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D E C I S I O N
of 25 September 2002

Case Number: T 1070/99 - 3.5.2

Application Number: 89106873.6

Publication Number: 0353394

IPC: G11B 7/00

Language of the proceedings: EN

Title of invention:
Optical information recording method and medium

Patentee:
TAIYO YUDEN CO., LTD.

Opponent:
Akzo Noble N.V.

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 123(2)

Keyword:
"Added subject-matter - main request (no)"
"Novelty, Inventive step - main request (yes)"

Decisions cited:
G 0009/92, G 0001/99

Catchword:
-

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Case Number: T 1070/99 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 25 September 2002

Appellant: (Opponent)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 4 October 1999 concerning maintenance of European patent No. 0 353 394 in amended form.**

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: J.-M. Cannard
P. Mühlens

Summary of Facts and Submissions

I. The opponent appealed against the decision of the opposition division concerning the maintenance of European patent No. 0 353 394 in amended form in accordance with the proprietor's request filed on 26 July 1999 during oral proceedings before the opposition division.

II. The following documents:

D1: US-A-4 398 203,

D2: EP-A-0 097 929,

D3: JP-A-82 60543,

D4: EP-A-0 019 329, and

D5: a declaration by Dr J.W.G. Mahy dated 24 June 1999,

considered during the proceedings before the opposition division remain relevant to the present appeal.

Documents:

D6: Ullmanns Encyklopädie der technischen Chemie, 4th ed., Vol. 15, Verlag Chemie.Weinheim.New York, page 326,

D7: Jpn. J. Appl. Phys., Vol. 32 (1993), Part 2, No. 10A, 1 October 1993, pages 1418-1420,

cited by the appellant in the statement of grounds of

appeal dated 31 January 2000 and in a letter dated 17 June 2002, and

D8: a declaration by Professor Reizo Kaneko dated 19 July 2002,

D9: JP-A-56 86795,

D10: JP-A-55 97033, and

D11: JP-A-1 39916,

cited by the respondent in a letter dated 16 August 2002,

were referred to during the appeal proceedings.

III. In the letter dated 17 June 2002 the appellant/opponent withdrew its request for oral proceedings and informed the Board that the appellant would not participate in the oral proceedings if these proceedings were nevertheless to be held.

IV. The respondent proprietor filed with the letter dated 16 August 2002 claims 1 to 7 of a main request and by fax on the 4 September 2002 a corrected claim 1 according to said main request.

Independent claims 1 and 3 of the main request, read as follows:

Claim 1:

"A method for optically recording information on an optical information recording medium, the medium

comprising
(i) a light transmitting substrate (1),
(ii) a light absorptive dye layer (2) overlaying the substrate (1) to absorb a laser beam (7), and
(iii) a light reflective layer (3) overlaying the light absorptive layer (2),
the method comprising energizing the light absorptive layer (2) by the energy of a laser beam (7) entered through the light transmitting substrate (1), to form optically readable pits characterized in that
said optically readable pits are formed either
(a) in the surface of the substrate (1) adjacent to the absorptive layer (2) and in the absorptive layer (2), or
(b) in the surface of the substrate (1) adjacent to the absorptive layer (2), in the absorptive layer (2), and additionally in an additional inter-layer (6) disposed between the substrate (1) and the light absorptive layer (2),
all said layers having a suitable heat distortion and/or a suitable hardness."

Claim 3:

"An optical information recording medium comprising
(i) a light transmitting substrate (1),
(ii) a light absorptive dye layer (2) overlaying the substrate (1) to absorb a laser beam (7) to form optically readable pits, and
(iii) a light reflective layer (3) overlaying the light absorptive layer,
characterized in that
said optically readable pits are formed either
(a) in the surface of the substrate (1) adjacent to the absorptive layer (2) and in the absorptive

layer (2), or

(b) in the surface of the substrate (1) adjacent to the absorptive layer (2), in the absorptive layer (2), and additionally in an additional inter-layer (6) disposed between the substrate (1) and the light absorptive layer (2),

all said layers having a suitable heat distortion and/or a suitable hardness."

Claim 2 is dependent on claim 1 and claims 4 to 7 are dependent on claim 3.

