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EXAMINER	
GARNER, LILY CRABTREE	

ART UNIT	PAPER NUMBER
3646	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 16/579,930	Applicant(s) Rayms-Keller et al.	
	Examiner LILY C GARNER	Art Unit 3646	AIA (FITF) Status Yes

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

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 9/24/19.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ 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.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-7 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1-7 is/are rejected.

8) ☐ Claim(s) _____ is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, 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.**

Application Papers

10)☑ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 9/24/19 is/are: a)☐ accepted or b)☑ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ 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)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the LENR fuel, exothermic material, and ignitor all being distinct components within a single embodiment (claim 1) must be shown and labeled or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to under 35 USC § 112(a) as failing to provide an adequate written description of the invention and further for failing to provide an enabling disclosure.

3. There is no reputable evidence of record to support the claim that the present invention involves nuclear fusion, nor is there evidence that claims of "excess heat" ("excess heat," Specification at ¶ 17; "fuel reacts to produce the thermal energy," claim

1) are valid and reproducible, nor is there evidence that the invention is capable of operating as indicated or capable of providing a useful output.

4. In the BACKGROUND of the invention (Specification, ¶¶ 2–7), Applicant admits that "the exact nature of LENR remains unknown."

5. Nevertheless, Applicant claims to have designed "a low energy nuclear reactor for providing thermal energy" via "an ignitor for initiating said exothermic material by sparking, wherein said LENR fuel reacts to produce the thermal energy," (claim 1). In other words, by simply by igniting widely available materials (e.g., see claim 4), Applicant claims to initiate thermonuclear reactions.

6. Applicant's **disclosed utility** is a commercially viable device for thermonuclear fusion: "to produce clean energy for many military and commercial applications," Specification at ¶ 5; "The harvested heat energy can be used to activate heat engines or can be transformed…exploited to propel and/or activate many electro-mechanical devices of military and commercial importances….underwater vehicles, surface vehicles, air vehicles, space vehicles, electronic devices, electric devices, heat engines, thermoelectric systems, steam systems, etc.," Specification at ¶ 9.

7. Therefore, the Specification purports to disclose a nuclear fusion device that not only generates a commercially viable energy gain, but does so using a suspiciously simple setup: as shown in Figure 1, the invention is simply a fuel-filled cylinder 120 placed inside a larger fuel-filled cylinder 140.

8. As is known by those having ordinary skill in the art, overcoming the Coulomb barrier to achieve critical ignition for nuclear fusion is only known to occur at extremely high kinetic energies, i.e., extremely high temperatures, such as those present on the sun. Georgia State University[1] explains:

> "The temperatures required to overcome the coulomb barrier for fusion to occur are so high as to **require extraordinary means** for their achievement. Such thermally initiated reactions are commonly called thermonuclear fusion. With particle energies in the range of 1-10keV, the temperatures are in the range of 10^7-10^8 K."

9. The device for producing nuclear fusion reactions claimed by Applicant is not capable of producing or sustaining such reactions. The device provides no mechanism for achieving and maintaining the temperatures of hundreds of millions of degrees Kelvin known to be required to achieve nuclear fusion.

10. The invention (see, for example, ¶¶ 2–8 of the Specification and Figure 1) is considered as based on the "cold fusion" concept set forth by Fleischmann and Pons[2] ("FP"). The Applicant uses the term Low Energy Nuclear Reactions (LENR) instead of "cold fusion." However, the invention still employs all of the original FP components, operated in a manner consistent with the FP design. Specifically, the invention employs a palladium or nickel metal that allegedly absorbs hydrogen atoms at low temperatures (e.g., Specification at ¶ 27).

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[1] Temperatures for Fusion, Department of Physics and Astronomy, Georgia State University: http://hyperphysics.phy-astr.gsu.edu/hbase/NucEne/coubar.html

[2] Braaten, "Ridiculously easy test yields claim of energy triumph," The Washington Times, p. A5, March 24, 1989.

11. As set forth more fully below, "cold fusion" is still no more than just an unproven concept rejected by mainstream scientists.

Background

12. After Fleischmann and Pons announced their fusion device, competing researchers attempted to reproduce their results. The results of these attempts were primarily negative. The few initial positive results were either retracted or later shown to be in error by subsequent experiments.[3,4] The general consensus by those skilled in the art and working at these various laboratories is that the fusion conclusion made by Fleischmann and Pons was based on experimental error.[5] The general consensus by those skilled in the art is that there is no reputable evidence to support the claims of excess heat production, or the production of fusion by-products such as neutrons, gamma rays, tritium, or helium.[6] See also Cooke, pages 4 and 5, which refers to the

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[3] Stipp, The Wall Street Journal, page B-4, "Georgia Group Outlines Errors That Led To Withdrawal Of 'Cold Fusion' Claims", April 26, 1989.

[4] Browne, "Fusion claim is greeted with scorn by physicists," The New York Times, pp. A1 and A22, vol. CXXXVIII, no. 47,859, May 3, 1989.

[5] *Id.*, *see also* Kreysa, et al., Journal of Electroanalytical Chemistry, vol. 266, pages 437-450, "A Critical Analysis Of Electrochemical Nuclear Fusion Experiments", 1989; Hilts, The Washington Post, page A7, "Significant Errors Reported In Utah Fusion Experiments", May 2,1989; Ohashi, et al., Journal of Nuclear Science and Technology, vol. 26, pages 729-732, "Decoding Of Thermal Data In Fleischmann & Pons Paper", July 1989; Miskelly, et al., Science, vol. 246, no. 4931, pages 793 and 796, "Analysis Of The Published Calorimetric Evidence For Electrochemical Fusion Of Deuterium In Palladium", November 10,1989; Chapline, "Proceedings of the NATO Advance Study Institute on the "Nuclear Equation of State," pages 1-9, "Cold Confusion," July 1989.

