NOZZLED TURBOCHARGER TURBINE

A turbine includes a turbine housing (215) including at least two gas passages (236) having substantially the same flow area and disposed on either side of at least one divider wall (240). A turbine wheel (212) includes a plurality of blades (214). A nozzle ring (238) is connected to the turbine housing (215) and disposed around the turbine wheel. The nozzle ring (238) includes an inner ring (242) disposed adjacent the divider wall (240) and at least one outer ring (238). A plurality of vanes (246) is fixedly disposed between the inner and outer rings. The vanes define a plurality of inlet openings (258) therebetween that are in fluid communication with a slot (230) formed in the ring and surrounding the turbine wheel (212). The inner ring (242) is disposed to block a portion of the inlet openings (258) that fluidly communicate with one of the at least two gas passages (236) in the turbine housing (215).

FIG. 1
(88) Date of publication of the international search report:

12 April 2012
INTERNATIONAL SEARCH REPORT

International application No. PCT/US2011/045826

A. CLASSIFICATION OF SUBJECT MATTER

F02B 37/24(2006.01)i, FOID 17/16(2006.01)1, FOID 9/04(2006.01)1, F02B 39/00(2006.01)1

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)
F02B 37/24; F02B 29/04; F04B 17/00; F01B 25/02; F02B 33/44; F01D 9/04; F02D 23/00

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
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) & Keywords: turbocharger, turbine, nozzle, ring, vane, EGR, exhaust, gas, recirculation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>US 5888553 A (BATTIG; JOSEF et al.) 09 February 1999 See column 3 line 31- column 4 line 35 and fig. 2</td>
<td>1-10</td>
</tr>
<tr>
<td>A</td>
<td>US 2007-0130943 A1 (Lorraine Sausse et al.) 14 June 2007 See paragraphs 20-23 and fig. 1</td>
<td>1-10</td>
</tr>
<tr>
<td>A</td>
<td>US 2007-0175214 A1 (PAUL [REIDOFF] et al.) 02 August 2007 See paragraphs 18-22 and fig. 1</td>
<td>1-10</td>
</tr>
<tr>
<td>A</td>
<td>US 2007-0089415 A1 (KIYOHISO SHIMOKAIA et al.) 26 April 2007 See paragraphs 30,33 and fig. 2</td>
<td>1-10</td>
</tr>
<tr>
<td>A</td>
<td>US 2005-0252210 A1 (TAKASHI SHIRAISHI et al.) 17 November 2005 See paragraphs 61-65 and fig. 2</td>
<td>1-10</td>
</tr>
<tr>
<td>A</td>
<td>US 0458678A A (WITCHGER; EUGENE s.) 06 May 1986 See column 2 lines 25-53, claim 1 and fig. 1</td>
<td>1-10</td>
</tr>
</tbody>
</table>

- 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
"&" document member of the same patent family

Date of the actual completion of the international search
23 FEBRUARY 2012 (23.02.2012)

Date of mailing of the international search report
24 FEBRUARY 2012 (24.02.2012)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex Daejeon, 189 Chongsan-ro, Seo-gu, Daejeon 302-701, Republic of Korea
Fax number: 82-42-472-7140

Authorized officer
LEE, TAEK SANG
Telephone No. 82-42-481-5492
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 05868553 A</td>
<td>09.02.1999</td>
<td>CN 1105231 C</td>
<td>09.04.2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1172893 A</td>
<td>11.02.1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 0806548 B1</td>
<td>01.03.2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 10-0470 12 A</td>
<td>17.02.1998</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR 10-04765 16 B1</td>
<td>16.06.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 2002-328 105 A1</td>
<td>29.03.2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1333154 C</td>
<td>22.08.2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1694998 A</td>
<td>09.11.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 60226784 D1</td>
<td>03.07.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1543220 A1</td>
<td>22.06.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1543220 B1</td>
<td>21.05.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 201 1-01678 17 A1</td>
<td>14.07.2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 79461 16 B2</td>
<td>24.05.2011</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wo 2004-022926 A1</td>
<td>18.03.2004</td>
</tr>
<tr>
<td>US 2007-01752 14 A1</td>
<td>02.08.2007</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 2003-252290 A1</td>
<td>14.02.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1650415 A4</td>
<td>24.06.2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wo 2005-010330 A1</td>
<td>03.02.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 2003-30 1328 A8</td>
<td>04.05.2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BR 0306617 A</td>
<td>19.10.2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1692214 A</td>
<td>02.11.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1692214 C0</td>
<td>05.03.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 15521 10 A2</td>
<td>13.07.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1892382 A2</td>
<td>27.02.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 1892382 A3</td>
<td>02.04.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2004-156592 A</td>
<td>03.06.2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2006-51419 1 A</td>
<td>27.04.2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR 10-080597 1 B1</td>
<td>25.02.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>KR20050049550A</td>
<td>25.05.2005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 7396204 B2</td>
<td>08.07.2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wo 2004-03599 1 A2</td>
<td>29.04.2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wo 2004-03599 1 A3</td>
<td>05.08.2004</td>
</tr>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
<td>Publication date</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------</td>
<td>-------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>US 04586878A A</td>
<td>06.05.1986</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>