

DETAILED ACTION

Notice of Pre-AIA or AIA Status

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

Election/Restrictions

2. Applicant's election without traverse of Invention I (Claims 1-13) in the reply filed on 01/24/2021 is acknowledged.
3. Applicant's election with traverse of Species A, Species H and Species J in the reply filed on 01/24/2021 is acknowledged. The traversal is on the grounds that Species D and J and Species E and K are the same. This is found persuasive and no election is required between J and K at this time due to the previous election of Species A. Claims 3-10 and 12-13 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 01/24/2021.
4. Accordingly, claims 1-13 are pending with claims 3-10 and 12-13 withdrawn. Claims 1, 2 and 11 are examined herein.

Specification

5. 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.

6. The specification is objected to under 35 U.S.C. §112, first paragraph, as failing to provide an enabling disclosure. The specification fails to provide an adequate written description of the invention and fails to adequately describe how to make and/or use the invention as required by 35 U.S.C. §112, first paragraph.

7. As set forth in MPEP 2107 (MPEP 2107.02(IV)), examination requires a review of the claims and the supporting written description to determine if the application has asserted for the claimed invention any specific and substantial utility that is credible. If no assertion of specific and substantial utility for the claimed invention made by the applicant is credible, and the claimed invention does not have a readily apparent well-established utility, a rejection of the claim(s) under 35 U.S.C. 101 on the grounds that the invention as claimed lacks utility is proper. A prima facie showing of no specific and substantial credible utility must establish that it is ***more likely than not*** that a person skilled in the art would not consider credible any specific and substantial utility asserted by the applicant for the claimed invention. The prima facie showing must contain the following elements: (i) an explanation that clearly sets forth the reasoning used in concluding that the asserted specific and substantial utility is not credible; (ii) support for factual findings relied upon in reaching this conclusion; and (iii) an evaluation of all relevant evidence of record, including utilities taught in the closest prior art.

8. The asserted utility of the present invention is “for sourcing neutrons and other fusion reaction products” ([0003]), while the claims include recitations of an electrochemical cell and a particle accelerator to generate a fusion reaction (claim 1). Yet, Applicant provides no evidence in the disclosure of any measurable neutrons or other fusion reaction products through this

process via the claimed device. This reference to the generation of a fusion reaction is known in the art as “cold fusion.” A skilled artisan would view this asserted utility as incredible based on the following considerations 1) the disclosed invention is a type of low energy nuclear reaction (LENR); and 2) the operation and effects of the present invention are inconsistent with scientific literature. The two factors are discussed in depth below.

9. 1) The present invention is LENR¹. The specification indicates that the disclosed invention falls into the realm of LENR, which is defined as *attempted nuclear fusion at temperatures less than those known to provide sufficient energy to achieve fusion reactions*. The disclosure describes the approach of the present invention as “revolutionary” because it could lead to fusion energy without the need for very hot plasmas (see [0015]). Moreover, the specification discloses the present invention operates “using deuterons having kinetic energies of 1 keV” (see [0038]). Accordingly, based on the prevailing scientific community view on LENR, a skilled artisan would doubt that the present invention possess a credible utility.

10. 2) The purported results of the present invention are inconsistent with literature. The energy barrier to achieving a nuclear fusion reaction is well-established in the scientific literature and the probability of fusion drops exponentially as particle energy is reduced².

- A 2004 review conducted by the Department of Energy³ found “the occurrence of low energy nuclear reactions is not conclusively demonstrated by the evidence presented” (pp. 4), echoing the conclusions of a similar study conducted in 1989.

¹ Berlinguette, C.P., Chiang, Y.M., Munday, J.N. et al. Revisiting the cold case of cold fusion. Nature 570, 45–51 (2019). <https://doi.org/10.1038/s41586-019-1256-6>

² Miley, G H, Towner, H, and Ivich, N. Fusion cross sections and reactivities. United States: N. p., 1974. Web. doi:10.2172/4014032.