V. The oral proceedings were cancelled.

VI. The arguments of the appellant/opponent can be summarised as follows:

Article 100(c) EPC

The deletion from granted claims 1 and 3 during the opposition proceedings of the feature: "or in the absorption layer and in said additional layer", which defined one of three equally preferred alternatives specifying the formation of pits in the patent, corresponded to an inventive selection for which no support could be found in the application as filed. This limitation constituted a positive disclaimer and was not admissible. The restriction of claims 1 and 3 to a recording medium "stably meeting a CD standard" extended beyond the content of the originally filed application which only referred to "the standard properties stipulated in the CD standards, i.e. the reflectance is at least of 70%".

Article 100(a) EPC

D4 did not disclose *expressis verbis* the formation of pits in the surface of the substrate (S) and in the inter-layer (T). However, D4 in combination with Dr Mahy's declaration, which stated that "due to the low thermal conductivity of the said organic layers...the heat itself suffices to generate deformation in the organic adjacent layers" and "It may be taken for granted that at least some deformation occurs at the surface of these layers adjacent to the absorption layer." anticipated both the remaining alternatives in claims 1 and 3. D1 (Figure 11; column 6, lines 3 to 27) was novelty-destroying because it disclosed a medium having pit formation in a dye absorptive layer (3) and in a dielectric layer (9), which could be considered as a part of the substrate (10), as was the inter-layer in the patent in suit.

The technical problem, which was supposed to be the provision of an optical recording medium meeting the CD standard, was solved or obvious from any one of documents D1 to D4. Since D1 (Figures 7, 8 and 11) disclosed a recording medium similar to that of the patent in suit and having a reflectance of 70-80%, the patent in suit merely recited an obvious alternative of the pit formation disclosed in D1, leading to the same result. It was obvious that the pit formation generally mentioned in D2 was obtained in the absorptive layer and in the substrate, as this appeared from a comparison of the thickness of the absorptive layer, refractive index, absorption coefficient and writing laser power in D2 and in the patent in suit. D3 disclosed an optical recording medium similar to that of the patent and having pits formed in the absorptive layer and in the substrate, the only difference being that in D3 the absorptive layer and the reflective

layer were combined.

VII. The arguments of the respondent/proprietor can be summarised as follows:

Article 100(c) EPC

The limitation of claim 1 was not a disclaimer. Claim 1 contained two alternatives; the first alternative, in which the substrate was involved, was preferred.

Article 100(a) EPC

D4 did not disclose an extension of the pits to other layers than the absorptive layer. Dr Mahy's declaration was a speculative opinion supported by no evidence and not an indication of the general knowledge. The metal layers according to D1 which were partially reflecting and partially absorbing could not be considered as a part of a transparent substrate. Moreover, the embodiment according to Figure 11 of D1 disclosed no reflective layer overlaying the absorptive layer.

D1 led away from the invention because it comprised absorptive metal layers which were disposed on each side of the absorptive dye layer for absorbing light. Any deformation caused by light absorption in D2 would extend to the surface of the absorptive layer exposed to air. D3, which showed a two-layer structure with a metal layer on the top of the substrate, could not suggest the structure of the recording medium according to the claims.

VIII. The appellant requested that the decision under appeal be set aside and the patent be revoked.

IX. The respondent requested that the appeal be dismissed and that the patent be maintained in amended form in the following version:

claim 1 filed per fax on the 4 September 2002, claims 2 to 7 filed with the letter dated 16 August 2002, description and drawings in the form approved by the opposition division (main request),

or with claims 1 to 7, description and drawings in the form approved by the opposition division (auxiliary request).

Reasons for the Decision

1. The appeal is admissible.

2. *Deletion of a feature from granted claims 1 and 3*

2.1 The feature: "or in the absorption layer and in said additional layer" which was incorporated in claims 1 and 3 during the grant procedure has been cancelled during the opposition proceedings.

2.2 The optical disc according to Figures 2 and 3 of the application as filed comprises a light absorptive layer (2) overlaying a light transmitting substrate (1) wherein the pits are formed in the absorptive layer and at the surface layer of the substrate. The optical discs according to Figures 4 to 7 of the application as filed comprise an inter-layer (6) disposed between the substrate and the absorptive layer (published application, column 7, lines 19 to 35 and column 8, lines 14 to 23); if the inter-layer is sufficiently

thick the pits are formed in the absorptive layer and in the inter-layer (Figure 5); if the inter-layer is thin, the pits are formed in both these layers and at the surface of the substrate (Figure 7). Accordingly the discs disclosed in the application as filed with reference to Figures 2, 4 and 6, which differ from each other by the absence or presence of an inter-layer (6) and by the thickness of the inter-layer, form three separate alternative embodiments of realisation.