[6] Cooke, Solid State Theory Section, Solid State Division, ORNL-FTR--3341, pages 2-15, "Report Of Foreign Travel Of J. F. Cooke, Head", 1989; Faller, et al., Journal of Radioanalytical Nuclear Chemistry, Letters, vol. 137, no. 1, pages 9-16, "Investigation Of Cold Fusion In Heavy Water", August 21,1989; Cribier, et al., "Conventional Sources of Fast Neutrons in 'Cold Fusion' Experiments," Physics Letters B, Vol. 228, No. 1, 7 September 1989; Hajdas, et al., Solid State Communications, vol. 72, no. 4, pages 309-313, "Search For Cold-Fusion Events", 1989; Shani, Solid State Communications, vol. 72. no. 1, pages 53-57, "Evidence For A Background Neutron Enhanced Fusion In Deuterium Absorbed Palladium," 1989; Ziegler, et al., "Electrochemical Experiments in Cold Nuclear Fusion," Physical Review Letters, vol. 62 No. 25, June 19, 1989; Schrieder, et al., B-Condensed Matter, vol. 76, no. 2, pages 141-142, "Search For Cold Nuclear Fusion In Palladium-Deuteride" 1989; AP, "Physicist: Utah Cold-Fusion Gear Doesn't Work," The Washington Post, March 29, 1990.

attempts at Harwell to obtain "cold fusion." Page 5 also indicates that data was also collected in Frascatti-type (i.e., gaseous) experiments. See the last paragraph on page 5:

> "After three months of around-the-clock work at a cost of over a half a million dollars, the project was terminated on June 15. This program is believed to be one of the most comprehensive worldwide with as many as 30 cells operating at a time and over 100 different experiments performed. The final result of this monumental effort in the words of the official press release was, in none of these experiments was there any evidence of fusion taking place under electrochemical conditions. It should also be added that there was no evidence of excess heat generated by any of their cells".

13. Note that a complete disclosure must contain enough detail as to enable a person skilled in the art or science to which the invention pertains to make and use the invention as of its filing date.[7] The present disclosure does not contain the requisite description and detail. There is no adequate description nor enabling disclosure of the parameters of a specific operative embodiment of the invention, including exact composition (including impurities and amounts thereof) of the electrolyte; composition (including impurities and amounts thereof), size, dimensions and porosity of the electrodes (as well as the spacing between the electrodes); the requisite concentration per unit volume of hydrogen isotopes in the cathode; the applied current and voltage, if any; the requisite physical and/or chemical pretreatment of the electrodes; the instrument calibration prior to and during a run, test or experiment; the amount of each electrode to be immersed in the electrolyte; etc. It is noted that the specification appears to set forth some of the parameters, but it does not appear to set forth an example of an operative embodiment that includes specific values for each of the above parameters.

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[7] *In re Glass*, 181 U.S.P.Q. 31 (CCPA 1974).

Note that such parameters are critical in arriving at a theoretically operative cold fusion embodiment. For example, Morrison[8] shows that electrode spacing is an important parameter. On page 3, Morrison shows that if the electrodes are close enough to each other, hydrogen isotopes and oxygen will recombine. This can be misinterpreted as excess heat.[9] These references demonstrate the critical importance of cell component composition and impurity content and of electrode pretreatment.

14. Claims of the production of excess heat due to a nuclear reaction are not sufficient to overcome the numerous teachings by skilled artisans that claims of cold fusion are not reproducible. Note that the numerous teachings by skilled artisans show that in this field it is easy to obtain false-positive results. It is not clear from the information set forth in the Specification that applicant would be able to show positive results or that the alleged positive results do not fall within the limits of experimental error. For example, the Examiner has cited several documents that deal with calorimeter evidence of cold fusion and possible sources of error. The Specification does not disclose any particular structure which makes Applicant's cold fusion system operative where the other systems disclosed have failed.

15. Hydrogen fusion is known to occur at very high pressures and very high temperatures, such as those present on the sun. The alternative mechanism proposed by Applicant (hydrogen absorption into a nickel lattice at low temperatures, Specification

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[8] Morrison, "Cold Fusion Update No. 8," November 27, 1993.

[9] *See* Jones, "An Assessment of Claims of Excess Heat in Cold Fusion Calorimetry," J. Phys. Chem. B 1998, 102, 3647; Murray, Google Advanced Groups Search. pages 1-11. "Subject: Rothwel: Abstracts: Cain, Case, Iwamura, Ohmori, Silver, Stringham," April 26, 1998; Shanahan, "Comments on 'Thermal behavior of polarized Pd/D electrodes prepared by co-deposition,'" July, 14, 2004; Miles, et al., "Anomalous Effects in Deuterated Systems," Naval Air Warfare Center Weapons Division, September 1996; Carr, "Re: CF claim score (was Re: reciprocal cold fusion proof standards...)."; Williams, et al., "Upper bounds on 'cold fusion' in electrolytic cells," Nature vol. 342, p. 375, November 23, 1989.

at ¶ 27) is not capable of producing or sustaining such a reaction. The device as claimed and as disclosed provides no mechanism for achieving the temperatures of hundreds of millions of degrees Kelvin known to be required to achieve nuclear fusion[10].

16. When an experimenter relies on the results of a particular test to establish certain facts (such as the production of excess heat), it is incumbent upon the experimenter to show that the alleged results are valid and not the result of errors or misinterpretation of results. This is especially important where the test in question is in a field that the general scientific community considers fraudulent.

