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NELSON MULLINS RILEY & SCARBOROUGH LLP
FLOOR 30, SUITE 3000
ONE POST OFFICE SQUARE
BOSTON, MA 02109

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chris.schlauch@nelsonmullins.com
ipqualityassuranceboston@nelsonmullins.com

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* KOICHIRO FURUSAWA, KENTARO NAGOSHI, HIDEAKI KIKUCHI, SHUICHI TOGASAWA, and YASUNORI KOTANI

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Appeal 2015-005908
Application 12/562,590
Technology Center 1700

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Before LINDA M. GAUDETTE, ELIZABETH M. ROESEL, and DEBRA L. DENNETT, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Appellants[2] appeal under 35 U.S.C. § 134 from a rejection of claims 1 and 3–6. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] In our Opinion below we refer to the Final Action mailed April 25, 2014 ("Final Act."); the Appeal Brief filed December 19, 2014 ("App. Br.); and the Examiner's Answer mailed March 13, 2015 ("Ans.").

[2] Appellants identify Honda Motor Co., Ltd. as the real party in interest. App. Br. 2.

The claims are directed to a fuel cell stack. Claim 1, reproduced below with the disputed phrase highlighted, is illustrative of the claimed subject matter:

1. A fuel cell stack, comprising

a stack body formed by stacking a plurality of power generation cells, the power generation cells each comprising one or more electrolyte electrode assemblies and a pair of separators, the one or more electrolyte electrode assemblies each including a pair of electrodes and an electrolyte interposed between the pair of electrodes,

reactant gas flow fields being formed along electrode surfaces of the power generation cells,

reactant gas passages being connected to the reactant gas flow fields and extending through the power generation cells in a stacking direction,

terminal plates, insulating plates, and end plates being provided at opposite ends of the stack body in the stacking direction, the end plates including a first end plate and a second end plate provided at an opposite end of the stack body from the first end plate,

reactant gas pipes being connected to the first end plate , the reactant gas pipes communicating with the reactant gas passages, and

a coolant pipe connected to the second end plate, the coolant pipe communicating with a coolant passage extending through the power generation cells in the stacking direction,

wherein one or more dummy cells corresponding to the power generation cells are provided at each end of the stack body in the stacking direction, the dummy cells each including a dummy electrode assembly having an electrically conductive plate corresponding to the electrolyte, and dummy separators sandwiching the dummy electrode assembly, the dummy separators having a structure identical to the pair of separators, wherein a number of the dummy cells provided near the first

> end plate that is connected to the reactant gas pipes is larger than the number of the dummy cells provided near the second end plate at the opposite end of the stack body, and
>
> wherein a plurality of dummy cells is provided near one of the end plates and one of the plurality of dummy cells is disposed adjacent to the stack body, and ***wherein a flow of a coolant between the stack body and the one of the plurality of dummy cells adjacent to the stack body is limited, and the coolant flows between the remaining dummy cells of the plurality of dummy cells***.

App. Br. 27–28.

## REFERENCES

The Examiner relies on the following prior art in rejecting the claims on appeal:

| | | |
|---|---|---|
| Asai et al., ("Asai") | US 2003/0215693 A1 | Nov. 20, 2003 |
| Nishiyama et al., ("Nishiyama") | US 2006/0110649 A1 | May 25, 2006 |
| Suzuki et al., ("Suzuki") | US 2007/0218332 A1 | Sept. 20, 2007 |
| Jinba et al., (Jinba") | US 2008/0187805 A1 | Aug. 7, 2008 |

## REJECTIONS

The claims are rejected as unpatentable under 35 U.S.C. § 103(a) over Jinba in view of Suzuki, Nishiyama, and Asai.

OPINION

Appellants argue claims 1 and 4–6 as a group. App. Br. 11. We select independent claim 1 as representative of the group. Claims 4–6 will stand or fall with claim 1. Appellants argue for the separate patentability of claim 3. *Id.* at 9.

For the reasons discussed in the Final Action and the Answer, Appellants have not persuaded us of reversible error. We add the following primarily for emphasis.

*Obviousness of claim 1*

The Examiner finds that Jinba explicitly teaches most of the limitations of claim 1, and acknowledges that Jinba does not teach that (a) the coolant pipe connects to the opposite end from the reactant pipes; (b) the number of dummy cells on each end of the fuel cell stack is different; and (c) the flow of coolant is limited between the stack body and an adjacent dummy cell, but the coolant flows between the remaining dummy cells. Final Act. 4.

The Examiner relies on Suzuki for teaching (a): reactant inlets (and outlets) on the opposite end of the stack from the coolant inlet and outlet. *Id.* For (b) above, the Examiner relies on Nishiyama for teaching that dummy cells function as heat insulating layers because heat insulating spaces are formed within a dummy cell as well as between dummy cells, and on Asai for teaching providing more cells on the reactant inlet/outlet end of a stack than on the other end of the stack. *Id.* at 5–6.

