



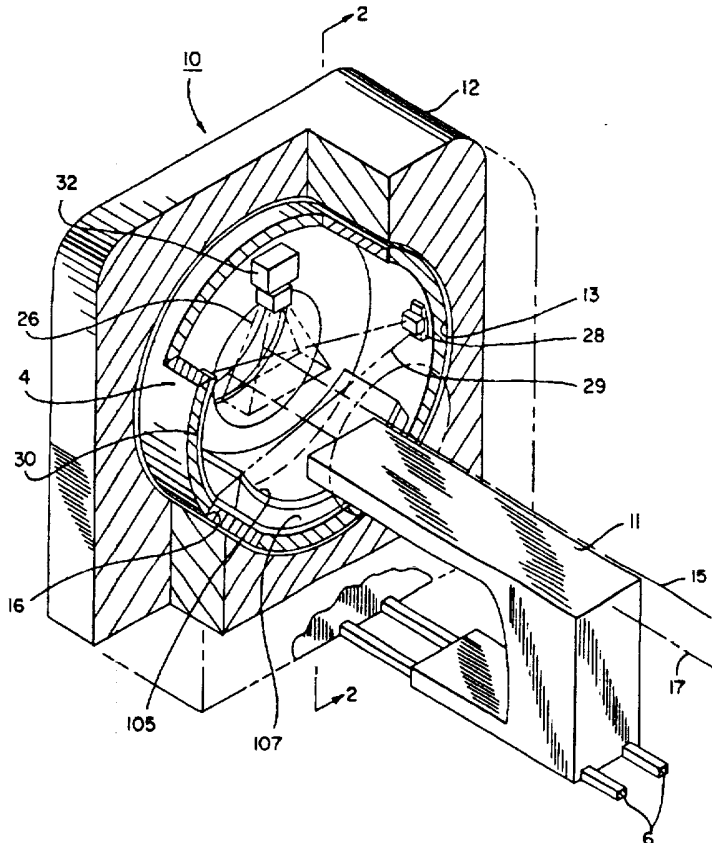
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification⁵ : A61N 5/01, 5/10, A61B 6/03, 6/00 A61N 5/00, G21K 1/04, H05G 1/26</p>	<p>A3</p>	<p>(11) International Publication Number: WO 94/28971 (43) International Publication Date: 22 December 1994 (22.12.94)</p>
<p>(21) International Application Number: PCT/US94/06488 (22) International Filing Date: 8 June 1994 (08.06.94) (30) Priority Data: 08/071,741 9 June 1993 (09.06.93) US 08/071,742 9 June 1993 (09.06.93) US (71) Applicant: WISCONSIN ALUMNI RESEARCH FOUNDATION [US/US]; Floor 13, 614 Walnut Street, Madison, WI 53707-7365 (US). (72) Inventors: SWERDLOFF, Stuart; 2309 Upham Street, Madison, WI 53704 (US). MACKIE, Thomas, Rockwell; 2310 Ravenswood Road, Madison, WI 53711 (US). HOLMES, Timothy; 18 Oak Glen Court, Madison, WI 53717 (US). (74) Agents: BAXTER, Keith, M. et al.; Quarles & Brady, Suite 2550, 411 East Wisconsin Avenue, Milwaukee, WI 53202-4477 (US).</p>	<p>(81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> (88) Date of publication of the international search report: 4 May 1995 (04.05.95)</p>	

(54) Title: RADIATION THERAPY SYSTEM

(57) Abstract

A radiation therapy machine having constrained angular freedom to produce a beam only within a gantry plane. A radiation shield may be stationary and not attached to the gantry or rotating to always block the primary beam. The constrained motion reduces the risk of patient/gantry collision and provides for extremely accurate radiation therapy planning. The therapy machine, so constrained, may include a tomographic imaging system on a single gantry. The two systems cooperate and employ many of the same hardware components to both plan and carry out therapy sessions in which irregularly shaped treatment volumes are accurately irradiated while tissue surrounding those volumes is minimally irradiated. The therapy machine also may include a collimator that changes the width of a fan beam of radiation as a treatment volume of the patient crosses the volume exposed by the beam so as to minimize the irradiation of healthy tissue at the front and back of the tumor. The width of the fan beam may be controlled to treat multiple adjacent, similar slices of the patient at one time reducing the treatment duration.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgystan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LK	Sri Lanka	SN	Senegal
CN	China	LU	Luxembourg	TD	Chad
CS	Czechoslovakia	LV	Latvia	TG	Togo
CZ	Czech Republic	MC	Monaco	TJ	Tajikistan
DE	Germany	MD	Republic of Moldova	TT	Trinidad and Tobago
DK	Denmark	MG	Madagascar	UA	Ukraine
ES	Spain	ML	Mali	US	United States of America
FI	Finland	MN	Mongolia	UZ	Uzbekistan
FR	France			VN	Viet Nam
GA	Gabon				

INTERNATIONAL SEARCH REPORT

Inte nal Application No
PCT/US 94/06488

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 5 A61N5/01 A61N5/10 A61B6/03 A61B6/00 A61N5/00
 G21K1/04 H05G1/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 5 A61N A61B G21K H05G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP,A,0 037 008 (SIEMENS) 7 October 1981 see abstract see page 5, line 24 - line 27 see page 6, line 6 - line 18 ---	1 2-4
X	US,A,4 660 799 (BUTLAND) 28 April 1987 see column 3, line 27 - line 52 see claim 1 ---	4
X	EP,A,0 113 879 (TOSHIBA) 25 July 1984 see abstract see page 4, line 20 - line 30 see page 5, line 16 - line 22	5,6
A	see claim 1 ---	7
	-/--	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *&* document member of the same patent family

