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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NATHANIEL IAN JOOS and MARIO DZAMARIJA

Appeal 2018-000943
Application 14/684,091
Technology Center 1700

Before JAMES C. HOUSEL, N. WHITNEY WILSON, and WESLEY B. DERRICK, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

Appellant[2] appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting, as unpatentable under 35 U.S.C. § 103(a), claims 1–7, 13, and 14 over Sato[3] as evidenced by Sugita[4] and in view of LaConti,[5] and

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[1] Our decision refers to the Specification ("Spec.") filed April 10, 2015, the Examiner's Final Office Action ("Final Act.") dated September 2, 2016, Appellant's Appeal Brief ("Appeal Br.") filed June 2, 2017, the Examiner's Answer ("Ans.") dated September 6, 2017, and Appellant's Reply Brief ("Reply Br.") filed November 6, 2017.

[2] Appellant is the Applicant, Hydrogenics Corporation, which is identified in the Appeal Brief as the real party in interest (Appeal Br. 3).

[3] Sato et al., US 2006/0024561 A1, published February 2, 2006 ("Sato").

[4] Sugita et al., US 2005/0019643 A1, published January 27, 2005 ("Sugita").

[5] LaConti et al., US 2004/0016638 A1, published January 29, 2004 ("LaConti").

claims 8–12 and 15–17 adding Belanger.[6] We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We REVERSE.

STATEMENT OF THE CASE

The invention relates to an arrangement for a bus bar for an electrochemical cell stack (Spec. ¶ 2). Appellant discloses that the cell stack comprises an elongated flat bus bar, an end plate having a recess on one side to receive the bus bar and a substantially flat sealing area surrounding the recess, and an elastic material arranged on the side of the bus bar opposite the recess (*id.* ¶ 20).

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal. The limitations at issue are italicized.

1. An electrochemical cell stack comprising:
   a) a bus bar having two opposite generally flat side surfaces;
   b) an end plate having a recess on one side, the recess arranged to receive the bus bar so that one of the two opposite generally flat side surfaces of the bus bar is received into the recess, the end plate having a substantially flat sealing area generally surrounding the recess; and
   c) an elastic material *in the form of a flat sheet* arranged on the other of the two opposite generally flat side surfaces of the bus bar, the elastic material extending from the bus bar to the sealing area of the end plate *to cover an interface between the bus bar and the end plate.*

[6] Belanger et al., US 2005/0186462 A1, published August 25, 2005 ("Belanger").

Independent claim 14 similarly recites an electrochemical cell stack except that element (c) is a sheet of gas diffusion layer material, rather than an elastic material in the form of a flat sheet.

Independent claim 17 also recites an electrochemical cell stack except that element (c) does not require that the elastic material is in the form of a flat sheet and an element (d) is added, which is a graphite flow field plate adjacent to the elastic material.

ANALYSIS

The Examiner has the initial burden of establishing a prima facie case of obviousness based on an inherent or explicit disclosure of the claimed subject matter under 35 U.S.C. § 103. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("[T]he examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability"). To establish a prima facie case of obviousness, the Examiner must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988).

Claim 1

The Examiner finds that Sato teaches an electrochemical fuel stack comprising elongated bus bar (terminal plate) 16a, end plate 18a having a recess on one side 60a for receiving the bus bar and a substantially flat sealing area surrounding the recess (Final Act. 3). The Examiner finds that Sato also teaches metal separator 32 arranged on the opposite side of the bus bar from the end plate, wherein the separator covers interface 66a between

the end plate and bus bar (*id.*). Though the Examiner acknowledges Sato does not expressly state that the separator is elastic, the Examiner finds that the separator is corrugated and that Sugita teaches such corrugated metal separators have elasticity (*id.* at 4).

However, the Examiner acknowledges that Sato's separator is not flat (Final Act. 4). The Examiner finds LaConti teaches an elastic member (compression pad) within a fuel stack in order to maintain uniform pressure over active areas, wherein this elastic member is a gas diffusion material (*id.*). The Examiner concludes that it would have been obvious to provide Sato with a compression pad as suggested by LaConti as the elastic material in order to maintain uniform pressure over the active areas of the cell stack (*id.*).

Appellant argues that substitution of LaConti's compression pad for Sato's separator would not have been obvious because of their different positions and functions (Appeal Br. 7). Appellant contends that LaConti's pads 305, 403, 405 are not against a bus bar, but instead are either inside each cell or between cells (*id.* at 8). In addition, Appellant notes that Sato's separator 32 provides a fuel gas flow field 48 on one side and a coolant flow field 50 on the other side (*id.*). As such, Appellant asserts that Sato's separator requires a non-porous material to separate these two flow fields (*id.*). Because LaConti's compression pads cannot define two separate flow fields, Appellant contends that LaConti's pads are not a workable replacement for Sato's corrugated metal separator (*id.*).

Appellant's arguments have persuasive merit. Although the Examiner determines that the skilled artisan would replace Sato's separator plate in contact with the bus bar (or terminal plate) with a flat elastic pad from

LaConti in order to maintain uniform pressure (Ans. 3), LaConti's pads are only capable of providing a single flow field within the pad itself. As Appellant asserts, Sato's separator 32 provides a separate flow field on each side formed by the corrugated metal sheet (Sato ¶ 32, Fig. 4). Thus, LaConti's pads are not a functionally equivalent substitute for Sato's separators.

