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**Datasheet for the decision
of 25 July 2022**

Case Number: T 1789/19 - 3.3.07

Application Number: 14182162.9

Publication Number: 2990494

IPC: C13K1/00, C09J103/02, C08L5/00,
C08L33/00, C08J5/08

Language of the proceedings: EN

Title of invention:
Biobinder

Patent Proprietor:
Rockwool International A/S

Opponent:
SAINT-GOBAIN ISOVER

Headword:
Melanoidin binder/ROCKWOOL

Relevant legal provisions:
EPC Art. 100(a), 56

Keyword:
Main request - inventive step (no) - obvious alternative
Auxiliary request 1- inventive step (yes) - no arguments from
the opponent



Beschwerdekammern

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Case Number: T 1789/19 - 3.3.07

D E C I S I O N
of Technical Board of Appeal 3.3.07
of 25 July 2022

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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 30 April 2019
rejecting the opposition filed against European
patent No. 2990494 pursuant to Article 101(2)
EPC**

Composition of the Board:

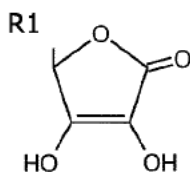
Chairman A. Usuelli
Members: J. Molina de Alba
R. Romandini

Summary of Facts and Submissions

I. European patent No. 2 990 494 was granted with 16 claims. Independent claims 1, 15 and 16 read as follows:

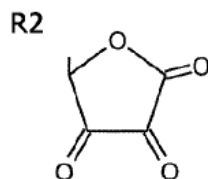
"1. An aqueous binder composition for mineral fibers comprising
a component (i) in the form of one or more compounds
selected from

- compounds of the formula, and any salts thereof:



in which R^1 corresponds to H, alkyl,
monohydroxyalkyl, dihydroxyalkyl,
polyhydroxyalkyl, alkylene, alkoxy, amine;

- compounds of the formula, and any salts thereof:



in which R^2 corresponds to H, alkyl,
monohydroxyalkyl, dihydroxyalkyl,
polyhydroxyalkyl, alkylene, alkoxy, amine;

a component (ii) in the form of one or more compounds selected from the group of ammonia, amines or any salts thereof;

a component (iii) in the form of one or more carbohydrates."

"15. A method of producing a bonded mineral fibre product which comprises the steps of contacting the mineral fibres with a binder composition according to any one of the claims 1 to 14, and curing the binder composition."

"16. Mineral fiber product, comprising mineral fibers in contact with the cured binder composition according to any one of claims 1 to 14."

- II. An opposition was filed against the patent on the grounds that the claimed subject-matter lacked novelty and inventive step (Article 100(a) EPC).
- III. The following documents were among those cited in the opposition proceedings:
- D1: EP 2 223 940
D2: EP 2 433 983
- IV. The opposition division rejected the opposition. In its decision, it concluded that the subject-matter claimed by the patent as granted was novel over the content of D1 and inventive starting from either of D2 and D1 as the closest prior art.
- V. The opponent (appellant) filed an appeal against the opposition division's decision. In its statement of grounds of appeal, it argued that the subject-matter of the patent as granted lacked novelty over D1 and was

not inventive starting from D2 as the closest prior art.

- VI. With its reply to the statement of grounds of appeal, the patent proprietor requested that the appeal be dismissed and filed seven sets of claims as its auxiliary requests 1 to 7.

Claim 1 of auxiliary request 1 differs from claim 1 as granted in that the following sentence has been added at the end of the claim:

"wherein the proportion of components (i), (ii) and (iii) is within the range of 1 to 50 weight-% component (i) based on the mass of components (i) and (iii), 50 to 99 weight-% component (iii) based on the mass of components (i) and (iii), and 0.1 to 10.0 molar equivalents of component (ii) relative to component (i)."

Independent claims 14 and 15 of auxiliary request 1 correspond to claims 15 and 16 as granted.

- VII. The board scheduled oral proceedings, in line with the parties' requests, and gave its preliminary opinion.
- VIII. The appellant informed the board that it would not attend the oral proceedings.
- IX. Oral proceedings were held before the board in the absence of the appellant. At the end of the oral proceedings, the board announced its decision.

- X. The appellant's arguments relevant to this decision can be summarised as follows.

