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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PAUL ALBERTUS, JOHN F. CHRISTENSEN, TIMM LOHMANN, and BORIS KOZINSKY

Appeal 2017–010870
Application 14/185,065
Technology Center 1700

Before ROMULO H. DELMENDO, LINDA M. GAUDETTE, and MARK NAGUMO, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge.*

DECISION ON APPEAL[1]

Appellant[2] appeals under 35 U.S.C. § 134(a) from the Examiner's decision finally rejecting claims 1–16. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] This Decision includes citations to the following documents: Specification filed Feb. 20, 2014 ("Spec."); Final Office Action dated Oct. 6, 2016 ("Final Act."); Appeal Brief filed Mar. 6, 2017("Appeal Br."); Examiner's Answer dated June 22, 2017 ("Ans."); and Reply Brief filed Aug. 22, 2017("Reply Br.").

[2] The Applicant and real party-in-interest is identified as Robert Bosch GmbH. *See* Appeal Br. 2.

The invention relates to a vehicular battery system that is said to be economic, efficient, and safe to operate. Spec. ¶ 22. The system includes "a tank or other enclosure that is principally closed from the atmosphere such that, when the ambient temperature around the tank or other enclosure rises significantly, the tank or other enclosure remains safe." *Id.* Independent claim 1 and its dependent claims 2–8 are directed to the inventive vehicular battery system. *See* Appeal Br. 27–29 (Claims Appendix). Independent claim 9 and its dependent claims 10–16 are directed to the inventive method of operating a vehicular battery system. *See id.* at 29–31. For reference, claim 1 is reproduced below.

> 1. A vehicular battery system, comprising:
>
> an oxygen reservoir supported by a vehicle;
>
> a vehicular battery system stack operably connected to the oxygen reservoir and a multistage compressor, the vehicular battery system stack including an active material which consumes oxygen from the oxygen reservoir during discharge;
>
> at least one sensor configured to generate a pressure signal associated with a pressure in the oxygen reservoir;
>
> a memory; and
>
> a processor operably connected to the memory and the at least one sensor, the processor configured to execute program instructions stored within the memory to
>
> obtain the pressure signal, and
>
> control the state of charge of the vehicular battery system stack based upon the obtained pressure signal.

Id. at 27.

The claims stand rejected under 35 U.S.C. § 103(a) as follows:

1. claims 1–6 and 9–14 over Hermann (US 2012/0041628 A1, pub. Feb. 16, 2012) in view of Mitlitsky (US 7,128,103 B2, iss. Oct. 31,

2006), and alternatively further in view of Arnaud (US 2003/0173276 A1, pub. Sept. 18, 2003); and

2. claims 6–8 and 14–16 over Hermann, Mitlitsky, Arnaud, and Newhouse (US 2010/0270980 A1, pub. Oct. 28, 2010).

The provisional rejections of claims 1–16 on the ground of nonstatutory double patenting over claims 1–20 of copending Application No. 14/184,964 or claims 1–18 of copending Application No. 14/184,994, in view of Arnaud have been rendered moot by the entry of two terminal disclaimers, filed by Appellant on December 28, 2017.

Hermann Figure 2 is reproduced below:

