BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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File Number: T 277/91 - 3.3.3

Application No.: 86 103 739.8

Publication No.: 0 199 087

Title of invention: A liquid coating composition and a process for coating a substrate with such coating composition

Classification: C08F 8/32

D E C I S I O N
of 10 February 1993

Proprietor of the patent: Akzo N.V.

Opponent: BASF Lacke + Farben Aktiengesellschaft
Hoechst AG Werk Kalle-Albert

Headword:

EPC Articles 54, 56

Keyword: "Novelty (yes) - no implicit disclosure"
"Inventive step (yes) - return to concept regarded as superseded - time factor"

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number : T 277/91 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 10 February 1993

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Decision under appeal :
Decision of the Opposition Division of the European Patent Office dated 10 January 1991, posted on 8 February 1991 rejecting the oppositions filed against European patent No. 0 199 087 pursuant to Article 102(2) EPC.

Composition of the Board :

Chairman : F. Antony
Members : C. Gérardin
M. Aúz Castro

Summary of Facts and Submissions

I. The mention of the grant of the patent No. 0 199 087 in respect of European patent application No. 86 103 739.8 filed on 19 March 1986 and claiming the priority of 29 March 1985 from an earlier application in The Netherlands, was published on 18 January 1989 on the basis of seven claims, of which Claim 1 read as follows:

"A liquid coating composition based on a polyacetoacetate, a polyamine having primary and/or secondary amino groups and blocked with a ketone or an aldehyde having not more than 18 carbon atoms, the blocked polyamine and the polyacetoacetate being present in an amount such that the ratio of the number of equivalents of primary and secondary amino groups of the polyamine to the number of equivalents of acetoacetate of the polyacetoacetate is between 1/2 and 2, characterized in that the polyacetoacetate is an acetoacetate groups-containing addition polymer having a number average molecular weight of 1000-100 000, a glass transition temperature of 250° - 370°K, a hydroxyl number of 0-200, and a content of acetoacetate groups of 3,5-45% by weight, the acetoacetate groups being present as ester of hydroxyalkyl acrylate, hydroxyalkyl methacrylate or allyl alcohol structural units."

Claims 2 to 6 were dependent claims directed to preferred coating compositions according to the main claim. Further, Claim 7 was a process claim concerning the use of a liquid coating composition according to any of the Claims 1 to 6 for coating a substrate.

II. On 28 July 1989 and 31 August 1989 Opponents 1 and 2 respectively filed Notices of Opposition against the grant of the patent and requested revocation thereof in its

entirety for lack of inventive step under Article 100(a) EPC. This objection, which was emphasised and elaborated during oral proceedings before the Opposition Division, was based essentially on the following documents:

(1) Journal of Paint Technology, Volume 46, No. 591, April 1974, pages 70 to 75,
(2) Journal of Paint Technology, Volume 46, No. 591, April 1974, pages 76 to 81,
(3) US-A-3 668 183,
(4) US-A-4 408 018,
(5) DE-A-2 158 957.

III. By a decision of 10 January 1991, with written reasons posted on 8 February 1991, the Opposition Division rejected the oppositions. It was first stated in this decision that the liquid coating composition according to the main claim was novel, since none of the documents relied upon by the Opponents described addition polymers containing acetoacetate groups. Regarding the issue of inventive step, although it was known from documents (1) to (3) that both low molecular weight compounds and condensation polymers bearing acetoacetate groups were suitable for coating applications, none of the citations suggested that addition polymers with acetoacetate groups would exhibit an improved resistance to water, acids and outdoor exposure.

IV. On 26 March 1991 the Appellant (Opponent 1) filed a Notice of Appeal against this decision and paid the prescribed fee at the same time.

(i) In the Statement of Grounds of Appeal filed on 16 May 1991, in a later submission as well as during oral proceedings held on 10 February 1993, the Appellant followed the same line of argumentation as before the

Opposition Division, i.e. an approach based on the shortcomings of the prior art coatings, which were attributed to a large extent to the poor properties of alkyd resins. With the later development of acrylic polymers reported in document (4), which proved to be superior to alkyd resins for coating applications, there was a strong incentive to use them in coating compositions combining the advantages of acetoacetate groups and blocked polyamines. Further, document (5) mentioned coating compositions, wherein the acetoacetate groups were attached to addition polymers corresponding in their structure and properties to those used in the patent in suit.

