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Datasheet for the decision of 11 February 2019

Case Number: T 1036/16 - 3.3.05

Application Number: 10744634.6

Publication Number: 2464771

IPC: D04H1/64, C08B37/00, C08L5/00, C03C25/32

Language of the proceedings: EN

Title of invention:
CURABLE FIBERGLASS BINDER COMPRISING AMINE SALT OF INORGANIC ACID

Patent Proprietor:
Johns Manville

Opponent:
Knauf Insulation

Headword:
Curable fiberglass binder/Johns Manville

Relevant legal provisions:
RPBA Art. 13(1)
EPC Art. 123(2), 123(3), 83, 84, 54, 56

Keyword:

Late-filed request - request clearly allowable (yes)
Amendments - allowable (yes)
Sufficiency of disclosure - (yes)
Claims - clarity (yes)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 1036/16 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 11 February 2019

Appellant: (Patent Proprietor)	Johns Manville 717 Seventeenth Street Denver, CO 80202 (US)
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Appellant: (Opponent)	Knauf Insulation Rue de Maastricht 95 4600 Visé (BE)
Representative:	ARC-IP ARC-IP sprl Rue Emile Francqui 4 1435 Mont-Saint-Guibert (BE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 6 April 2016 concerning maintenance of the European Patent No. 2464771 in amended form.**

Composition of the Board:

Chairman	E. Bendl
Members:	G. Glod
	S. Fernández de Córdoba

Summary of Facts and Submissions

I. The present appeals from **patent proprietor (appellant 1) and the opponent (appellant 2)** lie from the decision of the opposition division finding that amended European patent No. EP 2 464 771 B1 based on the then third auxiliary request met the requirements of the EPC.

II. The following documents cited in the decision are of relevance for the present decision.

D1: GB 2 451 719 A
D3: DE 10 2004 033561 A1
O1: DE 1 905 054 A1
O3: US 3 513 001 A
O5: WO 2010 106181 A1
O7: WO 2007 014236 A2
O9: EP 1 652 868 A1
O10: US 1 801 053 A
O11: US 4 048 127 A
O13: US 3 006 879 A
O14: US 3 383 267 A
O15: US 4 410 685 A
O16: WO 03 22899 A1
O17: US 5 905 115 A
O19: US 2005 0221705 A1

III. Appellant 1 filed first to sixth auxiliary requests with the statement of grounds.

IV. In its communication under Article 15(1) RPBA, the board was of the opinion that the appeals should be dismissed.

V. By letter of 20 December 2018, appellant 1 filed a new auxiliary request 5.

VI. By letter of 24 January 2019, appellant 2 withdrew its request for oral proceedings and announced that it would not attend the scheduled oral proceedings.

VII. Oral proceedings took place on 11 February 2019 in the absence of appellant 2. At these proceedings, appellant 1 filed a new sole request.

The independent claims of the request are as follows:

"*1. A curable composition for use in the binding of fiberglass comprising (i) an aldehyde or ketone and (ii) an amine salt of an inorganic acid obtainable by reacting the amine with the acid in water wherein the molar ratio of acid functionality to amine functionality is from 1:2 to 2:1 wherein (iii) the aldehyde is a reducing sugar and the molar ratio of salt to carbonyl is from 1:20 to 20:1 and, (iv) the amine is a diamine having at least one primary amine group and said amine is selected from the group consisting of ethylene diamine, 1,3-propanediamine, 1,4-butanediamine, 1,5-pentanediamine, 1,6-hexanediamine and mixtures thereof,*"

"*9. A process for binding fiberglass comprising applying to fiberglass a composition comprising: (i) an aldehyde or ketone and (ii) an amine salt of an inorganic acid wherein (iii) the aldehyde is a reducing sugar, (iv) the amine is a diamine having at least one primary amine group and thereafter curing said composition while present on said fiberglass.*"

Claims 2 to 8 and 11 refer to preferred embodiments of claims 1 and 9, respectively.

