



- (51) **International Patent Classification:**
F25J 1/00 (2006.01) *F25J 1/02* (2006.01)

(21) **International Application Number:**
PCT/US2019/044141

(22) **International Filing Date:**
30 July 2019 (30.07.2019)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
62/721,375 22 August 2018 (22.08.2018) US

(71) **Applicant: EXXONMOBIL UPSTREAM RESEARCH COMPANY** [US/US]; (EMHC-N1.4A.607), 22777 Springwoods Village Parkway, Spring, TX 77389 (US).

(72) **Inventors: LIU, Yijun;** 20102 Elaine Rose Ct., Spring, TX 77379 (US). **PIERRE, Fritz, Jr.;** 18011 Bayou Mead Trail, Humble, TX 77346 (US). **NAGAVARAPU, Ananda, K.;** 1114 W. 25th Street, Houston, TX 77008 (US). **WRIGHT, Xiaoli, Y.;** 4506 Willingham Court, Sugar Land, TX 77479 (US).

(74) **Agent: JENSEN, Nathan, O. et al.;** ExxonMobil Upstream Research Company, (EMHC-N1.4A.607), 22777 Springwoods Village Parkway, Spring, TX 77389 (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, ST, 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,

- (54) Title:** PRIMARY LOOP START-UP METHOD FOR A HIGH PRESSURE EXPANDER PROCESS

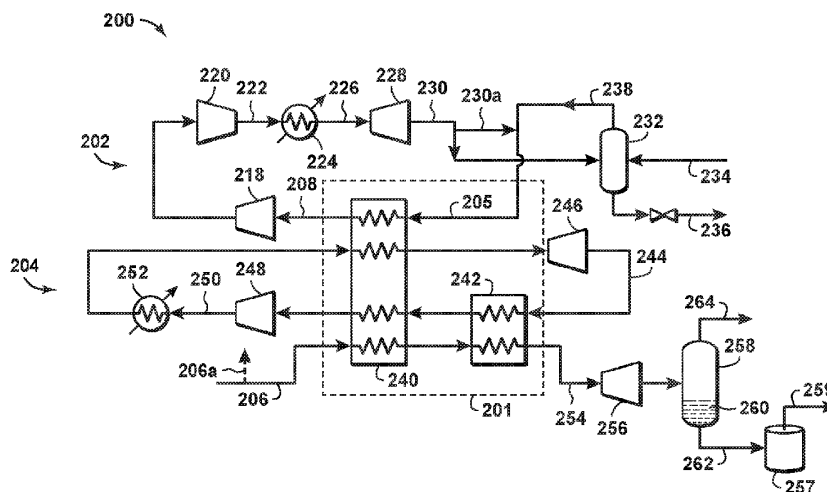


FIG. 2

- (57) Abstract:** A method is disclosed for start-up of a system for liquefying a feed gas stream comprising natural gas. The system has a feed gas compression and expansion loop, and a refrigerant system comprising a primary cooling loop and a sub-cooling loop. The feed gas compression and expansion loop is started up. The refrigerant system is pressurized. Circulation in the primary cooling loop is started and established. Circulation in the sub-cooling loop is started and established. A flow rate of the feed gas stream and circulation rates of the primary cooling loop and the sub-cooling loop are ramped up.

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

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))*

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))*
- *with information concerning one or more priority claims considered void (Rule 26bis.2(d))*