



- (51) **International Patent Classification:**
F02K 3/072 (2006.01) *F02C 7/04* (2006.01)
F02K 3/04 (2006.01)
- (21) **International Application Number:**
PCT/US2013/026266
- (22) **International Filing Date:**
15 February 2013 (15.02.2013)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
13/408,281 29 February 2012 (29.02.2012) US
- (71) **Applicant:** UNITED TECHNOLOGIES CORPORATION [US/US]; One Financial Plaza, Hartford, Connecticut 06101 (US).
- (72) **Inventors:** SUCIU, Gabriel L.; 27 Tanglewood Dr., Glastonbury, Connecticut 06033 (US). MERRY, Brian D.; 220 Bear Swamp Road, Andover, Connecticut 06232 (US).
- (74) **Agent:** LABA, Kerrie A.; Carlson, Gaskey & Olds/Pratt & Whitney, c/o CPA Global, P.O. Box 52050, Minneapolis, Minnesota 55402 (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, 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, LK, LR, LS, LT, 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, 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, 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, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report (Rule 48.2(g))

(54) **Title:** COUNTER-ROTATING LOW PRESSURE TURBINE WITH GEAR SYSTEM MOUNTED TO TURBINE EXHAUST CASE

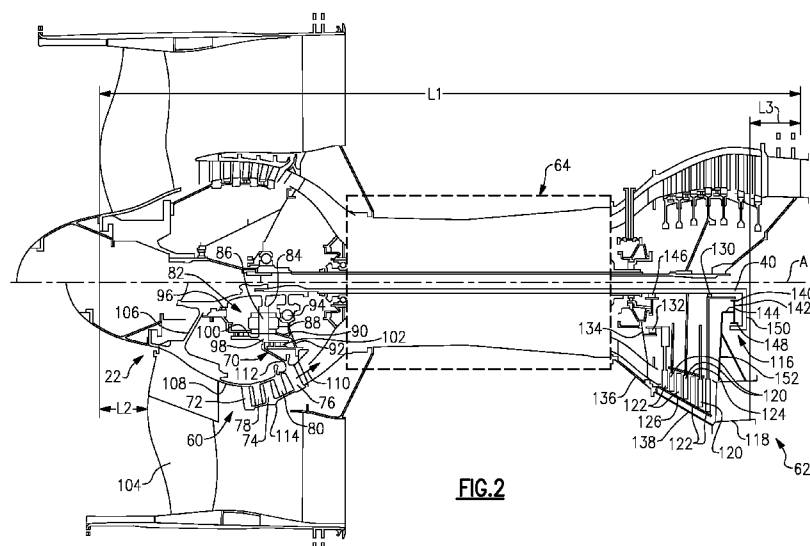


FIG. 2

(57) **Abstract:** A gas turbine engine includes a shaft defining an axis of rotation. An inner rotor directly drives the shaft and includes an inner set of blades. An outer rotor has an outer set of blades interspersed with the inner set of blades. The outer rotor is configured to rotate in an opposite direction about the axis of rotation from the inner rotor. A gear system couples the outer rotor to the shaft and is configured to rotate the inner set of blades at a lower speed than the outer set of blades.