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D E C I S I O N
of 5 November 1997

Case Number: T 0900/95 - 3.5.2

Application Number: 90311117.7

Publication Number: 0422923

IPC: G11B 11/10

Language of the proceedings: EN

Title of invention:

Magnetic head for magneto-optical recording and magneto-optical recording head

Applicant:

Sharp Kabushiki Kaisha

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 54, 56

Keyword:

"Novelty - yes"
"Inventive step - no"

Decisions cited:

T 0019/81, T 0519/89

Catchword:

-



Case Number: T 0900/95 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 5 November 1997

Appellant: Sharp Kabushiki Kaisha
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 25 March 1995
refusing European patent application
No. 90 311 117.7 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: W. J. L. Wheeler
Members: R. G. O'Connell
A. C. G. Lindqvist

Summary of Facts and Submissions

- I. This is an appeal from the refusal by the examining division of European patent application No. 90 311 117.7. The examining division held that the application had been amended in a manner which contravened Article 123(2) as far as the claims of the first auxiliary request then on file were concerned; and that the subject-matter of claim 1 of each of the other requests lacked an inventive step in view of

D1: DE-A-3 804 733

(erroneously referred to in the decision under appeal as DE-A-3 807 733, but unambiguously identifiable from the file).

- II. In a communication accompanying a summons to oral proceedings (appointed at the request of the appellant) the board indicated that the subject-matter of the claims filed with the grounds of appeal (corresponding to the third auxiliary request in the decision under appeal) appeared not to involve an inventive step over D1. In response to this communication the appellant submitted, with a letter dated 2 October 1997, a fresh document:

D2: JP-A-1 199 343

together with an English translation and Inpadoc abstract thereof. This document was said to be evidence of a prejudice which had to be overcome to arrive at the invention claimed in the present application.

III. In the oral proceedings held on 5 November 1997 the appellant filed amended claims by way of first and second auxiliary requests. Claim 1 of the main request is worded as follows:

"1. A floating type magneto-optical head apparatus for recording information on a magneto-optical medium (1) having tracks contained thereon, said apparatus comprising an optical head (3) for providing a focused laser beam (5) on said medium, and a magnetic head (2) having a slider (2a) for permitting movement of said magnetic head and a head core (2b) integrally formed with said slider, said magnetic head and said optical head being mutually opposed so as to receive, in use, said medium therebetween, said optical head and said magnetic head being supported so as to be out of contact with said received medium, wherein said head core (2b) has a section (2d) formed to be longer in the direction orthogonal to the tracks of said received medium than in the direction parallel to the tracks of said received medium, characterized in that the focal point (F) of said laser beam (5) moves in a range in said orthogonal direction delimited by respective distances of 20 μm measured inwardly from the ends of said head core section (2d), and in that the apparatus provides a substantially constant C/N ratio for information recorded on said medium by magnetic field modulation, for the whole of said range of movement of the laser beam focal point."

Claims 2 to 6 are dependent on claim 1.

Claims 1 of the first and second auxiliary requests differ from the main request by the insertion of the following words immediately after the passage "measured inwardly from the ends of said head core section (2d)," near the end of claim 1 of the main request:

"in that the area of the head core section is less than or equal to 0.04 mm²," (first auxiliary request)

or

"in that said section of the head core is rectangular and has dimensions of 0.4 mm in said orthogonal direction and 0.1 mm in said parallel direction," (second auxiliary request).

IV. The appellant's main request is that the decision under appeal be set aside and that a patent be granted in the following version:

Claims: 1 to 6 filed with the grounds of appeal faxed 2 October 1995;

Description: pages 1 to 4 and 7 to 15 filed with the letter dated 13 September 1994, pages 5 and 6 filed with the grounds of appeal faxed 2 October 1995;

Drawings: sheets 1 to 4 as originally filed.

Auxiliarily, grant is sought on the basis of claims 1 to 6 (first auxiliary request) and claims 1 to 3 (second auxiliary request) filed at the oral proceedings on 5 November 1997.

V. The appellant argued essentially as follows:

The decision under appeal was based on an incorrect interpretation of D1. The true teaching of that document, read as a whole, was directed to overcoming the problem of the prior art mentioned in that document, namely, that a fixed magnetic field producing means gave rise to a varying magnetic field at the recording film because of the disk moving up and down

and that the high magnetic field required was difficult to modulate at a high rate; see D1, column 3, lines 14 to 62. There was no reference in this problem addressed by D1 to greater radial width of effective magnetic field area; the point was to avoid the need to control the movement of the magnetic head. The passage at D1, column 8, line 7 said nothing about the spot movement relative to core size, indeed one embodiment had no core. In D1 the term 'effective' meant large enough to achieve recording. In Figure 8 of D1 reference was made to head end shape, not to the core; 'effective magnetic field area' was to be equated with head end shape and size. Although this figure related to vertical variation of the magnetic field, the analogous idea was to exploit the magnetic field outside the head; this was also the teaching in the later document D2 (from the same applicant as D1) where the magnetic field was also shown to have a large value outside the head core. In contrast, according to the present invention the effective magnetic field area stopped short of the edges of the head end.