Reproducibility

Regarding reproducibility, Huizenga[11] states:

> "The foundation of science requires experimental results to be reproducible. Validation is an integral part of the scientific process. Scientists are obligated to write articles in ways that allow observations to be replicated. Instructions should be available to permit a competent and well-equipped scientist to perform the experiment and obtain essentially the same results. Replication in science usually is reserved for experiments of special importance or experiments that conflict with an accepted body of work. The greater the implication of an experimental result, the more quickly it will be checked by other scientists.
>
> As more and more groups, at major universities and national laboratories were unable to replicate either the claimed excess heat or fusion products, proponents of cold fusion quickly pointed out that the experiment was not done properly: one needed different size palladium cathodes, longer electrolysis times and higher currents, they claimed.
>
> Whenever the inability of qualified scientists to repeat an experiment is met by ad hoc excuses, beware. One important role of a scientific article is to provide directions for others. Scientists establish priorities for their discoveries by publishing a clear and well documented recipe of their experimental procedures. If a scientific article fails to include an adequate

[10] Critical Ignition Temperature for Fusion, Department of Physics and Astronomy, Georgia State University: http://hyperphysics.phy-astr.gsu.edu/hbase/NucEne/coubar.html
[11] Huizenga, "Cold Fusion Labeled 'Fiasco of Century'", Forum for Applied Research and Public Policy, vol. 7, No. 4, 1992, pages 78-83.

> recipe which allows a skilled reader to reproduce the experiment, it is a warning that the author's understanding of their work is incomplete.
>
> Cold-fusion proponents introduced new dimensions into the subject of reproducibility in science. Some tried to turn the table on reproducibility by giving irreproducibility a degree of respectability. A second aberration was to assign a different value to experiments attempting replication. Only experiments that obtained some fragmentary evidence for cold fusion were to be taken seriously because it was declared that experiments obtaining negative results required no special skills or expertise. This viewpoint led proponents of cold fusion to invite mainly papers reporting positive results when organizing conferences. Such an aberrant procedure is incompatible with the scientific process and usually is viewed negatively by scientists as well as journalists."

17. "Reproducibility" must go beyond one's own lab. One must produce a set of instructions—a recipe—that would enable anyone to produce the same results. If reproducibility only occurs in one's own lab, errors (such as systematic errors) would be suspect.[12] Experimenters who previously found evidence of excess heat could not reproduce their results when better calorimetry equipment was used.[13] Reproducibility of alleged cold fusion results is a critical feature in determining if a disclosure adequately teaches other practitioners how to make and use an invention.

18. When one does not get identical results or the results are not reproducible at will, it must be concluded that the alleged positive results are not real but instead, the result of experimental errors, instrumentation errors, or misinterpretation of results.

19. It is elementary that identical structures operated in an identical manner must produce identical results. If such structures do not produce identical results, one of two things is implied: First, the structures are not identical. For example, one of the structures has an additional component or some critical feature that is not found in the

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[12] Little, et al., "Replication of Jean-Louis Naudin's Replication of the Mizuno Experiment."
[13] Morrison, *supra* n. 8, at § 2.2, p. 2.

other structure. Alternatively, the structures may be identical, but the experimenter's instrumentation is producing spurious results leading to the erroneous conclusion that the structures are producing positive results.

20. If it is the former that causes some of these cold fusion systems to produce actual, positive results then this critical feature must be clearly specified so as to enable another experimenter to make the invention. Accordingly, if Applicant's invention is capable of reproducibly producing excess heat or fusion by-products it can only be because of this undisclosed additional critical feature. If this is the case, the Applicant's specification is insufficient and non-enabling for failing to disclose the additional critical feature.

21. It is well-known that impurities in the cell container walls can leach out into the electrolyte and be deposited onto the cathode.[14,15,16] It is well-known that metals such as platinum, gold and, palladium are generally found in the same ore, that they can be extracted sequentially, and that they will be contaminated by the other metals present.

22. The presence of these impurities at the cathode could actually lead to the erroneous conclusion that transmutation has occurred. Applicant's disclosure is insufficient and non-enabling, as it does not address the issue of impurities. For additional commentary on the alleged transmutation of isotopes in a cold fusion cell, Applicant is referred to Huizenga.[17] Pages 152-156 of the reference[18] recall that

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[14] Flanagan, et al., "Hydrogen Absorption by Palladium in Aqueous Solution," Transactions of the Faraday Society, vol. 55 part 8, No. 440, p 1400-1408, 1407.
[15] Albagli, et al., "Measurement and Analysis of Neutron and Gamma-Ray Emission Rates, Other Fusion Products, and Power in Electrochemical Cells having Pd Cathodes," Journal of Fusion Energy, Vol. 9, No. 2, 1990 pp. 130-148, 144 (col 2.).
[16] *See also* Williams, *supra* n. 9, at 380 (second column) and 382 (first column).
[17] Huizenga, "Cold Fusion: The Scientific Fiasco of the Century", (selections provided) pp. 152-156, 237, 269, 275, 276, 284, 286.
[18] *Id.*

experimenters at the Naval Research Laboratory had mistakenly reported the production of particular palladium isotopes by neutron transmutation in cold fusion cells using a technique known as SIMS (secondary ion mass spectroscopy). See page 156,[19] which states:

> "The story associated with the palladium isotope anomaly is not nearly so interesting because it is was simply due to an erroneous interpretation of data where the experimental mass peaks were misidentified. Contributions from polyatomic species of impurities with masses nearly coincident with those of the palladium isotopes caused the misidentification. In spite of the fact that the palladium isotope anomalies had been discredited for over five months, Bockris submitted a paper on March 26, 1990 [Fusion Technology 1811 (1990)] in which he discussed, along with other cold fusion phenomena, the thermal and 14-MeV-neutron-induced cross sections on palladium isotopes. He used these mistaken isotopic anomalies data to suggest that the cold fusion reaction is a surface or near-surface reaction, and, therefore, to serve as supporting evidence for his model of fusion. Among cold fusion enthusiasts mistakes and erroneous results usually decay with a very long lifetime".

