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D E C I S I O N
of 25 January 1996

Case Number: T 0367/94 - 3.5.2

Application Number: 84303179.0

Publication Number: 0125150

IPC: G11B 5/70

Language of the proceedings: EN

Title of invention:
Magnetic recording medium

Patentee:
KONICA CORPORATION

Opponent:
Fuji Photo Film Co., Ltd.
BASF Aktiengesellschaft, Ludwigshafen

Headword:
-

Relevant legal provisions:
EPC Art. 56, 114(2), 123(2)(3)

Keyword:
"Inventive step - (yes, after amendment)"

Decisions cited:
T 0068/85

Catchword:
-



Case Number: T 0367/94 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 25 January 1996

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 1 March 1994
rejecting the oppositions filed against European
patent No. 0 125 150 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: A. G. Hagenbucher
Members: R. G. O'Connell
C. Holtz

Summary of Facts and Submissions

I. The appellants filed oppositions against European patent No. EP-A-125 150 and now contest the decision of the opposition division rejecting these oppositions.

II. In the notices of opposition the appellants requested revocation of the patent, which had been granted with 11 claims in all, of which claims 1 and 4 were independent, on the ground that none of the claims of the patent met the requirements of Articles 52 to 57 EPC. In these notices, however, arguments were presented only in relation to the ground of lack of inventive step. The following prior art documents were considered during the opposition proceedings.

D1: JP-A-57 133 521 (with partial English translation),

D2: JP-A-53 013 906 (with partial English translation),

D3: JP-A-57 073 105 (with partial English translation),

D4: JP-A-56 098 401 (with partial English translation),

D5: JP-A-52 134 858 (with partial English translation),

D6: "New Course in Elemental Chemistry", published by the Chemical Society of Japan (published 1979, according to the stamp on the front page).

E1: EP-A-0 056 257,

E2: DE-A-2 524 520 and

E3: JP-A-55 095 403 (with English translation).

The respondent submitted test results with letters dated 31 August 1988 and 14 August 1992. One appellant (BASF) submitted test results with a letter dated 12 January 1994.

III. In the appeal proceedings a translation of a further part of D5 was filed. One appellant additionally referred to

D7: JP-A-53 024 806 (with partial English translation)

in support of its assertion as to common general knowledge in the art which was made before the opposition division, but, absent evidence, not accepted in the impugned decision. The other appellant additionally referred to

E4: JP-A-55 062 105 (with German translation)

in order to show more clearly the relevance of documents E1, E3 and D1.

IV. The respondent objected to the introduction of documents D7 and E4, contending that their consideration for the first time in the appeal proceedings would amount to condoning an abuse of procedure. In the event that the documents were to be admitted, the respondent requested that the case be remitted to the opposition division for reassessment of inventive step in the light of these new documents, in particular the combination of E4 and D1.

V. In a communication dated 6 October 1995 which accompanied the summons to oral proceedings, the rapporteur informed the parties that the new documents D7 and E4 appeared at this stage to be relevant, on the assumption that the claimed feature of "no substantial

change in its thermal differential curve up to a temperature of at least 80°C" (hereinafter called the DTA80 curve) was, as contended by the appellants, an inherent property of the Fe-Al composition defined in claim 1. Moreover, in view of the fact that in the grounds of appeal the appellants had contested the findings of the opposition division on inventive step in relation to D1, which was regarded as the most relevant document, an immediate remittal of the present appeal case to the opposition division for consideration of the new documents did not appear to be appropriate.

- VI. In a reply dated 22 December 1995 the respondent presented new test results and pointed to the essential role played by selection on the basis of the DTA80 curve and to the fact that neither D1, nor D7 nor E4 disclosed such a curve.
- VII. During the oral proceedings on 25 January 1996 the respondent repeated its request with respect to documents D7 and E4. Both appellants objected to remittal as involving excessive delay, the appellant citing document D7 expressing a preference for non-admittance of this document to a remittal. The respondent filed a new set of 10 claims which omitted independent claim 4 of the patent as granted. Claim 1, which remained unamended, reads as follows:

"1. A magnetic recording medium comprising a support which has formed thereon a magnetic layer comprising a binder resin which comprises a urethane elastomer thermoplastic resin or a polyurethane curable thermosetting resin and a magnetic powder of an Fe-Al alloy system comprising aluminium atoms in an amount of from 0.5 to 20% by atomic weight of all metallic components of the

alloy system, the magnetic metallic powder having no substantial change in its thermal differential curve up to a temperature of at least 80°C."

Claims 2 to 10 of this new set of claims depend on claim 1.

