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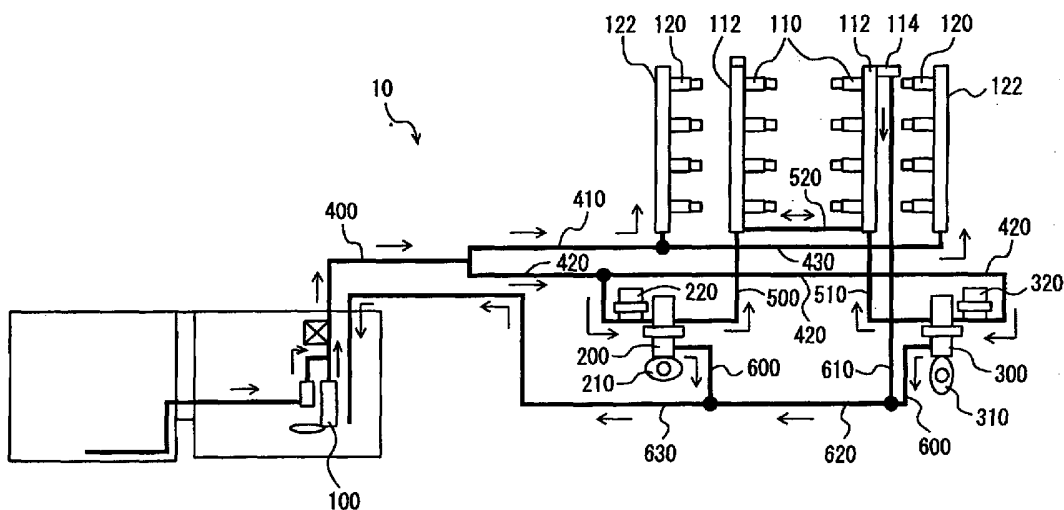
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[Continued on next page]

(54) Title: CONTROL DEVICE OF HIGH-PRESSURE FUEL SYSTEM OF AN INTERNAL COMBUSTION ENGINE



(57) Abstract: An engine ECU performs a program including the steps of calculating an amount of the fuel required to be discharged from high-pressure fuel pumps (the required discharge amount) (S100), determining whether one high-pressure fuel pump can be stopped (S110), and if not (NO in S110), determining whether the required discharge amount exceeds a maximum possible discharge amount of one high-pressure fuel pump of smaller capability (S140), and if not (NO in S140), causing the two high-pressure fuel pumps to discharge the fuel in approximately equal amount (S160), or if so (YES in S140), causing the high-pressure fuel pump of smaller capability to discharge the fuel of the maximum possible discharge amount and causing the high-pressure fuel pump of larger capability to discharge the fuel of the amount obtained by subtracting the discharge amount of the high-pressure fuel pump of smaller capability from the required discharge amount (S150).

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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.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP2005/011894

A. CLASSIFICATION OF SUBJECT MATTER

F02D41/38 F02D41/30 F02M63/02 F02D41/22

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)
F02D F02M F02B

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.
X	DE 199 55 617 A1 (MTU MOTOREN- UND TURBINEN-UNION FRIEDRICHSHAFEN GMBH; MTU FRIEDRICHSHA) 13 June 2001 (2001-06-13)	1-3,7, 11-13,17
Y	abstract column 1, line 8 - line 36 column 2, line 12 - line 24 column 2, line 43 - line 56 column 3, line 33 - column 4, line 2 figure 1	4-6,8, 14-16,18
Y	----- EP 1 251 272 A (SIEMENS DIESEL SYSTEM TECHNOLOGIES, LLC) 23 October 2002 (2002-10-23) paragraphs '0003!', '0012!', '0013!', '0017!', '0023!', '0025!; figures 2-5 ----- -/--	4-6,8, 14-16,18

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
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- "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

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP2005/011894

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>JP 2003 532833 T (ROBERT BOSCH GMBH) 5 November 2003 (2003-11-05) cited in the application abstract & DE 100 23 033 A1 (ROBERT BOSCH GMBH) 22 November 2001 (2001-11-22) paragraphs '0005!, '0007!, '0012!, '1618!, '0021!, '0024!; figures 1,2 abstract</p> <p>-----</p>	1,11
A	<p>DE 43 35 171 C1 (MERCEDES-BENZ AKTIENGESELLSCHAFT, 70327 STUTTGART, DE) 4 May 1995 (1995-05-04) the whole document</p> <p>-----</p>	1-8, 11-18
A	<p>DE 198 23 639 A1 (ROBERT BOSCH GMBH) 2 December 1999 (1999-12-02) abstract column 2, line 5 - column 3, line 25 figure 1</p> <p>-----</p>	1-8, 11-18
X	<p>EP 0 501 459 A (NIPPONDENSO CO., LTD) 2 September 1992 (1992-09-02) abstract column 3, line 16 - line 44 column 4, line 40 - column 5, line 21 column 12, line 12 - column 14, line 16 column 15, line 28 - column 16, line 38 figures 10-12</p> <p>-----</p>	9,10,19, 20
X	<p>US 6 076 504 A (STAVNHEIM ET AL) 20 June 2000 (2000-06-20) column 2, line 59 - column 3, line 32 column 12, line 6 - column 14, line 29</p> <p>-----</p>	9,10,19, 20
P,X	<p>DE 103 41 788 A1 (SIEMENS AG) 21 April 2005 (2005-04-21) paragraph '0004! paragraphs '0007! - '0010! paragraphs '0035!, '0036!</p> <p>-----</p>	9,10,19, 20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2005/011894

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.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/JP2005 /011894

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-8,11-18

Control apparatus for controlling a discharge ratio among a plurality of high pressure fuel pumps

2. claims: 9,10,19,20

Control apparatus for determining a failure of a high pressure pump

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP2005/011894

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