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**Datasheet for the decision
of 29 July 2014**

Case Number: T 1006/11 - 3.3.05

Application Number: 02719170.9

Publication Number: 1377533

IPC: C04B28/14, C04B24/26

Language of the proceedings: EN

Title of invention:

USE OF COMB-BRANCHED COPOLYMERS IN GYPSUM COMPOSITIONS
COMPRISING COMB-BRANCHED COPOLYMERS

Patent Proprietor:

COATEX S.A.S.

Opponents:

Huntsman International LLC
Sika Technology AG

Headword:

Coatex/comb-branched copolymers

Relevant legal provisions:

EPC Art. 56

Keyword:

inventive step (no) - improvement (no) - obvious alternative

Decisions cited:

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

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Case Number: T 1006/11 - 3.3.05

**D E C I S I O N
of Technical Board of Appeal 3.3.05
of 29 July 2014**

Appellant:
(Patent Proprietor)

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 11 March 2011
revoking European patent No. 1377533 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairman G. Raths
Members: A. Haderlein
 P. Guntz

Summary of Facts and Submissions

- I. The present appeal lies from the decision of the opposition division to revoke European patent EP-B-1 377 533. The patent in suit concerns the use of comb-branched copolymers in gypsum compositions.
- II. Two oppositions had been filed one of which having been withdrawn during the first instance proceedings. The opposition division found amongst other things that the subject-matter of claim 1 of the main request filed with the reply to the opposition brief lacked novelty in view of
- D1: JP 8-217505 and the English translation thereof,
- the subject-matter of auxiliary request 1 was novel over D1 but lacked an inventive step in view of D1 as the closest prior art which was also true for the subject-matter of auxiliary request 2.
- III. Apart from D1, the following documents were cited in the first instance proceedings and are relevant for the present decision:
- D5: McVay, Th., A study of hard finish gypsum plasters, Univ. of Illinois Bulletin, XXIV, 34, 26 April 1927.
- D6: US 3 856 543
- D16: Koslowksi, Th. und Ludwig, U., Zum Einfluß von Zusätzen bei der Herstellung und Anwendung von Baugipsen, 5/1999

IV. In the statement of grounds of appeal, the proprietor of the patent (appellant) requested that the decision under appeal be set aside and requested the maintenance of the patent in amended form based on the auxiliary request 2 on which the impugned decision was based. The appellant requested oral proceedings to be held on an auxiliary basis.

V. In its reply to the appeal, the opponent whose opposition had not been withdrawn during the first instance proceedings (respondent) filed the following document:

D17: Table II.

It also requested oral proceedings in case the board did not decide to dismiss the appeal.

VI. The parties were summoned by the board to oral proceedings to be held on 1 August 2014.

VII. The appellant informed the board in its electronic submissions dated 1 July 2014 that it would not attend the oral proceedings.

VIII. The respondent informed the board in its electronic submissions dated 11 July 2014 that it would not attend the oral proceedings.

IX. The board informed the parties by a communication dated 11 July 2014 that the oral proceedings were cancelled.

X. The sole claim of the sole request (corresponding to auxiliary request 2 on which the impugned decision was based) reads as follows:

"1. A wallboard comprising:
two sheets of board paper; and
a gypsum core between the sheets of board paper, the
gypsum core being the set product of a gypsum
composition comprising:
a) gypsum;
b) water; and
c) a dispersant formulation comprising an acrylic/
polyether comb-branched copolymer and a combination of
sodium sulfate and calcium hydroxide as inorganic
setting accelerant, wherein the copolymer, sodium
sulfate, and calcium hydroxide are present in the
dispersant formulation composition in a weight percent,
based on the total weight of the gypsum in the gypsum
composition in the following amounts:
copolymer between 0.001 and 1.0 wt. %;
sodium sulfate between 0.01 and 5 wt. %; and
calcium hydroxide between 0.0001 and 0.05 wt. %."

XI. The arguments of the appellant, in as far as they are relevant for the present decision, are summarised as follows:

Starting from D1 as the closest prior art, the problem to be solved was to improve the initial set time of gypsum compositions comprising a comb-branched copolymer as a dispersant without substantially affecting the fluidity. This problem was solved by using a combination of sodium sulfate and calcium hydroxide. As evidenced by a comparison of Examples 1 and 4 in Table 2 of the patent in suit the addition of the combination of sodium sulfate and calcium hydroxide to a gypsum composition comprising a comb-branched copolymer dispersant improved the initial set time without affecting the consistency. Moreover, from a comparison of Example 4 and Examples 2 and 3 in Table 2

a synergistic effect was demonstrated. Although the use of inorganic setting accelerants in gypsum composition was known, the prior art taught that the effects of additives for gypsum compositions were unpredictable, that such additives may have several effects and that some may even have reverse effects. This was in particular evidenced by D5, pages 9 and 10, D16, page 278, and D6, column 1, line 35. Thus, the subject-matter of the sole claim involved an inventive step.

