

(12) **United States Patent**
Watanabe

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(45) **Date of Patent:** **Dec. 4, 2001**

(54) **X-RAY DIAGNOSIS APPARATUS** 5,052,036 * 9/1991 Grady 378/197
(75) **Inventor:** Naoto Watanabe, Nasu-gun (JP) 5,835,558 * 11/1998 Maschke 378/198
6,092,928 * 7/2000 Mattson et al. 378/98.2

(73) **Assignee:** Kabushiki Kaisha Toshiba, Kawasaki (JP) * cited by examiner

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(21) **Appl. No.:** 09/393,195

(57) **ABSTRACT**

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An X-ray generator is rotatably attached to one end of a C-shaped arm, and a planar X-ray detector is attached to the other end of the C-shaped arm via a link mechanism capable of freely changing a position/direction of the detector. The X-ray generator is rotated to achieve imaging in an oblique direction, without sliding/rotating the C-shaped arm. The link mechanism is driven in association with the rotation of the X-ray generator so that the X-ray detector may face the X-ray generator. Thus, the limit to the slide angle range can substantially be eliminated without degrading accessibility, and various positioning is achieved exactly and easily.

(30) **Foreign Application Priority Data**

Oct. 16, 1998 (JP) 10-295526

(51) **Int. Cl.⁷** H05G 1/02; A61B 6/00

(52) **U.S. Cl.** 378/197; 378/196

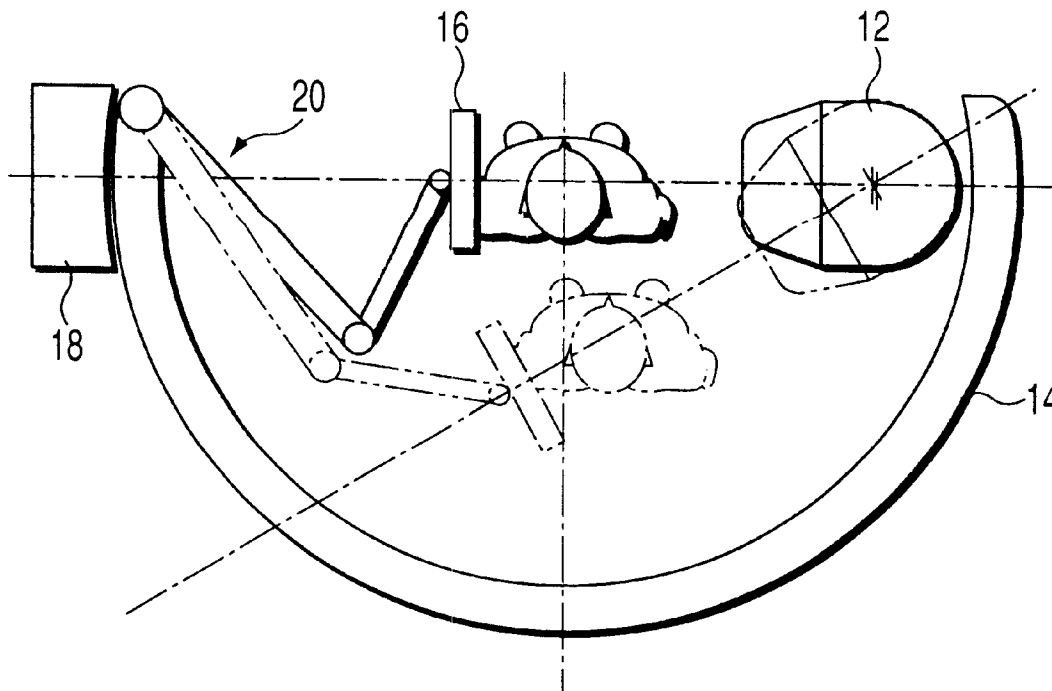
(58) **Field of Search** 378/197, 193, 378/196, 195, 198, 4, 20, 181

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,050,204 * 9/1991 Siczek et al. 378/197

