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NOTICE OF ALLOWANCE AND FEE(S) DUE

25570 7590 07/23/2021
Roberts Calderon Safran & Cole, P.C.
7918 Jones Branch Drive
Suite 500
McLean, VA 22102

Table with 2 columns: EXAMINER (RITCHIE, DARLENE M), ART UNIT (3646), PAPER NUMBER (6738)

DATE MAILED: 07/23/2021

Table with 5 columns: APPLICATION NO. (13/584,574), FILING DATE (08/13/2012), FIRST NAMED INVENTOR (Bert ZAUDERER), ATTORNEY DOCKET NO. (3923-40006), CONFIRMATION NO. (6738)

TITLE OF INVENTION: NUCLEAR ENERGY, METAL FUEL, H2 / O2 FROM H2O, WITH MHD POWER AND PROPULSION FOR ONE MONTH
ASTRONAUT ROCKET VOYAGES TO MARS

Table with 7 columns: APPLN. TYPE (nonprovisional), ENTITY STATUS (SMALL), ISSUE FEE DUE (\$600), PUBLICATION FEE DUE (\$0.00), PREV. PAID ISSUE FEE (\$0.00), TOTAL FEE(S) DUE (\$600), DATE DUE (10/25/2021)

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies. If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above. If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)". For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: **Mail Stop ISSUE FEE**
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P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the **ISSUE FEE** and **PUBLICATION FEE** (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

25570 7590 07/23/2021
Roberts Calderon Safran & Cole, P.C.
7918 Jones Branch Drive
Suite 500
McLean, VA 22102

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/584,574	08/13/2012	Bert ZAUDERER	3923-40006	6738

TITLE OF INVENTION: NUCLEAR ENERGY, METAL FUEL, H2 / O2 FROM H2O, WITH MHD POWER AND PROPULSION FOR ONE MONTH
ASTRONAUT ROCKET VOYAGES TO MARS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$0.00	\$600	10/25/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
RITCHIE, DARLENE M	3646	376-318000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2
- _____ 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE _____ (B) RESIDENCE: (CITY and STATE OR COUNTRY) _____

Please check the appropriate assignee category or categories (will not be printed on the patent) : Individual Corporation or other private group entity Government

4a. Fees submitted: Issue Fee Publication Fee (if required) Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

- Electronic Payment via EFS-Web Enclosed check Non-electronic payment by credit card (Attach form PTO-2038)
- The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. Change in Entity Status (from status indicated above)

- Applicant certifying micro entity status. See 37 CFR 1.29
- Applicant asserting small entity status. See 37 CFR 1.27
- Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 13/584,574, 08/13/2012, Bert ZAUDERER, 3923-40006, 6738
Row 2: 25570, 7590, 07/23/2021, EXAMINER RITCHIE, DARLENE M
Row 3: ART UNIT 3646, PAPER NUMBER

Roberts Calderon Safran & Cole, P.C.
7918 Jones Branch Drive
Suite 500
McLean, VA 22102

DATE MAILED: 07/23/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/584,574	Applicant(s) ZAUDERER, Bert	
	Examiner DARLENE M RITCHIE	Art Unit 3646	AIA (FITF) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. This communication is responsive to the PTAB decision mailed June 17th, 2021.
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. The allowed claim(s) is/are 1-4,6-7,12 and 14-16 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) All b) Some *c) None of the:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____ .
 3. Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|--|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____. | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material _____. | 7. <input checked="" type="checkbox"/> Other <u>examiner amendment proposal July 9,2021.</u> |
| 4. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date. <u>12 July 2021.</u> | |

/DARLENE M RITCHIE/
Primary Examiner, Art Unit 3646

DETAILED ACTION

Allowable Subject Matter

1. **Claims 1-4, 6-7, 12, and 14-16** are allowed. Claims 1–3 have been amended, claim 4 is previously presented, and claims 5–21 are withdrawn in the amendment filed by Applicant on June 25th, 2019.
2. Upon reconsideration, and in view of the PTAB decision mailed on June 17th, 2021, the Office withdraws the 35 U.S.C. 101 rejections of claims 1-4, the 35 U.S.C. 112(a) rejections of claims 1-4, and the 35 U.S.C. 112(b) rejections of claims 1-4.
3. In the interest of compact prosecution, the Office held an Interview with Applicant in order to resolve remaining 35 U.S.C. 112(b) issues in all of the claims. Please refer to the attached interview agenda of July 9th, 2021 and interview summary of July 12th, 2021.

