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United States Patent [19]

Tada

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[54] **SUPER WIDE ANGEL LENS SYSTEM USING AN ASPHERICAL LENS**

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[73] Assignee: **Asahi Seimitsu Kabushiki Kaisha**, Tokyo, Japan

[21] Appl. No.: **915,603**

[22] Filed: **Aug. 21, 1997**

[30] **Foreign Application Priority Data**

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Jul. 28, 1997 [JP] Japan 9-201903

[51] **Int. Cl.**[6] **G02B 13/04**; G02B 13/18
[52] **U.S. Cl.** **359/752**; 359/713; 359/753
[58] **Field of Search** 359/749, 750, 359/751, 752, 753, 708, 713

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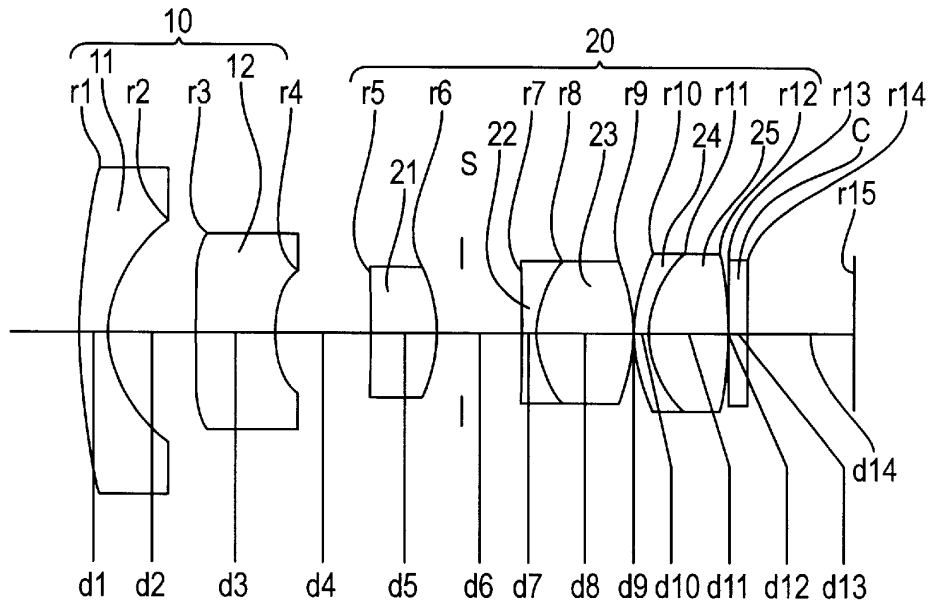3,856,385 12/1974 Takahashi 359/751
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Primary Examiner—Scott J. Sugarman
Attorney, Agent, or Firm—Greenblum & Bernstein, P.L.C.

[57] **ABSTRACT**

A retrofocus type super wide angle lens system includes a front lens group of negative power and a rear lens group of positive power, arranged in this order from the object side. The front lens group consists of a negative meniscus first lens element with a convex surface facing the object side and a second lens element having at least one aspherical surface, arranged in this order from the object side. The aspherical second lens element is shaped such that it forms a biconcave lens in the vicinity of the optical axis and forms a negative meniscus lens with a convex surface located on the object side at a peripheral portion thereof.

