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

(10) **Patent No.:** **US 7,859,588 B2**  
(45) **Date of Patent:** **\*Dec. 28, 2010**

- (54) **METHOD AND APPARATUS FOR OPERATING A DUAL LENS CAMERA TO AUGMENT AN IMAGE**
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- (75) Inventors: **Kenneth A. Parulski**, Rochester, NY (US); **Wilbert F. Janson, Jr.**, Shortsville, NY (US); **John N. Border**, Walworth, NY (US); **John R. Fredlund**, Rochester, NY (US); **Joseph A. Manico**, Rochester, NY (US); **Robert J. Parada, Jr.**, Rochester, NY (US)
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(73) Assignee: **Eastman Kodak Company**, Rochester, NY (US)

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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 882 days.

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This patent is subject to a terminal disclaimer.

(Continued)

(21) Appl. No.: **11/684,025**

Primary Examiner—Kelly L. Jerabek

(22) Filed: **Mar. 9, 2007**

(74) Attorney, Agent, or Firm—Thomas J. Strouse; Peyton C. Watkins

(65) **Prior Publication Data**

(57) **ABSTRACT**

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- (51) **Int. Cl.**
    - H04N 5/232** (2006.01)
    - G03B 13/00** (2006.01)
    - G03B 17/00** (2006.01)
  - (52) **U.S. Cl.** ..... **348/349**; 396/79
  - (58) **Field of Classification Search** ..... 348/349; 396/72, 79, 100
- See application file for complete search history.

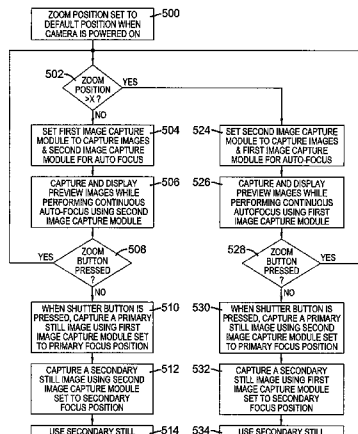
An electronic camera for producing an output image of a scene from a captured image signal includes a first imaging stage comprising a first image sensor for generating a first sensor output and a first lens for forming a first image of the scene on the first image sensor, and a second imaging stage comprising a second image sensor for generating a second sensor output and a second lens for forming a second image of the scene on the second image sensor. The sensor output from the first imaging stage is used as a primary output image for forming the captured image signal and the sensor output from the second imaging stage is used as a secondary output image for modifying the primary output image, thereby generating an enhanced, captured image signal.

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**22 Claims, 29 Drawing Sheets**



