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(54) Correlation of ultrasound images and gated position measurements

(57) A calibration apparatus (50) includes a motion assembly (59), which is arranged to move an imaging probe (28) through a calibration point having known coordinates. The imaging probe includes an ultrasound transducer (39) and a position sensor for acquiring concurrently a first sequence of ultrasound images and a second sequence of position measurements. The apparatus further includes a marking circuit, which is arranged to mark an ultrasound image that is acquired by the ultrasound transducer in the first sequence when the imaging probe is at the calibration point. A processor is arranged to calibrate a time offset between the first and second sequences by associating the marked ultrasound image in the first sequence with a position measurement in the second sequence whose coordinates match the coordinates of the calibration point.

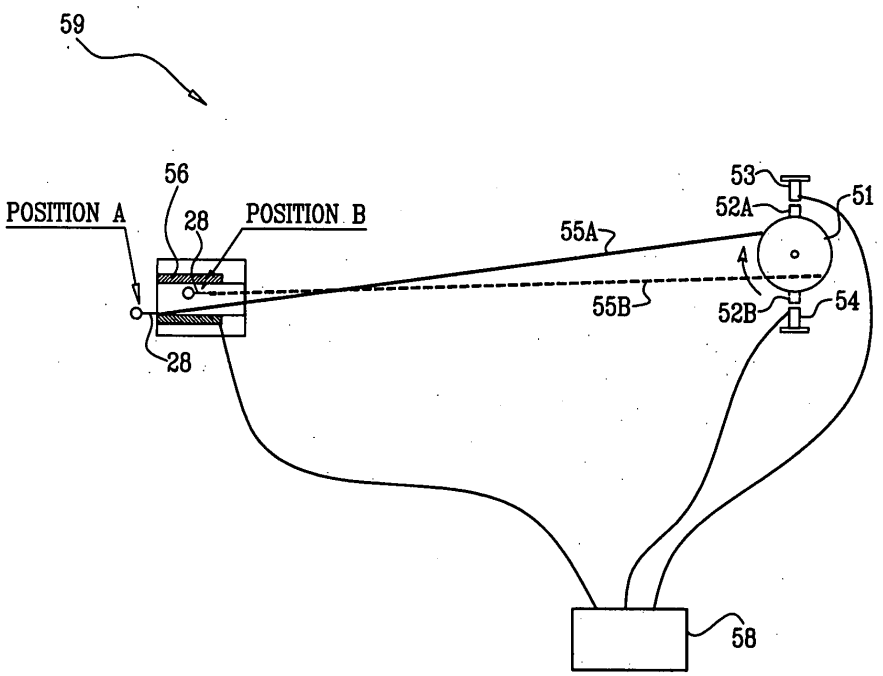

FIG. 4

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PARTIAL EUROPEAN SEARCH REPORT

which under Rule 63 of the European Patent Convention shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number EP 08 25 0367

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	HUANG Q H ET AL: "Development of a portable 3D ultrasound imaging system for musculoskeletal tissues" ULTRASONICS, IPC SCIENCE AND TECHNOLOGY PRESS LTD. GUILDFORD, GB, vol. 43, no. 3, 1 January 2005 (2005-01-01), pages 153-163, XP004647265 ISSN: 0041-624X	1,2, 7-10, 22-25	INV. G01S7/52 A61B8/12 ADD. A61B19/00
Y	* pages 155-156 *	6	

Y	PRAGER R W ET AL: "Stradx: real-time acquisition and visualization of freehand three-dimensional ultrasound" MEDICAL IMAGE ANALYSIS, OXFORDUNIVERSITY PRESS, OXFORD, GB, vol. 3, no. 2, 1 January 1998 (1998-01-01), pages 129-140, XP002199116 ISSN: 1361-8423 * pages 131-133 *	6	

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TECHNICAL FIELDS SEARCHED (IPC)

G01S
A61B

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC to such an extent that a meaningful search into the state of the art cannot be carried out, or can only be carried out partially, for these claims.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
Munich	10 June 2008	Willig, Hendrik

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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EPO FORM 1503 03.82 (P04E07)

