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D E C I S I O N
of 29 September 1993

Case Number: T 0389/90 - 3.3.3

Application Number: 82103184.6

Publication Number: 0063753

IPC: C08L 57/04

Language of the proceedings: EN

Title of invention:
One-pack composition comprising a silyl group containing vinyl type polymer

Patentee:
Kanegafuchi Kagaku Kogyo Kabushiki Kaisha

Opponent:
BASF Lacke + Farben AG

Headword:
-

Relevant legal norms:
EPC Art. 56

Keyword:
"Inventive step (denied) - effect as expected"

Decisions cited:
-

Catchword:
-

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Case Number: T 0389/90 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 29 September 1993

Appellant: (Proprietor of the patent)
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Representative:
-

Decision under appeal:
Decision of the Opposition Division of the European Patent Office of 11 December 1989, issued on 5 March 1990, revoking European patent No. 0 063 753 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: F. Antony
Members: H.H.R. Fessel
M.K.S. Aúz Castro

Summary of Facts and Submissions

I. European patent No. 0 063 753 in respect of European patent application No. 82 103 184.6, which was filed on 15 April 1982 claiming a priority of 17 April 1981 (JP 59002/81), was granted on 16 July 1986 (cf. Bulletin 86/29) on the basis of 2 claims, of which the only independent Claim 1 reads as follows:

"A one-pack composition which is curable at low temperatures by atmospheric moisture comprising a mixture of (A) 100 parts by weight of a silyl group containing resin in which the backbone is substantially composed of a vinyl polymer chain and which contains at least one silicon atom attached to a hydrolyzable group at a terminal or in a side chain of its molecule; (B) 0.1 to 10 parts by weight of a curing catalyst; and (C) a solvent; characterized in that said curing catalyst is selected from a carboxylic acid type organic tin compound, a mercaptide type organic tin compound having an Sn-S bond and a sulfide type organic tin compound having an Sn=S bond; said solvent comprises a hydrolyzable ester and/or an alkyl alcohol; and said silyl group-containing resin (A) has a molecular weight of between 1,000 and 30,000 and contains an ethylenically unsaturated organic monomer containing active hydrogen as a copolymerization component."

II. On 15 April 1987 a notice of opposition was filed by BASF Lacke & Farben AG, Münster (DE). In that notice of opposition revocation of the patent in its entirety was requested based on Article 100(a) EPC especially in conjunction with Article 56 EPC.

The opposition was supported by:

(1) GB-A-1 127 625
(2) DE-A-2 837 074, and
(3) EP-A-7 765.

III. The decision by the Opposition Division issued in writing on 5 March 1990 was based on a main request consisting of the claims as granted, and a subsidiary request filed during oral proceedings before the Opposition Division and consisting of one claim, viz. Claim 1 corresponding to the granted version except component (A) of the mixture being defined as follows:

"(A) 100 parts by weight of a resin containing alkoxy silyl alkyl groups at a terminal or in a side chain of its molecule in which the backbone is substantially composed of a vinyl polymer chain and wherein the alkoxy silyl alkyl groups amount to more than 5% by weight of the polymer".

It was held that the subject-matter of Claim 1 of the main request was not novel over compositions disclosed in (1), more particularly "Finish Appliance B" as disclosed therein.

That decision further held that the subject-matter of the claim of the subsidiary request did not involve any inventive step since it would have been obvious in view of (2), especially Example 10 thereof to increase the amount of alkoxy silyl alkyl groups over what was used in (1), i.e. to more than 5% by weight of the polymer as specified in the claim.

Moreover, according to (3) shelf stability and pot-life in the presence of trace amounts of moisture were increased by adding to similar polymer compositions

trialkyl orthoformates and an alkyl alcohol, a feature also proposed in the patent in suit (cf. page 2, lines 45 and 46).