The decision under appeal (cf middle of page 3 to top of page 5) read more into the passage at column 8, lines 23 to 28 of D1 than was actually there. D1 did not mention C/N ratio while the decision equated recording density and frequency response. The last paragraph of page 3 of the decision under appeal was ex post facto analysis based on the present invention leading to the erroneous conclusion in the first paragraph of page 4 that "to select such specific distances from the ends of the core section is an obvious design task for the skilled person who always has to determine appropriate operating parameters". In fact to select any distance within the core was inventive. Equally the paragraph bridging pages 4 and 5 of the decision went beyond and misinterpreted the disclosure of D1 when it stated that "it implies that

the range of the beam spot within this area is to be adapted accordingly, in particular that the radial length of said area should be wider than the eccentricity of the disk tracks, i.e. the interval in which the beam spot moves." In fact D1 only said that the effective area (meaning the size of the head end) must be wider than the disk eccentricity. D1 did not say that the spot range was less than the magnetic field and it taught nothing about the variation of the magnetic field across the core. The correct interpretation was that D1 equated head and magnetic field dimensions.

Although the preamble of claim 1 acknowledged that the feature of the radial extension of the head core section being greater than its tangential extension was known per se from D1 it was important to note that D1 also proposed square embodiments; there was no recognition in D1 of the advantage of rectangular shape.

The independent claims of the auxiliary requests were directed to particularly meritorious values of the head dimensions which represented a particularly good compromise between the conflicting requirements of high frequency response and accommodating disk eccentricity.

Reasons for the Decision

1. The appeal is admissible.
2. The issues in this appeal are novelty and inventive step.
3. *Novelty*
 - 3.1 *Main request*
 - 3.1.1 A floating type magneto-optical head apparatus for recording information on a magneto-optical medium having tracks contained thereon, said apparatus having the features of at least the preamble of claim 1, is undisputedly known from D1. The characterising part of claim 1 comprises two features:

(A): the focal point (F) of said laser beam (5) moves in a range in said orthogonal direction delimited by respective distances of 20 μm measured inwardly from the ends of said head core section (2d), and

(B): the apparatus provides a substantially constant C/N ratio for information recorded on said medium by magnetic field modulation, for the whole of said range of movement of the laser beam focal point.

The feature (B) merely specifies a result achieved by modifying the apparatus specified in the preamble in accordance with feature (A) and as such does not affect the assessment of novelty. The issue of novelty therefore boils down to the question whether D1 discloses an apparatus in which the focal point of the laser beam moves in a range in the manner specified by feature (A).

3.1.2 The movement of the laser spot relative to the magnetic head core section in D1 is not described *expressis verbis* in these terms; the figure of 20 μm does not appear. Nevertheless, in one embodiment of D1 the effective magnetic field area has a radial extent of 500 μm (D1, column 8, line 3) and taking the typical range of movement of the laser spot in a magneto-optical apparatus of this type - occasioned by the eccentricity of the disks normally employed - to be that indicated in the present application at column 2, line 41, namely, $\pm 100 \mu\text{m}$ it would appear that this embodiment in D1 would fall within the range specified in claim 1 and thus anticipate it.

3.1.3 Nevertheless, despite the force of the argument above the board regards it as inconclusive. In particular, the appellant has persuasively argued that the apparent oversizing of the magnetic head in this embodiment of D1 may reflect a margin allowing for alignment error; it is not necessarily a disclosure of laser spot motion within the limits specified in claim 1. This submission is not inconsistent with the statement at column 6, lines 22 to 23 of D1 (translated): "The magnetic head" is arranged exactly above the light spot on the disk".

3.1.4 The board therefore judges that the subject-matter of claim 1 is new over D1, which is the most relevant prior art on file.

3.2 *Auxiliary requests*

The above reasoning and conclusion apply *a fortiori* to claims 1 of the first and second auxiliary requests which are restricted versions of claim 1 of the main request.

4. *Inventive step*

4.1 *Main request*

4.1.1 *Closest prior art and problem*

Relative to the undisputed closest prior art D1 the problem solved by the apparatus specified in claim 1 is to increase the writing speed, i.e. frequency response, of the (generally rectangular) magnetic head known from D1, and specified in the preamble of the claim, by reducing the cross-sectional area and hence self-inductance of the latter while maintaining the magnetic field over the wobbling path of the laser spot; see description of the present application, column 3, lines 10 to 31 and D1, column 7, line 64 to column 8, line 34. This problem can be considered as the problem of improving the design of the D1 apparatus insofar as the present application pursues the same aim, within the same constraints, as D1. Given that the skilled person routinely reviews existing designs with a view to their improvement, the formulation of this problem is not to be regarded as contributing to an inventive step.

