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DECISION
of 11 September 1997

Case Number: T 0325/93 - 3.3.3

Application Number: 86117675.8

Publication Number: 0230619

IPC: C08L 63/00

Language of the proceedings: EN

Title of invention:

Silicone-modified epoxy resins having improved impact resistance

Applicant:

DOW CORNING CORPORATION

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (yes) - initial choice of closest state of the art inappropriate"

"Relevant technical problem not derivable"

"Structural similarities to claimed features not conclusive"

Decisions cited:

T 0229/85, T 0248/85, T 0686/91

Catchword:

-



Case Number: T 0325/93 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 11 September 1997

Appellant:

DOW CORNING CORPORATION
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Decision under appeal:

Decision of the Examining Division of the
European Patent Office dated 17 December 1992
refusing European patent application
No. 86 117 675.8 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: R. Young
J. A. Stephens-Ofner

Summary of Facts and Submissions

I. The appeal lies from the decision of the Examining Division, dated 17 December 1992, to refuse European patent application No. 86 117 675.8, filed on 18 December 1986 and published under No. 230 619. The Notice of Appeal was received on 10 February 1993, the appeal fee being paid on 11 February 1993.

II. The reasons given for the decision were that the subject-matter of Claim 1 of a set of Claims 1 to 7 filed on 9 May 1992 failed to satisfy the requirements of Article 56 EPC, in the light of the disclosures of the documents:

D1: E.M. Yorkgitis et al., Adv. Polym. Sci. 72 (1985) pages 80 to 108 and

D2: US-A-3 926 885.

Claim 1 read as follows:

"A dispersion comprising:

- a. from 78 to 94.5 percent by weight of a curable epoxy resin;
- b. from 5 to 20 percent by weight of an alpha, omega-functional polydimethylsiloxane having an average degree of polymerization between 30 and 400 and having endblocking groups containing carboxyl, amine or epoxide functionality; and
- c. from 0.5 to 2.0 percent by weight of a dispersing agent capable of maintaining (b) dispersed in (a), said dispersing agent being a siloxane copolymer selected from the group consisting of

1. copolymers consisting essentially of SiO_2 units, $(\text{CH}_3)_3\text{SiO}_{1/2}$ units and $\text{D}(\text{CH}_3)_2\text{SiO}_{1/2}$ units in which D is a polyoxyethylene polymer having a molecular weight between 1000 and 5000, or a polyoxyethylene-polyoxypropylene copolymer having a molecular weight between 1000 and 6000 wherein the polyoxypropylene portion constitutes up to 100 mole percent of the copolymer, said D being attached to the silicon atom via a silicon-carbon bond, and the ratio of the SiO_2 units to the total $(\text{CH}_3)_3\text{SiO}_{1/2}$ and $\text{D}(\text{CH}_3)_2\text{SiO}_{1/2}$ units is in the range of 1:0.4 to 1:1.2,
2. copolymers which are reaction products derived from heating a mixture of a siloxane resin copolymer consisting essentially of SiO_2 units and $(\text{CH}_3)_3\text{SiO}_{1/2}$ units in which the ratio of SiO_2 units to $(\text{CH}_3)_3\text{SiO}_{1/2}$ units is in the range of 1:0.4 to 1:1.2, and a hydroxylated polyoxyethylene polymer having a molecular weight in the range of 1000 to 5000 or a hydroxylated polyoxyethylene-polyoxypropylene copolymer having a molecular weight in the range of 1000 to 6000 wherein the polyoxypropylene portion constitutes up to 100 mole percent of the copolymer,
3. polydimethylsiloxane-organic copolymer in which the polydimethylsiloxane portion has a molecular weight between 1500 and 2000 and the organic portion consists essentially of a polyoxyethylene polymer having a molecular weight between 1000 and 2000, or a polyoxyethylene-polyoxypropylene copolymer having a molecular weight between 1500 and 4000 wherein said polyoxypropylene portion constitutes up to 100 mole percent of organic portion of the copolymer, said organic portion being attached to silicon atoms via silicon-carbon bonds, and

4. polydimethylsiloxane-organic copolymers which are the reaction products produced by heating a mixture of a polydimethylsiloxane containing silicon bonded hydrogen atoms having a molecular weight between 1500 and 2000 and a hydroxylated polyoxyethylene having a molecular weight between 1000 and 2000, or a hydroxylated polyoxyethylene-polyoxypropylene copolymer having a molecular weight between 1500 and 4000 wherein said polyoxypropylene constitutes up to 100 mole percent of the organic portion of the copolymer."

