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(54) Apparatus and method for determining cardiac output in a living subject

(57) An improved apparatus and method for determining the cardiac output of a living subject. The improved apparatus generally comprises one or more electrode assemblies or patches affixed to the skin of the subject in the vicinity of the thoracic cavity. In one embodiment, the apparatus comprises a constant current source impedance cardiography (ICG) monitor

adapted as a stand-alone system. In another embodiment, the apparatus comprises a module adapted for use with a host monitoring system, the latter providing ECG, blood pressure, and/or other inputs to the module. Method of detecting a loss of electrical continuity in one or more of the terminals of the electrode patch, and selecting between a plurality of signal inputs based on signal quality, are also disclosed.

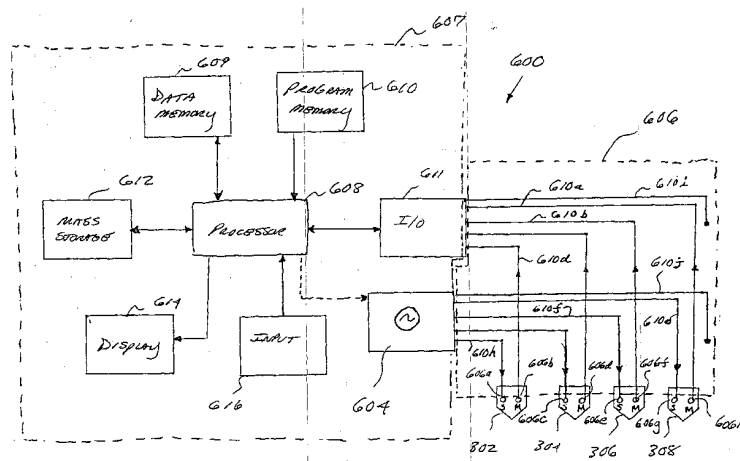


FIG. 6

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EUROPEAN SEARCH REPORT

Application Number  
EP 02 25 4832

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 5 505 209 A (REINING WILLIAM N) 9 April 1996 (1996-04-09)	1-3, 5-10,12, 13,18, 20,21, 23,25, 26, 33-35, 37,43,44	A61B5/029 A61B5/00 A61B5/0452 A61B5/0424 A61B5/053
A	* column 2, lines 44-67 * * column 4, line 34 - column 6, line 5; figures 1,2 * -----	11,22, 36,38-42	
X	US 5 103 828 A (SRAMEK BOHUMIR) 14 April 1992 (1992-04-14)	1-3,5,6, 8-10,12, 13,15, 18,20, 21,23, 25,26, 33-35,43	
A	* column 12, line 32 - column 20, line 60; figures 4-7 * -----	7,11,22, 36-42,44	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A61B
X	US 5 178 154 A (ACKMANN JAMES J ET AL) 12 January 1993 (1993-01-12)	1-3,5,6, 8-10,12, 13,15, 18,20, 21,23, 25,26, 33-35,43	
A	* column 3, line 33 - column 5, line 65; figure 1 * ----- -/--	7,11,22, 36-42,44	
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 February 2004	Examiner Fischer, O
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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European Patent  
Office

EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)	
X	WO 98/53737 A (TSOGLIN ALEXANDER ;FRINERMAN EFIM (IL); N I MEDICAL LTD (IL)) 3 December 1998 (1998-12-03)	1-3,5,6, 8-10, 12-14, 18-21, 23,25, 26, 33-35, 41,43		
A	* page 15, line 16 - page 18, line 29; figures 2A,2H,3 *	7,11, 37-40,42		
X	WO 00/62664 A (BRIEN WILLIAM G O ;LLEWELLYN MICHAEL D (GB); MULLARKEY WILLIAM J ()) 26 October 2000 (2000-10-26)	1-3, 5-10,12, 13,18, 20,21, 23,25, 26, 33-35, 37,43,44		
A	* page 12, line 7 - page 23, line 13; figures 1-6 *	11, 38-40,42		
X	EP 0 776 631 A (HEWLETT PACKARD CO) 4 June 1997 (1997-06-04)	27-29		TECHNICAL FIELDS SEARCHED (Int.Cl.7)
A	* page 3, line 20 - page 5, line 37; figures 1-6B *	30-32		
A	US 4 577 639 A (STEIN-GELINAS CAROLYN ET AL) 25 March 1986 (1986-03-25) * column 2, line 25 - column 4, line 52; figures 1-4 *	27-32		
A	US 6 217 525 B1 (NISKANEN ROBERT A ET AL) 17 April 2001 (2001-04-17) * column 11, line 27 - column 13, line 67; figures 1-7 *	27-32		
The present search report has been drawn up for all claims				
Place of search		Date of completion of the search	Examiner	
Munich		18 February 2004	Fischer, 0	
CATEGORY OF CITED DOCUMENTS				
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document		

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-17, 18-26, 33-44

Cardiac output measuring device/system comprising:

- a stimulation source
- a first interface to the patient (for ECG and impedance signals) and;
- a second interface to a monitoring device.

