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Datasheet for the decision of 24 February 2021

Case Number: T 2574/18 - 3.3.05

Application Number: 07872100.8

Publication Number: 2032505

IPC: C01F7/02, C01F7/18, C08K3/22, C09K21/02

Language of the proceedings: EN

Title of invention:
PROCESS FOR THE PRODUCTION OF ALUMINUM HYDROXIDE

Applicant:
Martinswerk GmbH

Headword:
Aluminum hydroxide/MARTINSWERK

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 25(2)
RPBA Art. 12(4)

Keyword:
Inventive step - main request (no) - auxiliary request (no) - reformulation of the technical problem - obvious alternative
Late-filed evidence - could have been filed in first instance proceedings (yes) - admitted (no)

Decisions cited:
T 0386/89

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2574/18 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 24 February 2021

Appellant: (Applicant)	Martinswerk GmbH Kölner Strasse 110 50127 Bergheim (DE)
Representative:	Uexküll & Stolberg Partnerschaft von Patent- und Rechtsanwälten mbB Beselerstraße 4 22607 Hamburg (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 24 May 2018 refusing European patent application No. 07872100.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	S. Fernández de Córdoba

Summary of Facts and Submissions

I. The appeal lies from the examining division's decision to refuse the European application EP 07872100.8.

II. The following documents were among those discussed at the examination stage:

D1 US 4,989,794 A

D2 US 5,306,480 A

D3 L. D. Hart, "Alumina Chemicals, Science and Technology Handbook", passage "Methods to Produce Aluminum Hydroxide", American Ceramic Society, 1990, 77-82, XP002409801

D6 EP 1 206 412 B1

D10 EP 1 380 540 A1

III. The application concerns the production of aluminum hydroxyde (ATH) flame retardants. At the examination stage the appellant added a feature relating to the ATH particle diameter before wet-milling to the independent claim and submitted comparative data.

In the subsequent office action, the examining division indicated that these results were not meaningful since the particle diameters after wet-milling in the inventive example and in the comparative example were different.

In the same vein, the examining division held in the decision under appeal *inter alia* that, when starting from D1, the applicant (appellant) had not demonstrated any technical effect associated with the distinguishing

feature d_{50} of the ATH particles before wet-milling (points 2.3.2 and 2.3.3). Inventive step was denied.

IV. With its statement setting out the grounds of appeal, the appellant submitted additional exhibits including Exhibits B to E:

Exhibit B	T. J. Lynch et al., "Advances in ATH benefit composite products", Reinforced Plastics, September 2003, 44-46
Exhibit C	"MARTINAL® MAGNIFIN®, Innovativer Flammschutz, Innovative Flame Retardancy", brochure, Martinswerk, Albemarle, October 2007, 1-26
Exhibit D	Thermogravimetric analysis
Exhibit E	"MARTINAL® LEO, New, A new Series of Fine Precipitated ATH Grades with Optimised Performance", brochure, Martinswerk, Albemarle, October 2007, 1-6

V. In a communication under Article 15(1) RPBA the board informed the appellant that the subject-matter of claim 1 still appeared to lack inventive step and that, consequently, the appeal was likely to be dismissed.

VI. In a submission dated 22 January 2021, the appellant submitted two auxiliary requests and re-iterated its request for Exhibits B, C and E to be admitted.

VII. Claim 1 of the first and second auxiliary requests reads as follows (amendments compared with the main request indicated by the board):

1. A process for producing spray-dried ATH particles comprising:

a) wet-milling a slurry comprising in the range of from ~~about~~ 1 to ~~about~~ 80 wt.% ATH, based on the total weight of the slurry, thus producing a milled ATH slurry, and
b) spray-drying said milled ATH slurry thus producing spray dried ATH;
wherein said wet-milling is conducted in the presence of a liquid using spherical milling media having a diameter in the range of from ~~about~~ 0.1 mm to ~~about~~ 1.0 mm and a density in the range of from ~~about~~ 1.5 to ~~about~~ 8 g/cm^3;
wherein said slurry is obtained from a process that comprises dissolving aluminum hydroxide in caustic soda to form a sodium aluminate liquor; filtering the sodium aluminate solution to remove impurities; cooling and diluting the sodium aluminate liquor to an appropriate temperature and concentration; adding ATH seed particles to the sodium aluminate solution; allowing ATH particles to precipitate from the solution thus forming an ATH suspension containing in the range of from ~~about~~ 80 to ~~about~~ 160 g/l ATH, based on the suspension, and having an ATH d_{50} particle size, as determined by laser diffraction, of from 1.0 to 6.0 µm; filtering the ATH suspension thus forming a filter cake; and re-slurrying said filter cake to form said slurry comprising in the range of from ~~about~~ 1 to ~~about~~ 80 wt.% ATH, based on the total weight of the slurry, optionally washing said filter cake one or more times with water before it is re-slurried;
and optionally
c) reducing the number of any agglomerates present in said spray dried ATH."

