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D E C I S I O N
of 30 January 2001

Case Number: T 0093/99 - 3.5.2

Application Number: 91902762.3

Publication Number: 0463183

IPC: G11B 20/12

Language of the proceedings: EN

Title of invention:
Data recording and reproducing methods

Applicant:
SONY CORPORATION

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 54, 56, 84

Keyword:
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Decisions cited:
-

Catchword:
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Case Number: T 0093/99 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 30 January 2001

Appellant: SONY CORPORATION
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 3 August 1998 refusing European patent application No. 91 902 762.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: F. Edlinger
P. H. Mühlens

Summary of Facts and Submissions

I. The appeal is against the decision of the examining division refusing European patent application No. 91 902 762.3, which was filed under the Patent Cooperation Treaty on 18 January 1991 under international application number PCT/JP/00054. The English translation of the Japanese language application was filed on 18 September 1991 and published in accordance with Article 158(3) EPC under No. 0 463 183. The reasons given for the refusal were that the subject-matter of claim 1 was not novel with respect to the state of the art disclosed in D1 (EP-A-0 196 590) and that claim 1 did not meet the requirement of Article 84 EPC. According to the opinion expressed under point 9 of the contested decision, the solution as specified in claim 1 was not complete insofar as it was necessary that one complete track was "respectively recorded before a non-operating operation" took place during (n-1) idle revolutions.

II. In a communication accompanying the summons to oral proceedings, the Board also referred to document D2 (GB-A-2 136 192) and expressed doubts whether the subject-matter of claim 8 was novel in view of D2.

III. In the oral proceedings before the Board, the appellant filed new claims 1 to 9 and new pages 3, 5, 6 and 9 of the description. Claims 1 and 7 are now worded as follows:

"1. A data recording method for recording data on a disc-shaped recording medium (32) having concentric tracks, comprising:

storing compressed data in storage means at a first transfer rate, the compressed data being continuous data compressed in time by 1/n, where n is an integer not smaller than 2, along the time axis from one block to another;

reading out a predetermined amount of the compressed data stored in the storage means at a second transfer rate which is n times the first transfer rate and recording the read-out data on the disc-shaped recording medium (32) by a recording head (34) and

stopping the recording operation after recording the predetermined amount of data on the disc-shaped recording medium (32) and performing a non-recording operation leaving the data on the disc-shaped recording medium (32) unchanged during (n-1) idle revolutions so that the same track will be scanned during a time period which is based on the data transfer rates, and

when again performing data recording after stopping the recording operation on said disc-shaped recording medium (32), the recording head (34) is shifted to a new recording start position on said disc-shaped recording medium (32) and another predetermined amount of data is recorded at the second transfer rate whereby data are continuously recorded, so that there is no sector in which data are not recorded."

"7. A method for reproducing data from a disc-shaped recording medium (32), on which data have been recorded at a pre-set compression ratio 1/n, where n is an integer not smaller than 2, according to the data recording method of claim 1, wherein said data reproducing method comprises the steps of:

reproducing the predetermined amount of compressed data from the disc-shaped recording medium (32) by a reproducing head (33);

storing the reproduced predetermined amount of compressed data in a memory at the second transfer rate;

reading out the compressed data stored in the memory at the first transfer rate which is slower than the second transfer rate by a factor of 1/n;

time-expanding the predetermined amount of compressed data read out from the memory;

causing the reproducing head (33) to scan the same track for another (n-1) times; and

causing the reproducing head (33) to be re-located at the new start position on the disc-shaped recording medium when the scanning of the same track by the reproducing head (33) comes to a close."

IV. The appellant's arguments may be summarised as follows:

Claim 1 of the present application specified a method where data were continuously recorded even in the presence of mechanical disturbances such as vibrations. This was achieved by using an increased data transfer rate during the recording operation and by performing (n-1) idle revolutions following the recording of a predetermined amount of data. During these idle revolutions the same track was repeatedly scanned with no risk of erroneous recording operation since no recording operation took place, but the recorded data

could be reproduced then. When the next recording operation was carried out after these idle revolutions, the next amount of data was recorded starting at a new start position so that data were continuously recorded and there was no sector of the disc where data were not recorded.

Claim 7 of the present application specified a method for reproducing compressed data recorded according to the method of claim 1. The reproducing head scanned the same data n times at the increased scanning speed and reproduced the compressed data once at the slower data transfer rate before they were time-expanded.

None of the prior art documents disclosed scanning of the same track during (n-1) idle revolutions. According to D1, an erasing operation was performed before each recording operation. D1 did not suggest a non-recording operation as in the present application. D2 disclosed a method for reproducing data in which a reproducing head scanned the tracks at a scanning speed which was by a factor five higher than the customary speed. A memory then time-expanded the stored data, but the recorded data were not compressed data and the time-expansion was only used to restore the customary data transfer rate.

V. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of:

Claims: 1 to 9 as filed in the oral proceedings;

Description: pages 3, 5, 6 and 9 filed in the oral proceedings;

pages 1, 2, 4, 8 and 10 to 30 as originally filed;
pages 4a and 7 as filed with letter dated 27 June 1996; and

Drawings: Figures 1 to 7 as originally filed.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

2.1 Amended claim 1 is based on claims 1, 2 and 4 as originally filed (English translation). Additional clarifications have been made in the appeal proceedings. The feature "recording medium (32) having concentric tracks" is disclosed in the context of the prior art where the problem then described arises (page 1, lines 13 to 19). The use of the same type of recording medium in the embodiments of the present application is confirmed by the disclosure, in several passages of the application as filed (see eg claim 2; page 5, lines 1 to 11; page 13, lines 4 to 9; page 17, lines 12 to 23), of a predetermined constant angular velocity of the recording medium and repeated scanning of the same track (without reverting to a previous track). The feature "reading out a predetermined amount ... at a second transfer rate which is n times the first transfer rate" is disclosed eg in claim 2 and on page 8, last paragraph to page 9, line 2 of the application as filed. The feature "performing a non-recording operation leaving the data on the disc-shaped medium (32) unchanged during (n-1) idle revolutions so

that the same track will be scanned during a time period which is based on the data transfer rates" and the features of shifting to "a new recording start position" and that of continuous recording of data "so that there is no sector in which data are not recorded" are directly and unambiguously derivable from page 9, line 18 to page 10, line 19.

