



US005696750A

United States Patent [19] Katayama

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[45] Date of Patent: **Dec. 9, 1997**

[54] **OPTICAL HEAD APPARATUS FOR DIFFERENT TYPES OF DISKS**

5,450,378 9/1995 Hekker 369/103

OTHER PUBLICATIONS

[75] Inventor: **Ryuichi Katayama**, Tokyo, Japan

Y. Komma et al., "Dual Focus Optical Head for 0.6 mm and 1.2 mm Disk", Optical Review vol. 1, No. 1, pp. 27-29, 1994.

[73] Assignee: **NEC Corporation**, Japan

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[21] Appl. No.: **658,373**

[22] Filed: **Jun. 5, 1996**

[57] ABSTRACT

[30] Foreign Application Priority Data

Jun. 5, 1995	[JP]	Japan	7-137675
Aug. 15, 1995	[JP]	Japan	7-208026
Sep. 7, 1995	[JP]	Japan	7-230099
Mar. 7, 1996	[JP]	Japan	8-049781

In an optical head apparatus for two or more different types of discs, there are provided a first light source for a first wavelength light beam, a second light source for a second wavelength light beam, and an objective lens for leading the first and second wavelength light beams to one of the discs. A holographic optical element is provided to converge or diverge only one of the first and second wavelength light beams. Or, an aperture limiting element is provided to adjust an effective numerical aperture of the objective lens for only one of the first and second wavelength light beams.

[51] Int. Cl.⁶ **G11B 7/00**

[52] U.S. Cl. **369/112; 369/109**

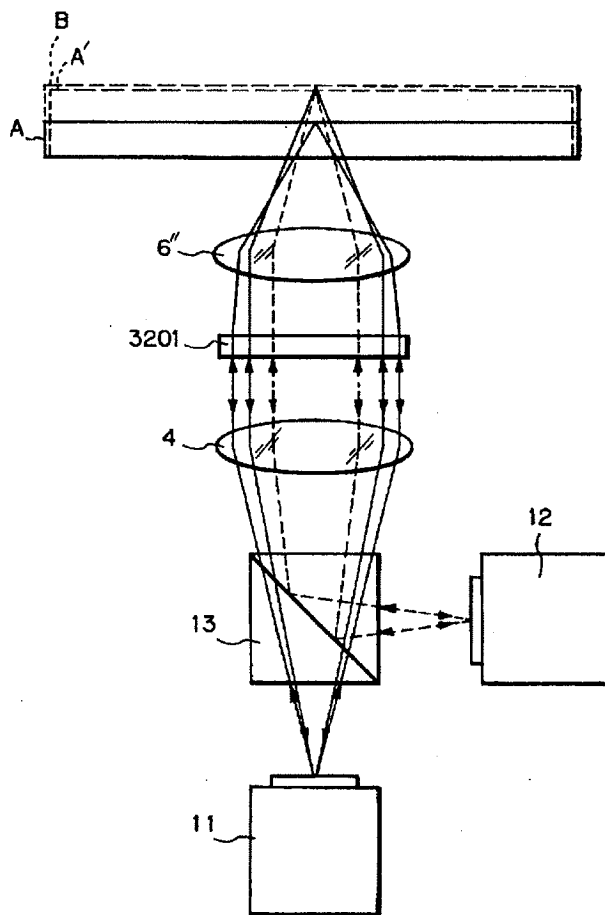
[58] Field of Search **369/112, 103, 369/109, 110, 44.12, 120, 121**