The composition of claim 1 as granted was not inventive. It differed from the closest prior art, represented by D2, in that it contained component (i) as an additional ingredient. The comparative examples in the patent did not show that this difference brings about any effect beyond those already present in the compositions of D2. The aqueous binder composition designated in the patent (paragraph [0072]) as "reference binder A" represented the teaching of D2. Nevertheless, it had been prepared using a lower proportion of ammonia in relation to citric acid than in the compositions of D2. Therefore, the pH of reference binder A was acidic, while that of the compositions of D2 was set in the alkaline range to avoid corrosion (paragraph [0013]). Tables 1-1 to 1-5 of the patent showed that reference binder A performed better than many of the compositions according to claim 1. This was true not only for the mechanical strength and the curing temperature range, but also for the reaction loss. Therefore, the objective technical problem was merely that of providing an alternative aqueous binder composition. The solution proposed in claim 1 lacked an inventive step because the skilled person knew from D2 (paragraphs [0011] and [0012]) that, in the context of the Maillard reaction, non-carbohydrate carbonyl compounds and reducing-sugar carbohydrates are equivalent. Therefore, it was obvious to partially replace a reducing-sugar carbohydrate, such as dextrose, with a non-carbohydrate carbonyl compound, such as ascorbic acid. Moreover, the combination of carbohydrate and non-carbohydrate carbonyl compounds for the Maillard reaction was explicitly suggested in D1 (paragraph [0048]).

XI. The respondent's arguments relevant to this decision can be summarised as follows.

The aqueous binder composition of claim 1 as granted was inventive. It differed from the closest prior art, represented by D2, by the additional component (i). The comparative examples in Tables 1-1 to 1-5 of the patent demonstrated that this difference produced surprising effects. Compared to reference binder A, which was representative of D2, the compositions according to claim 1 had a higher pH, and the majority of them exhibited a lower reaction loss. The higher pH rendered the compositions of claim 1 less corrosive, while the lower reaction loss made them environmentally and economically advantageous. The appellant, having the burden of proof, had failed to provide evidence that the claimed effects did not arise across the whole breadth of claim 1. Therefore, the objective technical problem had to take into account the technical effects shown in the patent. The solution proposed in claim 1 was not obvious because the skilled person found no motivation in the prior art to combine a carbohydrate with a non-carbohydrate carbonyl compound. These two types of compounds were disclosed in both D2 and D1 as alternatives, i.e. they excluded each other. The combination suggested in the last sentence of paragraph [0048] of D1 referred exclusively to the combination of reactants belonging to the same type of carbonyl compound. In any case, the skilled person would not have combined D2 with D1; while D2 dealt with the provision of environmentally friendly binders, the binders of D1 (claim 1 and Table 1 on page 10) contained a high proportion of components stemming from fossil fuels.

The subject-matter claimed by auxiliary request 1 was also inventive. In addition to the reasons put forward for the main request, the cited prior art neither disclosed nor suggested the proportion of components defined in claim 1.

XII. The parties' final requests were as follows:

- The appellant 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 as granted (main request). Alternatively, it requested that the patent be maintained in amended form on the basis of one of auxiliary requests 1 to 7, all filed with its reply to the statement of grounds of appeal.

Reasons for the Decision

1. The appeal is admissible. It meets the requirements of Articles 106 to 108 and Rule 99(2) EPC.
2. Absence of a party

The oral proceedings before the board took place in the absence of the appellant. The latter had been duly summoned but chose not to attend, as announced by letter of 25 May 2022. In accordance with Rule 115(2) EPC, the board decided to continue the proceedings in the appellant's absence. Pursuant to Article 15(3) RPBA, the board was not obliged to delay any step in the proceedings, including its decision, by

reason only of the appellant's absence from the oral proceedings. In line with this provision, the appellant was treated as relying on its written case. Therefore, the board was in a position to announce a decision at the conclusion of the oral proceedings, in accordance with Article 15(6) RPBA.

3. Main request (patent as granted) - inventive step

3.1 The patent in suit (paragraphs [0001] and [0005] to [0007]) concerns the provision of aqueous binder compositions which are prepared, at least partly, from renewable materials. Claim 1 as granted defines the three components essential for these aqueous binder compositions. Component (i) is defined by two generic formulae, a preferred embodiment being ascorbic acid (paragraphs [0022] and [0026]). Component (ii) contains an amino compound selected from ammonia, amines and their salts. Component (iii) contains a carbohydrate.

3.2 The parties agreed that D2 represents the closest prior art. The board has no reason to take another stance.

D2 (paragraphs [0008] and [0010] and claim 1) relates to the production of formaldehyde-free aqueous binders via the Maillard reaction. The latter is a well-known reaction between an amino component and a carbonyl component which results in a type of polymer called "melanoidins". Figure 1 and paragraphs [0011] and [0012] of D2 illustrate suitable reactants for the Maillard reaction; the carbonyl component may be either a reducing-sugar carbohydrate or a non-carbohydrate carbonyl compound, such as ascorbic acid. Specific aqueous binder compositions are illustrated in the examples of D2; they contain an ammonium salt (triammonium citrate) as the amine component and

dextrose as the reducing-sugar carbohydrate. The compositions of D2 have an alkaline pH to avoid corrosion (paragraph [0013]).

