BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

D E C I S I O N
of 26 October 2004

Case Number: T 0542/02 - 3.3.5

Application Number: 95939717.5

Publication Number: 0792250

IPC: C03C 25/02

Language of the proceedings: EN

Title of invention:
Fibrous glass binders

Patentee:
OWENS CORNING

Opponent:
ROCKWOOL International A/S

Headword:
Binders/OWENS CORNING

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step: no"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0542/02 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 26 October 2004

Appellant: (Opponent)
ROCKWOOL International A/S
Hovedgaden 584
DK-2640 Hedehusene (DK)

Representative:
Barz, Peter
Patentanwalt
Kaiserplatz 2
D-80803 München (DE)

Respondent: (Proprietor of the patent)
OWENS CORNING
One Owens Corning Parkway
Toledo
Ohio 43659 (US)

Respondent:
Perrey, Ralf, Dr. Dipl.-Chem.
Müller-Boré & Partner
Grafinger Strasse 2
D-81671 München (DE)

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 26 March 2002 concerning maintenance of European patent No. 0792250 in amended form.

Composition of the Board:

Chairman: M. M. Eberhard
Members: B. P. Czech
H. Preglau

Summary of Facts and Submissions

I. The appeal is from the decision of the opposition division maintaining European patent European patent no. 0 792 250 in amended form.

II. Claim 1 as amended during the opposition proceedings reads as follows (amendments of claim 1 as granted are **highlighted**):

"1. A binder composition for a glass fiber material, comprising an aqueous solution of:
a copolymer **having a number average molecular weight of less than 30,000** comprising a reaction product of a polymerizable carboxylic acid or anhydride, or mixtures thereof, and an hydroxy C_2 - C_8 alkyl acrylate or methacrylate, or mixtures thereof **and wherein the copolymer is constituted by 50 to 70 mole % of the polymerizable acid containing monomer and 50 to 30 mole % of the polymerizable hydroxy containing monomer**; and an alkali metal salt of a phosphorous-containing acid."

III. Considering the two prior art documents cited by the opponent, and in particular

D1: EP-A-0 583 086,

the opposition division reached the conclusion that the composition according to claim 1 as amended was based on an inventive step.

IV. In its statement of the grounds of appeal and in a further letter dated 21 September 2004, the appellant

(opponent) argued that the composition according to claim 1 as amended and maintained during the opposition proceedings still lacked an inventive step in view of the disclosure of document D1.

V. In its reply dated 16 December 2002, the respondent (proprietor of the patent) contested the appellant's view.

VI. Oral proceedings took place on 26 October 2004.

VII. The written and oral submissions of the parties, as far as they are relevant for the present decision, can be summarised as follows:

According to the appellant, D1 belonged to the same technical field as the contested patent and also concerned aqueous, curable, carboxy and hydroxy-functional binders for glass fibre materials. The disclosure of D1 was not, upon proper reading thereof, restricted to binder compositions comprising a polyacid, a polyol and an accelerator as separate components. In the embodiment referred to on page 6, lines 35 to 38, D1 also disclosed curable aqueous binders which are binary mixtures of a phosphorus-containing accelerator and of an addition polymer in which both carboxy and hydroxy functionalities are present. Hence, D1 taught the use of a phosphorus-containing accelerator together with a polymer obtained by copolymerising a carboxy-containing monomer and a hydroxy-containing monomer as referred to in claim 1. The claimed molar ratio of the acid/anhydride containing monomer to the hydroxy containing monomer was also disclosed in D1. Hence D1 taught the use of binders obtained by copolymerising

the said monomers and meeting the copolymer definition in present claim 1. The need for selecting a polymeric binder of sufficiently low molecular weight in order to obtain a composition of sufficiently low viscosity was also mentioned in D1. This was a mere routine measure for ensuring the operability of the binder composition, and therefore non-inventive. The respondent had not demonstrated any unexpected effect achieved in comparison to the binders of D1 which could be attributed to the claimed binder composition. A skilled person starting from D1 and seeking to provide other specific, low viscosity binders for glass fibre materials which retained their mechanical properties after curing would thus arrive at the claimed subject-manner in an obvious manner.

