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[Continued on next page]

(54) **Title**: APPARATUS AND METHOD FOR INTRAVASCULAR MEASUREMENTS

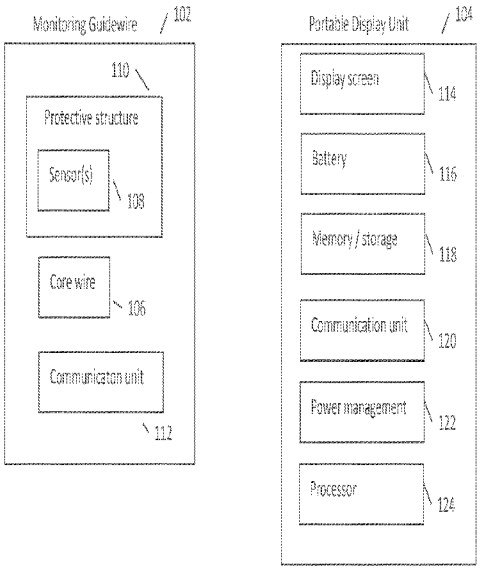

FIG. 1

(57) **Abstract**: Intravascular diagnosis apparatus and methods are disclosed. In one aspect of the disclosed technology, a intravascular diagnosis apparatus includes a monitoring guidewire and a display unit. The monitoring guidewire includes a core wire and a sensor disposed in a distal region of the core wire. The display unit includes a processor and a display screen, and is capable of receiving communication from the monitoring guidewire. The display unit is configured to perform computations using the processor based on communications received from the monitoring guidewire and is configured to display information on the display screen based on the computations. The display unit can be configured to be disposed after a predetermined number of uses or after a predetermined duration of use.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US14/45171

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A61B 5/00, 5/021 (2015.01)
CPC - A61B 5/02, 5/026
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(8): A61B 5/00, 5/021 (2015.01)
CPC: A61B 5/02, 5/026

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)
MicroPatent (US-G, US-A, EP-A, EP-B, WO, JP-bib, DE-C,B, DE-A, DE-T, DE-U, GB-A, FR-A); PatSeer (US, EP, WO, GB); Google/Google Scholar; IP.com; PubMed/MEDLINE: guidewire, laser, etch, fractional flow reserve, ffr, sensor, pressure, core wire, port, distal, proximal, battery, inoperable, duration, predetermined, dispoable, display.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 8391956 B2 (ZELLERS, RD et al) March 5, 2013; figure 1-3, 8, 9; column 3, lines 20-23, lines 52-56; column 4, lines 64-67 to column 5, lines 1-24; column 15, lines 31-45; claim 1-4	1, 5-6, 9-16, 19, 22-24, 30
Y	US 2006/0135864 A1 (WESTERLUND, LE et al.) June 22, 2006; paragraphs [0044], [0068]	1, 5-6, 9-16, 19, 22-24, 30
Y	US 2010/0268038 A1 (SMITH, L) October 21, 2010; paragraphs [0008], [0025]	6
Y	US 2005/0096566 A1 (ARNOTT, RJ) May 5, 2005; abstract; claim 1	12
Y	US 2003/0023190 A1 (COX, BJ) January 30, 2003; paragraph [0031]	13
Y	US 2011/0152721 A1 (SELA, R et al) June 23, 2011; paragraph [0079]	14
Y	US 2007/0078352 A1 (PIJLS, NHJ) April 5, 2007; paragraphs [0009], [0022], [0038]-[0039], [0042]	15, 16, 19
Y	US 2010/0234698 A1 (MANSTROM, DR et al) September 16, 2010; figures 11, 14-15; paragraphs [0044], [0046], [0102], [0116]-[0117]	15, 22-23
Y	US 2012/0289808 A1 (HUBINETTE, U) November 15, 2012; paragraph [0048]	24
A	US 2002/0072880 A1 (SVANERUDH, J et al) June 13, 2002; paragraphs [0017], [0091]	17-18, 20-21
A	WO 2012/173697 A1 (ANGIOMETRIX CORPORATION) December 20, 2012; paragraphs [0108], [0298]	1-30

☐ Further documents are listed in the continuation of Box C. ☐

* 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 application or patent 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	Date of mailing of the international search report
07 January 2015 (07.01.2015)	21 JAN 2015
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US14/45171

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:

Group I: Claims 1-30 are directed toward a portable apparatus for intravascular diagnosis comprising a handheld display.

Group II: Claim 1-29 and 31 is directed toward a portable apparatus for intravascular diagnosis comprising a display unit having no capability of being turned off after the display screen is turned on.

The inventions listed as Groups I-II 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 features of Group I include a handheld display unit, which are not present in Group II; the special technical features of Group II include display unit having no capability of being turned off after the display screen is turned on, which are not present in Group I.

-***- See Supplemental Page-***-

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.:
1-30

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.

-***-Continued from Box No III: Observations where unity of invention is lacking-***-

The common technical features of Groups I and II are a portable apparatus for intravascular diagnosis, the portable apparatus comprising: a monitoring guidewire comprising a core wire and a sensor disposed in a distal region of the core wire; a display unit configured to be disposed after a predetermined number of uses or after a predetermined duration of use, the display unit comprising a processor and a display screen, wherein the display unit is capable of receiving communication from the monitoring guidewire, is configured to perform computations using the processor based on communications received from the monitoring guidewire, and is configured to display information on the display screen based on the computations.

These common technical features are disclosed by US 8,391,956 B2 to Zellers et al., (hereinafter 'Zellers') in view of US 2006/0135864 A1 to Westerlund et al., (hereinafter 'Westerlund'). Zellers discloses a portable apparatus for intravascular diagnosis, the portable apparatus comprising: a monitoring guidewire (figure 3) comprising a core wire (48; figure 3) and a sensor (30) disposed in a distal region of the core wire (figure 3); a display unit (20; figure 8); the display unit comprising a processor and a display screen (20 includes a display and a processor; figure 9; column 5, lines 13-17) wherein the display unit is capable of receiving communication from the monitoring guidewire (20 may be connected to the sensor of the device 30; figure 8), is configured to perform computations using the processor based on communications received from the monitoring guidewire (figures 12e-16c), and is configured to display information on the display screen based on the computations (device performs calculations via a computing component and displays data to the user; claims 1-4). Zellers does not disclose a display unit configured to be disposed after a predetermined number of uses or after a predetermined duration of use. Westerlund discloses a display unit configured to be disposed after a predetermined number of uses or after a predetermined duration of use (display unit/monitor may be disposable; paragraphs [0044], [0068]). It would have been obvious to a person of ordinary skill in the art, at the time of the invention to further include wherein the device of Zellers has a display that may be disposed, as taught by Westerlund, for the advantage of having a device that can be sterile during use so as to not cause contamination to the patient or surgical equipment during a treatment or diagnostic procedure.

Since the common technical features are previously disclosed by the Zellers and Westerlund references, the common features are not special and so Groups I and II lack unity.