Title: ROTARY VANE ENGINES WITH MOVABLE ROTORS, AND ENGINE SYSTEMS COMPRISING SAME

Abstract: Embodiments of rotary vane engines (26, 300, 320) include rotors (44) that rotate about an axis of rotation (T). The rotors can be moved in directions substantially perpendicular to the axis of rotation (T) to vary expansion and/or compression ratios of the rotary vane engines (26, 300, 320). The ability to vary the expansion and/or compression ratios can facilitate optimization of the performance of the rotary vane engines (26, 300, 320) as operating conditions vary.
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:
14 October 2010
A. CLASSIFICATION OF SUBJECT MATTER

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 53/00, FOIC 1/344, F03C 4/00, F04C 15/04, F04C 18/344, F04C 2/344

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 database and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords vane, rotor, variable, housing, chamber, engine, axis

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<td>X</td>
<td>JP 10-068301 A (TORIZUKA SOGO KENKYUSHO KK) 10 March 1998 See paragraphs [0019] and fig 1</td>
<td>1, 4, 7-10, 13-18, 21-22</td>
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<td>US 2005-0079084 A1 (ALBERT, W PATTERSON) 14 Apr i1 2005 See abstract and fig 1</td>
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<td>A</td>
<td>wo 01-46591 A1 (COLTEC INDUSTRIES INC ) 28 June 2001 See abstract and fig 1</td>
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<td>A</td>
<td>JP 57-122190 A (NIPPON SOKEN INC) 29 July 1982 See abstract and fig 1</td>
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</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 09 AUGUST 2010 (09 08 2010)

Date of mailing of the international search report 13 AUGUST 2010 (13.08.2010)

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seomsa-ro, Seogu Daejeon 302-701, Republic of Korea
Facsimile No 82-42-472-7140

Authorized officer
LEE, TAEK SANG
Telephone No 82-42-48 1-5492

Form PCT/ISA/210 (second sheet) (My 2009)
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)

This International Searching Authority found multiple inventions in this international application, as follows:

Claims 1, 21 and 22 is directed to a rotary vane engine

The only common technical feature between Claims 1, 21 and 22 is a rotary vane engine comprising a housing, a rotor, a vane, and rotor is movable in relation to the housing

However this feature lacks novelty and inventive step with respect to the following documents cited in this ISR:
(a) JP 10-068301A
(b) US 2005/0079084
(c) US 2007/0215094
(d) WO 01/46591
(e) JP 57-122190 A

Thus there is no technical relationship left over the prior art among the claimed inventions, leaving the claims without a single general inventive concept. Hence there is lack of unity "a posteriori" (PCT Rules 13 1 and 13 T)

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 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

Form PCT/ISA/210 (continuation of first sheet (2)) (July 2009)
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<tr>
<td>JP 10-068301 A</td>
<td>10.03.1998</td>
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<td>CA 2483975-A1</td>
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Form PCT/ISA/210 (patent family annex) (My 2009)