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File Number: T 343/90 - 3.3.1
Application No.: 83 201 538.2
Publication No.: 0 107 888
Title of invention: Polyester and its use in powder coating

Classification: C09D 3/64

D E C I S I O N
of 26 May 1992

Proprietor of the patent: DSM RESINS BV
Opponent: 01) Bayer AG, Leverkusen Konzernverwaltung RP
Patente Konzern
02) Synthopol Chemie Dr.rer.pol. Koch GmbH & Co. KG

Headword:

EPC Articles 56 and 123(2)

Keyword: "Inventive step (yes) - alternative solution"
"Amendment of a claim by incorporation of a feature identifiable by the skilled reader as important for the invention (yes)"
"Formation of a numerical range for the said feature from the examples in their entirety without simultaneously adopting the numerical values given in these examples for the other parameters"



Case Number : T 343/90 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 26 May 1992

Appellant :
(Proprietor of the patent)

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Representative :

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Respondent :
(Opponent 01)

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Patente Konzern
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Respondent :
(Opponent 02)

Synthopol Chemie
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Representative :

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Decision under appeal :

Decision of Opposition Division of the European Patent Office of 16 January 1990 with written reasons posted on 27 February 1990 revoking European patent No. 0 107 888 pursuant to Article 102(1) EPC.

Composition of the Board :

Chairman : K.J.A. Jahn
Members : P.K.H. Krasa
M.K.S. Aúz Castro

Summary of Facts and Submissions

- I. The mention of the grant of patent No. 0 107 888 in respect of European patent application No. 83 201 538.2 filed on 26 October 1983, was published on 25 June 1986 (cf. Bulletin 86/26) on the basis of 14 claims.
- II. Notices of opposition, which were filed on 19 March 1987 (Opponent I) and on 23 March 1987 (Opponent II), requested the revocation of the patent on the grounds of lack of novelty and inventive step, and insufficient disclosure.

The oppositions were based on several documents. In the course of the opposition proceedings the following further document was cited:

(4) URALAC P 3400, SCADO GmbH (1979).

- III. Claim 1 of the disputed patent was amended in the course of the opposition proceedings (submission dated 18 November 1988) and read as follows:

"A powder coating, of which the binding agent contains a homogeneous mixture of triglycidyl isocyanurate and a polyester containing carboxyl groups, which polyester is based on a substantially aromatic dicarboxylic acid mixture and on a substantially aliphatic diol mixture, characterised in that the homogeneous mixture contains between 1,4 and 5,3 % by weight triglycidyl isocyanurate and from 94,7 to 98,6 % by weight of a polyester containing carboxylic groups with the following combination of properties: an acid number between 10 and 26 mg KOH/g, a hydroxyl number that is smaller than 15 mg KOH/g, a theoretical number-average molecular weight between 4500 and 12500 and a glass transition temperature between 40°C and 85°C."

By a decision delivered orally on 16 January 1990, with written reasons posted on 27 February 1990, the Opposition Division revoked the patent since the subject-matter of the said amended Claim 1 did not involve an inventive step in view of document (4).

The Opposition Division held that citation (4) was the most relevant prior art since it disclosed powder coating compositions having such properties as are necessary for successfully solving the technical problems listed on page 2, lines 13 to 18 of the disputed patent. Furthermore, according to the Opposition Division, it had not been rendered plausible that any unexpected effects, in particular any improvement in performance, were linked to the minor changes which differentiated the currently claimed products from those disclosed in citation (4).

IV. An appeal was filed against this decision on 24 April 1990 with payment of the prescribed fee. A Statement of Grounds of Appeal was filed on 26 June 1990 together with an amended Claim 1.

Oral proceedings were held on 26 May 1992, in which one Respondent (Opponent II) was not represented, although properly summoned. There the Appellant filed a set of eight claims as main request and a set of seven claims as auxiliary request. Claim 1 of the main request differs from the version before the Opposition Division in so far as the range of the acid number is restricted to 12 to 24 mg KOH/g and the additional feature of "a viscosity of 430 to 1300 dPas at 165°C" is added.

Claim 1 of the auxiliary request differs from that of the main request by the additional feature "... and the polyester contains a compound which has at least 4

optionally substituted methylene groups in an amount of at most 15 mol%."

