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

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(54) **IMAGING LENS AND IMAGING APPARATUS INCLUDING THE IMAGING LENS**

(58) **Field of Classification Search**
CPC G02B 13/0045
USPC 359/714
See application file for complete search history.

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Michio Cho, Saitama-ken (JP); **Yoshiaki Ishii**, Saitama-ken (JP)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(73) Assignee: **FUJIFILM CORPORATON**, Tokyo (JP)

8,310,768 B2 11/2012 Lin et al.
2010/0253829 A1* 10/2010 Shinohara 348/340
2012/0087020 A1* 4/2012 Tang et al. 359/714
2013/0033765 A1 2/2013 Tsai et al.

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

* cited by examiner

Primary Examiner — James Jones

(21) Appl. No.: **14/226,172**

(74) *Attorney, Agent, or Firm* — Young & Thompson

(22) Filed: **Mar. 26, 2014**

(57) **ABSTRACT**

(65) **Prior Publication Data**

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An imaging lens substantially consists of, in order from an object side, five lenses of a first lens that has a positive refractive power and has a meniscus shape which is convex toward the object side, a second lens that has a biconcave shape, a third lens that has a meniscus shape which is convex toward the object side, a fourth lens that has a meniscus shape which is convex toward the image side; and a fifth lens that has a negative refractive power and has at least one inflection point on an image side surface. Further, the following conditional expression (1) is satisfied.

(30) **Foreign Application Priority Data**

Mar. 29, 2013 (JP) 2013-072282

$$1.4 < f/f_1 < 4 \quad (1)$$

(51) **Int. Cl.**
G02B 3/02 (2006.01)
G02B 13/00 (2006.01)

(52) **U.S. Cl.**
CPC **G02B 13/0045** (2013.01)