VIII. The appellant's arguments, as far as relevant to the present decision, are summarised as follows:

Exhibits B to E should be admitted.

The subject-matter of claim 1 was inventive over D1 since nothing in D1 hinted that the claimed particle size *before* wet-milling resulted in less debris and thus in improved thermal stability and wettability.

Auxiliary request 1 was a reaction to objections raised for the first time in the board's communication.

In auxiliary request 2, the only additional amendment compared with auxiliary request 1 was the deletion of several dependent claims and the resulting renumbering of back-references.

The auxiliary requests should consequently be admitted.

IX. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the claims considered in the decision under appeal.

As an auxiliary measure, the appellant requested that a patent be granted on the basis of either of the two auxiliary requests as filed with the submission dated 22 January 2021.

Reasons for the Decision

1. Admissibility of documents

1.1 In the appellant's view, Exhibits B, C, D and E merely illustrate and corroborate arguments put forward at the examination stage.

However, the appellant has failed to explain why these documents were not submitted at the examination stage.

1.2 Exhibits B and D are supposed to demonstrate that the presence of less debris and the improved thermal stability of the ATH particles of claim 1 are linked to the distinguishing feature over D1 (i.e. the d_{50} particle size before wet-milling; see point 2.4 below).

However, as shown under point 2.6.2 below, these effects are not addressed in the application as originally filed (see also point 2.5 below). Since the examining division denied the presence of an effect throughout the examination proceedings (see for example the summons to the oral proceedings, page 2), these documents should have been filed at the examination stage.

1.3 In addition, the publication date of Exhibits C and E is October 2007, which is after the filing date of the application in this case.

1.4 Consequently, the board exercises its discretion and disregards Exhibits B, C, D and E (Articles 25(2) RPBA 2020 and 12(4) RPBA 2007).

First and second auxiliary requests

Since these requests fail for lack of inventive step, the question of their admissibility under Article 13 RPBA 2020 need not be answered.

2. Inventive step (Article 56 EPC)

2.1 The invention

The application relates to a process for producing aluminum hydroxide (ATH) particles.

2.2 The closest prior art

D1 discloses (Example 3) a process for producing spray-dried ATH particles, involving providing a slurry with an average particle size of the starting material of 50 µm and a concentration of 700 g/l ATH. This slurry is then wet-milled using ceramic beads as milling media and finally filtered and spray-dried.

Since D1 relates to the same purpose as the application and has several features in common with claim 1, it is a reasonable starting point for assessing inventive step. This has not been disputed.

2.3 The technical problem to be solved according to the application

According to the application, the effect associated with the claimed process is improved wettability of the ATH particles. This in turn reduces power draw fluctuations during the subsequent compounding (paragraphs [0015] and [0039]).

Accordingly, the problem to be solved according to the application is to provide a process for producing ATH particles which, during compounding, yield reduced power draw fluctuations in the compounding engine and thus allow for higher compounding throughputs without damaging the compounding engine.

2.4 The solution proposed

The proposed solution to this problem is the process for producing spray-dried ATH particles according to claim 1, which is characterised by a d_{50} particle size of the slurry to be wet-milled of between 1.0 and 6.0 µm.

It has not been contested that the size of the particles to be wet-milled is the sole distinguishing feature.

2.5 Success of the solution

2.5.1 For the following reasons, it has not been convincingly shown that the problem has been solved:

- There is no data on file as to the wettability; this has not been contested.

- Figures 10 and 11 of the application as originally filed, which, according to paragraphs [0075] and [0076], are supposed to show a reduced power draw of the ATH particles produced by means of the process according to the invention compared with the comparative Martinswerk OL-104 LE, are illegible and cannot demonstrate that the problem is solved.

The figures as re-submitted during the oral proceedings at the examination stage cannot demonstrate that the problem is solved either. While the curves themselves are indeed more legible, the absence of axis labels makes a comparison between Figures 10 and 11 impossible.

2.5.2 Even if, for the sake of argument, these figures were legible and the axes were labelled as alleged by the appellant, the comparative particles Martinswerk OL-104 LE in Figure 11 of the application in question and the particles in Example 3 of D1 would still not be comparable: while the particles of Example 3 of D1 are precipitated and subsequently milled, the Martinswerk OL-104 LE particles are, as confirmed by the appellant, only precipitated (i.e. without any subsequent milling). Yet this is considered to have a considerable impact on the particles' properties.

Consequently, any effect shown for the Martinswerk OL-104 LE particles would not necessarily exist for the particles in Example 3 of D1 as well.

2.5.3 In conclusion, there is no evidence that the problem has been solved. Therefore, it has to be reformulated.

2.6 Reformulation of the technical problem

2.6.1 In order to show an effect associated with the distinguishing feature of the particle size d_{50} before the wet-milling step, at the examination stage the (now) appellant submitted comparative data supposed to show the improved thermal stability of the particles according to the invention over particles representative of those in Example 3 of D1. This data was submitted again with the statement setting out the grounds of appeal.

