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BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

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D E C I S I O N
of 25 November 1993

Case Number: T 0443/91 - 3.3.3

Application Number: 85902649.4

Publication Number: 0182919

IPC: C08G 73/12

Language of the proceedings: EN

Title of invention:
Thermosetting resin composition

Applicant:
Mitsui Petrochemical Industries, Ltd.

Opponent:
-

Headword:
-

Relevant legal norms:
EPC Art. 54, 56

Keyword:
"Novelty (affirmed); after amendment"
"Inventive step (affirmed); after amendment"

Decisions cited:
-

Catchword:
-

Case Number: T 0443/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 25 November 1993

Appellant: Mitsui Petrochemical Industries, Ltd.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office dated 11 October 1990 refusing European patent application No. 85 902 649.4 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: F. Antony
Members: R.A. Lunzer
M.K.S. Aúz Castro

Summary of Facts and Submissions

I. European patent application No. 85 902 649.4, publication No. 0 182 919, was filed on 28 May 1985, having a priority date of 28 May 1984 derived from Japanese application No. 108131/84.

II. In its first communication of 8 March 1988, the Examining Division drew particular attention to the following documents:

(1) DE-A-3 030 111
(2) FR-A-2 201 313 and
(3) FR-A-2 355 047,

contending that there was a lack of novelty over the disclosure of document (1), and that documents (2) and (3) constituted closer prior art than that acknowledged in the specification. The Applicant (Appellant) filed an amended description and claims, as well as further arguments which were taken into account.

III. By its decision given on 11 October 1990, the Examining Division refused the application, holding that the alleged invention as claimed in amended Claim 1 filed with a letter of 9 April 1990 lacked novelty having regard to the disclosure of document (1). The decision did not deal fully with the issue of inventiveness on the assumption of novelty, but at paragraph 7, page 8, it drew attention to the fact that a communication of 22 June 1989 had been misinterpreted by the Appellant, to the extent that it was asserted that the Examining Division had recognised the existence of an inventive step. The Examining Division therefore indicated that

in its view it was highly dubious whether an inventive step could have been acknowledged even if there had been novelty.

The single independent Claim 1 as considered by the Examining Division (after correcting the spelling of the word "polyglycidyl" in the last line but two) was in the following form:

"A thermosetting resin composition comprising a pre-reacted product (a) of a polyamino compound, an unsaturated bismaleimide compound, and a curing agent, characterised in that

(i) the resin consists essentially of the pre-reacted product (a) dissolved in a vinyl compound (b) containing an epoxy group selected from glycidyl acrylate, glycidyl methacrylate and allylglycidyl ether, or a combination of the vinyl compound (b) and an aliphatic epoxy compound (b') having no vinyl group selected from ethylene diglycidyl ether and pentaerythritol polyglycidyl ether, and

(ii) as catalyst a combination of an epoxy curing agent (c) and a radical polymerisation initiator (d)."

IV. An appeal against that decision was lodged on 7 December 1990, the appeal fee was paid on the same day, and the Grounds of Appeal were filed on 18 February 1991. With its Statement of Grounds of Appeal, the Appellant filed a revised set of Claims numbered 1 to 5, and contrasted the disclosure of document (1) with the subject-matter of the new Claim 1.

V. The Board indicated informally that the amended Claim 1, defining a composition as "comprising" ingredients (A), (B) and (C), with the curing system defined as "comprising" other components, was inherently vague and unacceptable, whereas it would be prepared to accept the same claim if such words as "consisting of" or "consisting essentially of", were used both in line 1 of Claim 1, and equally in the definition of the curing system C in the latter part of the claim. By letters dated 21 September, and 17 November 1993, the Appellant expressed willingness to make both of those amendments. Claim 1 as considered by the Board read as follows:

...

VI. The Appellant requested that the decision under appeal be set aside, and that a patent should be granted on the basis Claim 1 as set out in paragraph IV above, that request being subject implicitly to the further revision mentioned in paragraph V above, together with dependent Claims 2 to 5, the description still to be amended, and also requested that as the issue of inventiveness had not been dealt with by the Examining Division, that issue should either be referred back to the Examining Division or dealt with by the Board.

Reasons for the Decision

1. The appeal is admissible.

2. *Admissibility of Amendments*

2.1 As compared with Claim 1 in the application as filed, the claim now before the Board relates to a composition consisting essentially of components (A), (B), and (C), each of which is more closely defined than before. (A) is now defined as being a reaction product of certain groups of compounds, which is in solution in component (B). (B) is defined as being (i) a vinyl epoxy monomer selected from a group of three identified compounds, or (ii) a combination of those three with an aliphatic epoxy monomer selected from another three named compounds, or (iii) a combination of (i) or (ii) with a styrene type monomer. (C) is defined as being a curing system consisting of a radical polymerisation initiator and an epoxy curing agent selected from six groups of compounds.

2.2 Having regard to the contents of the application as filed, the Board is satisfied that these limitations to Claim 1 are all admissible. The feature of component (A) being in solution in component (B) is disclosed in the passages at page 6, line 33 to page 7, line 4 and page 9, lines 9 to 10, together with page 10 lines 14 and 15 (in relation to the aliphatic epoxy compounds possibly included in the liquid component) and page 7, lines 23 to 25 (in relation to the styrene type monomer which may also optionally be included in the liquid component). Of the three possibilities concerning the liquid component (B), (i) corresponds to the disclosure of Claim 2 of the application as filed, (ii) is disclosed in the passage from page 9, line 25 to page 10, line 10, while (iii), the optional inclusion of a styrene type monomer is disclosed on page 7, lines 16 to 26. The groups of compounds which now define component (C) are disclosed at page 7, lines 28

to 33 of the application as filed. Accordingly, the Board is satisfied that these amendments are admissible for the purposes of Article 123(2) EPC.