21 Claims, 14 Drawing Sheets

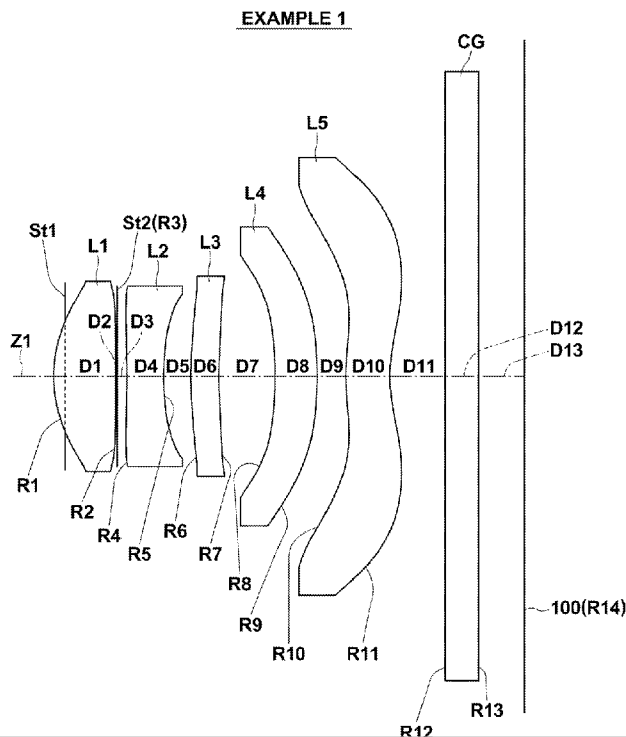


FIG. 1

EXAMPLE 1

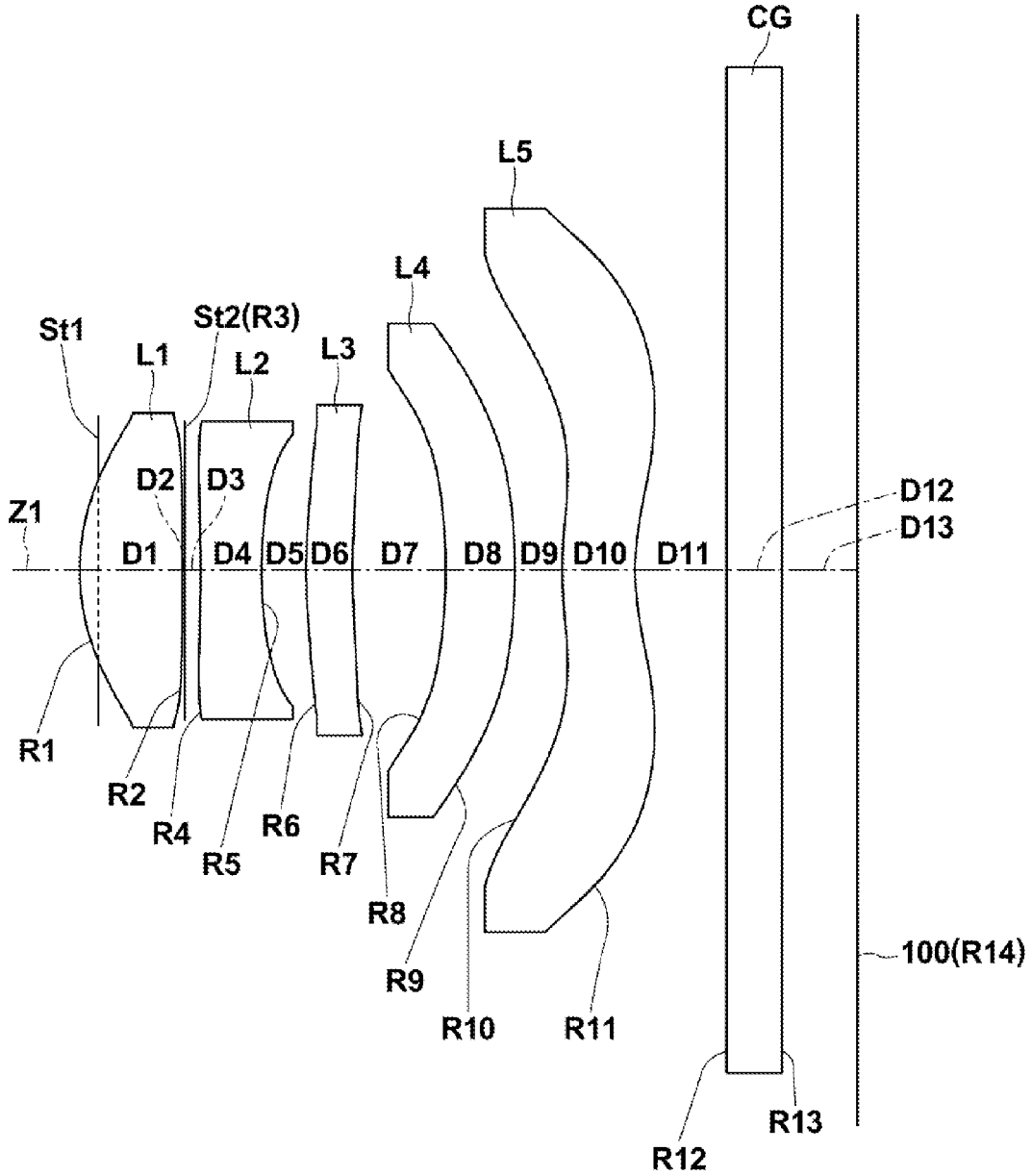


