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(12) **United States Patent**  
**Wang et al.**

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(45) **Date of Patent:** **\*Jan. 22, 2008**

- (54) **IMAGE PICK-UP LENS SYSTEM**
- (75) Inventors: **Zhuo Wang**, Beijing (CN); **Min-Qiang Wang**, Beijing (CN); **Ying-Bai Yan**, Beijing (CN); **Guo-Fan Jin**, Beijing (CN); **Ji-Yong Zeng**, Beijing (CN)
- (73) Assignees: **Tsing Hua University**, Beijing (CN); **Hon Hai Precision Industry Co., Ltd.**, Tu-Cheng, Taipei Hsien (TW)
- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 48 days.

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This patent is subject to a terminal disclaimer.

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- (21) Appl. No.: **10/954,726**
- (22) Filed: **Sep. 30, 2004**

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- (65) **Prior Publication Data**  
US 2005/0254147 A1 Nov. 17, 2005

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*Primary Examiner*—Jordan M. Schwartz  
(74) *Attorney, Agent, or Firm*—Jeffrey T. Knapp

- (30) **Foreign Application Priority Data**  
May 15, 2004 (CN) ..... 2004 1 0027254

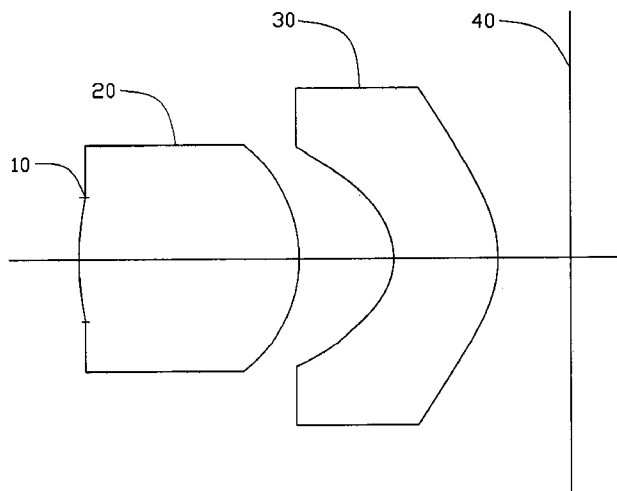
(57) **ABSTRACT**

- (51) **Int. Cl.**  
**G02B 9/04** (2006.01)  
**G02B 13/18** (2006.01)
- (52) **U.S. Cl.** ..... 359/793; 359/717; 359/738
- (58) **Field of Classification Search** ..... 359/793–795, 359/738–740  
See application file for complete search history.

An image pick-up lens system includes an aperture stop (10), a biconvex first lens (20), and a meniscus-shaped second lens (30) having a concave surface on a side of an object. The aperture stop, the first lens and the second lens are aligned in that order from the object side to an image side. Each of the lenses has at least one aspheric surface, and the following conditions are satisfied: (1)  $0.5 < f_1/f < 0.9$ , and (2)  $1 < T/f < 1.62$ , wherein  $f_1$  is a focal length of the first lens,  $f$  is a focal length of the system, and  $T$  is a length from the aperture stop to an image pick-up surface of the image side.

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**6 Claims, 16 Drawing Sheets**