XII. The arguments of the respondent, in as far as they are relevant for the present decision, are summarised as follows:

D1 was the closest prior art. The subject-matter of the sole claim differed from the wallboard of D1 in the selection of a combination of sodium sulfate and calcium hydroxide as accelerators and the addition of the copolymer and both sodium sulfate and calcium hydroxide in an amount within the claimed ranges. As evidenced by Table II of D17, the selection of a combination of comb-branched copolymer, sodium sulfate and calcium hydroxide within the claimed ranges did not necessarily lead to a higher reduction of the initial set time as compared to the use of comb-branched copolymer with a comparable amount of sodium sulfate alone. In fact, with reference to examples H3a and H1a at identical pH, namely pH=12, replacing a part of the sodium sulfate by calcium hydroxide did not alter the effect on the initial set time. The alleged synergistic effect did also not occur at pH=6 as evidenced by examples H1b and H3b. Moreover, the alleged effect that the initial set time was reduced without substantially affecting the fluidity of the gypsum composition was not correct. In particular, as shown by example H10a of D17, the fluidity, i.e. the consistency, was in fact

significantly affected.

The problem solved by the claimed subject-matter thus resided in the selection of another accelerator to reduce the initial set time of the gypsum composition.

The proposed solution was, however, obvious in view of the cited prior art. D1 already suggested to use accelerators. Sodium sulfate and calcium hydroxide were well known accelerators. D3 taught to use potassium sulfate or calcium hydroxide as accelerators. D5 taught to use sodium sulfate as an accelerator in gypsum compositions. D6 suggested to add calcium hydroxide and sulfuric acid as accelerators. It was therefore obvious to use sodium sulfate and calcium hydroxide in the composition known from D1. Moreover, the claimed ranges for these compounds were arbitrarily chosen. Thus, the subject-matter of the claim did not involve an inventive step.

XIII. Requests

The appellant requested that the decision under appeal be set aside and the European patent be maintained in amended form on the basis of the sole claim of the sole request filed with the statement of grounds of appeal.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. Inventive step
- 1.1 The invention concerns a wallboard comprising a gypsum core.
- 1.2 Such a wallboard is known from D1 which is considered to be the closest prior art.

D1 discloses (citations of D1 referred to between square brackets) a wallboard comprising two sheets of board paper [0001]; and a gypsum core between the sheets of board paper [0001], the gypsum core being the set product of a gypsum composition comprising:

- a) gypsum [0047];
- b) water [0047]; and
- c) a dispersant formulation comprising an acrylic/polyether comb-branched copolymer (dispersant C1 to C13 of [0052] in combination with the preparation of the dispersant in [0028] to [0042]). The copolymer is present in the dispersant composition in an amount falling within the claimed range of between 0.001 and 1.0 weight percent, based on the total weight of the gypsum in the gypsum composition (cf. [0025] and [0047]).

The appellant does not contest that D1 discloses the above features in combination. The parties agree that D1 does not disclose the combination of sodium sulfate and calcium hydroxide as inorganic setting accelerant in the required amounts, although it discloses the presence of setting accelerants in general [0003].

- 1.3 According to the patent in suit the problem to be solved consisted in providing a gypsum wallboard being manufactured according to a process using a consistency-decreasing additive that improved the setting of the gypsum composition (see paragraph [0016]). Moreover, according to the submissions of the appellant the problem to be solved was to improve the initial set time of gypsum compositions comprising a comb-branched copolymer as a dispersant without substantially affecting the fluidity of the gypsum composition comprising the dispersant.
- 1.4 As a solution to said problem, the patent in suit proposes a wallboard according to claim 1 of the sole request characterised by a dispersant formulation comprising a combination of sodium sulfate and calcium hydroxide as inorganic setting accelerant, wherein the sodium sulfate and calcium hydroxide are present in the dispersant formulation composition in a weight percent, based on the total weight of the gypsum in the gypsum composition, in the following amounts:
- | | |
|-------------------|--------------------------------|
| sodium sulfate | between 0.01 and 5 wt. %; and |
| calcium hydroxide | between 0.0001 and 0.05 wt. %. |
- 1.5 As to the success of the solution, it needs to be determined whether the above problem has been solved over the whole scope claimed.

D1 discloses to use an "aqueous curing promoter solution" (see paragraph [0003]), i.e the use of a setting accelerant. Considering that the claimed ranges encompass values of as low as 0.01 wt.-%, respectively 0.0001 wt.-%, it is not credible that the setting of the gypsum composition is improved over the closest prior art.

