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D E C I S I O N
of 18 March 2005

Case Number: T 0504/01 - 3.5.3

Application Number: 97105700.5

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IPC: G11B 7/125

Language of the proceedings: EN

Title of invention:
Optical recording method

Applicant:
Hitachi, Ltd.

Opponent:
-

Headword:
Optical recording method/HITACHI

Relevant legal provisions:
EPC Art. 54(1), 54(2), 56, 76(1), 123(2), 84

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

Decisions cited:
-

Catchword:
-

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Case Number: T 0504/01 - 3.5.3

D E C I S I O N
of the Technical Board of Appeal 3.5.3
of 18 March 2005

Appellant: Hitachi, Ltd.
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 27 November 2000 refusing European application No. 97105700.5 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: A. S. Clelland
Members: A. J. Madenach
M.-B. Tardo-Dino

Summary of Facts and Submissions

I. The present appeal is against the decision of the examining division, posted on 27 November 2000, to refuse the patent application published as EP 793 221 A, which is a divisional of the application published as EP 484 555 A, on the grounds of a lack of inventive step (Article 56 EPC).

II. The appellant (applicant) filed an appeal on 25 January 2001 and the corresponding grounds on 9 April 2001. He requested the grant of a patent based on claims 1 to 6 of a main request, as an auxiliary measure the grant of a patent based on claims 1 to 6 of a first auxiliary request, as a further auxiliary measure the grant of a patent based on claims 1 to 4 of a second auxiliary request.

III. On 3 June 2004, the board issued a communication dealing with the substantive issues raised by the present appeal.

IV. On 13 December 2004, the appellant withdrew the existing requests and submitted a new set of claims consisting of independent claims 1 and 2 together with amended description pages as a basis for his sole request for grant of a patent.

V. Claim 1 reads as follows:

"An optical recording method comprising the steps of: dividing an optical disk (57) constituting a recording medium into a plurality of zones each including a plurality of concentric tracks;

rotating the optical disk (57) at a constant angular velocity;
selecting one of the tracks onto which information is to be recorded;
generating a recording clock having a frequency which depends on the zone in which the selected track is located, the frequency of the recording clock being different for each of the zones;
setting both

- a light pulse power which depends on the zone in which the selected track is located, the light pulse power being different for each of the zones, and
- a light pulse width which depends on the zone in which the selected track is located, the light pulse width being different for each of the zones;

such that the light pulse width is constant in each of the zones,
modulating light in accordance with the information to be recorded, the recording clock, and the set one of a light pulse power and a light pulse width to produce light pulses indicative of the information to be recorded and having the set one of a light pulse power and a light pulse width; and
irradiating the selected track with the light pulses to record elongated recording marks along the selected track,
characterized in that the setting is performed such that the light pulse power is constant in each of the zones and said elongated recording marks having edges corresponding to the information to be recorded."

Independent claim 2 relates to a corresponding optical recording apparatus.

Independent claims 1 and 2 correspond to independent claims 1 and 2 considered in the decision under appeal with the sole substantial modification being that the term "pulse waveform" is replaced by "pulse width".

VI. The following documents are relevant for the present case:

D1: JP 61 131236 A with corresponding English translation as introduced by the examining division in their communication of 2 June 2000 (in the following, references to the text of D1 relate to this English translation)

D2: FR 2 578 346 A

D3: EP 0 218 214 A

D4: JP 63 205 819 A (in the following, references to D4 relate to the late published family document US 4 937 809 A)

D6: US 4 866 692 A

D7: Philips Technical Reviews, 1982, Vol. 40, No. 6, p. 152

Reasons for the Decision

1. *Admissibility of amendments (Articles 76(1) and 123(2) EPC) and clarity of the claims (Article 84 EPC)*

The modification of the term "waveform" into "width" in claims 1 and 2 as compared with the corresponding claims 1 and 2 on which the decision under appeal was based, has been made in an effort to overcome the lack of clarity connected with the term "waveform". The term "width" finds its support in Figure 34 and claims 2, 5 and 6 of the original disclosure. Figure 34 of the original disclosure is identical to the Figure of the same number of the original disclosure of the parent application EP 484 555 A from which the present application derives. All further modifications in claims 1 and 2 are formal amendments to bring the claims into conformity with Rule 29(1) EPC. Therefore, present claims 1 and 2 fulfil the requirements of Article 76(1) and 123(2) EPC.

As has been pointed out by the examining division, the term "constant" in the features "the light pulse width is constant" and "the light pulse power is constant" in claims 1 and 2 must be understood as meaning that the pulse power and width are independent of the radial position within a given zone. They vary, of course, as a function of the data to be recorded.

2. *Background of the invention*

The claimed invention relates to optical recording by means of an optical disk rotating at constant angular velocity within predetermined concentric zones with an adjustment of the recording frequency between the zones such that the length of recording marks is kept approximately radially constant, a method known as modified constant angular velocity or MCAV recording;

within the concentric zones the recording light pulse power and light pulse width are kept constant.

3. *Novelty and inventive step (Articles 54(1), (2), 56 EPC)*

3.1 The examining division considered D1 as the closest prior art.

D1 also relates to an optical recording and reproducing system. According to one embodiment, the disk in D1 also comprises a number of blocks, which correspond to the concentric zones in the terminology of the application in suit (see page 5, fourth paragraph of the translation of D1), the recording frequency, and thus the light pulse width, being kept constant within a given block or zone. D1 thus discloses MCAV optical disk recording.

