

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

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**(54) 3-DIMENSIONAL ULTRASONIC IMAGING**

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**(22) Filed:** **Oct. 19, 1999**

**(51) Int. Cl.<sup>7</sup>** ..... **A61B 8/00**

**(52) U.S. Cl.** ..... **600/443**; 128/916; 600/459

**(58) Field of Search** ..... 600/437, 443,  
 600/447, 459; 128/916

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**(57) ABSTRACT**

An ultrasonic imaging system including a probe containing at least one ultrasonic transducer and at least one inertial sensor as well as electronic circuitry connected to the probe for causing the at least one ultrasonic transducer to transmit ultrasonic energy into a region and to receive reflected ultrasonic energy therefrom, creating a plurality of generally two-dimensional images whose geometrical relationship is indicated by outputs from the at least one inertial sensor.

**35 Claims, 10 Drawing Sheets**

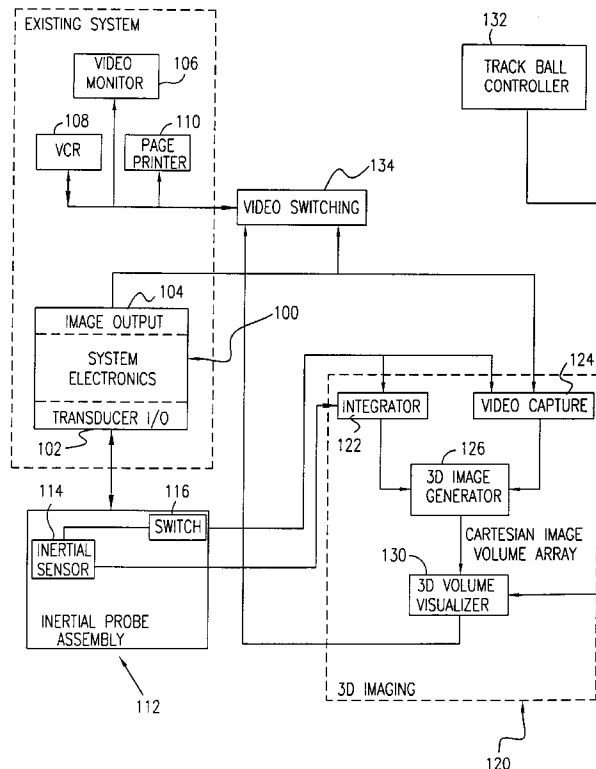


FIG. 1

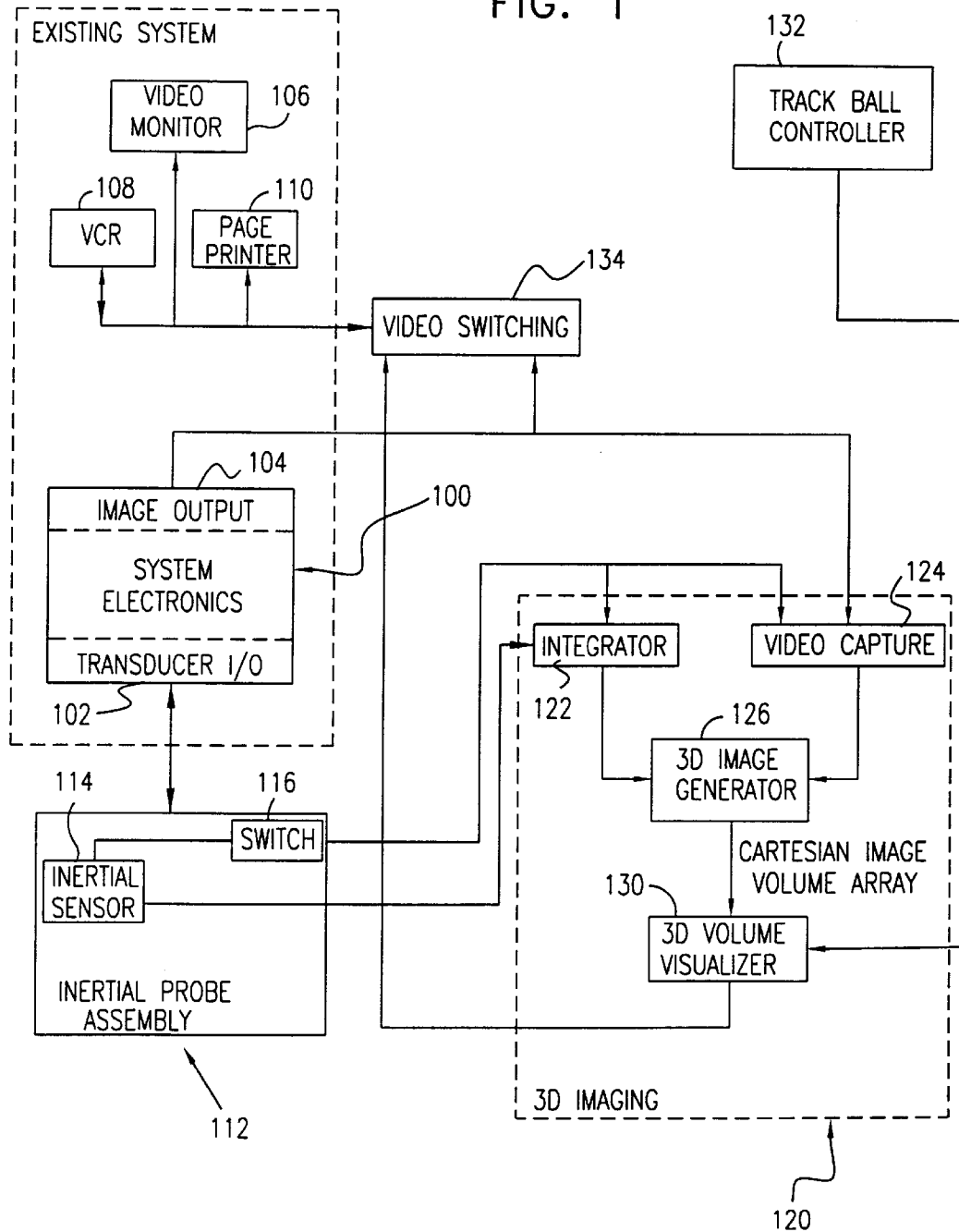
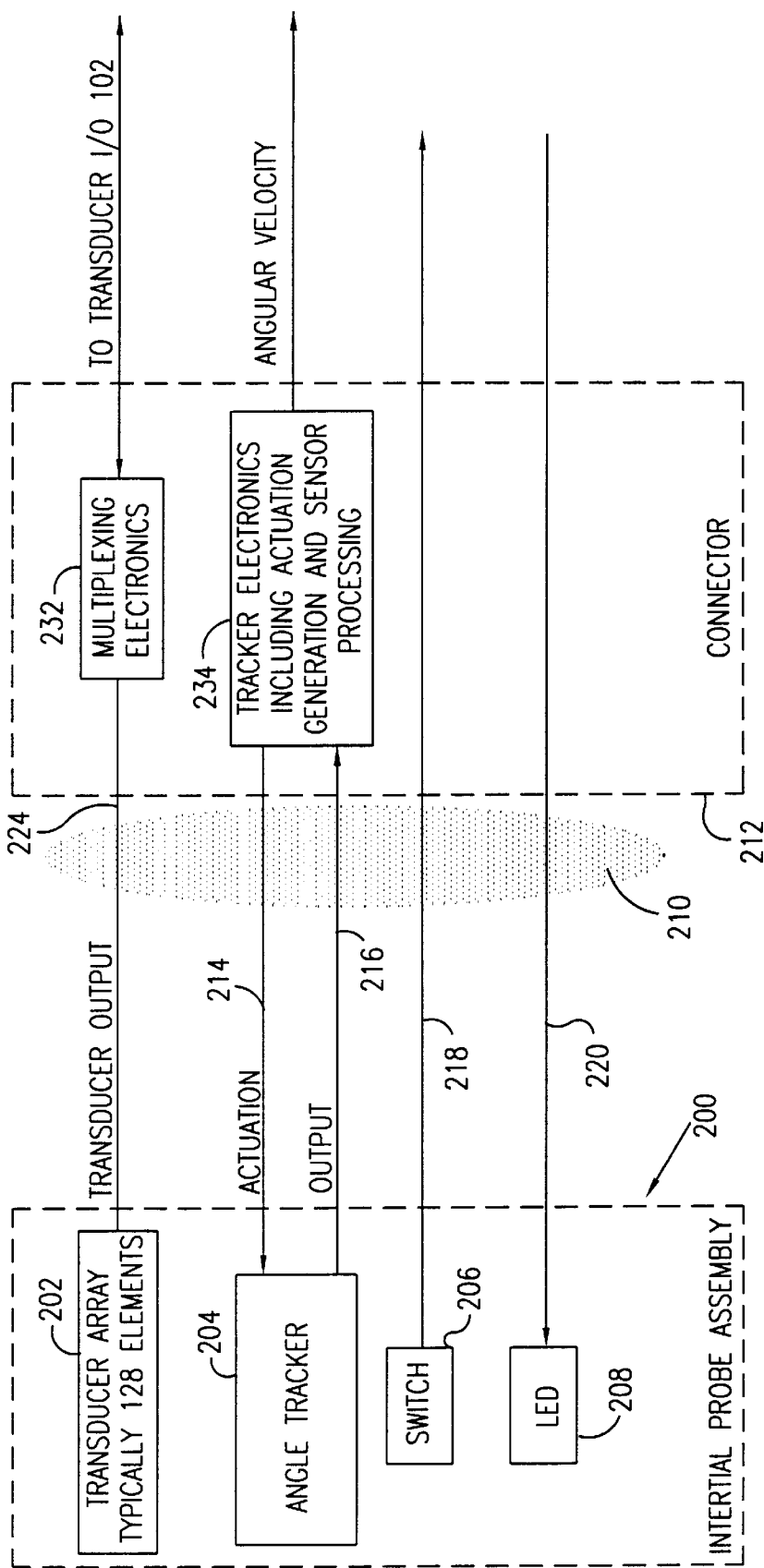


