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(54) Title: EXPANDING IMAGING PROBE

(57) Abstract: An imaging probe for imaging inside a cavity surrounded by a wall, the probe comprising: a) a probe body having a contracted state and an expanded state; and b) at least two imaging sensors, mounted on the probe body and having fields of view in different directions; wherein, when the probe body is in the expanded state, the fields of view of the imaging sensors respectively comprise portions of the wall of the cavity on different sides of the cavity.

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IL2005/001097

A. CLASSIFICATION OF SUBJECT MATTER
INV. G01R33/28

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)
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 practical, search terms used)

EPO-Internal, PAJ, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/158144 A1 (H. KEREN) 12 August 2004 (2004-08-12) paragraph [0006] - paragraph [0011] paragraph [0071] - paragraph [0086] figures 2,5-17	1-101, 104
Y	WO 93/05706 A (MEDRAD, INC) 1 April 1993 (1993-04-01) the whole document	1-101, 104
X	US 5 050 607 A (W.G. BRADLEY, L.W. JONES) 24 September 1991 (1991-09-24) column 5, line 3 - column 7, line 10 figures 2,4,5	1-9
A	EP 0 385 367 A (MEDRAD INC) 5 September 1990 (1990-09-05) the whole document	1-20

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 document 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.
- *Z* document member of the same patent family

Date of the actual completion of the international search

13 July 2006

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02/08/2006

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2005/001097

Box 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.: 102, 103, 105-137
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:
see FURTHER INFORMATION sheet PCT/ISA/210

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 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:

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 fee, this Authority did not invite payment of any additional fee.

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.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 102, 103, 105-137

Claim 102 specifies:

- an imaging system for imaging the walls of a blood vessel, comprising:
 - a) a probe according to any of claims 87-100;
 - b) a power supply capable of supplying power at least at an RF frequency;
 - c) a power channel which conveys electrical power from the power supply to the imaging sensors;
 - d) a receiving channel; and
 - e) a controller which controls one or more of the timing, amplitude, frequency and phase of the electrical power, and which receives imaging data from the imaging sensors through the receiving channel.

It is not clear for which technical reasons or for which technical purposes electrical power is supplied to the imaging probes defined in claim 87.

Moreover, claims 102 and 87 do not define:

- what is to be received / treated in a receiving channel,
- how and why timing, amplitude, frequency and phase of the electrical power [furthermore, is this DC electrical power?] must / can be controlled.

Due to these unclarities, the subject-matter of claim 102 cannot be searched and further examined.

Claim 103 specifies:

- a method of obtaining sensing data from an extended region of the wall of a blood vessel, the method comprising:
 - a) inserting a probe according to claim 87 into the blood vessel;
 - b) manipulating the control cable so that at least two of the sensors on each of at least two of the sub-probes are adjacent to the wall of the blood vessel; and
 - c) generating sensing data by said sensors from the different portions of the wall of the blood vessel.

The control cable is not defined in claims 87 and 103, and due to this unclarity, the subject-matter of claim 103 cannot be searched and further examined.

Claim 105 specifies:

- a magnetic resonance sensor comprising:
 - a) at least one permanent magnet which creates a static magnetic field in an excitation region; and
 - b) at least one RF coupling element capable of creating a time-varying magnetic field which is capable of exciting nuclei in the excitation region, and capable of receiving NMR signals from said excited nuclei and generating NMR electrical signals therefrom;
 - wherein a smallest convex volume which includes all of the at least one magnet is substantially cylindrical, the at least one magnet substantially reaches all of the radial surface of the convex volume, except for at least one slot, each slot being less than the length of

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

the convex volume, and one of the at least one RF coupling elements is located in one of the at least one slots, substantially entirely within the convex volume.

The technical meaning of "convex volume" is unclear. What is the delimitation between a convex volume and a cylindrical or a cubic volume?

What is the meaning of the "length of the convex volume"?

Due to this unclarity, the subject-matter of claim 105 and of claims 106 - 113, dependent thereupon, cannot be searched and cannot be further examined.

Claim 114 specifies:

- an imaging probe for imaging inside a cavity surrounded by a wall, the probe comprising:

a) a probe body having a contracted state and an expanded state;

and

b) at least two magnetic resonance sensors according to any of claims 105 - 113, adapted for MRI, mounted on the probe body and having fields of view in different directions;

wherein, when the probe body is in the expanded state, the fields of view of the magnetic resonance sensors respectively comprise portions of the wall of the cavity on different sides of the cavity.

Due to the reference to the undefined magnetic resonance sensor according to any of claims 105 - 113 [see above], the subject-matter of claim 114 is unclear and cannot be searched and cannot be further examined.

These arguments also apply to the subject-matter of claim 115.

Due to the reference to the undefined magnetic resonance sensor according to any of claims 105 - 113 [see above], the subject-matter of claim 115 and of claims 116 - 125, dependent thereupon, is unclear and cannot be searched and cannot be further examined.

These arguments also apply to the subject-matter of claim 126.

Due to the reference to the undefined NMR probe according to any of claims 121 - 125 [see above], the subject-matter of claim 126 and of claims 127 - 129, dependent thereupon, is unclear and cannot be searched and cannot be further examined.

These arguments also apply to the subject-matter of claim 130.

Due to the reference to the undefined sensor according to claim 121 [see above], the subject-matter of claim 130 and of claims 131 - 137, dependent thereupon, is unclear and cannot be searched and cannot be further examined.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IL2005/001097

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004158144	A1	12-08-2004	NONE
WO 9305706	A	01-04-1993	CA 2078536 A1 18-03-1993 DE 69227912 D1 28-01-1999 DE 69227912 T2 01-07-1999 EP 0604587 A1 06-07-1994 JP 2655940 B2 24-09-1997 JP 7502909 T 30-03-1995 US 5307814 A 03-05-1994
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EP 0385367	A	05-09-1990	AT 129395 T 15-11-1995 CA 2010899 A1 27-08-1990 DE 69023153 D1 30-11-1995 DE 69023153 T2 18-04-1996 DE 385367 T1 29-06-1995 JP 1850391 C 21-06-1994 JP 2277440 A 14-11-1990 JP 5058731 B 27-08-1993 US 5355087 A 11-10-1994