not be used for distinguishing the claimed subject-matter from document D6, which in particular referred to copolyamides having the same starting components as the first polyamide according to the patent in suit, but being presented as amorphous in D6 (cf. D6, column 5, lines 4 to 17).

4.6 In the Board's view, this argument is not convincing for the following reasons:

4.6.1 The argument of the Appellant is essentially based on document D6, which, however, refers to compositions comprising a semicrystalline polyamide and an amorphous polyamide (cf. D6, column 4, lines 6 to 18).

4.6.2 Thus, the disclosure of D6 itself evidently presupposes, that a clear distinction can be made between a semicrystalline polyamide and an amorphous polyamide.

4.6.3 In that respect, D6 discloses that the term "amorphous polyamide" is well known to those skilled in the art and the characteristic lack of crystallinity in amorphous polyamides can be shown by a conventional method such as differential scanning calorimetry (cf. D6, column 4, lines 19 to 25).

4.6.4 Thus, document D6, on the basis of which the objection of lack of clarity was raised, establishes, on the contrary, that it is clear for the skilled person where and how the borderline between a semicrystalline polyamide and an amorphous polyamide is to be found.

4.6.5 Since the terms "semicrystalline" and "partially crystalline" are indeed synonyms, it follows from the above that no objection of lack of clarity arises from the incorporation of the term "partially crystalline" in Claim 1.

4.7 Thus, the amendment to the claims do not introduce any unclarities. Accordingly the requirements of Article 84 EPC are complied with.

5. *Sufficiency of disclosure*

5.1 In the Board's view, there can be no doubt that the polyamide (a) used in the examples of the patent in suit is a copolyamide obtained from hexamethylene diamine, 2-methyl pentamethylene diamine, and terephthalic acid, since the nomenclature used in the patent in suit for designating this polyamide (i.e. 50/50% 6T/DT) unambiguously corresponds to the one used in the art for copolyamides. This is also further evident from the fact that a similar nomenclature

55/45% 66/6T has been used for characterizing the product Arlen C2000 of Mitsui Japan which is known as a copolyamide of hexamethylene diamine, adipic acid, and terephthalic acid (page 7, line 31). It thus follows that the skilled person is clearly taught to use a copolyamide as component (a) for carrying out the claimed invention.

5.2 The Appellant has further argued that the patent in suit contains no indication as to how to prepare a component (a) from aromatic dicarboxylic acids other than isophthalic and terephthalic acid so that the skilled person would not know how to prepare such a component (a).

5.3 In that respect it is noted by the Board that the patent in suit contains a very detailed description of a process for making a copolyamide (a) while using isophthalic or terephthalic acids as aromatic dicarboxylic acids (cf. page 3, lines 34 to 49), so that it is credible to the Board that the skilled person, using common technical knowledge, would, without undue burden, know how to adapt this process to other aromatic dicarboxylic acids (analogy process).

5.4 The Appellant has further questioned the feasibility of the preparation of the claimed composition by arguing that transamidation would occur and would prevent that a blend of the two polyamide components be obtained.

5.5 Even if, as admitted by the Respondent, some degree of transamidation could occur, the issue raised by the Appellant is an issue which would normally be decided in the light of relevant experimental evidence, showing

that the level of transamidation is such that no blend of the two polyamides can be obtained. No such evidence has, however, been submitted by the Respondent, although the Respondent has the onus of the proof of its allegation (cf. T 182/89, OJ EPO 1991, 391).

5.6 Thus, it has not been shown to the satisfaction of the Board that there is a deficiency in the patent in suit in the sense of Article 100(b) EPC. Consequently, the ground of opposition under Article 100(b) EPC cannot succeed.

6. *Novelty*

6.1 Documents D4 and D6 have been cited by the Appellant in support of its objection of lack of novelty against Claim 1 of the patent in suit.