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PARTIAL EUROPEAN SEARCH REPORT

Application Number
EP 08 25 0367

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	MERCIER L ET AL: "A review of calibration techniques for freehand 3-D ultrasound systems" ULTRASOUND IN MEDICINE AND BIOLOGY, NEW YORK, NY, US, vol. 31, no. 4, 1 April 2005 (2005-04-01), pages 449-471, XP004849064 ISSN: 0301-5629 * pages 462-464 *	1-10, 22-25	
A	WO 2005/039391 A (UNIV LELAND STANFORD JUNIOR [US]; SHAHIDI RAMIN [US]) 6 May 2005 (2005-05-06) * page 9, lines 4-13 *	1-10, 22-25	TECHNICAL FIELDS SEARCHED (IPC)

EPO FORM 1503 03.82 (P04C10)

European Patent Office

INCOMPLETE SEARCH
SHEET C

Application Number
EP 08 25 0367

Claim(s) not searched:
11-21

Reason for the limitation of the search (non-patentable invention(s)):

Claims 11-21 are directed to a method for calibration. As it becomes apparent from claim 12 and from claims 20 and 21, the claimed method encompasses a surgical intervention, namely the step of inserting the imaging probe into an organ of a living human or animal being. By means of this step the method as a whole is considered to be a method for treatment of the human or animal body by surgery in the sense of Art. 53(c) EPC.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 25 0367

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
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10-06-2008

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WO 2005039391 A	06-05-2005	EP 1680024 A2	19-07-2006
		EP 1689290 A2	16-08-2006
		JP 2007508913 T	12-04-2007
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		WO 2005043319 A2	12-05-2005

EPO FORM P0459

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

专利名称(译)	超声图像与门控位置测量的相关性		
公开(公告)号	EP1953564A3	公开(公告)日	2008-08-13
申请号	EP2008250367	申请日	2008-01-30
[标]申请(专利权)人(译)	韦伯斯特生物官能公司		
申请(专利权)人(译)	生物传感韦伯斯特，INC.		
当前申请(专利权)人(译)	生物传感韦伯斯特，INC.		
[标]发明人	HOCHMITZ MOSHE		
发明人	HOCHMITZ, MOSHE		
IPC分类号	G01S7/52 A61B8/12 A61B19/00		
CPC分类号	A61B8/12 A61B5/061 A61B8/4254 A61B8/543 A61B8/58 A61B34/20 A61B2034/105 A61B2034/2051 A61B2034/2055 A61B2090/367 A61B2090/378 A61B2090/3784 G01S7/5205 G01S7/52087 G01S15/899		
优先权	11/669620 2007-01-31 US		
其他公开文献	EP1953564B1 EP1953564A2		
外部链接	Espacenet		

摘要(译)

校准装置（50）包括运动组件（59），其被布置成使成像探针（28）移动通过具有已知坐标的校准点。成像探头包括超声换能器（39）和位置传感器，用于同时获取第一序列的超声图像和第二序列的位置测量。该装置还包括标记电路，该标记电路被布置成当成像探针处于校准点时标记由超声换能器以第一序列获取的超声图像。处理器被布置成通过将第一序列中的标记的超声图像与第二序列中的位置测量相关联来校准第一和第二序列之间的时间偏移，第二序列的坐标与校准点的坐标匹配。

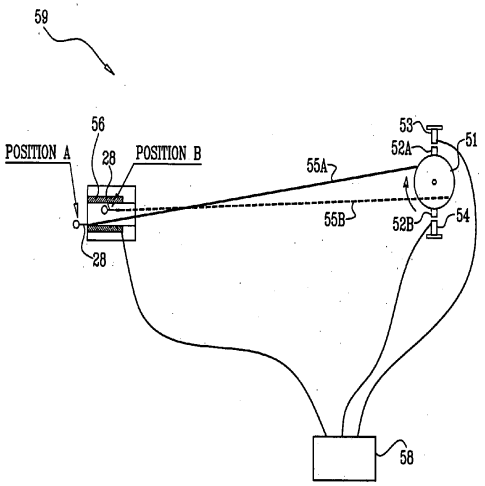

FIG. 4