

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 February 2004 (12.02.2004)

PCT

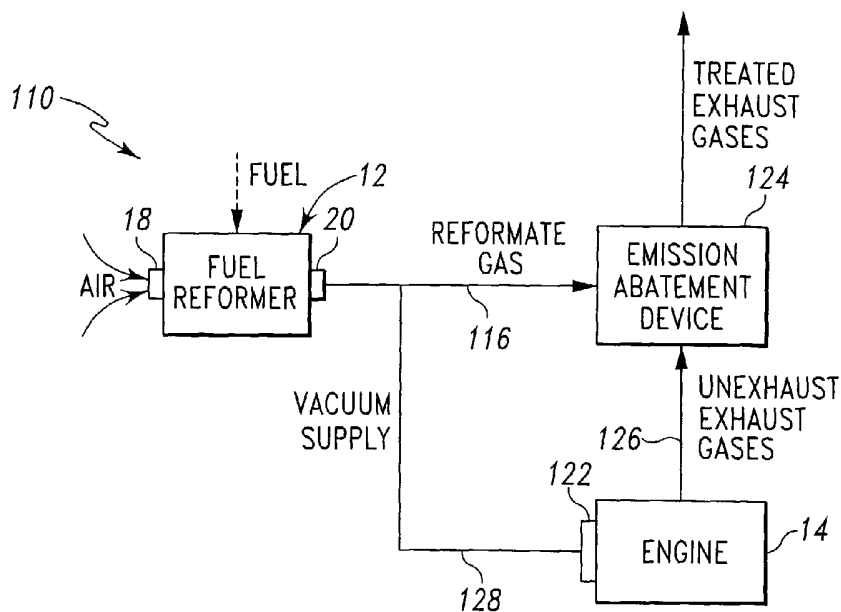
(10) International Publication Number
WO 2004/013471 A3

- (51) International Patent Classification⁷: F02B 43/08
- (74) Agent: BAUER, Shawn, D.; Barnes & Thornburg, 11 South Meridian Street, Indianapolis, IN 46204 (US).
- (21) International Application Number: PCT/US2003/021183
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (22) International Filing Date: 7 July 2003 (07.07.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
 - 60/401,092 5 August 2002 (05.08.2002) US
 - 10/612,312 2 July 2003 (02.07.2003) US
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- (71) Applicant: ARVIN TECHNOLOGIES, INC. [US/US]; 2135 West Maple Road, Troy, MI 48084 (US).
- (72) Inventors: TAYLOR, William; 2136 Franklin Street, Columbus, IN 47201 (US). CAIN, Rodney, H.; 5200 Oakhill Drive, Swartz Creek, MI 48473 (US). CARBONE, Donald, T.; 4250 Tallman Road, Troy, MI 48085 (US).

Published:
— with international search report

[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR ADVANCING AIR INTO A FUEL REFORMER BY USE OF AN ENGINE VACUUM



(57) Abstract: A method of operating a power system (10, 110, 210) is includes operating an internal combustion engine (14) so as to produce an engine vacuum, and advancing air into a fuel reformer (12) with the engine vacuum. The method also includes advancing reformat gas produced by the fuel reformer (12) to a component such as the intake (22) of the engine (14), an emission abatement device, or a fuel cell. A power system (10, 110) operated by such a method is also disclosed.

WO 2004/013471 A3



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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.

(88) Date of publication of the international search report:
10 March 2005

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/21183

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : F02B 43/08
 US CL : 123/3, 27GE, 568; 60/274, 276; 422/182

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)
 U.S. : 123/3, 27GE, 568; 60/274, 276; 422/182

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,175,523 A (NOGUCHI et al.) 27 November 1979 (27.11.1979), See the entire document.	1, 2, 4, 6, 12-15, 17, 18 and 20 ----- 3, 5, 7-9, 11, 16 and 19
Y, P	US 6,655,130 B1 (KIRWAN et al.) 02 December 2003 (02.12.2003), See the entire document.	3, 5, 7-9, 11, 16 and 19
A	US 4,031,865 A (DUFOUR) 28 June 1977 (28.06.1977), See the entire document.	1-20
A	US 4,475,483 A (ROBINSON) 09 October 1984 (09.10.1984), See the entire document.	1-20

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"&" document member of the same patent family
"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	

Date of the actual completion of the international search 29 July 2004 (29.07.2004)	Date of mailing of the international search report 27 JAN 2005
--	--

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230	Authorized officer <i>Sheila H. Veney</i> Linda Sholl Paralegal Specialist Telephone No. 703 308 1 Tech. Center 3700
---	---

INTERNATIONAL SEARCH REPORT

PCT/US03/21183

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4,143,620 A (NOGUCHI et al.) 13 March 1979 (13.03.1979), See the entire document.	1-20
A	US 4,200,062 A (DUCKWORTH) 29 April 1980 (29.04.1980), See the entire document.	1-20