6.2 Document D4 has been published on 3 August 1995 i.e. after the filing date of the patent in suit (i.e. 28 April 1994), but D4 claims the priority of the JP patent application 94/006937 of 26 January 1994, i.e. a priority date between the filing dates of the two US patent applications (i.e. 30 April 1993 and 19 April 1994), the priority of which is claimed by the patent in suit. It is thus necessary prior to assessment of novelty in view of D4 to determine (i) whether D4 is entitled to its priority, and, in the affirmative, (ii) to which extent the patent in suit is entitled to the priority date of the first US patent application (D2).

6.2.1 The Respondent has not contested that document D4 is entitled to the priority of the JP 94/006937. It is also evident in view of the comparison between Claims 1

to 6 of the JP-A-07216223 i.e. the Japanese patent corresponding to the Japanese patent application JP94/006937 (cf. D5 pages 1 and 2) and Claims 1 to 6 of D4, that D4 is entitled to the priority of this Japanese patent application.

6.2.2 Priority document D2 relates to compositions comprising a first crystalline or partially crystalline polyamide prepared from terephthalic or mixtures thereof with isophthalic acid, hexamethylene diamine and 2-methyl pentamethylene diamine, and an aliphatic polyamide and a mineral filler (cf. D2, page 3, lines 8 to 34).

6.2.3 While Claim 1 of the patent in suit is directed to compositions in which the first copolyamide is not restricted to those obtained from terephthalic acid or mixtures thereof with isophthalic acid and while it further relates to compositions in which the second polyamide may be a semiaromatic polyamide, it nevertheless enjoys the priority of D2 for the part of the claimed subject-matter also disclosed in D2, i.e. the compositions mentioned in paragraph 6.2.2 above (Article 88(2) EPC).

6.2.4 It thus follows that document D4 belongs to the state of the art according to Article 54(3)(4) for the patent in suit only in respect of the subject-matter not disclosed in D2, i.e. the compositions according to Claim 1 of the patent in suit based on a first polyamide obtained from an aromatic dicarboxylic acid other than terephthalic acid or mixture thereof with isophthalic acid, and the compositions comprising a semi aromatic polyamide as second polyamide (cf. also T 352/97 of 24 October 2000, not published in OJ EPO).

6.2.5 Document D4, however, relates only to polyamide resin compositions comprising (A) 30-90 weight percent, based on components (A) and (B), of a polyamide resin containing (i) 10-99 weight percent, based on components (i) and (ii) of an aromatic polyamide containing a carboxylic acid component derived from terephthalic acid or a mixture of terephthalic and isophthalic acid in which the isophthalic acid constitutes 40 mole percent or less of the mixture, and an aliphatic diamine component derived from a mixture of hexamethylene diamine and 2-methyl pentamethylene diamine; and (ii) 1-90 weight percent, based on components (i) and (ii), of an aliphatic polyamide resin and (B) 10-70 weight percent, based on components (A) and (B), of an inorganic filler (cf. D4, Claim 1). Consequently, D4 cannot destroy the novelty of Claim 1 of the patent in suit.

6.3 Document D6 belongs to the state of the art according to Article 54(2) EPC. It discloses compositions consisting essentially of about 50 to about 95 percent by weight of an ethylene vinyl alcohol copolymer having a copolymerized ethylene content of about 20 to about 60 mole percent and a degree of saponification of at least about 90 %, and about 5 to about 50 percent by weight of a polyamide blend consisting essentially of about 30 to about 90 percent by weight of at least one amorphous polyamide characterized by the lack of an endothermic crystalline melting peak as measured by differential scanning calorimetry and further characterized by a glass transition temperature of up to about 160°C, and about 10 to about 70 percent by weight of at least one semicrystalline polyamide which

is miscible with the ethylene vinyl alcohol copolymer. The amorphous polyamide may be a copolymer of hexamethylene diamine and 2-methylpentamethylene diamine with iso- or terephthalic acids, or mixtures of these acids, and the semicrystalline polymer is an aliphatic polyamide selected from polyamides prepared from lactams or amino acids, polyamides obtained by condensation of aliphatic diacid with aliphatic diamines or copolymers thereof. D6 further mentions that fillers may be added to the compositions (cf. D6, Claims 1, 4; column 5, lines 46 to 60; column 7, lines 56 to 59).

6.4 Firstly, the copolyamide of hexamethylene diamine and 2-methylpentamethylene diamine with iso- or terephthalic acids used in the composition of D6 is amorphous instead of being crystalline or partially crystalline as required by Claim 1 of the patent in suit, and, secondly, D6 is totally silent on the nature of the filler used (i.e. mineral or organic). Thus, it is evident that D6 does not disclose a composition according to Claim 1 of the patent in suit.

6.5 The further argument of the Appellant that the fact that D6 teaches to not use crystalline polyamides implicitly informed the skilled person that the possibility existed that component (a) could be crystalline or at least partially crystalline is not convincing either. A document can only be novelty destroying provided it discloses directly and unambiguously the claimed invention. This unambiguous disclosure does not encompass such hypothetical embodiments which are contrary to the teaching of this prior art document, and which, consequently, the

skilled person would have no technical motive to consider (cf. decision T 943/93; of 30 August 1994, not published in OJ EPO).

6.6 Consequently, D6 does not destroy the novelty of the subject-matter of Claim 1 of the patent in suit.

6.7 It thus follows from the above that the subject of Claim 1 is novel over the cited prior art. The same conclusion applies to the subject matter of dependent Claims 2 to 17 and to the subject matter of Claims 18, and 19 to 20 which relate to a fiber or a moulded product made from a composition according to Claim 1, respectively (Article 54 EPC).

7. *The patent in suit, the technical problem*

7.1 The patent in suit is concerned with semiaromatic polyamide compositions comprising mineral filler.

7.2 Such compositions are known from document D8 which the Board, in common with the Parties and the Opposition Division, regards as the closest state of the art.

7.3 Document D8 relates to compositions comprising partially crystalline copolyamides formed from an aromatic carboxylic acid and a mixture of hexamethylene diamine and 2-methyl pentamethylene diamine. The aromatic carboxylic acid is terephthalic acid or a mixture of terephthalic acid and isophthalic acid. The copolyamides have a melting point of greater than 280°C and less than 330°C, especially greater than 300°C. The copolyamides may be blended with stabilizers, flame retardants, smoke depressants, plasticizers, conductive

and/or anti-static agents, lubricants and mould release agents, nucleating agents, dyes and pigments, fillers including glass fibres, minerals, toughening and other modifying agents, and other additives that may be used in polyamide compositions. A wide range of fillers may be used e.g. in amounts of 0.5-200 parts of filler per 100 parts of copolyamide. Examples of such fillers included silica, metasilicates, alumina, talc, diatomaceous earth, clay, kaolin, quartz, glass, mica, titanium dioxide, molybdenum disulphide, gypsum, iron oxide, zinc oxide, fibres (e.g. glass, ceramic fibres). The compositions may be used in the manufacture of products using melt processing techniques, especially products intended for use at temperatures that are higher than those typically used with other polyamides e.g. parts requiring resistance to temperatures of 260°C or above. Alternatively, they may be spun into fibres (cf. D8, Claims 1, 5, 6, 19, 20; page 6, lines 5 to 26).

7.4 According to the patent in suit semiaromatic, semi-crystalline polyamide compositions, while exhibiting a high temperature resistance (high HDT), tend to crystallize very slowly, require high mould temperatures and are often unsuitable for applications requiring a glossy surface (cf page 1, line 17 to page 2, line 5).

7.5 Starting from D8, the technical problem may thus be seen in the provision of semiaromatic polyamide compositions having improved mouldability and crystallization properties (reflected by a low Tcc), i.e. allowing the use of lower mould temperature, while exhibiting high temperature resistance (reflected by a high Tg and a high HDT)) and good surface properties

(glossy surface) (cf. page 2, line 6 to 13; page 3, lines 1 to 2).