The diameter of the comparative particles before milling was indeed close to that in Example 3 of D1 (48 µm vs. 50 µm). The results show that, at a given degree of weight loss of 2%, the corresponding

temperature is higher for the particles of the invention (231°C vs. 209°C).

Yet in the very first communication following the submission of this comparative data, the examining division pointed to the fact that the different *final* particle sizes in the example according to the invention and in the comparative example made it impossible to attribute any effect to the distinguishing feature.

The appellant has, however, chosen not to submit further experiments, e.g. with similar final particle sizes, to corroborate the presence of an effect. While the appellant admits that the final particle sizes in this comparative data are not comparable (8 µm for the comparative example vs. 1.8 µm for the example according to the invention), it argues that the increase in thermal stability would be even more marked if the comparative particles were further milled from 8 µm to 1.8 µm, since the specific surface would increase even further.

The board, however, shares the examining division's view that the comparative data is not meaningful enough. Due to the different final particle sizes, it is not possible to acknowledge that the distinguishing feature, i.e. the claimed particle size *before* wet-milling, necessarily causes any effect. It is possible that phenomena other than the surface area would interfere and have an impact on the thermal stability if the comparative particles were milled from 8 to 1.8 µm.

2.6.2 In the appellant's view, the smaller particle size d_{50} of the slurry before wet-milling and spray-drying

inevitably resulted in lesser particle size reduction during milling and in less debris. This would increase the density of the particles and improve the wettability while also leading to increased thermal stability.

However, according to established case law, an effect which is not disclosed in the application as filed may only be taken into account when assessing inventive step if it can be deduced by the skilled person from the application as filed considered in relation to the nearest prior art (e.g. T 386/89, catchword).

Yet, as indicated above, the effect according to the application as originally filed is in fact improved wettability of the ATH particles, which in turn reduces power draw fluctuations during subsequent compounding (paragraphs [0003], [0015] and [0039]). By contrast, the application as filed is entirely silent on the presence of debris, let alone on the formation of debris during milling.

The application does not mention increased thermal stability as an effect either. Nor is it convincing that improved thermal stability is deducible from a use of the particles as a flame retardant, as argued by the appellant. Paragraphs [0066] and [0069] state that "within the experimental error, the inventive aluminum hydroxide ... has *similar* ... flame retardant properties as the comparative grade Martinal [OL-104 LE or OL-107 LE]" (paragraphs [0066] and [0069]; emphasis added by the board).

The measured losses on ignition ("LOI") in Tables 4 and 5 cannot demonstrate an improvement for the particles according to the invention either. Any such improvement

would be reflected in a lower LOI value due to reduced loss of organic compounds. Yet while the LOI value in Table 5 slightly decreases for the particles according to the invention, it slightly increases according to Table 4.

It is further noted that claim 1 does not require any specific size of the *resulting*, i.e. the milled and spray-dried, ATH particles. Lesser size reduction during milling compared with D1 is therefore not necessarily achieved, e.g. when coarse ATH particles are needed (see e.g. D1, column 2, lines 22 to 30; D2, column 1, lines 33 to 34; D3, page 80, first full paragraph; D10, paragraph [0004]). In this event, the amount of debris is not necessarily increased nor the size of the debris reduced.

2.7 Despite their not being considered, it is noted as an aside that none of Exhibits B (Figure 1, page 45, column 1, second paragraph), C (figure on page 7) and D (which allegedly depicts the negative impact of the degree of milling on the thermal stability) shows a meaningful comparison between particles according to the invention and particles representative of Example 3 of D1, i.e. particles with a diameter d_{50} between 1.0 and 6.0 µm before wet-milling on the one hand and particles with a diameter of 50 µm on the other hand.

Consequently, even if these documents were taken into consideration, they would not be relevant to the present decision.

2.7.1 For want of any effect, the problem to be solved has to be formulated as the provision of an alternative process for producing ATH particles.

This formulation is in line with that retained in the decision under appeal (see point 2.4).

2.8 Obviousness

However, since ATH particles with a size d_{50} after precipitation and before milling within the claimed range are commonly known (see D1, column 2, lines 33 to 36; D2, column 1, lines 37 to 39, or D6, paragraph [0021] and claim 1), the subject-matter of claim 1 of auxiliary requests 1 and 2 does not involve an inventive step within the meaning of Article 56 EPC.

Main request

The main request is the request considered in the decision under appeal.

3. Claim 1 of the main request differs from claim 1 of auxiliary requests 1 and 2 merely in that the vague term "about" is used on several occasions and the method for measuring the d_{50} particle size is not specified.

However, these differences do not change the subject-matter in substance and have no bearing on the reasoning set out above with regard to the inventive step of the first and second auxiliary requests.

Consequently, the main request does not involve an inventive step within the meaning of Article 56 EPC either.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated