

Exhibit A

United States Patent No. 6,914,635



US006914635B2

(12) **United States Patent**
Ostergard

(10) **Patent No.:** **US 6,914,635 B2**
(45) **Date of Patent:** **Jul. 5, 2005**

(54) **MICROMINIATURE ZOOM SYSTEM FOR DIGITAL CAMERA**

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(73) Assignee: **Nokia Mobile Phones, Ltd.**, Espoo (FI)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 695 days.

(21) Appl. No.: **09/779,416**

(22) Filed: **Feb. 8, 2001**

(65) **Prior Publication Data**

US 2004/0201773 A1 Oct. 14, 2004

(51) **Int. Cl.⁷** **H04N 5/225**

(52) **U.S. Cl.** **348/374; 348/340; 348/351; 348/240.3**

(58) **Field of Search** **348/374, 340, 348/240.3, 351, 357, 240.99**

(56) **References Cited**
PUBLICATIONS

“Electrostatic Linear Microactuator Mechanism for Focusing a CCD Camera” by Koga, et al., *Journal of Lightwave Technology*, vol. 17, No. 1, Jan. 1999; p. 43–47.*

* cited by examiner

Primary Examiner—Wendy R. Garber

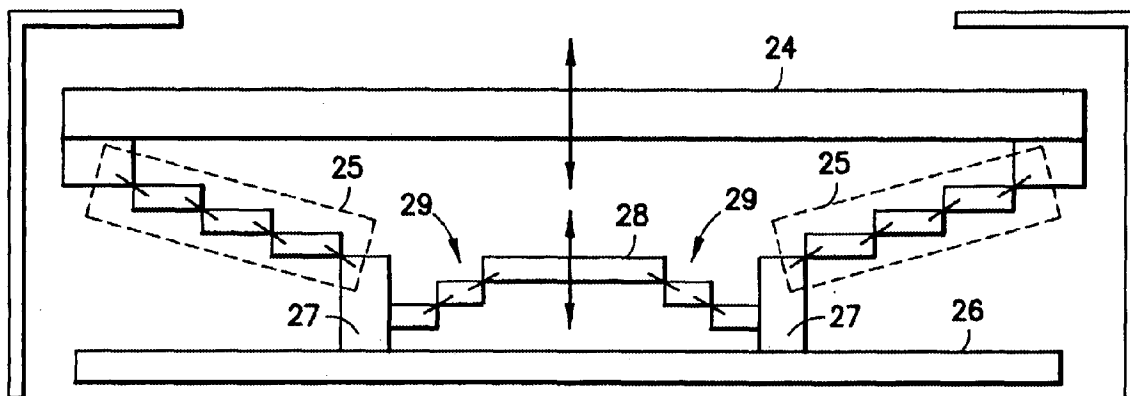
Assistant Examiner—Gary C. Vieaux

(74) *Attorney, Agent, or Firm*—Perman & Green, LLP

(57) **ABSTRACT**

A digital camera for use in a communication device in which the image sensor is formed on a substrate and is mounted on a micro-electromechanical system for movement relative to the camera lens to provide an autofocus capability. In addition the lens may be mounted on a micro-electromechanical system for movement relative to the image sensor to provide both an autofocus and a zoom capability.

12 Claims, 4 Drawing Sheets



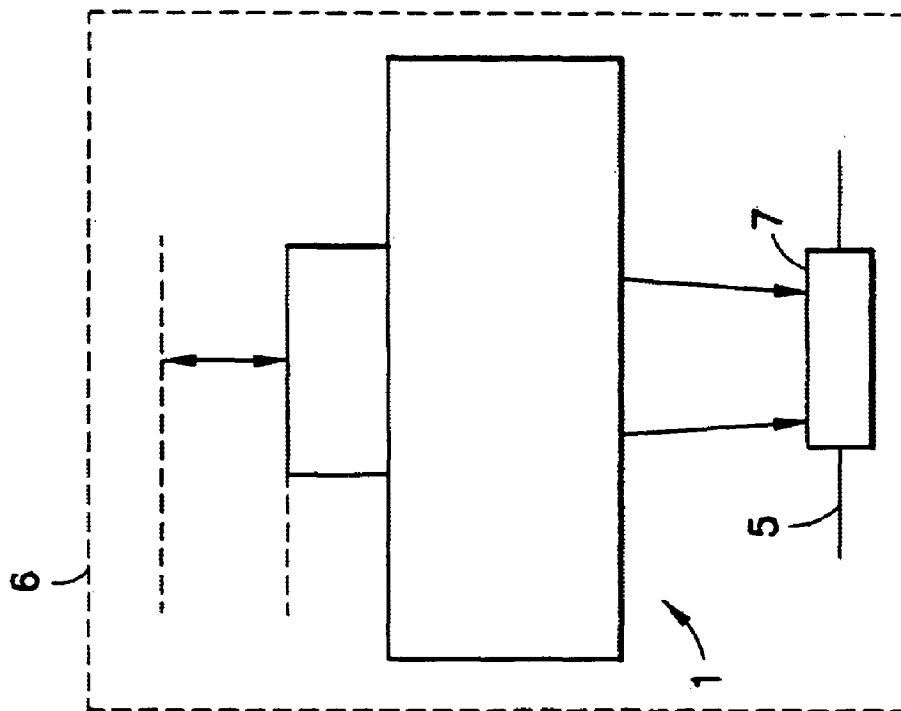


FIG. 1a

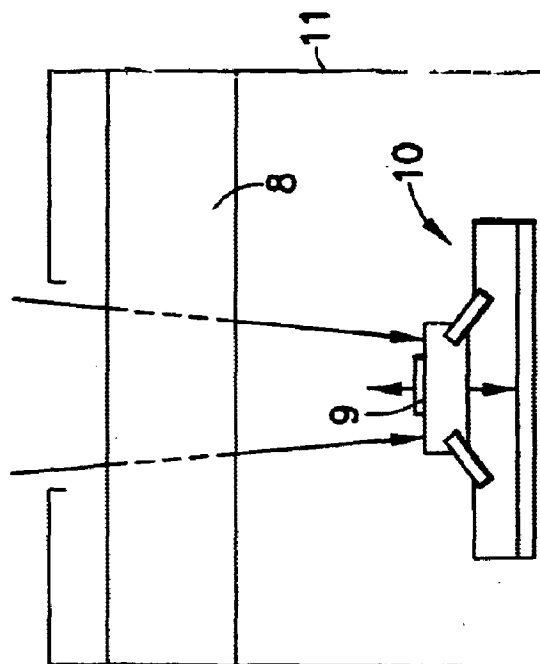


FIG. 1b

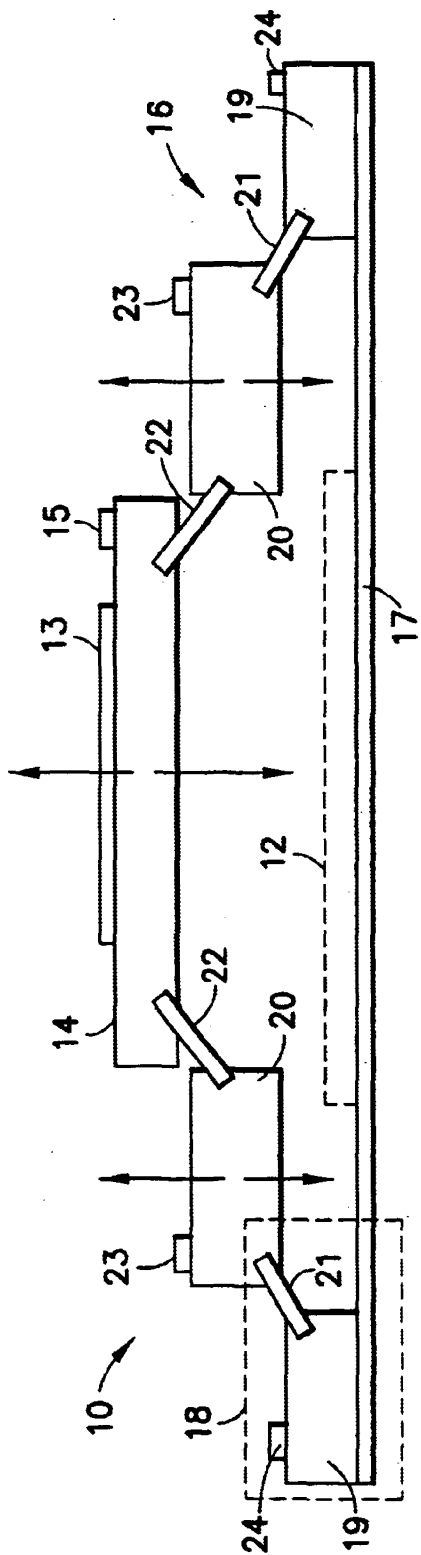


FIG. 2

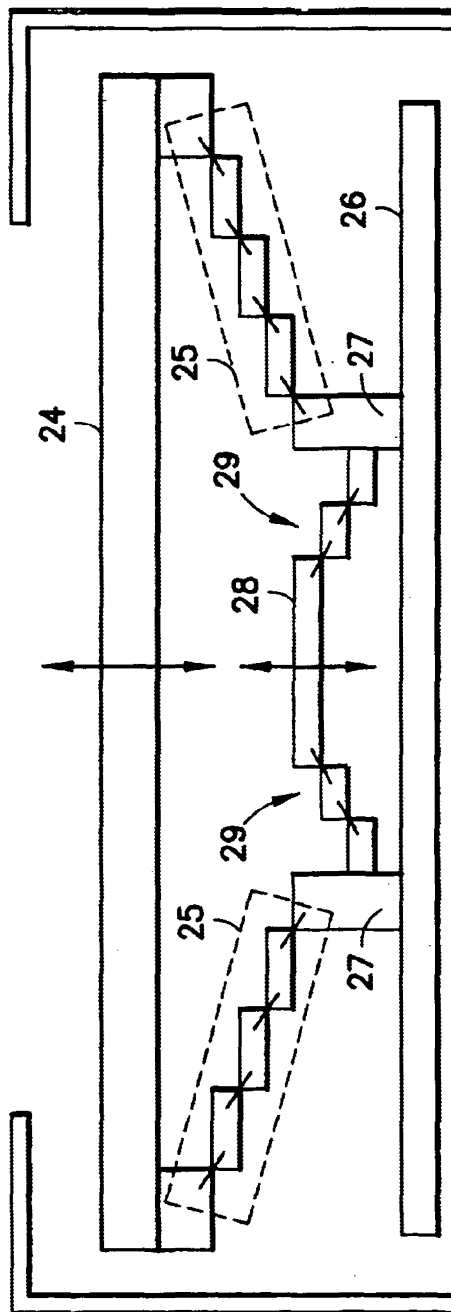


