BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

A		B		C	X

File No.: T 0894/90 - 3.3.3

Application No.: 82 108 342.5

Publication No.: 0 074 632

Classification: C08L 81/02

Title of invention: Glass-filled polyarylene sulfide compositions containing organosilanes.

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

Applicant: Philips Petroleum Company

Proprietor of the patent: -

Opponent: Hoechst Aktiengesellschaft Zentrale Patentabteilung

Headword:

EPC: Art. 56

Keyword: Lack of inventive step (confirmed)

Headnote
Catchwords

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0894/90 - 3.3.3

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

Appellant: (Proprietor of the patent)
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Respondent: (Opponent)
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Representative:
-

Decision under appeal:
Decision of the Opposition Division of the European Patent Office dated 11 July 1990, issued on 5 September 1990revoking European patent No. 0 074 632 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: H.H.R. Fessel
Members: R.A. Lunzer
M.K.S. Aúz Castro

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 074 632 in respect of European patent application No. 82 108 342.5 filed on 9 September 1982 claiming a US priority of 10 September 1981 (US 300 859) was announced on 24 February 1988 (cf. Bulletin 88/08). The patent was granted on the basis of 7 claims of which the independent Claims 1, 2 and 7 read as follows:

"1. A composition comprising a glass-filled polyarylene sulfide and at least one organosilane characterized in that said organosilane is selected from

1. Octadecyltriethoxysilane,
2. 2-(Benzylchloro)ethyltrimethoxysilane,
3. 3-Ureidopropyltrimethoxysilane,
4. N,N-Diethyltrimethoxysilylpropylthio-sulfenamide,
5. n-Propyltriethoxysilane,
6. Trimethylsilylpropylazide,
7. bis(3-Triethoxysilylpropyl)tetrasulfide,
8. Phenyltrimethoxysilane,
9. tris(Trimethoxysiloxy)phenylsilane,
10. Octyltrichlorosilane.

2. A method for modifying a property of a glass-filled polyarylene sulfide characterized by (a) combining polyarylene sulfide, glass and an organosilane selected from at least one of the compounds recited in Claim 1 to produce a mixture; and (b) raising the temperature of said mixture to a temperature equal to or above about the melting point of said polyarylene sulfide. =

7. A composition produced by the method of one of Claims 2 to 6."

II. A notice of opposition was filed on 24 November 1988 by Hoechst AG alleging lack of inventive step (Article 100(a) in conjunction with Article 56 EPC) of the subject-matter claimed in all of the claims.

The opposition was supported by *inter alia*

(1) DE-A-2 728 233.

III. By a decision which was given at the end of oral proceedings, held on 11 July 1990 and issued in writing on 5 September 1990, the Opposition Division revoked the patent as granted for lack of inventive step.

The Opposition Division saw the problem being solved by addition of the silanes as set out in claim 1 of the patent in suit in improving hydrolytic stability and effecting a change of flow rate of glass-filled polyarylene sulphide compositions.

The terms "Wasserbeständigkeit" as mentioned in (1) and "hydrolytic stability" used in the patent in suit were held to have basically the same meaning. Thus, it was known from (1) that silanes were used to improve the water stability of said compositions, and in the light of that disclosure it would have been obvious for a man skilled in the art to use other silanes and to determine with routine tests the most suitable ones for that purpose.

IV. On the 15 November 1990 an appeal was lodged against that decision together with payment of the prescribed fee. A statement of grounds was received on 15 January 1991, together with a new claim 1 and amended pages 2

and 5 of the patent specification. Claim 1 now on file differs from Claim 1 as granted in that six of the ten organosilanes specified therein were deleted, *viz.* only numbers 1, 2, 4 and 5 of the granted version are still the subject-matter of claim 1.

V. During oral proceedings held on 25 August 1993 and in the written submissions, the Appellant contested the arguments relied on in the decision under appeal. It argued that it was an object of the present invention to provide compositions comprising a glass-filled polyarylene sulphide showing little loss of mechanical properties when test specimens made thereof are immersed in water in a pressure cooker at 120°C. As demonstrated in Tables IV to VI of the disputed patent, the amount of loss for the claimed silanes was in the range of about 1.8 to 6.9 compared with other unknown silanes (viz. not known from the cited prior art) mentioned therein and having a loss of about 8.1 to 33.2.

Since (1) concerns the "Wasserbeständigkeit" of such compositions with regard to electric properties at room temperature (cf. Table IV) a man skilled in the art could not learn therefrom that the above object was achieved by using the claimed silanes, which were not mentioned at all in (1).

Contrary to the interpretation of the Opposition Division (1) did not support the notion that silanes improve the hydrolytic stability of mechanical properties, reflected by measuring tensile strength.

Even if it was believed in the art that silanes would improve hydrolytic stability of the compositions, the amount of the improvement could not have been predicted from what was known in the prior art. Tests for

mechanical stability were not provided in (1) and could thus not have been expected by a skilled worker.

VI. The Respondent (Opponent) disputed that argumentation and alleged that a person skilled in the art being aware that alkoxysilanes (page 6, paragraph 3 of (1)) were known to improve "Wasserbeständigkeit" of compositions comprising a glass-filled polyarylene sulphide, had only to make some routine tests to select the most appropriate alkoxysilanes for that purpose.

VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claim 1 filed on 15 January 1991 and Claims 2 to 7 as granted together with the amended description also filed on 15 January 1991.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. The amended claim 1 does not give rise to any objection under Article 123(3) EPC, since its subject-matter has been curtailed by the simple deletion of six of the ten previously specified organosilanes. Nor does the patent contain subject-matter which extends beyond the content of the application as filed (Article 123(2) EPC) in view of the disclosure of silanes 1, 3 and 5 of Claim 1, and component 21 in Table VI of the application as originally filed. Admissibility under Article 123(2) and (3) EPC has also not been disputed in the proceedings.

3. The subject-matter of the claims of the patent in suit is a composition comprising polyarylene sulphide and an organosilane specified therein (cf. Claim 1 of the patent in suit) and a method of combining a polyarylene sulphide, glass and at least one of the specified silanes and heating the thus obtained mixtures under the conditions given in Claim 2. The Board considers this subject-matter to be novel with regard to the cited prior art since nowhere in the prior art was a composition or method disclosed containing one of the four silanes specified in Claim 1 or any mixture thereof. Further details need not be given since novelty has not been disputed in the appeal proceedings.

4. The Board considers in conformity with the Opposition Division and the parties that (1) represents the closest prior art.

4.1 This document concerns arc-resistant compositions comprising a polyarylene sulphide and fillers such as glass, clay and/or talc (Claim 1). However, the problem to be solved is not only to provide arc-resistant compositions having acceptable physical properties but also to provide compositions having "Wasserbeständigkeit" (cf. page 3, last paragraph). Document (1) demonstrates that although the basic filled polyphenylene sulphide has adequate mechanical properties, improved "Wasserbeständigkeit" is attained when silanes or mixtures thereof selected from alkylsilanes, alkoxysilanes, or polymers thereof are used (cf. page 6, lines 9 to 21).

The patent in suit comprises the same compositions with the sole difference that the specific silanes of Claim 1, which are not mentioned in (1), are used to improve the hydrolytic stability of the said compositions.

Since the Board, like the Opposition Division, considers that the terms "Wasserbeständigkeit" and "hydrolytic stability" have basically the same meaning (cf. 5.2 and 5.3) and no evidence to the contrary has been provided during the proceedings, the problem to be solved by the patent in suit with regard to that prior art, may be seen in providing hitherto unknown compositions having also improved hydrolytic stability.

4.2 With regard to the results provided in Table VII of the patent in suit, the Board is satisfied that problem is effectively solved, and in fact the best results are obtained, when the four silanes specified in Claim 1 are used.

5. It has now to be considered whether it was obvious for a person skilled in the art to use those silanes to solve the above problem.

5.1 By (1) a person skilled in the art was taught that the addition of silanes to compositions comprising glass-filled polyarylene sulphide improved hydrolytic stability (cf. Table IV of (1)). Based on the results given in that Table he would realise that e.g. methyltrimethoxysilane, the silane of "Probe 4", did in fact lead to an improvement of hydrolytic stability in comparision with the silane-free compositions of "Probe 1".

A man skilled in the art seeking to solve the above problem and being aware of the said results of "Probe 4" would thus not hesitate to replace the silane specified therein *viz.* methyltrimethoxysilane by homologues thereof in the expectation of achieving the desired improvement. Since the Board considers silanes 1 and 4 of Claim 1 of the patent in suit to represent such

homologues it is considered to be obvious to use them instead of the silane of "Probe 4".

That the result to be expected was in fact achieved can thus not amount to evidence for an inventive step.

As to the alleged amount of improvement no evidence has been provided *vis-a-vis* silanes specified in (1), such as methyltrimethoxysilane which could demonstrate a significant effect based on the selection of the four silanes of Claim 1 (especially 1 and 4) over said prior art. Therefore, an inventive step cannot be based on the criterion of an inventive selection, regardless the fact that in general a quantitive improvement cannot normally be regarded as evidence of an inventive step (cf. T 321/87 item 7.5 and T 551/89 item 4.4 both unpublished). The evidence provided merely shows the expected effect of an improved hydrolytic stability of alkoxysilanes *vis-a-vis* silane-free compositions.

Moreover it appears that a skilled man could learn from the results given in Table IV of (1) that the amount of the improvement was certainly not only an effect of the alleged selection as shown by Probes 2 and 3 being the same products but emanating from different sources and would thus be based on trial and error and not on any inventive selection.

5.2 As to the different methods of determining the hydrolytic stability of the compositions disclosed in (1) and in the patent in suit, they are both based on the same phenomenon *viz.* hydrolytic stability or "Wasserbeständigkeit" and, thus, it does not matter whether that property is determined by measuring the electrical or mechanical properties of specimens made of such compositions *viz.* the dielectric constant or volume resistance after seven days in water, or the tensile

strength, after having been held in water in a pressure cooker at 120°C for 150 hours.

The improvement was, as set out above, to be expected by a person skilled in the art.

5.3 No valid distinction can be based on the fact that the patent in suit is concerned with the loss of tensile strength after 150 hours at 120°C in water, whereas (1) concerns reduction of the loss of electrical properties after 7 days at room temperature in water, because both tests are directed to the same basic property, i.e. hydrolytic stability. As stated in the decision under appeal, no evidence was provided to show that there is any basic difference between "Wasserbeständigkeit" and "hydrolytic stability", and as such evidence has not been produced in appeal proceedings either and the Board is not aware of anything to the contrary it follows the approach taken by the Opposition Division.

5.4 For the reasons given above the Board came to the conclusion that the subject-matter of Claim 1 lacks inventive step. Since the other independent Claims, 2 and 7, rely on the same principle also their subject-matter lacks inventive step.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier H.H.R. Fessel