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D E C I S I O N
of 25 June 2003

Case Number: T 0255/01 - 3.3.5

Application Number: 92104598.5

Publication Number: 0505896

IPC: C01F 7/02

Language of the proceedings: EN

Title of invention:
Process for the production of a colloidal boehmite

Patentee:
NORTON COMPANY

Opponent:
Minnesota Mining and Manufacturing Company

Headword:
Colloidal boehmite/NORTON

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step - no, obvious alternative"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0255/01 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 25 June 2003

Appellant: (Proprietor of the patent)	NORTON COMPANY 1 New Bond Street Worcester MA 01615-0008 (US)
Representative:	Diehl, Hermann O. Th., Dr. Diehl, Glaeser, Hiltl & Partner Patentanwälte Postfach 34 01 15 D-80098 München (DE)
Respondent: (Opponent)	Minnesota Mining and Manufacturing Company P.O. Box 33427 St. Paul, Minnesota 55133-3427 (US)
Representative:	Weinberger, Rudolf, Dr. Vossius & Partner Siebertstrasse 4 D-81675 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted 22 December 2000 revoking European patent No. 0505896 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
J. H. Van Moer

Summary of Facts and Submissions

I. The appeal is from the decision of the Opposition Division to revoke European patent No. 0 505 896. The patent was revoked on the ground of lack of inventive step (Articles 56 and 100(a) EPC). The reasons were based on the following documents:

D1: US-A-4 797 139

D4: US-A-4 360 449 and

D6: EP-B-0 168 606.

II. With the statement of the grounds of appeal the appellant(patentee) filed new claims 1 to 4 and amended description pages and rejected the Opposition Division's arguments against inventive step.

Claim 1 reads as follows:

"A process for the production of a colloidal boehmite which comprises providing a starting material which consists of a dispersion of a boehmite, optionally additives selected from electrolytes, magnesia, zirconia and/or silica and optionally an addition of seed material effective to promote the formation of alpha alumina,
acidifying the dispersion to a pH of 3.5 or lower by adding acid in sufficient quantity to lower the pH to the above level but insufficient to cause the boehmite to dissolve completely,
characterised by

providing the dispersion with a dispersibility of less than 70%,
subjecting the dispersion to a hydrothermal treatment by heating under a pressure of from 0.5 to 2 MPa (5.15 kg/cm^2 to 20.6 kg/cm^2) at a temperature of from about 150 to 200°C for a time of from 0.15 to about 8 hours so as to produce a colloidal boehmite with at least 95% dispersibility."

The appellant's arguments could be summarized as follows:

The subject-matter of claim 1 differed from the method disclosed in D4 essentially in the reversal of the order of process steps. This reversal led to a more effective breaking up of the agglomerates in the dispersion thereby improving the dispersibility. This improvement was apparent from the comparison of the results of Example 5 (Table 7) of D4 with the results of the samples of Example 3 (Table 2) of the patent in suit.

III. The respondent (opponent) maintained that the subject-matter of claim 1 lacked novelty over D1 or at least lacked an inventive step over D1 or over D4 in combination with D1 and/or D6. The respondent's argument against inventive step, insofar as it was based on D4 and D6, could be summarized as follows:

The appellant did not demonstrate an improvement in dispersibility. The measurements made according to the patent in suit were different and not comparable with those disclosed in D4. D6 disclosed that the dispersibility of a Boehmite containing suspension

could be improved by heat-treating the dispersion in the presence of an acid in an autoclave. It was thus obvious to reverse the treatment steps disclosed in D4 as an alternative route to produce a highly dispersed colloidal boehmite.

IV. In response to the summons for oral proceedings pursuant to Rule 71(1) EPC the appellant informed the board that it would not attend the oral proceedings. Oral proceedings took place on 25 June 2003 in the absence of the appellant.

At the oral proceedings the respondent admitted that D6 (the B-document) did not form part of the state of the art within the meaning of Article 54(2) EPC, and based its arguments in respect of inventive step on the published patent application (the A-document) corresponding to D6, hereinafter referred to as D6A. Said patent application was published on 22 January 1986, well before the priority date of the patent in suit (22 March 1991).

V. The appellant requested that the decision under appeal be set aside and that the European patent No. 0 505 896 be maintained with claims 1 to 4 and an amended description as filed with the Grounds of Appeal, dated 20 April 2001.

The respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. The subject-matter of claim 1 is new. The board does not accept the respondent's argument that D1 destroys the novelty. Although D1 discloses the hydrothermal treatment of a dispersion which **might contain boehmite**, there is no disclosure of a starting material which **consists of a dispersion of a boehmite** as required by present claim 1. Thus the process according to claim 1 differs from the process disclosed in 1 at least in the choice of the starting material.

