



- (51) International Patent Classification:
F02B 37/24 (2006.01) *F01D 17/16* (2006.01)
F02B 37/22 (2006.01)
- (21) International Application Number:
PCT/US2012/035755
- (22) International Filing Date:
30 April 2012 (30.04.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
10 2011 101 037.1 10 May 2011 (10.05.2011) DE
- (71) Applicant (for all designated States except US):
BORGWARNER INC. [US/US]; Patent Department,
3850 Hamlin Road, Auburn Hills, Michigan 48326 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **HEIDINGSFELDER,
Leif** [DE/DE]; Steinwendenerstrasse 6, 66877 Ramstein
(DE).
- (74) Agents: **PENDORF, Stephan A.** et al.; Patent Central
LLC, 1401 Hollywood Boulevard, Hollywood, Florida
33020-5237 (US).
- (81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: TURBOCHARGER WITH VARIABLE TURBINE GEOMETRY

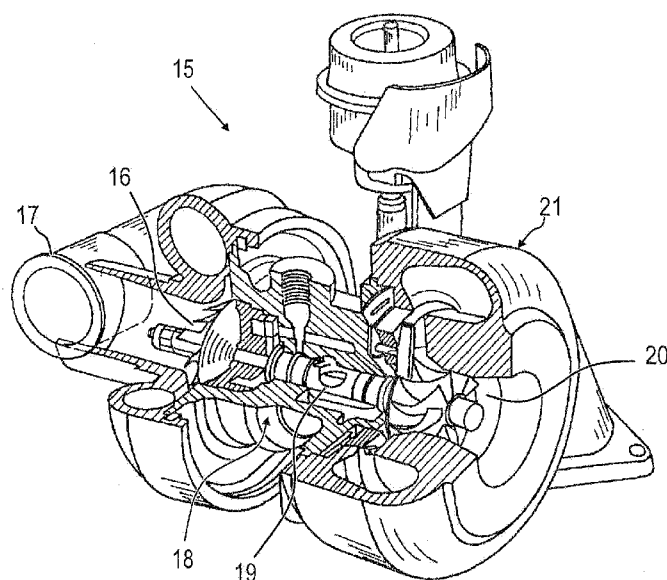


FIG. 1

(57) Abstract: The present invention relates to a turbocharger (15) with variable turbine geometry, having a blade bearing ring arrangement (1) which has a blade bearing ring (2) and a disk (3) which is fixed to the blade bearing ring (2) so as to create a flow duct (4), having guide blades (5) mounted in the blade bearing ring (2), and having a spacer device (5) which is arranged between the blade bearing ring (2) and the disk (3) so as to set a defined width (B) of the flow duct (4), wherein the spacer device (5) is formed as an inlet guide grate (6) which has movable inlet guide blades (8) which are arranged in each case on a spacer pin (7) which is fixed with its first end (7A) to the blade bearing ring (2). The invention also relates to a method for producing a blade bearing ring arrangement (1).

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

3 January 2013

A. CLASSIFICATION OF SUBJECT MATTER***F02B 37/24(2006.01)i, F02B 37/22(2006.01)i, F01D 17/16(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)

F02B 37/24; F01D 17/12; F01D 17/16; 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, variabe, geometry, blade, bearing, guide, spacer, ring, pin, inlet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2008-118833 A1 (HONEYWELL INTERNATIONAL INC. et al.) 02 October 2008 See the abstract, paragraphs 0033-0039, figures 2-11	1-11
A	US 7886536 B2 (HEMER HANS-JOSEF) 15 February 2011 See the abstract, column 5 lines 10-41, figure 1	1-11
A	US 7114919 B2 (GEORG SCHOLZ et al.) 03 October 2006 See the abstract, column 4 line 65 - column 5 line 5, figures 4-6	1-11
A	JP 2002-206427 A (ISHIKAWAJIMA HARIMA HEAVY IND., CO., LTD.) 26 July 2002 See the abstract, paragraphs 0020-0028, figures 2,4	1-11



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

13 NOVEMBER 2012 (13.11.2012)

Date of mailing of the international search report

14 NOVEMBER 2012 (14.11.2012)

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan
City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

LEE, TAEK SANG

Telephone No. 82-42-481-5492



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/035755

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2008-118833 A1	02.10.2008	CN 101542075 A EP 2171220 A1 US 2008-0240906 A1 US 7670107 B2	23.09.2009 07.04.2010 02.10.2008 02.03.2010
US 7886536 B2	15.02.2011	DE 102004057864 A1 EP 1662094 A2 EP 1662094 A3 JP 04-768416 B2 JP 2006-161811 A US 2006-0112690 A1	01.06.2006 31.05.2006 14.11.2007 24.06.2011 22.06.2006 01.06.2006
US 7114919 B2	03.10.2006	DE 50209301 D1 EP 1418311 A1 EP 1418311 B1 US 2004-0096317 A1	08.03.2007 12.05.2004 17.01.2007 20.05.2004
JP 2002-206427 A	26.07.2002	JP 4491766 B2	30.06.2010