

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
12 August 2004 (12.08.2004)

PCT

(10) International Publication Number  
**WO 2004/066814 A3**

(51) International Patent Classification<sup>7</sup>: **A61B 5/02**, 5/04

[US/US]; 300 La Mesa Drive, Portola Valley, CA 94028 (US). **RUGGIO, Joseph, M.** [US/US]; 27632 Fargo Road, Laguna Hills, CA 92653 (US).

(21) International Application Number:  
PCT/US2004/001814

(74) Agents: **SMITH, Scott, M.** et al.; Townsend and Townsend and Crew LLP, Two Embarcadero Center, 8th Floor, San Francisco, CA 94111-3834 (US).

(22) International Filing Date: 23 January 2004 (23.01.2004)

(25) Filing Language: English

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(26) Publication Language: English

(30) Priority Data:  
60/442,376 24 January 2003 (24.01.2003) US

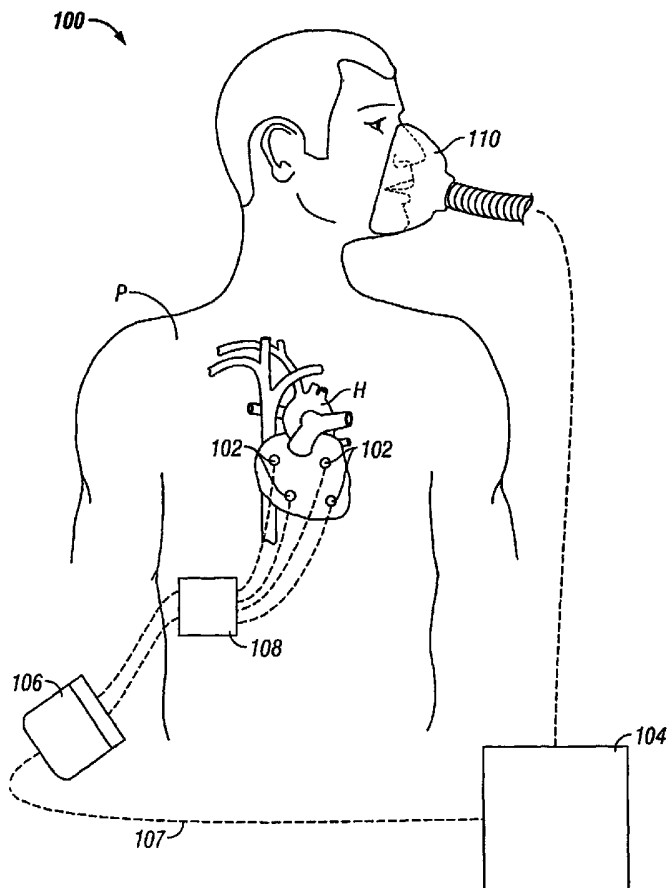
(71) Applicant (*for all designated States except US*): **PROTEUS BIOMEDICAL INC.** [US/US]; 800 El Camino Real, Suite 220, Menlo Park, CA 94025 (US).

(72) Inventors; and

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, [Continued on next page]

(75) Inventors/Applicants (*for US only*): **ZDEBLICK, Mark**

(54) Title: METHOD AND SYSTEM FOR REMOTE HEMODYNAMIC MONITORING



(57) Abstract: A cardiac sensor system includes implanted cardiac sensor assemblies and an external controller which receives information from the implanted sensors. The sensors permit direct measurement of a number of physiologic parameters. The external controller permits calculation of a variety of performance values based on the measured physiological parameters. Optionally, patient oxygen consumption can be measured externally and combined with the internally measured physiologic parameters in order to calculate a variety of unique performance values.

WO 2004/066814 A3



GM, KE, LS, MW, MZ, 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, IT, LU, MC, NL, 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*

**(88) Date of publication of the international search report:**  
19 May 2005

**Published:**

— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/01814

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(7) : A61B 5/02, 5/04 US CL : 600/481,508-528 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) U.S. : 600/481,508-528 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)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,156,154 A (VALENTA, JR. et al) 20 October 1992 (20.10.1992), figs. 1, 2, 8A, 8B, and 10; col. 6, lines 6-31; col. 10, line 31-col. 11, line 7; col. 14, line 44-col. 15, line 5; col. 20, lines 3-41; col. 16, line 45-col. 17, line 11; col. 24, lines 8-37.	1,4-7,10, 28 ----- 8,9
X --- Y	US 6,264,906 B1 (EKWALL et al) 24 July 2001 (24.07.2001), figs. 1 & 3; col. 3, line 41-col. 4, line 54.	34 ----- 38,39
X --- Y	US 6,309,350 B1 (VanTassel et al) 30 October 2001 (30.10.2001), figs. 1 & 3; col. 3, line 35-col. 4, line 17.	1,15,17,19,20 ----- 18
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> 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	"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 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		
Date of the actual completion of the international search 23 February 2005 (23.02.2005)	Date of mailing of the international search report <b>18 MAR 2005</b>	
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. (703) 305-3230	Authorized officer <i>Sharon N. Grewe for</i> Max Hindenburg Telephone No. (708) 308-0858	

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US04/01814

## C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,411,537 A (MUNSHI et al) 02 May 1995 (02.05.1995), figs. 1 & 2; col. 7, line 4-col. 8, line 33; col. 10, lines 13-26.	8,9,18
Y	US 5,072,737 A (GOULDING) 17 December 1991 (17.12.1991), fig. 1; col. 4, line 1-col. 5, line 9; col. 6, lines 12-33.	38,39
A	US 5,788,647 A (EGGERS) 04 August 1998 (04.08.1998), entire document	
A	US 5,213,098 A (BENNETT et al) 25 May 1993 (25.05.1993), entire document.	
A	US 6,363,279 B1 (BEN-HAIM et al) 26 March 2002 (26.03.2002), entire document	
A	US 5,544,656 A (PITSILLIDES et al) 13 August 1996 (13.08.1996), entire document	