28 Claims, 8 Drawing Sheets



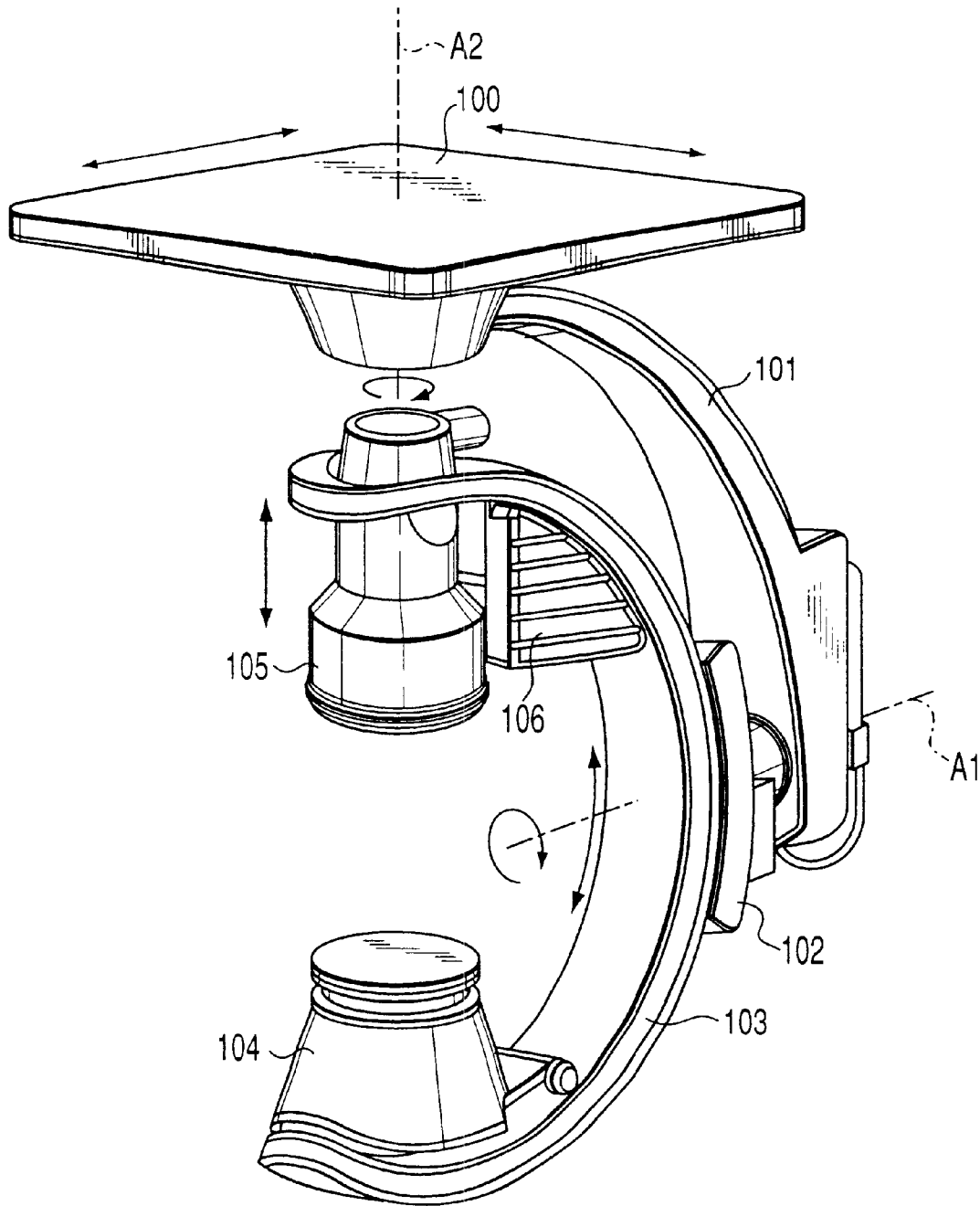


FIG. 1 PRIOR ART

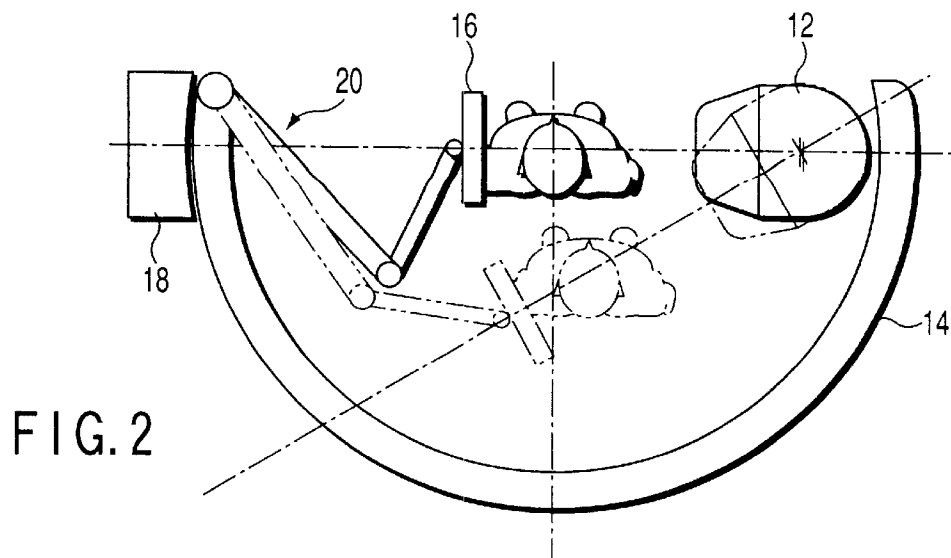


FIG. 2

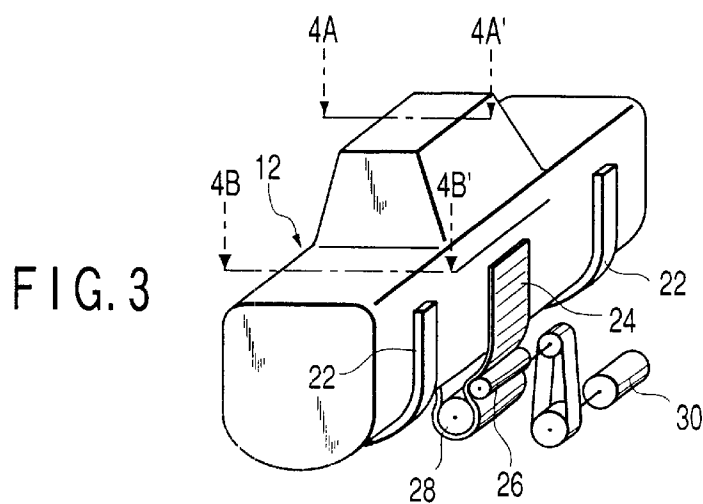


