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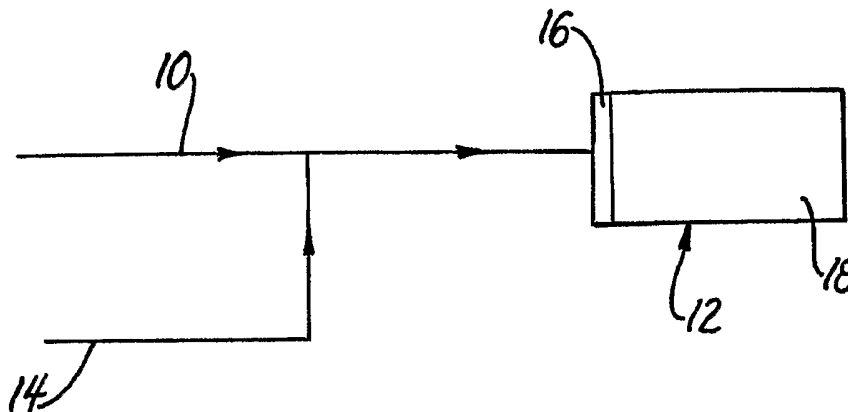
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(54) Title: REDUCING NO<sub>x</sub> EMISSIONS WITH A STAGED CATALYST



(57) Abstract: The conversion of NO<sub>x</sub> to nitrogen in the exhaust of a lean burn engine using a hydrocarbon assisted-selective catalytic reduction system is benefited by a two-stage oxidation catalyst-reduction catalyst SCR reactor. The character and quantity of the oxidation catalyst is managed to just activate the hydrocarbon reductant at low temperatures (but not fully burn it at high temperatures) to increase its NO<sub>x</sub> reduction efficiency as the exhaust then contacts the larger reduction catalyst stage of the two-stage reactor.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US05/35108

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC: F01N 3/00( 2006.01),3/10( 2006.01)

USPC: 60/286,301

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)  
U.S. : 60/286,301

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 practicable, search terms used)  
EAST; exhaust, gas, engine

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	WO 00/34632 A1 (JOHNSON MATTHEY PUBLIC LIMITED COMPANY) 15 June 2000 (15.06.2000), see col.4, lines 55-67; col. 5, lines 1-53.	1-5, 7-9, 11 and 12 ----- 6
Y	US 5,645,804 A (SUMIYA et al.) 08 July 1997 (08.07.1997), see col.15, lines 45-67; col. 16, lines 1-60.	10
A	US 6,581,374 B2 (PATCHETT et al.) 24 June 2003 (24.06.2003), see entire document	1-12
A	US 2003/0115859 A1 (DEEBA) 26 June 2003 (26.06.2003), see entire document.	1-12
A	US 2004/0098979 A1 (HAMMERLE et al.) 27 May 2004 (27.05.2004), see entire document.	1-12

Further documents are listed in the continuation of Box C.

See patent family 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		
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

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