

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
15 June 2006 (15.06.2006)

PCT

(10) International Publication Number
WO 2006/063236 A3

(51) International Patent Classification:

F04D 25/04 (2006.01) **F01D 25/24** (2006.01)

F04D 29/62 (2006.01)

(21) International Application Number:

PCT/US2005/044632

(22) International Filing Date:

9 December 2005 (09.12.2005)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

11/008,517 9 December 2004 (09.12.2004) US

(71) Applicant (for all designated States except US): **HONEYWELL INC.** [US/US]; 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MARTIN, Steven** [US/US]; 2042 Dacian Drive, Walnut, CA 91789 (US). **MEADE, Christopher** [US/US]; 1907 Voorhees, Redondo Beach, CA 90278 (US).

(74) Agents: **HOIRIIS, David** et al.; Honeywell Inc., 101 Columbia Road, P.O. Box 2245, Morristown, NJ 07960 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

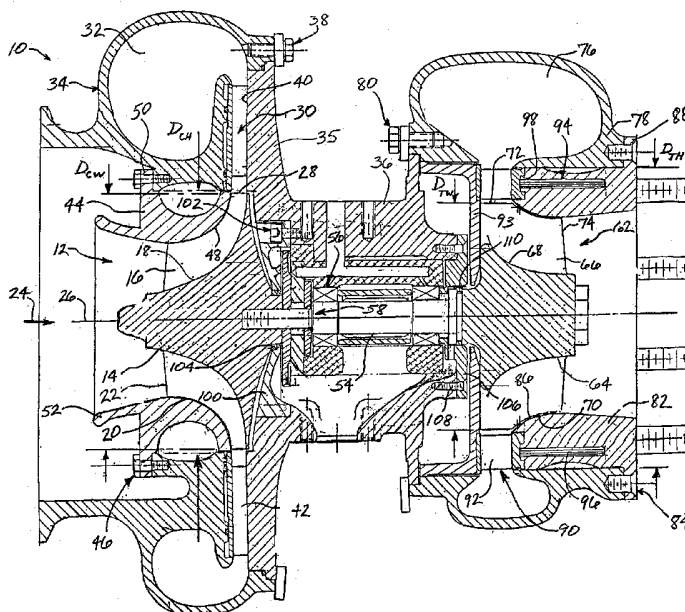
— with international search report

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

24 August 2006

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: TURBOCHARGER WITH REMOVEABLE WHEEL SHROUDS AND/OR REMOVABLE SEALS



(57) Abstract: A turbocharger includes compressor and/or turbine end housing(s) and removable compressor and/or turbine shroud portion(s) configured in relation to the compressor and/or turbine wheel(s) such that either or both of the wheels can be removed, after removal of the respective shroud portion(s), without having to remove the respective end housing(s). Additionally or alternatively, a turbocharger includes removable and replaceable compressor and/or turbine seal(s) supported by removable compressor and/or turbine seal plate(s).

WO 2006/063236 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/044632

A. CLASSIFICATION OF SUBJECT MATTER

INV. F04D25/04 F04D29/62 F01D25/24

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)

F04D F01D

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 345 503 B1 (GLADDEN JOHN R) 12 February 2002 (2002-02-12) figure 1	1
A		2-15
X	US 2002/114693 A1 (BARTHOLOMA KLAUS ET AL) 22 August 2002 (2002-08-22) figure 1	1
A		2-15
X	FR 1 274 253 A (BÜCHI) 20 October 1961 (1961-10-20) the whole document	8,9,12
Y		1,2,6
Y	GB 881 373 A (SULZER FRERES, SOCIETE ANONYME) 1 November 1961 (1961-11-01) page 2, line 68 - line 76; figure 1	1,2,6



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 document 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 another 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

17 May 2006

Date of mailing of the international search report

07/06/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Teerling, J

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2005/044632

Box 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.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box 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:

see additional sheet

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.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-11

Turbocharger comprising a removable compressor and/or turbine shroud, giving access to the compressor and/or turbine wheel and their shaft seals. Removal of the end housings is not required; the OD of the shroud is greater than the ID of the end housing.

2. claims: 12-15

Turbocharger comprising a removable turbine seal plate and a turbine shaft seal.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2005/044632

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6345503	B1	DE 10144418 A1	25-04-2002
US 2002114693	A1	CN 1372082 A	02-10-2002
		DE 10107807 C1	25-07-2002
		EP 1233190 A1	21-08-2002
		JP 2002257092 A	11-09-2002
FR 1274253	A	NONE	
GB 881373	A	NONE	