VIII. The appellants argued essentially as follows:

D1 represented the closest prior art. This document disclosed a magnetic recording medium comprising a support having formed thereon a magnetic layer with a polyurethane curable thermosetting resin binder and a magnetic powder of a Fe-Co or Fe-Ni-Co alloy system. It was clear from this document that the solution disclosed therein also aimed at solving the problem of providing a magnetic recording medium having good still life (i.e. still frame durability) and high storage stability. Table 1 of D1 showed an excellent still life of > 90 minutes and good storage stability (temporal stability magnetic decrease - 5%) for example 1. For this example, 5 wt% of Co were added to α -FeOOH particles in order to improve the oxidation stability of the powder obtained by reduction. The residual objective problem of the present invention could therefore only be directed to a further improvement of the resistance to oxidation. D1 itself pointed to various possibilities for improving this oxidation stability by incorporating other metals in the surface of the magnetic powder. Various coating metals were known for this purpose in connection with the manufacture of ferromagnetic particles and the person skilled in the art would use these stabilisation metals instead of Co in example 1 of D1. E1 showed that Al atoms in an amount of from 0.01 to 2.0% Al/Fe would close the pores on the surface of the metal particles and thus stabilise against oxidation. Similarly E3, D3

and D5 suggested the use of Al/Fe in ranges from 0.01 to 10 wt%, 0.1 to 20 wt% or 0.5 to 10 wt% respectively as a coating layer for improving oxidation stability while retaining excellent magnetic characteristics of the powder. D2 and D4 suggested the use of Fe-Al particles in combination with a polyurethane or a urethane binder for providing a magnetic recording medium. D4 indicated that Al could be added in an amount commonly known in the art in order to improve the oxidation stability of a ferromagnetic powder. It showed that a Fe-Ni-Mn-Si alloy system had no significant change in its DTA curve up to at least 80°C and taught the use of this alloy system for a tape together with a urethane binder. E2 underlined the importance of using a polyurethane binder together with a stabilised magnetic powder. The use of such a polyurethane binder together with stabilised particles known from D3 (claim 2) would lead inevitably to the solution specified in claim 1. A combination of D1 with any one of documents E1, E3, D2, D3, D4 or D5 would render the subject-matter of claim 1 obvious. Doubts as to the completeness of the teaching of claim 1 were expressed.

- IX. The respondent argued that the problem solved by the invention was threefold as indicated at page 2, lines 19 and 20 of the patent, namely providing a magnetic recording medium having high resistance to oxidation, great durability in repeated still frame operation and a high storage stability. These properties were not inevitably linked to each other as could be seen from Table 1 of the patent. The still life of comparative example 3 was only 15 minutes (compared to > 60 minutes) but the storage stability was close to those of examples 1 to 8. In order to solve the threefold problem underlying the opposed patent all features defined in claim 1 including the selection of the metallic powder

by means of a DTA80 curve were necessary in combination. Document D1, considered as the closest prior art, disclosed a recording medium with a polyurethane binder as specified in claim 1 but with different particles. It was clear from D1 that the specific binder was intended to improve the tracking properties and that the oxide film on the powder gave chemical stability. This was not the problem of the invention. Moreover, the still life of > 90 minutes for example 1 in Table 1 of D1 could not be compared with that (> 60 minutes) of examples 1 to 8 of the patent because according to the patent the still life was measured until a 2 dB drop occurred in the playback output whereas according to untranslated page 5, upper left hand column, lines 12 to 18 of the Japanese document JP-A-57 133 521 (D1) the still life was measured until a much bigger drop ("virtually to zero") occurred. This interpretation had been communicated to the appellants well before the oral proceedings and had not been refuted. It might well be that particles known from any of the other cited documents met the requirements for the particles in claim 1. The prior art did not give any incentive, however, to use these particles in combination with the other features specified in claim 1 in order to solve the threefold problem underlying the opposed patent. For example C of the test results filed by the respondent with the letter dated 22 December 1995 the same particles were used as for example 1 of the patent but in combination with a different resin. The fact that the medium of example C had only 3 minutes of still life instead of > 60 minutes showed that all features of claim 1 were required in order to provide a synergistic effect solving the problem of the opposed patent. D2 and D4 disclosed magnetic media with polyurethane or urethane as a binder and mentioned also the use of Al; D4 taught it specifically for improving the oxidation