(ii) During oral proceedings Opponent 2, which as a party to the proceedings had been duly summoned, emphasised the latter argument in the framework of an objection of lack of novelty because of the presence of water in the composition of Example 13. It put forward that all the compositional features of the claimed coating compositions were disclosed in this citation; the number average molecular weight and the glass transition temperature specified in Claim 1 of the patent in suit were nothing more than parameters expressing conditions which were implicitly fulfilled in this citation.

V. Regarding the objection of lack of novelty the Respondent argued that there were differences in terms of composition and, thereby, of reaction mechanism between document (5) and the patent in suit. Whereas the process according to document (5) involved the use of dispersions, wherein the amine component was not blocked, the claimed composition was based on a specific deblocking reaction which determined the subsequent reaction of the coating. In accordance with this argument, the Respondent filed a new

set of 7 claims during oral proceedings, wherein the main claim had been amended as follows: "A liquid coating composition based on a non-aqueous solution of a polyacetoacetate ...".

As far as the issue of inventive step was concerned, the Appellant's argumentation relied on a combination of features which could only be made by hindsight analysis, i.e. with the benefit of the knowledge of the patent. Moreover, the advantages provided by the claimed compositions in terms of flexibility in gel time, whereby coating of treated as well as untreated metals could be envisaged, were evidence of an inventive step.

VI. The Appellant as well as Opponent 2 requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the appeal be dismissed and that the patent be maintained on the basis of Claims 1 to 7 and the description filed during oral proceedings.

Reasons for the Decision

1. The appeal complies with Articles 106 to 108 and Rule 64 EPC and is admissible.

2. The patent in suit concerns a liquid coating composition and a process for coating a substrate with such coating composition. Liquid coating compositions of that kind are described in documents (1), (2) and (3), which the Board regards as equally suitable starting points for the definition of the technical problem underlying the patent in suit; these three documents, which report the results of a research program of the same company, deal with

polyenamine resins produced by the reaction of various polyacetoacetates with blocked polyamines. In document (1) the polyacetoacetate is trimethylolpropane triacetoacetate, thus a compound of low molecular weight (page 71, left-hand column, paragraph "Acetoacetate Preparation"); in document (2) prepolymers obtained by reaction of the above triacetoacetate with 1,6-hexanediamine or tolylene diisocyanate are used (page 76, paragraph "Experimental"); in document (3) a somewhat broader definition of suitable polyacetoacetates is given, which encompasses derivatives of polyols of low molecular weight as well as of condensation polymers having terminal hydroxyl groups (column 3, lines 44 to 63; Examples 8 to 14). All these polyacetoacetates have in common that, when mixed with a polyamine initially blocked with a ketone or an aldehyde, they give rise to compositions with pot lives of sufficient duration to enable them to be used in coating compositions; in many systems the pot life may even be increased by the addition of an organic solvent (document (3), column 4, lines 47 to 54). In practice, however, coating compositions derived from such polyenamines suffer from several shortcomings; they display insufficient resistance to water, are susceptible to acid attack and further possess an unsatisfactory resistance to outdoor exposure.

In the light of these shortcomings, the technical problem underlying the patent in suit can thus be seen to be the provision of an improved liquid coating composition which, without losing the advantageous pot life properties, displays better resistance to water, acids and outdoor exposure.

According to Claim 1 of the patent in suit this problem is to be solved by using a non-aqueous solution of a polyacetoacetate derived from an addition polymer

characterised by (i) a number average molecular weight, (ii) a glass transition temperature, (iii) a hydroxyl number, (iv) a content of acetoacetate groups all within specific ranges and (v) by the fact that the acetoacetate groups are present as ester of hydroxyalkyl acrylate, hydroxyalkyl methacrylate or allyl alcohol structural units.

In view of the experimental data in the patent in suit the Board is satisfied that the above-defined technical problem is effectively solved. These results have not been disputed by the Appellant.