FIG. 2

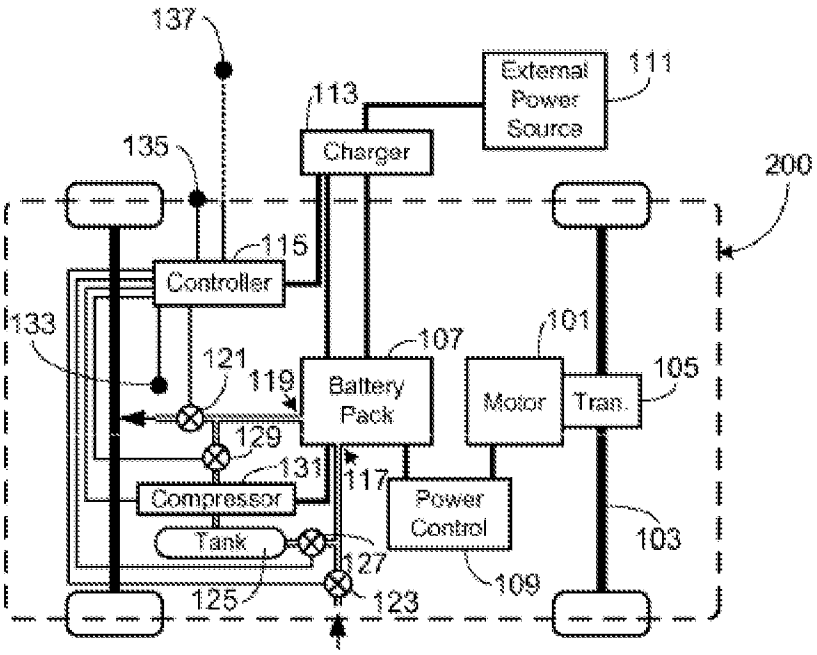

Figure 2 "illustrates the basic elements of a system for collecting, storing and re-using oxygen-rich effluent that is generated during the charge cycle of a metal-air battery pack, the system . . . utilizing an externally mounted charger." Hermann ¶¶ 13–14. The system includes high pressure gas tank 125 for storing oxygen-rich effluent, compressor 131, and battery pack 107

coupled to tank 125 and compressor 131. *Id.* ¶¶ 37, 40. Hermann discloses that in addition to battery pack 107 which comprises metal-air cells, the system may include a lithium-ion battery pack. *Id.* ¶ 33. "During battery pack charging, battery pack 107 is coupled to an external power source 111 (e.g., wall socket, dedicated charging station, etc.) via a charging circuit 113. A controller 115, coupled to charger 113, controls operation of the charger, preferably controlling not only its status (on/off), but also its charge rate." *Id.* ¶ 35. Hermann discloses one or more pressure monitors may be added to the system, including at the compressor inlet (not shown). *Id.* ¶ 48. The outputs from the pressure monitors are coupled to controller 115. *Id.*

Mitlitsky discloses a hydrogen gas fueling system comprising a multiple-stage compressor disposed in fluid communication with a hydrogen gas source, and configured to cool hydrogen gas received at a stage of the compressor. Mitlitsky 2:14–17. Mitlitsky discloses that a heat exchanger removes heat from the compressor via fluid flow streams directed to each stage. *Id.* at 6:11–13. The fluid flow streams to the first and second stages are controllable in response to system parameters. *Id.* at 6:13–18. The fluid flow stream to the first stage pre-cools the hydrogen gas stream to a temperature that enables optimum compression of the gas in the second stage, where the gas is further cooled. *Id.* at 6:13–19. The compressed hydrogen gas at the compressor outlet is cooled by the fluid flow stream exiting the second stage. *Id.* at 6:19–21. According to Mitlitsky, "[o]ptimum compression of the hydrogen gas at the second stage, in conjunction with cooling of the compressed gas as it is exhausted from [the] compressor . . . , provides for the maximum efficiency and operability of [the] fueling system." *Id.* at 6:24–28. Mitlitsky discloses that the cooling

loop can be shared with cooling loops for other system components. *Id.* at 6:21–24.

Arnaud discloses "[a] method and apparatus for supplying dissolved gases (such as oxygen, ozone, chlorine etc.) for chemical and biological processes." Arnaud Abstract. The apparatus includes control system 54, comprising microprocessor controller 98, oxygen pressure sensor 78, and compressed oxygen pressure sensor 86. *Id.* ¶ 44. Low pressure oxygen flows from low-pressure tank 81 into compressor 83 where pressure is increased. *Id.* ¶ 46. High pressure oxygen flows out of compressor 83 into high pressure tank 84. *Id.* Oxygen pressure is monitored in low- and high-pressure tanks 81, 84 by pressure sensors 78, 86, respectively, and recorded by controller 98. *Id.*

The Examiner finds Hermann discloses the invention as claimed, with the exceptions that Hermann does not teach that the compressor is a multistage compressor (claims 1 and 9), does not describe explicitly the use of a sensor for generating a pressure signal and a processor for controlling state of charge of the battery system based on the pressure signal (*id.*), and does not teach a cooling system (claims 4, 5, 12, 13) configured to cool the oxygen reservoir (claims 5, 13) and connecting the cooling system using the processor (claims 12, 13). Final Act. 2–6. The Examiner finds one of ordinary skill in the art at the time of the invention would have modified Hermann's apparatus and method to use a multistage compressor and a cooling system operably connected to the compressor, as taught by Mitlitsky, to provide maximum efficiency and operability to Hermann's vehicular battery system stack. *Id.* at 3–4 (citing Mitlitsky 6:8–28). The Examiner further finds the ordinary artisan would have modified the system

