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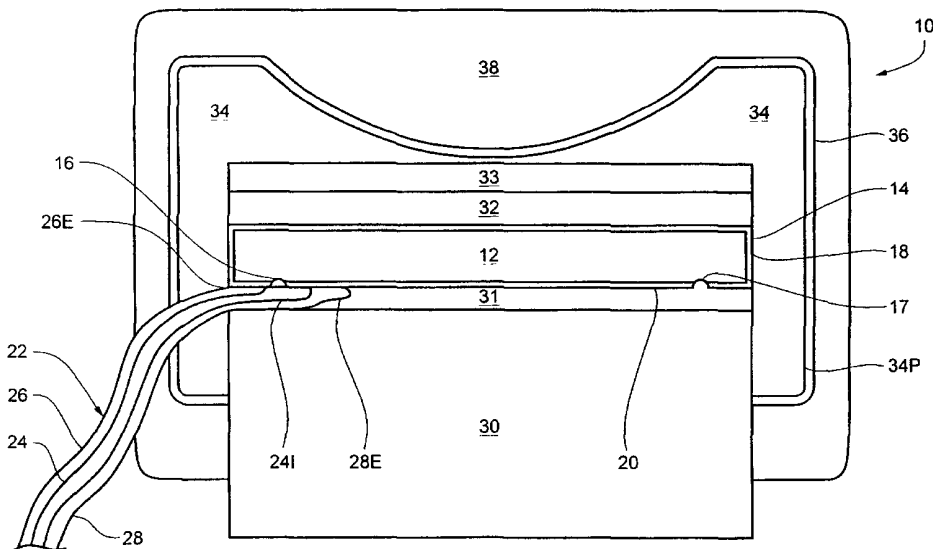
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- (21) International Application Number: PCT/US00/18266 (74) Agent: **MUTTER, Michael, K.**; Birch, Stewart, Kolasch & Birch, LLP, P.O. Box 747, Falls Church, VA 22040-0747 (US).
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- (71) Applicant (for all designated States except US): **MEDISON CO., LTD.** [KR/KR]; Medison Venture Tower, 997-4 Daechi-dong, Kangnam-ku, Seoul 135-280 (KR). (88) Date of publication of the international search report: 7 September 2001
- (71) Applicants and (72) Inventors: **DOUGLAS, Steve** [US/US]; 211 Brookridge

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ULTRASONIC LINEAR OR CURVILINEAR TRANSDUCER AND CONNECTION TECHNIQUE THEREFORE



(57) Abstract: A double-sided flexible circuit (22) is used to provide interconnection to a piezoelectric ultrasonic transducer array. The ultrasonic crystal (12) is covered with first and second electrode layers (8, 20) having an insulation gap (6, 17) provided therebetween. The flexible circuit material (22) is then bonded to the first and second electrode layers (18, 20) so that one side of the double sided flexible circuit (8) makes contact to one set of transducer electrodes (18) and the other side of the flexible circuit (28) makes contact to the second set of transducer electrodes (20). The ultrasonic transducer desirably includes a concave acoustic lens (34) having an acoustic velocity greater than water.



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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/18266

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B06B1/06 G10K11/30

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)

IPC 7 B06B G10K

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 774 960 A (DE FRAGUIER SIXTE ET AL) 7 July 1998 (1998-07-07) column 3, line 41 - line 47 column 4, line 36 -column 5, line 26 ---	1-3,5
X	US 5 296 777 A (MINE YOSHITAKA ET AL) 22 March 1994 (1994-03-22) column 4, line 45 -column 5, line 40; figure 9 ---	1-3,5
A	PATENT ABSTRACTS OF JAPAN vol. 013, no. 216 (E-760), 19 May 1989 (1989-05-19) & JP 01 027400 A (NIPPON DEMPA KOGYO CO LTD), 30 January 1989 (1989-01-30) abstract --- -/--	4

Further documents are listed in the continuation of box C.

Patent family members are listed in 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.
- *&* document member of the same patent family

Date of the actual completion of the international search

16 January 2001

Date of mailing of the international search report

14.02.2001

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/18266

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 699 150 A (KAWABUCHI MASAMI ET AL) 13 October 1987 (1987-10-13) column 4, line 11 - line 21; figures 2B,3A column 4, line 64 -column 5, line 9 ---	6,7,9,10
X	US 4 217 516 A (IINUMA KAZUHIRO ET AL) 12 August 1980 (1980-08-12) column 4, line 15 - line 27; figure 7 ---	6,10
A	US 3 387 604 A (ERIKSON KENNETH R) 11 June 1968 (1968-06-11) column 3, line 18 - line 44 ---	11-13
A	US 3 387 604 A (ERIKSON KENNETH R) 11 June 1968 (1968-06-11) column 3, line 18 - line 44 ---	8
A	US 5 792 058 A (SLIWA JR JOHN WILLIAM ET AL) 11 August 1998 (1998-08-11) column 10, line 31 - line 46 -----	11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/18266

Box I Observations where certain claims were found unsearchable (Continuation of item 1 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 II Observations where unity of invention is lacking (Continuation of item 2 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 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

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

1. Claims: 1-5

Connection to electrodes of piezoelectric elements using double-sided flexible circuit boards.

2. Claims: 6-10

Focussing of ultrasound waves using a concave acoustic lens.

3. Claims: 11-13

Electromagnetic shielding of an ultrasound transducer array using a shielding layer.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/18266

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