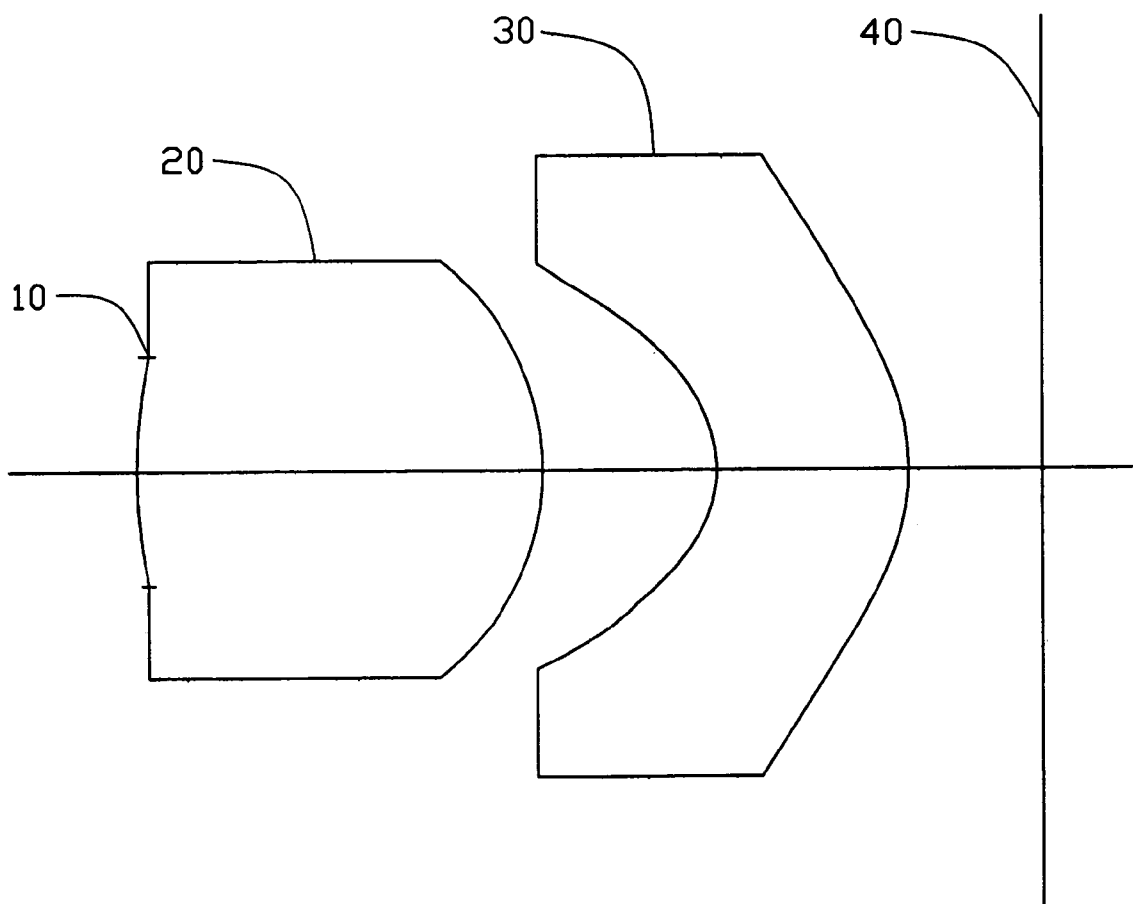


FIG. 1

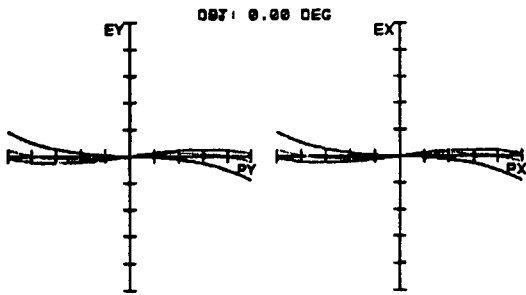


FIG. 2A

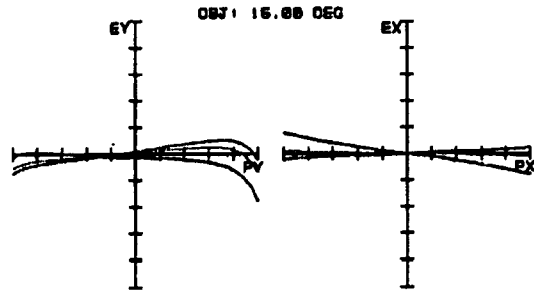


FIG. 2B

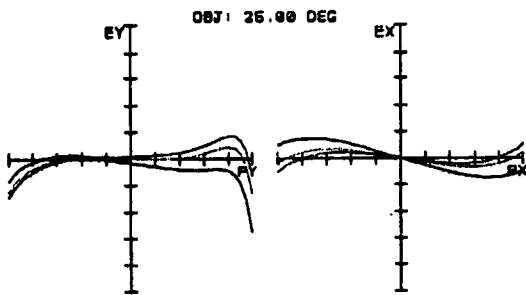


FIG. 2C

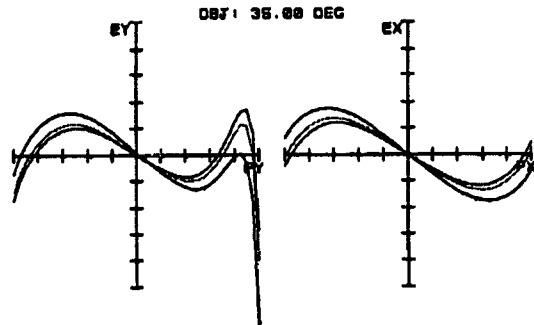


FIG. 2D

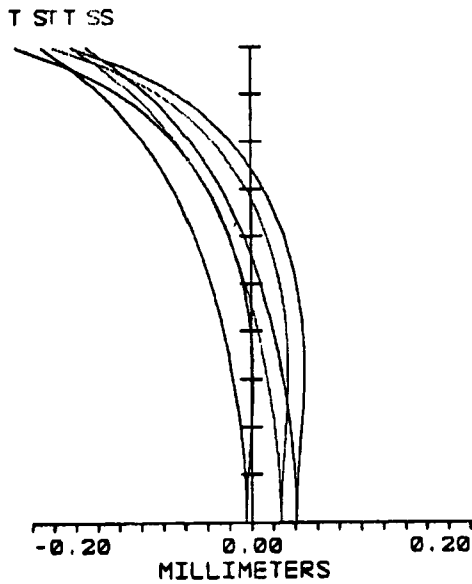


FIG. 3A

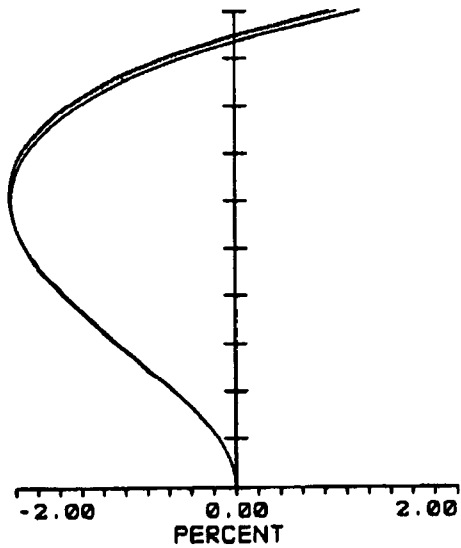


FIG. 3B

PUPIL RADIUS: 0.5640 MILLIMETERS

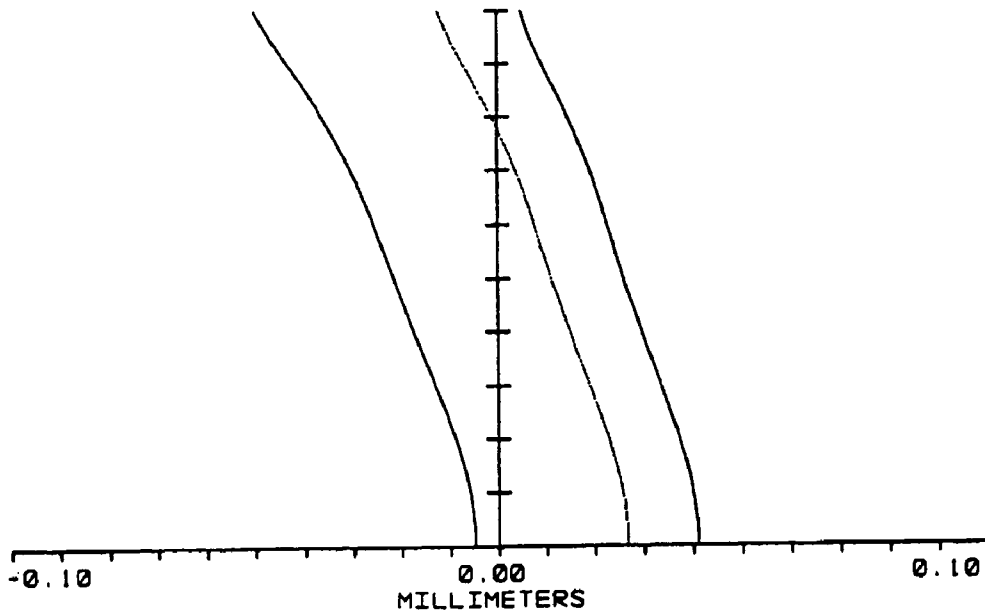


FIG. 4