Election/Restrictions

4. Claim 1 is allowable. The restriction requirement between methods A, B, and C, as set forth in the Office action mailed on June 19th, 2013, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a). The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim. Specifically, the restriction requirement of species A and B is withdrawn. Claims 6–7, 12, and 14–16, directed to species A and B (methods 1/1A and 2/2A), are no longer withdrawn from consideration because the claim(s) requires all the limitations of an allowable claim.
5. In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject

to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

EXAMINER'S AMENDMENT

6. An examiner's amendment to the record appears below. Authorization for this examiner's amendment was given in a telephone interview with Rupam Bhar on July 14th, 2021. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

The application has been amended as follows:

1. (Currently Amended) A method of earth orbit to a planetary landing, round trip mission with astronauts taking off in about 500,000 pound weight rocket ship that travels a direct about 75 million kilometer path in about 39 days, comprising:

thrusting a rocket from hydrogen produced via dissociated on-board pressurized water first heated in a 3000°K pebble bed nuclear reactor;

partially dissociating the water by the heat of nuclear reaction, wherein the partially dissociated water and steam after heating by the 3000°K pebble bed nuclear reactor flows into a pre-combustion chamber ~~to~~ for completely dissociate ~~dissociating~~ the water;

reacting the oxygen from the complete dissociation of the water ~~into oxygen reacts~~ with beryllium powder thereby forming beryllium oxide liquid droplets that are directed into ~~in~~ a slagging combustor;

injecting supplemental hydrogen into combustion stages of the slagging combustor;

heating dissociated hydrogen from the water to 6000°K;

expanding the combined supplemental and dissociated hydrogen ~~which expands~~ to a gas in a gas dynamic nozzle that is seeded with an alkali metal from 0.1% to 1% to render the gas electrically conducting;

flowing the electrically conducting combined hydrogen gas as it flows through an MHD generator-accelerator that comprises a linear Faraday magnetohydrodynamic (MHD) generator channel that is co-axially attached to a MHD linear accelerator that is co-axially attached to an expanding co-axial channel; and

exhausting the gas into Space from the expanding co-axial channel[[,]]
~~wherein a MHD generator-accelerator comprises the linear Faraday magnetohydrodynamic (MHD) generator channel and the MHD linear accelerator.~~

2. (Currently Amended) The method in accordance with Claim 1, wherein the mission is implemented initially in a pebble bed, nuclear reactor at about 100 atmosphere pressure that heats the on-board pressurized water to about 3000°K, wherein formation of the steam and the dissociation into H₂ and O₂ takes place, and where the pebbles comprise a multitude of ceramic, nominal 2 inch diameter spheres in which are embedded a multitude of chips of U238, U235, or U233, and thorium that emit nuclear reaction heat for the on-board pressurized water and the gas, and where the pebble bed, nuclear reactor contains a pebble conveyor that periodically at a beginning or end of a mission removes pebbles from a bottom of a reactor bed for inspection and re-injection ~~or~~ of new pebbles through openings at a top, and with the ceramics selected from ZrO₂, MgO, ZrB₂ that are solid to around 3000°K in order to operate at metal oxide vapor pressure below 100 parts per million to limit their vapor carryover into downstream components, and inhibit non-equilibrium ionization in the MHD generator-accelerator.

3. (Currently Amended) The method in accordance with Claim 2, wherein the dissociated water with dissociated oxygen and the dissociated hydrogen flow into the pre-combustion chamber where remaining water and the steam is dissociated into H₂ and O₂ and reacts with the beryllium powder to form liquid BeO droplets that continuously exhaust into a first stage of a two stage cyclone combustor of the slagging combustor; and wherein ~~with~~ entrained un-reacted beryllium powder ~~to mix~~ mixes with the supplemental injected hydrogen to heat all the hydrogen to ~~about~~ approximately 6000°K by further beryllium-oxygen reaction, ~~while~~ the BeO liquid droplets

collect in the pre-combustion chamber and a first stage combustor chamber wall from which they are drained and quenched into slag in a water filled tank, and are stored for future use.

4. (Currently Amended) The method in accordance with Claim 3, wherein the dissociated hydrogen flows axially into a second stage combustor chamber of the two stage cyclone combustor and mixes with the additional injected supplemental hydrogen, and the combined supplemental and dissociated hydrogen exits the two stage cyclone combustor and enters the gas dynamic nozzle wherein the alkali metal that consists of cesium in concentrations from 0.1% to 1%, is injected and whose exit is connected to the linear Faraday Magnetohydrodynamic (MHD) generator channel operating at a nominal Mach number of 0.9, that is placed inside a 6 Tesla, saddle coil magnet, wherein the linear Faraday MHD generator channel of the MHD generator-accelerator operates under equilibrium conductivity with the cesium seeded combined hydrogen gas, and whose electrode power output wires of the MHD generator channel are connected, in a diagonal mode, to anodes and cathodes of a coaxial supersonic, non-equilibrium conductivity, ~~the~~ MHD linear accelerator that operates at Mach numbers between 1.5 and to 2.5, thereby providing Faraday orthogonal electromagnetic thrust that augments inherent gas dynamic thrust from a stagnation pressure at an entrance to an entire nozzle geometry of the expanding co-axial channel that is from twice to several hundred times greater than an inherent gas dynamic thrust from the channel's stagnation pressure to Mach No. 5 to 6 at an expansion channel of the expanding co-axial channel whose inlet is connected coaxially to the MHD accelerator, and expand the hydrogen to exit into outer Space.

