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Babayoff

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(54) **METHOD AND APPARATUS FOR COLOUR IMAGING A THREE-DIMENSIONAL STRUCTURE**

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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 0 days.

This patent is subject to a terminal disclaimer.

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(65) **Prior Publication Data**

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Related U.S. Application Data

(63) Continuation of application No. 13/620,159, filed on Sep. 14, 2012, now Pat. No. 8,451,456, which is a continuation of application No. 13/333,351, filed on Dec. 21, 2011, now Pat. No. 8,363,228, which is a continuation of application No. 12/770,379, filed on Apr. 29, 2010, now Pat. No. 8,102,538, which is a continuation of application No. 12/379,343, filed on Feb. 19, 2009, now Pat. No. 7,724,378, which is a continuation of application No. 11/889,112, filed on Aug. 9, 2007, now Pat. No. 7,511,829, which is a continuation of application No. 11/154,520, filed on Jun. 17, 2005, now Pat. No. 7,319,529.

(60) Provisional application No. 60/580,109, filed on Jun. 17, 2004, provisional application No. 60/580,108, filed on Jun. 17, 2004.

(51) **Int. Cl.**
G01B 11/24 (2006.01)

(52) **U.S. Cl.**
USPC **356/601**; 250/559.4; 250/559.49; 356/479; 356/609

(58) **Field of Classification Search**
USPC 250/559.4–559.49; 356/479, 601–609
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

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Primary Examiner — Gregory J Toatley

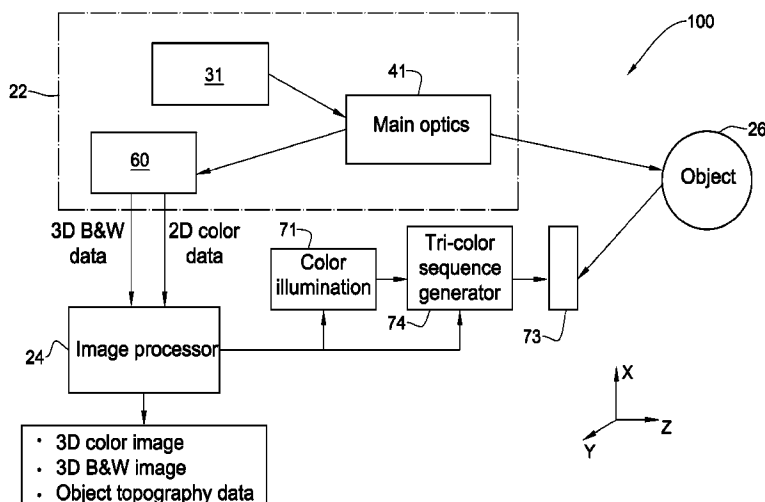
Assistant Examiner — Iyabo S Alli

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(57) **ABSTRACT**

A device for determining the surface topology and associated color of a structure, such as a teeth segment, includes a scanner for providing depth data for points along a two-dimensional array substantially orthogonal to the depth direction, and an image acquisition means for providing color data for each of the points of the array, while the spatial disposition of the device with respect to the structure is maintained substantially unchanged. A processor combines the color data and depth data for each point in the array, thereby providing a three-dimensional color virtual model of the surface of the structure. A corresponding method for determining the surface topology and associate color of a structure is also provided.

