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(54) Title: INCREASING EXHAUST TEMPERATURE FOR AFTERTREATMENT OPERATION

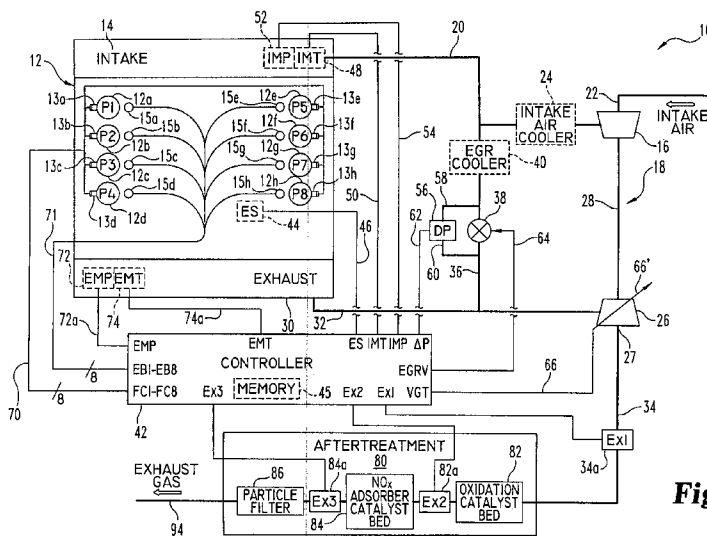


Fig. 1

(57) Abstract: An internal combustion engine system includes: an engine with a plurality of pistons; a variable load driven by rotary power from the engine, the load including one or more of a pump, an air conditioner; and a fan; aftertreatment equipment to control exhaust emission from the engine; a sensor to provide a sensor signal corresponding to temperature of exhaust from the engine; and a controller coupled to the sensor and operable to regulate a regeneration operation of one or more components of the aftertreatment equipment. The controller responds to the sensor signal to generate one or more control signals to adjust the variable load to increase loading of the engine and correspondingly raise the temperature of the exhaust for the regeneration operation.

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**A. CLASSIFICATION OF SUBJECT MATTER***F01N 9/00(2006.01)i, F02D 43/00(2006.01)i, F02D 45/00(2006.01)i*

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 8: F01N 9/00, F02D 43/00, F02D 45/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility Models since 1975

Japanese Utility Models and applications for Utility Models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS (KIPO internal) &amp; keywords: "engine", "oil flow", "pump", "regeneration", "exhaust temperature"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6199372 B1 (WAKAMOTO) 13 March 2001 See the abstract; Figs. 1-10; column 7, line 3 - column 12, line 53.	1-22
A	US 6931842 B2 (OHTAKE et al.) 23 August 2005 See the abstract; Figs. 1-7; column 3, line 10 - column 10, line 3.	1-22
A	US 2006-0130459 A1 (WARNER et al.) 22 June 2006 See the abstract; Fig. 1; paragraphs [0012]-[0027].	1-22
A	US 2006-0168945 A1 (SAMAD et al.) 3 August 2006 See the abstract; Figs. 1 and 2; paragraphs [0008]-[0035].	1-22
A	JP 2007-205223 A (ISUZU MOTORS CO., LTD.) 16 August 2007 See the abstract; Figs. 1-3; paragraphs <33>-<68>.	1-22

 Further documents are listed in the continuation of Box C. See patent family annex.

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"&amp;" document member of the same patent family

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6199372 B1	13.03.2001	DE 19781739 T0	01.04.1999
		GB 2328626 A	03.03.1999
		GB 2328626 B	11.08.1999
		GB 9822856 D0	16.12.1998
		JP 3066607 B2	17.07.2000
		WO 97-41336 A1	06.11.1997
US 6931842 B2	23.08.2005	US 2004-0103654 A1	03.06.2004
US 2006-0130459 A1	22.06.2006	GB 2421545 A	28.06.2006
		US 7461504 B2	09.12.2008
US 2006-0168945 A1	03.08.2006	WO 2006-083393 A1	10.08.2006
		WO 2006-083393 A9	28.09.2006
JP 2007-205223 A	16.08.2007	EP 1980725 A1	15.10.2008
		US 2009-0007547 A1	08.01.2009
		WO 2007-088714 A1	09.08.2007