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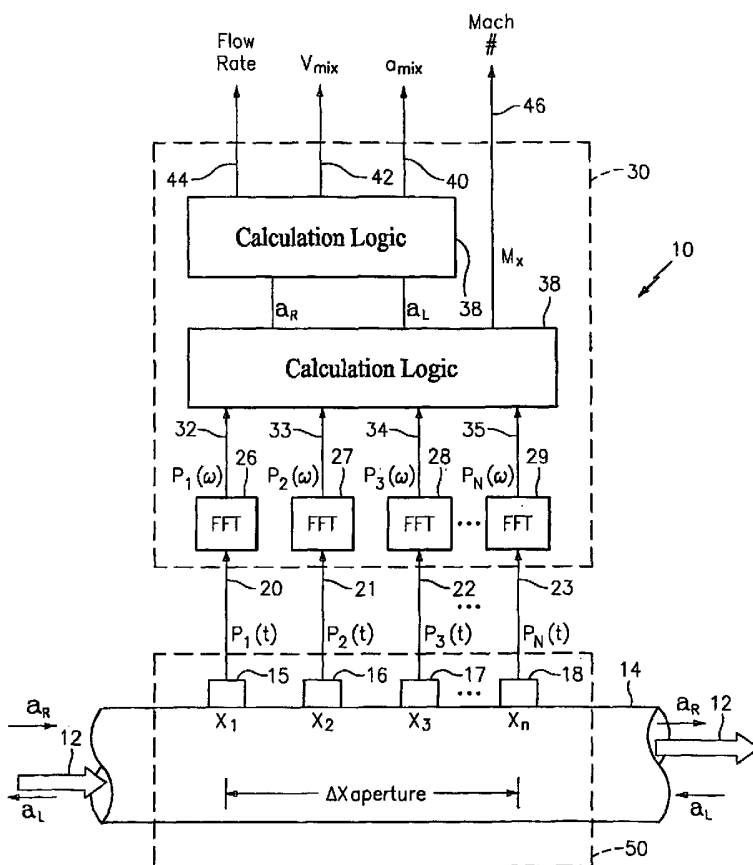
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(54) Title: APPARATUS FOR MEASURING VELOCITY AND FLOW RATE OF A FLUID HAVING A NON-NEGLECTIBLE AXIAL MACH NUMBER USING AN ARRAY OF SENSORS



(57) Abstract: An apparatus (10) and method is provided that includes a spatial array of unsteady pressure sensors (15 - 18) placed at predetermined axial locations X_1, \dots, X_N disposed axially along a pipe (14) for measuring the velocity and volumetric flow rate of a single phase or multi-phase fluid (12) having a non-negligible axial Mach number flowing in the pipe (14). The pressure sensors (15 - 18) provide acoustic pressure signals $P_1(t) - P_N(t)$ to a signal processing unit (30) which determines the speed of sound propagating with and against the flow of the fluid (12) in the pipe (14) using acoustic spatial array signal processing techniques. The apparatus, responsive to the measured speed of sound propagating with and against the flow of the fluid, determines the velocity and the flow rate of the fluid propagating through the pipe.

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
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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 6 202 494 B1 (RIEBEL ULRICH ET AL) 20 March 2001 (2001-03-20) abstract; figures 2,3 column 1, line 38 - column 5, line 36 column 6, line 66 - column 7, line 1	1-6, 9-14, 17-25
Y		7,8,15, 16
Y	----- US 6 354 147 B1 (GYSLING DANIEL L ET AL) 12 March 2002 (2002-03-12) abstract; figures 1,29,30 column 1 - column 2 column 19, line 12 - line 40 ----- -/--	7,8,15, 16

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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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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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, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Vorropoulos, G
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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