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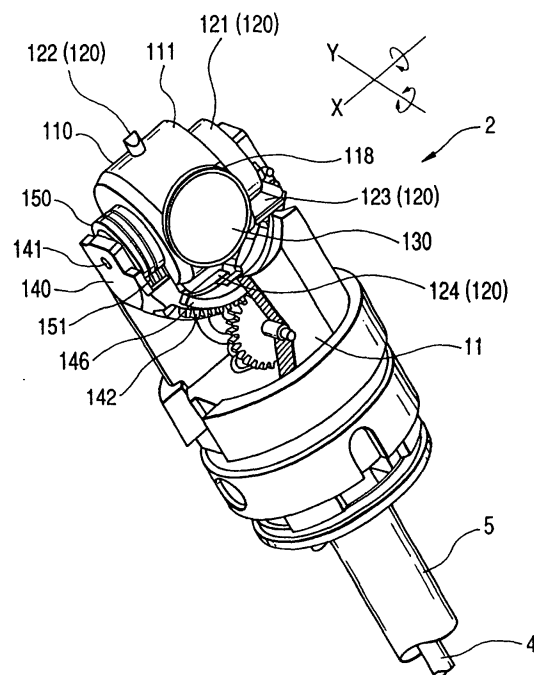
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(54) **Ultrasonic probe**

(57) An ultrasonic probe is provided which may be employed in medical applications to radiate an ultrasonic wave for inspecting the interior of a patient's body non-invasively. The ultrasonic probe includes a scan mechanism which consists of a rotating mechanism and a swinging mechanism. The rotating mechanism is designed to rotate a cylindrical holder having installed thereon a piezoelectric element which emits an ultrasonic wave and receives the echo. The swinging mechanism is designed to swing a rotary base which supports the rotating mechanism to swing the cylindrical holder about an axis of rotation extending perpendicular to that of the piezoelectric element.

**FIG. 2**





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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 12 4747

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (In CI.7)
X	US 4 841 979 A (DOW JULIAN ET AL) 27 June 1989 (1989-06-27)	1	A61B8/12 G10K11/35 B06B1/04
Y	* column 4, line 60 - column 6, line 62 * * figures *	2-5,7-12	
Y	US 5 088 495 A (MIYAGAWA TOYOMI) 18 February 1992 (1992-02-18) * column 3, line 46 - line 54 * * column 5, line 16 - line 27 * * figures 1-3 *	2,3,11, 12	
Y	US 4 453 409 A (CARNES RONALD C ET AL) 12 June 1984 (1984-06-12) * column 2, line 60 - column 3, line 20 *	4	
Y	US 3 964 296 A (MATZUK TERRANCE) 22 June 1976 (1976-06-22) * column 10, line 47 - column 11, line 7 * * column 15, line 33 - line 65 *	5	
Y	PATENT ABSTRACTS OF JAPAN vol. 014, no. 188 (C-0710), 17 April 1990 (1990-04-17) & JP 02 034154 A (FUJI ELECTRIC CO LTD), 5 February 1990 (1990-02-05) * abstract *	7,8	TECHNICAL FIELDS SEARCHED (Int.Cl.7)  G10K A61B G01S B06B
Y	US 5 829 439 A (SHINOMURA RYUICHI ET AL) 3 November 1998 (1998-11-03) * column 8, line 24 - column 9, line 2 *	9	
Y	US 5 353 798 A (SIEBEN WAYNE) 11 October 1994 (1994-10-11) * column 36, line 28 - line 61 *	10	
The present search report has been drawn up for all claims			
Place of search <b>MUNICH</b>		Date of completion of the search <b>6 October 2003</b>	Examiner <b>Martelli, L</b>
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			

EPO FORM 1503 (03.02) (P04C01)



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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:



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**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
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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: 1-3,11,12

Ultrasonic probe with an encoder.

2. Claims: 4,5

Ultrasonic probe with an electric motor made of a rotary cylinder.

3. Claims: 6-8

Ultrasonic probe with an electric motor swinging a rotary base.

4. Claim : 9

Ultrasonic probe with two piezoelectric elements producing waves of the same frequency.

5. Claim : 10

Ultrasonic probe with two piezoelectric elements producing waves of different frequencies.

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

EP 00 12 4747

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.

06-10-2003

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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)	超声波探头		
公开(公告)号	<a href="#">EP1103222A3</a>	公开(公告)日	2004-01-02
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当前申请(专利权)人(译)	松下电器产业有限公司.		
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CPC分类号	A61B8/4461 A61B8/12 A61B8/445		
代理机构(译)	MANITZ , FINSTERWALD & PARTNER GBR		
优先权	1999336353 1999-11-26 JP		
其他公开文献	EP1103222A2 EP1103222B1		
外部链接	<a href="#">Espacenet</a>		

#### 摘要(译)

提供了一种超声探头，其可以用于医疗应用中以辐射超声波来非侵入性地检查患者身体的内部。超声波探头包括扫描机构，该扫描机构包括旋转机构和摆动机构。旋转机构设计成旋转圆柱形支架，其上安装有发射超声波并接收回波的压电元件。摆动机构设计成摆动旋转底座，旋转底座支撑旋转机构，使圆柱形支架围绕垂直于压电元件延伸的旋转轴线摆动。

