

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
5 June 2008 (05.06.2008)

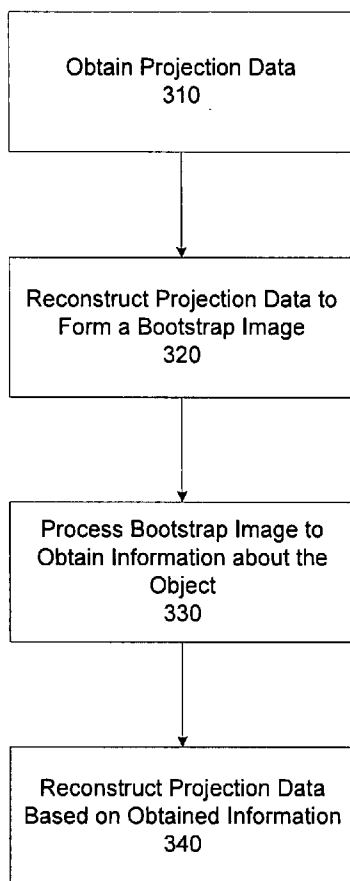
PCT

(10) International Publication Number  
WO 2008/066735 A3

- (51) International Patent Classification:  
G01N 23/04 (2006.01) A61B 6/00 (2006.01)
- (21) International Application Number:  
PCT/US2007/024244
- (22) International Filing Date:  
20 November 2007 (20.11.2007)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
11/603,876 22 November 2006 (22.11.2006) US
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- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR OBTAINING LOW-DOSE IMAGING



(57) Abstract: In one aspect, A method of imaging an object of interest positioned in an exposure area is provided. The method comprises obtaining projection data of the object by providing radiation to the exposure area and detecting at least some of the radiation exiting the object to form the projection data, performing a first reconstruction of the projection data to form at least one bootstrap image, obtaining first data based on information provided by the at least one bootstrap image, and performing a second reconstruction of the projection data based, at least in part, on the first data to form at least one second image.

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PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments*

**Published:**

— *with international search report*

**(88) Date of publication of the international search report:**

9 October 2008

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/024244

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. G01N23/04 A61B6/00

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)

G01N A61B

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)

EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/238133 A1 (KOPPE REINER [DE] ET AL KOPPE REINER [DE] ET AL) 27 October 2005 (2005-10-27) abstract paragraph [0012] - paragraph [0017] figures 1,2a-2e -----	1
X	WO 2006/039809 A (UNIV LAVAL [CA]; BEAULIEU LUC [CA]; YAZDI MEHRAN [CA]) 20 April 2006 (2006-04-20) abstract page 9, paragraph 2 page 12 - page 14; figures 2(a)-(f) ----- -/--	1

Further documents are listed in the continuation of Box C.

See patent family 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.
- \*Z\* document member of the same patent family

Date of the actual completion of the international search

9 May 2008

Date of mailing of the international search report

11/08/2008

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Authorized officer  
  

Rouault, Patrick

# INTERNATIONAL SEARCH REPORT

International application No PCT/US2007/024244
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 163 589 A (VARTANIAN MICHAEL H [US]) 19 December 2000 (2000-12-19) abstract claim 1 figure 2	1
A	US 2002/097830 A1 (RAUPACH RAINER [DE]) 25 July 2002 (2002-07-25) abstract page 22 - page 25	1,5

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2007/024244

## 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 allsearchable 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.:
  
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.:

see annex

### 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: 1-9

Method of imaging an object by estimating an exit spectrum indicative of the energy spectrum of radiation exiting an object to be inspected.

Problem: To improve image quality.

2. claims: 10, 11, 28-30

Method of imaging an object by estimating an amount of scattered radiation.

Problem: To improve image quality.

3. claims: 12-14

Method of imaging an object by obtaining boundary information indicative of a boundary of the object.

Problem: To improve image quality.

4. claims: 15-27

Method of imaging an object by using one density fiducial prior to obtaining image data of the object.

Problem: To improve image quality.

5. claims: 31-36

Method of detecting motion of an object positioned in an exposure area by comparing two images obtained at different times.

Problem: To inform an operator that motion blur the images may require to repeat imaging of the object.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/024244

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
US 2005238133	A1	27-10-2005	AU 2003249438 A1	03-03-2004
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			EP 1804667 A1	11-07-2007
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