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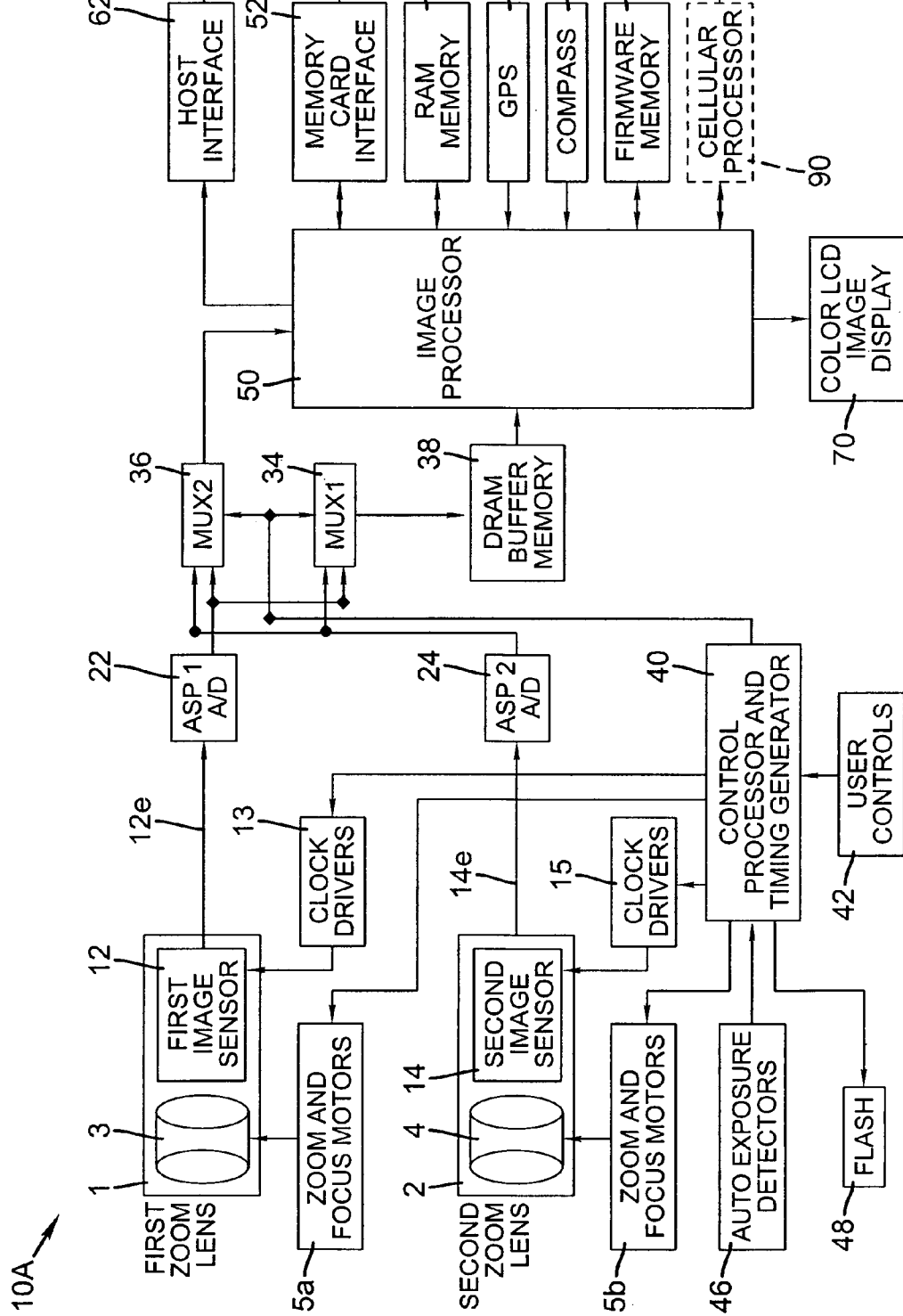
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**FIG. 1**