³ US DOE "Report of the Review of Low Energy Nuclear Reactions" 2004, available at <https://www.lenr-canr.org/acrobat/DOEreportofth.pdf>. (Year: 2004)

- Co-authors Curtis P. Berlinguette, Thomas Schenkel, David K. Fork, Ross Koningstein and Matthew D. Trevithick of “revisiting the cold case of cold fusion,” and joint inventors in the present invention, explored three experimental set-ups to generate cold fusion. “None found evidence of fusion⁴.”
- Berlinguette¹ summarizes this area of research, noting “light-ion fusion does not violate the conservation of energy, so one cannot completely reject the possibility (however remote) that the clever use of chemistry and materials science could access such phenomena... Isolated groups have continued its pursuit, but have yet to produce a credible ‘reference experiment’ that provides unambiguous evidence of anomalous heat or nuclear reaction products that can be independently verified and advanced.” (pp. 45).
- Scientists have theorized that electron screening could lead to enhanced fusion rates at energies on the order of several keV, but these publications stop short of demonstrating that nuclear fusion does occur at this energy range. Berlinguette describes “Studying fusion physics at low reaction energies is challenging because the rates of fusion drop exponentially with energy, and quickly approach unmeasurably low levels (Box 1)” (pp. 49) and “reports that screening can enhance ion penetration through the Coulomb barrier by many order of magnitude making screening highly relevant to our pursuit of fusion at low energies” (Box 1 on pp. 48, see also Fig. 5 on pp. 49). Another study concludes “the experimental errors for these low-energy data are still too large to draw

⁴ Google revives controversial cold-fusion experiments. Nature <https://www.nature.com/articles/d41586-019-01683-9>. 27 May 2019.

any meaningful conclusions” (Assenbaum⁵ at pp. 467). Accordingly, while the literature offers a glimmer of hope for achieving nuclear fusion at conditions similar to those disclosed in the present invention, this is not the same as concluding or demonstrating that nuclear fusion can happen at the energy levels of the present invention.

The present specification discloses that the “preliminary experimental results generated by the methods and system indicate possibly significant changes to the presently understood branching ratio of deuterium-deuterium fusion reaction, indicating the discovery of potentially new nuclear processes” and “if these preliminary experimental results are confirmed and the underlying mechanisms of these new nuclear processes can be understood, then implementation of the present invention could lead to fusion energy without the need for very hot plasmas (i.e. without fulfilling the Lawson criteria)” (see [0015]). The theory does not appear to have been tested in any manner and it appears as an idea for an invention and not an invention that has been reduced to practice.

There exists no evidence in the scientific literature that nuclear fusion can be achieved at the energy levels of the present invention (1 KeV). Moreover, there is no evidence to indicate that the applicant has so succeeded, where others have failed, in arriving at an operative system that produces nuclear fusion using low energy light-ions. Therefore, a skilled artisan would doubt the credibility of the asserted utility of the present invention, because it purportedly operates at an energy regime that the scientific literature predicts is incapable of achieving nuclear fusion.

⁵ Assenbaum, H. J., Langanke, K. & Rolfs, C. Effects of electron screening on low-energy fusion cross sections. Z. Phys. A 327, 461–468 (1987)

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11. 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 USPQ689, 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).

Claim Rejections - 35 USC § 101

12. 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.

13. Claims 1, 2 and 11 are 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. A "specific utility" is

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specific to the subject matter claimed and can "provide a well-defined and particular benefit to the public." *In re Fisher*, 421 F.3d 1365, 1371, 76 USPQ2d 1225, 1230 (Fed. Cir. 2005). "[A]n application must show that an invention is useful to the public as disclosed in its current form, not that it may prove useful at some future date after further research. Simply put, to satisfy the 'substantial' utility requirement, an asserted use must show that the claimed invention has a significant and presently available benefit to the public." *Fisher*, 421 F.3d at 1371, 76 USPQ2d at 1230. The present invention can produce no useful benefit to the public in its current form.

14. The specification's disclosed utility of generating fusion products is not credible. The production of fusion products using low energy nuclear reactions is yet to be proven and is currently theoretical as discussed above. Therefore, the claims are rejected under 35 USC 101 and 112, 1st paragraph for a lack of a credible asserted utility or a well-established utility, and as such one skilled in the art would not know how to use the claimed invention.

