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D E C I S I O N
of 15 April 1999

Case Number: T 0252/97 - 3.5.2

Application Number: 91304685.0

Publication Number: 0459706

IPC: G11B 5/706

Language of the proceedings: EN

Title of invention:
Magnetic recording medium comprising acicular dendrite free iron oxide magnetic particles

Patentee:
Minnesota Mining and Manufacturing Company

Opponent:
BASF Aktiengesellschaft Patente, Marken und Lizenzen

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no - obvious to try)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0252/97 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 15 April 1999

Appellant: (Opponent)
BASF Aktiengesellschaft
Patente, Marken und Lizenzen
67056 Ludwigshafen (DE)

Representative:
Riedl, Peter, Dr.
Patentanwälte
Reitstötter, Kinzebach & Partner
Postfach 86 06 49
81633 München (DE)

Respondent: (Proprietor of the patent)
Minnesota Mining and Manufacturing Company
3M Center
P.O. Box 33427
St. Paul
Minnesota 55133-3427 (US)

Representative:
Rauh, Peter A., Dr.
Vossius & Partner
Postfach 86 07 67
81634 München (DE)

Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 17 December 1996 rejecting the opposition filed against European patent No. 0 459 706 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: F. Edlinger
A. C. G. Lindqvist

Summary of Facts and Submissions

I. The appeal is against the decision of the opposition division rejecting the opposition against European patent No. 459 706. Opposition was filed against the patent as a whole based on the ground of lack of an inventive step.

II. The following prior art documents were considered in the proceedings before the opposition division:

D1: EP-A-0 281 873

D2: US-A-4 202 871.

III. With the statement setting out the grounds of appeal the appellant filed a further document:

D3: IEEE TRANSACTIONS ON MAGNETICS, Vol. MAG-20, No. 1, January 1984, pages 33 to 38; CORRADI, A.R. et al "Magnetic Properties of New (NP) Hydrothermal Particles".

IV. Claims 1 and 6 as granted read as follows:

"1. A magnetic recording medium, comprising:

(a) a nonmagnetizable substrate; and

(b) a magnetizable layer coated onto the nonmagnetizable substrate, comprising:

(i) a polymeric binder; and

(ii) from 83 to 89 percent by weight of acicular, substantially dendrite-free, iron oxide magnetic pigment particles dispersed in the polymeric binder, wherein the magnetic pigment particles have an oil absorption number of less than 40."

"6. A method of making a magnetic recording medium. (sic) comprising the steps of:

(a) providing acicular, substantially dendrite-free, iron oxide magnetic pigment particles, wherein the magnetic pigment particles have an oil absorption number of less than 40;

(b) dispersing the magnetic pigment particles in a polymeric binder to form a dispersion, wherein the magnetic oxide loading (dispersion) of the magnetic pigment particles is in the range from 83 to 89; and

(c) coating the dispersion onto a magnetizable substrate to form a magnetizable layer."

Claims 2 to 5 and 7 to 10 are dependent on claim 1 and claim 6, respectively.

V. The appellant requested that the decision under appeal be set aside, that the patent be revoked and, on an auxiliary basis, oral proceedings.

VI. The respondent requested that the appeal be rejected and, as an auxiliary measure, oral proceedings.

VII. In a communication accompanying the summons to oral proceedings, the board expressed the provisional opinion that the subject-matter of the claims did not involve an inventive step. The respondent, in reply to this communication, withdrew the request for oral proceedings without commenting on the substance. The oral proceedings were thereupon cancelled.

VIII. The appellant argued essentially as follows:

(i) Document D1 disclosed all the features of claim 1 but did not explicitly mention that the magnetic particles were substantially dendrite-free and had an oil absorption number of less than 40. Concerning the percentage by weight of magnetic pigment particles (referred to as loading in the following), D1 (page 2, lines 14 to 16) set out that as high as possible a loading was desirable because this improved the electromagnetic properties of a recording medium. Loading values as high as 90.9% by weight (D1, page 6, lines 34 to 36) were envisaged by D1. The specific binder material proposed therein improved the mechanical properties of the recording medium and, therefore, made it possible to use higher than usual loading values. The person skilled in the art would therefore try values in the upper part of the disclosed range of loading.