3. *Clarity of Claim 1*

In objecting to Claim 1 when defined as "comprising" (A), (B) and (C), the Board was adhering to the usual practice of the EPO in appropriate circumstances of objecting to such claims as unclear. (See T 472/88 (10 October 1990) not reported in OJ EPO but reported in 1991 EPOR 486). A claim when so worded would be infringed by a composition consisting of 99% of a further component (D), and only 1% of the essential components of the present alleged invention. In contrast, the term "consisting essentially of" allows for the possible presence of such further components as impurities, conventional additives, or even conventional fillers, depending on the art in question. There are some circumstances where the term "comprising" may be used, such as when defining an invention relating, not to the totality of the composition, but instead to one essential component, e.g. in such wording as "comprising X as a stabiliser".

4. *Novelty*

The Board is essentially in agreement with the views expressed in paragraphs 13 to 17 of the Statement of Grounds of Appeal, and notes that the general disclosure of document (1), as is reflected in particular by its independent Claims 1 and 7, and Examples 1 to 5, requires the presence of cyanate esters. Although the Examining Division rightly

observed that cyanato compounds could be embraced by the catalyst system as defined in Claim 1 as it then stood, now that component (C) is limited to certain defined classes of compounds, that possibility has been excluded. Consequently, the Board is satisfied that the objection of lack of novelty has been overcome, and that therefore the subject-matter of Claim 1 is novel within the meaning of Article 54 EPC.

5. *The closest prior art*

The Board regards document (1) as being the closest prior art, although reference was also made by the Examining Division to documents (2) and (3), which are now acknowledged in the description. Document (1) relates to a class of thermosetting resins which can be used in making coatings, adhesives, moulded components, laminates, etc. (sentence bridging pages 16 and 17), curing being effected by heating in a temperature range of 100 to 250°C depending on the actual composition chosen (page 16, paragraph 2). Prior to setting, the product may take the form of a powder, as is exemplified in Examples 1 and 2, or it may take the form of a fluid composition attained by the inclusion of a solvent (Examples 3, 4, and 5). The solvents used in those examples are methyl ethyl ketone in Examples 3 and 5, and a mixture thereof with N,N-dimethyl-formamide in Example 4.

6. *Problem and its solution*

Seen against the background of the above-mentioned prior art, the problem with which the alleged invention is concerned is to provide a low viscosity, easily

handled solvent free product, which is readily capable of being used for impregnating bodies such as bundles of glass fibre, and can cure to a strong hard solid with a minimum of shrinkage. Although component (A) is dissolved in component (B), component (B) is a co-reacting monomer, as contrasted with an organic solvent. Such a solvent is normally evolved from the composition upon curing, with consequent problems with respect to dimensional stability. The results set out in Tables 1 and 2 indicate that following the teaching of the alleged invention, products are capable of being obtained which have good storage stability, minimal shrinkage upon curing, and have considerable strength and elasticity. Accordingly, the Board is satisfied that the alleged invention affords a credible solution to the above-stated problem.

7. *Inventiveness*

7.1 The issue of inventiveness turns on whether a skilled person, having as his starting point the disclosure of document (1), and confronted with the above-defined problem, would have found in that document, or in any other of the cited prior art, a sufficient pointer in the direction of the alleged invention. The Board considers that, insofar as document (1) teaches either the use of solid uncured mouldable compositions, as illustrated in Examples 1 and 2, or liquid compositions which are attainable only by the employment of a conventional solvent having later to be removed, as in Examples 3, 4, and 5, it is unlike the alleged invention, which involves a copolymerisation step in which component (A), after being initially dissolved in component (B), is required to copolymerise with (B).

(In addition, the cyanate esters which are essential to document (1) are absent from the compositions according to the invention as defined in the main claim as now amended.) The Board is therefore satisfied that the teaching of document (1) is so unlike the proposal in accordance with the alleged invention that the skilled worker would not have found in document (1) any teaching in the direction of the alleged invention.

7.2 Equally, the Board finds that the teachings of documents (2) and (3) have little resemblance to the invention. Document (2) relates to a composition comprising (a) a prepolymer of a bisimide having a certain formula, which may include maleic anhydride groups in its molecule, which reacts with (b) an epoxy resin, and (c) an allyl monomer (page 1, lines 20 to 32). There is no suggestion of the formation of the bismaleimide-polyamine prereaction product dissolved in a monomer containing both an epoxy group and a vinyl group, which are essential features of the invention, and the Board is therefore satisfied that it does not provide any pointer in its direction.

7.3 Document (3) is also directed to a thermosetting composition. It involves four components, (a) a polyimide, (b) an alkenylphenol and/or an alkenylphenol ether, (c) an allyl group-containing epoxy compound, and optionally (d) an epoxy curing agent (page 17, Claim 1). Again, the Board regards this combination as being very unlike that of the invention, and hence sees in this disclosure no pointer towards the combination which is essential to the invention as now defined.

7.4 Accordingly, the Board is satisfied that the invention is not obvious in the light of this prior art.

8. *Conclusion*

The subject-matter of Claim 1 of the patent in issue is novel for the purposes of Article 54 EPC, and involves an inventive step as required by Article 56 EPC and is therefore patentable. The same applies to the subject-matter of the dependent Claims 2 to 5, since they fall wholly within the scope 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 that a patent be granted on the basis of Claim 1 referred to in paragraphs IV and V above.

The Registrar: The Chairman:

E. Görgmaier F. Antony