FIG. 3

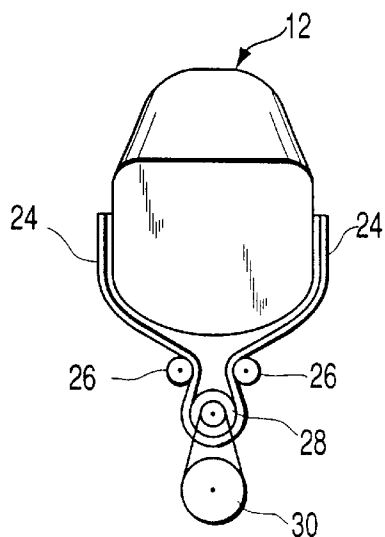


FIG. 4A

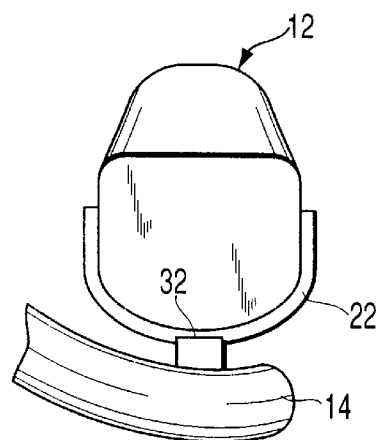


FIG. 4B

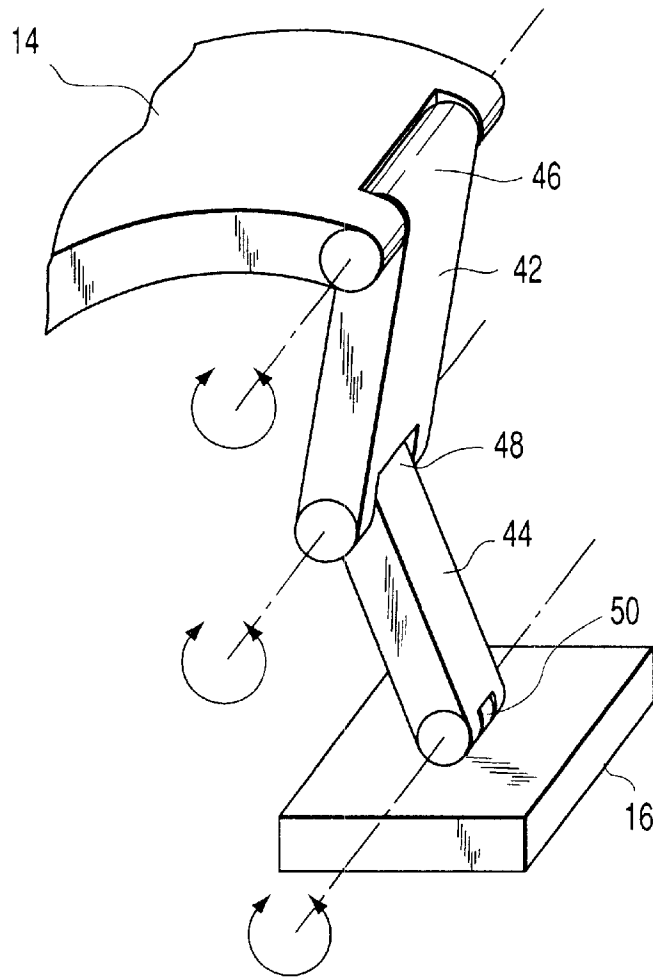


FIG. 5