MAXIMUM FIELD: 35.0000 DEG

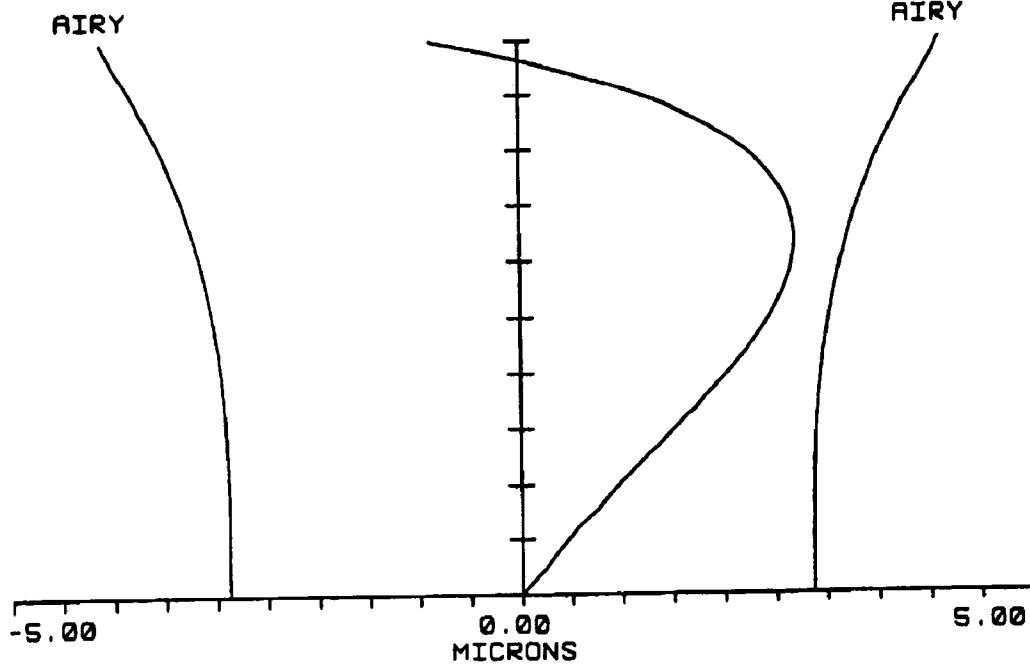


FIG. 5

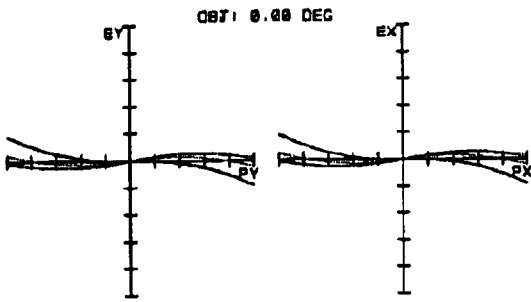


FIG. 6A

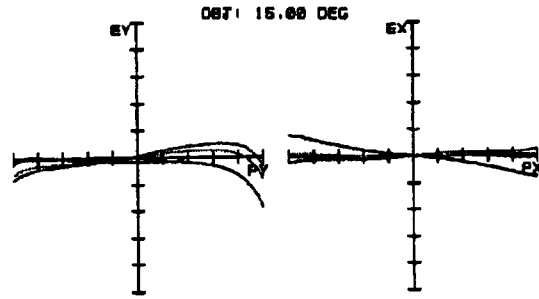


FIG. 6B

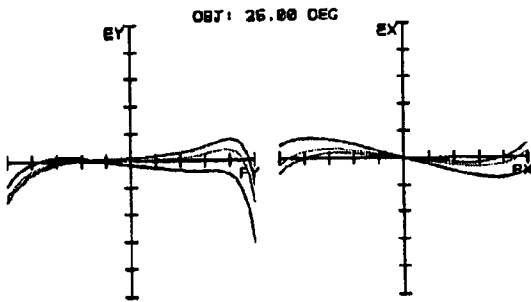


