



US006038285A

United States Patent [19]

Zhong et al.

[11] Patent Number: **6,038,285**

[45] Date of Patent: **Mar. 14, 2000**

- [54] **METHOD AND APPARATUS FOR PRODUCING MONOCHROMATIC RADIOGRAPHY WITH A BENT LAUE CRYSTAL**
- [76] Inventors: **Zhong Zhong**, Apt. I 1131 Chaping 700 E. Loop Rd., Stony Brook, N.Y. 11790; **Leroy Dean Chapman**, 4 Vermont Cir., Bolingbrook, Ill. 60440; **William C. Thomlinson**, 32 E. Masem, East Patchogue, N.Y. 11772
- [21] Appl. No.: **09/016,891**
- [22] Filed: **Feb. 2, 1998**
- [51] Int. Cl.⁷ **G21K 1/06**
- [52] U.S. Cl. **378/84; 378/85; 378/79**
- [58] Field of Search **378/84, 85, 79**

- 4,737,973 4/1988 Ogawa et al. .
- 4,949,367 8/1990 Huizing et al. .
- 5,123,036 6/1992 Uno et al. .
- 5,127,028 6/1992 Wittry .
- 5,164,975 11/1992 Steinmeyer .
- 5,579,363 11/1996 Ingal et al. .
- 5,923,720 7/1999 Barton et al. 378/84

OTHER PUBLICATIONS

Monochromatic energy-subtraction radiography using a rotating anode source and a bent Laue monochromator, a paper published in *Phys. Med. Biol.*, 42 (1997), pp. 1751-1762.

A bent Laue crystal monochromator for monochromatic radiography with an area beam, a paper published in *Nuclear Instruments and Methods in Physics Research, Section A*, 399 (1997), pp. 489-498.

Primary Examiner—David V. Bruce
Assistant Examiner—Michael J. Schwartz
Attorney, Agent, or Firm—Pauley Petersen Kinne & Fejer

[56] References Cited

U.S. PATENT DOCUMENTS

- 2,543,630 2/1951 Hansen .
- 2,853,617 9/1958 Berreman .
- 3,032,656 5/1962 Hosemann et al. .
- 3,439,163 4/1969 De Jongh .
- 3,628,040 12/1971 Schnopper et al. .
- 3,777,156 12/1973 Hammond et al. .
- 3,885,153 5/1975 Schoenborn et al. .
- 4,223,219 9/1980 Born et al. .
- 4,351,063 9/1982 Dineen et al. 378/79
- 4,625,323 11/1986 Okaya .
- 4,649,557 3/1987 Hornstra et al. .

[57] ABSTRACT

A method and apparatus for producing a monochromatic beam. A plurality of beams are generated from a polyenergetic source. The beams are then transmitted through a bent crystal, preferably a bent Laue crystal, having a non-cylindrical shape. A position of the bent crystal is rocked with respect to the polyenergetic source until a plurality of divergent monochromatic beams are emitted from the bent crystal.

16 Claims, 3 Drawing Sheets