Referring to claim 1 of D1, the respondent argued that the overall teaching of this document was to use a binder comprising separate polyacid and polyol components. Without presenting corresponding evidence, it alleged that such a composition was more difficult to handle upon use and less stable than a composition according to the contested patent. The sentence on page 6, lines 35 to 38 of D1 was thus in contradiction with the said claim 1. Moreover, the quoted sentence merely referred to "a polyol" and did thus not give the clear teaching to copolymerise monomers of the type referred to in claim 1 of the contested patent. It also pointed out that D1 did not mention compression recovery of cured glass fibre mats, and that the molecular weights of the polymeric binder components indicated in almost all of the examples of D1 were superior to 30,000. Hence, although relating to a similar technical problem, D1 did not suggest making

the multiple selections necessary to arrive at the particular combination of features making up the claimed solution.

VIII. The appellant requested that the appeal be set aside and that the patent be revoked.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. In the present case, only inventive step was at issue.

2. The board can accept and it has not been disputed by the respondent that D1, the sole reference relied upon by the appellant during the appeal proceedings, represents the closest prior art. Like the patent in suit, D1 relates to heat curable aqueous compositions which may be used as binders in non-wovens composed of fibreglass or other heat resistant fibres for use e.g. as insulation batts or rolls, see page 2, lines 9 to 10 and page 7, lines 38 to 39 and line 48.

2.1 It was undisputed that D1 mainly dealt with binder compositions comprising three separate components, namely (a) a polyacid, (b) a polyol, and (c) a phosphorus-containing accelerator (optional). See claim 1 and most of the samples described in the examples. Preferred polyacid components are, inter alia, addition (co)polymers of ethylenically unsaturated carboxylic acids, see claims 2 and 3; page 4, lines 39 to 40 and lines 46 to 56; and the examples. Hydroxyl group containing addition polymers, e.g. homopolymers

or (co)polymers of hydroxyethyl (meth)acrylate or hydroxypropyl (meth)acrylate are explicitly mentioned, inter alia, as possible polyol components, see page 6, lines 8 to 10. The phosphorus containing accelerators explicitly mentioned in D1 include alkali metal salts of phosphorus-containing acids such as alkali metal hypophosphites, phosphites, polyphosphates, and dihydrogen phosphates, see page 6, lines 18 to 21.

2.2 The 5th paragraph on page 6 of D1 deals with the preparation of the curable aqueous composition. It is first indicated in D1 that such compositions "may be prepared by admixing the polyacid, the polyol, and the phosphorous-containing accelerator using conventional mixing techniques", see page 6, lines 34 to 35. However, in the next sentence (page 6, line 35 to 38), the following is stated (**emphasis** added by the board): "In another embodiment a carboxyl- or anhydride-containing addition polymer and **a** polyol may be present **in** the **same** addition polymer, which addition polymer would contain **both carboxyl**, anhydride, or salts thereof **functionality and hydroxyl functionality**".

2.2.1 The latter embodiment does not correspond to the prima facie understanding of the wording of claim 1 of D1, i.e. to using compositions containing distinct polyacid, polyol and accelerator components, which understanding is in accordance with those parts of the description specifying suitable components (page 4, line 33 to page 6, line 33) and with almost all the examples. However, although the quoted sentence is somewhat isolated within the entire disclosure of D1, it is not, for that reason alone, unclear. In particular, the fact that claim 1 of D1 prima facie appears to merely relate

to compositions having three distinct components does not deprive the said sentence from its clear meaning. A patent application may well disclose more than it claims.

2.2.2 Moreover, in view of the quoted sentence, the board is not convinced that the wording of claim 1 of D1 was intended to encompass only embodiments wherein separate components are used. This view is corroborated by the fact that the quoted sentence is followed by references to further embodiments wherein the three components need not be distinct from each other, i.e. wherein either the polyol and the accelerator may be present in the same addition polymer, or wherein the carboxy- or anhydride-containing addition polymer, the polyol and the accelerator may be present in the same addition polymer, see page 6, lines 40 to 43.

2.2.3 In the board's view, the said paragraph thus unambiguously (without being in contradiction with the wording of claim 1) discloses and distinguishes between simple mixes of the three components and compositions wherein two or three of the components (polyacid, polyol and phosphorus-containing accelerator) are present in a same addition polymer. In particular, taken by itself, the sentence quoted above clearly and unambiguously discloses curable compositions wherein both a carboxy-containing addition polymer and a polyol, and hence both carboxy and hydroxy functional groups, are present in a same addition polymer.

