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D E C I S I O N
of 8 February 2000

Case Number: T 0688/97 - 3.3.3

Application Number: 89116102.8

Publication Number: 0357065

IPC: C08L 71/12

Language of the proceedings: EN

Title of invention:
Resin composition

Patentee:
MITSUBISHI PETROCHEMICAL CO., LTD.

Opponent:
GENERAL ELECTRIC COMPANY

Headword:
-

Relevant legal provisions:
EPC Art. 56, 83, 84, 100(a), (b), 114(1), (2), 123(2)

Keyword:
"Claims (main request and first auxiliary request) - clarity (no)"
"Disclosure - sufficiency (yes)"
"Inventive step (second auxiliary request) - unobvious combination of features"

Decisions cited:
T 0435/91

Catchword:
-



Case Number: T 0688/97 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 8 February 2000

Appellant:
(Opponent)

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Representative:

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Decision of the Opposition Division of the
European Patent Office posted 15 April 1997
rejecting the opposition filed against European
patent No. 0 357 065 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: A. Däweritz
M. Vogel

Summary of Facts and Submissions

I. The grant of European patent No. 0 357 065 in respect of European patent application No. 89 116 102.8 filed on 31 August 1989 and claiming priority of 31 August 1988 of an earlier application in Japan (215157/88), was announced on 21 December 1994 (Bulletin 94/51) on the basis of 11 claims, Claim 1 thereof reading as follows:

"1. A resin composition comprising:

(A) 100 parts by weight of a resin comprising:

(1) 20 to 60 % by weight of a polyphenylene ether resin,

(2) 25 to 65 % by weight of a polyamide resin, and

(3) 1 to 35 % by weight of an alkenylaromatic compound-conjugated diene copolymer;

(B) 0.01 to 10 parts by weight of a compound having unsaturated group and polar group in combination within the same molecule; and

(C) 1 to 50 parts by weight of an inorganic filler having an average particle size of 1 μm or less, said polyphenylene ether resin being dispersed into the polyamide resin which forms continuous phase, and said inorganic filler being dispersed into dispersed phases of the polyphenylene ether resin."

Claims 2 to 11 relate to preferred embodiments of the resin composition according to Claim 1.

II. On 22 September 1995, a Notice of Opposition was filed in which revocation of the patent in its entirety was requested on the grounds of lack of inventive step within the meaning of Article 56 EPC (Article 100(a) EPC) as well as insufficiency of disclosure under Article 100(b) EPC.

The objections were supported essentially by the following documents:

D1: EP-A-0 270 796,

Attachment A, concerning a commercial product "Noryl GTX-910", and

Attachment B, consisting of an experimental report.

III. By decision issued in writing on 15 April 1997, the Opposition Division rejected the opposition.

(i) The objection under 100(b) EPC was rejected with reference to the various experiments reported in the patent specification and submitted during the examination procedure, as well as because the experimental evidence submitted by the Opponent was not convincing.

(ii) D1 was regarded as representing the closest prior art, contrary to the Opponent which took the commercial product "Noryl-GTX-910" therefor. Based on the experimental data provided by the Proprietor, it was held that, unexpectedly, impact strength was improved according to the invention with respect to D1 and significant

improvements of flexural modulus and impact strength were achieved vis-à-vis the Noryl product. Consequently, an inventive step was acknowledged.

IV. On 13 June 1997, a Notice of Appeal was lodged by the Opponent (Appellant) against this decision with simultaneous payment of the prescribed fee.