2.2 Claim 7 corresponds to claim 8 of the set of claims underlying the contested decision and has been clarified by adapting its wording to that of claim 1 to which it refers.

2.3 Likewise, the description has been adapted to the amended claims. These amendments therefore do not infringe Article 123(2) EPC.

3. *Clarity and support of the claims in the description*

3.1 Claim 1, as it is now worded, sufficiently clearly specifies a relationship between the compression ratio 1/n of (a stream of) continuous data which are stored at a first transfer rate and read out and recorded at a second transfer rate which is n times that of the first transfer rate. The recording operation is followed by (n-1) idle revolutions during which the same concentric track is scanned. Data are continuously recorded in the sense that there is no sector in which data are not recorded. The time interval for storing a predetermined amount of compressed data at the first transfer rate thus corresponds to that for n revolutions of the recording medium. If the predetermined amount of data recorded on the medium corresponds to the amount of data recordable on a full track length (cf claim 2), the recording head, at the end of the recording

operation, will have returned to the same position of the concentric track, and after (n-1) idle revolutions the recording head will be moved to the adjacent track (page 9, last paragraph - page 11, paragraph 1; page 21, lines 13 to 21).

3.2 However, it is not necessary for recording a predetermined amount of data to last a full turn of the recording medium as long as the data are continuously recorded after (n-1) idle revolutions so that there is no sector in which data are not recorded. If these conditions are fulfilled, the recording head will remain at the radial position of the current track during the time interval which is required for storing and reading out of the next predetermined amount of data. The recording head can then be moved to the new recording start position which may be at the adjacent track when the current track is fully recorded. These features in combination as specified in claim 1 make it possible to continuously record compressed data having different compression ratios 1/n and also, by shortening the recording times, to reduce the risk of disturbances due to mechanical vibrations as explained in the description (pages 4 and 5; Figures 1 and 3). Claim 1 is thus clear and supported by the description.

4. *Novelty and inventive step*

4.1 Neither of the cited prior art documents discloses a method, as specified in claim 1, for continuously recording compressed data in a first turn of the recording medium and then scanning the same concentric track in a non-recording operation a number of times (n-1) which is determined by the compression ratio (1/n). The same applies to the method for reproducing

data recorded in this way as specified in claim 7.

4.2 D1 (page 6, last paragraph to page 8, line 2; Figures 3 to 5) discloses a method wherein erasure and recording of data on a long continuous track formed in a convolution or helix can be achieved within a time apparently equal to the reproduction time in that the linear velocity of the disc during the erasure and recording operation is made equal to at least twice that during reproduction. After the erasure operation, the recording head is returned back by jumping one track pitch and the same track turn is swept again in a record mode. D1 (page 18, last paragraph to page 19, line 5) also mentions that the rotational speed of the recording medium could be n times that during the reproduction mode operation. However, there is no hint at recording of compressed data with (n-1) idle revolutions of the same concentric track following the recording operation at this track in order to continuously record data compressed in time by 1/n.

4.3 D2 (page 2, lines 6 to 94; page 4, lines 25 to 38; page 6, lines 26 to 60; Figures 2, 5, 6 and 7) discloses a method for reproducing data from a disc-shaped recording medium having a spiral track wherein the scanning speed is controlled so as to obtain an electric information signal of a constant first bit-frequency which is a factor n higher than the ultimately desired bit frequency. The conversion arrangement comprises a memory device for the storage, at the first bit frequency, of the data bits of an information block being read and for subsequently outputting said data bits with the desired bit frequency. In an embodiment, the number of information blocks near the periphery of the recording medium is

twenty and n equals five. In this way five information blocks (recorded on a track length extending over a quarter of the peripheral track) are consecutively read into the memory at a bit transfer rate which is five times that at which the blocks are read out from the memory to provide a signal at the ultimately desired bit-frequency. After these five information blocks have been read, the reproducing head is moved back radially by one track pitch and is positioned again on the preceding turn of the track. Therefore, this known method does not reproduce compressed data recorded at a preset compression ratio according to the data recording method of claim 1 of the present application. Nor does the reproducing head scan the same track turn for another (n-1) times before it is relocated at the new start position when the scanning of the same track turn comes to a close, as specified in claim 7 of the present application, but it is relocated after reading of a predetermined number of information blocks. D2 thus does not suggest a relationship between a compression ratio and the number of times the reproducing head scans the same track turn of a recording medium either.

5. The subject-matter of claims 1 and 7 shall thus be considered to be new and involve an inventive step. The same applies to that of claims 2 to 6, 8 and 9 which are dependent on claims 1 and 7 respectively.

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 in the following version:

Claims: 1 to 9 as filed in the oral proceedings;

Description: pages 3, 5, 6 and 9 filed in the oral proceedings;
pages 1, 2, 4, 8 and 10 to 30 as originally filed;
pages 4a and 7 as filed with letter dated 27 June 1996; and

Drawings: Figures 1 to 7 as originally filed.

The Registrar: The Chairman:

M. Hörnell W. J. L. Wheeler