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14/566,738	12/11/2014	David G. Converse	78196US01; 67036-773PUS1	6016
26096	7590	08/21/2020	EXAMINER	
CARLSON, GASKEY & OLDS, P.C. 400 WEST MAPLE ROAD SUITE 350 BIRMINGHAM, MI 48009			CULLEN, SEAN P	
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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* DAVID G. CONVERSE and THOMAS J. LEZON

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Appeal 2019-005064  
Application 14/566,738  
Technology Center 1700

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Before LINDA M. GAUDETTE, MONTÉ T. SQUIRE, and  
JANE E. INGLESE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

The Appellant<sup>2</sup> appeals under 35 U.S.C. § 134(a) from the Examiner’s decision finally rejecting claims 1–4, 7, 10–13, 16, 17, and 19–24.<sup>3</sup>

We AFFIRM.

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<sup>1</sup> This Decision includes citations to the following documents: Specification filed December 11, 2014, as amended (“Spec.”); Final Office Action dated February 22, 2018 (“Final Act.”); Appeal Brief filed July 18, 2018 (“Appeal Br.”); Revised Appendix of Claims filed March 15, 2019 (Claims App.); Examiner’s Answer dated April 18, 2019 (“Ans.”); and Reply Brief filed June 18, 2019 (“Reply Br.”).

<sup>2</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. The Appellant identifies the real party in interest as Hamilton Sundstrand Space Systems International, Inc. Appeal Br. 1.

<sup>3</sup> We have jurisdiction under 35 U.S.C. § 6(b).

### CLAIMED SUBJECT MATTER

The claims are directed to a multi-voltage fuel cell. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A fuel cell stack, comprising:
  - a plurality of proton exchange membrane cells;
  - a first end plate;
  - a second end plate;
  - an internal current collecting plate arranged in the fuel cell stack between the first end plate and the second end plate dividing the fuel cell stack into a first stack portion between the first end plate and the internal current collecting plate and a second stack portion between the internal current collecting plate and the second end plate, wherein a first load is connected to the first end plate and the second end plate, and a second load is connected to the first end plate and the internal current collecting plate;
  - an anode recycle loop configured to direct a flow of fuel exiting the fuel cell stack to a fuel source for reuse in the fuel cell stack, the anode recycle loop comprising a pump; and
  - the first and second loads are components of one of an Unmanned Underwater Vehicle and an Unmanned Aerial Vehicle.

Claims App. 2.

### REFERENCES

The Examiner relies on the following prior art as evidence of unpatentability:

Name	Reference	Date
Dunn	US 7,938,077 B1	May 10, 2011
Scartozzi	US 2003/0091884 A1	May 15, 2003
Jahnke	US 2004/0229102 A1	Nov. 18, 2004
Dewey	US 2005/0287411 A1	Dec. 29, 2005
Mohajeri	US 2008/0070072 A1	Mar. 20, 2008
Matsukawa (as	JP 10-228914 A	Aug. 25, 1998

### REJECTIONS

1. Claims 1–4, 10–13, 16, 17, 19–21, and 23 are rejected under 35 U.S.C. § 103 as unpatentable over Dewey in view of Jahnke and Dunn. Final Act. 2.
2. Claim 7 is rejected under 35 U.S.C. § 103 as unpatentable over Dewey in view of Jahnke, Dunn, and Matsukawa. Final Act. 8.
3. Claim 22 is rejected under 35 U.S.C. § 103 as being unpatentable over Dewey in view of Jahnke, Dunn, and Scartozzi. Final Act. 9.
4. Claim 24 is rejected under 35 U.S.C. § 103 as being unpatentable over Dewey in view of Jahnke and Mohajeri. Final Act. 9.

### OPINION

We have considered the Appellant's arguments as to each ground of rejection, including the Appellant's separate arguments in support of patentability of claim 20. The Examiner has fully addressed these

arguments, and we agree with the Examiner that the Appellant's arguments are not persuasive of reversible error in the obviousness rejections of claims 1–4, 7, 10–13, 16, 17, and 19–24 based on the fact-finding and the reasons stated in the Answer, as well as in the Final Office Action and the Advisory Action dated April 11, 2018. In addition to the reasons given by the Examiner, we note that many of the Appellant's arguments are unpersuasive because they are not supported by evidence. *See, e.g.*, Appeal Br. 4 (“Dewey replaces an internal combustion engine of an automobile with a fuel cell because of an abundance of environmental air . . . .”); *id.* at 5 (“The addition of an anode recycle loop having a pump would undoubtedly make [Dewey's] system louder.”). We add the following primarily to address the Appellant's arguments in the Reply Brief.