4.1.2 *The approach of the person skilled in the art*

Any attempt to squeeze extra performance out of the D1 design would naturally focus on the design of the magnetic head since the permitted degree of eccentricity of the disks would be an industry standard. Following the kind of considerations discussed in connection with Figure 8 of D1, i.e. investigating the vertical variation of the field of the magnetic head with a view to determining optimal thickness of the protective coating of the disk, the skilled person would naturally be led to investigate

the horizontal structure of the field of the magnetic head with a view to determining the minimum radial head dimension which would still effectively straddle the wobble path. That this thought would come naturally to the skilled person is flagged throughout D1 by the continual use of the term '**effective** magnetic field area' (wirksame Magnetfeldfläche), which points to the fact that the skilled person is aware that the magnetic 'footprint' on the disk under the head is not coterminous with the geometrical projection in the fashion of an ideal mathematical step-function but, following the physical laws which govern the field, would taper gradually, although not necessarily monotonically, depending on the core structure, from a maximum value in the centre to a near zero value sufficiently far outside the geometrical shadow. This is a physical phenomenon which is sufficiently notorious as to have the generic name of 'edge effect'. It follows that finding the minimum radial extent of a head which will still do the job becomes a matter of determining what drop-off in the magnetic field, in dB terms relative to the maximum field, just delivers an acceptable recorded signal and where, relative to the geometrical edge, this occurs. This would be a routine exercise for the person skilled in the art, involving the optimising of a single parameter - the radial location of the limit to the effective footprint - in which the skilled person would be bound to succeed.

4.1.3 *The relevance of C/N ratio*

The fact that D1 does not refer to C/N ratio is not regarded as significant by the board. It is a standard measure of recorded signal quality and is correspondingly used without explanation or definition in the description of the present application. The reference to '**substantially** constant C/N ratio' in the

claim reflects the fact that the person skilled in the art would routinely apply an appropriate standard of constancy in determining the effective magnetic edge, eg within industry standard tolerance for record/playback quality.

4.1.4 *The prejudice argument*

It was argued by the appellant that the skilled person would in fact fail to arrive at the claimed solution because of the alleged technical prejudice to the effect that the effective magnetic footprint edge was located outside the geometrical edge, and D2 was cited as evidence of this prejudice. A single patent document is not, however, evidence of a prejudice; see decision T 19/81 OJ EPO 1982, 051, headnote, and T 519/89 dated 5 May 1992 (not published in OJ EPO) at point 6.6. It could also be argued that D2 would, if anything, confirm the skilled person in his belief that there was indeed a significant edge effect and in attempting to locate the effective magnetic edge in accordance with D2 he would inevitably find that it was in fact within the geometrical edge and thus arrive at the solution of claim 1.

4.2 *First auxiliary request*

It is undisputedly notorious that the smaller the area of the head core section the smaller the self inductance and hence the faster the writing time, i.e. the higher the frequency response. On the other hand the head must provide a sufficiently large magnetic field to record a useful signal over a sufficiently large area to accommodate the laser spot wobble. This design trade-off is documented in D1 in the paragraph bridging columns 7 and 8. No evidence or argument was adduced by the appellant to suggest that the value of

0.04 mm² represented anything other than a value arrived at by routine design considerations within the framework of this known trade-off. It is, in the judgement of the board, a non-inventive selection.

4.3 *Second auxiliary request*

The feature that the orthogonal (radial) dimension is longer than the parallel (tangential) direction is known from D1 and is accordingly in the prior art portion of the claim. Indeed D1 discloses a generally rectangular (in the sense of right-angled) shape in the paragraph cited immediately above read in conjunction with Figure 3C, so that, strictly speaking, the feature 'rectangular' belongs in the prior art portion also. As regards the particular numerical values, the reasoning above in relation to the first auxiliary request applies *mutatis mutandis* and the conclusion is the same - a non-inventive selection.

5. *Conclusions*

For the above reasons the board finds that, having regard to the prior art on file, neither the subject-matter of claim 1 of the main request nor the subject-matters of claims 1 of the first and second auxiliary requests involves an inventive step within the meaning of Article 56 EPC. Consequently a patent cannot be granted on the basis of any of these requests. In these circumstances the dependent claims need not be considered.

Order

For these reasons it is decided that:

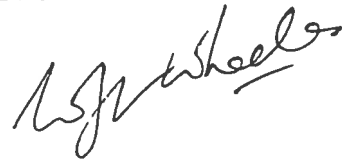
The appeal is dismissed.

The Registrar:



S. Fabiani

The Chairman:



W. J. L. Wheeler