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- (54) **OPTICAL SCANNING HEAD** 5,726,436 A * 3/1998 Oka et al. 250/201.5
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5,995,292 A * 11/1999 McDonald 359/637
6,078,554 A * 6/2000 Ootaki et al. 369/112.02
6,320,699 B1 * 11/2001 Maeda et al. 359/637
6,411,576 B1 * 6/2002 Furukawa et al. 369/53.19

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FOREIGN PATENT DOCUMENTS

EP 0745980 A1 12/1996 G11B/7/09

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OTHER PUBLICATIONS

Jeroen Wals, "Optical Scanning Device", Filed Dec. 22, 1999, Ser. No. 09/469,877.

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* cited by examiner

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(57) **ABSTRACT**

(65) **Prior Publication Data**

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An optical head scans the information layer (3) of an optical record carrier (1) by means of a radiation beam (13). Optical aberrations in the beam such as coma and spherical aberration, caused by tilt and thickness variations in the optical disc respectively, are compensated by an aberration compensator (27) arranged in the radiation beam. The tilt or thickness variation is measured by a detector (30) and used to control the aberration compensator. The radiation beam is focused onto the information layer by an objective system (11). A displacement of the objective system in the transverse direction (26) as used for radial tracking of the optical beam, causes a mismatch between the wavefront to be compensated and the wavefront introduced by the aberration compensator (27). The mismatch is reduced by using a position detector (33) for measuring the transverse position of the objective system and using the position signal (34) as input for the control of the aberration compensator.

(30) **Foreign Application Priority Data**

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(58) **Field of Search** 250/201.5, 234,
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(56) **References Cited**

U.S. PATENT DOCUMENTS

5,173,598 A 12/1992 Bakx 250/202

9 Claims, 9 Drawing Sheets