Undue Experimentation

23. It is the Examiner's position that an undue amount of experimentation would be required to produce an operative embodiment of Applicant's invention.

24. In its present form, the disclosure is completely devoid of useful instruction that might enable a person skilled in the art to follow Applicant's methods, account or control for any necessary assumptions, or manipulate the input data with any expectation of a successful outcome (i.e., achieving a nuclear reaction at low temperatures).

25. The Examiner has cited numerous documents showing that experimenters have obtained negative results using various types of cold fusion apparatuses, all based on

[19] *Id.*

the cold fusion concept set forth by Fleischmann and Pons (i.e., low-temperature hydrogen absorption into a palladium/nickel lattice). These documents show how easily experimental results can be misinterpreted as evidence of cold nuclear fusion.

26. This issue of undue experimentation has been succinctly addressed by Douglas Morrison at the Fourth International Conference on Cold Fusion Technology, (ICCF-4) held Dec. 6-9, 1993 in Hawaii,[20] see pages 6-7 which states:

> "[T]he previous speaker, Dr. H. Fox, giving he said, a business man's point of view, declared he expected a working Cold Fusion device in TWENTY YEARS.
>
> November 1993. Dr. S. Pons said that by the year 2000 there should be a household power plant - SIX YEARS.
>
> 1992. Dr. M. Fleischmann said a 10 to 20 Kilowatt power plant should be operational in ONE YEAR.
>
> July 1989. The Deseret News published an article by Jo-Ann Jacobsen-Wells who interviewed Dr. S. Pons. There is a photograph in colour, of Dr. Pons beside an simple apparatus with two tubes, one for cold water in and one for hot water out. This working unit based on Cold Fusion was described as; " 'It couldn't take care of the family's electrical needs, but it certainly could provide them with hot water year-round' said Pons".
>
> Later in the article it was written "Simply put, in its current state, it could provide boiling water for a cup of tea". Time delay to this working model - ZERO YEARS.
>
> **Thus it appears that as time passes, the delay to realisation of a working model increases.**

27. To determine whether a given claim is supported in sufficient detail (by combining the information provided in the disclosure with information known in the art) such that any person skilled in the art could make and use the invention as of the filing

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[20] Morrison, "Review of Progress in Cold Fusion," Dec. 1993 available at http://newenergytimes.com/v2/archives/DROM/cfu9a.shtml (last accessed 18 December 2015).

date of the application without *undue* experimentation, at least the following factors should be included:

(A) The breadth of the claims;
(B) The nature of the invention;
(C) The state of the prior art;
(D) The level of one of ordinary skill;
(E) The level of predictability in the art;
(F) The amount of direction provided by the inventor;
(G) The existence of working examples; and
(H) The quantity of experimentation needed to make or use the invention based on the content of the disclosure.

This standard is applied in accordance with the U.S. Federal Court of Appeals decision *In re Wands*, 858 F.2d at 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). See also *United States v. Telectronics Inc.,* 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988), *cert. denied*, 490 U.S. 1046 (1989).

28. Reviewing the aforementioned *Wands* factors, Examiner summarizes the above-elaborated explanations as to why Applicant's invention fails to satisfy the enablement requirement:

(A) *The breadth of the claims*: Applicant's claims to provide a low-energy nuclear reactor (LENR) are extremely broad, as evidenced by their lack of detail (e.g., clms. 1 and 4, simply by igniting widely available materials) as well as the fact that the disclosed result of producing nuclear reactions from said device necessarily abandons modern nuclear physics, to the extent that the alleged outcomes of said device cannot be reasonably predicted and measured.
See MPEP § 2164.08.

(B) *The nature of the invention*: The nature of the invention, i.e., the subject matter to which the claimed invention pertains, revolves around the viability of low-energy nuclear fusion as a source of net energy; as currently disclosed by Applicant, such viability involves a complete departure from the accepted and well-tested theories that comprise known nuclear and plasma physics, chemistry, and electromagnetism. As such, the subject matter to which the invention pertains lies outside the realm of working science.
See MPEP § 2164.05(a).

(C) *The state of the prior art*: The effects claimed by Applicant have not been verified by the existing body of scientific work and are, in fact, incompatible with it. See MPEP § 2164.05(a).

(D) *The level of one of ordinary skill*: The level of ordinary skill in the art cannot be ascertained because the art encompassing low-temperature nuclear fusion research lies within the realm of fringe science and subsequently does not possess a recognizable standard level of associated skill. See MPEP § 2164.05(b).

(E) *The level of predictability in the art*: Low-temperature nuclear fusion experiments are predictably unable to produce expected, reproducible, or meaningful empirical data. See MPEP § 2164.03.

(F) *The amount of direction provided by the inventor*: Applicant's acknowledges a lack of underlying theory (e.g., "the exact nature of LENR remains unknown," and "The overall enthalpy for the reaction inside the reactor 100 remains speculative," Specification at ¶¶ 7 and 28), and no scientifically rigorous experimental results or other substantial supporting evidence is provided for the record. See MPEP § 2164.03.

(G) *The existence of working examples*: Examples are defined as and explained by theoretical possibilities and are not reliably-reproducible working examples. See MPEP § 2164.02.