VIII. The arguments of appellant 2 can be summarised as follows:

The deletion of the multifunctional amines from the dependent claims was contrary to Article 123(2) EPC. The combination of granted claim 1 and granted claim 7 was contrary to Article 123(2) EPC since the subject-matter of claim 7 was only disclosed in combination with the subject-matter of claim 6. The molar ratio of acid functionality to amine functionality from 1:2 to 2:1 only related to the process for the preparation of the salt and not to the amine acid salt itself.

The molar ratio of acid functionality to amine functionality was unclear.

The description and the claims would not have taught the skilled person what was required to make the invention work over the whole scope claimed. In particular, claim 1 covered compositions that were not curable. It would have been too heavy a burden for the skilled person to have found out the content of aldehyde/ketone and amine salt required to obtain a curable binder composition.

O1 (examples on pages 36 and 37) disclosed a composition comprising sugar cane molasse, phosphoric acid and phenylene diamine. O3 disclosed compositions for use as a binder that comprise a carbohydrate like dextrose and one or more amines such as paraphenylene diamine that may be used in the form of a salt. O5 disclosed a curable composition for use in the binding of fiberglass comprising a reducing sugar component, an

amine component, such as ethylene diamine (page 12), and up to 20 wt % phosphoric, hypophosphorous, boric, sulfuric or nitric acid. O9 disclosed curable binder resin compositions for binding fiberglass which comprise melamine, an aldehyde and a catalyst. The opposition division's assessment of O11 was agreed to. Example 8 of O13 showed a binder composition which comprised melamine, formaldehyde and hydrochloric acid. O14 disclosed the manufacture of a phenol-formaldehyde resin comprising the addition to formaldehyde of an amine salt of phosphoric acid. O15 disclosed an amino-formaldehyde resin prepared by a process in which the amine was added to a very acidic solution of formaldehyde. The opposition division's conclusion on O16 was correct.

The compositions in the patent were merely obvious alternatives to the compositions disclosed in O9. O11 also looked for alternatives to phenol formaldehyde resin binders. The skilled person knowing about O11 and seeking to use non-formaldehyde-based resins on fiberglass would undoubtedly have looked at the composition of O11 and tried it on fiberglass. O1 disclosed similar resins and taught that the composition adhered well to all sorts of materials. O7 and O9 also indicated that the O11 type binder chemistry was suitable for bonding fiberglass. O17 and O19 were also relevant in that respect.

IX. Appellant 1 refuted the arguments and indicated that neither O1 nor O3 disclosed diamines as present in claim 1, while O11 did not disclose a ratio of salt to carbonyl within the range claimed. In any case, the compositions of examples 6 and 7 of O11, respectively, were not suitable as binder and did not directly and unambiguously disclose a salt of an amine. The

arguments presented by appellant 2 no longer applied to the current restricted request.

X. Appellant 1 requests that the impugned decision be set aside and that the patent be maintained on the basis of the sole request submitted during oral proceedings before the board.

Appellant 2 requests that the impugned decision be set aside and that the patent be revoked.

Reasons for the Decision

1. Article 13(1) & (3) RPBA

The present request was submitted during oral proceedings before the board. According to established case law (Case Law of the Boards of Appeal of the EPO, 8th edition 2016, IV.E.4.2.5, page 1133), a request filed after the grounds of appeal may be admitted and considered at the board's discretion if the amended request is clearly or obviously allowable.

In the present case, the request is a further restriction of a previously filed request and was submitted to overcome an objection under Article 123(2) EPC and Article 84 EPC in view of the molar ratio of acid functionality to amine functionality and to avoid likely problems of double patenting with respect to European patent No. EP 2 464 772 B2. The request was considered clearly allowable (see below) and was therefore admitted into the proceedings.

