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[54] **APPARATUS RESPONSIVE TO MOVEMENT OF A PATIENT DURING TREATMENT/ DIAGNOSIS**

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[51] Int. Cl.^{6} **A61B 6/00**

[52] U.S. Cl. **128/653.1**

[58] **Field of Search** 128/630, 653.1, 128/660.03; 364/413.02, 413.13, 413.25, 413.26; 356/375; 378/69, 205

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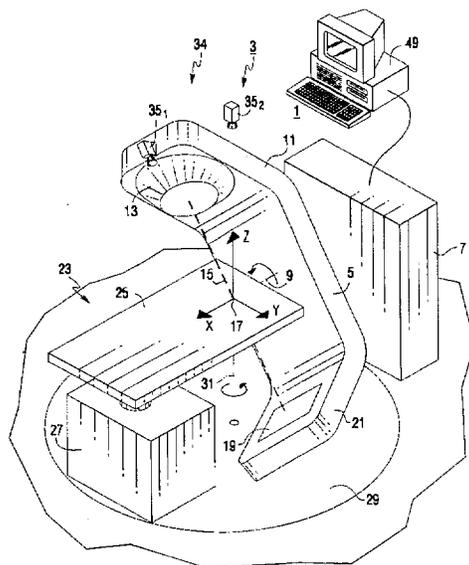
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[57]   **ABSTRACT**

A camera generates digital image signals representing an image of one or more natural or artificial fiducials on a patient positioned on treatment or diagnosis equipment. A processor applies multiple levels of filtering at multiple levels of resolution to repetitively determine successive fiducial positions. A warning signal is generated if movement exceeds certain limits but is still acceptable for treatment. Unacceptable displacement results in termination of the treatment beam. Tracking templates can be generated interactively from a display of the digital image signals or through automatic selection of an image having the median correlation to an initial template. A gating signal synchronized to patient breathing can be extracted from the digital image signals for controlling the radiation beam generator.
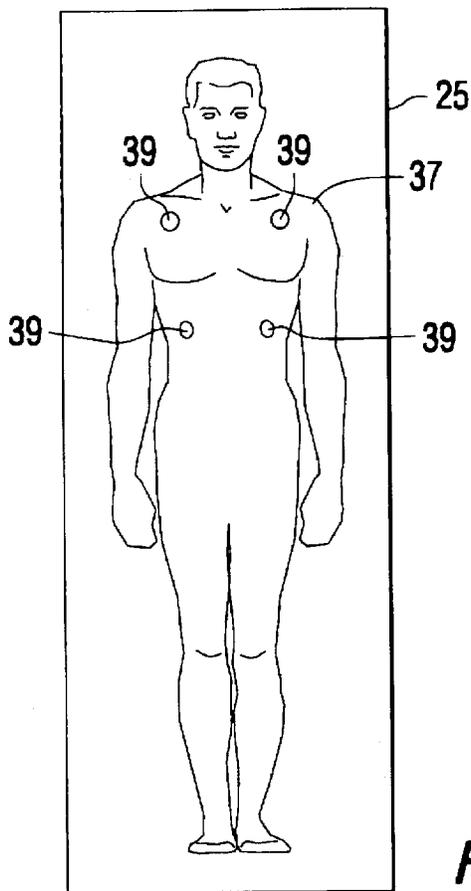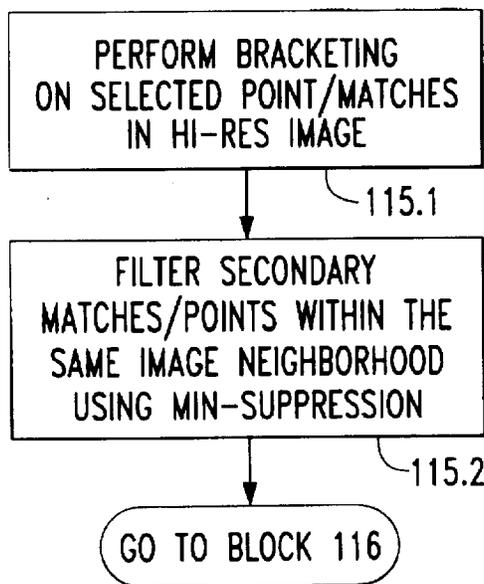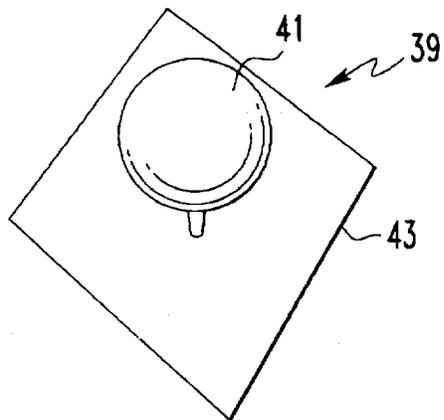
22 Claims, 12 Drawing Sheets