(H) *The quantity of experimentation needed to make or use the invention based on the content of the disclosure*: The quantity of experimentation needed is infinite, as the practical guidance provided is insufficient to enable one to build or operate a working prototype of the invention, and the provided theoretical guidance is insufficient to enable one to understand the underlying sequence of phenomena required to attempt such an endeavor. See MPEP § 2164.06.

Conclusion

29. As evidenced above, the specification, in its present state, fails to teach a person having ordinary skill in the art how to make and use the invention, and the specification is therefore inadequate. The disclosed invention is not, as required by 35 U.S.C. 101, an operable invention of any practical use to the public. To be patentable, the claimed invention as a whole must be useful and accomplish a practical application. That is, it

must produce a "useful, concrete and tangible result." See *In re Alappat*, 33 F.3d 1526, 1544, 31 USPQ2d 1557 (Fed. Cir. 1994) and also *State Street Bank & Trust Co. v. Signature Financial Group*, 149 F.3d 1368, 1373-4, 47 USPQ2d 1596 (Fed. Cir. 1998), *cert. denied*, 119 S. Ct. 851 (1999). The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or hopeful concept, or subject matter that is simply a starting point for future investigation or research. For more examples of this real-world applicability requirement being applied, see *Brenner v. Manson*, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96 (1966); *In re Fisher,* 421 F.3d 1365, 76 USPQ2d 1225 (Fed. Cir. 2005); *In re Ziegler,* 992 F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993).

30. The Examiner has cited documents showing how easily experimental data can be misinterpreted in cold fusion systems. The general scientific community does not consider cold fusion systems real, valid or operative. Since Fleischman and Pons' 1989 announcement, there has been a continuing stream of publications demonstrating that virtually none the "cold fusion" claims are valid.[21] The cited references provide clear evidence that no excess heat is generated in such "cold fusion" systems nor is there any evidence of nuclear fusion.

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[21] *See* Ewing, et al., "A sensitive Multi-detector Neutron counter used to monitor "Cold Fusion" Experiments in an Underground Laboratory: Negative Results and Positive Artifacts", IEEE Transactions on Nuclear Science, vol. 37, no. 3, June 1990, pages 1165-1170; Albagli, *supra* n. 15; Balke, et al., "Limits on Neutron Emission from 'Cold Fusion' in Metal Hydride," Physical Review C, Vol. 42, No. 1, July 1990; Huizenga, *supra* n. 11; Huizenga, *supra* n. 17; Huizenga, "New Developments in the Cold Fusion Saga", Abstracts of Papers of the American Chemical Society, vol. 207, March 13, 1994, page 6; Rogers, et al, "Cold Fusion Reaction Products and Their Measurement", Journal of Fusion Energy, vol. 9, no. 4, 1990, pages 483-485.

31. The disclosure must enable a person skilled in the art to practice the invention without having to incorporate elements not readily available in the art.[22] The Examiner has set forth a reasonable and sufficient basis for challenging the adequacy of the disclosure. The statute requires the application itself to inform, not to direct others to find out for themselves.[23,24] Accordingly, the Specification is inadequate.

Claim Rejections - 35 USC § 101

32. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

33. Claims 1–7 are rejected under 35 U.S.C. 101 because the disclosed invention is **inoperative** and therefore lacks utility for the detailed reasons provided above in the Specification objections that are accordingly incorporated herein. Applicant's invention (e.g., Fig. 1 and claim 1) is directed to an electrochemical cold fusion device (see ¶¶ 1–8 of the Specification), an inoperable invention under 35 USC § 101[25]. The sole asserted utility for the invention is for achieving the roundly discredited LENR "cold fusion" reaction (Specification at ¶ 1) operable "to produce clean energy for many military and commercial applications," Specification at ¶ 5 and "The harvested heat energy can be used to activate heat engines or can be transformed…exploited to propel and/or activate many electro-mechanical devices of military and commercial

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[22] *In re Hirsch*, 295 F.2d 251 (C.C.P.A. 1961).
[23] *In re Gardner et al.*, 99 F.2d 767 (C.C.P.A. 1938).
[24] *In re Scarbrough*, 182 U.S.P.Q. 298 (C.C.P.A. 1974).
[25] Cold fusion devices have been to the federal circuit and lost twice. In re Swartz, 232 F.3d 862 (Fed. Cir. 2000) and In re Dash, No. 04-1145, 08/439,712 (Fed. Cir. 2004).

importances….underwater vehicles, surface vehicles, air vehicles, space vehicles, electronic devices, electric devices, heat engines, thermoelectric systems, steam systems, etc.," Specification at ¶ 9.

34. In describing said specified utility, Applicant has, at best, set forth what may be considered a concept or an object of scientific research. While useful as a thought experiment, this fact creates a type of deficiency in which an assertion of specific and substantial utility for the claimed invention made by an Applicant is not credible. See MPEP 2107.01(II) for further examples of the Federal courts' treatment of inventions claiming incredible utility. The Examiner has provided a preponderance of evidence as to why the asserted operation and utility of Applicant's invention is inconsistent with known scientific principles, making it speculative at best as to whether attributes of the invention necessary to impart the asserted utility are actually present in the invention. As set forth in the objection to the Specification above, there is currently no reputable evidence of record to indicate the invention has been reduced to the point of providing an operative low-temperature nuclear fusion system. See also *In re Sichert*, 566 F.2d 1154, 196 USPQ 209 (CCPA 1977). Accordingly, the invention as disclosed is deemed inoperable and therefore lacking in utility for its purported purpose of creating the commercially-viable amounts of energy disclosed.