In the course of the examination, opposition and appeal proceedings, reference was made by the parties to the following experimental data in the patent specification and in additional test reports:

Exhibit 1 Table on page 10 of the patent specification

Exhibit 2 Table on page 7 of the test report received from the Applicant on 25 October 1993

Exhibit 3 Attachment B to the Notice of Opposition

Exhibit 4 Experimental report received from the Proprietor on 30 April 1996

Exhibit 5 Test report annexed to the Statement of Grounds of Appeal filed on 15 August 1997

Exhibit 6 Trace experiment submitted by the Respondent (Patent Proprietor) on 7 May 1998

In the Statement of Grounds of Appeal, the Appellant maintained its previous objections. In substance, it argued essentially as follows:

- (i) It had not been successful in repeating the Respondent's Run 4 of Exhibit 2, in particular with respect to the distribution of the filler in the discontinuous polyphenylene ether phase as required in Claim 1.
- (ii) Moreover, the technical problem to improve the impact strength had not been solved by the claimed particle size and distribution of the filler as demonstrated in Exhibits 3 and 5.

V. In its Counterstatement of Appeal submitted on 7 May 1998, the Respondent disputed these arguments.

- (i) It argued that the closest state of the art, D1, taught away from resin compositions including a filler, because its presence would *prima facie* reduce the impact strength of such compositions as was shown by Comparative Examples 2 and 3 of D1, which described identical compositions except for the presence of a filler in Comparative Example 3.
- (ii) Exhibit 6 provided experimental evidence supporting the Respondent's arguments for inventive step and demonstrating that the technical problem was solved by the resin composition as claimed.
- (iii) An amended version of Claim 1 was filed, wherein the final clause of the claim as granted was drafted as follows:

"said polyphenylene ether resin being dispersed into the polyamide resin which forms a continuous phase, and 90% or more of the inorganic filler particles are dispersed into dispersed phases of the polyphenylene ether resin."

VI. In an additional letter received on 17 November 1999, the Respondent submitted a further amended version of Claim 1 and specified its requests in the following way:

(i) The main request was based on Claim 1 as amended on 7 May 1998 (see V.iii) and Claims 2 to 11 as granted.

(ii) The first auxiliary request was based on Claim 1 as filed on 17 November 1999 and Claims 2 to 11 as granted, Claim 1 differing from Claim 1 as granted in that at the end of the penultimate line the word "a" had been inserted between "forms" and "continuous phase", the first word "and" in the last line had been deleted and at the end of the claim the following feature had been added:

"such that 90% or more of the inorganic filler particles exist in the dispersed phases formed from the polymer components".

(iii) The second auxiliary request was based on the set of claims in the patent as granted.

VII. In accordance with the requests of both parties, oral proceedings were arranged. In an annex to the summons dated 18 August 1999, it was indicated that the requirements of Article 123 EPC might be an issue in the hearing.

VIII. On 2 February 2000, the Appellant filed a new document

D2: product leaflet "Tipaque CR-63" of Ishihara Sangyo Kaisha, LTD.

allegedly relevant for the issue of insufficiency of disclosure. According to the Appellant a postponement of the oral proceedings could be envisaged in view of the influence thereof on the ultimate outcome of the case.

On 3 February 2000, the Respondent's Representative informed the Board that the technical experts of the Proprietor did not have sufficient time to look into the new matter raised by the Appellant. He requested that the hearing be postponed or, alternatively, that the late filed facts and evidence be disregarded.

On 3 February 2000, the Board informed both parties by telefax that the date for the arranged oral proceedings was maintained.

IX. During the hearing which took place on 8 February 2000 the procedural questions arising from the late submission of D2 by the Appellant were dealt with first.

In the discussion of the issue of insufficiency of disclosure, the Respondent provided some information explaining the discrepancy between the Appellant's experimental results and its own figures.

As to the issue of inventive step, the arguments of the parties, which mainly relied on Exhibits 5 and 6 as well as on facts and evidence previously submitted and already considered by the Opposition Division, did not shed a new light on the interpretation of document D1.

- X. The Appellant requested that the decision under appeal be set aside and the patent be revoked in its entirety.

