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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,

[Continued on next page]

(54) Title: X-RAY GENERATION APPARATUS AND X-RAY RADIOGRAPHIC APPARATUS

FIG. 1A

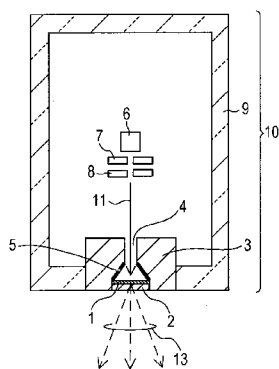
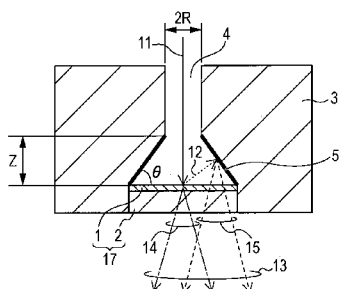


FIG. 1B



(57) Abstract: In an X-ray generation apparatus (10) of transmission type including an electron emission source (6), and a target (1) generating an X-ray (14) with collision of electrons emitted from the electron emission source against the target, the X-ray generation apparatus further includes a secondary X-ray generation portion (5) generating an X-ray with collision of electrons reflected by the target against the secondary X-ray generation portion, and the secondary X-ray generation portion and the target are arranged such that the X-ray (14) generated with the direct collision of the electrons against the target and the X-ray (15) generated with the collision of the electrons reflected by the target against the secondary X-ray generation portion are both radiated to an outside. X-ray generation efficiency is increased by effectively utilizing the electrons reflected by the target.

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HN, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/JP2012/072518

**A. CLASSIFICATION OF SUBJECT MATTER**  
 INV. H01J35/14 H01J35/16  
 ADD.  
 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)  
 H01J  
 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 practicable, search terms used)  
 EPO-Internal, WPI Data

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/021377 A1 (TURNER CLARK [US] ET AL) 30 January 2003 (2003-01-30)  paragraphs [0036], [0039], [0045], [0047], [0050] - [0052], [0062], [0064]; figures 1-4,6	1-3, 12-15, 17-20
X	JP 11 144653 A (MITSUBISHI HEAVY IND LTD) 28 May 1999 (1999-05-28) abstract; figure 5	1-6,8,9, 12,20
A	US 2008/112538 A1 (ROGERS CAREY SHAWN [US]) 15 May 2008 (2008-05-15) paragraph [0028]	1
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Further documents are listed in the continuation of Box C.       See patent family annex.

\* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"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</p> <p>"&amp;" document member of the same patent family</p>
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Date of the actual completion of the international search  14 March 2013	Date of mailing of the international search report  22/03/2013
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer  Krauss, Jan
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## INTERNATIONAL SEARCH REPORT

International application No  
PCT/JP2012/072518

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2005 327497 A (SHIMADZU CORP) 24 November 2005 (2005-11-24)  abstract; figures 1-5 -----	1-5, 7-10,12, 13,15, 17,20
X	JP 2005 346933 A (HAMAMATSU PHOTONICS KK) 15 December 2005 (2005-12-15)  abstract; figures 1,2,4 -----	1-5,8,9, 11-13, 15,17,20
X,P	WO 2011/105035 A2 (CANON KK [JP]; MIYAZAKI KAZUYA [JP]; OGURA TAKAO [JP]; UEDA KAZUYUKI []) 1 September 2011 (2011-09-01)  paragraphs [0066] - [0094]; figures 10-12 -----	1-6, 8-10, 12-15, 17-20

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP2012/072518

## Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

see additional sheet

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 fees, this Authority did not invite payment of additional fees.
  
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.:  
  
1-15, 17-20
  
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 and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-6, 8, 9, 12-15, 17-20

dedicated to an x-ray generating apparatus as defined in claim 6 with the relationship of  $2R \leq Z \leq 20R$

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2. claims: 7, 10, 11

dedicated to an x-ray generating apparatus with the specific geometries as defined in claims 7, 10 or 11

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3. claim: 16

dedicated to an x-ray generating apparatus with the specific materials of the support base as defined in claim 16

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No PCT/JP2012/072518
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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