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D E C I S I O N
of 11 July 2005

Case Number: T 1282/04 - 3.3.5

Application Number: 00989948.5

Publication Number: 1237827

IPC:

Language of the proceedings: EN

Title of invention:
Preparation of concrete accelerator

Patentee:
Construction Research & Technology GmbH

Opponent:
BK Giulini GmbH

Headword:
Concrete accelerator

Relevant legal provisions:
EPC Art. 100(b)

Keyword:
"Sufficiency of the disclosure: yes, evidence to the contrary not conclusive"
"Remittal: yes, novelty and inventive step not dealt with by first instance"

Decisions cited:
-

Catchword:
-



Case Number: T 1282/04 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 11 July 2005

Appellant: Construction Research & Technology GmbH
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Representative: Arlt, K., Dr.
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Respondent: BK Giulini GmbH
(Opponent) Giulini Strasse 2
D-67065 Ludwigshafen (DE)

Representative: Rossato, E., Dr.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 6 September 2004
revoking European patent No. 1237827 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: M. M. Eberhard
Members: B. P. Czech
S. U. Hoffmann

Summary of Facts and Submissions

I. The appeal is from the decision of the opposition division posted on 6 September 2004 revoking the European patent No. 1 237 827.

II. The independent claims 1 and 10 of the granted patent read as follows:

"1. A method of preparing an accelerator for sprayed concrete, consisting essentially of the steps of

(i) dissolving aluminium sulphate and aluminium hydroxide in water, optionally containing at least one amine dissolved therein, to give a clear solution; and

(ii) optionally adding at least one of at least one stabiliser and at least one defoaming agent;

the proportions of ingredients present being such that the final product contains 3%-12% by weight of aluminium sulphate (measured as Al_2O_3), up to 30% by weight of amorphous aluminium hydroxide, up to 15% by weight amine, up to 3% by weight defoaming agent and up to 0.06. mol/kg stabiliser, the stabiliser being selected from hydroxycarboxylic acids, phosphoric acids and non-alkaline salts of phosphoric acids."

"10. An accelerator for use with sprayed concrete, prepared by a process according to any one of claims 1-9."

III. The patent was revoked on the ground of insufficiency of the disclosure. Considering in particular

R1: an experimental report of the opponent concerning the reproduction of examples 1 to 4 of the patent in suit (see pages 3 and 4 of the opposition brief and the two photographs annexed thereto),

the opposition division concluded "that the opponent convincingly showed that the process defined by claim 1 cannot be carried out by a person skilled in the art to the extent that a clear solution is obtained and that the accelerator defined in claim 10 cannot be prepared by a person skilled in the art".

The objections under Article 100(a) EPC raised by the opponent and the seven documents submitted in relation therewith are not discussed in the contested decision.

IV. In its statement of the grounds of appeal, the appellant (proprietor of the patent) contested the reasons given in the decision under appeal and rejected all the objections raised by the opponent in the first instance proceedings. Concerning the issue of Article 100(b) EPC, it submitted two additional documents:

R2: An experimental report of BMG ("Anlage 1") and

R3: An experimental report of EMPA ("Anlage 2").

Subsequently, the appellant filed a further copy R3' of the EMPA report R3 bearing an additional signature, an internal analysis report (quantitative analysis of

amorphous Al(OH)₃ ex Taurus Chemicals, MEP-AHA 040412), and printouts of internet pages of three suppliers of aluminium hydroxide.

With its last written submission dated 6 July 2005, the appellant filed an expert opinion ("Gutachten") of Prof. Hiller and four sets of amended claims as auxiliary requests 1 to 4.

- V. In its reply to the statement of grounds of appeal the respondent (opponent), referring to R1, maintained its objections under Articles 100(a) and 100(b) EPC.

With a further letter, it filed the following additional documents, in case more than just the issue of sufficiency was to be discussed at the oral proceedings scheduled by the board:

D8: EP-B1-1 114 004

D9: H. Reul, Handbuch der Bauchemie, 1991, Verlag für chemische Industrie H. Ziolkowsky AG, Augsburg; Seiten 53 bis 183, 226 und 227.

- VI. Oral proceedings took place on 11 July 2005.