and method of Hermann, as modified by Mitlitsky, to connect the cooling system to the vehicular battery system stack using Hermann's controller because Hermann discloses monitoring various parameters and controlling the output from the oxygen reservoir to the battery pack "to meet the needs of the batteries." *Id.* at 6 (quoting Hermann ¶ 49). The Examiner finds that use of a sensor to generate a pressure signal was conventional in the art, and use of a processor to control state of charge of a battery would have been within the level of skill of the ordinary artisan at the time of the invention. *Id.* at 4–5. The Examiner finds, in the alternative, that the ordinary artisan would have modified Hermann's system and method based on Arnaud's teaching of using measured oxygen pressure in a tank to control other system parameters. *See id.* at 5. The Examiner finds the ordinary artisan would have modified Hermann to control state of charge of the battery based on pressure signal data "to optimally carry out the operations of Hermann's system." *Id.*

Appellant argues the Examiner's rejections should be reversed because they are based on the below-listed findings of fact that Appellant contends are erroneous or unsupported:

1. Mitlitsky is analogous art. Appeal Br. 4–8.

2. Arnaud is analogous art. *Id.* at 9–11.

3. Hermann discloses or suggests using a pressure signal associated with pressure in the oxygen reservoir to control the state of charge of the battery as required by claims 1 and 9. *Id.* at 8–9, 11–12.

4. Hermann discloses or suggests a processor configured to control state of charge of the battery system stack by connecting an electrical load to the battery system stack as recited in claims 3 and 11. *Id.* at 13, 20.

5. Mitlitsky discloses a cooling system as recited in claims 4, 5, 12, and 13. *Id.* at 14–17, 21–23.

6. Hermann discloses using a voltage signal in a state of charge monitoring as recited in claims 6 and 14. *Id.* at 18, 24.[3]

We have considered these arguments, but are not convinced of reversible error in the Examiner's conclusion of obviousness for the reasons stated in the Answer. *See* Ans. 10–19. Below we provide additional discussion of issues raised by the Examiner and Appellant in the Answer and the Reply Brief.

Did the Examiner apply an overly broad interpretation of the claim term "associated with" in finding Hermann discloses or suggests a system configured to generate a pressure signal associated with a pressure in the oxygen reservoir, as recited in claims 1 and 9?

Claim 1 recites "at least one sensor configured to generate a pressure signal associated with a pressure in the oxygen reservoir." Claim 9 recites "generating a pressure signal associated with a pressure in the oxygen reservoir." Appellant contends the Examiner erred in finding Hermann discloses or suggests a system and method that include this feature/step. Appeal Br. 8. Appellant argues Hermann discloses pressure sensors located only in the battery and optionally at the inlet of the compressor. Appeal Br. 8. Appellant argues the pressures at these locations are neither determinative of, nor necessarily related to, the pressure in the oxygen reservoir. Reply Br. 3.

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[3] As to the second ground of rejection, Appellant's arguments in support of patentability of claims 6–8 and 14–16 are limited to a contention that Newhouse fails to cure the deficiencies in the Examiner's rejection of claims 6 and 14 over the combination of Hermann, Mitlitsky, and Arnaud. *Id.* at 24.

Appellant's argument is based on an interpretation of the claim language as requiring a pressure sensor that senses the pressure in the oxygen reservoir. *See* Appeal Br. 8; Reply Br. 3–5. In support of its interpretation, Appellant relies on a dictionary definition of "associated" as "connected, joined, or related." Reply Br. 4 (citing http://www.dictionary.com/browse/associated). Appellant also quotes Specification paragraphs 51 and 52 which describe the pressure sensor as being located in the oxygen storage tank. *Id.*

"[T]he PTO must give claims their broadest reasonable construction consistent with the specification. . . . Therefore, we look to the specification to see if it provides a definition for claim terms but otherwise apply a broad interpretation." *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007). "[C]laim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art." *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010) (citation omitted).

Paragraphs 51 and 52 describe the embodiment of the invention illustrated in Figure 6. We find no indication in the Specification, however, that the inventors intended to limit the claims to that particular embodiment. *See, e.g.*, Spec. ¶ 61 (explicitly stating that the disclosure is "illustrative and not restrictive in character"). Nor are we persuaded that one of ordinary skill in the art would have understood from the dictionary definition of the term "associated," which includes "related," that the claims require generating a pressure signal from a direct measurement of pressure in the oxygen reservoir, e.g., via a sensor located in the reservoir. The Examiner found that an ordinary artisan at the time of the invention would have been