(ii) The opposed patent stated on page 4, lines 13 to 16, that the dendrite-free magnetic pigment particles disclosed in documents D2 or D3 were the particularly preferred particles. These

particles had an oil absorption number of less than 40 and were presented in D2 and D3 as improving the electromagnetic performance of a recording medium. It was obvious to combine the teaching of either of documents D2 and D3 with that of D1, as found by the opposition division (point 12a of the contested decision). D3 explicitly referred to better packing and higher amount per unit volume and confirmed the advantageous electromagnetic properties of such pigment particles. It was therefore obvious to try the pigment particles disclosed in D2 or D3 in a magnetic recording medium as disclosed in D1.

(iii) When examining novelty, the opposition division had considered that D1 disclosed acicular iron oxide magnetic particles in an amount from 83 to 89% by weight, but departed from this view when it considered inventive step. However, the disclosure of D1 was not limited to the specific values of the examples and since high loading values were desirable, the person skilled in the art would consider other values within the specified range and not discard them as being speculative.

(iv) The method claim 6 and the dependent claims only added usual features so that they fell with claim 1.

IX. The respondent's arguments may be summarised as follows:

(i) The invention as claimed in the contested patent made it possible to maintain critical physical and mechanical parameters with a high loading of specific pigment particles in a conventional binder material. It proposed to select, out of the many known pigment particles, specific pigment particles with a low oil absorption number. This was surprising in view of D1 (page 2, lines 19 to 24) which acknowledged the fact that both measures, reducing the amount of binder and using acicular magnetic material, had a negative influence on the mechanical properties of the recording medium. This passage of D1 explicitly stated that this problem could only be overcome by using a high performance binder material. D1 had a different object, ie to improve mechanical properties under tropical conditions, and suggested the use of a specific binder in combination with conventional magnetic pigments. The upper limit of the loading range was to be considered as speculative because the values of the examples of D1 were only in the conventional range.

(ii) D2 did not deal with the mechanical performance of the recording medium and gave no information about how the performance of a magnetic recording medium could be improved with the acicular particles disclosed there.

(iii) The respondent did not object to the introduction of D3, but argued that D3 disclosed pigment particles, prepared according to D2, without giving any information on coatings

comprising such particles, or about the mechanical properties of a recording medium using such particles. Packing density was dependent on a variety of factors and the uniform size of the particles highlighted in D3 tended to yield a less tight packing because gaps could not be filled with smaller particles.

(iv) The inventors of D1 did not recognise that particles as disclosed in D2 or D3 could successfully be employed in magnetic recording media although D1 was filed ten years after D2 and four years after the publication of D3.

Reasons for the Decision

1. The appeal is admissible.

2. Novelty was not contested in these proceedings.

3. The closest prior art is disclosed in D1, which deals with the conflicting requirements of electromagnetic and mechanical properties of a magnetic recording medium.

3.1 The parties agree that D1 discloses a magnetic recording medium comprising a nonmagnetizable substrate (feature a) and a magnetizable layer comprising a polymeric binder (feature b (i)). The disclosure of the loading range of 83 to 89% is however disputed.

3.2 D1 (page 6, lines 33 to 39), refers to weight ratios of magnetic material with respect to binder material lying

between 1 and 10, particularly between 3 and 6. These ranges correspond to 50 to 91% by weight and 75 to 86% by weight of pigment particles dispersed in a binder. Examples 1 and 2 of D1 use chromium dioxide with loading values in the centre of the preferred range 75 to 86% (about 80%; cf annex to the contested decision). At least the preferred range cannot be regarded as speculative for acicular pigment particles in the combination as disclosed in D1. However, it cannot be regarded as a direct and unambiguous disclosure of the range of 83 to 89% in combination with substantially dendrite-free particles having an oil absorption number of less than 40.