The Respondent requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claim 1 as filed on 7 May 1998 and Claim 2 to 11 as granted (main request) or on the basis of Claim 1 as filed on 17 November 1999 and Claims 2 to 11 as granted (first auxiliary request) or that the appeal be dismissed and that the patent be maintained as granted (second auxiliary request).

Reasons for the Decision

1. The appeal is admissible.
2. *Procedural matter*
 - 2.1 In order to justify the late filing of D2, the Appellant argued that Exhibit 6 did not give any particulars of the filler, such as the particle size. D2 however provided an explanation for the differences between the results of its own experiments and those in Exhibit 6 regarding the key feature of the invention: the distribution of the filler in the different resin phases. These differences could be related to the surface-treatment of the filler used. Therefore D2 was relevant for the issue of insufficient disclosure.
 - 2.2 By contrast, the Respondent took the view that the document was not relevant, because the location of the filler was determined by the process for making the composition, as supported by the Opponent's letter dated 17 April 1997 (thus submitted shortly after the issuance of the Opposition Division's decision), rather than by treatment of the filler which was of only minor

importance. Moreover, based on the information in the patent specification, the Trace experiment of Exhibit 6 had been carried out by a third party without any difficulty. Further, it had not been possible for the technical experts of the Respondent to consider before the hearing the new issues arising from the submission of D2.

2.3 In view of the numerous experimental data in the patent specification and in the file as well as the fact that D2 raises new issues without clarifying the questions under dispute, the late filed citation could not be regarded as relevant for the outcome of the case. This document was therefore not admitted into the proceedings (Article 114(1) and (2) EPC).

3. *Insufficiency of Disclosure (Article 100(b) EPC)*

3.1 The discussion about the issue of insufficiency of disclosure exclusively focused on the selection of a filler, and no argument was raised with respect to the other mandatory components. Therefore they need not be considered in further detail.

3.2 The objection under Article 100(b) EPC was based on the argument that, upon repeating Example 1 of the patent in suit (annex to the Notice of Opposition, page 3, Point B) or of Run 4 of Exhibit 4 (Statement of Grounds of Appeal, page 5, lines 7 to 14 and the list on page 1), the Appellant had not succeeded in obtaining the dispersion of the filler in the discontinuous phase of the composition as required by Claim 1. Whilst the Respondent had reported that >99 % of the filler were found in the dispersed polyphenylene ether resin (PPE) phase (see the table in Exhibit 2), only 20 % were

found there when they repeated an experiment according to Claim 1 (see Table 1 of Exhibit 5, Composition # 2). Even in Comparative Examples 1 of the Exhibits 4 and 6, which were both based on identical compositions, different filler distributions were found.

For these reasons, the Appellant took the position that the subject-matter claimed was not disclosed in a sufficiently clear and complete manner, since the disclosure did not enable the skilled person to obtain substantially all embodiments falling within the scope of the Claim 1. In order to support its argument, the Appellant referred to the various decisions cited in the paragraph bridging pages 149 and 150 in Chapter II.A.3 "Clarity and completeness of disclosure" of the Case Law, 3rd edition, EPO, 1999 and to Rule 27(1) EPC.

3.3 To support the sufficiency of disclosure the Respondent relied on additional experimental reports (Exhibits 4 and 6) and on the experimental data in the patent specification.

3.3.1 To that end, it first emphasised that the patent in suit contained only product claims, but no process claims. It confirmed that the claimed products could be prepared in different ways, i.e. not only in a one-step process as used in the examples, but also in a two-step process as e.g. disclosed as an alternative embodiment on page 7, lines 13 to 17.

Irrespective of the properties of the individual components selected within the definition of Claim 1 (viz. the use of a treated or untreated filler), the above two-way process would inevitably result in a product in accordance with Claim 1. On the basis of the disclosure in the patent specification, the skilled man would therefore know how to obtain the desired product.