3. During oral proceedings emphasis was laid on an objection of lack of novelty based on the teaching of document (5).

This citation describes a coating composition which contains (a) an aqueous dispersion of an addition copolymer bearing acetoacetate groups, (b) a polyamine, and (c) formaldehyde and/or a polyaldehyde (Claim 1). Typical such addition copolymers contain 0.5 to 50%, preferably 20 to 40% by weight of monomers bearing such groups (Claims 2 and 3) and typical such monomers are acetoacetates of glycol mono(meth)acrylates (page 3, lines 1 to 3; Examples 1 to 4). However, even if one adopts the line of argumentation followed by Opponent 2 during oral proceedings and assumes that these addition polymers fulfil the above conditions (i) to (v), i.e. that these requirements are implicitly met in document (5), this teaching cannot be regarded as anticipating the claimed subject-matter for the following reasons.

The first is that component (a) of these coating compositions is used as an aqueous dispersion; this particular embodiment has been excluded by the last amendment in Claim 1, since it is now specified that a

non-aqueous system should be used. The second reason is that, whereas the patent in suit requires the use of a blocked polyamine, document (5) teaches the use of the polyamine and the aldehyde as separate components acting as cross-linking agents for component (a) (page 4, paragraph 4). The third reason, which can in fact be regarded as a consequence of the first two, concerns the general properties of the compositions; in contradistinction to document (5), which describes processes for dressing leather and synthetic leather only, wherein pot life duration is not an essential criterion, the patent in suit aims at compositions which are particularly useful in the protective coatings sector and, especially, in the car refinish sector, as will appear hereinafter. It is self-evident that such differences in the fields of application reflects marked differences in properties, which can only be attributed to differences inherent to the compositions.

For these various reasons, it can be concluded that the coating compositions disclosed in document (5) do not anticipate the claimed subject-matter.

4. It still remains to be decided whether this subject-matter involves an inventive step with regard to the teaching of the documents relied upon.

4.1 Although some specific embodiments mentioned in documents (2) and (3) would appear to provide an improvement of acid resistance and, thereby, a partial solution to the above-defined technical problem, the advantage is too limited to be considered by the skilled man; moreover, the solutions advocated in these citations cannot lead to the claimed subject-matter.

The first parameter which the skilled man would consider is the molecular weight of the polyacetoacetate, i.e. the molecular weight of the polyol reacted with diketene or an alkyl acetoacetate. Document (2) shows that by using a hydroxyl-terminated alkyd resin of high equivalent weight, which means a lower concentration of enamine groups in the final product, the acid resistance can be improved, but at the expense of several mechanical properties (page 78, paragraph "Improving polyenamine acid resistance" to page 79, left-hand column, paragraph 1).

A second potential method would be to reduce the ability of aqueous acids to wet the coated surface by incorporating a monofunctional or, preferably, difunctional silicon-containing acetoacetate into the polymer (document (2), page 79, left-hand column, paragraph 2; document (3), column 5, lines 26 to 46). However, apart from the fact that the improvement in terms of acid resistance is limited, the difficulties expected in improving the other properties regarded as unsatisfactory have made commercialisation of these intermediates and coatings overall unattractive (document (2), page 81, left-hand column, paragraph 1).

In the Board's view, these negative conclusions regarding the improvement of the general properties of enamine crosslinked coatings would rather deter the skilled man from further attempts in this direction.

4.2 As noted above, the ternary systems described in document (5), which contain (a) an addition copolymer with acetoacetate groups, (b) a polyamine, and (c) formaldehyde and/or a polyaldehyde, cannot be equated with the present compositions. In particular, compounds (b) and (c) are explicitly described as crosslinking agents, which are either incorporated together with the dispersion of

copolymer (a) or applied separately on the leather (page 4, paragraph 4); there is thus no question of a reacted form corresponding to an aldimine.

Moreover, the specific use envisaged for these ternary compositions, i.e. dressing of leather and synthetic leather, requires that the copolymer is applied as an aqueous dispersion and that crosslinking occurs rapidly (page 2, lines 2 to 5); if necessary, that reaction may even be accelerated by a slight increase in temperature or by the addition of small quantities of chromium (III) salts (page 4, paragraph 5). It is evident that both the presence of water and the need of a fast curing reaction are features which are opposite to the requirements in the present case, wherein aqueous systems are now expressly excluded and long gel times are regarded as advantageous.