IV. On 14 May 1990 an appeal together with payment of the prescribed fee was lodged by the Patentee against said decision. A Statement of Grounds of appeal was filed on 16 July 1990. The Appellant contested the above findings, arguing in writing and during oral proceedings held on 29 September 1993, that (1) represented the closest prior art and the problem underlying the patent in suit was to provide compositions which were easy for users to handle. This problem was surprisingly solved by the claimed one-pack compositions. Such one-pack compositions were not previously known or used; what was known were two-pack compositions as disclosed in (1) and (2), dating from 1968 and 1978 respectively. Moreover it was common general knowledge that one-pack compositions must not comprise a catalyst whereas two-pack compositions did contain a catalyst (cf. Römpps Chemie-Lexikon, 8th edition (1987), page 3858). This was said to amount to a prejudice against one-pack compositions containing a catalyst. Neither did (3), whose polymers differed from those of the patent in suit, provide any hint at said one-pack compositions, since its examples did not mention catalysts, whereas the last paragraph on page 10 merely referred to a possible use of catalysts in compositions employed as coating materials.

On 16 April 1991 the Appellant filed a second subsidiary request, differing from the first in that, in the passage "said solvent comprises a hydrolyzable ester and/or an alkyl alcohol", the word "or" was to be deleted.

V. The Respondent disputed the Appellant's argumentation, denying that the teachings of (1) and (2) in the light of common general knowledge could lead to any technical prejudice. While it was true that according to (1) the catalyst was added just prior to use of the composition, a man skilled in the art would recognise that the composition disclosed in (1) could also be used as a one-pack composition. This argument was based e.g. on page 6, lines 14 to 20 of (3), where it was disclosed that an alkyl alcohol having 1 to 4 carbon atoms had a viscosity stabilising effect when added to polymeric organosilanes which were subsequently exposed to 2,000 ppm of water. One therefore would expect the n-butanol used in "Finish Appliance B" of (1) to act as stabiliser, permitting the addition of a catalyst without any negative effect on the handling characteristics of the composition when stored in a sealed can.

VI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained as granted or on the basis of the auxiliary request underlying the decision under appeal or the further auxiliary request filed on 16 April 1991.

The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. No objection was raised as to the subject-matter of the claims as granted (main request) based on Article 100(c) EPC, and the subject-matter of the claims of the first subsidiary request was held to meet the requirements of

Article 123(2) and (3) EPC. This has not been disputed in appeal proceedings. As to the subject-matter of the second subsidiary request filed during these proceedings, which differs from the subject-matter of the first subsidiary request by deletion of "or" in the combination of "a hydrolyzable ester and/or an alkyl alcohol", i.e. a restriction to one of two alternatives, the Board is satisfied that the provisions of Article 123(2) and (3) EPC are met.

3. Novelty of the subject-matter claimed in the first and second auxiliary requests was not in dispute whereas the Board expressed doubts as to novelty of the subject-matter of Claim 1 of the main request. A detailed discussion of this point is, however, superfluous since for the reasons given below the appeal must any way fail for other reasons.

4. *Problem underlying the patent in suit*

4.1 The Board considers (1) to represent the closest prior art. Like the patent in suit, that document discloses solutions comprising a silyl-group containing polymer in which the backbone is substantially composed of a vinyl type polymer chain which contains at least one silicon atom attached to a hydrolysable group at the terminal or a side chain in the molecule (A), a curing catalyst (B) and a solvent (C) for coating (cf. Finish Appliance B and Table IV on page 6). As to the storage stability of the solutions of (A) and (C), it is disclosed in the paragraph bridging pages 1 and 2 that they are stable at normal room temperature and crosslinkable by heat and/or catalyst addition (cf. page 2, lines 3 and 4 in conjunction with page 6, Table IV).

4.2 The problem to be solved by the patent in suit vis-à-vis that prior art may be seen in providing a solution

comprising components (A), (B) and (C) and being "quite stable" at room temperature and curable at low temperatures by atmospheric moisture.

4.3 The Board is satisfied that said problem has been effectively solved by the proposed solutions of the claims of the main and both subsidiary requests.

In particular, this is shown by the results given in Table 1 of the patent in suit. Based on the examples referred to therein the term "quite stable" is understood to cover a change in viscosity of a composition stored in a sealed tin paint can at 50°C for 20 days from 0.10 to 0.27 and from 0.20 to 0.35 Pa.S. Curing by atmospheric moisture at low temperatures is illustrated by a temperature of 60°C leading to a pencil hardness as given therein.

5. *Inventivity of main request*

It has now to be considered whether a man skilled in the art would store a solution of (A), (B) and (C) in, e.g., a sealed tin paint can in the expectation that said solution would have such adequate storage stability and would sufficiently cure under such conditions. Solutions with those properties were called "one-pack" in the claims of the patent in suit (cf. page 2, lines 20 to 21 of the patent specification).