3. The board concurs with the Opposition Division and the appellant that D4 represents the closest prior art. This document discloses a process for the production of a colloidal boehmite which comprises hydrothermally treating a mixture of a boehmite and water followed by mixing the so treated boehmite with a dilute aqueous solution of a monovalent acid (column 1, line 41 to column 2, line 44; column 3, line 61 to column 4, line 39 and column 7, lines 1 to 14). The hydrothermal treatment is preferably performed at 250 to 500°F (121 to 260°C) at autogenous pressure during 1 to 8 hours . The boehmite recovered from the autoclave is dispersed in an aqueous acid solution containing 0.4 to 2.0 wt% monovalent acid (column 4, lines 8 to 33). In Example 3 a run is disclosed at 350°F (177°C) for 3 hours, whereafter the boehmite is dispersed at a pH of 2.1 (Table 3). In Example 5 a run is disclosed at 350°F for 3 hours whereafter the boehmite is dispersed in 0.4 wt% HNO_3 to make up a 10 wt% dispersion. The dispersibility, measured after the dispersion had been centrifuged, was raised by this treatment from 77 to 94% (cf. Table 7, lines 1 and 4).

4. According to present claim 1 the dispersibility of a boehmite treated by the process of the patent in suit is raised from below 70% to above 95%. This is confirmed by at least some of the examples. It is however not indicated in claim 1 how the dispersibility is measured. According to the description the dispersibility is measured after the dispersion has been centrifuged at 3500 G for 3 minutes (page 2, lines 51 to 52). The respondent has submitted that the weight percent of solids that can be separated by centrifuging also depends on the amount of boehmite sol placed in the test tube and the amount of solids in the boehmite sol, which are not defined in the test. This was not contested by the appellant. In view of this deficiency and the fact that in D4 the G-force of the centrifuge and the centrifugion time have not been defined, the board agrees with the respondent that the dispersibility values in the patent in suit cannot be reliably compared with those in D4. In the absence of proper comparison examples, which in this case would not have caused great effort, the board holds that an improvement in dispersibility by the process according to claim 1 has not been convincingly demonstrated. The problem underlying the invention can, however, be seen in providing an alternative process for preparing a highly dispersed colloidal boehmite. It is undisputed that by first preparing an acidified dispersion and subjecting the dispersion to a hydrothermal treatment according to claim 1 this problem can be solved. Thus the board is satisfied that the process according to claim 1 actually solves that problem.

5. Looking for an alternative process for producing a highly dispersed colloidal boehmite, the skilled person would consider recent patent documents relating to processes in which dispersions comprising colloidal boehmite are prepared. D6A is such a patent document. In the Statutory Declaration of Ralph Bauer (inventor in D6A and the patent in suit), filed with the appellant's letter dated 8 August 2000, D6 was referred to as "European Patent No. 0 168 606-A2". The appellant was thus obviously aware that where in the contested decision and in the reply to the grounds of the appeal reference was made to D6 in fact a reference to D6A was intended. D6A discloses processes for the production of alumina bodies by firing a gelled dispersion comprising boehmite particles, which were peptized in contact with acid (claim 1; page 3, line 31 to page 4, line 24 and page 5, line 36 to page 6, line 11). D6A further discloses that the problem of unpeptized material is recognized even in the case of dilute sol-gel dispersions and that such material can be made peptizable by subjecting the mix to a hydrothermal treatment at 180°C for 2 hours at autogenous pressure. Such treatment may or may not be needed depending upon the quality of the alumina monohydrate powder and the tolerable amount of unpeptized material in the product (page 4, lines 10 to 23). Since the alumina monohydrate powder is a boehmite (page 6, lines 8 to 11) and the mix comprises the boehmite peptized with acid in water (page 3, lines 31 to 36), D6A provides the skilled person with a clear incentive that the dispersibility of a boehmite, which is not completely peptized in an aqueous acid solution by stirring, can be improved by a hydrothermal treatment under the conditions mentioned in D6A. A hydrothermal treatment of an acidified

dispersion of boehmite is therefore, in the board's judgment, an obvious alternative to the process disclosed in D4 for improving the dispersibility of boehmite suspensions.

6. D6A does not disclose the pH of the dispersion before the hydrothermal treatment. Since D4 discloses in its examples pH values from 1.7 to 4.2 for peptizing the boehmite after the hydrothermal treatment (Examples 1 to 3), the skilled person would, in the absence of any incentive to act otherwise, consider acid concentrations within said range also for the hydrothermal treatment proposed in D6A. The finding of an optimum pH range of 3.5 or lower, within the limits disclosed in D4, is a matter of routine experimentation. For these reasons the board holds that the process according to claim 1 of the main request does not involve an inventive step.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

U. Bultmann R. Spangenberg