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[Continued on next page]

(54) Title: IMAGING AND VISUALIZATION SYSTEMS, INSTRUMENTS, AND METHODS USING OPTICAL COHERENCE TOMOGRAPHY

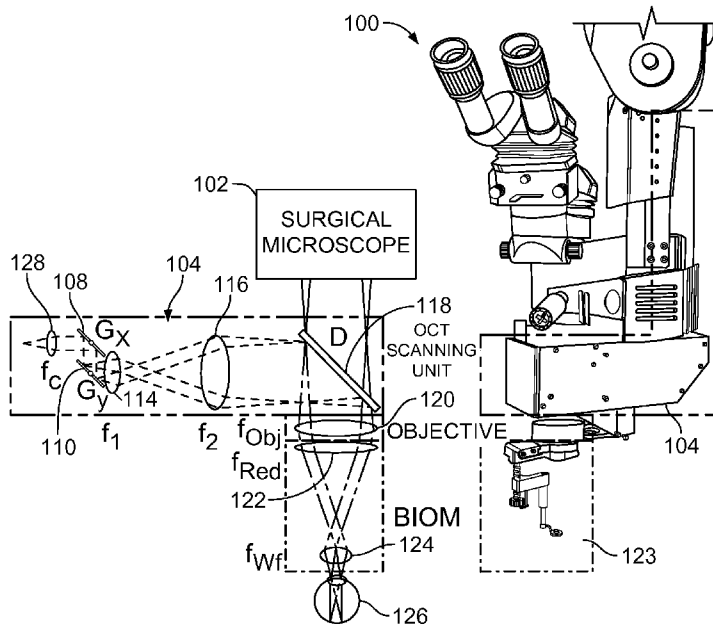
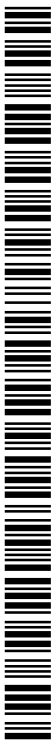


FIG. 1

(57) Abstract: Imaging and visualization systems, instruments, and methods using optical coherence tomography (OCT) are disclosed. A method for OCT image capture includes determining a location of a feature of interest within an operative field. The method also includes determining a relative positioning between the feature of interest and an OCT scan location. Further, the method includes controlling capture of an OCT image at a set position relative to the feature of interest based on the relative positioning.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/021839

<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - A61B 8/13 (2012.01) USPC - 600/425 According to International Patent Classification (IPC) or to both national classification and IPC</p>																				
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) IPC(8) - A61B 6/03, 8/00, 8/08, 8/10, 8/13 (2012.01) USPC - 356/73, 430; 600/425, 427, 443; 606/1, 107, 129</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) MicroPat, Google Patents, Google Scholar</p>																				
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>US 2010/0228123 A1 (BRENNAN et al) 09 September 2010 (09.09.2010) entire document</td> <td>1-20</td> </tr> <tr> <td>Y</td> <td>US 2002/0099290 A1 (HADDAD) 25 July 2002 (25.07.2002) entire document</td> <td>1-20</td> </tr> <tr> <td>Y</td> <td>US 2008/0002183 A1 (YATAGAI et al) 03 January 2008 (03.01.2008) entire document</td> <td>9-10, 19-20</td> </tr> <tr> <td>A</td> <td>US 2009/0287223 A1 (PUA et al) 19 November 2009 (19.11.2009) entire document</td> <td>1-20</td> </tr> <tr> <td>A</td> <td>US 2009/0131921 A1 (KURTZ et al) 21 May 2009 (21.05.2009) figure 1, 5, paragraphs 11, 45-47</td> <td>1-20</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	US 2010/0228123 A1 (BRENNAN et al) 09 September 2010 (09.09.2010) entire document	1-20	Y	US 2002/0099290 A1 (HADDAD) 25 July 2002 (25.07.2002) entire document	1-20	Y	US 2008/0002183 A1 (YATAGAI et al) 03 January 2008 (03.01.2008) entire document	9-10, 19-20	A	US 2009/0287223 A1 (PUA et al) 19 November 2009 (19.11.2009) entire document	1-20	A	US 2009/0131921 A1 (KURTZ et al) 21 May 2009 (21.05.2009) figure 1, 5, paragraphs 11, 45-47	1-20
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<p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/></p>																				
<p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>“A” document defining the general state of the art which is not considered to be of particular relevance</td> <td>“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</td> </tr> <tr> <td>“E” earlier application or patent but published on or after the international filing date</td> <td>“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</td> </tr> <tr> <td>“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)</td> <td>“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</td> </tr> <tr> <td>“O” document referring to an oral disclosure, use, exhibition or other means</td> <td>“&” document member of the same patent family</td> </tr> <tr> <td>“P” document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table>			“A” document defining the general state of the art which is not considered to be of particular relevance	“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	“E” earlier application or patent but published on or after the international filing date	“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	“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)	“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	“O” document referring to an oral disclosure, use, exhibition or other means	“&” document member of the same patent family	“P” document published prior to the international filing date but later than the priority date claimed									
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<p>Date of the actual completion of the international search</p> <p>06 July 2012</p>		<p>Date of mailing of the international search report</p> <p>13 JUL 2012</p>																		
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</p>		<p>Authorized officer:</p> <p>Blaine R. Copenheaver</p> <p>PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>																		

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/021839

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 extra 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 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.:
1-20

- 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.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-20, drawn to a method and system for receiving a plurality of OCT B-scans of a field of view area and applying spatial compounding to generate an OCT image of the area of the field of view area.

Group II, claims 21-54, 62-68, drawn to a method, system and OCT instrument for determining a location of a feature of interest within an operative field, determining a relative positioning between the feature of interest and an OCT scan location, and controlling capture of an OCT image at a set position relative to the feature of interest based on the relative positioning.

Group III, claims 55-61, drawn to a system comprising a heads-up display (HUD) for display via an ocular eyepiece unit, and a user interface controller for determining surgical information associated with a surgical site image projected for view through the ocular eyepiece unit and controlling the HUD to display the surgical information.

The inventions listed as Groups I, II and III do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: receiving a plurality of OCT B-scans of a field of view area and applying spatial compounding to generate an OCT image of the area of the field of view area as claimed therein is not present in the invention of Groups II and III. The special technical feature of the Group II invention: determining a location of a feature of interest within an operative field, determining a relative positioning between the feature of interest and an OCT scan location, and controlling capture of an OCT image at a set position relative to the feature of interest based on the relative positioning as claimed therein is not present in the invention of Groups I or III. The special technical feature of the Group III invention: a heads-up display (HUD) for display via an ocular eyepiece unit, and a user interface controller for determining surgical information associated with a surgical site image projected for view through the ocular eyepiece unit and controlling the HUD to display the surgical information as claimed therein is not present in the invention of Groups I or II.

Groups I, II and III lack unity of invention because even though the inventions of these groups require the technical feature of an optical coherence tomography (OCT) image capture scanning system and apparatus for surgical site image capture and processing, this technical feature is not a special technical feature as it does not make a contribution over the prior art in view of US 2009/0131921 A1 (KURTZ et al) 21 May 2009 (21.05.2009) figure 1, 5, paragraphs 11, 45-47.

Since none of the special technical features of the Group I, II or III inventions are found in more than one of the inventions, unity of invention is lacking.