

(19) World Intellectual Property  
Organization  
International Bureau



WIPO | PCT



(10) International Publication Number  
**WO 2019/021234 A9**

(43) International Publication Date  
31 January 2019 (31.01.2019)

(51) International Patent Classification:

F02K 9/42 (2006.01) F02K 99/00 (2009.01)  
F03H 99/00 (2009.01) F02K 9/62 (2006.01)

(72) Inventor; and

(71) Applicant: MINOTTI, Angelo [IT/IT]; VIA LAURI 32,  
00037 SEGNI (RM) (IT).

(21) International Application Number:

PCT/IB2018/055595

(74) Agent: LEONE, Mario et al.; Cantaluppi & Partners, Via  
XX Settembre 98/G, 00187 Roma (IT).

(22) International Filing Date:

26 July 2018 (26.07.2018)

(25) Filing Language:

Italian

(26) Publication Language:

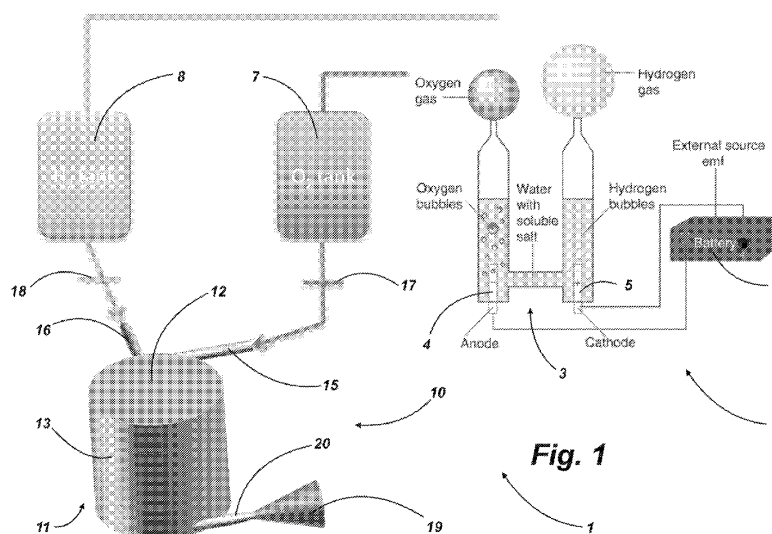
English

(30) Priority Data:

102017000087235 28 July 2017 (28.07.2017) IT

(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,

(54) Title: SPACE PROPULSION SYSTEM



(57) Abstract: A space propulsion system (1), having reduced sizes, is designed specifically for the application on miniaturised satellites, but it can be scaled easily based upon a wide range of sizes of the target vehicle, and it comprises: a combustion chamber (10) implemented by a cylindrical container (11) having cylindrical walls (13), a first end (12) provided with at least an injection duct (15) for a combustion agent, a fuel and/or a mixture thereof, for the injection according to a direction tangential to said cylindrical walls so as to induce a helical combustion path in the combustion chamber (10), a possible additional perpendicular injection duct (16) for a fuel or a combustion agent, and an opposite end (14) provided with a discharge duct (19) arranged according to a direction tangential to said cylindrical walls (13) so as to receive and direct said helical path, wherein the cylindrical walls in case have a deposition of catalytic material inside thereof, for accelerating the combustion reaction; and a supersonic nozzle (20), connected to said discharge duct (19)

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

**Published:**

- *with international search report (Art. 21(3))*
- *with amended claims (Art. 19(1))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*

**(48) Date of publication of this corrected version:**

24 November 2022 (24.11.2022)

**(15) Information about Correction:**

see Notice of 24 November 2022 (24.11.2022)

---

for discharging the combustion products in the combustion chamber.