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[Continued on next page]

(54) **Title:** APPARATUS, SYSTEM, AND METHOD FOR REDUCING NO_x EMISSIONS ON AN SCR CATALYST

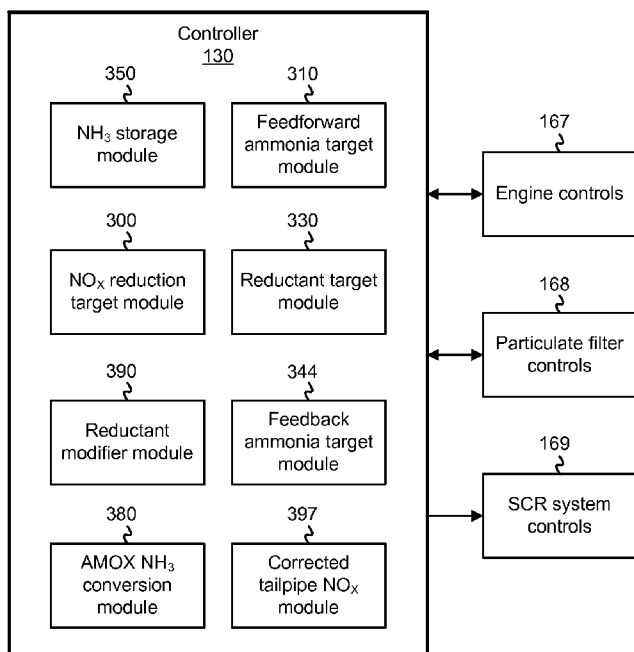


Fig. 3

(57) **Abstract:** According to one representative embodiment, an apparatus (130) for reducing NO_x emissions in an engine exhaust includes a NO_x reduction target module (300) configured to determine a NO_x reduction requirement (304). The apparatus also includes an ammonia target module (310) configured to determine an ammonia addition requirement (326) that includes an amount of ammonia added to the exhaust gas stream to achieve the NO_x reduction requirement. The apparatus also includes a reductant target module (330) that is configured to determine a reductant injection requirement (332) that includes an amount of reductant added to the exhaust gas stream to achieve the ammonia addition requirement. The apparatus further includes a reductant limiting module (390) that is configured to determine whether at least one reductant limiting condition is met and to limit the amount of reductant added in response to the at least one reductant limiting condition if the at least one reductant limiting condition has been met.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/042340**A. CLASSIFICATION OF SUBJECT MATTER***F01N 3/20(2006.01)i, B01D 53/94(2006.01)i, B01D 53/58(2006.01)i, F01N 3/10(2006.01)i, B01D 53/56(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 3/20; F01N 3/00; F01N 3/10; F01N 7/00

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)

eKOMPASS(KIPO internal) & Keywords: SCR, reductant, ammonia

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | US 7093427 B2 (MICHIEL J. VAN NIEUWSTADT et al.) 22 August 2006 See Abstract, column 3 line 51 - column 5 line 34, claims 1, 13, 14 | 1-25 |
| A | US 2008-0022658 A1 (MICHAEL B. VIOLA et al.) 31 January 2008 See Abstract, paragraph 15-20, claim 1 | 1-25 |
| A | US 2006-0130458 A1 (CHARLES E. SOLBRIG) 22 June 2006 See Abstract, paragraph 25-28, claim 1 | 1-25 |

 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

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"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

"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/042340

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:

- Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
- Claims Nos.: 26
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:

The feature of claim 26 is not referred to in the description. Therefore, claim 26 is not supported by the description as required by PCT Article 6.
- 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:

- As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
- 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.:
- 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/US2009/042340

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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