21 Claims, 11 Drawing Sheets



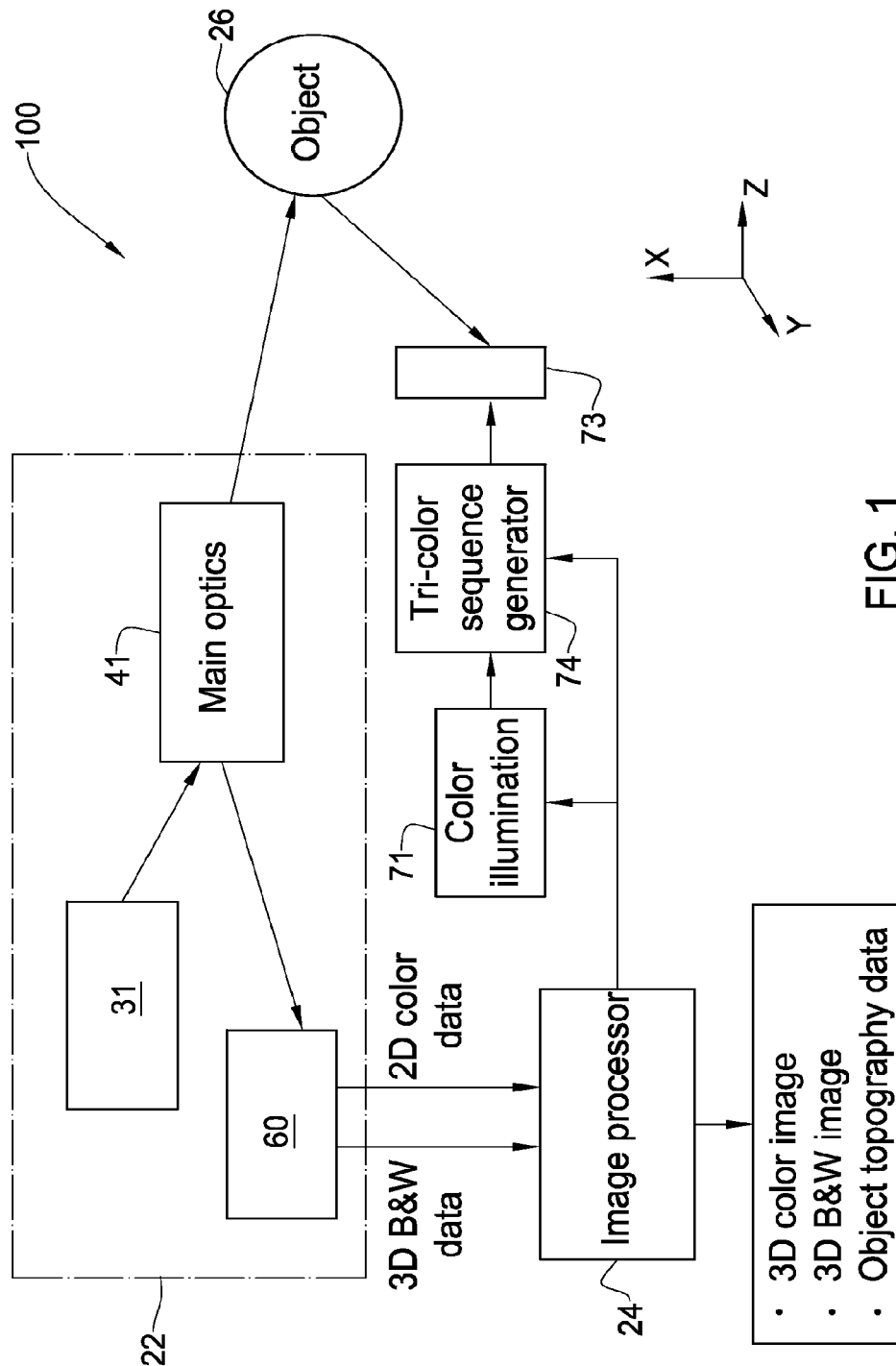


FIG. 1

