

The opinion in support of the decision being entered today was **not** written for publication and is **not** binding precedent of the Board.

Paper No. 29

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NORMAN L. WEINBERG, KLAUS TOMANTSCHGER,
ROBERT S. FELDSTEIN,
J. DAVID GENDERS and JOSEPH M. RAIT

Appeal No. 1999-0928
Application No. 08/334,952

ON BRIEF

Before OWENS, WALTZ, and JEFFREY T. SMITH, **Administrative Patent Judges**.

WALTZ, **Administrative Patent Judge**.

DECISION ON APPEAL

This is a decision on an appeal from the primary examiner's final rejection of claims 1, 2, 4, 6 through 12, 14 through 27, 33, 34, 36 and 37.¹ The remaining claims pending in this

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invention. See 37 CFR § 1.142(b). We have jurisdiction pursuant to 35 U.S.C. § 134.

According to appellants, the invention is directed to a method for the electrolysis of water for enhanced production of oxygen, hydrogen and heat by the application of a unique repeating sequence of voltages (Brief, pages 2 and 4).

Illustrative independent claim 1 is reproduced below:

1. A method for electrolyzing water to produce oxygen, hydrogen and heat which comprises the steps of:

(i) providing an electrochemical cell comprising an isotopic hydrogen storage cathode, an electrically conductive anode and an ionically conducting electrolyte comprising water, and

(ii) impressing a repeating sequence of voltages across said cathode and anode comprised of at least two cell voltage regimes, a first cell voltage regime consisting of a voltage sufficient to enhance cathodic absorption of hydrogen, and a second cell voltage regime consisting of at least one voltage pulse which is at least 2 times the voltage of the first cell voltage regime for a total duration no greater than 0.10 seconds.

A list of the prior art relied upon by the examiner as evidence of unpatentability may be found on pages 4-5 of the

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(1) the claims on appeal stand rejected under 35 U.S.C. § 112, first paragraph, and under 35 U.S.C. § 101, for failing to provide an enabling disclosure due to the lack of utility and operativeness (Answer, pages 5 and 13);

(2) the claims on appeal stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite (Answer, page 11);

(3) claims 1, 2, 6-12, 14-18, 21-24, 27, 33, 34 and 37 stand rejected under 35 U.S.C. § 102(b) as anticipated by Horvath (*id.*);

(4) the claims on appeal stand rejected under 35 U.S.C. § 103 as unpatentable over Pons in combination with Spaepen and the admitted prior art (as evidenced by Mazur, Saito, Greenberg, or Suzuki, as disclosed on page 10 of the specification) (*id.*);
and

(5) claims 1, 2, 6-12, 14-22, 33, 34, 36 and 37 stand rejected under 35 U.S.C. § 103 as unpatentable over Timewell in combination with either Sobieralski or Pons (Answer, page 12).

We reverse all of the examiner's rejections on appeal

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OPINION

A. *The Rejection under 35 U.S.C. § 112, ¶2*

A proper analysis of patentability should begin with the second paragraph of section 112, proceed to the first paragraph, and then analyze the prior art applied against the claimed subject matter under sections 102 and 103. See *In re Angstadt*, 537 F.2d 498, 501, 190 USPQ 214, 217 (CCPA 1976).

The examiner states that, in claim 1, line 2, it remains "unclear" whether the term "heat" constitutes "excess heat" (Answer, page 11). Therefore the examiner concludes that the "metes and bounds" of the claims are undefined (*id.*). However, the initial burden of establishing unpatentability, on any ground, rests with the examiner. See *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). The legal standard for definiteness of claim language is whether a claim reasonably apprises those of skill in the art of its scope, when read in light of the specification. See *In re Warmerdam*, 33 F.3d 1354, 1361, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994); and *In re*

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The examiner has failed to meet the initial burden in that no reasoning has been presented why the term "heat" would not reasonably apprise those of ordinary skill in this art of its scope (e.g., see Horvath, col. 11, ll. 4-26). The examiner has also failed to present any reasons why one of ordinary skill in this art, upon reading the specification, would be "unclear" whether "heat" includes "excess heat" (Answer, page 11). The term "heat," used in its normal and accepted art-recognized meaning, would include any production of heat energy, whether small or "excess" (Brief, page 22; specification, page 2, ll. 16-31, and pages 22-23).