5.1 Document (1) deals with storage stability and cure of a solution comprising (A) and (C). On page 2, lines 72 to 77 it is specified that said solutions are, in the absence of any catalyst (B), storage stable up to about 125°C. They will give a product with a pencil hardness of 4-5 H after having been subjected to heating at 145°C for 30 minutes when used as coating material (cf. Finish Appliance B, uncatalysed, page 6, Table IV). The said

Table also specifies that the same solution (A) and (C) when catalysed with dibutyl di-2-ethylhexoate, i.e. a catalyst (B) of the carboxylic acid type organic tin compound, will provide a pencil hardness of 6H after heating. This document read in isolation does, however, not provide any hint as to storage stability of solutions containing each of (A), (B) and (C), disclosed in Table IV with (C) being n-butanol.

5.2 Document (3) deals with stabilised compositions of (A) and in effect discloses on page 6, line 6 to page 7, line 2 that, while each of the alkyl alcohols having 1 to 4 carbon atoms and a monomeric hydrolytically reactive compound such as a trialkyl orthoformate, individually have a viscosity stabilising effect on compositions comprising (A), by an admixture of both a synergistic effect is achieved. As to the cause of the stabilising effect of those compounds, it is believed that the stabilisation is achieved by preventing the moisture from hydrolysing and crosslinking the polymeric organosilanes (A) (page 3, lines 7 to 12). Possible addition of a cure accelerating catalyst is briefly mentioned on page 10, line 25 as a conventional additive, so that, by (3) alone, again no hint is given to any storage stability of compositions containing each of (A), (B) and (C).

5.3 The next question to be considered is whether a man skilled in the art would combine the teachings of (1) and (3) when seeking to solve the above problem.

In other words, would a skilled worker aware of the state of the art disclosed in (3) expect a composition of (A), (B) and (C) as disclosed in the above-referred Example of (1) to have an appropriate stability when stored in a tin paint can at room temperature.

The Board considers that a skilled person is taught by (3) that stability is brought about by the absence of moisture, and since hydrolysable esters and alkyl alcohols are said in (3) to act as stabilising agents (which means, in context, as moisture-scavengers), or to shift hydrolysis equilibrium versus ROSi≡, he would expect a solution of (A) and (B) in n-butanol, as is known from Finish Appliance B of (1), to be storable at room temperature in a sealed tin paint can and curable by atmospheric moisture. In other words it would have been obvious for him to try using the known composition as one-pack composition. Hence, Claim 1 of the main request, even if supposed to be novel, would lack in any inventive step

6. *First auxiliary request*

The subject-matter of the claim of this request essentially differs from that of Claim 1 of the main request in that "the silicon atom attached to a hydrolysable group" in (A) is now restricted to an "alkoxy silyl alkyl group which amounts to more than 5% by weight of the polymer".

In "Finish Appliance B" of (1) the said group is a 3-(trimethoxysilyl)propyl group thus within the scope of that definition. Whereas the amount of said group is just 5% by weight and **not more than** 5% as claimed according to the patent in suit, it is known from the prior art (cf. (1), page 2, lines 91 to 99) that the amount of said group depends on the polymer to be crosslinked and the degree of crosslinking desired. No evidence (or even arguments) was produced which could have enabled the Board to formulate a more ambitious problem effectively solved owing to an amount greater than 5% by weight of that hydrolysable silyl component

in (A). This feature thus cannot contribute to acknowledging existence of any inventive step.

7. *Second auxiliary request*

7.1 The subject-matter of Claim 1 of this request differs from that of the first auxiliary request in that the individual use of either of the two solvents there specified has been excluded thus the claimed subject-matter is restricted to the presence of an admixture of both solvents.

7.2 While Example 1 in Table 1 of the patent in suit does show an improved stability of a composition containing both methanol and methyl orthoformate as solvent (third horizontal column; initially: 0.11 Pa.s, after 20 days at 50°C: 0.20 Pa.s) as against one containing only the former (first horizontal column; respective values: 0.10 and 0.27), this effect was to be expected in view of the teaching given on page 6 of (3), The values given in Table 1 of the patent in suit merely verify the synergistic effect disclosed in (3). Hence the above restriction over the subject-matter of the first auxiliary request cannot help to establish an inventive step.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

E. Görgmaier F. Antony

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AC