



(51) International Patent Classification:

B64G 1/40 (2006.01) F03H 1/00 (2006.01)

(21) International Application Number:

PCT/US2021/047275

(22) International Filing Date:

24 August 2021 (24.08.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/069,631 24 August 2020 (24.08.2020) US

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(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, IT, 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, ST, SV, SY, TH, 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, 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))
- 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))

(88) Date of publication of the international search report:

05 May 2022 (05.05.2022)

(54) Title: PROPELLANT APPARATUS

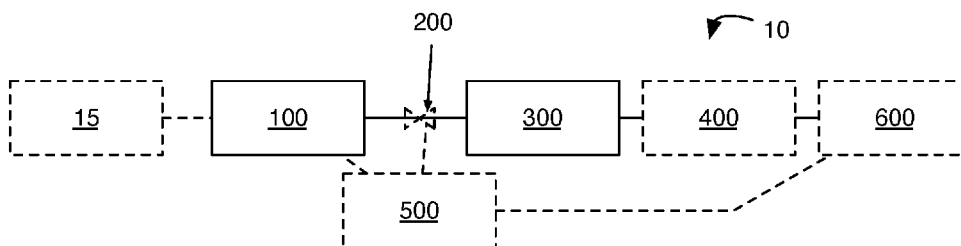


FIGURE 1

(57) Abstract: A system can include a reservoir configured to hold working material, a decontamination module configured to remove contaminants from the working material, a flow control mechanism configured to regulate working material flow between the reservoir and the decontamination module, and a manifold fluidly connecting the reservoir to the decontamination module.



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US21/47275

A. CLASSIFICATION OF SUBJECT MATTER

IPC - B64G 1/40; F03H 1/00 (2021.01)

CPC - F03H 1/0012; B64G 1/402; B64G 1/405; F03H 1/0037

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	US 2005/0257515 A1 (WEIDONG SONG) 24 November 2005; figures 1, 2A, 6 and 7; paragraphs [0026-0028, 0030-0031, 0045, 0047, 0048, 0051, 0057, 0062]	1-4, 6, and 10 — 5, 7-9, 21
X	WO 2010/036291 A2 (AEROJET-GENERAL CORPORATION) 01 April 2010; figures 1-4, paragraphs [0014, 0016-0017, 0020-0022, 0024-0026, 0028, 0031]	1, 3
Y	US 2013/0228700 A1 (MASSACHUSETTS INSTITUTE OF TECHNOLOGY) 05 September 2013; figure 15; paragraphs [0094]	7-9
Y	KREJCI. "Micro-machined ionic liquid electrospray thrusters for Cubesat applications" . . . 08 October 2017; Conference Paper, The 35th International Electric Propulsion Conference, Georgia Institute of Technology, USA; October 8–12, 2017 [Retrieved from Online] [Retrieved on 03/10/2022] <URL:https://www.researchgate.net/publication/320335334_Micro-machined_ionic_liquid_electrospray_thrusters_for_Cubesat_applications>, figures 1 and 2; page 3, section II, paragraph 1; Page 12, section VI, paragraph 1	5, 21/1

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

10 March 2022 (10.03.2022)

Date of mailing of the international search report

MAR 21 2022

Name and mailing address of the ISA/US

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US21/47275

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
-***-Please See Supplemental Page-***-

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
Group I: Claims 1-10, 21/1

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US21/47275

-***-Continued From Box No. III: Observations where unity of invention is lacking-***-

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fee must be paid.

Group I: Claims 1-10, 21/1 are directed towards an electrospray system comprising: a reservoir, a first emitter, an electrode, a first and second electric polarity, and a second emitter.

Group II: Claims 11-20, 21/11, 22-24 are directed towards a system comprising: a reservoir storing an ionic fluid, a decontamination module, a valve, and a manifold.

Group III: Claims 25 and 26 are directed towards a system comprising: a propellant management device within a porous inner compartment, an external environment, and a second valve.

The inventions listed as Groups I-III do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features.

The special technical features of Group I are at least an electrospray system comprising: a first emitter and a second emitter each associated with a respective electrode, wherein the respective electrodes are configured to apply a first and second electric polarity to the working material emitted from the first and second emitter, respectively; a manifold fluidly coupling the reservoir to at least one of the first emitter and the second emitter, wherein the manifold is in fluid communication with an external environment proximal the manifold, which are not present in Groups II or III.

The special technical features of Group II are at least a decontamination module configured to remove contaminants from the ionic liquid; a valve between the reservoir and the decontamination module; and a manifold fluidly connecting the reservoir to an endpoint through the decontamination module, which are not present in Groups I or III.

The special technical features of Group III are at least an inner compartment with a porous wall; and a propellant management device within the porous inner compartment; a first valve in a fluid path connecting the reservoir to an external environment; a manifold fluidly connecting the reservoir to an endpoint; and a second valve between the reservoir and the manifold, which are not present in Groups I or II.

The common technical features of Groups I-III are a system comprising: a reservoir to store a working material; a manifold fluidly coupled to the reservoir, and a valve between the reservoir and the manifold, which are previously disclosed by US 9,140,723 A (STROGANOV). STROGANOV discloses a system comprising: a reservoir to store a working material; a manifold fluidly coupled to the reservoir, and a valve between the reservoir and the manifold (a system comprising: a reservoir storing a working liquid, a manifold between the valve and the reservoir; see claim 15 of STROGANOV).

Since the common technical features are previously disclosed by STROGANOV, these common features are not special and so Groups I-III lack unity.