Date of the actual completion of the international search

24 January 1995

Date of mailing of the international search report

05.04.95

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax (+31-70) 340-3016

Authorized officer

Taccoen, J-F

INTERNATIONAL SEARCH REPORT

 International Application No
 PCT/US 94/06488

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 464 645 (TOSHIBA) 8 January 1992 see column 3, line 49 - column 4, line 33 see column 4, line 42 - line 45 see column 4, line 57 - column 5, line 22 see column 2, line 4 - line 8 ---	5,6
X Y	FR,A,2 346 754 (SIEMENS) 28 October 1977 see page 2, line 37 - page 3, line 7 see page 4, line 18 - line 33 see page 7, line 33 - page 8, line 6 see claim 1 ---	1 3
A Y	US,A,4 233 519 (COAD) 11 November 1980 see abstract see column 1, line 36 - line 45 see column 2, line 26 - line 51 see claim 1 ---	1,4,5 3
A	EP,A,0 144 670 (SIEMENS) 19 June 1985 see abstract see page 1, line 12 - line 16 see claim 1 ---	3,7
A	EP,A,0 034 735 (BUSBY) 2 September 1981 see abstract ---	1,4,5
A	US,A,4 230 129 (LEVEEN) 28 October 1980 see abstract ---	1,4,5
A	DE,A,30 48 682 (ALOKA) 24 September 1981 see claim 1 see page 10 ---	4
A	WO,A,89 11826 (MEDICAL & SCIENTIFIC) 14 December 1989 see abstract see page 9, line 5 - line 12 see page 9, line 28 - page 10, line 3 see page 10, line 10 - line 14 ---	4
A	EP,A,0 161 324 (MATSUSHITA) 21 November 1985 see abstract ---	1,4,5
A	EP,A,0 387 801 (KONICA) 19 September 1990 see column 4, line 9 - line 46 ---	13-15
A	EP,A,0 417 965 (GENERAL ELECTRIC COMPANY) 20 March 1991 see abstract see column 22, line 31 - column 25, line 36 ---	13
1 6	A US,A,4 397 314 (VAGUINE) 9 August 1983 see column 8, line 34 - line 66 ---	13
	-/--	

INTERNATIONAL SEARCH REPORT

Internal Application No
PCT/US 94/06488

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 460 749 (PHILIPS) 11 December 1991 see the whole document ----	13
A	EP,A,0 449 113 (MATSUSHITA) 2 October 1991 see column 2, line 53 - column 3, line 18 -----	13

1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 94/06488

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claims: 1- 7
2. Claims: 8-12
3. Claims: 13-15
4. Claim: 16

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

13-15
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

...formation on patent family members

International Application No

PCT/US 94/06488

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0037008	07-10-81	DE-A- 3010780 JP-A- 57112848 US-A- 4411012	24-09-81 14-07-82 18-10-83
US-A-4660799	28-04-87	NONE	
EP-A-0113879	25-07-84	JP-B- 2060332 JP-A- 59111738 DE-A- 3374652 US-A- 4630202	17-12-90 28-06-84 07-01-88 16-12-86
EP-A-0464645	08-01-92	JP-A- 4058944 US-A- 5212717	25-02-92 18-05-93
FR-A-2346754	28-10-77	DE-A- 2613620	13-10-77
US-A-4233519	11-11-80	CA-A- 1141484 FR-A,B 2459054 JP-C- 1466616 JP-A- 56013957 JP-B- 63016149 SE-A- 8004527	15-02-83 09-01-81 10-11-88 10-02-81 07-04-88 19-12-80
EP-A-0144670	19-06-85	DE-A- 3339775 US-A- 4744099	15-05-85 10-05-88
EP-A-0034735	02-09-81	DE-A- 3006356 DE-A- 3030327 AU-A- 6689181 JP-A- 57196977 US-A- 4434341	24-09-81 18-03-82 27-08-81 03-12-82 28-02-84
US-A-4230129	28-10-80	CA-A- 1072186 CH-A- 591869 DE-A- 2547086 FR-A,B 2316974 GB-A- 1556416 JP-A- 52009994 NL-A- 7512880 US-E- RE32057	19-02-80 30-09-77 27-01-77 04-02-77 21-11-79 25-01-77 13-01-77 31-12-85

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 94/06488

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4230129		US-E- RE32066 US-A- 3991770 US-A- 4119102	21-01-86 16-11-76 10-10-78
DE-A-3048682	24-09-81	JP-A- 56119265 JP-C- 1343509 JP-A- 56094229 JP-B- 61001699 JP-A- 57099966 FR-A- 2474302	18-09-81 29-10-86 30-07-81 20-01-86 21-06-82 31-07-81
WO-A-8911826	14-12-89	US-A- 5165410	24-11-92
EP-A-0161324	21-11-85	US-A- 4794257	27-12-88
EP-A-0387801	19-09-90	JP-A- 2239598 DE-D- 69007143 DE-T- 69007143 US-A- 5029332	21-09-90 14-04-94 16-06-94 02-07-91
EP-A-0417965	20-03-91	US-A- 4998270 CA-A- 2014920 JP-A- 3149036	05-03-91 06-03-91 25-06-91
US-A-4397314	09-08-83	NONE	
EP-A-0460749	11-12-91	NL-A- 9001265 JP-A- 4233377 US-A- 5191621	02-01-92 21-08-92 02-03-93
EP-A-0449113	02-10-91	DE-D- 69104756 JP-A- 4212041 US-A- 5177776	01-12-94 03-08-92 05-01-93