2. Article 123(2) EPC

The amendments made to granted claims 1 and 10 (Article 100(c) EPC was not a ground of opposition) are directly and unambiguously derivable from the following passages of the application as filed:

claim 1 (ii): page 5, lines 28 to 31
claim 1 (iii): claim 11 and page 6, lines 22 and 23. Claim 11 was originally dependent on claim 10 that included the feature "aldehyde is used with the salt". Claim 10 was to be understood that if the aldehyde was used then it was used with the salt. Including the feature of claim 10 in claim 1 therefore does not require the deletion of ketone in claim 1. Furthermore, the feature "used with the salt" cannot be considered a composition feature, so it puts no limitation on claim 1. Consequently, the feature of claim 11 as filed can be included in claim 1 without the feature of claim 10 as filed.
claim 1 (iv): page 5, line 37, to page 6, line 2. The deletion of some compounds present in claim 7 as filed is a restriction of the meaning of diamine to what the skilled person normally would have understood by this term.

claim 9 (iii): claim 14 in combination with claim 11, respectively, the second full paragraph on page 6.

The requirements of Article 123(2) EPC are fulfilled.

3. Article 123(3) EPC

Claims 1 and 9 have been restricted with respect to granted claims 1 and 10, respectively. The amendment to claim 1 (ii) relating to the molar ratio of acid

functionality to amine functionality does not have a different meaning in the patent as granted (see paragraph [0024]), so the scope of claim 1 is not changed by the addition of that feature to claim 1.

The requirements of Article 123(3) EPC are fulfilled.

4. Article 84 EPC

The wording relating to the molar ratio of acid functionality to amine functionality is now formulated such that it is clear that this ratio relates to the preparation of the amine salt and not to the ratio in the amine salt itself. The product-by-process formulation used in claim 1(ii) is best suited to correctly and clearly reflect this.

The requirements of Article 84 EPC are fulfilled.

5. Article 83 EPC

Claim 1 relates to a curable composition which implies that the composition has to be curable so that components that fulfil the criteria of claim 1, but are not curable, do not fall under the scope of the claim. The same applies to the composition applied to the fiberglass in process claim 9 since the composition is cured while present in the fiberglass.

Claim 1 is restricted to a diamine selected from a limited number of well-defined diamines that is to be reacted with an inorganic acid to obtain the amine salt. The preferred acids are given in paragraph [0023]. The salt is cured with a reducing sugar or a ketone. The reducing sugar is further defined in paragraph [0027], while examples of the ketones are

given in paragraph [0028]. The curing conditions are provided in paragraph [0032]. In addition, a preferred molar ratio of salt to carbonyl is included in claim 1.

Claim 9 does not specify how the amine salt could be obtained, but this information is provided in paragraph [0024] and illustrated in example 1. The diamine is also not defined, but the patent provides information on it in paragraph [0025], while the ratio of salt to carbonyl is given in paragraph [0027]. In addition, example 15 is a specific embodiment of process claim 9.

The board concurs with the opposition division's opinion on Article 83 EPC since the appellant, speculation aside, has not provided any evidence that the information provided in the patent does not allow providing a curable composition. There is also no evidence that many of the components defined in claims 1 and 9 would not have led to a curable composition. Therefore, it cannot be recognised that there was an undue burden to find the appropriate components to obtain a curable composition when taking into consideration the teaching of the patent.

The requirements of Article 83 EPC are fulfilled.

6. Article 54 EPC

The requirements of Article 54 EPC are met for the following reasons:

6.1 The examples of O1 (pages 36 and 37) disclose, *inter alia*, a composition comprising phosphoric acid, phenylenediamine and sugar cane molasses. Phosphoric acid is present as a catalyst (page 3, third paragraph) and phenylenediamine is present to prevent the binder

from degrading wood (page 7, first paragraph), but the first paragraph on page 5 explicitly states that the amine reacts with the acid residues. However, O1 does not disclose an amine selected from the group indicated in claim 1 and does not disclose the application of a composition to fiberglass as present in claim 9.

6.2 O3 discloses a di- or polyamine that may be used in the form of a salt (column 2, lines 58 to 61). O3 does not disclose a diamine selected from the group present in claim 1 and does not disclose the application of the composition to fiberglass.

