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(54) **SYSTEM AND METHOD FOR FUSING THREE-DIMENSIONAL SHAPE DATA ON DISTORTED IMAGES WITHOUT CORRECTING FOR DISTORTION**

(75) Inventors: **Andre Gueziec**, Mamaroneck; **Alan David Kalvin**, Irvington, both of NY (US); **Willie Williamson, Jr.**, Roseville, CA (US)

(73) Assignee: **International Business Machines Corporation**, Armonk, NY (US); .

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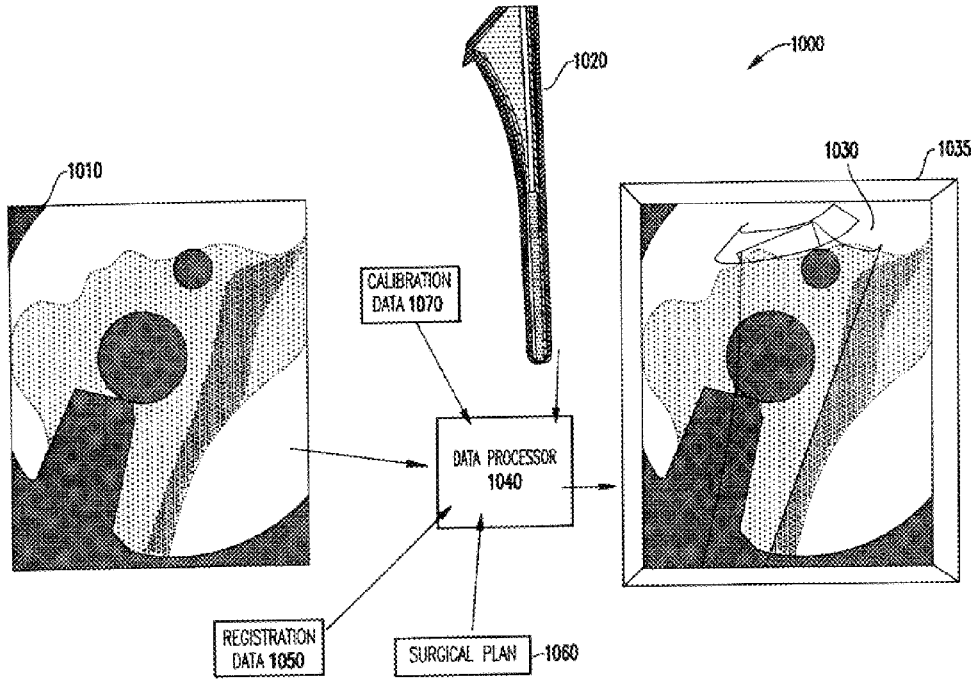
Primary Examiner—Brian L. Casler
(74) *Attorney, Agent, or Firm*—Louis J. Percello, Esq.; McGinn & Gibb, PLLC

(57) **ABSTRACT**

A system and method for intra-operatively providing a surgeon with visual evaluations of possible surgical outcomes ahead of time, and generating simulated data, includes a medical imaging camera, a registration device for registering data to a physical space, and to the medical imaging camera, and a fusion mechanism for fusing the data and the images to generate simulated data, without correcting for distortion. The simulated data (e.g., such as augmented X-ray images) is natural and easy for a surgeon to interpret. In an exemplary implementation, the system preferably includes a data processor which receives a three-dimensional surgical plan or three-dimensional plan of therapy delivery, one or a plurality of two-dimensional intra-operative images, a three-dimensional model of pre-operative data, registration data, and image calibration data. The data processor produces one or a plurality of simulated post-operative images, without correcting for distortion, by integrating a projection of a three-dimensional model of pre-operative data onto one or a plurality of two-dimensional intra-operative images.

17 Claims, 4 Drawing Sheets