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Datasheet for the decision of 9 April 2019

Case Number: T 1255/14 - 3.3.02

Application Number: 05001355.6

Publication Number: 1557448

IPC: C09B67/04

Language of the proceedings: EN

Title of invention:
Wet grinding process using microbeads

Patent Proprietor:
Dainichiseika Color & Chemicals Mfg. Co., Ltd.

Opponent:
Gill Jennings & Every LLP

Headword:
PIGMENT GRINDING

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

Keyword:
Insufficiency of disclosure (no)
Inventive step - (yes)

Decisions cited:
T 0608/07, T 0593/09, T 2290/12

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 1255/14 - 3.3.02

D E C I S I O N
of Technical Board of Appeal 3.3.02
of 9 April 2019

Appellant: (Opponent)	Gill Jennings & Every LLP Broadgate Tower 20 Primrose Street London Greater London EC2A 2ES (GB)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)
Respondent: (Patent Proprietor)	Dainichiseika Color & Chemicals Mfg. Co., Ltd. 7-6 Nihonbashi Bakuro-cho 1-chome Chuo-ku Tokyo 103-8383 (JP)
Representative:	Hartz, Nikolai Wächtershäuser & Hartz Patentanwaltspartnerschaft mbB Weinstrasse 8 80333 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 31 March 2014 rejecting the opposition filed against European patent No. 1557448 pursuant to Article 101(2) EPC**

Composition of the Board:

Chairman	M. O. Müller
Members:	M. Maremonti
	M. Blasi

Summary of Facts and Submissions

I. The appeal by the opponent (hereinafter "appellant") lies from the decision of the opposition division to reject the opposition against European patent No. 1 557 448.

II. The contested patent contains a single claim, which reads as follows:

"*1. A production process of an inkjet recording ink comprising an aqueous pigment dispersion and further comprising at least one additive selected from the group consisting of film-forming polymers, crosslinking agents, film-forming aids, pH adjusters, surfactants, nozzle drying inhibitors, thickeners, defoaming agents, preservatives, antimolds and antibiotics, said process, comprising:*

(A) finely dispersing a pigment in a pigment dispersion mixture obtained by mixing at least a pigment and a dispersant in an aqueous medium with beads having diameters of from 0.5 mm to 2 mm such that said pigment is formed into fine particles having an average particle size of from 100 nm to 500 nm; and

(B) ultrafinely dispersing the pigment dispersion mixture obtained in step (A) with microbeads having diameters of not smaller than 0.02 mm but smaller than 0.2 mm,

wherein said pigment dispersion mixture is ultrafinely dispersed in an annular mill for producing the aqueous pigment dispersion,

wherein said ultrafine dispersion is conducted to satisfy the following inequality (1):

0.005 < L/X < 0.01 (1)

wherein L is an effective mill capacity in liters of said annular mill and X is a flow rate in liters of said pigment dispersion mixture per hour through said annular mill."

III. The following were among the documents cited during the opposition proceedings:

D1: Way, H.W., *Grinding and Dispersing Nanoparticles*, JCT Coatings Tech, January 2004, pages 54 to 60.

D3: JP 1998-286478.

D9: Journal of the Society of Powder Technology, 1985, vol. 22 no. 6, pages 380 to 389, with English translation of table 1 on page 380, table 2 on page 387 and figures 16 to 18.

D10: US 2001/0036438 A1.

D11: JP 06-035092.

D12: Chemical Industry, 1990, vol. 41, pages 923 to 931, with English translation of pages 924 and 925 and of figures 4 and 5.

D13: Chaiyasat *et al.*, Colloid and Polymer Science, 2007, vol. 285 (5), pages 557 to 562.

D14: US 2012/0170105 A1.

D15: US 2003/0008080 A1.

D18: Otsuka Electronics Co. Ltd., Fiber-Optics Particle Analyzer, FPAR-1000, 27.12.2006.

The opposition division had come to, *inter alia*, the following conclusions:

- The ground for opposition under Article 100(b) EPC did not prejudice the maintenance of the patent as granted.

- The subject-matter of claim 1 as granted involved an inventive step in view of D1 taken as the closest prior art. Hence, the ground for opposition under Article 100(a) and Article 56 EPC did not prejudice the maintenance of the patent as granted either.

IV. In its statement setting out the grounds of appeal, the appellant contested the reasoning of the opposition division and maintained that the claimed subject-matter was not sufficiently disclosed and lacked inventive step.

V. In its reply to the statement of grounds of appeal, the patent proprietor (hereinafter "respondent") rebutted the arguments of the appellant and submitted that the claimed subject-matter met all the requirements of the EPC.