3.3.2 Besides the way in which the individual components were brought together, residence time and shear conditions also had an important influence on the distribution of the filler between the dispersed and the continuous phases. High shear over long time would result in migration of the filler from the dispersed PPE phase into the continuous polyamide resin (PA) phase. This phenomenon might well explain the different results obtained by the Appellant.

3.3.3 The Respondent additionally referred to Table 1, Composition #4 in Exhibit 5, demonstrating that the Appellant had been able to prepare without any difficulty a composition which fulfilled the disputed feature of filler distribution. This fact was conceded by the Appellant.

3.4 As further pointed out by the Respondent, the patent in suit relates to a resin composition, i.e. a product *per se*. The claim to a product *per se* is not limited to the products directly obtained by the process disclosed in the examples by virtue of Article 64(2) EPC. The disclosure to be considered in the assessment of the grounds for opposition under Article 100(b) EPC (cf. Article 83 EPC as well) includes all parts of the specification, description (including the examples), drawings (if present) and claims.

3.4.1 As regards the appropriate selection of a filler and the methods by which affinity and interfacial bonding between the filler and the resins can optionally be modified, guidance can be found on page 6, line 30 *et seq.* of the specification.

- 3.4.2 It was not disputed between the parties that the two-step process as disclosed on page 7, lines 13 to 17 of the specification would allow to prepare a product as claimed.
- 3.4.3 Additionally, Table 1, Composition #4 of Exhibit 5 demonstrates that the distribution of filler was actually obtained by the Appellant in a two-step process. The composition was *expressis verbis* identified to be "in accordance with claim 1 of the Patent" (Statement of Grounds of Appeal, page 4, Table 2, Composition 3, and the last two lines on that page).
- 3.4.4 According to established case law, the question of insufficient disclosure has to be decided on a case-by-case basis (see the cited passage in the Case Law; point 3.2, *supra*).
- 3.4.5 It has not been contested by the Appellant that the distribution of the filler in the dispersed PPE phase can be achieved by means of the two-step process disclosed on page 7, lines 13 to 17. This has been demonstrated by its own experimental data (see point 3.4.3). Claim 1 is not directed to a process but to a product. The Appellant, which as the Opponent has the onus of proof, has not provided any evidence showing that a *product according to Claim 1* could not be prepared by the above two-stage process.
- 3.4.6 It follows from these considerations that the specification clearly provides sufficient information and guidance for the selection of a filler and its use (see points 3.4.1 and 3.4.2) and that, consequently, the whole subject-matter that is defined in Claim 1 is

capable of being carried out by a skilled person without the burden of an undue amount of experimentation or the application of inventive ingenuity (cf. T 435/91, OJ EPO 1995, 188, point 2.2.1 of the reasons).

3.5 The invention being disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art, the requirements of Article 100(b) EPC must thus be regarded as met.

4. *Wording of Claim 1 in the Main and the Auxiliary requests*

4.1 Main request

As indicated by the Respondent, the support for the amended wording "90% or more of the inorganic filler particles are dispersed into dispersed phases of the polyphenylene ether resin" (see point V.iii, *supra*) is to be found in the passage "it is preferred that 90% or more in number of the inorganic filler component (C) should exist in the dispersed phases formed by the polymer component" (page 7, lines 11 and 12). Whilst it is clear from the wording of the claim as granted and from page 7, lines 2 and 3, that the filler is dispersed into the PPE phase, it is not unambiguously clear from the modified wording whether the percentage is based on the number or e.g. on the volume, which is another way often used to quantify a filler content. These obviously would not be equivalent methods of measurement of the quantity of filler in a polymer.

The Board, thus, cannot concur with the Appellant's point of view that the reference to the filler **particles** in the more "elegant" formulation in Claim 1 would render the claim unambiguously clear (Article 84 EPC).

Therefore, the main request cannot be successful.

4.2 First auxiliary request

The same argument applies to Claim 1 of the first auxiliary request since the amended passage reads "such that 90% or more of the inorganic filler particles exist in the dispersed phases formed from the polymer components" (see point, *supra*).