- 3.3 It was undisputed that the Maillard reactants in the examples of D2, i.e. ammonium citrate and dextrose, correspond to components (ii) and (iii) of claim 1. Therefore, the parties agreed that the aqueous binder composition of claim 1 differs from those taught in D2 in that it additionally contains component (i), i.e. a non-carbohydrate carbonyl compound as defined by the formulae in claim 1. A preferred embodiment of component (i) is ascorbic acid (see patent, paragraphs [0022] and [0026]).
- 3.4 The technical effect brought about by this difference was a matter of dispute.
- 3.4.1 At the oral proceedings before the board, the respondent conceded that the composition "reference binder A" in the patent (paragraph [0072]) was representative of the compositions in D2. Although it did not exactly reproduce any of the examples in D2, it contained the same amino and carbohydrate components at similar molar ratios, namely ammonium citrate and dextrose at a molar ratio of about 1:6. According to the respondent, Tables 1-1 to 1-5 in the patent showed that, compared to reference binder A, the compositions of claim 1 had a higher pH, implying that they were less corrosive, and experienced a lower reaction loss upon curing.

In the written proceedings, the appellant had also considered reference binder A to be representative of the teaching of D2. It nevertheless noted (statement of grounds of appeal, page 10, last paragraph to page 11,

second paragraph) that the pH of reference binder A was not that of the binder compositions in D2; contrary to the examples in D2, the amount of ammonia used in the patent was not sufficient to fully neutralise the three acidic groups of citric acid (21.04 mmol ammonia vs 8.84 mmol citric acid). Therefore, reference binder A had an acidic pH (5.0) while the binder compositions of D2 were alkaline (D2, paragraph [0013]). Furthermore, the pH was not a property determined by the difference from D2 (statement of grounds of appeal, page 10, penultimate paragraph). With regard to the reaction loss, it was apparent from Tables 1-1 to 1-5 that reference binder A performed better than a good number of binder compositions according to claim 1.

- 3.4.2 The board agrees with the appellant's observation that the pH of reference binder A does not represent that of the binder compositions of D2, which are clearly taught to be alkaline to reduce corrosion. The appellant is also right in that the pH of the binder compositions according to claim 1 is not determined by the difference from the closest prior art, i.e. component (i). The board also notes that claim 1 does not contain any limitation on the pH of the claimed compositions. Therefore, the board does not agree with the respondent's contention that the compositions according to claim 1 have a higher pH and, consequently, are less corrosive than those of D2.

Nevertheless, the fact that reference binder A does not have a pH in accordance with the teaching of D2 does not render it unsuitable as a comparator for the assessment of the reaction loss. In this regard, the appellant submitted (statement of grounds of appeal, page 11, third paragraph) that the pH does not influence the general performance of the binder. When

asked by the board at the oral proceedings, the respondent also did not contest the absence of correlation between the pH and the reaction loss. Therefore, the board took into account the parties' submissions on the comparative data in Tables 1-1 to 1-5 and the issue of the reaction loss.

According to the respondent, a reduction of the reaction loss is environmentally and economically advantageous. The reaction loss reported for reference binder A in Table 1-1 of the patent is 39.3%. The binder compositions in Tables 1-1 to 1-5 which contain the three essential components defined in claim 1 are No. 2 and 8 to 32; binder compositions No. 33 to 51 contain additional components and therefore have a low comparative value. The patent shows that a relevant number of compositions among those containing the three essential components of claim 1 perform less well than reference binder A in terms of reaction loss; see in particular binders No. 8, 9, 14, 18, 19, 25, 26 and 32. Therefore, the board is not convinced that the reduction of the reaction loss is a general technical effect of the binder compositions defined in claim 1.

If follows from the above that the claimed compositions are not less corrosive, nor do they exhibit a lower reaction loss. Therefore, the respondent has not demonstrated that the distinguishing feature produces a technical effect.

3.4.3 In this context, the respondent argued at the oral proceedings before the board that the presence of a technical effect had been acknowledged by the examining division, which granted a patent. Therefore, in opposition and its subsequent appeal proceedings, the

appellant had the burden to prove that the technical effect was not achieved. This burden had not been met.

The board does not consider it necessary for this case to decide on the general question of which party has the burden of proof for the existence or not of a technical effect which an invention allegedly achieves. In this case, the appellant has provided arguments and reasons relying on the available experimental evidence as to why the patent does not show any technical effect over the closest prior art. The board found these arguments to be convincing. Therefore, it holds that the technical effects alleged by the respondent are not achieved.

