



- (51) **International Patent Classification:**
F02C 9/00 (2006.01)

(21) **International Application Number:**
PCT/US2011/042870

(22) **International Filing Date:**
1 July 2011 (01.07.2011)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
61/361,169 2 July 2010 (02.07.2010) US

(71) **Applicants** (*for all designated States except US*): **EXXONMOBIL UPSTREAM RESEARCH COMPANY** [US/US]; P.O. Box 2189, Corp-URC-SW359, Houston, Texas 77252-2189 (US). **GEORGIA TECH RESEARCH CORPORATION** [US/US]; 505 Tenth Street, N.W., Atlanta, Georgia 30332 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants** (*for US only*): **HUNTINGTON, Richard** [US/US]; 12714 Autumn Crest Drive, Oak Hill, Virginia 20171 (US). **RASMUSSEN, Chad C.** [US/US]; 1815 Bethlehem Street, Houston, Texas 77018 (US). **MITTRICKER, Franklin F.** [US/US]; 14777 Presilla Drive, Jamul, California 91935 (US). **LIEUWEN, Tim** [US/US]; 1689 Fernleaf Circle, Atlanta, Georgia 30319 (US). **DHANUKA, Sulabh K.** [IN/US]; 1111 Post Oak Blvd, Apt 201, Houston, Texas 77056 (US). **MINTA, Moses K.** [US/US]; 7531 Trail Hollow, Missouri City, Texas 77459 (US). **STARCHER, Loren K.** [US/US]; 3410 Castlebrook Ct., Sugar Land, Texas 77478 (US). **GUPTA, Himanshu** [IN/US]; 9278 Laurel Ridge Crossing Rd., Lorton, Virginia 22079 (US).

(74) **Agent:** **EDMONDS, Robb D.**; Edmonds & Nolte, P.C., 16815 Royal Crest Drive, Suite 130, Houston, Texas 77058 (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, LR, LS, LY, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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,

[Continued on next page]

- (54) Title:** SYSTEMS AND METHODS FOR CONTROLLING COMBUSTION OF A FUEL

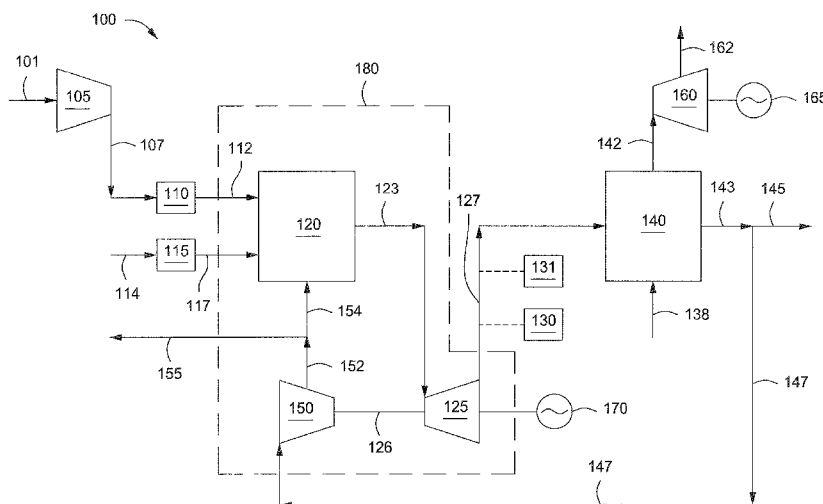


FIG. 1

- (57) Abstract:** Systems and methods for controlling the composition of a combustion exhaust gas are provided. Exemplary methods include introducing a fuel, an oxidant, and a diluent to a combustion zone and combusting at least a portion of the fuel to produce an exhaust gas comprising water, carbon dioxide, oxygen, and carbon monoxide. The exhaust gas may be expanded to produce mechanical power and an expanded exhaust gas. A concentration of at least one of oxygen and carbon monoxide is determined in at least one of the exhaust gas and the expanded exhaust gas. The method continues by adjusting an amount of at least one of the oxidant and the fuel introduced to the combustion zone based at least in part on the determined concentration of at least one of oxygen and carbon monoxide to produce an exhaust gas containing a combined amount of oxygen and carbon monoxide of less than about 2 mol %.



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, (88) Date of publication of the international search report:
ML, MR, NE, SN, TD, TG). 1 August 2013

Published:

— *with international search report (Art. 21(3))*