Moreover, the passage on page 7, line 12 of the patent specification corresponding to page 15, lines 23 to 26 of the application as originally filed refers to "dispersed phases formed by the polymer component", but not to "polymer components" (emphasis added). In view of the presence of three polymer components in the claimed composition, the composition of the dispersed phase is not different; it follows that the amended wording does not comply with Article 123(2) EPC either.

It follows that the first auxiliary request cannot succeed either.

4.3 Second auxiliary request

Since the second auxiliary request is based on the claims as granted, no objection arises under Articles 84 and 123 EPC.

5. *Novelty*

Although D1 describes a resin composition comprising a polyphenylene ether, a mixture of polyamides and, as further optional components, e.g. a polar compound (Claim 18), a styrene-diene copolymer (Claim 24) and a filler (page 28, line 5 and page 29, lines 10/11 as well as page 33, lines 9/10 and Table 1, Comparative Example 3), an average particle size of 2 μm is disclosed only with respect to the talc used in the comparative example (page 33, line 10), not as a general feature. Moreover, this value differs significantly from the average particle size of the filler as defined in Claim 1 of the patent in suit (1 μm or less).

Therefore the subject-matter of Claim 1 is clearly novel with respect to the prior art relied upon by the Appellant. In fact, this has not been disputed.

6. *Problem and Solution*

6.1 The patent in suit concerns a resin composition comprising (A-1) a polyphenylene ether resin and (A-2) a polyamide resin.

6.2 Such a product is known from D1 which the Board, like the parties and the Opposition Division, regards as representing the closest state of the art.

6.2.1 This citation describes a composition comprising (a) from 5 to 70 % by weight of a polyphenylene ether resin, (b) from 1 to 94.5 % by weight of a non-crystalline or low-crystalline polyamide resin, and (c) from 0.5 to 79 % by weight of a crystalline polyamide resin (Claim 1; page 3, lines 6 to 14) which is suitable for injection, extrusion or blow moulding, having an excellent balance between mechanical and

other physical properties, in particular, with respect to planar impact strength, dimensional stability and satisfactory organic solvent resistance (page 1, lines 2 to 9; page 3, lines 1 to 5 and 15 to 24).

In addition to 100 parts by weight of the above components (a), (b) and (c), the known composition preferably contains 0.01 to 10 parts by weight of (d) a compound selected from a compound having at least one polar group and a low-molecular diene polymer (Claim 18). The polar compound may be unsaturated (Claims 20 and 22). Further, the composition may comprise (e) 1 to 40 parts by weight of an alkenyl aromatic compound/conjugated diene copolymer or a hydrogenation product thereof (Claim 24).

The composition may also include various compounding additives, *inter alia* organic or inorganic fillers as far as the objects of the invention are not impaired (page 27, line 25 to page 28, line 9). The components may be blended by means of commonly used kneading machines altogether; or masterbatches of fillers and other components may be used which are then diluted with other polymers. Thus, the filler may be previously kneaded with the crystalline polyamide resin. Likewise components (d) and (e) may be premixed or subjected to partial grafting which is preferred when (e) is a hydrogenated alkenyl aromatic compound/conjugated diene copolymer (page 28, line 13 to page 29, line 11).

- 6.2.2 None of the examples according to the teaching of D1 describes a composition comprising a filler. Contrary to that teaching, the compositions according to Comparative Examples 2, 3 and 4 include only one polyamide resin component. In Comparative Example 3, which represents the closest state of the art and differs from Comparative Example 2 only in the presence of talc having an average particle size of 2 μm , both

the dart drop and the Izod impact strengths are poorer than those of the filler free compositions in Tables 1 and 2. Table 3 discloses results of compositions which do neither contain fillers, nor alkenylaromatic compound/diene copolymer, nor an unsaturated polar compound.