2.2.4 However, D1 does not specifically disclose a composition with all the combined features of present claim 1.

3. As indicated in the introductory part of its description, the patent in suit aims at providing a non phenol formaldehyde binder having a low viscosity when uncured and structural rigidity when cured. Such a binder is useful in the preparation of fibrous glass insulation materials since it permits the expansion of the binder-coated glass fibre material before curing and leads to a high compression recovery of material obtained after curing, see page 2, sections [0001], [0004], [0005], [0008] [0009] and [0019].

3.1 The importance of avoiding too high viscosities by using polymeric components of too high molecular weight is also mentioned in D1, see the paragraph bridging pages 4 and 5 which discloses molecular weights preferably within the ranges of 1000 to 250,000 or 10,000 to 100,000 for the addition polymer containing carboxy groups. Moreover, the binders according to D1 should be free of formaldehyde, see page 2, lines 24 to 26. The respondent has not argued or shown that those binders of the type disclosed in D1 comprising polymeric components with relatively low molecular weights would actually be less suitable than the claimed binders for successfully producing glass fibre insulation products.

3.2 D1 stipulates that "nonwoven fabrics which incorporate a curable aqueous composition should substantially retain the properties contributed by the cured aqueous composition such as, for example, tensile strength", and that "in addition, the cured composition should not substantially detract from essential nonwoven fabric characteristics, as would be the case, for example, if

the cured composition were too rigid or brittle or became sticky under processing conditions", see page 2, lines 18 to 23. The cured binders according to D1 which overcome the problems mentioned on page 2 thereof (see page 2, line 53) thus impart a certain structural rigidity to the fibrous material treated without making them brittle, and the treated material should retain the mechanical properties conferred on it by the cured binder. The respondent has neither argued nor shown that the claimed binders led to an unexpected improvement in terms of compression recovery in comparison with those compositions of D1 containing a relatively low molecular weight polymeric component, when applied to glass fibre insulation materials.

3.3 During the oral proceedings, the respondent alleged that binder as claimed would be easier to use (requiring no previous blending), easier to cross-link and generally more stable since it contained the two functionalities (carboxy and hydroxy) in one copolymer, rather than in two distinct components. The board cannot accept this allegation, let alone in the absence of any supportive evidence, since in its view D1 already discloses the use of addition copolymers bearing both the hydroxy and the carboxy functionalities necessary for curing.

3.4 In the absence of any demonstrated improvement over the binders according to D1, the board can accept that starting from D1 as closest prior art, the technical problem to be solved consisted in providing further aqueous, non-phenol-formaldehyde, low viscosity binder compositions suitable for use as binders for glass fibre material such as insulation materials, i.e. which

can be cured to form rigid products retaining their mechanical properties, such as the required compression recovery.

4. In view of the information and examples in the patent in suit it is credible that this problem has actually been solved by the binder compositions as defined in claim 1. Hence, what remains to be seen is whether binders having all the features as recited in claim 1 were obvious in the light of D1.

4.1 Concerning hydroxy-functionality providing components, the sentence on page 6, lines 35 to 38 of D1 merely refers to "**a** polyol" (emphasis added). The respondent emphasised that although the list of possible polyols given in D1, page 6, first paragraph, explicitly includes (inter alia) homopolymers or copolymers of hydroxyethyl (meth)acrylate, hydroxypropyl (meth)acrylate and the like, the said document is silent about a use of the latter **mono**mers in formulating a binder composition. However, the skilled person whishing to put into practice this embodiment according to which both the carboxy and the hydroxy functionalities are "present in the same addition polymer" would certainly consider the said list of possible polyols. Carrying out an addition polymerisation of well-known carboxy-containing monomers and hydroxy-containing monomers is one obvious possibility (amongst others) that would immediately come to the mind of a skilled person aiming at obtaining such an addition polymer. The choice of hydroxyethyl (meth)acrylate and/or hydroxypropyl (meth)acrylate as the polymerisable hydroxy-containing monomer(s) to be reacted with the carboxy-containing

monomers lies within the competence of the skilled person in view of the teaching of D1, and in particular in view of the list of possible polyols (and polyacids, see point 4.2 below) disclosed therein.