Appellants do not dispute the above findings of the Examiner. App. Br. 13. Instead, they argue that the Examiner had not provided sufficient evidence or reasoning to support a finding that the ordinary artisan would

have further modified Jinba's structure to allow the flow of coolant between the added dummy cells. *Id.* Appellants contend that none of the references suggest a structure that would initially restrict coolant flow (between the end power generation unit and the first dummy cell) and then allow flow to be restored in the vicinity of subsequent dummy cells. *Id.* at 14. Appellants further argue the Examiner fails to provide any rationale to support the selective removal of only some elements from the proposed combination of references while retaining other elements. *Id.* at 15–17. Specifically, Appellants contend that if the Examiner were to simply multiply Jinba's dummy cell, heat insulating layer (64) would also necessarily be copied, providing a coolant flow field between adjacent dummy cells (unlike in the instant claimed invention). *Id.* at 15. Appellants further suggest that, if it would be obvious for one of ordinary skill in the art at the time of the invention to remove the seal from heat insulating layer (64) in the second dummy cell, for consistency, one would also remove the seal from the first dummy cell, resulting in elimination of heat insulation layer (64). *Id.* at 15–16.

The Examiner contends that, because Nishiyama teaches that heat insulating spaces are created within a dummy cell as well as between dummy cells, one of ordinary skill in the art would have found it obvious to substitute multiple dummy cells (as taught by Asai) in place of multiple insulation portions within a dummy cell (as disclosed by Nishiyama) with the predictable result of providing heat insulation. Final Act. 5–6. The combination of the disclosures of Nishiyama/Asai and Jinba would result in a structure having a coolant flow field between the addeddummy cells, as the

insulation space created by dummy cells can be substituted for the insulation space created by limiting coolant flow. *Id.* at 7–8.

The Examiner argues that dummy cells and flow-restricted coolant flow fields are both known to be heat insulators, thus the substitution of one for another, even in a selective manner, is obvious. Ans. 10. The Examiner argues that Jinba teaches multiple insulating regions, and the substitution of dummy cells for insulating regions is not limited to being applied to all of Jinba's insulating regions. *Id.* at 10-11. Therefore, the Examiner concludes that the combination of references would retain the insulating region where coolant is limited, as claimed, while other insulating regions would be substituted with additional dummy cells which allow coolant flow.

The Examiner notes that, when considering obviousness of a combination of known elements, the operative question is "whether the improvement is more than the predictable use of prior art element according to their established functions." Ans. 16 (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). The Examiner determines that the selective substitution of one heat insulator for another, even in a selective manner, would yield the predictable result of providing heat insulation, making the combination obvious. Ans. 15. "Since flow-restricted coolant flow fields and dummy cells are equivalents for heat insulators, substitution of one, some, or all of one structure for another would still yield an equivalent structure and provide a predictable result." *Id.*

The Examiner thus provides a reason for one of ordinary skill in the art at the time of the invention to combine the references and make the proposed substitutions resulting in the claimed invention.

Appellants' other arguments address the references individually. *See* App. Br. 17, 20–22. One cannot show nonobviousness by attacking references individually when the rejection is based on a combination of references. *In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). Each reference cited by the Examiner must be read, not in isolation, but for what it fairly teaches in combination with the prior art as a whole. *See id.*

For the reasons above, we sustain the Examiner's rejection of claim 1. The rejection of dependent claims 4–6 is likewise sustained.

*Obviousness of claim 3*

Appellants argue the separate patentability of claim 3, which depends from claim 1. App. Br. 27.

Claim 3 recites:

> [a] fuel cell stack according to claim 1, wherein each of the dummy cells includes a plurality of reactant gas flow fields, and wherein, in the dummy cells, a flow of an oxygen-containing gas to one of the plurality of reactant gas flow fields is limited, and a fuel gas is supplied to at least one other of the plurality of reactant gas flow fields.

*Id.* at 28.

Claim 3 is rejected over Jinba in view of Suzuki, Nishiyama, and Asai. Final Act. 2. With respect to claim 3, the Examiner finds that Jinba's dummy cells include a plurality of reactant gas flow fields, and Jinba teaches limiting flows in different manners to create insulating layers. *Id.* at 8

Appellants argue that none of the prior art references teach the restriction of the oxygen-containing gas flow field or the fuel gas flow field. *Id.* at 24.

The Examiner notes that Appellants recognize that both flowing and limiting the flow of fuel and oxygen-containing gases to dummy cells are known. Ans. 21. The Examiner finds that modifying the structure of the prior art combination to limit the flow of one gas and not the other would have achieved a desired, predictable result, namely to flow gas would result in removing water, while not flowing gas would result in improved heat insulation. *Id.* at 20-21. (citing Jinba ¶¶ 66, 68–69). In addition, the Examiner finds that Appellants' arguments are not commensurate in scope with claim 3. *Id.* at 21.

We agree with the Examiner that Appellants' arguments are not persuasive of reversible error in the Examiner's conclusion of obviousness as to claim 3.

## DECISION

For the above reasons, the Examiner's rejection of claims 1 and 3–6 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2014).

## AFFIRMED