2.3 Claims 1 and 3 as granted covered all three of the above described alternatives: "said optically readable pits are formed either in the surface of the substrate adjacent to the absorption layer and in the absorption layer or additionally in a layer adjacent to the absorption layer or in the absorption layer and in said additional layer" (column 38, line 57 to column 39, line 4). The deletion of one of these alternatives during the opposition proceedings thus merely limits the scope of the claims to the two other alternative embodiments originally disclosed with reference to Figures 2, 3, 6 and 7, and neither corresponds to an inventive selection having no support in the application as filed nor to a disclaimer. Accordingly the deletion in the granted claims of a feature defining the originally disclosed embodiment of the disc according to Figures 4 and 5 does not contravene Article 123(2) EPC.

3. *Main request - Admissibility of the amendments*

The Board is satisfied that claims 1 and 3 according to the main request satisfy the requirements of Article 84 EPC and do not contravene Article 123(2) or (3) EPC. More specifically:

3.1 The feature "stably meeting a CD standard", which was introduced in claims 1 and 3 during the opposition proceedings and objected to by the appellant as contravening Article 123(2) EPC, has been deleted. The deletion of this feature from claims 1 and 3, which widens the scope of these claims and puts the opponent, who is the sole appellant, in a situation worse than if he had not appealed, appears at first sight to offend against the prohibition of *reformatio in peius* (G 9/92, OJ 1994,875). However, an exception to this principle may be made in circumstances where the patent as maintained in amended form would otherwise have to be revoked as a direct consequence of an inadmissible amendment held allowable by the opposition division in its interlocutory decision (G 1/99, OJ 2001,381). The only possible candidate which could be used to replace the feature "stably meeting a CD standard" is the reference to the CD standards disclosed at column 4, lines 35 to 38 of the published application. However, this passage is itself not clear, so that it is not possible to find an originally disclosed clear feature which could be used to restrict the scope of the patent as amended in opposition proceedings. In these circumstances the deletion of the inadmissible feature may be allowed (see G 1/99, point 15). For the sake of completeness, it is noted that this deletion does not infringe Article 123(3) EPC because the deleted feature was not recited in claims 1 and 3 as granted.

3.2 The optical disc according to Figures 6 and 7 of the application as filed comprises an inter-layer (6) disposed between the substrate and the absorptive layer and so thin that the pits are formed in both layers and in the substrate (published application, column 7, lines 19 to 35 and column 8, lines 14 to 23; column 19,

lines 11 to 31: Example 13). Accordingly the formation of pits in the surface of the substrate, in the absorptive layer and in an inter-layer disposed between the substrate and the absorptive layer as recited in feature (b) of claims 1 and 3 was disclosed in, and supported by, the originally filed application.

Main request - Novelty

4. Document D4 discloses an optical information recording medium (Figure 2; page 7, line 7 to page 8, line 4; Example II) which comprises all the features set out in the preamble of claim 3 according to the main request, namely an optical information recording medium comprising:

- a light transmitting substrate (S),
- a light absorptive dye layer (A) overlaying the substrate (S) to absorb a laser beam to form optically readable pits (1), and
- a light reflective layer (R) overlaying the light absorptive layer (A).

5. The feature (a) recited in the characterizing part of claim 3 specifies a first alternative embodiment of the recording medium according to which the optically readable pits are formed in the surface of the substrate (S) adjacent to the absorptive layer (A) and in the absorptive layer (A).

5.1 According to D4 (Figure 2; page 2, lines 15 to 26; page 4, lines 33 and 34; page 7, line 31; page 8, lines 28 and 29) physical/chemical changes, namely holes, are produced in the absorptive layer by means of a laser. D4 thus discloses optically readable pits

formed in the absorptive layer (A) of the recording medium. However D4 does not show or describe pits formed outside the absorptive layer, particularly not in the surface of the substrate (S) adjacent to the absorptive layer (A).