V. The Appellant (patentee) argued that polyesters with acid numbers at the lower end of the range given in citation (4) had never actually been made. This was concluded from a screening of about 180 batches of the product URALAC P 3400 produced from January 1988 to August 1989. He submitted experimental results demonstrating that polyesters of document (4) with an acid number of about 27, contrary to polyesters according to the patent in suit, did not result in good powder coating compositions when mixed with only 4% by weight of triglycidyl isocyanurate (TGIC). In particular the reverse impact strength of the resulting coating was poor. The Appellant also relied upon an unexpected good flow performance of the polyesters according to the patent in suit as compared to URALAC P 3400 with a low acid number when mixed with 4% by weight of TGIC. The Appellant concluded that the skilled person would have expected problems when choosing polyesters with a low acid number and that, thus, the currently claimed powder coating compositions were inventive.

He requested that the impugned decision be set aside and that the patent be maintained on the basis of Claims 1 to 8 of the main request, alternatively on the basis of Claims 1 to 7 of the auxiliary request.

In substance the Respondents' arguments were that document (4) had to be evaluated in the light of its literal disclosure, and that the allegation that the range of low acid numbers was only a theoretical one, had not been proved. They submitted that the experiments, on which the Appellant relied in support of his above arguments, were not convincing, as the viscosity of the modified URALAC

P 3400 with low acid number was about 1900 dPa.s, while citation (4) clearly disclosed a viscosity in the range of 600 to 900 dPa.s, and furthermore, the Appellant had used only 0.83 epoxy equivalents per acid equivalent for his comparative tests which resulted in reduced cross-linking and, thus an unjustified devaluation of the products obtained by the modification of the state of the art. The Respondents stated that reducing the amount of cross-linking agent would always result in a reduced impact strength and that this not only applied to URALAC P 3400 but also to the products according to the patent in suit. They referred to experiments in support of this argument and concluded that no surprising effects arose from the subject-matter of the disputed patent.

- VI. The Respondents requested that the appeal be dismissed. One Respondent (Opponent I) questioned the allowability of the claims of the main and auxiliary request, since the additional feature viscosity range could not be derived from the description but resulted from a combination of values taken from the examples.

At the end of the oral proceedings the Chairman announced the decision of the Board to allow the Appellant's main request.

Reasons for the Decision

1. The appeal is admissible.
2. Amendments
 - 2.1 Claim 1 of the main request is in fact a combination of Claims 1, 2, and 10 as granted, which in turn are identical with the respective claims of the application as

originally filed. The specific viscosity range included as an additional feature cannot be found expressis verbis either in the specification as filed or in the disputed patent as granted. However, it finds support in the examples. The lowest viscosity value given there is 430 dPa.s and the highest value is 1300 dPa.s (Examples 2A and 5A respectively; page 4, Table 1 of the patent as granted, corresponding to page 7, Table 1 of the application as originally filed). Hence, the lower and the upper limit of the viscosity range in the amended Claim 1 were specifically mentioned in the application as filed.

The Respondent submitted that these values were linked to the particular parameters of the respective examples and that, therefore, it was not allowable under Article 123(2) EPC to generalise such viscosity values to create a generic range therefrom.

- 2.2 However, when answering the question whether or not the limitation of the original Claim 1 has any basis in the application as filed, a literal interpretation of the application is inappropriate, since the addressee of any technical information is the notional person skilled in the art, who would not stick to the wording, but would consider the content of any document in the light of the knowledge which forms part of his professional skill.

Although, it is not a feature of any claim as filed or granted, the importance of the viscosity of the polyester in the context of the present invention is clear from the description of the patent in suit, where means are disclosed for the adjustment of the polyester's viscosity (see page 3, penultimate paragraph of the original description and page 2, last paragraph of the granted patent). Moreover, the skilled reader would pay particular attention to the numerous examples which all contain

specific values supporting the above range of the viscosity of the polyester used for powder coatings as claimed. He would realise immediately that these viscosities are suitable in the context of the present invention since the Examples 1A to 10A disclose specific embodiments thereof.