FIG. 1

FIG. 2

PERFORM BRACKETING
ON SELECTED POINT/MATCHES
IN HI-RES IMAGE

115.1

115

FILTER SECONDARY
MATCHES/POINTS WITHIN THE
SAME IMAGE NEIGHBORHOOD
USING MIN-SUPPRESSION

115.2

GO TO BLOCK 116
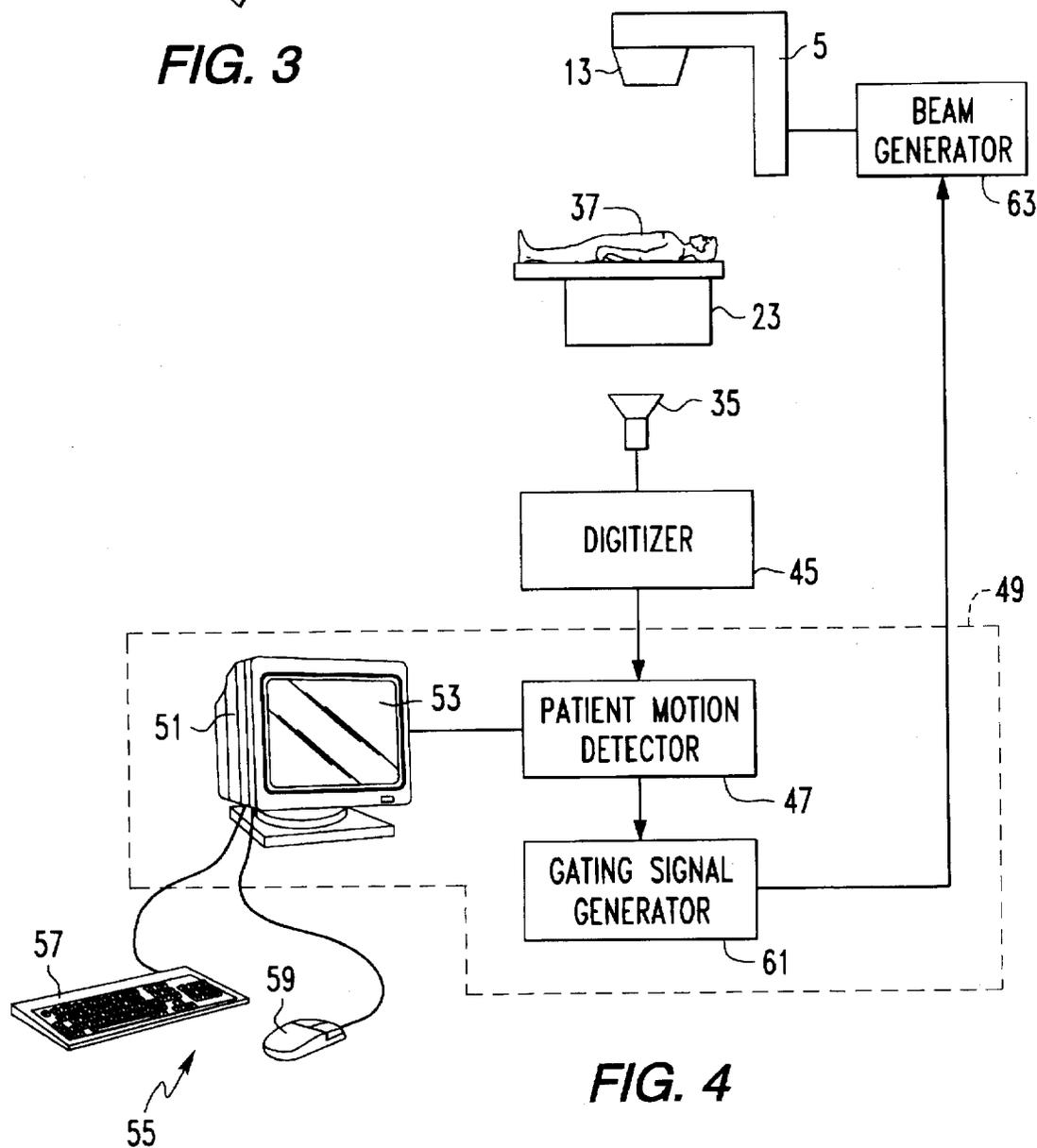
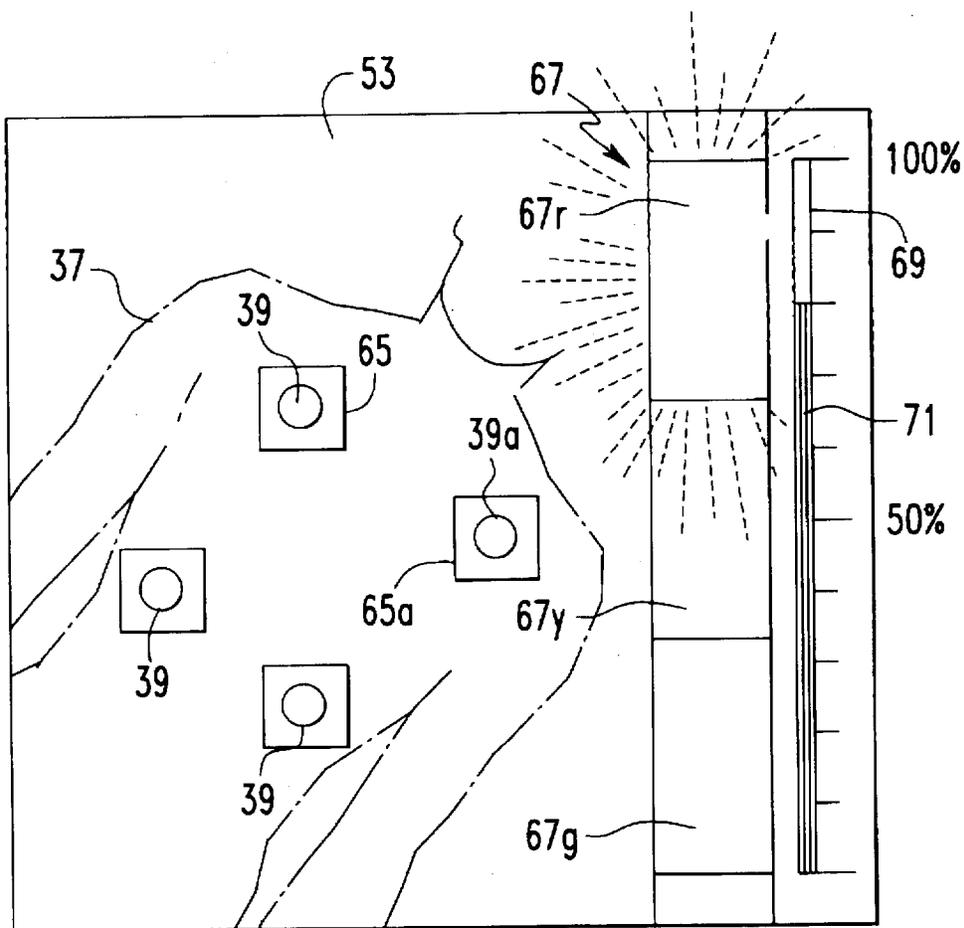*FIG. 9*
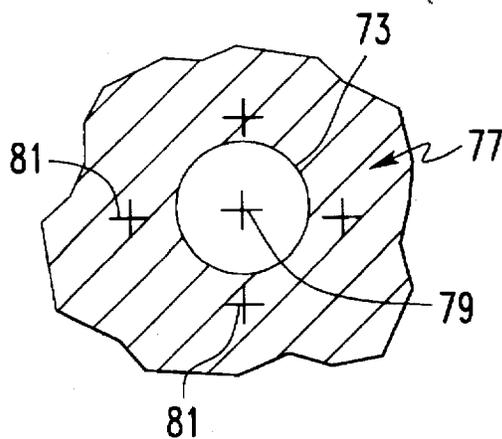
FIG. 3

FIG. 4

FIG. 5

FIG. 17

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