5.2 The appellant does not dispute that D4 does not disclose *expressis verbis* the formation of pits in the surface of the substrate. However in the appellant's view, D4 in combination with Dr Mahy's declaration D5 anticipated the formation of pits in the surface of the substrate (S) adjacent to the absorptive layer (A).

5.3 Dr Mahy's declaration essentially relates to the Example I of D4 in which the recording medium is provided with a **Bi** absorptive layer (Figure 1; page 8, lines 9 to 20: Example I). However, the discs according to Figure 1 and Example I of D4, in which the substrate is not adjacent to the absorptive layer, and those according to Figure 2 of D4, when they comprise a metallic absorbing layer, do not destroy the novelty of claim 3 which is restricted to an absorptive **dye** layer adjacent to the substrate. Insofar as the declaration is relevant to the Example II of D4, which merely shows a recording medium comprising an absorptive **dye** layer (vanadyl phthalic cyanine), and not a metallic absorptive layer, adjacent to the substrate, the appellant's arguments, in the view of the Board, did not demonstrate that formation of pits in the surface of the substrate adjacent to the dye absorptive layer was made available to the public, even implicitly, by the disclosure of D4.

5.4 The declaration may explain that the heat produced in a **Bi** absorptive layer is so high as to generate

deformation at the interface between the absorptive layer and an adjacent organic layer, and consequently at the surface of an organic substrate adjacent to the absorptive layer. However neither the passage of D4 quoted in the declaration (page 4, lines 8 to 15) which does not explicitly suggest that the adjacent layers in D4 are mechanically deformed, nor the mere statement made in the declaration without evidence that droplets of melted absorptive metallic layers have been observed to mechanically deform adjacent organic layers, are sufficient to demonstrate that "at least some deformation occurs at the surface of these (organic) layers adjacent to the absorptive layer" as stated in the declaration.

5.5 The appellant argued that decomposition of a layer made of vanadyl phthalic cyanine (VOPc), which must occur to obtain pits, took place at temperatures above 200°C, and that at this temperature the substrate of D4 would be deformed as described in Dr Mahy's declaration. However D4 does not disclose the use of a substrate made of a material which deforms when the pits are formed. The declaration merely explains that the recording laser "may easily lead to melting of the Bi (absorptive) layer (m.p. 271°C)" and consequently that "the interfaces between the absorbing layer and the transparent layer (and/or the substrate) are exposed to a temperature of several hundred degree" which "is typically much higher than the melting and/or glass transition temperatures of most organic materials". Thus, it has not been shown that the physical/chemical changes in a VOPc absorptive layer in Example II of D4 which begin at 200°C (see D7) must cause deformation in the surface of a substrate made of glass or synthetic resin materials, as argued by the appellant.

5.6 According to paragraph 6 of Dr Mahy's declaration, which merely considered Example II of D4 in respect of its cellulose transparent layer, deformations are produced in the surface of this transparent layer (T), if the layer is sufficiently thick. This cannot prove that deformations are formed in the surface of the substrate (S) according to D4 wherein the transparent layer (T) is disposed between the absorptive layer (A) and the reflective layer (R) (see Figure 2 of D4).

6. The feature (b) recited in the characterizing part of claim 3 specifies a second alternative embodiment of the recording medium according to claim 3 in which optically readable pits are formed in the surface of the substrate (1) adjacent to the absorptive layer (2), in the absorptive layer (2), and additionally in an additional inter-layer (6) disposed between the substrate (1) and the light absorptive layer (2). D4 discloses an additional inter-layer (T), but this layer is not disposed between the substrate (S) and the light absorptive layer (A). For this reason, D4 does not take away the novelty of the second alternative according to claim 3. Moreover for the reasons given in the foregoing point (5 to 5.6), D4 also does not disclose the formation of pits in the surface of the substrate adjacent to the absorptive layer according to this second alternative.

7. Document D1 discloses various embodiments of realisation of discs having an expandable or thermodegradable dye layer (3) overlaying a substrate. However, in none of these embodiments, particularly those of Figures 8 and 11, are optically readable pits formed at the surface of the substrate, so these embodiments do not have all the features recited in

claim 3.