The Board has no reason to assume that the viscosity values taken from Examples 2A and 5A, respectively, as the end-points of the above viscosity range have to be seen only in the context with all the other data given there for the acid number, the hydroxyl number, the molecular weight, and the glass transition temperature of the polyester; on the contrary the facts speak against this insofar as in Example 10A, with a viscosity value close to the lower end-point of the claimed range, a molecular weight of 9000 is obtained (as against 6500 in the above Examples 2A and 5A) and still a glass transition temperature is obtainable which is below that of Examples 2A and 5A. There is no indication that the technical problem (see below) is not solved because of the restriction of the polyester's viscosity and simultaneously maintaining the ranges of the other above mentioned parameters unchanged.

It is self-evident that by incorporating the additional feature "viscosity", the scope of the amended Claim 1 is restricted as compared to Claim 1 as granted and that thereby the protection conferred is not extended. Therefore, the amended Claim 1 complies with the requirements of Article 123 EPC.

3. Novelty

After examination of the cited prior art, the Board has reached the conclusion that the claimed subject-matter is

novel. Since novelty of the present claims was not disputed, it is not necessary to give reasons for this finding.

4. Sufficiency

Sufficiency of disclosure was not in issue on appeal. The Board sees no reason to deviate from the Opposition Division's finding that no objection arises against the patent in suit under Article 83 EPC.

5. Inventive step

5.1 The patent in suit relates to powder coatings comprising, as a binding agent, a polyester and TGIC.

Document (4), which is a leaflet containing information on a polyester resin with carboxylic groups named URALAC P 3400, discloses powder coatings containing 93 parts by weight of the polyester, which has an acid number of 27 to 37, and 7 parts by weight of TGIC (page 1, paragraphs 1 and 2, and the first line after "Kennzahlen" in the box). The powder coatings obtained with this binder system have very good properties and in particular good mechanical properties (reference (4), page 1, line 5 after the heading "Eigenschaften"); the impact strength, measured according to ASTM 2794-69, is 120 inch.lbs.

The Appellant did not provide experiments which would allow a direct comparison of a powder coating according to his invention with one of this closest prior art. Having regard to the fact that the impact strength of the products of the subject matter of the patent, as determined by the same test method, is within the range of 120 to 160 psi (see the examples) and in the absence of further evidence, the technical problem underlying the

patent in suit vis-à-vis this prior art is seen as providing alternative powder coatings having comparable beneficial mechanical properties.

- 5.2 According to the patent in suit, this technical problem is essentially solved by providing powder coatings, the binding agent of which contains between 1.4 and 5.3% by weight TGIC and from 94.7 to 98.6% by weight of a polyester having an acid number between 12 and 24, a hydroxyl number that is smaller than 15, a theoretical number-average molecular weight between 4500 and 12500, a glass transition temperature between 40°C and 85°C and a viscosity of 430 to 1300 dPas at 165°C, and which is based on a substantially aromatic dicarboxylic acid mixture and on a substantially aliphatic diol mixture.

The disputed patent discloses that these powder coatings show good mechanical properties on curing (page 3, lines 12 to 16, supported by the Examples 1B to 10B, page 3, lines 39 to 57, and page 5, Table 2).

- 5.3 One Respondent (Opponent I) contested this statement on the basis of comparative tests in which the polyesters of Examples 1A and 2A of the disputed patent were reproduced and the coatings resulting therefrom were compared with a coating prepared from a commercial product, Crelan LS 2788. According to the Respondent, this commercial product corresponds to the polyester URALAC P 3400 of document (4) with respect to its composition and properties (letter dated 31 October 1990, page 3, lines 16 to 19). The coatings obtained on the basis of polyesters

prepared according to Examples 1A and 2A of the disputed patent exhibited, on curing for 15 minutes at 200°C, an inferior shock resistance (less than 5 in x lb according to ASTM D 2794-69) as compared to a coating resulting from Crelan LS 2788 (more than 80 in x lb according to ASTM D 2794-69; compare the last line in the table on page 4 of the Respondent's letter dated 31 October 1990).