FIG. 2

EXAMPLE 2

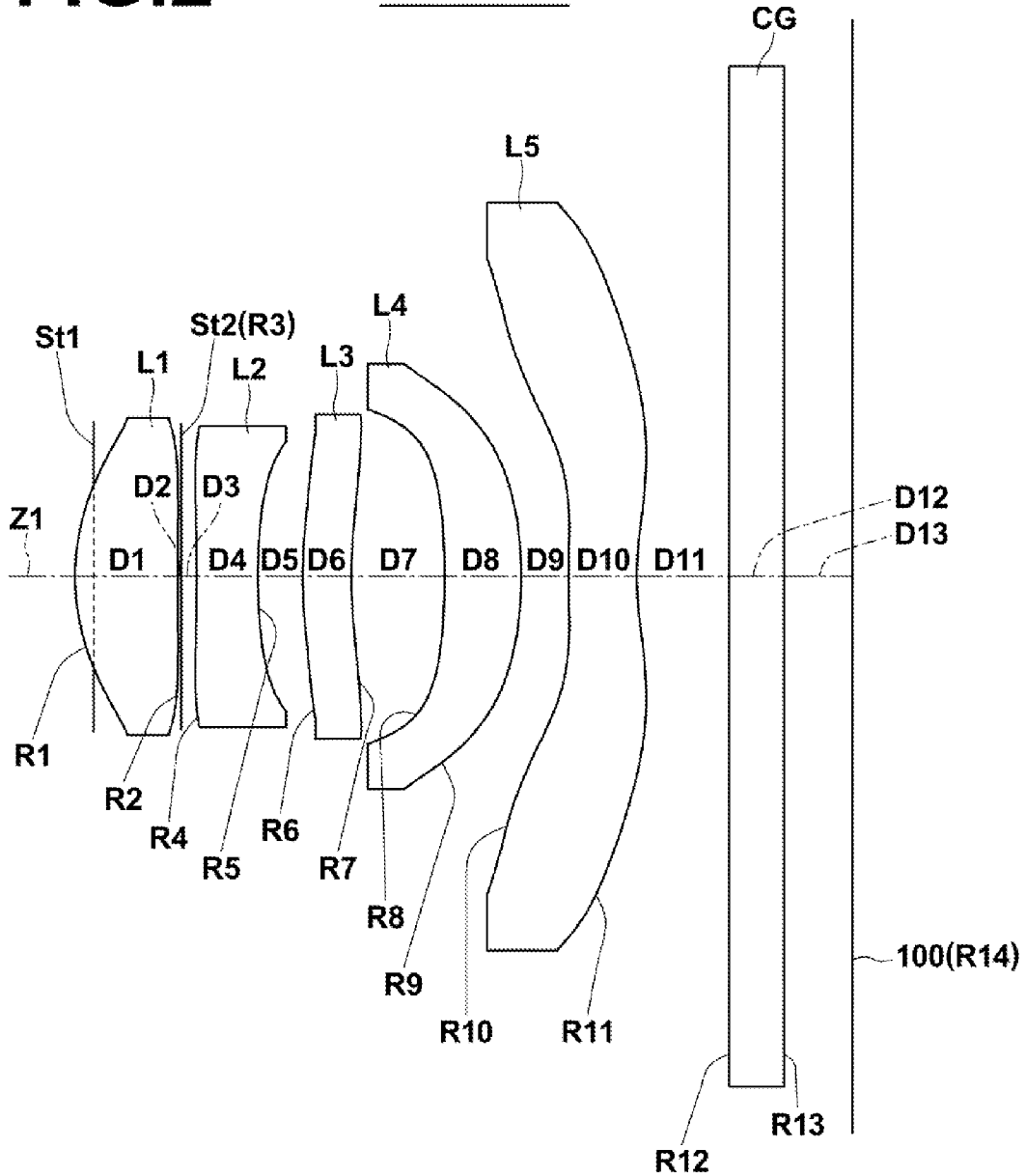


FIG. 3

EXAMPLE 3

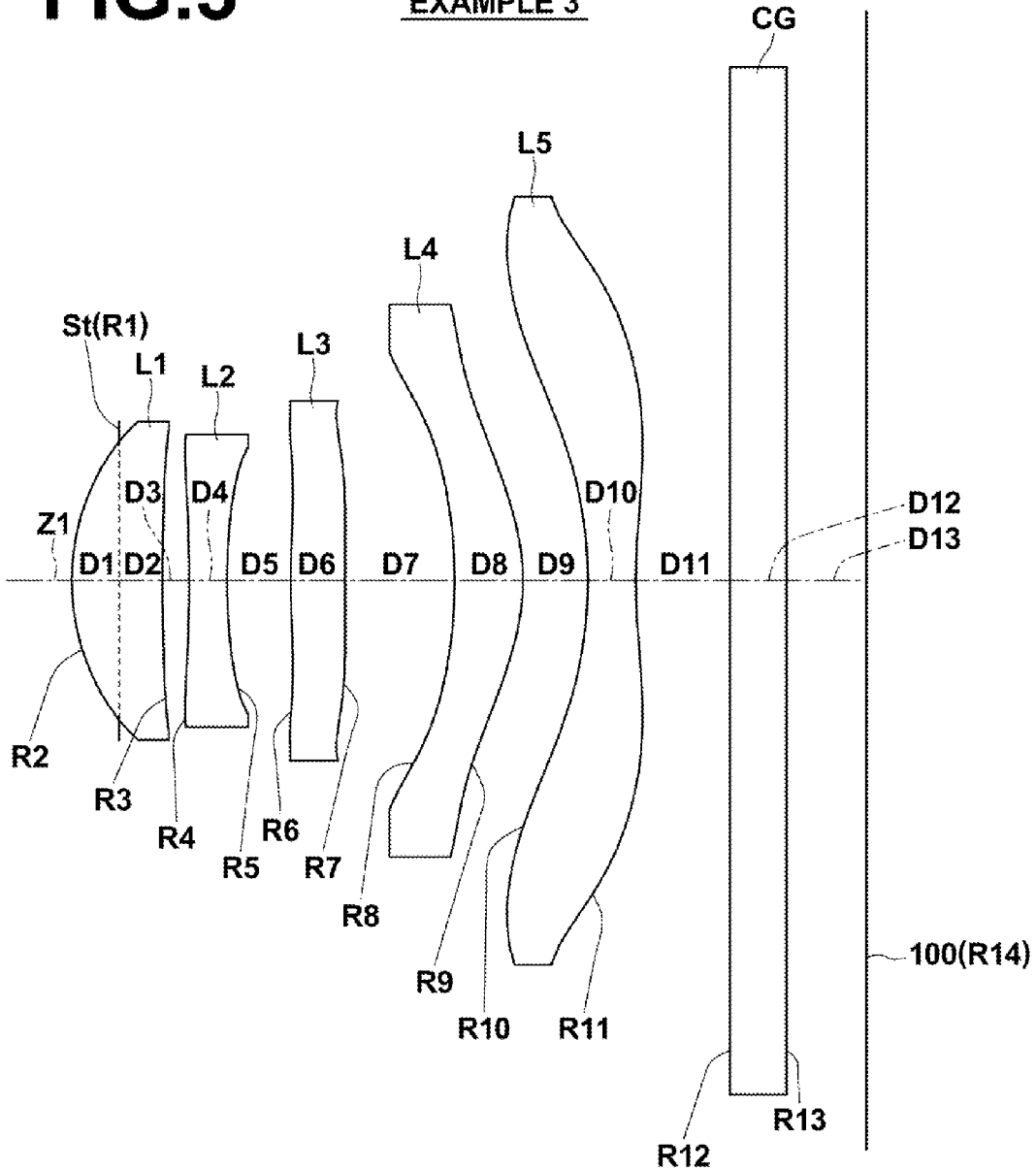