- VII. The essential arguments of the parties concerning the sole ground of opposition dealt with in the present decision (sufficiency of the disclosure) can be summarised as follows:

At the oral proceedings, the appellant argued that claim 1 was limited to those preparation methods which actually led to compositions suitable for use as

accelerators for sprayed concrete. Claim 1 merely required the formation of a clear solution in an intermediate step, but included as preferred methods those which actually led to a solution as a final product. Methods leading to viscous and/or turbid but homogenous liquids were thus also covered by claim 1, provided these liquids were suitable for being used as accelerators for sprayed concrete. As shown in R2, the reproduction of the examples of the patent led to clear solutions. The appellant did not exclude the possibility that upon prolonged storage some precipitation or gelification could occur in the solutions prepared according to the teaching of the patent. However, the homogeneous liquids resulting from the reproduction of the examples of the patent were suitable for use as accelerators. Even if the examples were considered as not being reproducible, the patent in suit taken in its entirety contained all the information required to carry out the method according to claim 1. Hence, the patent sufficiently disclosed the claimed invention. The appellant also held that the respondent's experimental report R1 could not conclusively demonstrate that the examples of the patent in suit could not be reproduced and that the teaching of the patent was insufficient. It objected that R1 did not contain any precise indications concerning the equipment used and the process conditions actually applied. Some of the tests were based on pure aluminium hydroxide rather than on the carbonate- and water-containing hydroxides preferred according to the patent. It also argued that the respondent possibly had not varied the process conditions as any skilled person would do in order to arrive at a useful product. On the other hand, measures

like extended stirring or heating could have led to the unwanted solidification of the product. Moreover, it argued that a gel-like consistency of a product did not necessarily exclude its usefulness as accelerator for sprayed concrete. Equipment suitable for using viscous gels or suspensions as accelerators was available on the market.

The respondent considered claim 1 to be restricted to methods leading to clear or slightly turbid solutions suitable for being used as accelerators for sprayed concrete as final products, i.e. even after the cooling the composition to room temperature. It pointed to section [0019] of the patent in suit, according to which the product to be obtained was in the form of a clear or turbid solution, and not in the form of a suspension. If the formation of a clear solution according to step (i) of claim 1 was only to be considered as an intermediate step, this would imply that the final product after cooling to room temperature could also be a suspension, a non-pumpable solid mass or a very viscous solution of poor processability. Since the final product of the preparation method was required to be effective as an accelerator for sprayed concrete at room temperature, and since this was not the case with solid or very viscous compositions, this could only mean that according to the method of claim 1 the product of step (i) must remain a clear or slightly turbid solution upon cooling. Based on its own experience in the field, the respondent explicitly acknowledged at the oral proceedings that clear or almost clear solutions could be prepared by processes falling under the broad terms of claim 1 as granted. To achieve this, specific

process conditions had to be respected with respect to e.g. the temperatures, raw materials, concentrations of the components, amount of stabilising acid and concentration ratios used. However, claim 1 did not specify the conditions necessary and essential for obtaining such solutions. Neither did the description of the patent disclose a corresponding reproducible teaching. The minimum requirement as regards sufficiency of the disclosure was that the specific examples of the patent in suit could be reproduced. However, not even the reproduction of examples 1 to 4 of the patent as reported in R1 led to solutions, but to solid ("stichfest") gels unsuitable for the intended use as accelerators. Therefore, some elements of information essential for carrying out the invention must be missing in the patent. If, on the other hand, claim 1 was to be understood as not requiring that the method had to lead to clear or almost clear solutions, then the patent lacked the information required for obtaining compositions having a consistency making them suitable to be used as an accelerator for sprayed concrete, i.e. for obtaining accelerators that could be pumped and rapidly dispersed in the concrete. Starting from the patent in suit, the skilled person could thus not arrive at the claimed invention without an undue experimental effort and/or without making inventive selections in terms of the components to be used and the process conditions to be applied.