stability of the ferromagnetic powder. These documents did not suggest the specific metallic component selection including Al in the amount specified in claim 1 for solving the problem of the opposed patent. D4 showed that a specific Fe-Ni-Mn-Si alloy had no change in its DTA curve up to at least 80°C. Documents E1, E2, E3, D3 and D5 concerned only the manufacturing of magnetic particles without undesired sintering, surface deformation or spontaneous combustion. These objects were different from that of the opposed patent. The finding of the present invention that fewer pinholes contributed to the achieved heat stability in a DTA curve was not known from the state of the art. The pores mentioned at page 9, line 19 of E1 ran through the particles because they caused undesirable deformation and a reduction in size; they were not comparable with the pinholes in the surface of the metallic particles mentioned at line 13 of page 2 of the opposed patent. The object mentioned in D5 of producing particles for high density recording and a high saturation magnetic flux density was different from that of the opposed patent. As far as the overlapping ranges of Al/Fe in the magnetic particles known from documents E1, E2, E3, D3 and D5 were concerned, attention was drawn to the fact that certain percentages of Al could be in the centre of the particles but not on their surfaces. Then the specified DTA80 curve would not necessarily be achieved. Regarding the alleged incompleteness of the teaching of claim 1 it was pointed out that the tests carried out by BASF with the results filed on 12 January 1994 also included a measurement of the DTA80 curve. BASF had thereby shown that a selection by means of the DTA80 curve as indicated in claim 1 was possible for a person skilled in the art.

- X. The appellants requested that the decision under appeal be set aside and that the patent be revoked.
- XI. The respondent requested that the appeals be dismissed and that the patent be maintained on the basis of claims 1 to 10 and pages 2, 3 and 4 of the description as submitted in the oral proceedings on 25 January 1996, together with pages 1, 5 to 9 of the description and the drawings in the form as granted.

Reasons for the Decision

1. The appeals are admissible.
2. *Late-filed documents E4 and D7*

In its response to the statement of grounds of appeal dated 27 April 1995 and in its reply dated 22 December 1995 the respondent made it clear that the measurement of the thermal differential curve up to a temperature of at least 80°C (DTA80 curve) served as a further selection feature for the magnetic powder of the Fe-Al alloy system comprising aluminium atoms in an amount of from 0.5 to 20% by atomic weight of all metallic components in the alloy system. Since documents E4 and D7 - which are late-filed in the sense that they were submitted for the first time in the appeal proceedings more than two years after the expiry of the time limit laid down in Article 99(1) in conjunction with Rule 55(c) EPC and were not filed in response to an amendment of the patent - do not suggest a further selection of an Fe-Al alloy system by means of a DTA80 curve, as was also emphasised by the respondent's letter dated 22 December 1995, the board now considers these documents as not sufficiently relevant - in the sense of being

likely to change the eventual outcome of the appeal - as to require further consideration, and therefore exercises its discretion pursuant to Article 114(2) EPC to disregard them.

In so deciding, the board is mindful not only of the limited relevance of the late-filed material, but also of the respondent's request for remittal to the opposition division in the event of the material being admitted, and the appellants' request that the appeal should be decided without remittal.

3. *Amendments*

The amendments to the claims and description filed during the oral proceedings merely delete the second embodiment from the patent with consequential changes to the text. They do not contravene Article 123(2) or (3) EPC.

4. The subject-matter of claim 1 being undisputedly new, the issue to be decided in the present appeal is whether this subject-matter involves an inventive step.

5. *Closest prior art and problem underlying the present invention*

D1, which is the undisputed closest prior art, discloses by means of example 1 a magnetic recording medium comprising a support which has formed thereon a magnetic layer comprising a binder resin with a polyurethane curable thermosetting resin corresponding to an example indicated at page 4, line 34 of the opposed patent. A magnetic powder of an Fe-Co alloy system comprising Co in an amount of 5 wt% is used in example 1. This known magnetic medium is the result of research aimed at

improving the tracking properties and durability without impairing the magnetic properties, electromagnetic conversion properties, still life, repeated tracking stability, coefficient of friction, temporal stability etc. It was found that these properties resulted from the use of the specific binder. The appellants have not provided evidence to refute the statement of the respondent that, in contradistinction to the opposed patent, in example 1 of D1 the still life was obtained by measuring the time for the output to drop to almost zero. Moreover, a quantitative comparison of the still life properties of various recording media measured with different equipment is only possible if one can assume that apart from the recording media the other head-medium interface parameters, e.g. head load, head shape and speed are comparable because all these parameters have an impact on the frictional energy which is converted to heat and influences the materials close to the interface. Since these further parameters for the equipment used for the tests in Table 1 of the patent and that of D1 are not available it can only be concluded from D1 that the obtained medium had a relatively good durability in repeated still frame operation but not whether this durability was better or worse than that indicated in the opposed patent. It appears that the desired "temporal stability" measured by the magnetic decrease according to D1 meant good storage stability. Regarding resistance to oxidation, D1 refers to three methods which use as principal components Fe-Co or Fe-Ni-Co and any mixture with another metal without indicating Al at all. According to D1 a metallic powder with superior oxidation stability, magnetic properties and electromagnetic conversion properties of tapes may be produced by one of these methods and would show excellent results in the context of the objectives of D1. As far as this can be judged

from the translated parts of document D1 no details of specific metallic components and percentages for the further metals are given for achieving good oxidation stability. The essential component mentioned in D1 is Co which is known for providing good coercivity but not necessarily for high resistance to oxidation. Hence, the solution with respect to good oxidation stability is not fully disclosed in D1. Moreover, a selection has to be made from three indicated methods.