35. Claims 1–7 are further rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a **credible asserted utility or a well-established utility**, for the reasons set forth in the above objection to the Specification. **The disclosed utility is to utilize cold fusion, or LENR, to** "to produce clean energy for

many military and commercial applications," Specification at ¶ 5 and "The harvested heat energy can be used to activate heat engines or can be transformed…exploited to propel and/or activate many electro-mechanical devices of military and commercial importances….underwater vehicles, surface vehicles, air vehicles, space vehicles, electronic devices, electric devices, heat engines, thermoelectric systems, steam systems, etc.," Specification at ¶ 9.

36. In the above objection to the Specification, the Examiner has provided substantial evidence that those skilled in art would reasonably doubt this asserted utility of the claimed invention. "The PTO may establish a reason to doubt an invention's asserted utility when the written description 'suggest[s] an inherently unbelievable undertaking or involve[s] implausible scientific principles.'" *In re Cortright*, 165 F.3d 1353, 1357 (Fed. Cir. 1999) (quoting *In re Brana*, 51 F.3d 1560, 1566 (Fed. Cir. 1995)).

37. As set forth in MPEP § 2107.01(IV), a deficiency under 35 U.S.C. 101 also creates a deficiency under 35 U.S.C. 112, first paragraph. See *In re Brana,* 51 F.3d 1560, 34 USPQ2d 1436 (Fed. Cir. 1995). Citing *In re Brana*, the Federal Circuit noted,

> "Obviously, if a claimed invention does not have utility, the specification cannot enable one to use it."

Claim Rejections - 35 USC § 112

38. The following is a quotation of the first paragraph of 35 U.S.C. 112(a):

> (a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode

contemplated by the inventor or joint inventor of carrying out the invention.

39. Claims 1–7 are rejected under 35 U.S.C. 112(a) as failing to comply with the **enablement** requirement. The claim(s) contains subject matter which was not described in the Specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, a device which is found to be inoperative is not enabled as a matter of law. See *In re Swartz,* 232 F.3d 862 (2000). See the above 101 rejections and the above objection to the Specification.

40. Claims 1–7 are rejected under 35 U.S.C. 112(a) as failing to comply with the **written description** requirement. The claims contains subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, at the time the application was filed, had possession of the claimed invention, for the same reasons set forth in the above objection to the Specification, which are accordingly incorporated herein.

41. Claims 1–7 are rejected under U.S.C. 112(a) because the claimed invention is not supported by either a **credible asserted utility or a well-established utility** for the same reasons set forth in the above objection to the Specification as well as in the 101 rejection section above, which are accordingly incorporated herein; as such, one skilled in the art clearly would not know how to use the claimed invention.

42. Claims 1–7 are rejected under 35 U.S.C. 112(a) because the **best mode** contemplated by the inventor(s) has not been disclosed. Evidence of concealment of

the best mode is based upon the disclosure of the Groeneweg (WO2012163966A) publication cited herein. Groeneweg discloses a low-temperature nuclear reactor comprising concentric fuel-filled vessels for producing thermal energy by igniting an exothermic material, i.e., Applicant's claimed invention. However, as shown in the above objection to the Specification, this device is a variation of the Fleishmann & Pons "cold fusion" concept that remains unproven and unworkable. Accordingly, if Applicant's cold fusion device is operative, while Groeneweg's is not, then the Examiner must conclude that some essential information is missing from Applicant's disclosure that makes Applicant's invention operative.

43. Claims 1–7 are further rejected under 35 U.S.C. 112(a) as failing to comply with the **written description** requirement. The claims contains subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, at the time the application was filed, had possession of the claimed invention.

Specifically, claim 1 recites three distinct materials: (1) LENR fuel, (2) exothermic material, (3) and an ignitor/ignition fuel. Claim 4 further delimits the exothermic material as being aluminum and iron oxide. However, the Specification repeatedly states that aluminum and iron oxide are actually the ignition fuel (e.g., ¶¶ 24, 28, 29), and the Specification further does not support the recitation in claim 1 that there exists a distinct "exothermic material." Instead, the Specification at ¶ 29 states that an exothermic *reaction* is created by the ignition fuel. Therefore, the Specification does not provide support for there being an "exothermic material" that is materially or physically distinct

from the "ignitor" as recited in claim 1.

44. Claim 7 is further rejected under 35 U.S.C. 112(a) as failing to comply with the **written description** requirement. The claims contains subject matter which was not described in the Specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor or a joint inventor, at the time the application was filed, had possession of the claimed invention.

Specifically, in claim 7, the ignitor is further described as being sodium/copper azide; however, the portion of the Specification discussing this (¶ 36) recites the use of these ignitors as an alternative embodiment from the "sparking" embodiment of claim 1. Therefore, the Specification does not provide support for the simultaneous use of sodium/copper azide as the ignitor (claim 7) as well as the ignition occurring via sparking (claim 1).

45. Any claim not specifically addressed in this section that depends from a rejected claim is also rejected under 35 U.S.C. 112, first paragraph, for its dependency upon an above–rejected claim and for the same reasons.

46. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

47. Claims 1–7 are rejected under 35 U.S.C. 112(b) as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor regards as the invention.

48. Claim 1 recites "exothermic material." The descriptor of "exothermic" for a piece of material does not make sense. Material itself is not exothermic. Instead, the term

exothermic is a descriptor for a process—a chemical reaction, for example, can be exothermic[26]. However, as shown in claim 4, Applicant intends the "exothermic material" to be aluminum and iron oxide. Aluminum and iron oxide are not "exothermic" materials. However, it is possible, under the right conditions, for aluminum and iron oxide to undergo an exothermic process. For the purposes of examination, examiner will interpret "exothermic material" to mean "a material capable of undergoing an exothermic reaction."