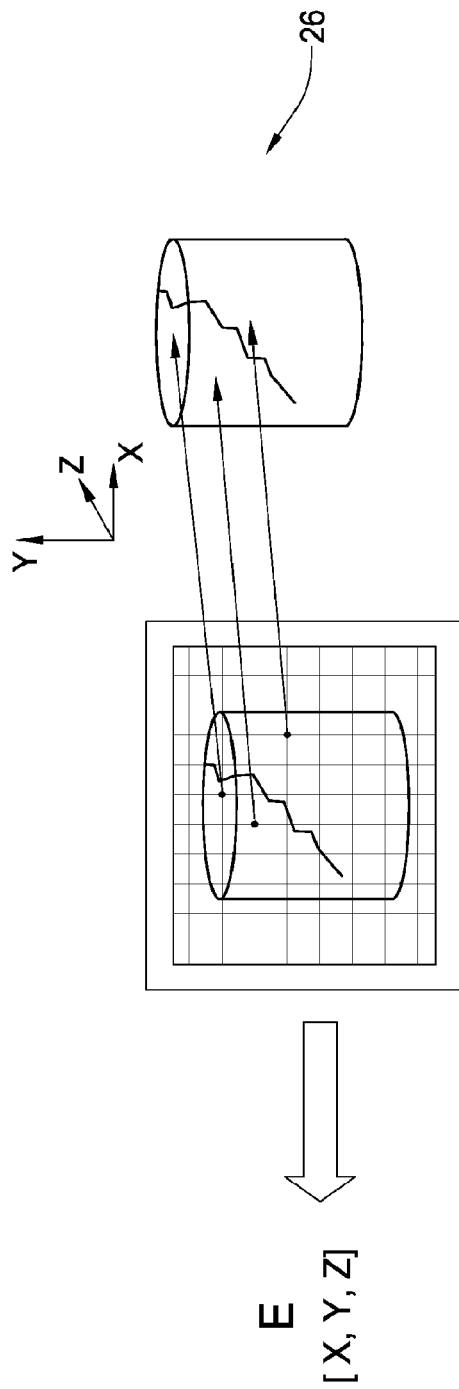
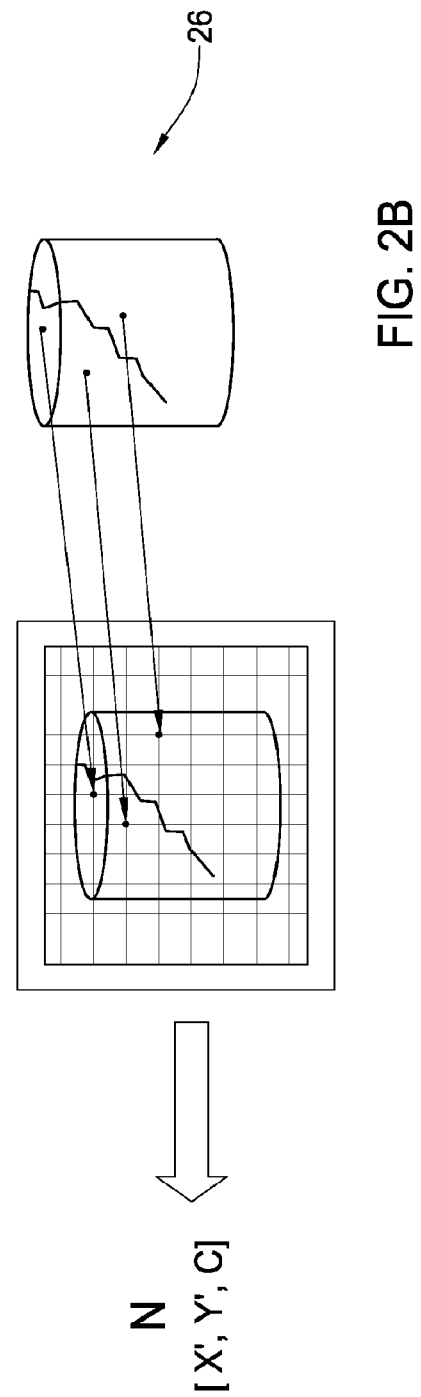


