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Campus, Building 44, NL-5656 AE Eindhoven (NL).(81) Designated States (unless otherwise indicated, for every
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DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
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MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
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MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
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ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a
patent (Rule 4.17(ii))— as to the applicant's entitlement to claim the priority of the
earlier application (Rule 4.17(iii))

Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

[Continued on next page]

(54) Title: WIRELESS PROSPECTIVE MOTION MARKER

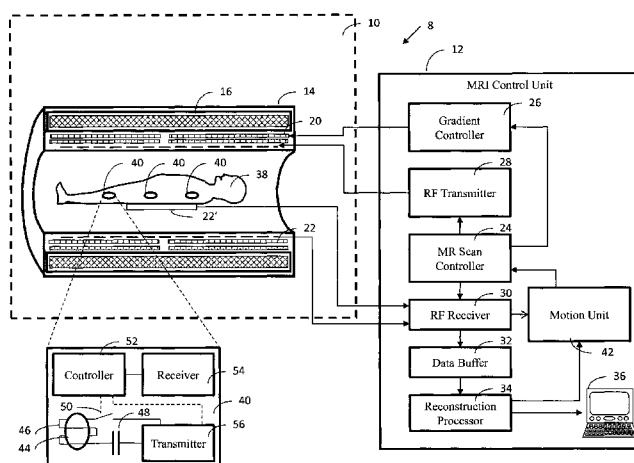


FIGURE 1

(57) **Abstract:** A magnetic resonance system includes a magnetic resonance scanner (8) and a magnetic resonance scan controller (24). A plurality of markers (40, 140) are attached to the subject to monitor motion of a portion of a subject within an examination region. A motion control unit receives motion data from the markers indicative of the motion and controls the magnetic scan controller to adjust scan parameters to compensate for the motion. In one embodiment, the marker (40) includes a substance (44) which resonates at a characteristic frequency in response to radio excitations by the magnetic resonance scanner. A controller (52) switches an inductive circuit (48, 50) disposed adjacent the substance between a tuned state and a detuned state. In another embodiment, the motion sensor includes an accelerometer, a gyroscope, a motion sensor, or a Hall-effect element, and a controller (144) which gathers motion data generated by the element and provides temporary storage for the motion data. A communication unit (146, 148, 150) transmits the motion data wirelessly.



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17 January 2013

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2012/052460

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61B5/055 A61B5/11 G01R33/565
ADD.

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)
A61B G01R

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)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/209846 A1 (BAMMER ROLAND [US]) 20 August 2009 (2009-08-20) figure 1 paragraphs [0019], [0021], [0034], [0035]	1-4,7-11
X	----- US 2003/220559 A1 (EHNHOLM GOSTA J [FI] ET AL EHNHOLM GOESTA J [FI] ET AL) 27 November 2003 (2003-11-27) paragraphs [0009], [0024], [0029] - [0032]	1-4,7-11
A	----- WO 2008/142629 A2 (KONINKL PHILIPS ELECTRONICS NV [NL]; ELGORT DANIEL R [US]; SHECHTER GU) 27 November 2008 (2008-11-27) page 5, line 13 - line 28 page 8, line 27 - line 32 figure 1 -----	2-4,7,8

☐

Further documents are listed in the continuation of Box C.

☒

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

"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

21 September 2012

Date of mailing of the international search report

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Name and mailing address of the ISA/

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Authorized officer

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2012/052460

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 additional 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 an 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.:
1-4, 10, 11(completely); 7-9(partially)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4, 10, 11(completely); 7-9(partially)

A motion compensated magnetic resonance imaging (MRI) system and method wherein the markers include a resonatable material and at least one of a LC circuit or a RF micro coil.

2. claims: 5, 6(completely); 7-9(partially)

A motion compensated magnetic resonance imaging (MRI) system and method wherein the markers include a motion sensor.

3. claims: 12-20(completely); 7(partially)

A marker comprising a transmitter configured to transmit signals carrying motion data. A motion compensated magnetic resonance imaging method wherein the markers transmit motion indicating signals wirelessly.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2012/052460

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009209846 A1	20-08-2009	NONE	

US 2003220559 A1	27-11-2003	AU 2003237218 A1	12-12-2003
		EP 1509152 A1	02-03-2005
		JP 2005527292 A	15-09-2005
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		WO 03099154 A1	04-12-2003

WO 2008142629 A2	27-11-2008	NONE	