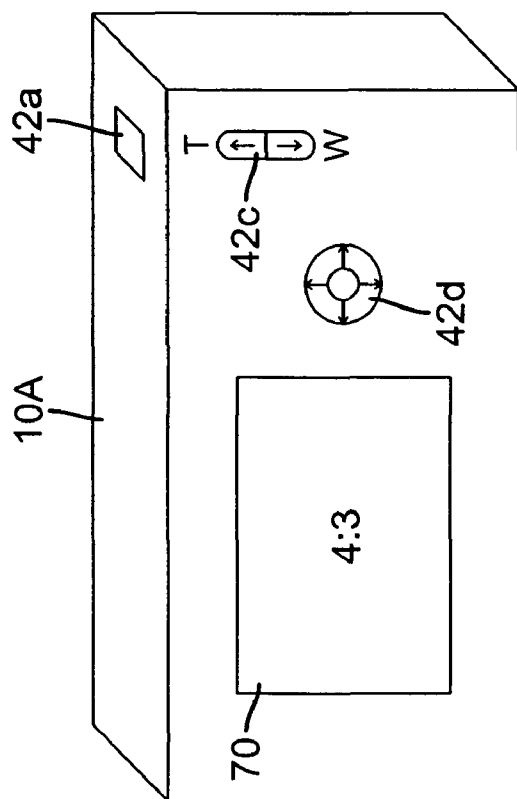


FIG. 2B

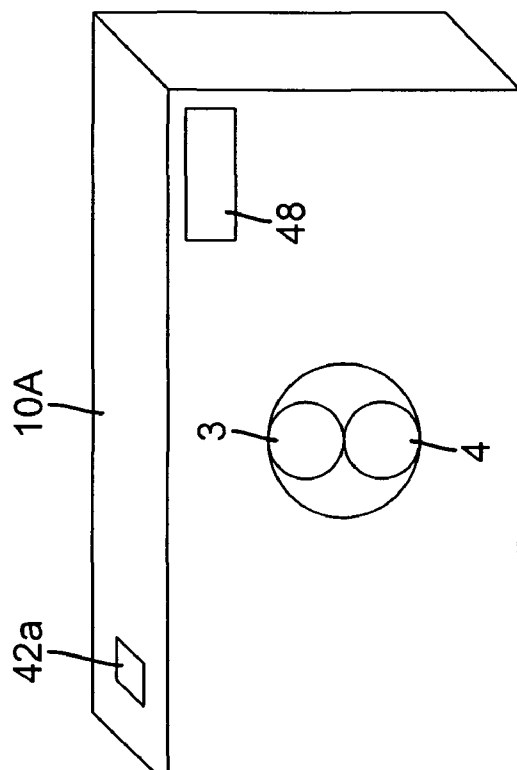


FIG. 2A

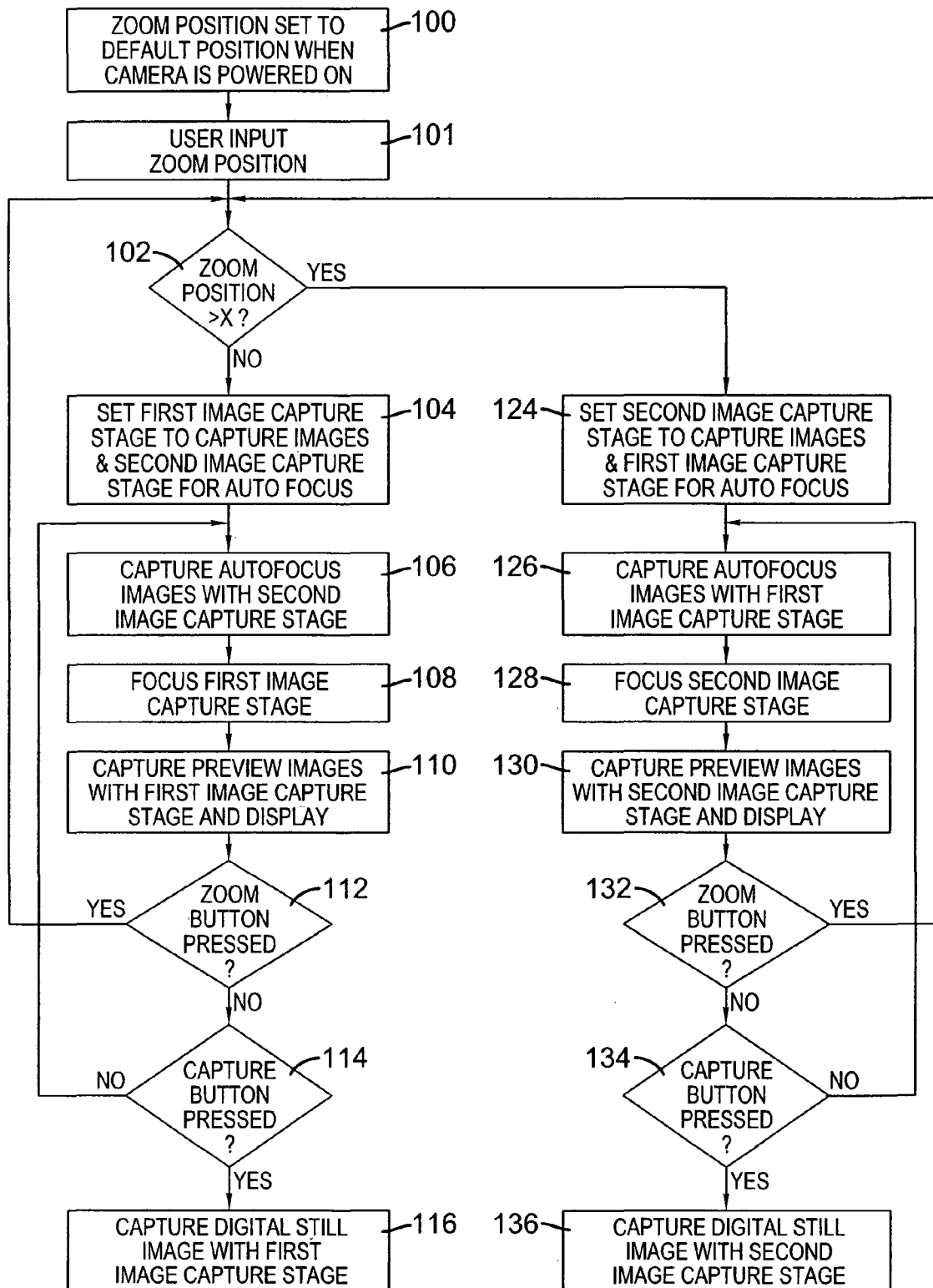


FIG. 3

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