FIG. 2A



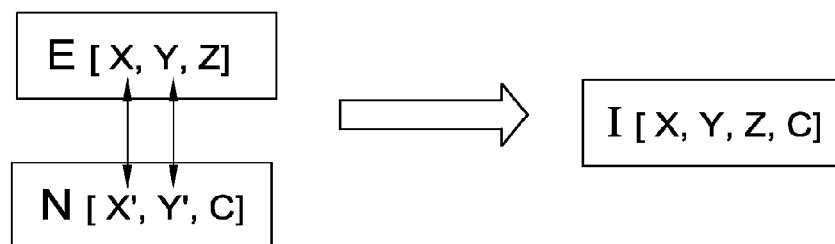


FIG. 2C

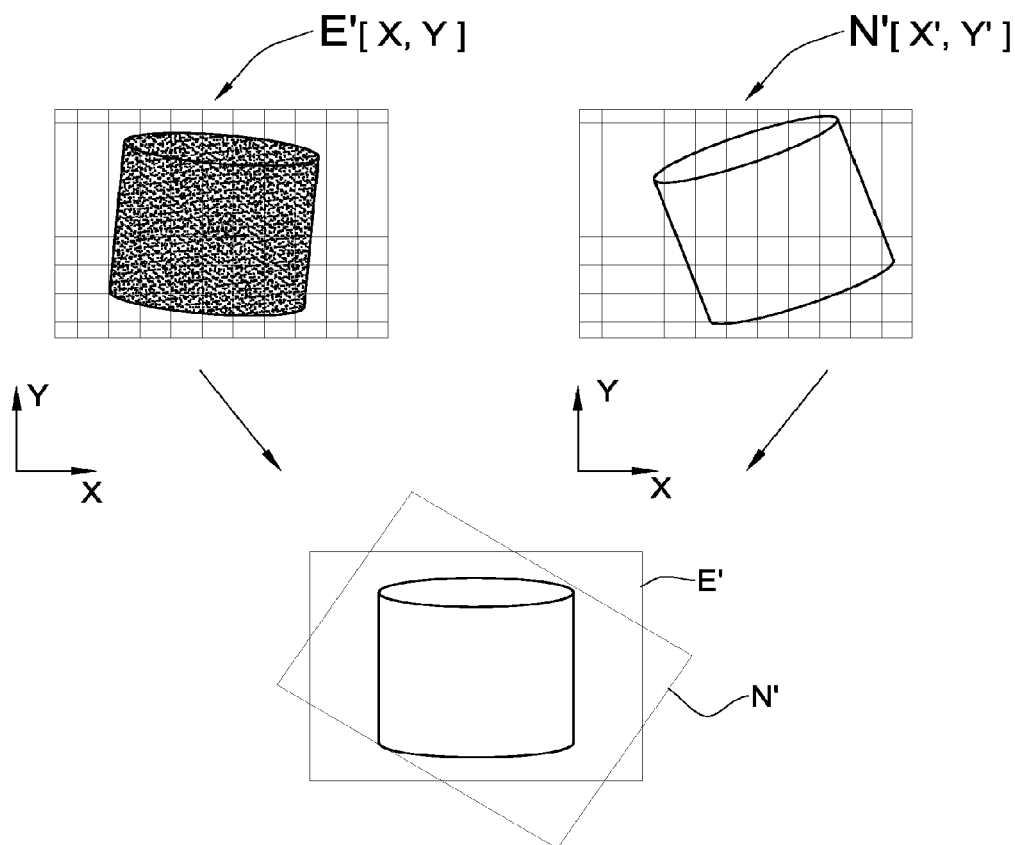
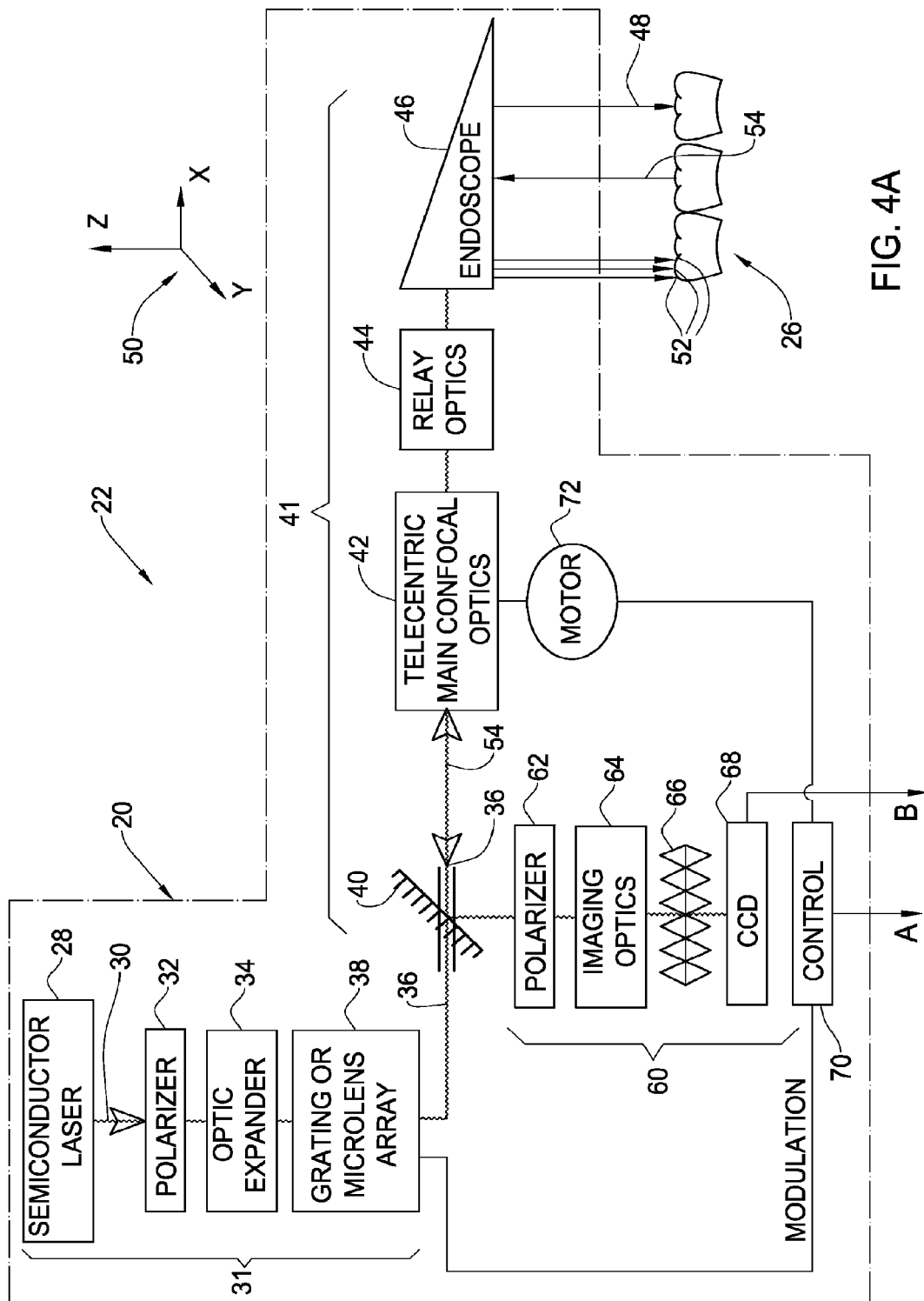


FIG. 3





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