- 5.4 In the Board's judgment these comparative tests are defective for several reasons. No evidence was provided by the Respondent that Crelan LS 2788 is indeed a product of the state of the art and, in particular, that it can be equated with URALAC P 3400 disclosed in document (4). Furthermore, as confirmed by the Respondent's technical expert at the oral proceedings, the comparative tests were not an exact repetition of the respective examples of the patent in suit; test parameters were utilised, such as the ratio of pigment to binding agent and curing times for the coatings, which were adjusted to the requirements of the art prevailing at the time of the said comparative tests.
- 5.5 Finally, it is obvious from the striking low values for the shock resistance (see the above paragraph 5.3) that the coatings obtained by the Respondent according to the Examples 1A and 2A were by no means sufficiently cured, if at all, by a curing time of 15 minutes at a temperature of 200°C (last paragraph on page 3 of the Respondent's letter of 31 October 1990).

The Respondent cannot be heard with his argument that this poor shock resistance was obtained by strictly following the teaching of the patent in suit which discloses curing times of 10 to 30 minutes and curing temperatures of 160 to 200°C (page 3, lines 12 to 14). A skilled person, becoming aware of the said deficiency of the obtained coating, would have taken care to ensure that the coatings

were completely cured by applying his common general knowledge (increase of the curing temperature or the curing period). In particular, when checking the specification for possible remedies, he would have found that curing catalysts are disclosed as usual additives of the powder coatings concerned (page 3, lines 11 to 12) and, thus, he would have availed himself of their curing promoting properties. Since the Respondent has failed to do this, the comparative tests cannot be said to have been executed properly.

Therefore, the Board considers the Respondent's tests as irrelevant.

Hence, the Board is satisfied that on the basis of figures regarding the good mechanical properties of coatings in question on curing, as set out in paragraph 5.1, the above technical problem is effectively solved.

- 5.6 It still remains to be decided whether the requirement of inventive step is met by the claimed powder coatings.

It is well known that TGIC acts as the cross-linking agent for the polyester resin containing carboxyl groups used both in the prior art and in the present Claim 1. The reduction of its amount from 7% by weight as disclosed in citation (4), page 1, paragraph 2, to 5.3% by weight or less means in fact a decrease of the TGIC contents in the binding agent of at least about 25% which cannot be said to be only a minor change. There is no indication in the cited state of the art that compositions with such a reduced content of cross-linking agent would still result in coatings with satisfactory mechanical properties. Rather, on the contrary, a skilled person would have expected a detrimental effect from such reduction as in fact the Respondent explained. He stated in the summary on

page 5 of his submission of 31 October 1990 (in English translation) "... The attempt, obvious for cost reasons, to modify the system according to document (4) by further reducing the acid number ... and simultaneously the amount of cross-linking agent, results naturally in a reduced degree of cross-linking and all the disadvantages which are connected with that, in particular a poor solvent resistance and a clearly reduced shock resistance. This holds also for the systems according to the disputed patent. The allegation that the systems of the patent in suit are surprisingly not governed by this principle, is not true."

Thus, the Board concludes that a skilled person faced with the above defined technical problem would not have tried to reduce the contents of cross-linking agent in the binder composition for powder coatings known from document (4) since he would have expected that this would result in coatings with inferior mechanical properties.

It follows from the above that the subject-matter of the present Claim 1 involves an inventive step for this reason only. There is no need to inquire whether or not the other characterising features in Claim 1 contribute to inventive step.

5.7 Dependent Claims 2 to 6 relate to particular embodiments of the subject-matter of Claim 1; they are supported by the inventive step of Claim 1.

Independent Claim 7 relates to a process for the electrostatic coating of a substrate with a powder coating according to Claims 1 to 6 and independent Claim 8 relates to a completely or partly coated substrate, the coating material being a powder coating of Claims 1 to 6; both claims benefit from the same inventive idea as Claim 1.

6. The Appellant's main request being allowable, it is not necessary to deal with his auxiliary request.

Order

For these reasons, it is decided that:

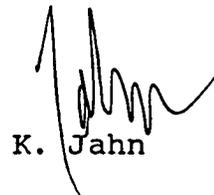
1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of Claims 1 to 8 filed as main request and a description yet to be adapted.

The Registrar:



E. Gorgmaier

The Chairman:



K. Jahn