49. Claim 1 recites three distinct materials: (1) LENR fuel, (2) exothermic material, (3) and an ignitor/ignition fuel. The relationship among these three materials is unclear. Claim 4 further delimits the exothermic material as being aluminum and iron oxide. However, the Specification repeatedly states that aluminum and iron oxide are actually the ignition fuel (e.g., ¶¶ 24, 28, 29), and the Specification further does not support the recitation in claim 1 that there exists a distinct "exothermic material." Instead, the Specification at ¶ 29 states that an exothermic *reaction* is created by the ignition fuel. Therefore, the Specification does not provide support for there being a distinct "exothermic material" as recited in claim 1. Instead, the Specification appears to imply that the exothermic material and the ignitor may be the same feature. Accordingly, the relationship among these three materials is unclear.

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[26] "In thermodynamics, the term **exothermic process** describes a process or reaction that releases energy from the system to its surroundings, usually in the form of heat...." https://en.wikipedia.org/wiki/Exothermic_process

50. The term "sudden" in claim 2 is a relative term which renders the claim indefinite. The term "sudden" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. There is no consensus among ordinary skilled artisans for what "energy application" is considered "sudden" versus "not sudden."

51. Any claim not specifically addressed in this section that depends from a rejected claim is also rejected under 35 U.S.C. 112(b) for its dependency upon an above–rejected claim and for the same reasons.

Claim Rejections - 35 USC § 102

52. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

53. For Applicant's benefit, portions of the cited reference(s) have been cited to aid in the review of the rejection(s). While every attempt has been made to be thorough and consistent within the rejection, it is noted that the *PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS.* See MPEP 2141.02 VI.
54.

55. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a)(1) the claimed invention was patented, described in a printed publication, or in public use, on sale or otherwise available to the public before the effective filing date of the claimed invention.

56. **A note regarding statements of intended use or desired result:** the following two clauses in claim 1 are interpreted herein as intended use or desired result-type clauses that do not receive patentable weight:

"...for initiating said exothermic material by sparking" and

"...wherein said LENR fuel reacts to produce the thermal energy in response to initiation heat from said exothermic material."

57. These clauses do not serve to patentably distinguish the claimed structure over that of the applied reference(s), as long as the structure of the cited reference(s) is capable of performing the intended use. See MPEP § 2111–2115.

MPEP § 2114(II) states:

> A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim.
>
> [A]pparatus claims cover what a device *is*, not what a device *does*."

58. In this case, the cited apparatus in **Groeneweg** is *allegedly* capable of being used for the intended use of "...for initiating said exothermic material by sparking" as well as the *alleged* desired result "wherein said LENR fuel reacts to produce the thermal energy in response to initiation heat from said exothermic material."

59. Claims 1, 2, and 5 are rejected under 35 U.S.C. 102(a)(1) as being anticipated by Groeneweg[27] (WO2012163966A).

60. Regarding claim 1, Groeneweg teaches (Fig. 1) an alleged low energy nuclear reactor (LENR) for providing thermal energy, said LENR comprising:

a first vessel (3) defining a first chamber containing LENR fuel (e.g., electrolyte 5, heavy water, D2O, page 7, l. 25; or LiOD, page 10, l. 34);

a second vessel (9) disposed inside said first vessel and defining a second

[27] See the attached 29-page Foreign Reference.

chamber containing exothermic material (e.g., hydrogen, page 8, l. 11); and

an ignitor (hydrogen, as cited above, and/or voltage from voltage source 11, and/or light from light source 15 and/or "a thin conductive wire," page 9, l. 25) for initiating said exothermic material by sparking wherein said LENR fuel reacts to produce the thermal energy in response to initiation heat from said exothermic material: e.g., "the apparatus comprising a controller and/or a voltage driver configured to drive the cathode voltage between first and second different voltages, e.g. an oscillating voltage, in controllable manner. This is considered advantageous for promoting production of heat at the cathode," page 6, lines 5–9; "the electrolysis of the electrolyte...significant amounts of heat upon driving the electrolysis process on D2O or LiOD," page 10, lines 33-34; "A sharp and/or thin electrode portion, e.g. a thin conductive wire, may provide a high field gradient so that one or more (corona) discharges may be ignited within the cathode, which may facilitate ionising gas atoms and/or molecules in addition to optical ionization," page 9, lines 26-29.

Accordingly, claim 1 is rejected as anticipated by Groeneweg.

61. Regarding claim 2, Groeneweg anticipates all the elements of the parent claim and additionally teaches an electric source (11) to provide said sparking as sudden energy application. According to ¶ 21 and ¶ 36 of Applicant's Specification, a generic power supply providing a charge is capable of sparking the ignition fuel.

Accordingly, claim 2 is rejected as anticipated by Groeneweg.

62. Regarding claim 5, Groeneweg anticipates all the elements of the parent claim and additionally teaches converting the thermal energy into electrical energy (e.g., "a

thermal energy converter connected to but at a distance from the apparatus," page 9, lines 3-4; see also page 15, lines 22-26; page 1, lines 2-4) using a Seebeck device ("a thermocouple," page 15, line 23).

Claim Rejections - 35 USC § 103

63. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

64. For Applicant's benefit, portions of the cited reference(s) have been cited to aid in the review of the rejection(s). While every attempt has been made to be thorough and consistent within the rejection, it is noted that the *PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS.* See MPEP 2141.02 VI.