10 Claims, 9 Drawing Sheets

FIG. 1
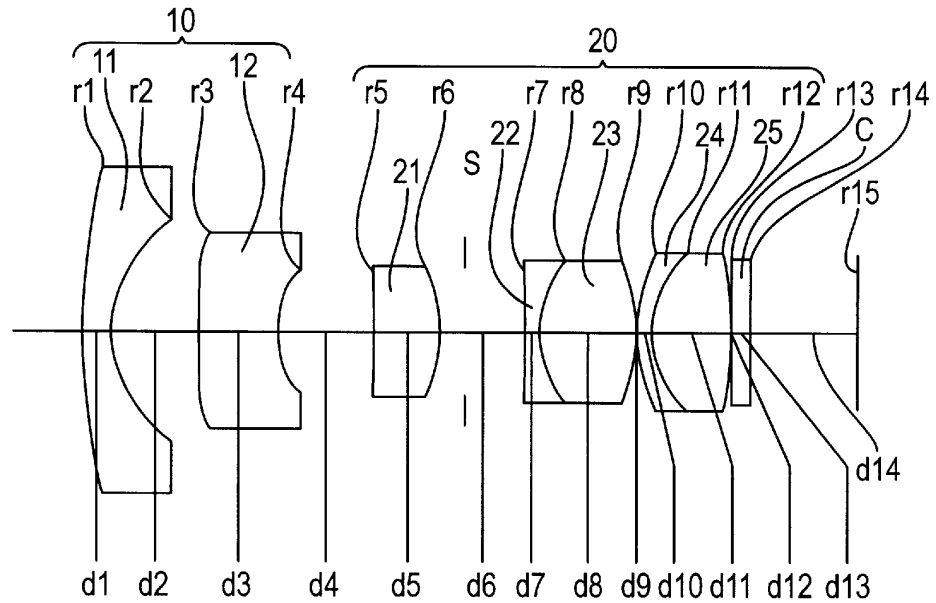
FIG. 2
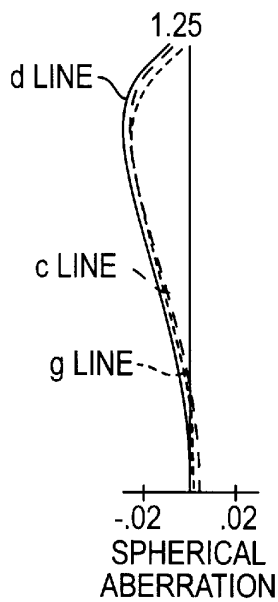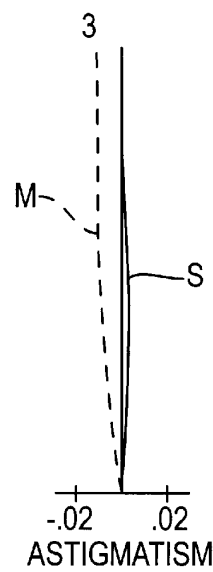
SPHERICAL
ABERRATION