15. Claims 1, 2 and 11 are also rejected under 35 U.S.C. 112(a) or pre-AIA 35 U.S.C. 112, first paragraph. Specifically, because the claimed invention is not supported by either a specific and substantial asserted utility or a well-established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention. 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

16. 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.

The following is a quotation of the first paragraph of pre-AIA 35 U.S.C. 112:

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 of carrying out his invention.

17. Claims 1, 2 and 11 are rejected under 35 U.S.C. §112, first paragraph, as failing to provide an enabling disclosure. The specification fails to provide an adequate written description of the invention and fails to adequately describe how to make and/or use the invention as required by 35 U.S.C. §112, first paragraph. The claim(s) 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, or for pre-AIA the inventor(s), at the time the application was filed, had possession of the claimed invention.

18. Claims 1, 2 and 11 are rejected for the same reasons as the specification objection above.

Claim Rejections - 35 USC § 112

19. 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.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

20. Claims 1, 2 and 11 rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor (or for applications subject to pre-AIA 35 U.S.C. 112, the applicant), regards as the invention.

21. Claim 1 contains statements that are either essentially method limitations or statements of intended or desired use. For example, “such that some of the low-k light element particles are absorbed...” and “high-k light element particle operably collides with an associated said low-k light...” These clauses, as well as other statements of intended use do not serve to patently distinguish the claimed structure over that of the reference, as long as the structure of the cited references is capable of performing the intended use. See MPEP 2111-2115.

See also MPEP 2114 that 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. Ex parte Masham, 2 USPQ2d 1647.

Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531.

[A]pparatus claims cover what a device is, not what a device does.” Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525,1528.

The recitation that the electrochemical cell is intended to be used such that “some of the low-k light element particle are absorbed from the electrolyte solution” and the particle accelerator is intended to be used to “generate a fusion reaction when said each high-k light element particle operably collides” are statements of an intended operation of the claimed

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apparatus, as set forth in MPEP 2115. Accordingly, it is unclear if this claim is intended to be a method step of operating the apparatus, or if it is intended to be interpreted structurally.

22. The term "light-element-absorbing-material" in claim 1 is a relative term which renders the claim indefinite. The term "light-element-absorbing-material" 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. The specification discloses that target electrode comprises a metal foil comprising, for example, Palladium or a lithium absorbing material (see [0012]), but it is unclear what is considered a light-element absorbing material. Light elements are generally considered those with an atomic number less than 11, so it's unclear as Palladium has an atomic number of 46 and Lithium has an atomic number of 3. Moreover, it's unclear whether the term is intended to be interpreted as the target electrode is made of (1) a light element or (2) a material that absorbs light elements.

23. The terms "low-kinetic-energy light element particles" and "high-kinetic-energy light element particles" in claim 1 are relative terms which renders the claim indefinite. The term "low-kinetic-energy light element particles" and "high-kinetic-energy light element particles are 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. The specification defines light element particle as "colliding light element atoms or ions (e.g., a deuteron colliding with a deuterium atom)" (see [0033]), but it is unclear what is considered a light element. Moreover, the specification merely provides, for

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example, deuterium ions with kinetic energy of 1 KeV (see [0038]), but it is unclear the specific bounds of high and low kinetic energy. What is considered low-kinetic? High-kinetic energy?

Claim Rejections - 35 USC § 103

24. 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.

25. 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, 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.

26. The factual inquiries 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.

27. 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

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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.

28. Claim 1 and 2 is/are rejected under 35 U.S.C. 103 as being unpatentable over Stubbers et al. US Pub 20110091000, in view of Simons et al. WO 9010935.