For the foregoing reasons and those stated in the Brief and Reply Brief, we determine that the examiner has failed to establish that the claimed subject matter in question would not have reasonably apprised one of ordinary skill in this art of the scope of the claims. Accordingly, the rejection based on the second paragraph of 35 U.S.C. § 112 is reversed.

B. The Rejections under 35 U.S.C. § 101 and § 112, ¶1

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satisfies the utility requirement of § 101 are closely related and thus we treat these two rejections together. See *In re Swartz*, 232 F.3d 862, 863, 56 USPQ2d 1703, 1703 (Fed. Cir. 2000). To satisfy the enablement requirement of § 112, ¶1, the patent application must adequately disclose the claimed subject matter so as to enable one of ordinary skill in the art to practice the invention at the time the application was filed without undue experimentation. See *Swartz, supra*. The utility requirement of § 101 mandates that the invention be operable to achieve useful results. See *Swartz*, 232 F.3d at 863, 56 USPQ2d at 1703-04. "Thus, if the claims in an application fail to meet the utility requirement because the invention is inoperative, they also fail to meet the enablement requirement because a person skilled in the art cannot practice the invention." *Swartz*, 232 F.3d at 863, 56 USPQ2d at 1704.

The examiner states that appellants' invention "falls into the 'cold fusion' category of alleged low temperature nuclear fusion/transformation reactions and 'excess heat' generation."

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evidence of the 'excess heat' generated at the indicated levels (570%) being from chemical reactions or merely lattice induced vibrations, then it follows that the excess heat is from alleged nuclear reactions of the 'cold fusion' system type." Answer, sentence bridging pages 5-6. The examiner finds that cold fusion systems involve decreasing the interatomic spacing between hydrogen isotopes in the host lattice to generate excess heat, such as disclosed by appellants, "regardless of any other name they may be given." Answer, page 6. The examiner considers appellants' invention as being based on the "cold fusion" concept set forth by Pons and Fleischmann and then discusses numerous references that refute this concept (Answer, pages 6-7). Accordingly, the examiner believes that a reasonable and sufficient basis has been set forth for challenging the adequacy of the disclosure, with a showing that claims of nuclear fusion and/or excess heat generation are not reproducible or even obtainable (Answer, page 10). We disagree.

The examiner has the initial burden of challenging an

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Swartz, 232 F.3d at 864, 56 USPQ2d at 1704. "If the PTO provides evidence showing that one of ordinary skill in the art would reasonably doubt the asserted utility, however, the burden shifts to the applicant to submit evidence sufficient to convince such a person of the inventions's asserted utility." *Swartz*, 232 F.3d 864, 56 USPQ2d at 1704, underlining added. Appellants do not, on this record, assert a utility involving "cold fusion" (Brief, page 10). The examiner makes the assertion that appellants' invention involves "cold fusion" (Answer, pages 5-11). The claims, as represented by claim 1 above, are directed to a method for electrolyzing water to produce oxygen, hydrogen and heat. The specification is only directed to this utility, i.e., the electrolysis of water to produce oxygen, hydrogen and heat (see the specification, page 1, ll. 8-11; and page 2, ll. 32-35). The examiner has not presented any evidence or reasoning to show that the asserted utility of electrolyzing water to produce oxygen, hydrogen and heat is inoperative or not obtainable. In fact, the examiner has applied prior art (Horvath) that shows the

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Therefore appellants have provided a credible utility for the claimed subject matter and thus satisfy the utility requirement of § 101.

Similarly, the examiner has provided no basis or support for the assertion that the specification disclosure is non-enabling. Appellants have provided a schematic diagram and an example disclosing how to make and use the claimed invention (Brief, pages 17-21; specification, pages 15-25). The examiner's citation of numerous references that refute claims to "cold fusion" show that "cold fusion" would not occur without the production of tritium, neutrons, helium-4 and gamma rays (see, for example, Hilts, Chapline, Lewis, Alber, Faller, Hajdas, Ziegler, and Jones). The examiner has not cited any disclosure or allegation by appellants that such by-products of "cold fusion" have been produced. As discussed above, the examiner has not shown that appellants are claiming or alleging that their method involves "cold fusion."² See *Swartz*, 232 F.3d at 864, 56

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USPQ2d at 1704 ("In his written description and throughout prosecution of his application, Mr. Swartz continually represented his invention as relating to cold fusion.").

