

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
02 May 2024 (02.05.2024)



(10) International Publication Number
WO 2024/088559 A1

(51) International Patent Classification:
B01D 53/00 (2006.01) **F01K 23/10** (2006.01)

(21) International Application Number:
PCT/EP2023/025442

(22) International Filing Date:
23 October 2023 (23.10.2023)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
102022000022254 28 October 2022 (28.10.2022) IT

(71) Applicant: **NUOVO PIGNONE TECNOLOGIE - S.R.L.** [IT/IT]; Via Felice Matteucci 2, 50127 Florence (IT).

(72) Inventors: **LISTORTI, Marco**; Via Felice Matteucci 2, 50127 Florence (IT). **IANNUZZI, Gianni**; Via Felice Matteucci 2, 50127 Florence (IT).

(74) Agent: **ILLINGWORTH-LAW, William** et al.; Baker Hughes, 245 Hammersmith, Chalk Hill Road, London W6 8DW (GB).

(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, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, 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, ST, SV, SY, TH,

(54) Title: A GAS TURBINE SYSTEM WITH SUPERSONIC CARBON DIOXIDE SEPARATOR AND METHOD

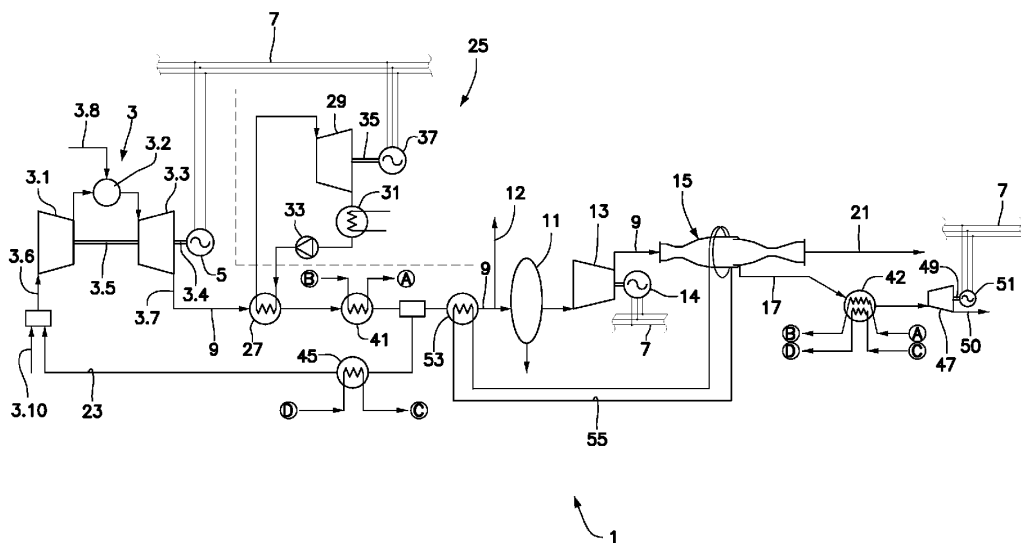


Fig.1

(57) Abstract: The gas turbine system comprises a gas turbine engine and a flue gas discharge line fluidly coupled to the discharge side of the gas turbine engine an adapted to deliver flue gas to a flue gas compressor. The delivery side of the flue gas compressor is fluidly coupled to an expansion device, where the compressed flue gas is expanded causing a change of phase of the carbon dioxide from gaseous to liquid and/or solid. The liquid or solid carbon dioxide particles are removed from the flue gas prior to discharging the latter in the atmosphere. At least a partial carbon dioxide capture is thus obtained. To improve the efficiency of the system, a recycling line is further provided, connecting the flue gas discharge line to the suction side and adapted to recycle a portion of exhausted flue gas to the suction side of the gas turbine engine.

[Continued on next page]

WO 2024/088559 A1

TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS,
ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, 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, ME, 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).

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))*