3.3 The subject-matter of claim 1 thus differs from the recording medium disclosed in D1 by feature b (ii).

4. The problem to be solved is presented in the patent specification (page 2, lines 41 to 44) as a generally known problem with recording media, ie to achieve improvements in electromagnetic properties while maintaining critical physical and mechanical properties. D1 (page 2, lines 6 to 24) confirms that the skilled person is aware of these conflicting requirements.

5. The skilled person trying to solve this problem would consider selecting a different magnetic pigment if he had a reasonable expectation of success in doing so, since the properties of the recording medium depend on both binder and pigment, and improvements in electromagnetic properties will essentially depend on the magnetic material.

5.1 Document D2 (column 1, lines 28 to 31; column 8, lines 9 to 33; figure 1) discloses acicular, substantially dendrite-free, ferric oxide particles with an oil absorption number as specified in the contested patent, which refers, inter alia, to D2 and D3 as describing preferred magnetic pigments (see page 4, lines 12 to 22, of the opposed patent). It is apparent from the introductory part of D2 (column 1, lines 4 to 40) that improvements in crystallographic properties of the magnetic powder are desirable in recording media, and that the relatively uniform, single crystalline configuration obtained by the new method has advantageous properties for recording media (no aggregation, pin-holes, or protuberances; they are easily oriented and give improved performance).

The person skilled in the art would therefore have found good reasons for trying this powder in a magnetic recording medium.

5.2 High loading values are generally desirable because they allow increased magnetisation, but are known to decrease the mechanical properties (see page 2, lines 11 to 40, of the opposed patent and page 2, lines 6 to 24 of D1). The achievable loading depends on a number of parameters, such as particle morphology and the binder characteristics, and the acceptable limits of the mechanical properties. As is acknowledged in the opposed patent, conventional magnetic media with gamma-Fe_2O_3 typically contain from 70 to 80% by weight of the oxide dispersed in the binder (page 2, lines 21 to 22 of the patent specification). The board considers that although values higher than 80% might be considered unusual, they would not be rejected as undesirable or

unfeasible.

5.3 The person skilled in the art starting from a recording medium with a binder material making it possible to use high loading values for acicular iron oxide particles (D1, page 6, lines 21 to 26 and 34 to 39) would thus contemplate making routine experiments with high loading values, eg in the preferred range of 75 to 86% disclosed in D1, using the dendrite-free uniform particles disclosed in D2, since they would tend to yield easier orientation and a higher packing (D2, figure 1) than irregular crystalline particles (D2, column 1, lines 21 to 27, figure 4).

5.4 Proceeding along this obvious path, the person skilled in the art would thus arrive at the subject-matter of claim 1 by selecting, with a reasonable expectation of success, pigment particles as described in D2 and carrying out routine experiments in a loading range as contemplated in D1 for similar but less regular acicular pigment particles.

6. Regarding the respondent's argument referring to different approaches in D1 and the contested patent, it is observed that claim 1 only specifies (any) polymeric binder and (any) substantially dendrite-free pigment particles characterised by an oil absorption number of less than 40. Claim 1 clearly covers a combination of a binder material as in D1 and pigment particles as in D2. Since this polymeric binder and acicular iron oxide constituted a preferred combination in D1 (page 6, lines 24 to 26), the person skilled in the art could expect more uniform dendrite-free acicular particles (as in D2) to further improve the performance of the

recording medium regarding easier orientation and packing density. Even without any information about the mechanical properties of these particles with a particular binder material, it was obvious to try these particles and carry out routine tests with high loading values.

7. The fact that D1, although filed with a priority date of about ten years after that of D2, does not mention that the pigment particles disclosed in D2 may be used, does not indicate that it is not obvious to do so. Whether the adoption of any feature not mentioned in a piece of prior art is obvious or not, has to be judged on an objective basis in view of the available prior art.

8. Since the subject-matter of claim 1 does not involve an inventive step and since the respondent has filed no other requests, the remaining claims need not be examined and the patent has to be revoked in accordance with Article 102(1) EPC.

Order

For these reasons it is decided that:

1. The decision is set aside.

2. The patent is revoked.

The Registrar The Chairman

M. Kiehl W. J. L. Wheeler