4.2 As possible polyacid components of the binder, D1 mentions addition polymers of ethylenically unsaturated monomers carrying carboxy groups, such as (meth)acrylic acid. Additional ethylenically unsaturated monomers such as hydroxyethyl (meth)acrylate or hydroxypropyl (meth)acrylate may also be used. See in particular D1, page 4, lines 40 to 56 and example 13, sample 42. On the other hand, said specific hydroxy C_2- and C_3-alkyl (meth)acrylates are also disclosed as possible monomers for making up certain polymeric polyol components, see page 6, lines 1, 2 and 8 to 10. Made aware of the possibility to incorporate the carboxy and the hydroxy functionalities into the same addition polymer, the skilled person could thus gather from D1 itself suitable addition polymerisable unsaturated co-monomers, including the ones to be used according to claim 1 of the patent in suit.

4.3 According to D1, the ratio of the number of equivalents of carboxy of the polyacid to the number of equivalents of hydroxy of the polyol is from about 1/0.01 to 1/3 (i.e. from 100 to 0.33), more preferably from about 1/0.2 to 1/1 (i.e. from 5 to 1). An excess of carboxy equivalents is preferred, see D1, page 6, second paragraph and claim 7. As pointed out by the appellant during the oral proceedings, the results presented for various three-component binders in table 11.2 of D1, where the carboxy:hydroxy ratios range from 10:1 to 1:1 (corresponding to the mentioned hydroxy:carboxy ratios

of from 1 to 0.1), also show that a ratio of 1:1 or a slight excess of carboxy functionality leads to better curing responses for a given polyacrylic acid binder component. The skilled person, putting into practice the indications concerning the embodiment referred to on page 6, lines 35 to 38 of D1, would thus have contemplated trying the said preferred range of carboxy:hydroxy ratios for the monomers suggested by D1, i.e. inter alia (meth)acrylic acid and hydroxyethyl- or hydroxypropyl- (meth)acrylate. Doing so, the skilled person would arrive by mere routine experimentation at copolymers meeting the criterion of present claim 1 concerning the relative amounts (in mole-%) of the carboxy-functional and the hydroxy-functional monomers, respectively.

4.4 D1 refers to polycarboxylic addition polymers having molecular weights of from about 300 to about 10,000,000, preferably 1000 to about 250,000, and more specifically to polyacrylic acid binder components having molecular weights of 2,000; 3,500; 10,000; 40,000; 60,000 (most samples) and up to 190,000. See the paragraph bridging pages 4 and 5 and examples 1, 2, 5 to 12, 14, 16 and 18. However, D1 underlines in the quoted paragraph that the use of polycarboxy-functional addition polymers having relatively high molecular weights leads to curable compositions which exhibit excessive viscosity. Hence, the skilled person starting from D1 and formulating a binder for a given glass fibre material application such as insulation batts is encouraged to use lower molecular weight copolymers when confronted with problems due to the viscosity of the binder composition, bearing in mind at the same time that too low molecular weights may lead to an insufficient curing response,

see example 14, the MW and swell ratio data for samples 45 and 48 in tables 14.1 and 14.2 in conjunction with the sentence bridging pages 13 and 14. By applying these considerations to a copolymer of the type suggested by D1 (see above points 4.1 to 4.3) in order to make it suitable for use in the preparation of glass fibre insulation materials, the skilled person would, by means of mere routine experimentation, arrive at copolymers having molecular weights within the claimed range.

4.5 The respondent has neither argued nor demonstrated that a particular unexpected effect could be attributed to the choice of alkali metal salts of phosphorus-containing acids amongst the several phosphorus-containing accelerators listed on page 6, third paragraph. Moreover, such a salt is used in most of the examples of D1 (sodium hypophosphite monohydrate). Hence, this type of accelerator as a component of the binder composition to be provided was one of the most obvious to choose.

4.6 Summarising, neither the general considerations nor the choices necessary for reducing to practice the indications concerning the embodiment referred to on page 6, lines 35 to 38, can be considered to imply an inventive step in the light of D1. On the contrary, the skilled person trying to solve the stated technical problem would find in D1 itself pointers towards using polymers having relatively low molecular weights (and consequently relatively low viscosities), the specific monomers and the relative amounts of carboxy-containing monomers and hydroxy-containing monomers as defined in claim 1 under examination. He would thus arrive at

binders as claimed by mere routine experimentation involving nothing more than general considerations and obvious choices.

5. The subject-matter of independent claim 1 is thus not based on an inventive step. Therefore, the patent cannot be maintained on the basis of the claims according to the sole request of the respondent.

Order

For these reasons it is decided that:

6. The decision under appeal is set aside.

7. The patent is revoked.

The Registrar: The Chairman:

A. Wallrodt M. Eberhard