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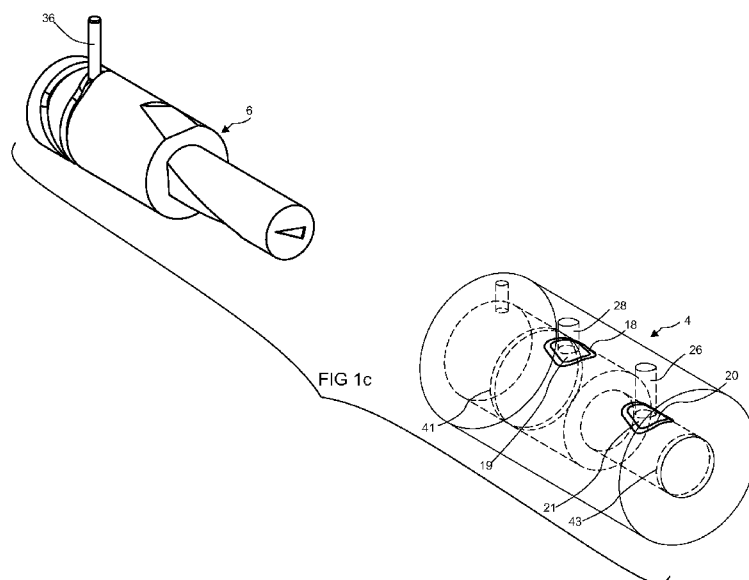
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Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: MICROPUMP



(57) Abstract: A pump comprising a housing comprising a rotor chamber, inlet and outlet channels opening into the rotor chamber, and inlet and outlet seals mounted on a surface of the chamber, and a rotor rotatably and axially slidably received in the chamber and comprising a first axial extension comprising a liquid supply channel and a second axial extension comprising a liquid supply channel, the first and second axial extensions having different diameters. The inlet and outlet seals engage a surface of the rotor, whereby the liquid supply channel of each axial extension in conjunction with a corresponding seal forms a valve that opens and closes as a function of the angular and axial displacement of the rotor. At least one of the inlet and outlet channels opens transversely into the rotor chamber and at least one of the inlet and outlet seals forms a closed circuit circumscribing said at least one of the inlet and outlet channels.



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— *of inventorship (Rule 4.17(iv))*

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INTERNATIONAL SEARCH REPORT

International application No PCT/IB2011/051071

A. CLASSIFICATION OF SUBJECT MATTER INV. F04B7/04 F04B7/06 F04B9/04 F04B19/00 A61M5/142 ADD.		
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) F04B A61M		
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		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 1 527 793 A1 (ECOLE POLYTECH [CH]) 4 May 2005 (2005-05-04) cited in the application paragraphs [0022] - [0042]; figures 3A-5,7 -----	1-13
Y	WO 2007/074363 A2 (SENSILE MEDICAL A G [CH]; HILBER JOSEF [CH]; STRAESSLER SIGFRID [CH]) 5 July 2007 (2007-07-05) cited in the application page 9, line 8 - page 18, line 32; claims 17-21; figures 1-10 -----	1-13
Y	US 4 553 506 A (BEKIAROGLU PRODRAMOS [DE]) 19 November 1985 (1985-11-19) column 7, line 59 - line 68; figure 7c -----	1-13
Y	WO 92/16747 A1 (NESTE OY [FI]) 1 October 1992 (1992-10-01) page 8, line 5 - line 9; figure 1 -----	1-13
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> 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	
"E" earlier document but published on or after the international filing date	"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	
"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		
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Jurado Orenes, A	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-13

A pump comprising:

a housing comprising a rotor chamber, inlet and outlet channels opening into the rotor chamber, and inlet and outlet seals mounted on a surface of the chamber, and a rotor rotatably and axially slidably received in the chamber and comprising a first axial extension comprising a liquid supply channel and a second axial extension comprising a liquid supply channel, the first and second axial extensions having different diameters, said inlet and outlet seals engaging a surface of the rotor, said liquid supply channel of each axial extension in conjunction with a corresponding said seal forming a valve that opens and closes as a function of the angular and axial displacement of the rotor, wherein at least one of the inlet and outlet channels opens transversely or radially into the rotor chamber and at least one of the inlet and outlet seals forms a closed circuit circumscribing said at least one of the inlet and outlet channels, and

A method of detecting occlusion or leakage of a pump, including providing a pump according to any one of claims 1-10, performing an initial measurement comprising turning the rotor in a forward pumping direction at least one revolution and storing the axial displacement as a function of rotation displacement profile in a look-up table as a cam profile, measuring the rotor axial displacement as a function of rotation displacement during subsequent pumping and comparing the measured rotor displacement with the stored cam profile.

2. claims: 14-16

A pump comprising:

a housing comprising a rotor chamber, inlet and outlet channels opening into the rotor chamber, and inlet and outlet seals mounted on a surface of the chamber, and a rotor rotatably and axially slidably received in the chamber and comprising a first axial extension comprising a liquid supply channel and a second axial extension comprising a liquid supply channel, the first and second axial extensions having different diameters, said inlet and outlet seals engaging a surface of the rotor, said liquid supply channel of each axial extension in conjunction with a corresponding said seal forming a valve that opens and closes as a function of the angular and axial displacement of the rotor, wherein at least one of the inlet and outlet channels opens transversely or radially into the rotor chamber and at least one of the inlet and outlet seals forms a closed circuit

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

circumscribing said at least one of the inlet and outlet channels, and

A method of removing gas bubbles in a pump according to any one of claims 1-10 comprising a housing and an axially and rotatably movable rotor mounted in the housing and having an inlet valve and an outlet valve, the method including applying a back and forth displacement of the rotor over an angle less than 180° while applying an axial force on the rotor.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2011/051071

Box No. 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.:
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 No. 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:

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 fees, this Authority did not invite payment of additional fees.

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.:

"see additional sheet(s)"

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.