Thus, starting from D1, the problem to be solved by the present invention is to provide a magnetic recording medium having in combination three properties, namely high resistance to oxidation, great durability in repeated still frame operation and high storage stability despite the magnetic particles used for the medium containing a variety of metallic components (cf. page 4, lines 3 to 12 of the opposed patent).

6. *Solution*

6.1 The examples and comparative examples in the opposed patent and the test results submitted with the letters dated 31 August 1988, 14 August 1992 and 22 December 1995 make it clear that not only the features

- (a) a specific binder resin comprising a urethane elastomer thermoplastic resin or a polyurethane curable thermosetting resin and
- (b) a magnetic powder of a Fe-Al alloy system comprising Al atoms in an amount of from 0.5 to 20% by atomic weight of all metallic components of the alloy system,

but also a selection by

- (c) determining whether the magnetic metallic powder has no substantial change in its thermal differential curve up to a temperature of at least 80°C

are necessary for solving the threefold problem of the invention.

Features (a), (b) and (c) are mutually independent. The functional definition of feature (c) enables the class of magnetic powder alloys to be reduced by routine experiments not involving undue burden - as evidenced by the test results filed by BASF on 12 January 1994 - in order to obtain appropriate magnetic powder materials for solving the problem of the invention. In view of the fact that various other metallic components in addition to Al may be present, this definition is permissible (cf. T 68/85, OJ EPO 1987, 228, at point 8.4). According to the respondent's statement the word "substantial" in "no substantial change in its DTA curve" means only that typical insignificant wobbles in the curve should be ignored.

- 6.2 In order to decide whether the subject-matter of claim 1 involves an inventive step, the question to be considered is not only whether the prior art suggests using Fe-Al in an amount of 0.5 to 20 wt% of all metallic components but also whether it teaches the selection of an Fe-Al alloy system - which may have various other metallic components - by means of feature (c), in order to solve the problem specified above.

Since the cited prior art (cf. E1, E3, D2, D4) makes various suggestions for using Al in order to improve the resistance to oxidation of the particles, and D3 (cf. claim 2) and D5 (cf. page 2) indicate the addition of a certain amount of Al for improving the magnetic properties, a person skilled in the art might also try to improve the oxidation and magnetic properties of the magnetic medium of D1 by using such particles. It is clear, however, from the test results submitted by the respondent that in order to solve the problem of the invention one would have to make a first selection from the Al ranges indicated in D3 (claim 2), D5 (page 2), E1 (page 6) and E3 (page 8), which may be combined with other metallic components, in order to arrive at the Al amount defined in feature (b) of claim 1 and then to make a second selection according to feature (c) of claim 1 in order to see whether the desired stability is really achieved. In this context it has to be borne in mind that some documents (cf. E1, E3 and D5) suggest adding to Al an amount of more than 1% Si or more percentages of Si than Al, with which it would be difficult to achieve the required DTA80 curve (cf. page 4, lines 7 and 8 of the opposed patent). Only documents D4 and D6 mention the measurement of a DTA curve, D4 up to at least 80°C. However, none of these documents teaches the use of a DTA80 curve as a means for selection in order to find an appropriate magnetic alloy. D4 does not suggest measuring the DTA80 curve of an Fe-Al alloy system; it records only the results of measurements of oxidation susceptibility (oxidation point by DTA and peeling test) on an Fe-Ni-Mn-Si alloy system.

6.3 Conclusion

It follows from the above considerations that, in view of the fact that the selection steps (b) and (c) are missing in the prior art, a skilled person would not derive even from a combined consideration of the cited documents a suggestion for solving the specific problem of the opposed patent by means of the combination of features specified in claim 1. Hence the board upholds the conclusion reached by the opposition division that the subject-matter of claim 1 involves an inventive step.

Claims 2 to 10, being properly dependent on claim 1, are also allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent as amended in accordance with the respondent's request (cf. paragraph XI above).

The Registrar:

The Chairman:

M. Kiehl

A. Hagenbucher