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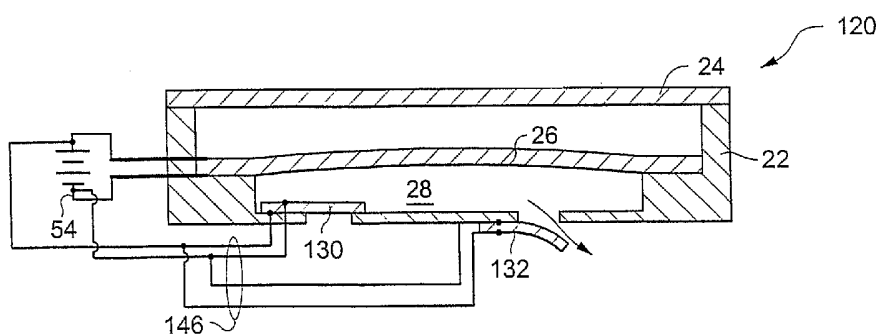
— with international search report

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21 December 2006

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: METHOD AND APPARATUS FOR SCAVENGING ENERGY DURING PUMP OPERATION



(57) Abstract: A pump comprises a body for at least partially defining a pump chamber (28); a pump member, such as a diaphragm (26) or a valve (130), which undergoes displacement when acting upon a fluid in the pumping chamber; and a piezoelectric element which responds to the displacement of the pump member to generate an electric current. The electric current generated by the piezoelectric element is preferably applied to a charge storage device, such as a capacitor or battery.



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/47357

A. CLASSIFICATION OF SUBJECT MATTER

IPC: F04B 39/00(2006.01),17/00(2006.01);H01L 41/04(2006.01);F16K 15/16(2006.01)

USPC: 417/313,413.2;310/339;137/855

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)

U.S. : 417/313, 413.2, 505; 310/339, 324, 319; 137/855-858

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)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 3,822,388 A (MARTINI et al) 02 July 1974 (02.07.1974), see Fig. 1.	1, 5, 11, 16, 19-21, 32, 37 and 39 ----- 2-4
X --- Y	US 4,442,372 A (ROBERTS) 10 April 1984 (10.04.1984), see entire document.	1, 5, 11, 16, 19-21, 32, 37 and 39 ----- 2-4
Y	US 5,801,475 A (KIMURA) 01 September 1998 (01.09.1998), note col. 4 lines 28-32.	2-4

☐ 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	"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
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"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US05/47357

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms: diaphragm, generate, current, piezoelectric, valve