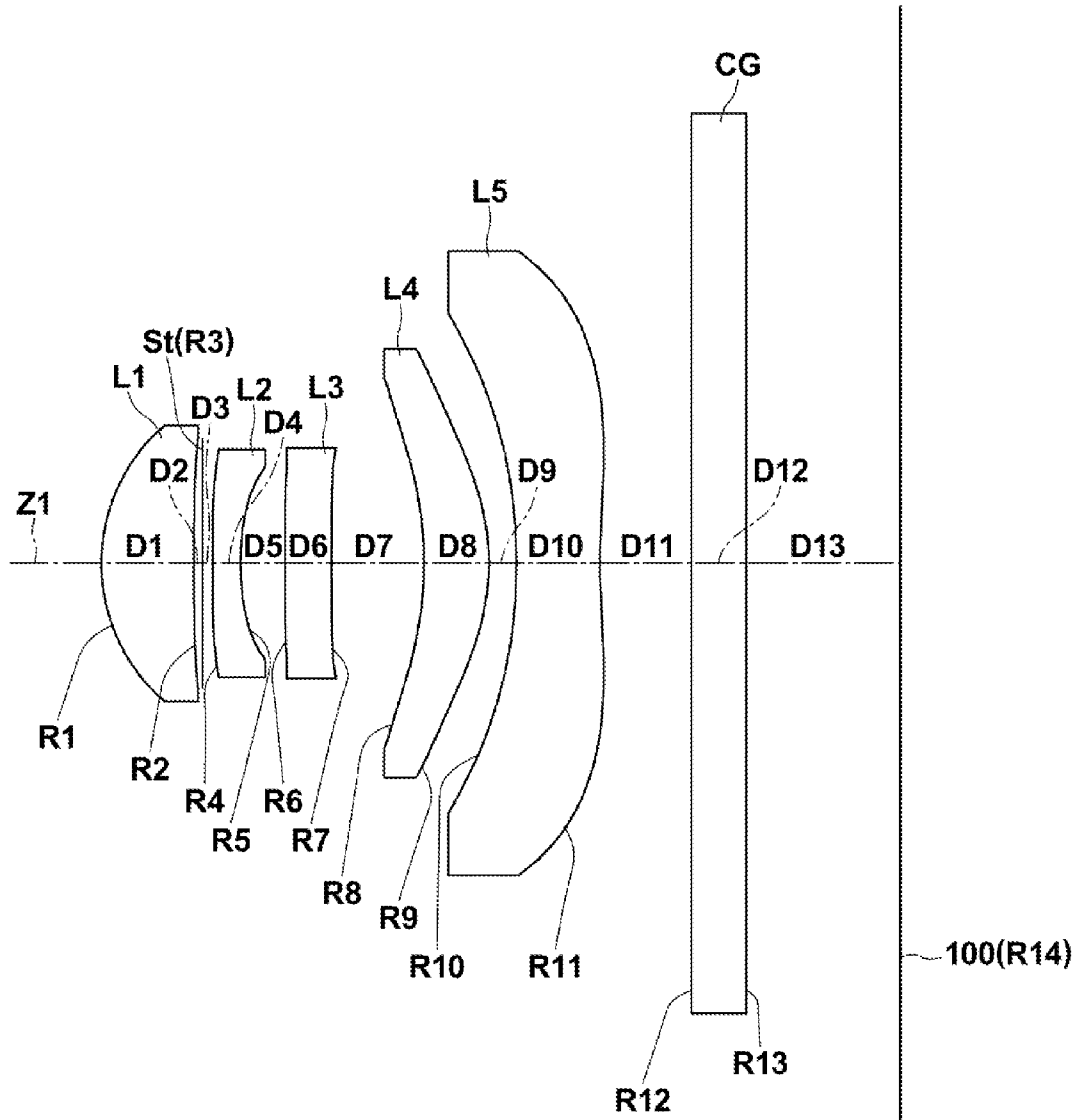


FIG. 4

EXAMPLE 4



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