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(71) Applicant (for all designated States except US):  
CATERPILLAR INC. [US/US]; 100 N.E. Adams Street,  
Peoria, IL 61629-9510 (US).

(72) Inventor; and

(71) Applicant (for all designated States except US): KAP-  
PAROS, David, J. [US/US]; 213 N. Louise St., Chill-  
icothe, IL 61523 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BLOMS, Jason, K.  
[US/US]; 6816 N. Basket Oak Dr., Edwards, IL 61528  
(US). RICHARDS, Tyler, V. [US/US]; 2927 W. Sylvan  
Land, Peoria, IL 61615 (US). COX, Glenn, B. [US/US];  
701 W. Deerbrook Dr., Peoria, IL 61615 (US).  
LEUSTEK, Matthew, E. [US/US]; 1309 Hickory Hills,

Metamora, IL 61548 (US). NANJUNDAREDDY, Rajiv,  
B. [IN/US]; 935 W. Loire Ct., Peoria, IL 61614 (US).  
KULKARNI, Vadiraj, P. [IN/US]; 1700 W. Hickory  
Grove Rd., #B206, Dunlap, IL 61525 (US).

(74) Agents: RUPPEL, Jeffrey, A. et al.; 100 N.E. Adams  
Street, Peoria, IL 61629-9510 (US).

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DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,  
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KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,  
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,  
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ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,  
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TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: DIESEL PARTICULATE FILTER REGENERATION CONTROL AND METHOD

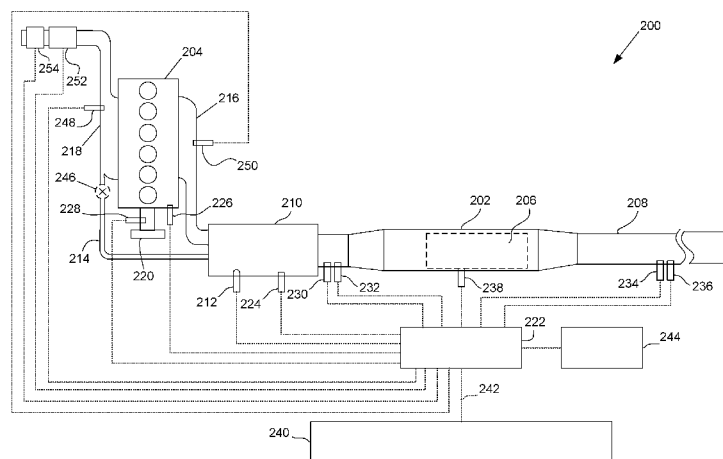


FIG. 2

(57) Abstract: An after-treatment device (202) that includes a diesel particulate filter (DPF) (206) requiring periodic regeneration includes a sensor (238) providing a signal (306) indicative of a soot accumulation and at least one device (240) providing an operating parameter (242) indicative of a work mode of the machine (100). A controller (222) determines a soot level (310) and a readiness level (312) based on the work mode of the machine (100), and further classifies the soot level (310) relative to a desired range for initiating a regeneration event and initiates the regeneration event when the soot level (310) falls within the desired range.

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**A. CLASSIFICATION OF SUBJECT MATTER***F01N 3/023(2006.01)i, F01N 3/025(2006.01)i, F01N 9/00(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)

F01N 3/023; F01N 3/00; F01N 3/035; F01N 3/02

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

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords: diesel, exhaust, filter, DPF, regeneration, soot

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7406822 B2 (FUNKE STEVEN J. et al.) 05 August 2008 See columns 3,4,5,6,11,12 and figure 2.	1-4
A	US 6622480 B2 (TASHIRO; YOSHIHISA et al.) 23 September 2003 See columns 9,10,19,20 and figure 1.	1-4
A	WO 2007-055160 A1 (TOYOTA JIDOSHA KABUSHIKI KAISHA et al.) 18 May 2007 See page 11 and figure 1.	1-4
A	EP 1321642 A1 (MITSUBISHI JIDOSHA KOGYO KABUSHIKI KAISHA) 25 June 2003 See columns 6,8,9,16,17 and figures 1,5,7.	1-4

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

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

Date of the actual completion of the international search

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Name and mailing address of the ISA/KR

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Authorized officer

Noh Dae Hyun

Telephone No. 82-42-481-5637



**INTERNATIONAL SEARCH REPORT**

International application No.

**PCT/US2010/025922****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.: 5-10  
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:

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 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.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/US2010/025922**

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7406822 B2	05.08.2008	CN 1916378 A	21.02.2007
		DE 102006022074 A1	04.01.2007
		US 2007-0000241 A1	04.01.2007
US 6622480 B2	23.09.2003	DE 60210528 D1	24.05.2006
		DE 60219522 D1	24.05.2007
		EP 1234959 A2	28.08.2002
		EP 1460245 A1	22.09.2004
		JP 03951618 B2	01.08.2007
		JP 03951619 B2	01.08.2007
		JP 2002-242660 A	28.08.2002
		JP 2002-250218 A	06.09.2002
		US 2002-0112472 A1	22.08.2002
		WO 2007-055160 A1	18.05.2007
EP 1947304 A1	23.07.2008		
JP 2007-152336 A	21.06.2007		
JP 4270224 B2	27.05.2009		
KR 10-2008-0056001 A	19.06.2008		
US 2009-0120074 A1	14.05.2009		
EP 1321642 A1	25.06.2003	CN 1243183 C	22.02.2006
		CN 1425849 A	25.06.2003
		DE 60203157 D1	14.04.2005
		JP 2003-184538 A	03.07.2003
		KR 10-0509877 B1	25.08.2005
		US 2003-0106309 A1	12.06.2003
		US 6708487 B2	23.03.2004