Claims 2 to 6 were directed to elaborations of the dispersion according to Claim 1. Claim 7, an independent claim, was worded as follows:

"A method for improving the impact resistance of a curable epoxy resin, comprising:

- (A) emulsifying from 5 to 20 percent by weight of an alpha, omega-functional polydimethylsiloxane having an average degree of polymerization between 30 and 400 and having endblocking groups containing carboxyl, amine or epoxy functionality in said epoxy resin, using as dispersing agent from 0.5 to 2.0 percent by weight of a copolymer selected from the group consisting of

1. [wording identical with sub-para c.1. of Claim 1],
2. [wording identical with sub-para c.2. of Claim 1],
3. [wording identical with sub-para c.3. of Claim 1],
and
4. [wording identical with sub-para c.4. of Claim 1];

to form a homogeneous dispersion;

(B) mixing said dispersion with an appropriate amount of a cure agent for the epoxy resin to produce a uniform mixture therebetween; and (C) curing the mixture obtained in step B."

According to the decision, neither of the cited documents disclosed a dispersion comprising (a) a curable epoxy resin, (b) a polydimethylsiloxane having carboxyl, amine or epoxide endgroups as modifier and (c) a siloxane copolymer, as defined in the claims. Consequently, the claimed subject-matter was novel. Compared with the disclosure of D2, which was considered to be the closest state of the art, the distinguishing feature was the endblocking group of component (b) being carboxyl, amine or epoxide, rather than trimethylsilyl. There was, however, no convincing evidence on file that showed that this distinguishing feature brought about a technical effect, since the results of a comparison with a trimethylsilyl endblocked polysiloxane showed no improvement in impact strength, and there had in any case been differences in degree of polymerisation and a wide statistical spread in the results. Consequently, the objective, as opposed to the subjective technical problem arising from D2, was merely to provide further components (b) based on polydimethylsiloxane. It was, however, known from D1 to use a polysiloxane endblocked with aminoethylpiperazine, and also that the endgroups reacted with the epoxy resin. Consequently, the skilled person would have expected a certain improvement of the mechanical properties from such a reaction, and it would therefore have been obvious to solve the technical problem by introducing an amine endgroup as disclosed in D1 into the polysiloxanes known from D2.

III. The Appellant filed, on 2 March 1993, together with the Statement of Grounds of Appeal, a new, restricted set of Claims 1 to 7 and amended pages of description.

Claim 1 of this set is worded as follows:

"A dispersion comprising:

- a. from 78 to 94.5 percent by weight of a curable epoxy resin;
- b. from 5 to 20 percent by weight of an alpha, omega-functional polydimethylsiloxane having an average degree of polymerization between 30 and 400 and having endblocking groups containing carboxyl or amine functionality; and
- c. from 0.5 to 2.0 percent by weight of a dispersing agent capable of maintaining (b) dispersed in (a), said dispersing agent being a siloxane copolymer selected from the group consisting of
 - (1) [wording identical with sub-para c.1. of previous version of Claim 1 (section I., above)],
 - (2) [wording identical with sub-para c.2. of previous version of Claim 1 (section I., above)],
 - (3) [wording identical with sub-para c.3. of previous version of Claim 1 (section I., above)], and
 - (4) [wording identical with sub-para c.4. of previous version of Claim 1 (section I., above)].

Claims 2 to 6 are directed to elaborations of the dispersion according to Claim 1.

Claim 7, an independent claim, is worded as follows:

"A method for improving the impact resistance of a curable epoxy resin, comprising:

- (A) emulsifying from 5 to 20 percent by weight of an alpha, omega-functional polydimethylsiloxane having an average average degree of polymerization between 30 and 400 and having endblocking groups containing carboxyl or amine functionality in said epoxy resin, using as dispersing agent from 0.5 to 2.0 percent by weight of a copolymer selected from the group consisting of
 - (1) [wording identical with sub-para c.(1) of Claim 1, above],
 - (2) [wording identical with sub-para c.(2) of Claim 1, above],
 - (3) [wording identical with sub-para c.(3) of Claim 1, above], and
 - (4) [wording identical with sub-para c.(4) of Claim 1, above];

to form a homogeneous dispersion;

- (B) mixing said dispersion with an appropriate amount of a cure agent for the epoxy resin to produce a uniform mixture therebetween; and (C) curing the mixture obtained in step B."

