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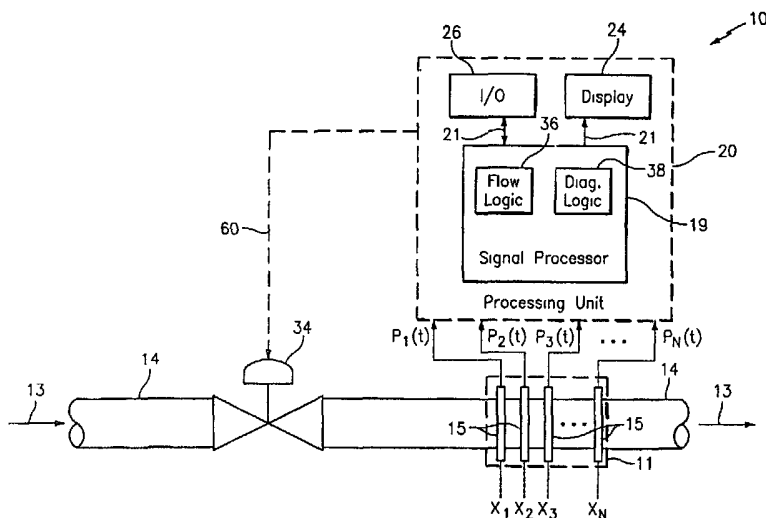
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31 March 2005

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 MEASURING PARAMETERS OF A FLUID FLOWING WITHIN A PIPE USING A CONFIGURABLE ARRAY OF SENSORS



(57) Abstract: An apparatus for measuring at least one parameter associated with a fluid flowing within a pipe includes a spatial array of pressure sensors disposed at different axial locations $x_1 \dots x_N$ along the pipe. Each of the pressure sensors provides a pressure signal $P(t)$ indicative of unsteady pressure within the pipe at a corresponding axial location of the pipe. A signal processor receives the pressure signals from each of the pressure sensors and determines the parameter of the fluid using pressure signals from selected ones of the pressure sensors. By selecting different pressure sensors, the signal processor can configure the array to meet different criteria. In one embodiment, the array of pressure sensors may be formed on a single sheet of polyvinylidene fluoride

(PVDF) that is wrapped around at least a portion of an outer surface of the pipe. This arrangement allows a large number of pressure sensors to be quickly and economically installed.

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/024779

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01F1/66 G01F1/712

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 G01F B06B H01L H04R

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, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/194932 A1 (WINSTON CHARLES R ET AL) 26 December 2002 (2002-12-26) paragraph [0004] paragraph [0010] paragraph [0051] - paragraph [0058] paragraph [0062] paragraph [0064] - paragraph [0066] paragraph [0084] figures 1,38	1-42, 50-57
X	----- WO 03/062759 A (CIDRA CORP) 31 July 2003 (2003-07-31) page 2, line 14 - line 21 page 4, line 30 - page 5, line 2	43-57
A	page 27, line 16 - line 26 page 28, line 14 - line 17 page 29, line 15 - line 27 figures 20,21 ----- -/--	1-42

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

18 January 2005

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 4 216 403 A (CLAASSEN PETER ET AL) 5 August 1980 (1980-08-05) column 2, line 33 - column 3, line 27 column 7, line 13 - column 8, line 10 figures 1,4,8,9 -----	43-45 12-19, 33-40, 46-57
X A	US 4 376 302 A (MILLER HARRY B) 8 March 1983 (1983-03-08) column 2, line 60 - column 3, line 11 claim 1 figures 1,2 -----	43-49 12-19, 33-40, 52-57
X A	GB 2 282 931 A (ATOMIC ENERGY AUTHORITY UK) 19 April 1995 (1995-04-19) page 5, line 23 - page 6, line 28 page 7, line 3 - line 10 page 8, line 11 - line 13 figures 5,6 -----	43-49 12-19, 33-40, 52-57

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2004/024779

Box 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 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 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: 1-11,20-32,41,42

An apparatus and a method for measuring a parameter of a fluid passing through a pipe including a configurable array of pressure sensors

2. claims: 12-19,33-40,43-57

An array of pressure sensors formed on a single sheet of polyvinylidene fluoride (PVDF)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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