According to the decision under appeal, the following features of claim 1, on which the appealed decision was based, differ from the method known from D1 (see point 2 of the statement of reasons):

(1) the light pulse power is constant in each of the zones

(2) the elongated recording marks have edges corresponding to the information to be recorded (so called "pit edge recording")

(3) the light pulse waveform is constant in each of the zones.

3.2 The Board agrees with this analysis.

The replacement of the term "waveform" by "width" in claim 1 of the request of 13 December 2004 has as a consequence that the above third difference between the subject-matter of claim 1 and the teaching of D1 disappears. From paragraph 4 on page 5 of the translation of D1, it follows that the signal frequency remains constant within each block (a block according to D1 corresponds to a zone in the terminology of the present application). Since the signal frequency and the light pulse width are proportional to each other (see paragraph 2 on page 5 of the translation of D1), the light pulse width is constant within a given zone. It is noted that this feature is now in the preamble of the revised claim 1.

3.3 The problem to be solved by the above feature (2) can be seen as the use of an alternative recording method.

In the absence of any information as to the recording method in D1 and considering that at the earliest claimed priority date the use of edge recording systems was common general knowledge in the art (reference is made in particular to D7, page 152, left column, first paragraph; and to D4, column 1, lines 16 to 23), the board is of the opinion that it was obvious for the skilled person to make use of edge recording in a system making use of constant light pulse width within blocks or zones in accordance with the teaching of D1.

3.4 Therefore, the remaining and decisive question is whether the above feature (1) renders the subject-

matter of claim 1 inventive with respect to the disclosure of D1.

The problem to be solved by the above feature (1) can be seen as a simplification of the method according to D1, which is achieved by keeping the light pulse power constant in a given zone and thus removing the need of a trackwise light pulse power adjustment. This is in fact the same problem which is solved by using concentric zones in a MCAV method as in D1 in general, where the adjustment of the recording frequency and thus of the length of the recording marks is only performed at transitions from zone to zone, thus removing the need for a trackwise adjustment of the recording frequency.

3.5 The question accordingly arises as to whether the skilled person modifying the MCAV method by introducing concentric zones within which the recording frequency is kept constant as in D1 would further simplify this method by keeping the light pulse power constant as well.

The examining division argued that because of the slight variation of the linear speed between neighbouring tracks of a given zone it was obvious for the skilled person not only to keep the recording frequency (and thus the light pulse width) constant within a zone but also to keep the light pulse power constant. It was evident that such a measure simplified the recording method further.

3.6 The board does not follow this argument since there is nothing in the prior art which suggests the use of a

constant light pulse power within a given zone. D1 on a proper interpretation emphasizes the requirement of a constant thermal change, a quantity which depends on the light pulse width, the light pulse power and the relative linear speed of a given track with respect to the light pulse, to such an extent that it rather points towards a light pulse power which varies within a given zone.

According to paragraph 3 on page 5 of the translation of D1 the peak power of the laser beam must be made higher towards the outer periphery in correspondence with the track position, so as to make the thermal change produced by the recording dot the same. This is necessary to offset the decreasing pulse width and increasing linear speed towards the outer periphery.

Although this paragraph precedes paragraph 4 on page 5 of the translation of D1, which introduces the optional concept of blocks (which correspond to the concentric zones in the wording of claim 1), and thus does not relate to an MCAV method using zones, there is no indication in D1 that the requirement of a constant thermal change could be dispensed with within a given block or zone in an MCAV method with zones.

According to paragraph 4 of the translation of D1, only the recording frequency is kept constant within a block or zone. In the board's view, the skilled person would have interpreted this statement as a requirement for an even tighter control of the light pulse power from track to track in order to keep the thermal change product constant. The importance of a constant thermal change product is further stressed in the last

paragraph on page 5 of the translation of D1, which paragraph follows the discussion of a MCAV method with zones and can thus be understood as relating to such a method as well.

3.7 Document D6, which relates to a CAV system without zones, underlines the importance of a continuous optimization of recording pulse width and power (i.e. the light pulse width and power) in particular in a pit edge recording method (column 2, lines 27 to 31 of D6).

3.8 In the light of this evidence, the board considers that the skilled person, starting from the teaching of D1, would not be led to maintain the light pulse power constant in a given zone.

3.9 None of the further documents considered during the examination procedure appear to show anything which would lead the skilled person to keep the light pulse power constant in a recording method with a constant light pulse width in predetermined zones according to D1.

D2 shows a constant light pulse width within zones (page 8, line 17 - page 9, line 3) and is silent on the light pulse power. D3 shows a zoned disk with constant light pulse width within the zones (see Figure 4 and column 7, lines 13 to 37), but is, however, silent on the light pulse power. D4 shows in Figure 7 that the recording power is linearly increased along the disk, no zones being mentioned.

3.10 The above arguments apply *mutatis mutandis* to the subject-matter of independent claim 2.

3.11 Therefore, the subject-matter of claims 1 and 2 cannot be considered to have been rendered obvious by the cited prior art and thus fulfils the requirements of Article 52(1) and 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to grant a patent on the basis of the following documents:

   - Claims 1 and 2 as submitted on 13 December 2004.

   - Description pages 1, 3 and 3a as submitted on 13 December 2004.

   - Description pages 2, 4-85 as originally filed.

   - Figures sheets 1-40 as originally filed.

The Registrar: The Chairman:

D. Magliano A. S. Clelland