7.1 The disc according to Figure 8 of D1 has an absorptive dye layer (3) overlaying a transparent substrate (10), a light reflective layer (2) overlaying the absorptive layer, an additional transparent layer (9) adjacent to the dye layer and a ductile metal layer disposed between the dye layer and the transparent layer (Figures 7 and 8; column 8, lines 21 to 52). However, no optically readable pits are formed in the surface of the substrate (10). The same consideration applies to the embodiment of Figure 11 which moreover does not show a light reflective layer.

7.2 The layer (9) has an anti-reflection function (column 8, lines 21 to 31) differing from the usual supporting function of a substrate and is deposited on the substrate, for example by centrifugation (column 7, lines 43 to 57) in a way similar to the inter-layer (6) in the patent. The Board thus cannot share the appellant's view that the substrate (10) and the layer (9) could be considered as forming together a laminated substrate.

8. Accordingly, the appellant has not shown that the subject-matter of claim 3 according to the main request lacks novelty in view of the cited prior art. The same considerations apply to claim 1 which relates to a method for optically recording information on an optical information recording medium according to claim 3.

Main request - Inventive step

9. Starting from D4 the objective problem underlying the

present invention can be seen as providing an optical information recording medium which may follow the same standards as the widely prevailing standards for compact discs (CD), so that they are interchangeable with already prevailing CDs and can be played back by CD players. This problem corresponds to the problem mentioned in the patent in suit (column 1, lines 53 to 58; column 2, lines 21 to 25).

9.1 According to claim 3 the problem is solved by forming the optically readable pits also in the surface of the substrate adjacent to the absorptive layer. This makes it possible to obtain a recordable optical disc which meets the CD standards since the read-out signals are not so different from those of CDs, where the pits are formed on a substrate by press molding (column 3, lines 34 to 50).

10. The recording medium according to D4 is not a CD, but is of the anti-reflection type and comprises an anti-reflection coating formed by the transparent layer (T) disposed between the absorptive layer (A) and the reflective layer (R), the thickness of the transparent layer being such that the phase difference between the beam incident on the absorptive layer (A) and the beam transmitted from this layer to the outside after reflection by the reflective layer is an odd multiple of 180°.

10.1 The recording medium according to D4 has for its object to improve the prior art discs of the anti-reflection type, especially by ensuring that "the energy applied during writing of information is not only absorbed as completely as possible in the absorptive layer of the anti-reflex coating, but remains also concentrated as

much as possible in the area where a physical or chemical change must be produced in the absorbing layer" (page 2, lines 17 to 22).

10.2 The recording medium according to claim 3, alternative (b), comprises an inter-layer (6) and some embodiments include an additional layer (16) sandwiched between the absorptive layer and the reflective layer. However neither the inter-layer nor the additional layer are specified in the patent in suit as providing an anti-reflection effect, the recording medium of the invention appearing to work in a way similar to that of a CD. Therefore the skilled man faced with the problem of the invention would not consider D4, which is concerned with a different problem and teaches a solution which does not solve the problem of the invention.

10.3 There are no good reasons for considering Dr Mahy's declaration, which was made in 1999, twenty years after the date of priority of D4, as an indication of the general knowledge in the relevant field at the date of priority of D4. Moreover, the teaching of D4, even if combined with Dr Mahy's declaration, does not suggest forming the readable pits outside the absorptive layer, and in particular cannot suggest forming them in the surface of the substrate (see points 5 to 5.6 above).

11. Discs in which optical readable pits are formed in a light absorptive dye layer and in the surface of a substrate overlayed by the dye layer do not appear to be disclosed in D1 (see paragraph 7 to 7.2 above), in D2 or in D3. Moreover neither D1, D2, nor D3 suggests the formation of pits in the surface of the substrate.

12. Accordingly, the appellant's arguments have not convinced the Board that the subject-matter of claim 3 was obvious to the person skilled in the art at the priority date of the patent. The same is true for claim 1. The Board therefore concludes that the subject-matter of the independent claims 1 and 3 involves an inventive step within the meaning of Article 56 EPC.

13. In the Board's judgement, taking into account the amendments according to the main request the patent in suit and the invention to which it relates satisfy the requirements of the Convention.

14. Since the main request is allowable, the auxiliary request need not to be considered.

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 in amended form in the following version:

   claim 1 filed per fax on the 4 September 2002, claims 2 to 7 filed with the letter dated 16 August 2002, description and drawings in the form approved by the opposition division.

The Registrar: The Chairman:

D. Sauter W. J. L. Wheeler