FIG. 3

ASTIGMATISM

FIG. 4

DISTORTION

FIG. 5A

Y= 0.00   +0.02   c LINE

d LINE

g LINE   -0.02

FIG. 5B

Y= 0.63   +0.02

g LINE   −c LINE

-0.02   d LINE

FIG. 5C

Y= 0.84   +0.02

g LINE   c LINE

-0.02   d LINE

FIG. 5D

c LINE

Y= 1.06   +0.02

g LINE

-0.02   d LINE

FIG. 6

FIG. 7

1.25

d LINE

−c LINE

g LINE

-.02   .02

SPHERICAL
ABERRATION

CHROMATIC

FIG. 8

58.4

M

S

-.02   .02

ASTIGMATISM

FIG. 9

58.4

-30 (%) 30

DISTORTION

FIG. 10A

Y= 0.00   +0.02

g LINE

c LINE   -0.02

d LINE

FIG. 10B

Y= 0.65   +0.02

g LINE   c LINE

-0.02

d LINE

FIG. 10C

c LINE

Y= 0.86   +0.02

g LINE

-0.02

d LINE

FIG. 10D

Y= 1.08   c LINE   +0.02

g LINE

-0.02

d LINE
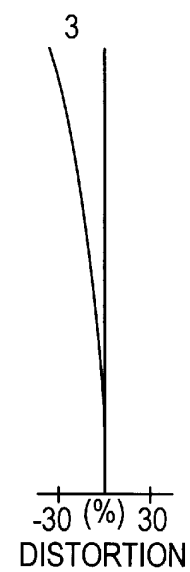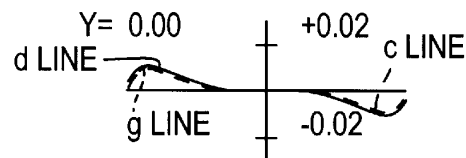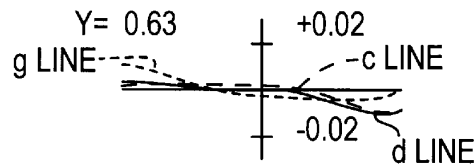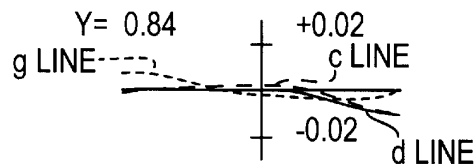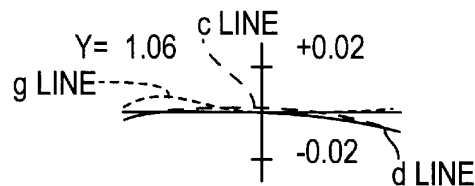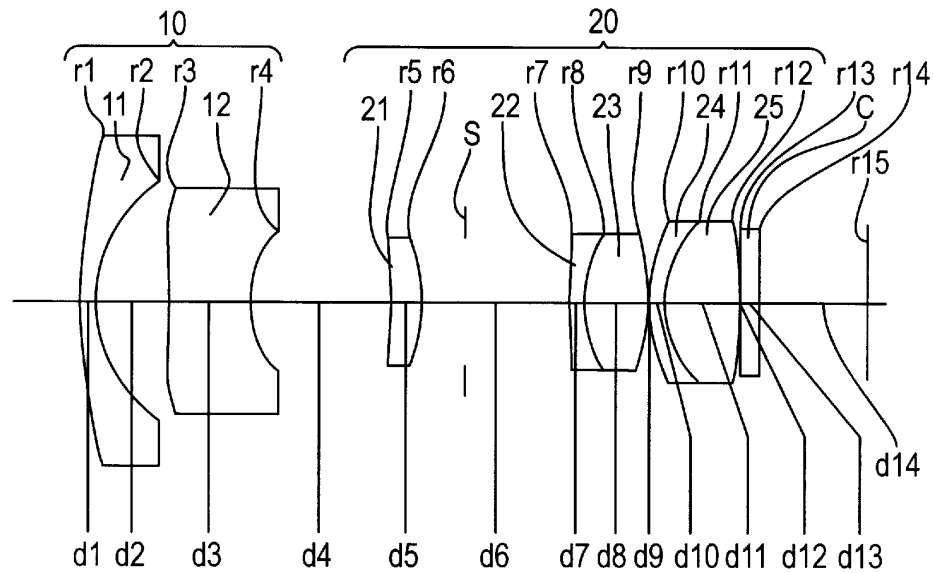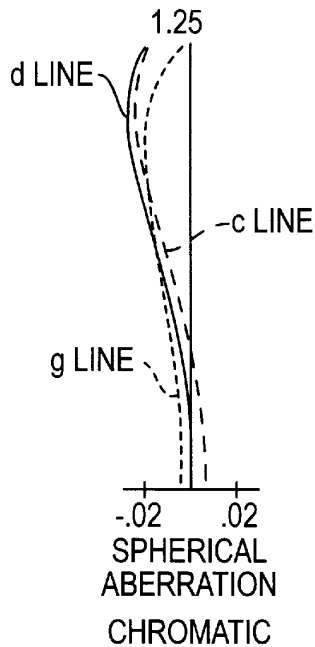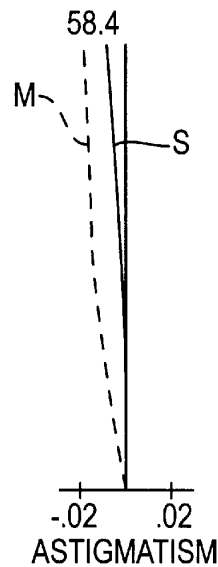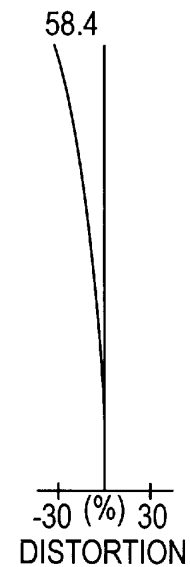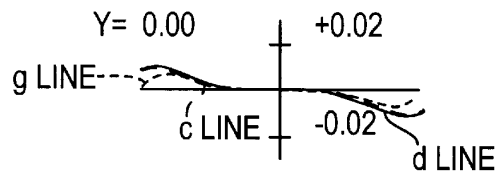
DOCKET ALARM
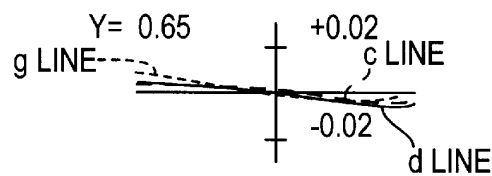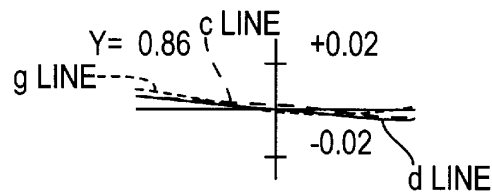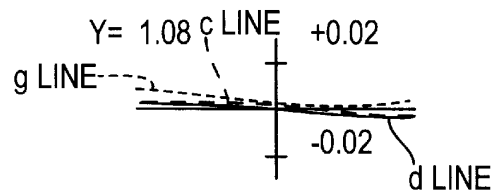
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