6.3 O5 relates to an aqueous composition comprising a sugar syrup containing a reducing sugar, a polycarboxylic acid component, an amine component, and a reaction product of a polycarboxylic acid component and an amine component (claim 1). A curing accelerator may also be added (claim 13). Ethylene diamine that is a diamine having at least one primary amine group is disclosed as one amine among many others (page 12, second to fifth paragraph). Inorganic acids such as phosphoric acid are disclosed as curing accelerators among many other components (page 16, first paragraph). Glass fibres are also disclosed but are one type of fibres in a list of different fibres (page 17, first paragraph). As the opposition division held, to arrive at the components indicated in claims 1 and claim 9, several selections from different lists would have had to been made. Therefore, the subject-matter of claims 1 and 9 is not directly and unambiguously derivable from O5.

6.4 It is not directly and unambiguously derivable from O9 that the catalyst reacts with an amine since the resin is formed by reacting melamine with the aldehyde. The catalyst is added to apply the already formed resin to

the substrate (paragraph [0025]). Therefore, an amine salt of an inorganic acid is not necessarily present in the composition of O9. Furthermore, O9 is silent about diamines.

6.5 Examples 6 and 7 of O11 disclose the condensation of dextrose with toluene diamine and ethylene diamine, respectively, and phenol. Sulfuric acid is the catalyst (column 4, lines 35 to 54, and column 6, lines 37 to 57). In examples 6 and 7, 1 mole of dextrose is reacted with 0.5 mole of diamine. There is no indication in which form, under the given conditions, the diamine and sulfuric acid would be present in the reaction mixture. Even if it were accepted that sulfuric acid and the diamine reacted to an amine salt, the molar ratio of salt to carbonyl would not be in the range of 1:20 to 20:1 since the composition contains 1 mole of dextrose (1 mole carbonyl) and only 1.4 g of 5N H_2SO_4, which would not allow producing 0.05 moles - needed to fulfil the ratio - of amine salt. O11 does not disclose fiberglass. Consequently, O11 is not prejudicial to the subject-matter of claims 1 and 9.

6.6 O13 does not disclose diamines.

6.7 O14 does not disclose the mix of an aldehyde with an amine salt of an inorganic acid since the amine salt is added to the already reacted resin. In addition, diamines are not disclosed.

6.8 Example 1 of O15 describes the analysis of the final resin, which does not constitute a curable composition per se (column 8, lines 12 to 16). Diamines are not disclosed in O15.

6.9 O16 discloses a binder that comprises a urea formaldehyde resin precursor cured in the presence of a catalyst which consists of at least one salt of an acid with a diamine (claim 1). However, O16 does not disclose ketones or reducing sugars.

7. Article 56 EPC

7.1 Claim 1

7.1.1 The present invention relates to a curable composition for the binding of fiberglass.

7.1.2 It is established case law that the closest prior art is normally a prior-art document disclosing the same purpose or aiming at the same objective as the claimed invention and having the most features in common with the claimed subject-matter. In the present case, O9 is considered the closest prior art since it also relates to binders (without formaldehyde) for fiberglass (paragraphs [0001] to [0003] and [0024]). The binder comprises a catalyst and a resin composition comprising the reaction product of melamine, an aldehyde, a cross-linking agent, and at least one polyol having 2 or more than 2 hydroxyl groups (claims 12 and 1). The catalyst is needed to apply the already formed resin to the substrate (paragraph [0025]).

O11 seems less suited as the closest prior art since it does not relate to binders but to resins for thermoset moulding applications. O17 does not relate to binding fibre glass. D1 mentions binding glass fibres but does not disclose diamines and only once refers to "an amine reactant" as a source of nitrogen. D3 refers to a binder for producing formed activated charcoal.

Thus, O9 is considered the closest state of the art.

7.1.3 The problem to be solved is to provide an alternative composition for the binding of fiberglass (see also paragraph [0015] of the patent).