[56] References Cited

U.S. PATENT DOCUMENTS

5,202,860 4/1993 Takahashi et al. 369/110

24 Claims, 34 Drawing Sheets



LG Electronics, Inc. et al.
EXHIBIT 1002

Fig. 1 PRIOR ART

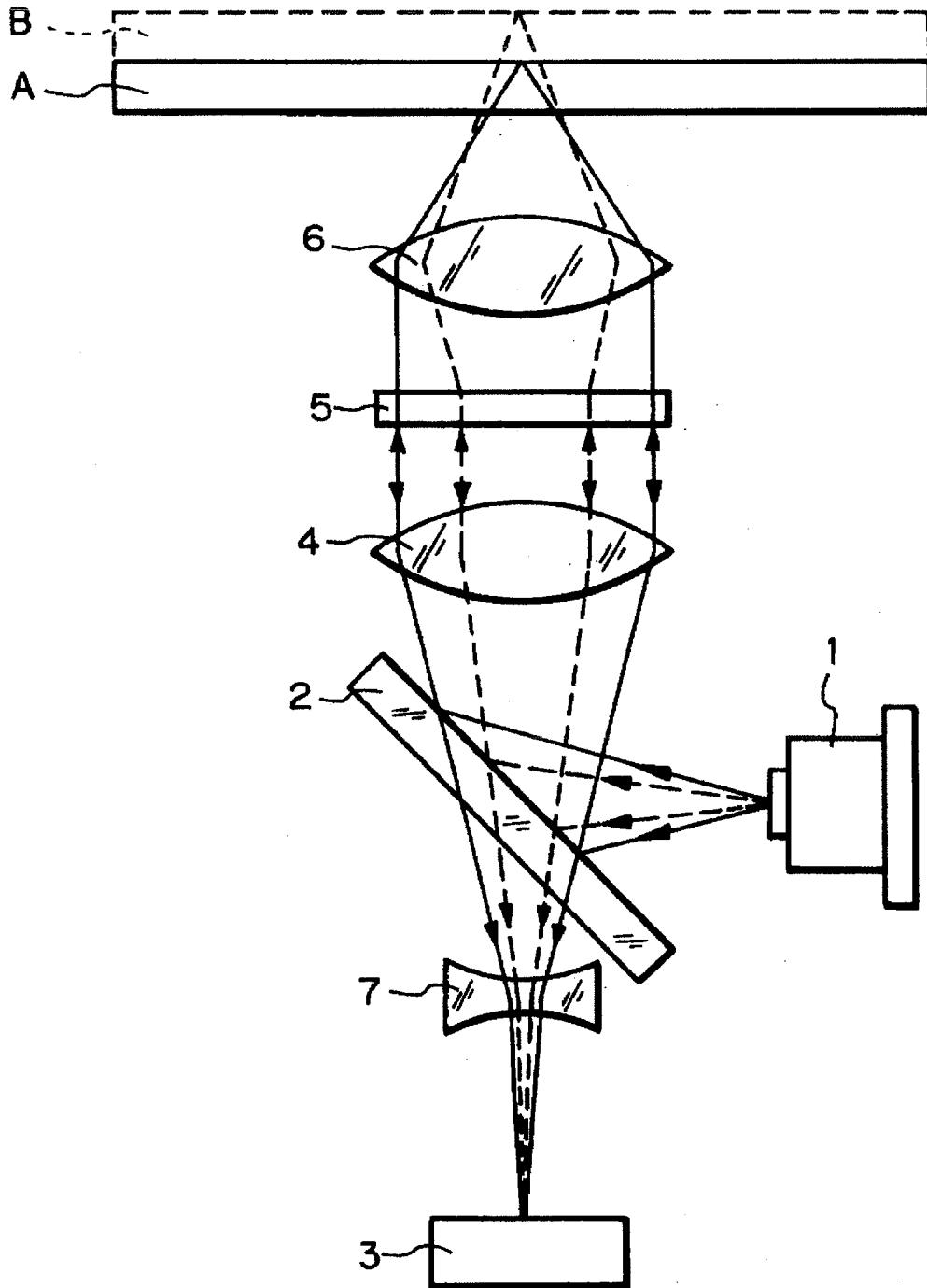


