(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 652 476 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
07.06.2006 Bulletin 2006/23

(43) Date of publication A2:
03.05.2006 Bulletin 2006/18

(21) Application number: **05023405.3**

(22) Date of filing: **26.10.2005**

(51) Int Cl.:
A61B 8/00 *(2006.01)* ***G10K 11/00*** *(2006.01)*

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **27.10.2004 JP 2004312352**
02.12.2004 JP 2004349372
28.01.2005 JP 2005020579

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(54) Ultrasonic probe and ultrasonic diagnostic apparatus

(57) An ultrasonic probe comprises a transducer part, a heat-receiving part, a refrigeration unit and a cable unit. The cable unit includes a signal line, a refrigerant supply tube, a refrigerant ejection tube and a heat insulator. The heat-receiving part absorbs heat generated from the transducer part. The refrigerant supply tube supplies a refrigerant from the refrigeration unit to the heat-receiving part. The refrigerant ejection tube sends the refrigerant for ejecting heat of the heat-receiving part to the refrigeration unit. The heat insulator is arranged around the refrigerant supply tube. A set of the refrigerant supply tube, the refrigerant ejection tube and the heat insulator is arranged at a center of the cable unit substantially while the signal line is arranged around at least one of the refrigerant supply tube, the refrigerant ejection tube and the heat insulator.

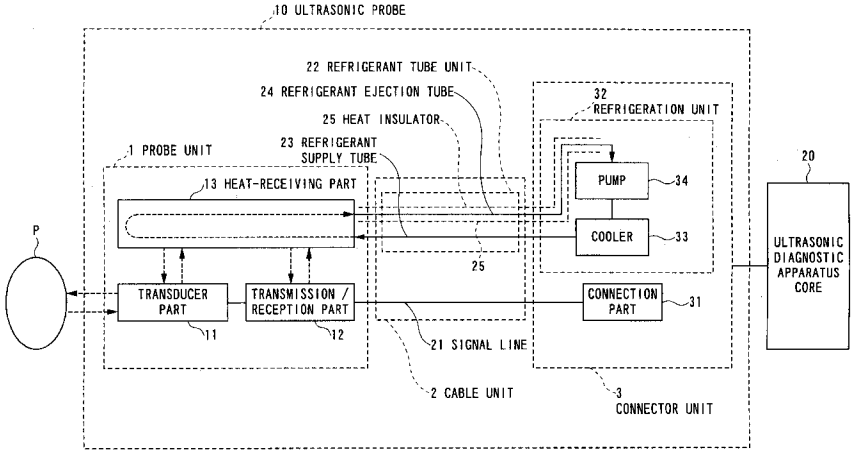

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 05 02 3405

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* column 9, line 10 - column 21, line 45; claims 74-96; figures 1,2a,3d-e,5,8 *	2,3,13, 14	

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A	* paragraph [0008] - paragraph [0027]; figures 1,2 *	7,9,10, 13	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 April 2006	Artikis, T

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 SEARCH REPORT

Application Number
EP 05 02 3405

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 4 748 985 A (NAGASAKI ET AL) 7 June 1988 (1988-06-07) * abstract * * column 3, line 52 - line 60; figure 1A *	1,4	TECHNICAL FIELDS SEARCHED (IPC)
A	US 2004/073118 A1 (PESZYNSKI MICHAEL EUGENE ET AL) 15 April 2004 (2004-04-15) * paragraph [0024] - paragraph [0028]; figures 1,2 *	13,14	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 April 2006	Artikis, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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Application Number
EP 05 02 3405

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:

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 05 02 3405

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: 1-6

An ultrasonic probe comprising a probe unit with a transducer and a heat-receiving part for the transducer, a refrigeration unit for the heat-receiving part and a cable unit having a signal line and refrigerant supply and ejection tubes, wherein one of the tubes is arranged at the center of the cable unit.

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2. claims: 7-14

An ultrasonic probe comprising a probe unit, a connector unit and a cable unit, wherein the probe unit includes a probe case, a transducer, an optional circuit board and a shield absorbing heat from the transducer or the circuit board.

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3. claims: 15-27

An ultrasonic probe comprising a transducer, a heat-receiver, a housing case and a probe connector unit including a radiator with refrigerant channels, a refrigerant circulation part between the heat-receiver and the radiator and a connector case housing the radiator and the circulation part.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 02 3405

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.

07-04-2006

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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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)	超声波探头和超声波诊断仪		
公开(公告)号	EP1652476A3	公开(公告)日	2006-06-07
申请号	EP2005023405	申请日	2005-10-26
[标]申请(专利权)人(译)	株式会社东芝 东芝医疗系统株式会社		
申请(专利权)人(译)	株式会社东芝 东芝医疗系统公司		
当前申请(专利权)人(译)	株式会社东芝 东芝医疗系统公司		
发明人	HASHIMOTO, SHINICHI C/O INTELLECTUAL PROPERTY DIV.		
IPC分类号	A61B8/00 G10K11/00		
CPC分类号	A61B8/546 A61B8/00 A61B8/4455 G10K11/004		
代理机构(译)	KRAMER - HARSH - 施密特陈		
优先权	2004312352 2004-10-27 JP 2005020579 2005-01-28 JP 2004349372 2004-12-02 JP		
其他公开文献	EP1652476A2 EP1652476B1		
外部链接	Espacenet		

摘要(译)

超声波探头包括换能器部分，热量接收部分，制冷单元和电缆单元。电缆单元包括信号线，制冷剂供应管，制冷剂喷射管和绝热体。受热部分吸收换能器部分产生的热量。制冷剂供应管将制冷剂从制冷单元供应到受热部件。制冷剂喷射管将用于将热量接收部件的热量喷射的制冷剂发送到制冷单元。隔热材料布置在制冷剂供应管周围。一组制冷剂供应管，制冷剂喷射管和绝热体基本上布置在电缆单元的中心，而信号线布置在制冷剂供应管，制冷剂喷射管和绝热体中的至少一个周围。 。

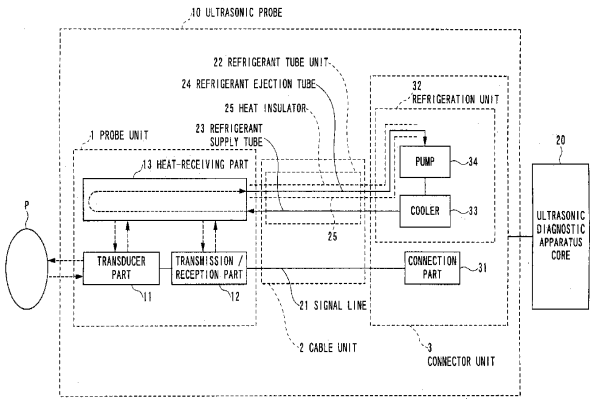

FIG. 1