VI. By letter of 24 August 2018, the appellant informed the board that it would not be represented at the oral proceedings and that the request for oral proceedings was withdrawn.

VII. On 12 December 2018, the board issued a communication in preparation for the oral proceedings.

VIII. By letter of 31 January 2019, the respondent informed the board that it would not be represented at the oral proceedings and that the request for oral proceedings was withdrawn.

IX. The board considered it expedient to maintain the date for oral proceedings. Accordingly, oral proceedings

before the board were held on 9 April 2019 in the absence of the parties pursuant to Rule 115(2) EPC and Article 15(3) RPBA.

X. Final requests

The **appellant** requested in writing that the decision under appeal be set aside and that the patent be revoked.

The **respondent** requested in writing that the appeal be dismissed.

XI. The arguments of the appellant, where relevant for the present decision, can be summarised as follows:

Insufficiency of disclosure:

- The skilled person might not work the invention as defined in claim 1 as granted in view of the features "*average particle size*" mentioned in step (A) and "*annular mill*" mentioned in step (B) of claim 1.

- As to the first feature, no measurement method was mentioned in claim 1. The opposition division thus erred in interpreting this feature as implicitly implying a measurement by the instrument FPAR-1000.

- In fact, this instrument was only mentioned in referential example 5 of the contested patent (paragraph [0066]), falling outside the ambit of claim 1.

- Even considering the measurement to be done by the instrument FPAR-1000, the contested patent failed to teach which type of average was intended, namely whether number, weight or volume average. In fact,

FPAR-1000 was able to furnish all three types of averages as confirmed by D13 and D14.

- Moreover, the software provided with said instrument could use several methods to analyse data, possibly leading to different results, see D18.

- The argument that a number average had necessarily to be intended did not hold. The additional calculations needed to convert a number average to a weight or volume average were so trivial that it was unlikely ever to be mentioned in a patent.

- D13 and D15 confirmed that number, weight and volume averages were significantly different from each other. The failure to indicate which of these averages was meant and how it was to be precisely measured led to the conclusion that the feature "*average particle size*" was meaningless and incapable of being worked.

- As to the second feature, the definition of an "*annular mill*" given in paragraph [0013] of the contested patent substantially differed from the mills shown in D9 to D12, which were referred to by the opposition division in the impugned decision (see page 4).

- Therefore, this feature did not have a distinct meaning and the skilled person did not know which annular mill he could or could not use.

- As a consequence, the invention as defined in claim 1 as granted was not sufficiently disclosed in the contested patent.

Inventive step:

- D1 represented the closest prior art.
- The flow-rate L/X feature of claim 1 was taught by D3, which provided the skilled person with the motivation to control the flow-rate in order to improve storage stability.
- In this respect, the only example of the patent in suit falling within the ambit of claim 1 was example 4.
- It was not credible that the improvement in optical density and gloss shown for this single, punctuate example on a single tested pigment existed across the whole claimed scope.
- As a consequence, the claimed subject-matter lacked inventive step.

XII. The respondent essentially counter argued as follows:

Sufficiency of disclosure:

- By referring to the measuring instrument FPAR-1000, the contested patent made clear that the number average particle size was intended in claim 1 and that it was measured by using said instrument.
- In order to arrive at both weight and volume averages, additional calculations would be required. There was no indication of such calculations in the contested patent.
- As to the term "*annular mill*", the skilled person working in the milling field was capable of selecting an appropriate annular mill from annular mills commercially available on the market.

- The sole requirement was that the mill had to fulfil the function of the present invention. The mills disclosed in D9, D11 and D12 were not inconsistent with the definition given in the contested patent.

- The claimed invention was thus sufficiently disclosed in the patent in suit.

Inventive step:

- D1 could be regarded as the closest prior art.

- The pins present on the inner and outer cylinders of the bead mill of D1 had a detrimental influence on the crystal structure of the pigment obtained due to the mechanical impact on the pigment. According to the present invention instead, not only the particle size should be reduced but, additionally, a detrimental influence on the crystal structure of the pigment should be avoided.

- Therefore, the claimed subject-matter differed from D1 in that the dispersion mixture obtained in step (A) was subjected to step (B) wherein an annular mill was used and wherein the inequality (1) was satisfied.

- The objective technical problem was to provide a production process for water-based pigment inks with improved colour density and gloss, while at the same time having ejection stability and stability of the dispersion.

- The data presented in table 2, example 4 of the contested patent showed that the L/X range defined in claim 1 rendered the production of pigment

particles with improved optical density and gloss possible.

- Examples 1 to 3, although formally outside the claimed scope, where carried out at an L/X value adjacent to the claimed range. They also showed superior results in terms of dispersion of fine particles. Example 4 was thus not the only evidence of the properties obtained by the claimed process.