We note the Examiner finds that "[w]hile the separator plates are used to form a coolant flow field within the bulk of the fuel cell stack, Sato specifically teaches away from allowing the coolant to come into contact with the bus bar, since this causes corrosion" (Ans. 4). Since Sato's end separators do not function to form a coolant flow field in contact with the bus bar, the Examiner determines that LaConti's pad would be a functional replacement for Sato's end separators (*id.*).

However, as Appellant asserts (Reply Br. 2), Sato does not teach restricting coolant flow to any separator. Sato does disclose that, in the internal manifold type fuel cell, fluid supply and discharge passages extend through the metal terminal plates such that coolant water contacts the terminal plates (Sato ¶ 7). Due to current flowing through the terminal metal plates, Sato discloses that this coolant water contact leads to undesirable electrical corrosion in these plates (*id.*). This discussion is set forth in Sato's "Description of the Related Art" (*id.* ¶ 3). Contrary to the Examiner's finding, Sato does not teach that the coolant flow field of any separator, in particular the separators in contact with the terminal plates or bus bars is not used. Sato merely teaches that the fluid passages do not extend through these terminal plates (*id.* ¶ 14), but otherwise teaches that the first metal separator adjacent the terminal plate has both fuel gas flow field 48 and

coolant flow field 50, wherein this coolant flow field is connected to the coolant supply and discharge passages (*id.* ¶ 32). Therefore, the Examiner's finding that Sato's separators adjacent the terminal plates or bus bars would not have a coolant flow field lacks support in Sato and is erroneous.

Because the obviousness rejection relies on this erroneous finding, the Examiner's conclusion of obviousness lacks sufficient rational underpinning. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness."), *quoted with approval in KSR*, 550 U.S. at 418. We note that the Examiner does not rely on Belanger to remedy this deficiency. Accordingly, we will not sustain the Examiner's obviousness rejection of claim 1, and claims 2–13 which depend from claim 1, over the combination of Sato, Sugita, and LaConti, whether or not combined with Belanger.

Claim 14

The Examiner's obviousness rejection of claim 14 relies on the same substitution of LaConti's compression pad for Sato's separators adjacent the terminal plates or bus bars. For the same reasons given above, the Examiner's conclusion of obviousness as to claim 14 lacks sufficient rational underpinning because it relies on the erroneous finding that Sato's corrugated metal separators would not provide a coolant flow field adjacent the terminal plates or bus bars, which is contrary to Sato's express disclosure. Accordingly, we will not sustain the Examiner's obviousness rejection of claim 14, and dependent claims 15 and 16, over the combination of Sato, Sugita, and LaConti, alone or further combined with Belanger.

Claim 17

The Examiner finds that Sato, as evidenced by Sugita and in view of LaConti, teaches the electrochemical stack except for the graphite flow field plate (Final Act. 7). However, the Examiner finds Belanger teaches that it is desirable to form flow field or separator plates from graphite because such plates have excellent electrical conductivity, electrochemical stability, structure integrity, size stability, and good manufacturability at low cost (*id.*). Therefore, the Examiner concludes that it would have been obvious to make Sato's flow field separator plates from graphite for the advantages Belanger teaches (*id.*).

Appellant argues that elements (a), (b), and (c) are similar to elements (a), (b), and (c) of claim 1 and the same arguments as to claim 1 apply here (Appeal Br. 11). As to element (d), Appellant argues that "MEA [membrane electrode assembly] 30, 42 of Sato is not a flow field plate and could not perform its intended functions if made of graphite, at least because graphite is not an electrolyte or a membrane as required of polymer electrolyte membrane 42" (*id.*). As to this latter argument, the Examiner responds that the rejection does not equate Sato's MEA to a flow field plate (Ans. 6). In light of the Examiner's response, Appellant understands that the Examiner's position is that an internal separator plate would be adjacent to a compression pad that replaced Sato's separator plate 32 (Reply Br. 5). However, Appellant contends that no separator plate is adjacent to separator plate 32 that is replaced with a compression pad (*id.*).

Appellant's arguments are persuasive of reversible error. The Examiner's rejection requires that the LaConti's compression pad replace

Sato's separator 32 and the flow field plates of Sato in view of LaConti be made out of graphite as suggested by Belanger. The difficulty with this rejection is that Sato's separators are also flow field plates. Thus, replacing Sato's separator with LaConti's compression pad, but making that pad graphite would prevent LaConti's pad from compressing. Conversely, as Appellant contends, if first separator 32 adjacent terminal plate 16a is replaced with a compression pad and second separator 34 is made from graphite, the Examiner fails to explain how the second separator would be adjacent to the compression pad, as required by this claim. Indeed, such is contrary to Sato's teaching that the MEA 30 extends between separators 32, 34. Accordingly, we will not sustain the Examiner's obviousness rejection of claim 17 over the combination of Sato, Sugita, LaConti, and Belanger.

DECISION

Upon consideration of the record, and for the reasons given above and in the Appeal and Reply Briefs, the decision of the Examiner rejecting claims 1–17 under 35 U.S.C. § 103(a) as unpatentable over the combination of Sato, Sugita, and LaConti, alone or further in view of Belanger, is *reversed*.

REVERSED