65. The following is a quotation of 35 U.S.C. 103 which forms the basis for all obviousness rejections set forth in this Office action:

> A patent for a claimed invention may not be obtained, notwithstanding that the claimed invention is not identically disclosed as set forth in section 102 of this title, if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. Patentability shall not be negated by the manner in which the invention was made.

66. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

67. Claim 3 is rejected under 35 U.S.C. 103 as being unpatentable over Groeneweg in view of Olshansky (US 2019/0096535).

68. Regarding claim 3, Groeneweg anticipates all the elements of the parent claim and additionally teaches wherein said LENR fuel comprises lithium (Li) (LiOD, page 1, line 15 and page 10, l. 34) and a metal as a catalyst (e.g., the walls of container 3 may include part of the anode, which may be gold or platinum, page 8, line 35 – page 9, line 2).

69. Groeneweg does not explicitly state using lithium aluminum hydride (LiAlH4) as reagents and nickel (Ni) as the catalyst.

70. Olshansky does teach this. Olshansky is in the same art area of alleged low energy nuclear reactors (abstract) and teaches using LENR fuel that comprises lithium aluminum hydride and nickel as a catalyst: "the catalytic exothermic reaction of nano powder of nickel and chemical compound $LiAlH_4$—Lithium aluminum hydride," ¶ 65. A purpose for this teaching is, as described by Olshansky (¶ 66–67), because this combination was believed to produce an exothermic reaction in which "hydrogen release occurs actively."

71. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized of nickel and Lithium aluminum hydride as part of the LENR fuel of Groeneweg, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Accordingly, claim 3 is rejected as obvious over Groeneweg in view of Olshansky.

72. Claim 4 is rejected under 35 U.S.C. 103 as being unpatentable over Groeneweg in view of Bognar (US 2014/0076043).

73. Regarding claim 4, Groeneweg anticipates all the elements of the parent claim, including an exothermic material, as cited above in response to claim 1.

74. Groeneweg does not explicitly suggest using aluminum (Al) and iron oxide (Fe2O3).

75. Bognar does. Bognar is in the same art area of heat-producing apparatuses utilizing hydrogen (abstract) and teaches using aluminum and iron oxide: "a thermite composition comprising a powder metal oxide and powder metal," claim 19, "wherein the powder metal oxide is selected from…iron (III) oxide…and the powder metal is selected from…aluminum," claim 23. The skilled artisan would have been motivated to utilize these species within the exothermic material of Groeneweg because such combinations "can generate thermal energy," ¶ 25 in an exothermic reaction, ¶ 26.

76. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the aluminum and iron oxide chemicals within the apparatus of Groeneweg, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Accordingly, claim 4 is rejected as obvious over Groeneweg in view of Bognar.

77. Claim 6 is rejected under 35 U.S.C. 103 as being unpatentable over Groeneweg in view of Case (US 2001/0040935).

78. Regarding claim 6, Groeneweg anticipates all the elements of the parent claim, including wherein the inner vessel is composed of tantalum (page 2, line 21) and the outer vessel is formed from a metallic material (page 9, line 1).

79. Groeneweg does not specifically state that the outer vessel is also composed of at least one of titanium (Ti), tantalum (Ta), tungsten (W), Hastelloy, Inconel, stainless steel, alumina (A203), and hafnium boride (HfB2).

80. Case is in the same art area of alleged low temperature fusion reactions (abstract) and teaches (¶ 20) using multiple vessels made from stainless steel: "The vessels suitable for use in this invention are not of critical configuration, but... may be conveniently made of 304 stainless steel." The skilled artisan would have been motivated to utilize the stainless steel material of Case as part of the vessel material of Groeneweg because, as described by Case (¶ 20), "stainless steel, which fabricates well, and is not affected by hydrogen."

81. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the stainless steel of Case for the vessels of Groeneweg, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Accordingly, claim 6 is rejected as obvious over Groeneweg in view of Case.

82. Claim 7 is rejected under 35 U.S.C. 103 as being unpatentable over Groeneweg in view of Richardson (US 2013/0333902).

83. Regarding claim 7, Groeneweg anticipates all the elements of the parent claim, including the use of an ignitor (e.g., hydrogen and/or "A sharp and/or thin electrode portion, e.g. a thin conductive wire, may provide a high field gradient so that one or more (corona) discharges may be ignited within the cathode, which may facilitate ionising gas atoms and/or molecules in addition to optical ionization," page 9, lines 26-29)

84. Groeneweg does not explicitly state that said ignitor is composed of one of sodium azide (NaN2) and copper azide (Cu(N3)2).

85. However, it was already known at the time the invention was made to utilize sodium azide as one of the ingredients in a suitable ignitor, as taught by Richardson. Richardson teaches using sodium azide over other ignitors because of "its ready availability and affordability, and its characteristic of producing nearly-pure nitrogen gas as its gaseous post-combustion by-product. The sodium azide may be mixed with other minor ingredients which serve as propellant binders or provide other operational performance enhancements, as is commonly known to those skilled in the art," ¶ 40. Additionally, Richardson notes that "Advantageously, propellants generated by sodium azide based materials are typically 10% to 15% of the temperature those generated by non-azide based propellants…Use of sodium azide based materials therefore permits a significant reduction in size," ¶ 41 and that sodium azide is a preferred ignitor when the operator wishes to avoid fires, ¶ 48.

86. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized sodium azide as part of the ignitor of

Groeneweg, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Accordingly, claim 7 is rejected as obvious over Groeneweg in view of Richardson.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LILY C GARNER whose telephone number is (571)272-9587. The examiner can normally be reached on 9-5 CT.

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.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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 https://ppair-my.uspto.gov/pair/PrivatePair. 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.

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