IV. In the Statement of Grounds of Appeal, the Appellant argued essentially as follows:

- (a) Whilst there had been some difference in degree of polymerisation in the comparison chosen, and some variation in the numerical values of the results obtained, nevertheless an improvement in impact

strength using the carboxyl- and amine- terminated modifiers according to the application in suit had been shown, which was both significant and relevant, over the control in which a modifier was entirely absent, compared with the performance, relative to the same control, of trimethylsilyl endblocked modifying polymers of the closest prior art.

- (b) Such an improvement, which satisfied a long-felt need in the art, was not predictable, because D2 related to an invention concerned with quite different objectives. In particular, no relationship had been recognised between the nature of the endblocking group and the effect on impact resistance. Furthermore, this relationship was still not fully understood even after the invention had been made. The argument that the differences in impact strength could be explained by the capability of carboxyl and amine groups of reacting with epoxy groups was rendered unconvincing by the comparison, also given in the application, with hydroxy endblocked modifiers, which were also capable of reaction with epoxy groups but did not yield an improvement in impact strength.
- (c) The remaining document was of no relevance for determining inventive step, since it was not concerned with the problem of improving the impact strength of epoxy resins, which corresponded to the objective problem with which the application in suit was concerned. Thus, although D1 admittedly disclosed epoxy-reactive piperazine-terminated silicones, it could not suggest the

solution of the relevant technical problem, because the document itself was not concerned with this problem. Nor could it otherwise enable a prediction because the mechanism was currently not understood.

- V. The Appellant requested that the decision under appeal be set aside and a patent granted on the basis of the amended claims and description forming the text relied upon in the Statement of Grounds of Appeal.

Reasons for the Decision

1. The appeal is admissible.
2. The text of the application in suit on which the present decision is based, in accordance with the request of the Appellant, is as follows:

Claims:

Claims 1 to 7 filed on 2 March 1993 (with the Statement of Grounds of Appeal).

Description:

pages 1, 2, 4, 6, 7, 9 and 11 to 13 of the application as originally filed;

pages 14 and 15 filed on 11 May 1992 (letter dated 9 May 1992);

pages 3, 5, 8, 10 and 16 to 21 filed on 2 March 1993 (with the Statement of Grounds of Appeal);

(pages 22 to 25 of the application as filed having been deleted).

3. *Amendments*

Apart from the provision of brackets around the introductory numerals in section c. of Claims 1 and 7, the claims differ from those as originally filed only by (i) the deletion, from Claims 1 and 7, of the reference to "epoxide" functionality in the alpha, omega polydimethylsiloxane component b., and of the word "about" before numerical weight percentages, (ii) the deletion, from Claim 2 of the final formula in the claim (also an epoxide functionality), and (iii) the replacement, in Claims 3 to 6, of the appendancy to Claim 1, by an appendancy to Claim 1 or 2.

The amendments to the description correspond to those effected in the claims, in particular the deletion of references to epoxide functionality (pages 3, 5 and 8), of embodiments describing an epoxide functionality (page 10) and of Examples illustrating an epoxide functionality (original Example 7), as well as certain comparative examples (original Examples 9 and 11) with consequent rearrangement of the experimental results in a single Table (page 21) and insertion of S.I units (pages 14, 15 and 19).

There are no objections under Article 123(2) EPC to the deletions, since they involve a simple excision of one particular alternative embodiment of the modifier ("epoxide") and of certain independent comparisons.

The remaining amendments are, in the case of the inclusion of appendancies to Claim 2, supported by the description of the preferred embodiments (page 9), and, in the case of the provision of S.I. units, by the original units.

Consequently, no objection arises under Article 123(2) EPC to the amended text of the application in suit.

4. *Closest state of the art: the technical problem*

The application in suit is concerned with an epoxy resin dispersion capable of providing a cured resin having improved impact resistance (see title, opening paragraph, examples).

According to both the decision under appeal and the Appellant, document D2 represented the closest state of the art (Reasons for the decision, point 4.1; Statement of Grounds of Appeal, page 2, last sentence).