FIG. 6C

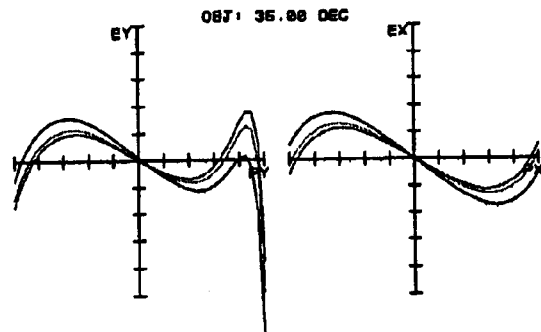


FIG. 6D

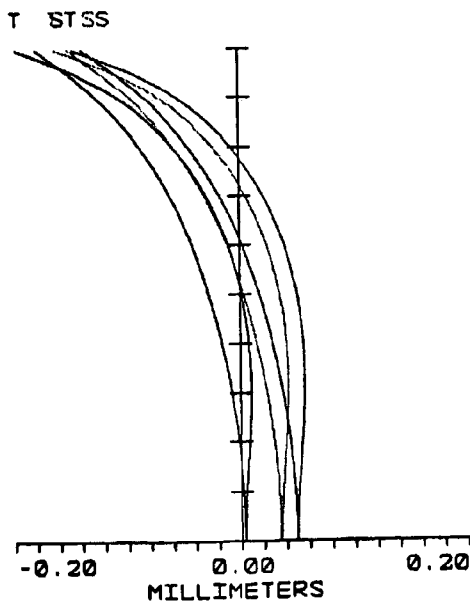


FIG. 7A

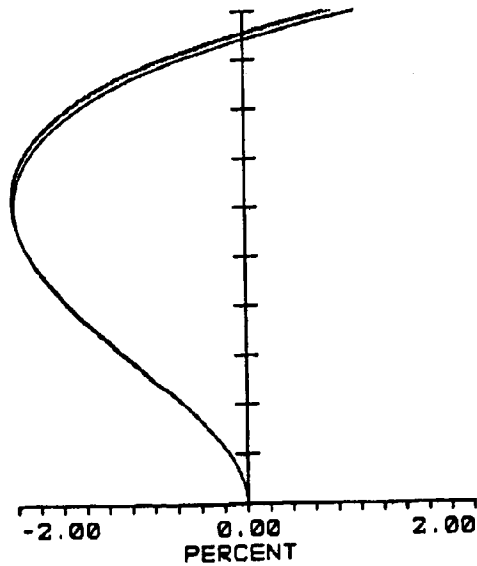


FIG. 7B

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