- 6.3 In line with the introductory statement in the patent specification (page 2, lines 3 to 5), the technical problem underlying the patent in suit may thus be seen as the provision of a resin composition showing a good balance in physical properties of rigidity and impact strength.
- 6.4 According to the patent in suit, this problem is solved by providing a composition of (A) 100 parts by weight of a combination of 20 to 60 % by weight of PPE, 25 to 65 % by weight of PA and 1 to 35 % by weight of a copolymer of an alkenylaromatic compound and a diene with (B) 0.01 to 10 parts by weight of an unsaturated polar compound and (C) 1 to 50 parts by weight of a filler having an average particle size of 1 μm or less. In the composition the PPE is dispersed in the continuous PA phase and the said filler is dispersed in the discontinuous PPE phase, as specified in Claim 1.
- 6.5 According to the tables on page 10 of the patent specification (Exhibit 1) and in Exhibit 2, as well as the results on page 5 of Exhibit 3 and Compositions #1 and #4 in Exhibit 4, the combination of the above components shows enhanced impact strengths compared to filler-free compositions.

The comparison of Example 4 with Comparative example 4 in Exhibit 1, which correspond to Runs 4 and 8 in Exhibit 2, demonstrates that the average particle sizes of the fillers according to the definition in Claim 1 do hardly affect the rigidity (expressed in terms of

flexural modulus) of the samples, but have a significant effect on the measured impact strength values. The same effects can be found with respect to the locations and distributions of the fillers when comparing Runs 4 and 12 in Exhibit 2 as well as Example 1 and Comparative Example 2 in Exhibit 6. These results were not disputed by the Appellant.

- 6.6 Consequently, the above defined technical problem is effectively solved by the composition as defined in Claim 1.

That a different distribution of the filler between the dispersed PPE phase and the continuous PA matrix would result in even better impact strength values (cf. the Compositions #2 and #3 in Exhibit 5) is not a valid argument here, because technical advantage is not a criterion for patentability under the EPC, nor is any one of these additional comparative experiments a true repetition of the state of the art, as conceded by the Appellant during the oral proceedings.

7. *Obviousness*

7.1 It remains to be decided whether the claimed solution was obvious to a person skilled in the art having regard to the state of the art relied upon by the Appellant.

7.2 It is evident from the above considerations that the only prior art citation D1 teaches away from the use of a filler rather than suggesting to include a filler having an average particle size of 1 μm or less.

The general statement on page 28, line 19 to page 29, line 2 that fillers may be first kneaded in high concentrations to obtain a masterbatch which may then be blended with other components cannot be interpreted

as providing an incentive to solve the above problem by means of a composition as defined in Claim 1 either. The only explicit disclosure of such a technique in D1 recommends to knead the filler with the polyamide resin first (page 29, lines 10 and 11). As demonstrated by both parties (Exhibit 5, Composition #3 and Exhibit 6, Comparative Example 2), a composition prepared in accordance with this recommendation contains the filler dispersed predominantly in the PA phase, which is contrary to the corresponding feature as defined in Claim 1.

- 7.3 It follows that the resin composition according to Claim 1 of the second auxiliary request would not be obvious to a person skilled in the art in view of the prior art relied upon by the Appellant and, therefore, involves an inventive step.

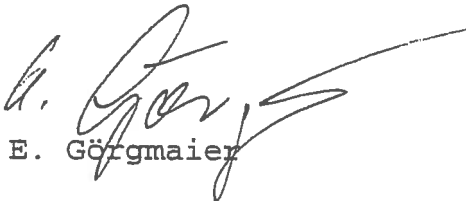
8. Claims 2 to 11, which relate to preferred embodiments of the claimed composition, are supported by the patentability of the main claim and thus also allowable.

Order

For these reasons it is decided that:


1. The Respondent's main and first auxiliary request are rejected.
2. The appeal is dismissed.

The Registrar:



E. Görgmaier

The Chairman:



C. Gérardin