- 4.1 According to D2, an epoxy resin composition, which, when cured, exhibits a low coefficient of friction, is provided in the form of a homogeneous dispersion comprising (a) from 55 to 95 wt% of a curable epoxy resin composition; (b) from 4 to 35 wt% of a fluid lubricant which is incompatible with the epoxy resin, the fluid having a viscosity in the range of 20 to 20,000,000 cs. at 25°C; and (c) from 1 to 10 wt% of a dispersing agent capable of maintaining (b) dispersed in (a), the dispersing agent being a polydimethylsiloxane-polyoxyalkylene copolymer (column 1, line 26 to column 2, line 2). The fluid lubricant component may be a polydimethylsiloxane, especially a trimethylsilyl endblocked polydimethylsiloxane (column 3, lines 46 to 65, and Examples 1, 2, 4 and 5). There is a sacrifice of physical strength as greater amounts of lubricant are added (column 5, lines 24, 25). An article formed from the cured composition exhibits surface lubricity and hydrophobicity (column 5, line 68 to column 6, line 1). According to Example 5 in conjunction with Example 2, an emulsion (6) consisted essentially of 80 pbw of a liquid epoxy resin ("D.E.R. 331", the reaction product

an effect having, if anything, an opposite tendency to that of the application in suit. In other words, the problem with which the application in suit is concerned is neither derivable nor indeed recognisable from the disclosure of D2.

- 4.4 Such a situation has been considered and adjudicated by another Board in decision T 0686/91 of 30 June 1994 (not published in OJ EPO).

In that decision, the Board observed that, in the determination of the closest state of the art, ex post facto considerations should be avoided. Therefore, a document not mentioning a technical problem that is at least related to that derivable from the patent specification, did not normally qualify as a description of the closest state of the art on the basis of which the inventive step was to be assessed, regardless of the number of technical features it might have in common with the subject-matter of the patent concerned (Reasons for the Decision, point 4). Although that decision concerned a granted patent, its legal principles are clearly also applicable to pre-grant proceedings.

- 4.5 In view of the above, it is evident that D2 does not form an appropriate starting point for the derivation of a typical technical problem.

- 4.6 In this connection, the technical problem as formulated in the decision under appeal ("to provide further components (b)") is inadmissible, firstly because it fails to take into account the relevant surplus result, compared with D2, of the provision of impact resistance (T 0248/85, OJ EPO 1986, 261), and secondly, because, in referring specifically to the distinguishing feature, it contains a pointer to the solution adopted (T 0229/85, OJ EPO 1987, 237).

4.7 Furthermore, the finding in the decision under appeal, that no improvement in impact strength had been validly demonstrated compared with the trimethylsilyl end-blocked polysiloxane modifiers according to D2 (Reasons for the decision, points 4.3, 4.4) is irrelevant, because D2 does not make available such an impact strength (section 4.2, above).

5. *Novelty*

Novelty of the claimed subject-matter was explicitly recognised in the decision under appeal. The Board sees no reason to take a different view.

Consequently, the subject-matter claimed in the application in suit is held to be novel.

6. *Inventive step*

6.1 A consequence of the choice of D2 as the starting point in the state of the art is that the claimed subject-matter is non-obvious with respect to such art, since any attempt by the skilled person to establish a chain of considerations leading in an obvious way to the claimed subject-matter gets stuck at the start, for lack of an identifiable relevant problem.

6.2 Nor would the skilled person be led to combine with D2 a prior art disclosure more directly relating to the relevant problem than that of D2, since, in view of the above, the relevance of such a disclosure would not be apparent.

6.3 Clearly, if the relevant problem is not derivable, the solution to it is a fortiori not derivable, let alone obvious.

