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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte CHANG-EON JIN

Appeal 2018-002289
Application 13/590,952
Technology Center 1700

Before MARK NAGUMO, GEORGE C. BEST, and JEFFREY R. SNAY, *Administrative Patent Judges*.

SNAY, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–3, 6–9, 19, 20, and 22. We have jurisdiction under 35 U.S.C. § 6(b). A hearing was held August 22, 2019.

We affirm.

[1] We refer to the Specification ("Spec.") filed August 21, 2012, as amended; Final Office Action ("Final Act.") dated August 2, 2016; Appellant's Appeal Brief ("App. Br.") filed January 30, 2017; Examiner's Answer ("Ans.") dated November 17, 2017; and Appellant's Reply Brief ("Reply Br.") dated December 28, 2017.

BACKGROUND

The invention relates to battery cooling. Spec. 1. An electric vehicle battery pack conventionally includes a plurality of unit cells, the electrochemical properties of which can be negatively affected by surrounding environmental temperature. *Id.* at 1–2. Appellant describes in the Specification an apparatus for differentially cooling a battery pack by steering cooling air toward a region of the battery pack that is detected to have a relatively higher temperature. *Id.* at 4–5. Claim 1 is the sole independent claim:

> 1. An apparatus for cooling control of a battery pack, the apparatus comprising:
>
> a plurality of temperature sensors configured to measure the temperature of different parts of the battery pack, *the plurality of temperature sensors being located on different surfaces of the battery pack from each other*;
>
> a supply blower module for introducing a cooling medium into the battery pack by means of fan operation;
>
> an exhaust blower module for exhausting the cooling medium from the battery pack;
>
> a controller for controlling the operation of the supply blower module so that the cooling medium is introduced into the battery pack at a differential flow rate depending on temperature information input by the temperature sensor; and
>
> a steering module for adjusting an introducing direction of the cooling medium, the steering module including a plurality of adjustable vanes to change direction of the cooling medium in a left-right direction or an up-down direction, the steering module being located upstream of the battery pack such that all of the cooling medium flows through the steering module prior to reaching the battery pack,
>
> wherein the battery pack, the supply blower module and the exhaust blower module are provided together in a space defined by a chamber, and

> wherein the controller is configured to control the steering module so that the cooling medium is introduced in an amount relatively more in the direction of the temperature sensor indicative of a relatively higher temperature among the temperature sensors.

App. Br. Claims Appendix 1 (emphasis added).

REJECTIONS

I. Claims 1–3, 20, and 22 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Tamura,[2] Arase,[3] and Hoermandinger.[4]

II. Claim 19 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Tamura, Arase, Hoermandinger, and Okuda.[5]

III. Claims 6 and 7 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Tamura, Arase, Hoermandinger, Okuda, and Drozdz.[6]

IV. Claims 8 and 9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Tamura, Arase, Hoermandinger, Okuda, Drozdz, and Kreiner.[7]

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential), (cited with approval in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011)

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[2] US 2010/0075206 A1, published March 25, 2010.
[3] JP2009-185788 A, published July 13, 2006, as translated.
[4] US 2010/0059299 A1, published March 11, 2010.
[5] US 2006/0172188 A1, published August 3, 2006.
[6] US 2008/0280192 A1, published November 13, 2008.
[7] US 2010/0136384 A1, published June 3, 2010.

("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections . . . .")). After considering the evidence presented in this Appeal and each of Appellant's arguments, we are not persuaded that Appellant identifies reversible error. Thus, we affirm the Examiner's rejections for the reasons expressed in the Final Office Action and Answer. We add the following primarily for emphasis.

Rejection I

With regard to Rejection I, Appellant does not separately argue claim 2, 3, or 20. *See* App. Br. 4–11. These claims stand or fall with their parent claim 1. Separately argued claim 22 is separately addressed below.

Claim 1

Relevant to Appellant's arguments on appeal, the Examiner finds that Tamura discloses a battery pack including a plurality of cell modules, a temperature sensor provided on a surface of each cell module, and a cooling fan operated by a control unit based on temperature information generated by the temperature sensors. Final Act. 2–3 (citing Tamura Fig. 3). The Examiner finds further that "Tamura teaches that the cooling medium flows above and/or between the individual battery cell modules (5) (paragraph [0057]), which are arranged in rows extending normal to the flow of the cooling medium (figure 4)." *Id.* at 3. The Examiner relies on Arase as evidence that it was known to use adjustable dampers to guide cooling air to hotter regions of a battery pack. *Id.* at 4. In light of these teachings, the Examiner finds one of ordinary skill in the art would have had a reason to provide Tamura's apparatus with adjustable dampers positioned between the

cooling fan and the battery pack, to enable preferential cooling of hotter regions of the battery pack. *Id.* at 4–5.

Appellant argues Arase provides air-directing dampers under a battery, rather than upstream of the battery as claimed. Appeal Br. 6. Appellant also argues that providing dampers upstream of the battery pack in Arase would not accomplish Arase's disclosed function of directing air vertically through the battery. *Id.* Appellant's arguments are not persuasive.

Tamura's battery and cooling system are depicted in Tamura's Figure 1, which we reproduce below.