7.6 The solution proposed according to Claim 1 of the patent in suit is to add an aliphatic polyamide resin or a different semiaromatic polyamide to the composition comprising the crystalline or partially crystalline semiaromatic polyamide.

7.7 While the compositions of Examples 1 to 15, and 17 of the patent in suit exhibit a low Tcc, high Tg and HDT, and a glossy surface, it is true, as submitted by the Appellant, that the composition of Example 16 results in a matte surface appearance. It is, however, noted by the Board that the composition of Example 17, which differs from that of Example 16 only by the incorporation of glass fibres in the composition exhibits a glossy surface, although glass fibres are generally known to degrade the surface appearance. Thus, in the Board's view, this occasional lack of success cannot impair the credibility of the solution proposed by the patent in suit. It thus follows that the Board is satisfied that the technical problem is effectively solved by the claimed measures.

8. *Inventive step*

8.1 It remains to be decided whether the solution of the technical problem was obvious to a person skilled in the art having regard to the relevant prior art.

8.2 Although D8 discloses a long list of additives which might be used in the compositions (cf. point 7.3 above), it is totally silent on the incorporation of further

polyamides such as aliphatic polyamides or semiaromatic polyamides. Furthermore, it teaches to add nucleating agent in order to improve the crystallization rate of the compositions (cf. page 15, lines 20 to 22). Thus, document D8 itself cannot suggest the solution of the technical problem.

8.3 Document D7 relates to compositions comprising a polyamide obtained from terephthalic acid, hexamethylene diamine, 2-methyl pentamethylene diamine and optionally 2-ethyl pentamethylene diamine, and a filler such as talc, mica, glass fibres or asbestos fibres. While the aim of D7 presents some similarity to that of the patent in suit i.e. in providing compositions having a high HDT of at least 240°C and high crystallization rate allowing the use of low mould temperatures, D7 firstly solves this problem by using a specific amount of hexamethylene diamine i.e. from 40 to 90% by mole in the diamine component of the single polyamide and, secondly, gives no indication of the surface appearance of the moulded parts obtained (cf. D7; page 2, line 29 to page 4, line 28). Thus, D7 cannot lead to the solution of the technical problem.

8.4 Documents D9, D11 and the late filed document D12 which relate to compositions comprising a semiaromatic polyamide and a mineral filler, all teach to modify the starting components of the semi aromatic polyamide, i.e. the dicarboxylic acid component and/or the diamine component in order to improve the mouldability of such compositions while maintaining good thermomechanical properties (cf. D9, column 2, line 48 to column 3, line 61; cf. D11, Claim 1; column 1, lines 29 to 64;

column 5, lines 7 to 37; cf. D12, page 3, line 31 to page 4, line 14).

8.4.1 The reference to the possibility of adding other polyamides, such as nylon 12, nylon 11, nylon 69, nylon 610 or nylon 66 which are aliphatic polyamides (cf. D11, column 5, lines 43 to 60) is mentioned in passing and in particular is not associated with any suggestion of what the effect of such addition might be, let alone that it would contribute to the solution of the technical problem.

8.4.2 Hence, neither of these documents would offer to the skilled person a hint to the solution of the technical problem.

8.5 The information contained in documents D10 and D6 is even less relevant, since D10 refers only to compositions based on amorphous polyamides, and since document D6 aims to provide thermoformable ethylene vinyl acetate compositions by adding therein a polyamide blend.

8.6 In other words, it follows from the above that the solution of the technical problem does not arise in an obvious way from the state of the art.

8.7 Consequently, the subject-matter of Claim 1, and by the same token that of dependent Claims 2 to 17 involves an inventive step. Furthermore, the subject-matter of Claims 18, and 19 to 20, which are respectively directed to a fibre and a moulded product obtained from a composition according to Claim 1 also involves an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar: The Chairman:

E. Görgmaier R. Young