29. Regarding claim 1, Stubbers discloses an apparatus for sourcing fusion reaction products (Fig. 10 and Fig. 14) comprising:

a target electrode (1019) comprising a light-element-absorbing material ([0011] “disc shaped target... made of lithium metal” and [0105]);

an electrochemical cell (Fig. 14: 1410, unlabeled electrode behind the target and power supply 1420) including an heavy water coolant containing low-kinetic-energy (low-k) light element particles (“D/T”); and

a particle accelerator configured to direct a plurality of high-kinetic-energy (high-k) light element particles ([0110] “A particle beam 1027 composed of deuterium ions (molecular and/or atomic deuterium ions) is formed and accelerated by the ion accelerator 1018”) toward the target electrode (ion beam 1027 incident to target 1019);

wherein the electrochemical cell is configured to maintain contact between the heavy water coolant and the target electrode (heavy water coolant is in contact with 1019 and Fig. 14: 1425) such that some of the low-k light element particles (“D/T”) are absorbed from the heavy water coolant into the target electrode (1425 “electrolytic loading”), and

wherein the particle accelerator is configured to provide each said high-k light element particle with sufficient energy to generate a fusion reaction when said each high-k light element

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particle operably collides with an associated said low-k light element particle absorbed by the target electrode ([0111] “the particle beam 1027 both implants deuterium atoms in the target layer 1019, and causes fusion to occur between the beam ions and both the deuterium atoms implanted in the target layer and the lithium from which the target is made”).

30. Stubbers discloses a solution of heavy water coolant, but does not explicitly disclose an electrolyte solution.

31. Simons, however, does and teaches an electrochemical cell (Fig. I-3: 24) including an electrolyte solution containing low-kinetic energy light element particles (Pg. 19/20 “an electrolyte solution of deuterated water containing ordinary water and/or tritiated water, containing an electrolyte such as LiOD or Li.sub.2SO.sub.4, for example”). One of ordinary skill in the art before the effective filling of the claimed invention would have found it obvious to modify the system of Stubbers with the electrochemical cell and electrolyte solution of Simons for the predictable advantage of electrolytic formation of atomic isotopic hydrogen at the lattice surface, and efficient absorption of the atomic isotopic hydrogen into the lattice (Pg. 15/16).

32. Regarding claim 2, the combination of Stubbers and Simons teaches all the elements of claim 1. Stubbers further discloses wherein the target electrode (1410) has a first surface (surface on the left side) and an opposing second surface (surface on the right side), wherein the electrochemical cell is configured to maintain contact between the electrolyte solution and the second surface of the target electrode (structure, as in Fig. 10/14, maintains contact between heavy water and the surface on the right of the target), and wherein the particle accelerator (Fig. 10: 1027) is configured to direct at least a portion of the plurality of high-k light

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element particles (particle beam 1405) toward the first surface of the target electrode (1405 is incident to surface of right side of 1410), and in this combination, Simons teaches the electrolyte solution (Pg. 19/20 “electrolyte solution”). One of ordinary skill in the art would be motivated to modify Stubbers with Simons for the above stated reasons of claim 1.

33. Claim 11 is/are rejected under 35 U.S.C. 103 as being unpatentable over Stubbers et al. US Pub 20110091000, in view of Simons et al. WO 9010935 as applied to claim 1 above, and further in view of Wasco et al. US 3939609.

34. Regarding claim 11, the combination of Stubbers and Simons teaches all the elements of claim 1. Simons further teaches an electrochemical cell (Fig. III-1: 208) comprising a reference electrode (237). Stubbers, Simons, nor the combination explicitly teach a counter electrode.

35. Wasco, however, teaches an electrochemical cell (Fig. 2) that includes a counter electrode (19) and reference electrode (18) disposed in contact with the electrolyte solution (Col 2 ln 10-14 “solution 14 which also acts as an electrolyte for the two electrodes”). One of ordinary skill in the art before the effective filling of the claimed invention would have found it obvious to modify the Stubbers-Simons system with the counter and reference electrode of Wasco for the predictable advantage of measuring the potential of the electrochemical cell and applying a uniform potential.

Conclusion

36. Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSHUA C DEVORKIN whose telephone number is (408) 918-7563. The examiner can normally be reached on Monday - Friday, 7:30 - 4:30 PT.

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.

/J.C.D./
Examiner, Art Unit 3646

/JACK W KEITH/
Supervisory Patent Examiner, Art Unit 3646