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(54) Title: DIAGNOSTIC METHOD FOR AN INTERNAL COMBUSTION ENGINE THROUGH ANALYSIS OF ITS EXHAUST GASES AND A DEVICE FOR IMPLEMENTING SAME

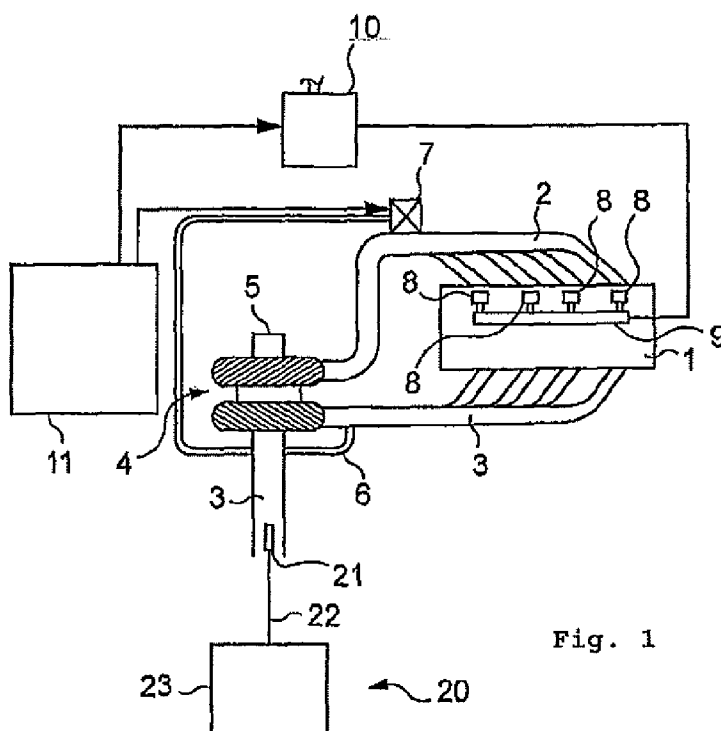


Fig. 1

(57) Abstract: The diagnostic method for a Diesel engine for determining whether this engine, or at least one device connected thereto, is affected by one or several malfunctions negatively influencing the degree of pollution of the exhaust gases produced by this engine, comprises the steps of analyzing the level of an exhaust gas or the evolution of this level, alone or together with the level or evolution of the level of another gas, according to a predetermined state of the engine and characterizing, from said analysis, any malfunction(s) affecting the Diesel engine and/or the devices associated with it. The invention also concerns a device for implementing this method and a computer program executable on the device.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

INV. F02D41/00 F02D41/14 F02D41/22 F02D21/08 F02M25/07

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

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)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	US 2003/225503 A1 (MAZUR CHRISTOPHER JOHN [US]) 4 December 2003 (2003-12-04) abstract paragraphs [0005] - [0009] paragraphs [0018] - [0062] claim 1	1, 3-6, 17-20 7
X Y	US 5 239 971 A (UCHINAMI MASANOBU [JP]) 31 August 1993 (1993-08-31) abstract column 2, line 59 - column 3, line 45 column 4, line 6 - column 6, line 4 figures 1,3,4	1, 3-6, 17-20 7
Y	EP 0 899 563 A (FIAT RICERCHE [IT]; ARMINES [FR]; CORRECI S A COMPAGNIE DE REGUL [FR];) 3 March 1999 (1999-03-03) the whole document	7

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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- *E* earlier document but published on or after the international filing date
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- *O* document referring to an oral disclosure, use, exhibition or other means
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- *G* document member of the same patent family

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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.
Y	US 2003/093994 A1 (BAILEY BRETT M [US]) 22 May 2003 (2003-05-22) abstract paragraphs [0010] - [0012] paragraph [0027] -----	7
A	US 2002/157458 A1 (SCHELL MICHAEL B [US]) 31 October 2002 (2002-10-31) cited in the application the whole document -----	1-7, 17-20
X	DE 101 60 704 A1 (VOLKSWAGEN AG [DE]) 26 June 2003 (2003-06-26) the whole document -----	1,2, 17-20
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A	H. BAUER: "Kraftfahrtechnisches Taschenbuch" 2002, ROBERT BOSCH GMBH, STUTTGART, XP002517057 ISBN: 3-528-13876-9 page 603; table 1 -----	1-6, 16-20
A	EP 0 940 571 A (BOSCH GMBH ROBERT [DE]) 8 September 1999 (1999-09-08) abstract paragraphs [0017] - [0029]; figure 3 paragraphs [0034] - [0036] -----	1-6, 16-20
A	US 6 085 132 A (ISHII TOSHIO [JP] ET AL) 4 July 2000 (2000-07-04) abstract column 1, line 10 - column 2, line 50 -----	1-6, 16-20

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2008/060177

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 allsearchable 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 reportcovers only those claims for which fees were paid, specifically claims Nos.:

1-7, 16-20
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 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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-7,17-20

Diagnostic method for a diesel engine for determining whether an exhaust gas recirculation valve connected to said engine is affected by malfunctions negatively impacting the degree of pollution of the exhaust gases produced by said engine.

2. claims: 1-6,8,17-20

Diagnostic method for a diesel engine for determining whether an exhaust line connected to said engine is clogged thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

3. claims: 1-6,9,17-20

Diagnostic method for a diesel engine for determining whether said engine has insufficient air filling thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

4. claims: 1-6,10,17-20

Diagnostic method for a diesel engine for determining whether a common rail injector system connected to said engine has an internal leak thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

5. claims: 1-6,11,17-20

Diagnostic method for a diesel engine for determining whether a high pressure pump and a flow regulation valve of a common rail injection system is affected by malfunctions negatively impacting the degree of pollution of the exhaust gases produced by said engine.

6. claims: 1-6,12,17-20

Diagnostic method for a diesel engine for determining whether a turbocharger equipping said engine has an oil leak thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

7. claims: 1-6,13,17-20

FURTHER INFORMATION CONTINUED FROM PCT/SA/ 210

Diagnostic method for a diesel engine for determining whether a poor spraying of the injectors is affecting the engine thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

8. claims: 1-6,14,17-20

Diagnostic method for a diesel engine for determining whether an injection advance is correctly controlled thus not negatively impacting the degree of pollution of the exhaust gases produced by said engine.

9. claims: 1-6,15,17-20

Diagnostic method for a diesel engine for determining whether an intake system equipping said engine has an air scoop thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

10. claims: 1-6,16,17-20

Diagnostic method for a diesel engine for determining whether an engine's injection circuit is affected by a seizing of the injectors thus negatively impacting the degree of pollution of the exhaust gases produced by said engine.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2008/060177

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