VIII. The appellant requested that the decision under appeal be set aside and that the patent be maintained as granted as main request or, in the alternative, on the basis of one of the auxiliary requests 1 to 4 all filed with the letter of 6 July 2005.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Claim 1 relates to a "method for the preparation of an accelerator for sprayed concrete".
 - 1.1 More particularly, according to part (i) of claim 1, the method is "**consisting essentially** of the steps of (i) dissolving aluminium sulphate and aluminium hydroxide in water, optionally containing at least one amine dissolved therein, **to give a clear solution**; and (ii) optionally adding at least one stabiliser and at least one defoaming agent" (emphasis added by the board). Claim 1 thus requires that the process comprises a step wherein aluminium sulphate and aluminium hydroxide must be dissolved in water, the latter optionally containing at least one dissolved amine, in such a manner that a clear solution is formed.
 - 1.1.1 In section [0015] of the description of the patent in suit, it is indicated that "in order to achieve solutions at the various stages, some heating may be necessary, typically to about 50-60°C". As also acknowledged by the respondent during the oral proceedings, heating is required to prepare the desired solutions having high aluminium concentrations. The accelerators to be prepared will typically be used at room temperature. Even though it is not recited in claim 1, a step of cooling the mixture to room temperature will normally take place in the case where heating may be necessary, see e.g. the explicit mention

of cooling in example 4 of the patent in suit. In accordance with the information given by the description, the expression "consisting essentially" as used in claim 1 with regard to the method steps is thus not considered to exclude further usual process measures, such as cooling the clear solution formed during step (i) to room temperature, which solution formation (i) can thus be considered as an **intermediate** step of the claimed method.

1.1.2 At the oral proceedings the respondent argued that since no further process measures were indicated in claim 1 and since the final product had to be an accelerator at room temperature, claim 1 had to be understood in the sense that the clear solution obtained in step (i) by means of heating and stirring necessarily had to remain a clear solution upon cooling. This view is not shared by the board for the following reasons:

1.1.3 Concerning the consistency and appearance of the products obtained by the process of the patent in suit, the board notes that in example 4 the product is stated to remain a "clear solution" after its final cooling to room temperature and the addition of citric acid, but that it cannot be gathered from examples 1 to 3 that the products obtained therein could also be described as "clear solutions" after their cooling to room temperature.

1.1.4 Moreover, in the general description of the patent in suit, it is explicitly mentioned (see section [0019]) that the product of the process according to the patent in suit may be a clear "**or slightly turbid** solution"

(emphasis added by the board). In conformity with this quoted passage, the reproduction of the examples of the patent as carried out by BMG on behalf of the appellant lead in each case to a clear solution which turned into a homogenous but **turbid** liquid ("trübe, jedoch homogene Flüssigkeit") upon cooling to room temperature, see R2, sections 3.1, 3.2, 3.3 and 3.4.

- 1.1.5 The board thus concludes that although claim 1 requires the formation of a clear solution of aluminium sulphate and hydroxide at least as an intermediate step, said claim is neither implicitly nor explicitly restricted by its present wording to processes leading to final products which are in the form of clear solutions at room temperature, although the latter are also covered. Whether these products become unusable with time is of no relevance, since a particular shelf life is not prescribed by claim 1.
- 1.2 Claim 1 recites water, aluminium sulphate and aluminium hydroxide as mandatory components and amine, stabiliser, defoaming agent as optional components in the preparation of the accelerator (see parts (i) and (ii) of the claim), and imposes certain limitations on the relative amounts of the components used (see last part of claim 1). Claim 1 is thus restricted to those methods wherein the qualitative and quantitative indications given in the last part of claim 1 are respected. By virtue of the indication of the final product to be obtained, i.e. by virtue of the expression "method for the preparation of an accelerator for sprayed concrete" claim 1 is however **further restricted** to those preparation methods which

actually lead to "final products" suitable for being used as accelerators in sprayed concrete.

2. In order for the claimed invention to be considered as sufficiently disclosed, it is necessary that the skilled person using its general knowledge and taking into account the entire information disclosed in the patent, can obtain useful accelerators for sprayed concrete by means of a method consisting essentially of the steps mentioned in claim 1, and wherein the amounts of the components used are comprised in the quantitative ranges indicated in the last part of claim 1.

- 2.1 The reproduction of examples 1 to 4 of the patent as carried out by BMG led to products which in view of the pairs of photographs provided in R2 for each example can indeed be described as viscous and turbid but homogenous liquids, and which do not appear to be suspensions or solid ("stichfest") gels. From R3' it can be gathered that the products obtained by BMG following the instructions given in the examples and the general description had the desired accelerating effect. At the oral proceedings, the parties also agreed that it was not of importance whether the amine was dissolved first (as in the examples of the patent) or after the dissolution of the aluminium sulphate (as described in R2). The burden to demonstrate, by means of suitable evidence, that the patent did not sufficiently disclose the claimed invention thus clearly rests with the opponent (here: the respondent).