The Examiner's rejections are based on a finding that the ordinary artisan would have used Dewey's fuel cell to power unmanned, underwater-vehicle components because Dewey's lighter, smaller, and more efficient fuel cell system would further Dunn's goal of improving an underwater vehicle's endurance. Final Act. 3–4. The Appellant asserts that “[t]he Examiner has not identified anything in the references to suggest the fuel cell system of Dewey that replaces a DC/DC converter for an automotive system would address the endurance factor of unmanned underwater vehicles.” Reply Br. 2; *see* Appeal Br. 5. The Examiner explained that a fuel cell system having reduced mass, volume, and losses, as taught by Dewey, would improve an underwater vehicle's endurance because reduced mass and increased efficiency would allow the vehicle to travel farther or longer on the same amount of fuel, and reduced volume would provide increased fuel storage capacity. Ans. 6. The Appellant has not explained persuasively

why this finding is erroneous or unreasonable. *Compare id.*, with Appeal Br. 4 (arguing that Dunn improves endurance “[by] allowing for more fuel to be stored on board”).

The Appellant maintains its contention that Dewey’s reduced mass, volume, and losses are achieved by eliminating the need for a separate DC/DC converter, and the Examiner has not identified evidence that Dunn’s underwater vehicle utilizes a DC/DC converter. Reply Br. 2; Appeal Br. 4–5. Responsive to the Appellant’s argument, the Examiner cited Dame (US 2006/0071630 A1, published April 6, 2006) Figure 1 and paragraph 23 as evidence that DC/DC converters are used in unmanned underwater vehicles. Ans. 5–6. The Appellant argues that Dame paragraph 23 discloses an AC/DC converter not a DC/DC converter. Reply Br. 2. The Appellant’s argument is not persuasive because Dame, in disclosing that the Figure 1 “motor drive 111a converts the direct current from the DC bus 109 to alternating current for the motor 111b,” explicitly states that “DC motors can also be used.” Dame ¶ 22.

The Appellant also continues to argue that the ordinary artisan would not have combined the teachings of Dewey and Dunn because “the two references teach different systems in different environments.” Reply Br. 1. More specifically, the Appellant argues that “Dewey is an automotive system that relies on air to provide the anode,” whereas “Dunn relies on oxygen stored in solid form on board the unmanned underwater vehicle to provide the anode.” *Id.* This argument is not persuasive for several reasons.

First, Dewey does not disclose that its fuel cell system is solely for use in automobiles. Rather, Dewey describes a goal of the invention as eliminating DC/DC converters in “[v]ehicles and other systems” that require

conversion of a fuel cell stack's high voltage to a voltage level suitable for powering low voltage devices. Dewey ¶ 9; *see also id.* ¶ 10 (“[A] fuel cell system is disclosed that includes a fuel cell stack providing high voltage DC output power, *such as* for operating a vehicle.” (emphasis added)); Claim 9 (“The system according to claim 1 wherein the system is a fuel cell system on a vehicle.”).

Second, contrary to the Appellant's argument, Dewey does not disclose that the system relies on “air.” *See* Dewey ¶ 5 (“A hydrogen fuel cell is an electrochemical device that includes . . . [a] cathode [that] receives oxygen *or* air.” (emphasis added)); *id.* ¶ 7 (disclosing that in an automobile, the fuel cell stack *typically* receives a cathode input gas as a flow of air). The Appellant has not argued persuasively, or provided evidence, that Dewey's fuel cell stack would not be expected to function as intended using the oxygen and hydrogen sources described in Dunn.

Finally, although Dewey does not explicitly disclose that its fuel cell stack may be used in an unmanned underwater vehicle, as found by the Examiner, both Dewey and Dunn describe their fuel cell stacks as “consum[ing] oxygen and hydrogen to produce electricity to operate a motor.” Ans. 4. Moreover, Dame evidences that at the time the present application was filed, it was known that the same fuel cell could be used in automobile and unmanned underwater vehicle power generation systems. Dame Abstract, ¶ 19.

As to claim 22, the Appellant argues that the Examiner has not shown that Dewey discloses a fuel cell system wherein “each of the proton exchange membrane cells provides between 0.6 and 0.9 volts” (claim 22). Reply Br. 2. This argument is not persuasive because it fails to identify error

in the facts and reasons relied on by the Examiner in rejecting this claim: “it would have been obvious to one of ordinary skill in the art . . . to make the proton exchange membrane cells of modified Dewey with a useful *voltage as taught by Scartozzi*” (Final Act. 9 (emphasis added)). *See Scartozzi ¶ 7* (“Experience has shown that a single fuel cell membrane electrode assembly of a typical design produces a useful voltage of only about 0.45 to about 0.7 volts D.C. under a load.”).

### CONCLUSION

The Appellant has not identified reversible error in the Examiner’s rejections of claims 1–4, 7, 10–13, 16, 17, and 19–24 for the reasons stated in the Final Office Action, the Advisory Action, the Answer, and above.

### DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1–4, 10–13, 16, 17, 19–21, 23	103	Dewey, Jahnke, Dunn	1–4, 10–13, 16, 17, 19–21, 23	
7	103	Dewey, Jahnke, Dunn, Matsukawa	7	
22	103	Dewey, Jahnke, Dunn, Scartozzi	22	
24	103	Dewey, Jahnke, Mohajeri	24	
<b>Overall Outcome</b>			1–4, 7, 10–13, 16, 17, 19–24	

Appeal 2019-005064  
Application 14/566,738

TIME PERIOD FOR RESPONSE

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

AFFIRMED