- 6.4 Consequently, the finding of lack of inventive step in the decision under appeal cannot be accepted by the Board.
- 6.5 In view of the above conclusion, the appeal must succeed. Since, however, the success of the appeal is thus far dependent solely on the choice, in the decision under appeal, of an unsuitable starting point for the analysis of inventive step, the Board has deemed it appropriate to consider whether it would have come to a different conclusion starting from the other document also cited in the decision under appeal, namely D1.
- 6.5.1 According to D1, the use of epoxy resins as structural adhesives and as matrix resins for high-strength composites requires good fracture resistance and impact strength. The fracture toughness of epoxy resins chemically modified with functionally terminated oligomers of (i) poly(dimethyl siloxane); (ii) poly(dimethyl-co-methyltrifluoropropyl siloxane); and (iii) poly(dimethyl-co-diphenyl siloxane) is investigated. Fracture toughness, in terms of the plane-strain fracture toughness factor K_{IC} , is improved at 40% or higher methyltrifluoropropyl (TFP) content or at 20 and 40% diphenyl siloxane (DP) content. When poly(dimethyl siloxane) homopolymer is used as modifier, however, the fracture toughness is actually reduced compared with the unmodified resin (page 79, Abstract; page 97, last paragraph to page 98, first paragraph, in conjunction with Figures 11a to 11c).

To prepare the samples, an epoxy resin based on bisphenol A diglycidyl ether (Epon 828) with a molecular weight of 380 g/mol. is reacted, in excess, with a series of 2-aminopiperazine-terminated siloxane copolymers with varying weight percentages of dimethyl, methyltrifluoropropyl (TFP) and diphenyl (DP) siloxane,

having a controlled molecular weight of approximately 2 200 g/mol to form a linear precursor. A bis(4-aminocyclohexyl)methane curing agent is then added and the mixture poured into hot RTV-silicone moulds of the precise shapes to be used for solid-state testing (page 83, "Experimental", first four paragraphs). The 2-aminopiperazine-terminated siloxane modifier is present in an amount of 5 to 15 wt% of the precursor. The siloxane modifier is chemically bonded to the epoxy matrix (page 86, "Results and Discussion", first paragraph).

- 6.5.2 Thus, D1 represents a closer state of the art than D2, since it not only involves the use of functional (amine)-terminated polysiloxanes reactive with the epoxy resin, which is a feature common with the subject-matter claimed in the application in suit, but also, more conclusively, it mentions both impact strength and a parameter closely related thereto, namely fracture toughness, which differs primarily in the stress concentrator used in its method of measurement.
- 6.5.3 The argument of the Appellant, that D1 does not mention the problem of impact resistance, is not correct, since there is an explicit reference to fracture resistance and impact strength of epoxy resins, which are generally regarded as insufficient; the fact that these properties are mentioned in combination confirms the closely related nature of these parameters (page 80, second paragraph).
- 6.5.4 Furthermore, it is clear that the disclosure of D1 closely reflects the state of the art, acknowledged in the application in suit, from which Appellant evidently started out. This is an article relating to the same

siloxane modifiers and the same epoxy polymers as D1, by the same author as D1 (application in suit, page 2, lines 15, 16). Consequently, D1 is considered to reflect the closest state of the art.

- 6.5.5 Compared with this state of the art, the technical problem is to be seen in the provision of epoxy resin compositions which are less brittle, i.e. have improved mechanical toughness, at lower cost, and in particular, to enable the cheaper and more readily available polydimethylsiloxanes to be used to improve the impact resistance of such resins. This does not differ from the technical problem as formulated in the application in suit (page 1, paragraph 2, and page 2, lines 22 to 25).
- 6.5.6 The solution proposed according to the application in suit is to replace the two-step synthesis according to D1 by the formulation, instead, of a single composition in which the still curable epoxy resin and the difunctional polydimethylsiloxane modifier are combined with 0.5 to 2.0 wt% of certain siloxane-polyoxyalkylene copolymer dispersing agents capable of maintaining the modifier dispersed in the epoxy resin (Claim 1), and then curing the composition (Claim 7).
- 6.5.7 A direct comparison of the toughness performance achieved by the compositions exemplified in the application in suit with those disclosed in D1 is not possible, because the results of the latter are expressed in terms of fracture toughness and not impact strength. Nevertheless it is evident that an **increase** in impact strength, over an untreated control, is obtained with the polydimethylsiloxane modified epoxy

compositions according to the application in suit, which contrasts with a **reduction** in the closely related parameter of fracture toughness, over an untreated control, of the corresponding polydimethylsiloxane modified epoxy composition according to D1.

6.5.8 The finding in the decision under appeal, that the average impact strengths reported in the application in suit showed too great a random error to be acceptable (Reasons for the decision, point 4.3(c)) does not apply to the relevant comparison here, which is with an untreated control. Compared with such a control, the improvements are sufficiently larger than the statistical variation (Table, page 21).