- Moreover, the results obtained with a single pigment might be generalised to other pigments since milling could be applied to any pigment. Therefore, the inventive effect was achieved across the whole claimed scope.

- D3 did not provide any incentive to improve optical density and gloss by conducting an ultrafine dispersion by satisfying inequality (1) of claim 1.

- As a consequence, the claimed subject-matter involved an inventive step.

Reasons for the Decision

Sufficiency of disclosure - Article 100(b) EPC

1. The appellant submitted that the skilled person might not be able to carry out the invention as defined in claim 1 as granted in view of the features:

   - "*average particle size*" mentioned in step (A) and

   - "*annular mill*" mentioned in step (B) of claim 1.

1.1 The board notes that granted claim 1 indeed fails to indicate how the mentioned "*average particle size*" is

measured. As to the description of the contested patent, an indication is only given in paragraph [0066], concerning referential example 5, stating that "*the average particle size of the pigment in the red base color was also measured by a particle size distribution analyzer ("FPAR-1000", trade name; manufactured by OTSUKA ELECTRONICS CO., LTD.)*".

1.2 However, the fact that the method of measuring the particle size is left open and different known methods may possibly lead to somewhat different results does not necessarily amount to an insufficiency of disclosure within the meaning of Article 100(b) EPC. As long as these measurement methods are readily available to the person skilled in the art and their application does not pose any technical difficulty, the skilled person is free to select any of them when carrying out the claimed invention.

1.3 The fact that, as argued by the appellant, it is not specified whether number, weight or volume average particle size is intended and these values can differ from each other, may indeed lead to an ambiguity as to the precise delimitation of the ambit of claim 1.

In the communication issued in preparation for the oral proceedings, however, the board raised the question whether this potential ambiguity only concerned the clarity of the claim under Article 84 EPC, in the sense that the skilled person may not know whether he works within or outside the claim's ambit, or was so serious to permeate the entire claimed scope leading to an insufficiency of disclosure (see e.g. T 2290/12, reasons 3.1, T 608/07, reasons 2.5.1 and 2.5.2, T 593/09, reasons 4.1.3 to 4.1.5).

1.4 Despite this indication, the board was not presented with any further submissions, which could raise serious doubts, based on verifiable facts, that the potential uncertainty as regards the size of the pigment particles after dispersion step (A) would hinder the skilled person from conducting the subsequent dispersion step (B). In other words, that it would pose an undue burden on the skilled person trying to carry out the claimed process as a whole.

1.5 In this regard, the board also notes that according to referential examples 5 to 12 reported in the contested patent, pigment dispersion mixtures were only subjected to dispersion step (B) as defined in claim 1. Nevertheless, colours having excellent properties were obtained (contested patent, paragraph [0069] and table 3). This is an indication that the achievement of a precise particle size after dispersion step (A) is not identified in the contested patent as to be crucial in order to attain the objects of the invention.

1.6 As to the term "*annular mill*", no structural details of such a mill are mentioned in the claim. Therefore, any annular mill available to the skilled person is covered by this term as long as it is suitable for performing the pigment dispersion step (B) as defined in claim 1 as granted. Additionally, paragraphs [0013], [0030] and [0031] of the contested patent give sufficient structural details of an annular mill suitable to be used in the claimed process. Thus, the presence in claim 1 of the above term does not pose any undue burden on the skilled person trying to reproduce the claimed process.

1.7 The board concludes that the invention as defined in claim 1 as granted is sufficiently disclosed in the

opposed patent. As a consequence, the ground for opposition under Article 100(b) EPC does not prejudice the maintenance of the patent as granted.

Inventive step - Article 100(a) and Article 56 EPC

2. The closest prior art

2.1 Both parties indicated the disclosure of document D1 as representing the closest prior art. In view of the pigment dispersing methods disclosed therein, the board sees no reasons to take another stance.

2.2 In fact, document D1 discloses several pigment dispersing methods, the results of which are presented in figures 5, 6 and 8.

In particular, the results of figure 6 refer to a two-step dispersing method carried out on a mixture containing titanium dioxide and a dispersant (legend of figure 6 on page 58). The first dispersing step involves the use of 0.5 mm beads, while in the second step 0.1 mm beads are employed. The second step is carried out in a pin mill, particularly illustrated in figure 4 (lower) on page 57. Particle reduction down to around 150 nm is reported (page 59, paragraph entitled "Examples of bead milling with small media").

This two-step dispersing method of D1 has the most features in common with the subject-matter of claim 1 and is regarded by the board as the most promising starting point for the assessment of inventive step. It is noted that the same starting point was used by the opposition division in the impugned decision (page 5 under "Inventive step").