For all these reasons, the skilled man would not seriously consider the teaching of document (5) for the solution of the above-defined technical problem.

4.3 Although document (4) in its introductory section refers to the poor weatherability of alkyd resins (column 1, lines 18 and 19) and then describes coating formulations based on acrylic resins, there is no direct comparison of compositions based on these polymers, thus no information useful in the present case.

This citation concerns a method for crosslinking an acrylate polymer containing a plurality of pendant acetoacetate moieties with an organic compound containing at least two acrylate groups in the presence of a strong base catalyst (Claim 1; column 2, lines 7 to 37). The curing mechanism is thus based on a Michael reaction with an acryloyl groups-containing crosslinking agent (column 1, lines 48 to 51), whereby a relatively strong

carbon-carbon bond is formed between the binder and the crosslinking agent. By contrast, in the crosslinking reaction according to the above documents (1) to (3) or the patent in suit, the polyacetoacetate and the blocked polyamine interact via an enamine reaction giving rise to a weaker bond more susceptible to acid attack. This argument in the Counterstatement of Appeal (page 4, paragraph 7 to page 5, paragraph 3), which has not been disputed by the Appellant, shows that the curing mechanism involved in document (4) makes a major contribution to the properties of the acrylic coatings described therein. This means as well that the teaching regarding the properties of acrylic resins cannot be isolated from its context and that, consequently, document (4) cannot provide any information valid for a system based on enamine crosslinking reactions.

4.4 The availability of acrylic resins well before the priority date of the patent in suit raises the question of the time factor.

As pointed out by the Board during oral proceedings and agreed by the parties, the advantageous properties of coating compositions based on acrylic resins were known to the skilled man already in the late seventies, thus only a few years after the date of publication of documents (1) to (3). This means that at least seven years elapsed before the date of priority of the patent in suit, i.e. before the acrylic resins according to document (4) replaced the polyols mentioned in documents (1) to (3), which is a considerable time in a field as active as acrylic resins. Under these circumstances, the Appellant's argument that the list of suitable polyols in document (3) (column 3, lines 44 to 63) was not strictly limited to polyols of low molecular weight and condensation polymers with terminal hydroxyl groups, but would be interpreted by

the skilled man as encompassing addition polymers, in particular acrylic resins, makes it even more convincing that the solution claimed in the patent in suit involves an inventive step. For the reasons given above in point 4.1, the skilled man would have been deterred from replacing condensation polymers by addition polymers, because this required the consideration of enamine crosslinked coatings which could not be regarded as promising products. In the Board's view, such a step, which can be regarded as the return to a concept considered as superseded, is an indication for the presence of an inventive step (cf. Decision T 392/86 of 1 February 1988, unpublished).

4.5 Likewise, the advantageous properties of the resulting coatings speak in favour of an inventive step (Counterstatement of Appeal, pages 3 and 4, paragraph "Proprietor's Goal and Solution"). As contended by the Respondent, the enamine crosslinked acrylic systems satisfy the need for an acceptable substitute for polyurethane resins in the protective coatings sector as well as in the car refinish sector; this is highly desirable in view of the toxicity of isocyanates. For instance, protective coatings comprising a primer and a micaceous iron oxide topcoat based upon the acetoacetate-ketimine compositions as defined in Claim 1 can be applied on larger objects, such as oil tanks; with respect to car refinishes, in addition to providing excellent protection against corrosion, the resulting coatings possess faster initial drying properties than polyurethanes, which is a decisive advantage if one considers that most automobile repair applicators are not able to work in clean and dust-free environments.

4.6 For these reasons the Board concludes that the subject-matter of Claim 1 involves an inventive step.

5. Claim 1 being allowable, the same applies to dependent Claims 2 to 6, which are directed to preferred coating compositions according to Claim 1, as well as to dependent Claim 7, which concerns a process of coating a substrate with a liquid coating composition as defined in any of the product claims, and whose inventiveness is supported by that of the main claim.

Order

For these reasons, it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 7 and the description filed during oral proceedings.

The Registrar: The Chairman:

E. Görgmaier F. Antony