The only evidence the examiner presents is that appellants disclose that "excess heat" is sometimes generated by their method but appellants offer no explanation for this observation (Answer, page 14; Brief, page 11; specification, pages 23 and 25). However, the claims are limited to the production of "heat" (see claim 1 above) and the observation of "excess heat" in some examples is not sufficient and convincing evidence that "cold fusion" is involved in the claimed method. See Hilts, where it is disclosed that the amount of heat produced depends on the amount of electrical power put into the process, and "excess" heat is only an excess over what the appellants assume they should get. Thus incorrect assumptions by appellants could result in the production of "excess heat." See also Kreysa, where the "excess heat" production of Pons and Fleischmann is attributed to the catalytic recombination of hydrogen and oxygen

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evidence of excess heat production without a relationship to concomitant production of neutrons, tritium, and helium, was explained by considering a recombination of hydrogen and oxygen evolved during the experiment, not by categorizing the experiment as "cold fusion" (page 729). Finally, Jones teaches that the production of excess heat generation during water electrolysis "could be readily terminated by the introduction of various barriers to the migration of hydrogen and oxygen" and that "[t]here is no compelling evidence that excess heat is of a nuclear origin in such electrolytic cells." Jones, page 6973, abstract. Therefore, on this record, the examiner has not presented any evidence that appellants' generation of "excess heat" during electrolysis of water is of a nuclear origin or that appellants' invention should be categorized as "cold fusion" but, on the contrary, the evidence of record supports the opposite view when "excess heat" is the only by-product of the electrolysis.

For the foregoing reasons and those stated in the Brief and

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subject matter is inoperative or lacks enabling disclosure. Accordingly, we cannot sustain the examiner's rejections under 35 U.S.C. § 101 and § 112, first paragraph.

C. The Rejection under 35 U.S.C. § 102(b)

The examiner finds that Horvath discloses a method comprising an electrolysis cell having an isotopic hydrogen storage cathode, an anode, and an electrolyte comprising water, with voltage sequences including a voltage pulse (Answer, page 11, citing col. 10, l. 60-col. 11, l. 26, and col. 13, l. 59 - col. 14, l. 5).

Under § 102(b), anticipation or lack of novelty requires that the prior art reference discloses, either expressly or under the principles of inherency, every limitation of the claim. See *In re King*, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986). From the examiner's findings noted above, there is no explanation as to why the "voltage pulse" of Horvath describes the claimed limitation of at least two cell voltage regimes, with the first voltage enhancing cathodic absorption of hydrogen while

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see claim 1 on appeal). Accordingly, we cannot sustain the examiner's rejection under section 102(b) since the examiner has not found every limitation of the claims described by the reference.

D. The Rejections under 35 U.S.C. § 103

There are two rejections based on section 103 before us in this appeal. In the first rejection, the examiner combines Pons and Spaepen (along with the "admitted prior art") (Answer, page 11). The examiner finds that Pons discloses the same method as claimed but "lacks a specific showing of superimposing voltage regimes" (Answer, page 12). Therefore the examiner applies Spaepen for the disclosure of superimposing a high voltage pulse regime on to a low voltage regime to obviate ageing phenomena (*id.*). From these findings, the examiner concludes that it would have been obvious to include superimposing voltage regimes in the method of Pons, as taught by Spaepen, to have "enhanced curing ageing phenomena" (*id.*).