3. The technical problem

3.1 It is undisputed that the subject-matter of claim 1 differs from the above-mentioned two-step dispersing method of D1 at least in that the second dispersion step is carried out so as to satisfy the inequality (1) mentioned in claim 1 as granted. This inequality defines a range for the L/X value, L being the annular mill capacity in litres and X representing the flow rate in litres of the pigment dispersion per hour through the annular mill (II, *supra*).

3.2 According to the contested patent (paragraph [0016]), the claimed process, requiring L/X to fall within the specified range, results in an ink having excellent colour-developing properties and storability. Moreover, the reported examples show excellent results in terms of particle size reduction, optical density, gloss and stability (paragraphs [0062] and [0073]).

3.3 On this basis, the technical problem may be formulated as the provision of a production process of an inkjet recording ink with excellent properties in terms of particle size, optical density, gloss and storage stability.

3.4 The appellant argued (XI, *supra*) that the technical effect put forward was not achieved across the whole claimed scope.

The board disagrees. Tables 1 and 2 of the patent show that by using an L/X value of 0.0075, i.e. inside the claimed range (example 4), a pigment dispersion having better properties in terms of particle size, stability upon heating, optical density and gloss was obtained as compared to dispersions containing the same pigment as example 4 but produced with L/X values falling outside

the claimed range; see referential examples 1 and 2 having an L/X value of 0.015 and 0.003, respectively. Referential example 1 resulted in poor stability after heating (table 1), while referential example 2 resulted in a higher particle size (117 nm vs 94 nm in example 4, see table 1). Moreover, both referential examples 1 and 2 showed inferior optical density and gloss (table 2).

Additionally, example 1 was performed on the same pigment as reference examples 1 and 2. Although formally outside the claimed scope, example 1 was carried out at an L/X value of 0.005, i.e. infinitesimally close to the lower limit of the claimed range. The obtained results (tables 1 and 2) in terms of particle size reduction, optical density, gloss and storage stability are also superior to those obtained in referential examples 1 and 2, performed with L/X values lying well outside the claimed range.

3.5 In the board's view, the appellant's assertion is therefore mere speculation, which is not sufficient to raise serious doubts, substantiated by verifiable facts, that these improved properties could not be obtained with other pigments. The board has thus no reason to doubt that the technical effect of the claimed L/X value as shown in the contested patent is achieved across the whole claimed scope.

As a consequence, the technical problem set out above (3.3, *supra*) is also the objective technical problem.

4. Obviousness of the claimed solution

4.1 It remains to be decided whether, having regard to the state of the art and common general knowledge, it was obvious to the skilled person seeking to solve the

technical problem posed (3.3, *supra*) to modify the two-step dispersing method of the closest prior art by carrying out the second step with an L/X value falling within the claimed range.

4.2 The appellant argued (XI, *supra*) that document D3 provided the motivation to control the flow-rate and thus the L/X ratio in order to improve storage stability.

The board disagrees. Document D3 (paragraph [0001]) concerns the grinding of solid dispersions in liquid media within agitation mills, particularly annular mills (paragraphs [0004] and [0012]). The aim of D3 (paragraphs [0001] and [0008]) is to prevent thermal and mechanical deterioration as well as aggregation of the matter to be milled so that a stable dispersion is obtained. In order to achieve this, document D3 proposes to use minute milling media of 0.3 mm or less (paragraph [0012]) and to control the flow-rate in the mill between 30 to 130 litres per hour times the mill's volume (paragraph [0011]). This corresponds to an L/X value ranging from 0.0077 and 0.033, i.e. in an interval overlapping with the range defined in claim 1 as granted. As to the material to be milled, document D3 mentions (paragraph [0019]) calcium carbonate, ceramic material and pigments.

Although pigments are also mentioned, document D3 does not address the problem of producing an inkjet recording ink, let alone an ink comprising a pigment dispersion with excellent properties in terms of particle size, optical density and gloss. Moreover, the L/X range disclosed in document D3 comprises values well outside the claimed range, for which the obtained pigment properties were found in the opposed patent to

be inferior as compared to those achieved by working in the claimed range (3.4, *supra*).

The board thus concludes that the skilled person seeking to solve the technical problem posed does not find in document D3 any incentive to modify the process of the closest prior art so to carry out the second dispersing step with an L/X value falling within the claimed range. Therefore, the subject-matter of claim 1 as granted involves an inventive step within the meaning of Article 56 EPC.

Conclusions

5. None of the grounds for opposition invoked by the appellant prejudices the maintenance of the patent as granted.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin M. O. Müller

Decision electronically authenticated