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2. claims: 27-32

Method of providing an input waveform to a processing device comprising:

- generating a sum of a plurality of parameters, said parameters being derived from a plurality of input waveforms
- selecting one of said plurality of waveforms based on the value of said sum.

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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 02 25 4832

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-02-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5505209	A	09-04-1996	DE 69530207 D1	08-05-2003
			DE 69530207 T2	05-02-2004
			EP 0771172 A1	07-05-1997
			WO 9601586 A1	25-01-1996
US 5103828	A	14-04-1992	WO 9000367 A1	25-01-1990
US 5178154	A	12-01-1993	NONE	
WO 9853737	A	03-12-1998	WO 9853737 A1	03-12-1998
			AU 2913397 A	30-12-1998
WO 0062664	A	26-10-2000	US 6416471 B1	09-07-2002
			AU 4642300 A	02-11-2000
			CA 2365316 A1	26-10-2000
			EP 1176905 A1	06-02-2002
			JP 2002541893 T	10-12-2002
			WO 0062664 A1	26-10-2000
			US 6454708 B1	24-09-2002
			ZA 200107935 A	22-08-2003
EP 0776631	A	04-06-1997	DE 69629164 D1	28-08-2003
			EP 0776631 A1	04-06-1997
			JP 9173310 A	08-07-1997
			US 5817027 A	06-10-1998
US 4577639	A	25-03-1986	AU 4907385 A	15-05-1986
			CN 85108601 A	10-09-1986
			EP 0182197 A2	28-05-1986
US 6217525	B1	17-04-2001	US 6171256 B1	09-01-2001
			CN 1299248 T	13-06-2001
			EP 1075214 A1	14-02-2001
			JP 2002512832 T	08-05-2002
			WO 9955228 A1	04-11-1999
			EP 1075213 A1	14-02-2001
			JP 2002512831 T	08-05-2002
			WO 9955226 A1	04-11-1999

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	用于确定活体中的心输出量的装置和方法		
公开(公告)号	<a href="#">EP1275342A3</a>	公开(公告)日	2004-04-14
申请号	EP2002254832	申请日	2002-07-10
申请(专利权)人(译)	CARDIODYNAMICS INTERNATIONAL CORPORATION		
当前申请(专利权)人(译)	CARDIODYNAMICS INTERNATIONAL CORPORATION		
发明人	HEPP, DENNIS G., C/O CARDIO DYNAMICS INT. CORP. BAURA, GAIL D., C/O CARDIO DYNAMICS INT. CORP. ELF, JAMES O., C/O CARDIO DYNAMICS INT. CORP. MALECHA, JEREMY R., CARDIO DYNAMICS INT. CORP. NG, SAU K., CARDIO DYNAMICS INT. CORP.		
IPC分类号	A61B5/029 A61B5/0408 A61B5/0416 A61B5/053 A61B5/00 A61B5/0424 A61B5/0452		
CPC分类号	A61B5/0416 A61B5/02028 A61B5/029 A61B5/04085 A61B5/0535 A61B5/6843 A61B5/7225 A61B5/726		
优先权	09/903473 2001-07-10 US		
其他公开文献	EP1275342A2 EP1275342B1		
外部链接	<a href="#">Espacenet</a>		

摘要(译)

一种用于确定活体的心输出量的改进装置和方法。改进的装置通常包括在胸腔附近固定到受试者皮肤的一个或多个电极组件或贴片。在一个实施例中，该装置包括适合作为独立系统的恒流源阻抗心电图（ICG）监视器。在另一个实施例中，该装置包括适用于主机监测系统的模块，后者向模块提供ECG，血压和/或其他输入。还公开了检测电极贴片的一个或多个端子中的电连续性的损失，以及基于信号质量在多个信号输入之间进行选择的方法。