"When relying on numerous references or a modification of

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re Mayne, 104 F.3d 1339, 1342, 41 USPQ2d 1451, 1454 (Fed. Cir. 1997). It is well settled that before a conclusion of obviousness may be made based on a combination of references, there must have been a reason, suggestion, or motivation to lead the inventors to combine those references. See *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1629 (Fed. Cir. 1996). The examiner has found that Pons is directed to electrolyzing water to produce hydrogen, oxygen and heat using an isotopic hydrogen storage cathode, an anode, and an aqueous electrolyte (Answer, pages 11-12). However, the examiner has failed to note that Spaepen is directed to another type of electrolysis, namely that Spaepen teaches applying a potential pulse train for influencing an electrocatalytic reaction proceeding at the electrode, where this reaction is the oxidation of methanol on platinum or the oxidation of hydrogen, hydrazine, or ammonia on an alloy (Spaepen, col. 1, ll. 42-67). Spaepen teaches that it was already known to obviate partly some of the ageing phenomenons which occur in electrocatalysts by bringing

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and 15), Spaepen does not teach that the inventive pulsed regime obviates ageing phenomenons, only that it was known in the art to obviate these phenomenons by bringing the electrode to another potential (see col. 1, ll. 10-15). Secondly, the examiner has not identified any reason or suggestion why one of ordinary skill in the art of electrolyzing water would have included the pulsed regime of Spaepen in the method of Pons, whether used to obviate ageing phenomenons or to influence the specified oxidation reactions at the electrode (see the Brief, page 25). The examiner has failed to identify why Pons would have desired obviation of ageing phenomenons.

The "admitted prior art" (Answer, pages 11-12) has been applied by the examiner to show that it was well known in this art to have an electrolysis cell with an ion-exchange membrane divider. Therefore these references do not remedy the deficiency noted above.

For the foregoing reasons and those set forth in the Brief and Reply Brief, we determine that the examiner has failed to

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examiner's rejection under 35 U.S.C. § 103 over Pons in combination with Spaepen and the "admitted prior art."

With regard to the second rejection based on section 103, the examiner finds that Timewell "substantially discloses the claimed invention," lacking only a specific showing of an isotopic hydrogen storage cathode (Answer, page 12). Therefore the examiner applies Sobieralski or Pons to show that isotopic hydrogen storage materials (e.g., palladium) are known in the art to be equivalent to aluminum for use as a cathode (Answer, paragraph bridging pages 12-13). Accordingly, the examiner concludes that it would have been obvious to have substituted an isotopic hydrogen storage material for the aluminum cathode of Timewell (Answer, page 13).

Assuming *arguendo* that Timewell discloses all limitations of the claimed subject matter except the use of an isotopic hydrogen storage cathode, we do not agree with the examiner that the secondary references disclose the equivalency of palladium and aluminum in the art of electrolyzing water and therefore there is

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modification or substitution. *See In re Mayne, supra; and Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., supra.*

Timewell is directed to a method and apparatus for electrically conditioning electrode means positioned in an electrolyte (see col. 2, ll. 21-24). Timewell discloses use of a saltwater electrolyte with production of hydrogen at the cathode and relatively little oxygen at the depassivated anode (col. 3, ll. 28-31; col. 4, ll. 49-66). Pons, as previously discussed, is directed to the electrolysis of water to produce hydrogen, oxygen and heat but the examiner has failed to identify any portion of Pons that teaches the equivalency of aluminum and palladium as isotopic hydrogen storage cathodes (see the Answer, page 13, citing page 32 of Pons). Sobieralski is directed to the production of zinc powder from the electrolysis of lead-containing zinc halide solutions (abstract; col. 2, ll. 25-32). The cathode materials disclosed by Sobieralski are taught to be equivalents since they do "not detrimentally effect the operation of the process or the properties of the produced zinc to an

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of ordinary skill in the art of electrolyzing water would have used the teaching of Sobieralski regarding the equivalency of cathode materials in the production of zinc and substituted these equivalents in the process of Timewell. Furthermore, the examiner has not presented any evidence or reasoning why one of ordinary skill in this art would have substituted an isotopic hydrogen storage cathode for the aluminum of Timewell, when there is no evidence on this record that aluminum is an isotopic hydrogen storage material (see the Brief, page 30).

For the foregoing reasons and those stated in the Brief and Reply Brief, we determine that the examiner has not established a *prima facie* case of obviousness in view of the reference evidence. Accordingly, we reverse the examiner's rejection under 35 U.S.C. § 103 over Timewell in combination with either Sobieralski or Pons.

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E. Summary

All of the rejections on appeal have been reversed.
Therefore the decision of the examiner to reject the claims on
appeal is reversed.

REVERSED

TERRY J. OWENS)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
THOMAS A. WALTZ)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
)	
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