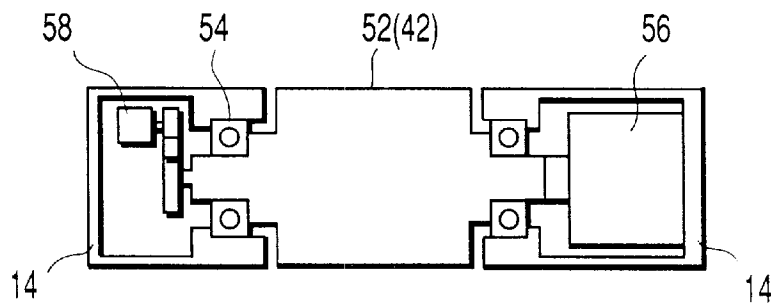


FIG. 6

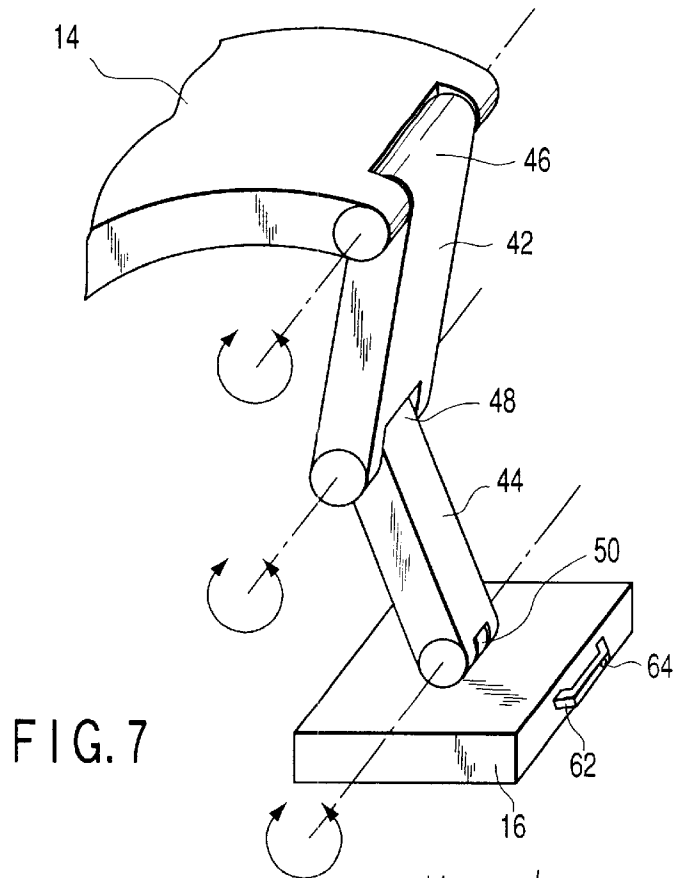


FIG. 7

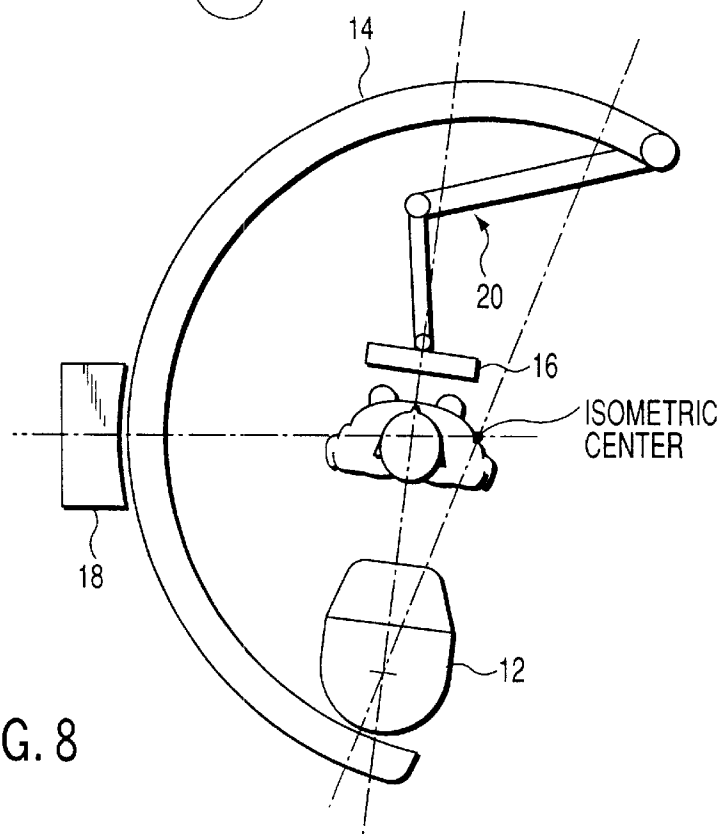


FIG. 8

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