familiar with the relationships between pressure in the oxygen reservoir and pressures at various locations in the system and possessed the requisite skills to generate a pressure signal associated with/related to a pressure in the oxygen reservoir based on pressure measurements taken at other system locations. *See* Final Act. 4–5; Ans. 15. Appellant has not provided persuasive evidence to refute this finding. *See* Reply Br. 3; *In re Geisler*, 116 F.3d 1465, 1471 (Fed. Cir. 1997) (explaining that argument by counsel cannot take the place of evidence). Therefore, we are not persuaded of harmful error in the Examiner's determination that, applying the broadest reasonable construction of the term "associated with," the phrase "a pressure signal associated with a pressure in the oxygen reservoir" encompasses signals generated from pressure sensors in the system from which pressure in the oxygen reservoir may be derived.

In sum, we are not persuaded that the Examiner applied an overly broad interpretation of the claim term "associated with" in finding Hermann discloses or suggests a system configured to generate a pressure signal associated with a pressure in the oxygen reservoir. *See* Final Act. 4–5; Ans. 14–15. Moreover, the Examiner has provided, by a preponderance of the evidence, persuasive support for finding, in the alternative, that one of ordinary skill in the art would have been motivated, based on the teachings of Arnaud, to locate a pressure sensor in the oxygen reservoir for generating a pressure signal associated with a pressure in the oxygen reservoir. *See* Final Act. 5; Ans. 16–17.

Has Appellant shown that the Examiner erred in finding Hermann, alone or in combination with Arnaud, discloses or suggests controlling the state of charge of the vehicular battery system stack with a processor based upon the obtained pressure signal (see claims 1 and 9)?

Appellant contends the Examiner erred in finding "Hermann teaches controlling state of charge based upon an obtained pressure signal at paragraph 51–53." Reply Br. 5 (citing Ans. 17). Referring to Hermann Figure 15, Appellant argues that in Hermann's system and method, charging of the battery continues irrespective of the status of the oxygen reservoir. *Id.* at 6–7.

Appellant's argument is not persuasive because it fails to identify reversible error in the facts and reasons relied on by the Examiner. The Examiner's rejection is not based on a finding that Hermann explicitly describes controlling the state of charge of the vehicular battery system stack with a processor based upon the obtained pressure signal; rather, "it is the examiner's position that" "[g]iven the teachings of Herman and Arnaud," "it would have been well within the level of one having ordinary skill in the art to have controlled the [state of charge] of the battery by way of a pressure signal associated with the pressure in an oxygen reservoir." Ans. 17; see *also* Final Act. 4–5 ("Hermann appears to suggest . . . [but] does not explicitly teach these features."). The Examiner identifies and discusses the teachings in Hermann and Arnaud that support this finding. *See* Ans. 16–17. As explained by the Examiner, Hermann discloses that the system first determines whether the oxygen reservoir is full. Ans. 17; Hermann ¶ 51. Continued charging of the battery is dependent on that determination. Hermann ¶ 51. Hermann discloses using sensors to monitor oxygen concentration and comparing that value to a preset maximum. *Id.* ¶ 52.

Charging of the battery is continued as long as oxygen concentration is below the present maximum. *Id.* As acknowledged by Appellant, Hermann also discloses the use of pressure monitors at other parts of the system. *See* Appeal Br. 8; Hermann ¶ 48. Arnaud teaches monitoring oxygen pressure in a tank, comparing the measured pressure to a preset value and using a controller to shut down the compressor when the preset value is met. *See* Arnaud ¶¶ 46–47; Final Act. 5. Appellant has not explained, with sufficient clarity and specificity, why the relied-upon teachings in Hermann and Arnaud fail to support the Examiner's finding that it would have been obvious to the ordinary artisan to base charging of Hermann's battery on a measurement of oxygen pressure instead of oxygen concentration.

CONCLUSION

Appellant has failed to identify reversible error in the Examiner's rejections of claims 1–16 for the reasons stated in the Final Office Action, the Answer, and above.

ORDER

We AFFIRM the rejections under 35 U.S.C. § 103(a) of (1) claims 1–6 and 9–14 over Hermann in view of Mitlitsky, (2) claims 1–6 and 9–14 over Hermann in view of Mitlitsky and Arnaud, and (3) claims 6–8 and 14–16 over Hermann, Mitlitsky, Arnaud, and Newhouse.

We DISMISS the provisional rejections of claims 1–16 on the ground of nonstatutory double patenting over claims 1–20 of copending Application No. 14/184,964 or claims 1–18 of copending Application No. 14/184,994, in view of Arnaud.

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).

AFFIRMED