Fig. 2 PRIOR ART

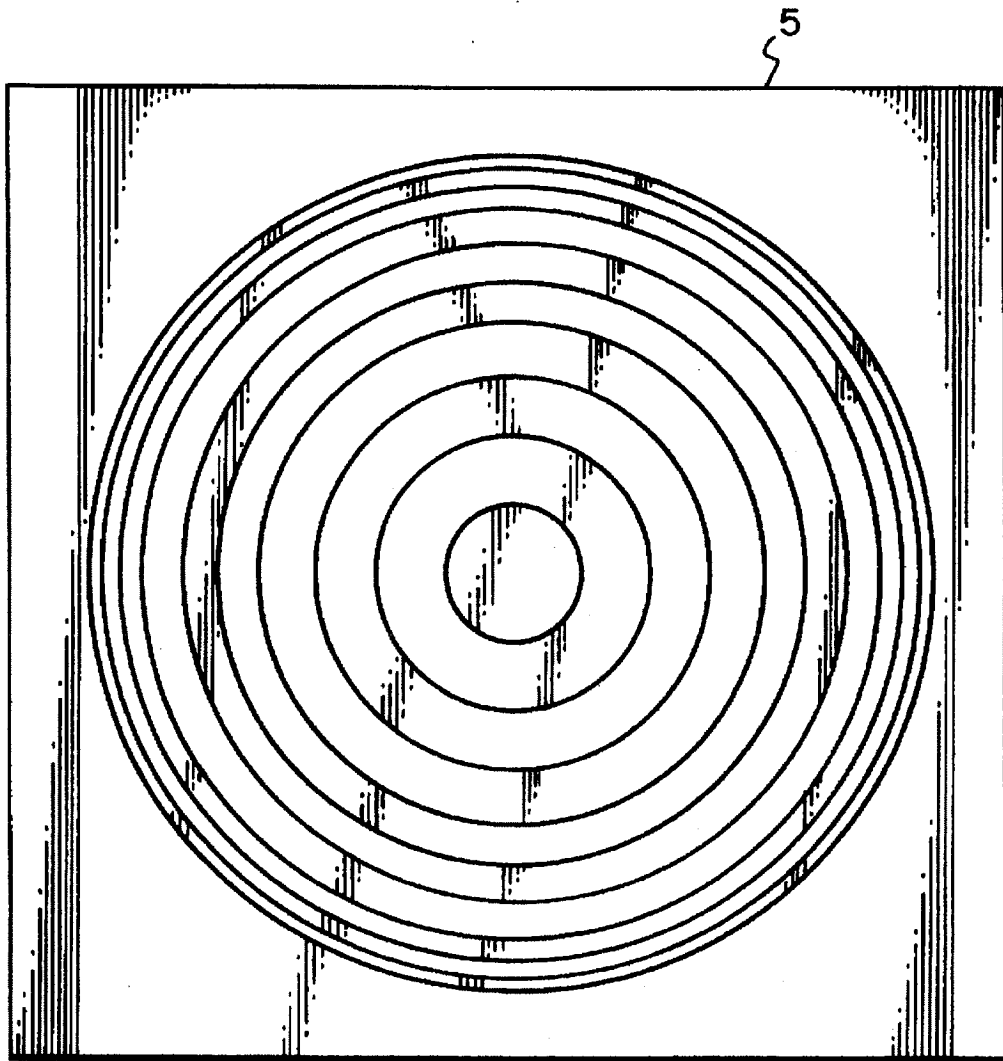


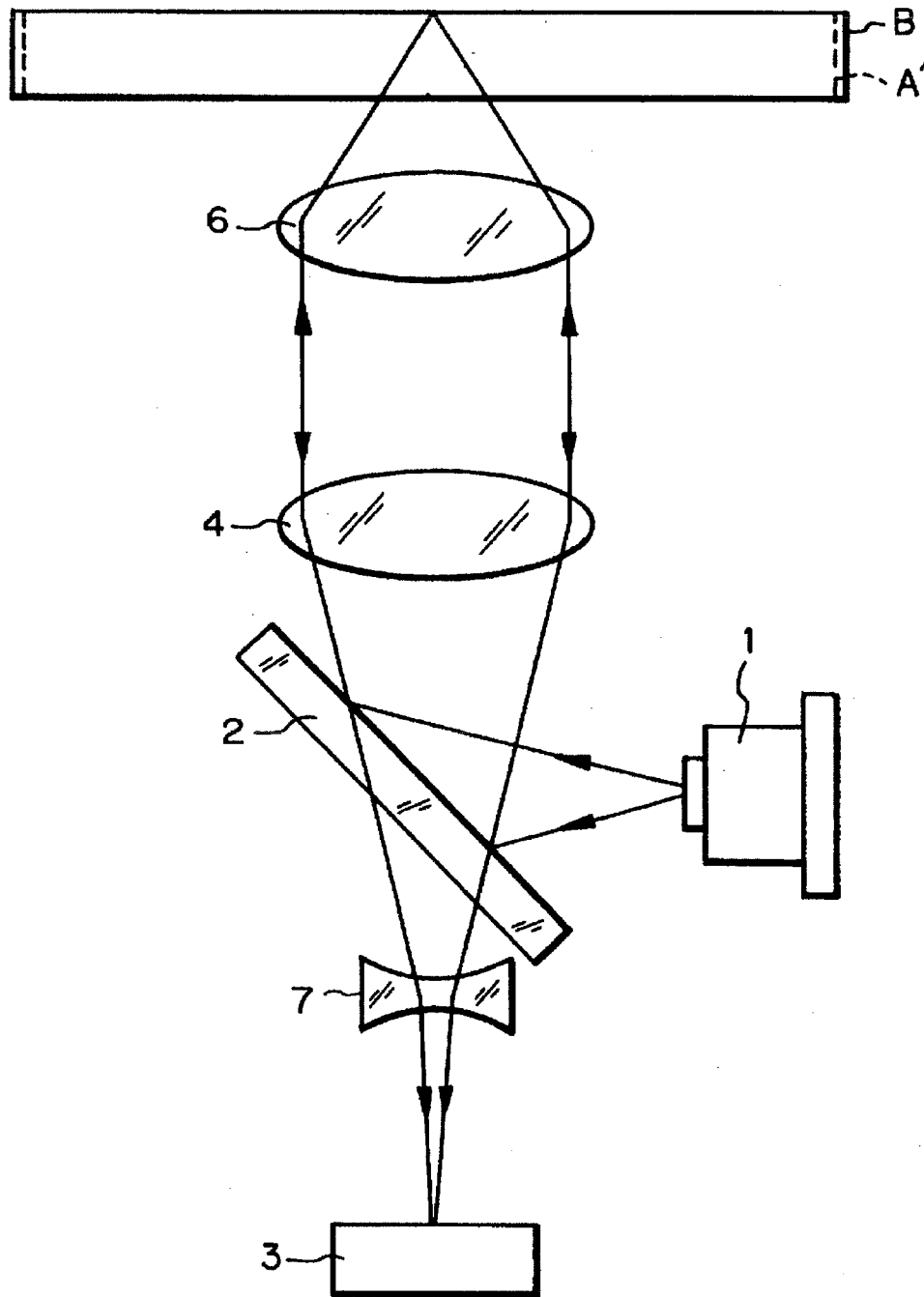


Fig. 3A
PRIOR ART



Fig. 3B
PRIOR ART

Fig. 4 PRIOR ART



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