FIG. 3

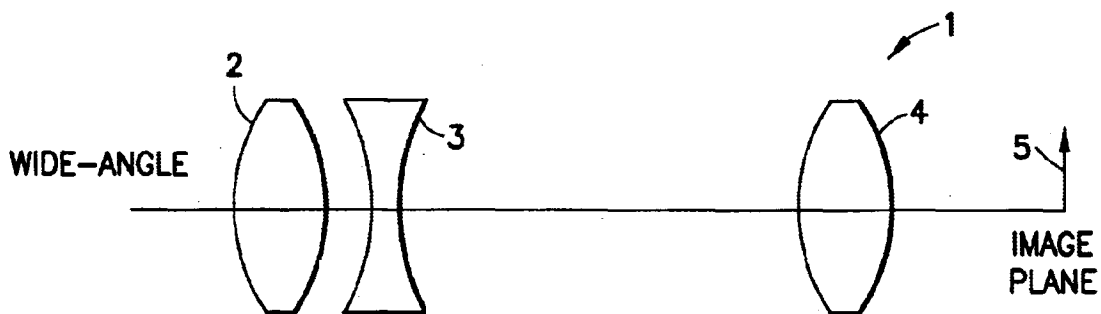


FIG. 4a

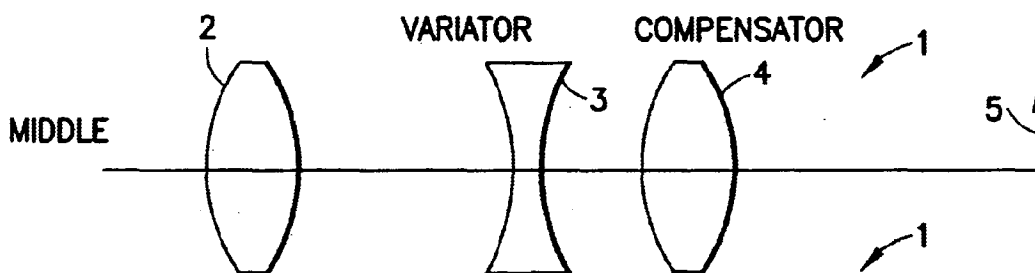


FIG. 4b

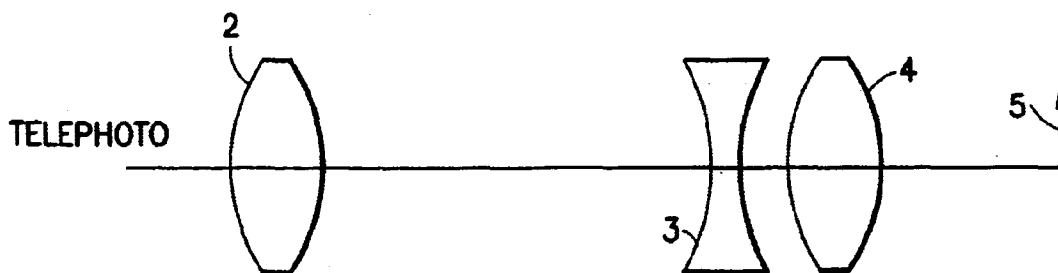


FIG. 4c

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