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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/831,382	07/07/2010	Benjamin D. Gould	99590-US2	2329
26384	7590	12/08/2016	EXAMINER	
NAVAL RESEARCH LABORATORY ASSOCIATE COUNSEL (PATENTS) CODE 1008.2 4555 OVERLOOK AVENUE, S.W. WASHINGTON, DC 20375-5320			PARK, LISA S	
			ART UNIT	PAPER NUMBER
			1729	
			MAIL DATE	DELIVERY MODE
			12/08/2016	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte BENJAMIN D. GOULD, KAREN SWIDER LYONS, and
OLGA A. BATURINA

Appeal 2015-005469
Application 12/831,382
Technology Center 1700

Before DONNA M. PRAISS, MONTÉ T. SQUIRE, and
JEFFREY R. SNAY, *Administrative Patent Judges*.

SNAY, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellants² appeal under 35 U.S.C. § 134(a) from the Examiner’s decision rejecting claims 1–9 and 13–15. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ We cite to the Specification (“Spec.”) filed Jul. 7, 2010; Final Office Action (“Final Act.”) dated Apr. 9, 2014; Examiner’s Answer (“Ans.”); and Appellants’ Appeal Brief (“App. Br.”) and Reply Brief (“Reply Br.”).

² Appellants identify The Government of the United States of America, as represented by the Secretary of the Navy, as the real party in interest. App. Br. 2.

BACKGROUND

The subject matter on appeal relates to a method for recovering performance of a catalyst-containing cathode in a fuel cell. Spec. 1. Sole independent claim 1 is illustrative:

1. A method of improving the electrical performance of an operating fuel cell catalyst-containing cathode in a fuel cell connected to an electrical load comprising:
 - stopping the flow of air to the cathode;
 - operating the fuel cell with the load connected to consume oxygen at the cathode, leaving humidified nitrogen at the cathode until the fuel cell produces a current below a current threshold and a voltage less than a voltage threshold;
 - disconnecting the load from the fuel cell;
 - connecting a potentiostat to the fuel cell;
 - cycling an applied voltage, current, or power to the fuel cell one or more times while the cathode is in contact with the humidified nitrogen;*
 - disconnecting the potentiostat from the fuel cell;
 - reconnecting the load to the fuel cell; and
 - resuming the flow of air to the cathode.

App. Br. 8 (Claims App'x) (emphasis added to highlight the key recitation in dispute).

REJECTION

The Examiner maintained the following ground of rejection:³

Claims 1–9 and 13–15 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Donahue,⁴ Mohtadi,⁵ and Colbow.⁶

OPINION

In reaching the Rejection, the Examiner found that Donahue discloses regenerating performance of a fuel cell by stopping the flow of oxidant gas (air) to the cathode side of the fuel cell to reduce the cathode potential, but fails to teach cycling voltage, current or power applied to the fuel cell. Final Act. 2–3. For that feature, the Examiner relied on Mohtadi, finding that Mohtadi discloses a fuel cell recovery method in which a voltage applied to a fuel cell cathode is cycled “under nitrogen gas.” *Id.* at 3. The Examiner reasoned that it would have been obvious to “include the application of a cycled voltage in the method of Mohtadi to the fuel cell recovery method of Donahue to be able to rejuvenate the cathode despite extensive poisoning.” *Id.* at 5.

Appellants principally argue that neither Donahue nor Mohtadi teaches cycling an applied voltage, current, or power while the cathode is in contact with the humidified nitrogen which remains after operating the fuel cell while the air flow is stopped. App. Br. 4–5. Particularly, Appellants point out that “Mohtadi teaches the use of cyclic voltammetry with the

³ Final Act. 2–6; Ans. 2–6.

⁴ US 6,399,231 B1, issued Jun. 4, 2002 (“Donahue”).

⁵ R. Mohtadi, *Assessing Durability of Cathodes Exposed to Common Air Impurities*, 138 J. Power Sources 216–225 (2004) (“Mohtadi”).

⁶ US 6,472,090 B1, issued Oct. 29, 2002 (“Colbow”).

cathode under flowing pure nitrogen.” *Id.* at 4 (citing Mohtadi). There, Mohtadi explains that cyclic voltammetry was performed “while flowing N₂ on the cathode” (Mohtadi, *rt. col.*, 1st full para.), and that “high purity N₂” was used (*id.* at *lt. col.*, 1st full para.). Appellants contend that even if Mohtadi’s cyclic voltammetry technique were applied in Donahue’s method, any residual humidified nitrogen in contact with the fuel cell cathode “would be immediately replaced by pure nitrogen.” App. Br. 5.

In response, the Examiner interpreted the phrase, “cycling an applied voltage,” in claim 1 as “*initiating* a potentiostat to cycle the applied voltage.” Ans. 7. Under that interpretation, the Examiner found that there inherently would be residual humidified nitrogen in contact with the cathode “*at least* when the cycling is initiated, which meets the claim limitation.” *Id.*

Appellants persuasively argue, Reply Br. 1–2, that the foregoing claim interpretation is unreasonable. Claim 1 recites, “*cycling* an applied voltage, current, or power to the fuel cell *one or more times* while the cathode is in contact with the humidified nitrogen.” (Emphasis added). As the Examiner acknowledged, one cycle would involve sweeping the applied voltage from a starting voltage to a different ending voltage and returning to the starting voltage. *See* Ans. 7 (“[A] potential is applied starting from a negative potential to a positive potential and back to the negative potential in one ‘sweep’.”). The claim expressly requires that at least one such cycle occurs “while the cathode is in contact with the humidified nitrogen,” particularly, the same humidified nitrogen which is left at the cathode as a result of operating the fuel cell for a period of time after stopping the flow of air to the cathode. The Examiner’s different interpretation is contrary to the express language of the claim and, therefore, improper.

The Examiner alternatively found that “the skilled artisan would find it reasonable to expect the humidified nitrogen to be in the cathode compartment and contacting the cathode for a long enough time to accommodate a single cycle . . . of the potentiostat based on the flow rate of added nitrogen of Mohtadi and the scan rate of the potentiostat.” Ans. 8. However, Appellants persuasively argue that Mohtadi does not provide a flow rate of added nitrogen. Reply Br. 2; *see Mohtadi* 217, section 2 (Experimental). The Examiner has not identified any evidence of record or technical reasoning to support the otherwise conclusory statement that humidified nitrogen would contact Donahue’s cathode over the course of at least one cycle of Mohtadi’s cyclic voltammetry under flowing nitrogen.

On this record, we are persuaded that the Examiner erred in finding that the combination of Donahue and Mohtadi teaches or inherently results in cycling an applied voltage, current, or power while the cathode is in contact with the humidified nitrogen which results from operating the fuel cell after the air flow is stopped. That deficiency is not remedied by the additional prior art cited by the Examiner in the Final Rejection. Accordingly, we do not sustain the Rejection of claim 1. Because each of claims 2–9 and 13–15 depend directly from claim 1, we reverse the rejection of the dependent claims for the same reason.

DECISION/ORDER

The Examiner’s rejection of claims 1–9 and 13–15 under 35 U.S.C. § 103(a) is reversed.

REVERSED