7.1.4 The problem is solved by the composition according to claim 1 characterised in that a reducing sugar or ketone is present with an amine salt of an inorganic acid in which the amine is selected from the specified group.

7.1.5 The solution is not obvious for the following reasons:

O9 itself is silent on diamines.

O1 does not relate to fiberglass and does not teach to use amine salts of inorganic acids. Such salts would be formed as a side product in the reaction mixture. In any case, O1 does not disclose the diamines of claim 1.

O3 discloses that di- or polyamines may be used in the form of a salt of an inorganic acid (column 2, lines 59 to 62) for reacting with dextrose monohydrate (claim 1) to provide a binder in a shell moulding process, but it does not provide any pointer that these binders would be suitable for fiberglass. Furthermore, there is no teaching that the binder of O3 would be equivalent to and thus compatible with the binders of O9, especially since the intended use of the binders is different. In any case, O3 does not disclose the list of diamines present in claim 1.

O7 relates to formaldehyde-free binders suitable for fiberglass (page 2, paragraph 5; page 6, lines 1 and 2). It discloses Maillard reactants including an amine

and a reducing sugar as a binder (claims 1 and 5). Suitable amines are indicated in Figure 1. Preferred binders for fiberglass are shown in Table 7 (page 59). O7 does not disclose amine salts of an inorganic acid.

Neither O10 nor O11 relate to binders, so the skilled person would not have considered them when trying to solve the posed problem starting from O9. As indicated above (point 6.5), sulfuric acid is only used as catalyst in examples 6 and 7. The skilled person would have had no reason to change this amount since the primary goal was not to produce an amine salt of an inorganic acid.

Neither O13 nor O15 disclose diamines.

O16 discloses a binder that comprises a urea formaldehyde resin precursor cured in the presence of a catalyst which consists of at least one salt of an acid with a diamine (claim 1). However, O16 is silent on ketones and reducing sugars, and it does not concern formaldehyde-free binders, so there is no reason that the skilled person starting from O9 would have considered O16.

O17 is silent on amine salts of inorganic acid.

O19 does not disclose diamines.

Consequently, there is no teaching in the prior art to use the proposed solution. The subject-matter of claim 1, and of claims 2 to 8 depending directly or indirectly on claim 1, involves an inventive step.

7.2 Claim 9

7.2.1 The invention relates to a process for binding fiberglass.

7.2.2 O9 is still the closest prior art for the reasons provided in point 7.1.2.

7.2.3 The problem to be solved is to find an alternative process for binding fiberglass.

7.2.4 The problem is solved by a process according to claim 9 characterised in that the composition comprises an aldehyde or ketone, an amine salt of an inorganic acid, in which the amine is a diamine having at least one primary amine group.

7.2.5 The reasoning provided in point 7.1.5 still applies, mainly since none of O1, O3, O10 and O11 relates to fiberglass; O9, O13 to O15 and O19 do not disclose diamines; O7 and O17 do not concern amine salts of an inorganic acid; and O16 is silent on ketones and reducing sugars.

7.2.6 Consequently, the solution to the posed problem is not obvious, and the subject-matter of claim 9, and of claims 10 and 11 depending directly or indirectly on claim 9, involves an inventive step.

8. Double patenting

It is established case law that double patenting can only arise when the same subject-matter is patented again (Case Law of the Boards of Appeal of the EPO, 8th edition 2016, II.F.5., second paragraph).

In the case at hand, the subject-matter of claim 1 differs from claim 1 as accepted in corresponding appeal case T 687/16 concerning European patent No. EP 2 464 772 B1 in the molar ratio of salt to carbonyl and in that no thickener and/or rheology modifier is present. Claim 9 differs from claim 16 in that no thickener and/or rheology modifier is present and the glass fibres are not further specified.

Consequently, the subject-matter is not the same as in the corresponding case, and no problem of double patenting arises.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with the claims according to the main request as filed during the oral proceedings and a description to be adapted thereto.

The Registrar: The Chairman:

C. Moser E. Bendl

Decision electronically authenticated