Table 2 of the patent in suit suggests that the consistency, i.e. the fluidity, of the gypsum composition is not affected by the addition of the setting accelerants, at least at calcium hydroxide concentrations of 0.007 and 0.014 wt. % (see examples 1 to 4 in Table 2). Also, Table 3 of the patent in suit seems to suggest that the consistency is not affected by the setting accelerants at calcium hydroxide concentrations of as low as 0.005 wt. % (see examples 6 to 8). In contrast, the data provided by the respondent in D13 show that at hydroxide concentrations of as high as 0.0498, i.e. at the upper limit of the claimed range, consistency is substantially affected (see examples H10a and H10b compared to example H0: a decrease in consistency from 60.3 to 56.3). It must thus be concluded that it is not credible that the problem of not substantially affecting the consistency of the gypsum composition is solved over the whole range claimed.

The appellant also argued that Table 2 of the patent in suit showed a synergistic effect, i.e. the addition of a small amount of calcium hydroxide together with a substantial amount of sodium sulfate as in example 3 of Table 2 would lead to an over proportional decrease in initial set time while the addition of each compound alone (examples 2 and 3) would not achieve such an important decrease of initial set time. The board notes that Table 2 is silent about the pH of the gypsum composition or the copolymer. In contrast, the evidence provided by the respondent (i.e. Table II of D17) shows that at constant pH values of the copolymer no such synergistic effect could be observed (compare examples H0, H1a, and H3a). In general, it appears that the decrease in initial set time significantly depends on the pH of the gypsum composition. For instance, example

6 in Table 3 of the patent in suit was carried out at pH=9.4 leading to an initial set time of 360 sec whereas the same composition at pH=11.9 led to an initial set time of 306 sec. This compares with the data provided by the respondent showing that at pH=12 an initial set time of 408 was obtained (example H10a in Table II of D17) whereas the same composition at pH=6.02 led to an initial set time of 435 sec. As the claim, however, does not specify the pH of the dispersant formulation the purported synergistic effect does not occur over the whole range claimed.

The board thus concludes that the problem set out *supra* at 1.3 is not solved over the whole scope claimed.

- 1.6 The technical problem needs therefore to be reformulated as the provision of an alternative gypsum wallboard. Indeed, this problem has been solved.
- 1.7 It remains to be decided whether the proposed solution is obvious in view of the cited prior art.

D1 teaches to use an "aqueous curing promoter solution" (see paragraph [0003]), i.e the use of a setting accelerant. It is undisputed that sodium sulfate and calcium hydroxide were well known as setting accelerants in gypsum compositions. Moreover, D2 (page 6, line 2) and D3 (column 8 lines 48 to 57) disclose calcium hydroxide. D5 (page 10, lines 1 to 6) teaches to use sodium sulfate as accelerant whereas D16 mentions both sodium sulfate and calcium hydroxide as possible accelerants in gypsum compositions (page 280, penultimate paragraph).

The appellant did not contest that sodium sulfate and calcium hydroxide were well known setting accelerants,

but argued that the skilled person would not use sodium sulfate and calcium hydroxide as accelerants in D1, as the use of inorganic setting accelerants was unpredictable and they might have reverse effects. This argument must fail as the problem to be solved resides merely in the provision of an alternative gypsum wallboard and thus the skilled person would not have been prevented from using the known inorganic accelerants in gypsum compositions. Although D5 discusses, as argued by the appellant, a number of theoretical explanations for the phenomena leading to the observed acceleration (see paragraph bridging pages 9 and 10), D5 clearly teaches to use sodium sulfate as an accelerant (page 10, lines 1 to 6). It is true that D16 mentions that, depending on the quantity used, the same compound used as an accelerator can act as a retarder (page 280, right-hand column, second paragraph), but D16 also clearly teaches to use calcium hydroxide and sodium sulfate as accelerants (see page 280, right-hand column, penultimate paragraph). Further, it was known to add inorganic accelerants in an amount of less than 1 wt.% (see for example D3, column 8, lines 10 to 19; D16, page 274, right-hand column, last three lines). The skilled person, faced with the problem of providing an alternative gypsum wall board, would thus have used sodium sulfate in an amount falling within the claimed range of 0.01 to 5 wt.%. He would also have tried to use calcium hydroxide in an amount of 0.05 wt.% (i.e. the upper limit of the range claimed for calcium hydroxide) and below, depending on the circumstances, for instance if the amount of calcium hydroxide available was limited and the initial set rate needed to be reduced only to a certain extent.

In view of the above, the board concludes that it was

obvious to use sodium sulfate and calcium hydroxide in amounts falling within the claimed ranges of claim 1 in the dispersant composition disclosed in D1 and thus arriving at the claimed subject-matter.

- 1.8 It follows from the above that the subject-matter of claim 1 does not fulfill the requirements of inventive step set forth in Art. 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

G. Rath

Decision electronically authenticated