FIG. 2



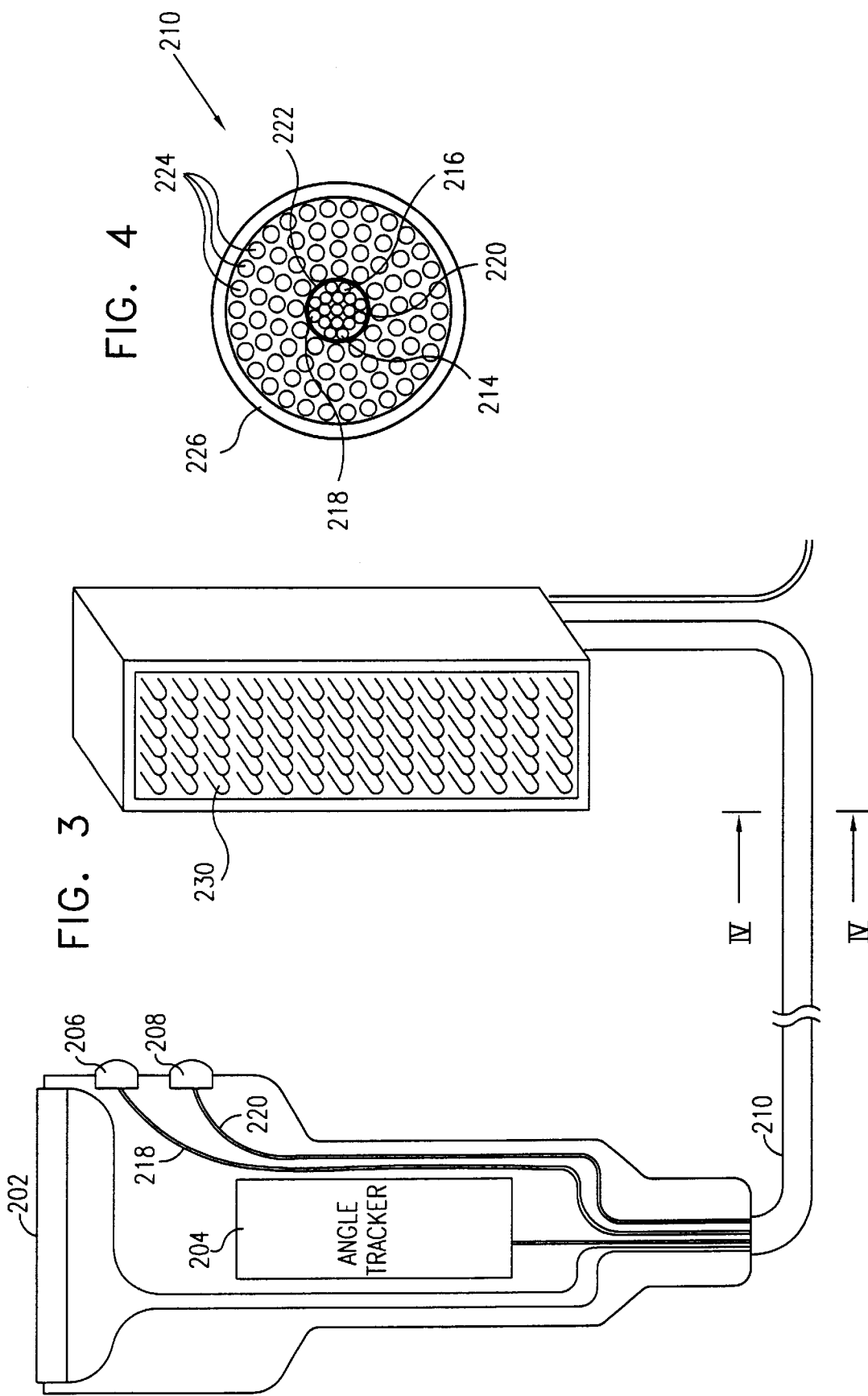
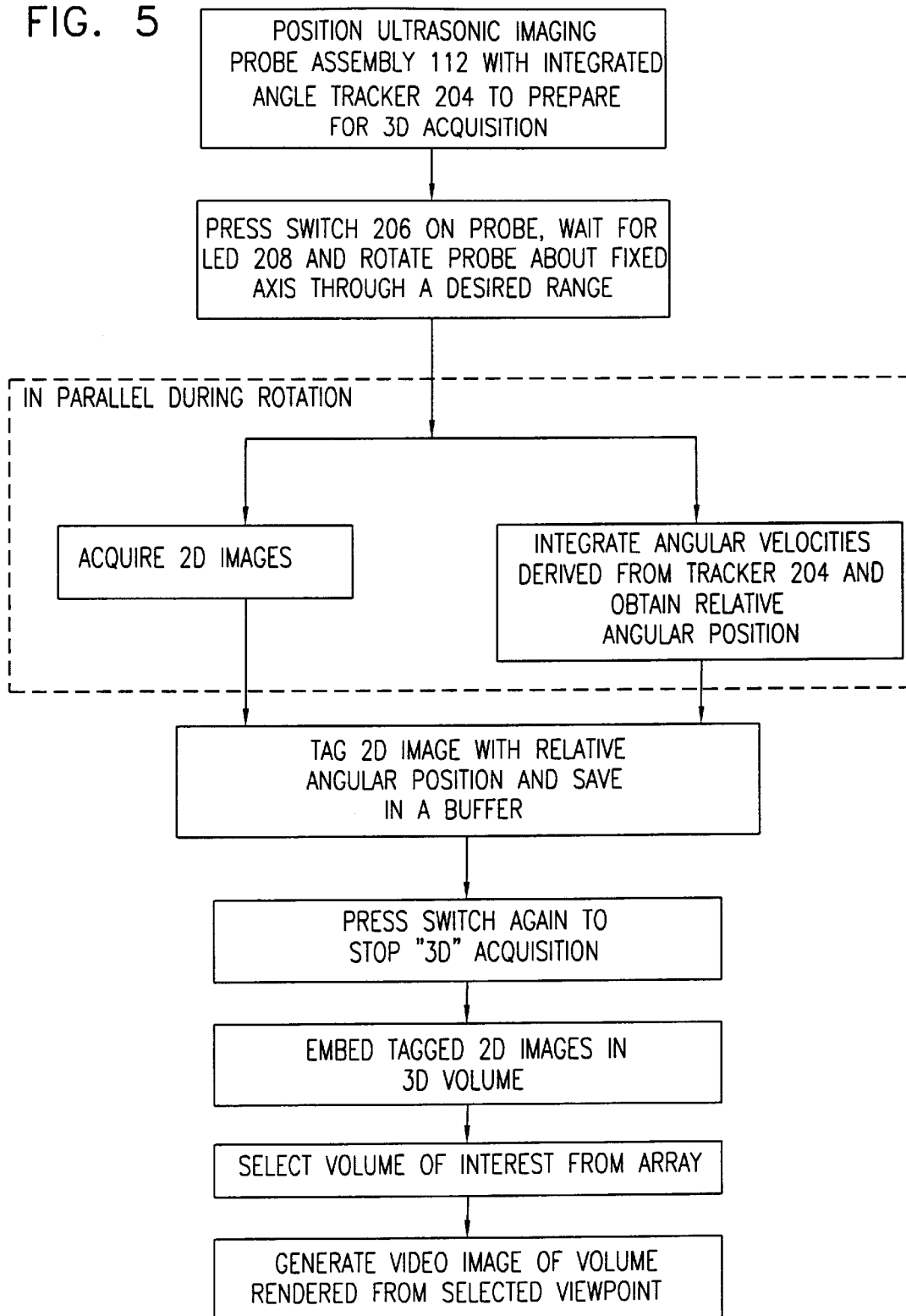


FIG. 5



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