- 2.2 The respondent essentially based its objection of insufficiency on its own experimental report R1 and the conclusions it drew therefrom. In its view, R1 showed

that by reproducing the examples of the patent in suit, the skilled person would not arrive at pumpable solutions but at gels or masses having a viscosity or consistency ("stichfest") unsuitable for their intended use as accelerators for sprayed concrete.

2.2.1 It is however noted that R1 comprises no indications concerning the process conditions actually applied. In particular, R1 does not mention the duration of the individual mixing steps, the temperatures applied, the formation of a solution, further stirring or cooling after solution formation, or the amounts in grams of the aluminium hydroxide Type A 215 actually used. When questioned by the board at the oral proceedings, the respondent's representative could not present a detailed written "experimental report" drawn up by the persons who made these experiments. The further explanations given by the representative of the respondent at the oral proceedings were based "on what the technicians of the respondent had told him", i.e. that the experiments were carried out as described in the examples of the patent in suit. The board considers it as rather unusual that no detailed report was available. Moreover, the absence of such a report deprives the appellant of the possibility to analyse these experiments in detail in order to find possible explanations for the diverging results obtained. In the board's view, the results reported and the conclusions drawn from the stated results must thus be considered with particular caution.

2.2.2 At the oral proceedings, the respondent's representative completed the information given in R1 by stating that like in examples 1 to 4 of the contested

patent, the aluminium sulphate was in each case first dissolved under heating and stirring in an aqueous solution of diethanolamine, followed by the slow addition of aluminium hydroxide under continued heating and stirring, until the aluminium hydroxide was dissolved. The temperatures applied were between 50 and 60°C. Upon being questioned by the board, the respondent expressly confirmed that in each experiment a clear solution was obtained upon dissolution of the aluminium hydroxide, but that gelification occurred upon **subsequent further** stirring. This means that in all its experiments, the respondent actually succeeded in reproducing step (i) of method claim 1, i.e. in forming a (hot and) clear solution comprising aluminium sulphate and hydroxide, as well as diethanolamine.

- 2.2.3 The **final** products obtained according to R1, i.e. after stirring the intermediate, potentially unstable solutions for unknown durations, are described as solid ("stichfest") gels or masses. At the oral proceedings, the respondent's representative also used the German expression "wie Pudding" (like blancmange) to describe their consistency. The photographs filed with R1 do not show clear solutions but further conclusions as to the consistency or viscosity of the products are not possible, and at the oral proceedings the respondent decided to no longer rely on them. In R1 it is further stated that clear solutions, in particular pumpable solutions as required for spraying concrete, could not be obtained. At the oral proceedings, the respondent additionally specified that due to their gel consistency, the products obtained could not be pumped by the usual suction pumps and that they could not be satisfactorily dispersed when used in spraying concrete.

2.2.4 In this connection, the board notes that there is no clear boundary between a composition described as a very viscous solution and a composition described as solid gel. On the other hand, the final product to be obtained according to claim 1 need not be a clear solution (see point 1.1.5 above). The appellant moreover did not accept that gels in general could not be satisfactorily pumped and dispersed. It stated at the oral proceedings that there was equipment available on the market which could be used to pump and dose viscous or gel-like accelerators in connection with spraying concrete, and that a high viscosity or a gel consistency of a given composition did not - per se - necessarily imply an insufficient dispersibility. Although the burden of proof was on its side, the respondent has not provided any evidence corroborating its allegation according to which the products obtained were not pumpable and dispersible due to their gel consistency or high viscosity, such as results of tests performed with the specific gels obtained using equipment available for treating viscous and gel-like products. Even taking R1 into consideration despite its lack of detail, and even taking further into account the additional explanations of the respondent provided at the oral proceedings, the board is not convinced, in the absence of such evidence, that the results reported in R1 demonstrate that the products obtained were indeed unsuitable for being used as accelerators for sprayed concrete.