5. (canceled)

6. (currently amended and rejoined) The method for generating electric power in outer space in a range from 10 MW to 1000 MW from ~~an~~ the MHD generator wherein cesium is seeded into the combined hydrogen gas after exiting ~~a~~ the gas cooled nuclear reactor in accordance with Claim 2, the combined hydrogen gas enters the MHD generator from which it exits, enters a spray condenser to mix and react with liquid lithium at a temperature above 1270°F, exits a radiator to enter ~~said~~ the spray condenser to form liquid lithium hydride that ~~enter~~ enters a collection chamber from which it exits to be compressed in an electromagnetic pump to the original

hydrogen stagnation pressure after which the lithium and cesium boil off in a boiler and enter a separator from which the lithium and cesium enter a radiator to reject the cycle heat to outer Space, while the hydrogen gas enters the ~~gas-cooled~~ pebble bed nuclear reactor which is gas cooled for reheating to original stagnation temperature.

7. (currently amended and rejoined) The method in accordance with claim 4, wherein one of:

if the magnetic field vector in the MHD accelerator is in a same direction as a MHD generator vector, thereby inducing a an induced Faraday voltage $U \times B$ ~~is~~ in an opposite direction as an applied voltage from the MHD generator, then in which case an applied accelerator voltage and current delivered by the MHD generator exceeds ~~must exceed~~ the accelerator Faraday induced voltage, and which is accomplished by diagonally connecting the MHD segmented generator electrodes are diagonally connected so as to stack the MHD net generator voltage that is connected to the accelerator, or,

if there is magnet space between generator and accelerator magnets, reversing a to ~~reverse~~ a magnetic field vector in the accelerator by 180° from the generator vector, such that in ~~which case for~~ a $K = -1$ applied voltage to the MHD accelerator combines with the induced voltage thereby doubling ~~therein doubles~~ K .

8. (canceled)

9. (canceled)

10. (canceled)

11. (canceled)

12. (rejoined) The method in accordance with Claim 4, wherein the implementation of the mission provides a specific impulse to the rocket that is at least 1620 seconds.

13. (canceled)

14. (currently amended and rejoined) The method in accordance with Claim 6 wherein in addition to power generation for thrust, MHD power is increased for periods of seconds and

Art Unit: 3646

minutes in order to provide pulsed power for ~~any application that requires instant mega joules~~ applications that require greater than one mega joule of energy fired in seconds or minutes.

15. (currently amended and rejoined) The method in accordance with Claim 6, wherein output from the MHD generator is converted to microwave frequency to deliver power to space stations ~~in remote locations on Space stations~~.

16. (currently amended and rejoined) The method in accordance with Claim 2, wherein the pebbles are periodically removed from a bottom of a reactor core and reprocessed to remove spent radioactive materials and replaced with new pebbles comprising uranium and thorium that are and reinserted at a top of the reactor core, and spent non-renewable pebbles are delivered to off site dry waste storage.

17. (canceled)

18. (canceled)

19. (canceled)

20. (canceled)

21. (canceled)

7. The following is an examiner's statement of reasons for allowance:

8. No prior art either alone or in combination, teaches or suggests thrusting a rocket from hydrogen produced via water dissociated via heat from a pebble bed nuclear reactor, wherein the oxygen is further dissociated via beryllium powder, and the hydrogen and oxygen are directed into a slagging combustor whose exit leads to a gas dynamic nozzle that expands the hydrogen gas while seeding it with an alkali metal, for flowing through an MHD generator-accelerator that further exhausts the gas into Space, in combination with all other limitations.

9. Pettus teaches a nuclear propulsion reactor with a propellant nozzle, but the fuel is not water dissociated into hydrogen, and there is no MHD associated with the exhaust. Baumgaertner

teaches using the heat energy obtained from a nuclear reactor to produce hydrogen, but there is no suggestion to immediately use the hydrogen produced in a combustor as propellant. Walsh teaches a nuclear rocket engine that does not dissociate water and does not use an MHD generator/accelerator. Hodgson teaches the use of alkali oxides in a combustion chamber for thrust. However, there is no suggestion to combine the elements of the above-cited prior arts or any of the other cited prior arts together, and prior arts teaching MHD generators/accelerators do not suggest applying them with the above method.

10. The Office does not necessarily agree with any of the opinions expressed in the Specification as written. The Allowability of the claims has been determined solely based on the technical features.

11. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DARLENE M. RITCHIE, reachable at telephone number (571) 272-4869. The examiner is normally available Monday - Friday 9:30 AM to 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-4869.

Interviews

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at <http://www.uspto.gov/interviewpractice>.

Application Status

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DARLENE M RITCHIE/
Primary Examiner, Art Unit 3646