- 3.5 In the absence of a technical effect brought about by the distinguishing feature, the board agrees with the appellant that the objective technical problem has to be formulated as the provision of an alternative aqueous binder composition.
- 3.6 On obviousness, it was common ground that reducing-sugar carbohydrates and non-carbohydrate carbonyl compounds were presented in D2 as alternative Maillard reactants. The matter of dispute was rather whether the skilled person had a motivation to combine these two alternatives for the Maillard reaction.
 - 3.6.1 The Maillard reaction is a well-known reaction which was first described at the beginning of the 20th century. D2 (paragraphs [0011], [0012] and [0045] and Figure 1) teaches that, in relation to the Maillard reaction, reducing-sugar carbohydrates and non-carbohydrate carbonyl compounds are equivalent. Nevertheless, it does not explicitly suggest that the two reactants be combined. Therefore, is not clear from

D2 alone whether the skilled person had a motivation to combine the two types of carbonyl compounds.

- 3.6.2 Like D2, D1 (paragraphs [0041] and [0048]) is concerned with the provision of aqueous binder compositions containing an amine component and a carbonyl component which react via the Maillard reaction to produce a melanoidin. D1 also presents carbohydrates and non-carbohydrate carbonyl compounds, e.g. ascorbic acid, as equivalent reactants for the Maillard reaction. D1 goes even further and proposes in the last line of paragraph [0048] that (emphasis added by the board) "*[t]he carbohydrate or a non-carbohydrate carbonyl component of the aqueous binder composition may be one or more of those described herein, or a combination thereof.*"

The respondent reads this sentence narrowly and argues that it suggests the combination of one or more carbonyl components of the same type rather than a combination of carbonyl components belonging to any type.

The board disagrees. According to paragraph [0048], carbohydrate and non-carbohydrate carbonyl components are equivalent. Therefore, when it suggests a combination of carbonyl components, there is no reason to understand that the suggestion is limited to combining components of the same type. The skilled person would understand that equivalent carbonyl reactants can be combined, irrespective of whether they are carbohydrates or non-carbohydrates, since they play the same role in the Maillard reaction. Therefore, the skilled person seeking to solve the objective technical problem would, in light of D1, arrive at an aqueous binder composition comprising components (i) to (iii), as defined in claim 1 as granted.

3.6.3 At the oral proceedings before the board, the respondent argued that the skilled person would not combine D2 with D1: while D2 was directed to environmentally friendly aqueous binder compositions, the compositions of D1 (claim 1 and Table 1 on page 10) contained up to 50% of an emulsion polymer made of components stemming from fossil fuels.

This argument is not convincing. D2 relates to formaldehyde-free compositions but does not exclude components stemming from fossil fuels. More importantly, D1 conveys a clear teaching with respect to the equivalency and the possible combination of the two types of carbonyl reactants suitable for the Maillard reaction when used to produce melanoidin binders. This teaching is not impaired by the fact that the composition of D1 may contain other components.

3.7 Therefore, the board concludes that the subject-matter of claim 1 does not involve an inventive step (Article 56 EPC), so the ground for opposition of Article 100(a) EPC precludes the maintenance of the patent as granted.

4. Auxiliary request 1

The appellant did not file any objections or arguments against the auxiliary requests.

The claims of the application as filed and those of the patent as granted are identical. The claims of auxiliary request 1 derive from the claims of the application as filed (or the patent as granted) by incorporating claim 6 into claim 1 and renumbering and correcting the dependencies of the remaining claims.

Therefore, auxiliary request 1 meets the requirements of Article 123(2) and (3) EPC.

The appellant had raised a novelty objection against the main request based on the disclosure of D1. It is apparent that the feature added into claim 1 of auxiliary request 1 is not disclosed in D1. Therefore, at least for this reason, the subject-matter of claim 1 is novel over D1 (Article 54 EPC).

Regarding inventive step, as correctly argued by the respondent, neither of D2 and D1 suggests the new feature in claim 1. Furthermore, the appellant has not submitted any argument as to why this feature would be obvious in light of the prior art. Therefore, the board can only come to the conclusion that the subject-matter of claim 1 is inventive (Article 56 EPC).

The appellant did not raise any objection against the other independent claims in auxiliary request 1, namely claims 14 and 15. The board sees no reason to raise any objection either.

Therefore, none of the grounds for opposition raised by the appellant prejudices the maintenance of the patent as amended in the form of auxiliary request 1.

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 the claims of auxiliary request 1 filed with the reply to the statement of grounds of appeal, and a description possibly to be adapted thereto.

The Registrar:

The Chairman:



B. Atienza Vivancos

A. Uselli

Decision electronically authenticated