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PATENTAMTS

BOARDS OF APPEAL OF
THE EUROPEAN PATENT
OFFICE

CHAMBRES DE RECOURS
DE L'OFFICE EUROPEEN
DES BREVETS

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File Number: T 784/92 - 3.5.2

Application No.: 87 105 191.8

Publication No.: 0 241 007

Title of invention: Optical head

Classification: G11B 11/10

D E C I S I O N
of 12 May 1993

Applicant: SHARP KABUSHIKI KAISHA

Headword:

EPC Article 56

Keyword: "Inventive step - yes, after amendment"

Case Number : T 784/92 - 3.5.2

D E C I S I O N
of the Technical Board of Appeal 3.5.2
of 12 May 1993

Appellant : SHARP KABUSHIKI KAISHA
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Decision under appeal : Decision of the Examining Division of the European Patent Office dated 31 March 1992 refusing European patent application No. 87 105 191.8 pursuant to Article 97(1) EPC.

Composition of the Board :

Chairman : W.J.L. Wheeler
Members : A.G. Hagenbucher
E.M.C. Holtz

Summary of Facts and Submissions

I. The present appeal contests the decision of the Examining Division refusing Appellant's European patent application No. 87 105 191.8. The reason for the refusal was that the claimed subject-matter did not involve an inventive step having regard to the normal skill of a person skilled in the art and the following prior art documents:

D1: Xerox Disclosure Journal, Vol. 8, No. 4, July/August 1983, pages 367 to 368, D. Cheng et al: "Readout enhancement by masking for magneto-optical storage systems"

D2: US-A-3 480 933.

II. During oral proceedings on 12 May 1993, the Appellant filed amended Claims 1 and 2, worded as follows:

"1. A memory device comprising

- an optical head (K) having an optical system (17, 18, 19) for emitting and detecting a bundle (4) of reflected rays and comprising a diaphragm (20) formed with a substantially cross-shaped through-opening (23) for cutting at least an outer portion of said bundle (4) of rays, and

- an optical disk (15) having a recording medium (15b) reflecting said bundle of rays (4) to be detected by said optical head (K),

characterised in that

- said optical disk (15) is provided with a substrate (15a) for said recording medium (15b), said substrate (15a) causing a first double refraction in a direction perpendicular to the plane of said disk (15) and a second double refraction in a direction of the plane of said disk (15), said first double refraction being different from said second double refraction,
- said substrate (15a) of said optical disk (15) is provided before the recording medium (15b) such that the rays emitted by the optical head (K) are transmitted through said substrate (15a), reflected at said recording medium (15b), and transmitted through the substrate (15a), and
- said substantially cross-shaped through-opening (23) of said diaphragm (20) is defined by four arcuate light cutting portions (22) diagonally opposed to each other and is provided in the course of said optical system (17, 18, 19), for cutting at least an outer portion of said bundle (4) of rays reflected from said recording medium (15b) and transmitted through said substrate (15a)."

"2. Use of an optical head (K) having an optical system (17, 18, 19) for detecting a bundle (4) of rays reflected from a recording medium (15b) and a diaphragm (20) for cutting at least an outer portion of the bundle (4) of reflected rays, said diaphragm (20) being formed with a substantially cross-shaped through-opening (23) defined by four arcuate light cutting portions (22)

diagonally opposed to each other, in an optical memory device comprising an optical disk (15) having a substrate (15a) for the recording medium (15b), with the rays reflected from the recording medium (15b) being transmitted through the substrate (15a) to the optical head (K) and the outer portion of the bundle (4) of reflected rays including elliptically polarized rays caused by different double refractions of the substrate (15a) in directions perpendicular to and in the plane of said optical disk (15), said double refractions being caused by said substrate (15a)."

III. The Appellant argued essentially that D1 taught the use of a mask with a cross-shaped aperture to cut out outer portions of a polarised beam which was focused by a lens having a high numerical aperture, causing depolarisation of off-axis areas of the light beam, travelling in air, as it was reflected at the front surface of the recording medium. In D2 an iris was used to cut out scattering due to surface imperfections of the storage medium then used. Such surface imperfections did not exist in the present storage medium. Neither D1 nor D2 mentioned a recording medium on a substrate through which the beam travelled, or suggested the use of a mask to cut out areas of elliptically polarised light caused by different double refractions of the substrate. Although Fig. 1B of the present application was labelled "prior art", it was only the optical recording disk and the fact that it suffered from differential birefringence which were previously known. The inventors had discovered the distribution pattern of the elliptical polarisation. Neither D1 nor D2 disclosed a mask with a substantially cross-shaped through-opening

defined by four arcuate light cutting portions diagonally opposed to each other.

- IV. The Appellant requested that the decision under appeal be set aside and a patent granted on the basis of the following documents:

Claims 1 and 2 as filed at the oral proceedings;
Description, pages 1, 5a and 6 to 8 as filed at the oral proceedings, pages 2 and 3 as filed with the letter dated 30 January 1991 (received 31 January 1991), page 4 as originally filed, and page 5 as filed with the grounds of appeal dated 27 July 1992 (received 28 July 1992);
Drawings, Figures 1A, 1B and 2 as originally filed, and Figures 3 and 4 as filed at the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. The claims are now limited to the embodiment claimed in dependent Claim 3 submitted with the Statement of Grounds of Appeal. An alternative embodiment (with a circular aperture) which was described in the application as originally filed has been deleted from the application. In the opinion of the Board the amendments comply with Article 123(2) EPC.
3. Document D1 discloses the closest prior art, namely a magneto-optical memory device comprising an optical head having an optical system for emitting a polarised read

beam and detecting a reflected read beam, a recording medium reflecting the read beam to be detected by the optical head, and a diaphragm formed with a cross-shaped aperture, for cutting out outer parts of the reflected beam, where unwanted depolarisation appears due to an ellipsometric effect resulting from the use of a focusing lens with a high numerical aperture. D1 does not disclose that the recording medium is an optical disk or that it is provided with a substrate through which the read beam passes before and after reflection from the recording medium.

4. As explained in the introductory part of the description of the present application, it was already known to provide a magneto-optical recording disk with a substrate through which the read beam passes before and after reflection from the recording medium. It was known that injection moulded plastics substrates offered certain advantages (such as ease of manufacture and handling), but caused elliptical polarisation of the reflected read beam, resulting in excessive deterioration in the quality of the reproduced signals. According to the Appellant's explanation given in the oral proceedings, it was not previously known that the elliptical polarisation was confined to areas off the X and Y axes (as shown in Figure 1B of the present application). In the absence of any evidence to the contrary, the Board accepts this, but nevertheless considers it to have been obvious to investigate the distribution pattern of the elliptical polarisation in the reflected beam, and that such an investigation would have revealed the fact that the beam was linearly polarised along the X and Y axes.

5. While it might well be obvious to a person skilled in the art to try to use an optical disk of the type mentioned in paragraph 4 above in a system of the type described in D1 and adapt the dimensions of the cross-shaped aperture in the diaphragm to obtain the best signal to noise ratio in the detected signal, thereby arriving at an apparatus falling within the scope of the claims refused by the Examining Division, it is, in the opinion of the Board, not obvious to give the aperture the particular shape now specified in Claims 1 and 2. As the Appellant correctly pointed out, an aperture of this shape is not disclosed in D1 or D2. In the opinion of the Board, it was not obvious to try it, having regard to the cited prior art.

6. Thus, the Board concludes that the subject-matter of the present claims involves an inventive step.

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 Appellant's request (see paragraph IV above).

The Registrar:

The Chairman:

M. Beer

W.J.L. Wheeler