6.5.9 The further finding, that such levels of impact resistance had been achieved by other conventional modifying polymers (Reasons for the decision, point 4.4, second paragraph) is irrelevant, since these do not constitute the closest state of the art.

6.5.10 Consequently, the Board finds it credible that the claimed measures provide an effective solution of the stated problem arising from D1.

6.6 For the assessment of inventive step, it is necessary to consider whether the skilled person, in possession of the teaching according to D1, would have expected that the toughness, in particular to impact, of an epoxy resin could be enhanced with a polydimethylsiloxane homopolymer modifier by adopting the measures outlined in section 6.5.6, above.

6.6.1 There is no suggestion in D1 itself to take any of these measures, since there is no mention of using a dispersing agent of any kind, let alone a siloxane-polyoxyalkylene dispersing agent of the type defined in

Claim 1 of the application in suit. On the contrary, it is positively emphasised in D1 that the modifier is reacted with the epoxy resin prior to curing (page 86, "Results and Discussion", first paragraph). This step, which is presented as essential in D1, excludes any possibility of maintaining the epoxy resin in curable (unreacted) form prior to the step of dispersing.

- 6.6.2 The finding in the decision under appeal, that variables such as dispersing agents would be avoided in a scientific study such as D1, is not supported by the disclosure of D1 itself, which makes no remark to this effect. On the contrary, it is clear from the text of D1, that further experimental details are given elsewhere (page 83, "Experimental", point 2.1, first paragraph, last sentence). It must therefore be concluded that the content of D1, which is a review article, refers to all the features of the system which the author considered to be essential for obtaining the effects investigated. These do not include any reference to dispersing agents.
- 6.6.3 Consequently, there is no reason to suppose that the attention of the skilled person reading D1 would be alerted to the relevance of dispersing agents, let alone that he would contemplate the particular dispersing agents required by the solution of the stated problem.
- 6.6.4 Thus, the disclosure of D1 itself offers no hint to the solution of the relevant technical problem.
- 6.6.5 As to the disclosure of D2, there is no reason why the skilled person should consider this teaching as relevant to the solution of the technical problem in the first place, since it does not relate to the

improvement of impact resistance, or indeed to the improvement of any quality discernably related to impact resistance. On the contrary, the opposite tendency of its teaching would discourage such an initiative (section 4.3, above).

6.6.6 Even if the skilled person were for some reason to attempt to make use of the teaching of D2, the latter combines the dispersing agent with a non-functionally terminated polydimethylsiloxane and there is no hint to "divorce" this combination and instead combine a functionally terminated polydimethylsiloxane with the dispersing agent, as would be required by the solution of the technical problem. On the contrary, it is an essential requirement of the teaching of D2 that the fluid lubricant component (b), in the relevant embodiment a polydimethylsiloxane, be incompatible with the epoxy resin (D2, Claim 1 and column 3, lines 46 to 54). This implies, as a minimum, that the polydimethylsiloxane is not reactive with the epoxy resin.

6.6.7 Consequently, there is no pointer to the solution of the technical problem in the teaching of D2, either.

6.7 In view of the above, it is evident that the subject-matter of Claim 1, and by the same token, that of dependent Claims 2 to 6, does not arise in an obvious way from the documents of the state of the art, whether starting from D2, as was the case in the decision under appeal, or from D1, as above, as the closest state of the art. The same reasoning applies to the subject-matter of independent Claim 7, which is of the same scope in relation to the definition of the final product.

6.8 In other words, the Board would not have come to a different conclusion even if D1 had been taken as the closest state of the art instead of D2.

6.9 Hence, the subject-matter of Claim 1 and of dependent Claims 2 to 6, as well as of Claim 7 involves an inventive step.

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 requested by the Appellant in the Statement of Grounds of appeal, i.e. the following text:

Claims:

Claims 1 to 7 filed on 2 March 1993 (with the Statement of Grounds of Appeal).

Description:

pages 1, 2, 4, 6, 7, 9 and 11 to 13 of the application as originally filed;
pages 14 and 15 filed on 11 May 1992 (letter dated 9 May 1992);
pages 3, 5, 8, 10 and 16 to 21 filed on 2 March 1993 (with the Statement of Grounds of Appeal);
(pages 22 to 25 of the application as filed having been deleted).

The Registrar:


E . Görgmeier

The Chairman:


C. Gérardin