2.2.5 In connection with the discussion of R1, the respondent emphasised the absence of indications concerning the exact nature and composition of the aluminium hydroxide

actually used in examples 1 to 4 of the patent in suit. Therefore, in carrying out each of its own experiments referred to in R1, it had added amorphous aluminium hydroxide in amounts such that the amount of aluminium (calculated as Al_2O_3) actually added corresponded to the amount of aluminium added when using 18 wt% of pure amorphous aluminium hydroxide (containing about 65% Al_2O_3). The mixtures prepared according to R1 reportedly contained from about 19.6 to about 20.6 wt% aluminium (calculated as Al_2O_3). The respondent argued that based on the assumption that the specific amorphous aluminium hydroxide used by BMG in the experiments referred to in R2, like other amorphous aluminium hydroxides available from Taurus Chemicals, contained substantial amounts of carbonate and water, the mixtures prepared by BMG actually must have contained less than 19% aluminium (mention was made of 15% during the oral proceedings). In its view, this lower aluminium concentration could explain why turbid solutions could be obtained by BMG.

Carbonate-containing aluminium hydroxide is a preferred material according to the patent in suit (see page 2, lines 34 to 35). Although the respondent also used this type of material ("Type A 215") in its experiments, it did not reproduce examples 1 to 4 of the patent using 18 wt% of this material (see the table in section [0022] of the patent in suit). Instead, it used a higher amount thereof corresponding to 18 wt% pure aluminium hydroxide (in terms of its aluminium oxide content), see page 2 third paragraph of its reply dated 14 March 2005. From the results reported by the respondent it can thus not even be concluded that obtaining a (viscous and turbid) accelerator solution would not

have been possible when using only 18% of the said preferred, carbonate-containing material.

2.2.6 Even assuming for the sake of argument that R1 showed that a useful accelerator for sprayed concrete was not necessarily obtained by dissolving in water components of a nature and in relative amounts as indicated in the last part of claim 1, this is not sufficient to demonstrate an insufficiency of disclosure for the following reasons: As already pointed out in point 1.2 above, claim 1 does not cover every conceivable such composition, but only those suitable for use as accelerator for sprayed concrete. Moreover, it was common ground between the parties that solutions highly concentrated in aluminium are difficult to obtain. Accordingly, it could be expected that by using a relatively high amount of aluminium sulphate together with a relatively high amount of aluminium hydroxide, it would be more difficult to produce a solution as a final product. Assuming for the sake of argument that a skilled person reproducing the examples of the patent in the manner described in R1 would draw the same conclusions as the respondent (consistency of the products unsuitable for use as accelerator for spraying concrete), the said skilled person could thus be expected to consider lowering the total aluminium content of the mixture, whilst still operating in the ranges indicated in claim 1, to a degree leading to a more suitable consistency of the final product, e.g. by trying to use a carbonate-containing aluminium hydroxide in an amount of 18 wt%. The respondent has, however, not shown that by varying the conditions in this sense it was also not possible to arrive at a useful product.

- 2.3 The respondent has provided no further experimental evidence. In particular, it has not shown that by carrying out the method according to claim 1 at a somewhat lower total aluminium concentration (i.e. at less than about 19% Al₂O₃), whilst respecting all of the quantitative indications given in the last part of claim 1, compositions of a viscosity and consistency (such as clear or slightly turbid solutions) suitable for being used with sprayed concrete and acting as accelerator, could not be obtained.
- 2.4 Summarising, the respondent has not succeeded in demonstrating that a skilled person reproducing the examples whilst giving due consideration to the total information contained in the contested patent would not be able to arrive at (possibly turbid and viscous) solutions suitable for use as accelerators for sprayed concrete without undue experimental efforts. Neither does the evidence presented by the respondent conclusively demonstrate that the preparation of further useful accelerators, differing in terms of their composition but having the required consistency and meeting the compositional limitations imposed by the last part of claim 1, was not possible considering the entire information provided by the patent in suit. The preparation method of claim 1 and the accelerators of claim 10 are thus disclosed in the patent in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.
3. The sole ground of opposition dealt with in the appealed decision is sufficiency of the disclosure. The issues of novelty and inventive step were left open by

the opposition division up to and including the appealed decision. At the oral proceedings, the appellant considered a remittal of the case to the first instance for the examination of novelty and inventive step to be appropriate, and the respondent did not object thereto. Under these circumstances the board, in the exercise of its discretionary power pursuant to Article 111(1) EPC, finds it appropriate to remit the case to the first instance for further prosecution.

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 for further prosecution.

The Registrar:

The Chairman:

A. Wallrodt

M. Eberhard