FIG. 1

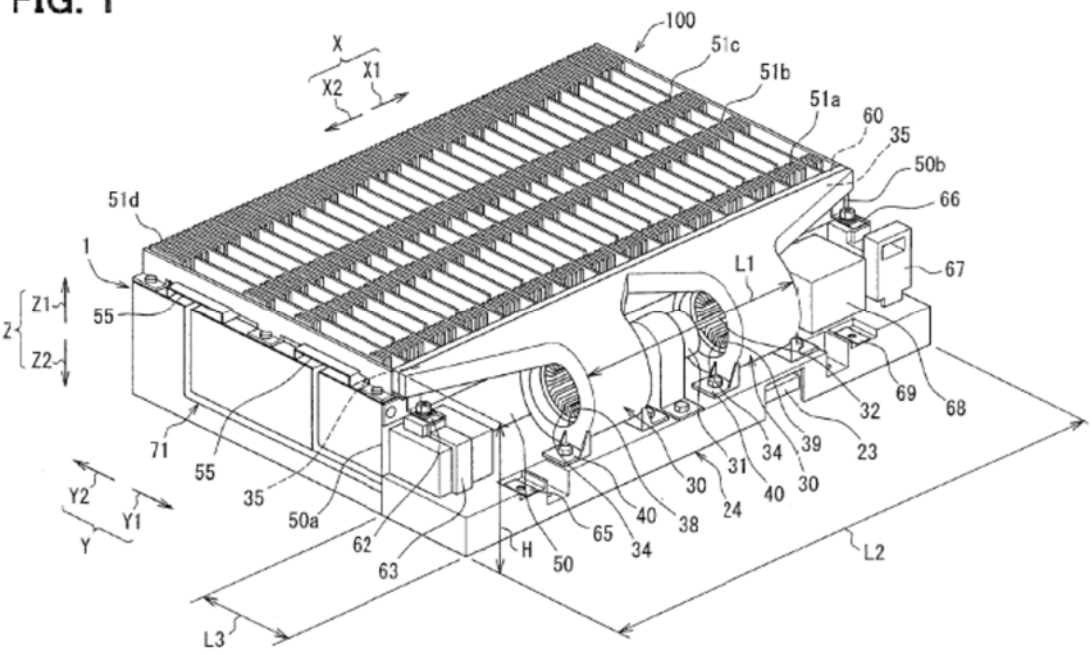

Figure 1 is a schematic perspective view of a battery assembly.

As shown, Tamura provides cooling fans **30** positioned to direct air across cooling fins **51** associated with each cell module of the battery pack. *See* Tamura ¶¶ 18, 31. A control circuit adjusts fan speed based on the detected temperature of the cells. *Id.* ¶ 24.

The Examiner's obviousness determination is premised on the finding that Arase teaches using temperature-responsive dampers to direct cooling air toward hotter battery regions. Final Act. 4; Ans. 12. In light of that teaching, the Examiner finds one of ordinary skill would have had a reason to provide temperature-responsive dampers between the cooling fans and battery pack in Tamura, such that cooling air could be directed toward hotter regions along the x-axis depicted in Tamura's Figure 1. Ans. 13. Appellant's argument that Arase does not position its temperature-responsive dampers upstream of the battery pack does not refute the Examiner's determination regarding the combined teachings of both Tamura and Arase, or the Examiner's explanation regarding where one skilled in the art would position such dampers in Tamura to accomplish the desired directional cooling.[8]

Appellant also argues that Tamura does not provide the disclosed plurality of temperature sensors on different surfaces of the battery pack. Appeal Br. 8–10; Reply Br. 1–2. According to Appellant, "[t]he sensors are on surfaces of different battery modules but are on the same surface of the battery pack formed by the different battery modules." Appeal Br. 2. We disagree. As the Examiner found—and Appellant has not argued with specificity to the contrary—Tamura provides a temperature sensor (72) on each cell module (5). Final Act. 3 (citing Tamura ¶ 37, Fig. 4, and Tamura ¶ 57). Tamura depicts temperature sensors (72) on a side surface of

[8] Moreover, the Examiner finds in the Answer that although Arase permits vertical air flow between cells, the disclosed dampers direct air flow horizontally across a planar surface of the battery cells, similar to what would result by adding dampers to Tamura. Ans. 12–13. Appellant does not challenge this finding in the Reply Brief.

the cell module. *See* Tamura Fig. 4. Because Tamura's cell modules are stacked to form the battery pack, the provision of a temperature sensor on each cell results in a plurality of temperature sensors being located on different surfaces of the battery pack—namely, different cell surfaces within the battery pack. Appellant does not point to language in claim 1, or to definitions in the Specification, that would require the recited temperature sensors to be located on different external surfaces of the battery pack.

For the foregoing reasons, we are not persuaded of reversible error in the Examiner's rejection of claim 1. Rejection I as applied to claims 1–3 and 20 is sustained.

Claim 22

With regard to claim 22, Appellant additionally argues that Arase does not disclose a second plurality of adjustable vanes for changing the direction of cooling air in an up-down direction. Appeal Br. 11. However, as the Examiner points out (Ans. 15), Arase teaches using adjustable elements to direct flow both in a left-right direction and in an up-down direction. Ans. 15 (citing Arase ¶¶ 18, 22). Moreover, although Tamura discloses directing cooling air in a plane over the plurality of cell modules (Tamura Fig. 1), as noted *supra*,Tamura also teaches that cell modules may be spaced from one another to permit cooling air also to flow between cell modules for more efficient cooling. Tamura ¶ 57. Tamura's teaching of directing cooling air in perpendicular directions relative to the cell modules supports the Examiner's finding that one of ordinary skill in the art would have had a reason to implement Arase's dampers to selectively direct cooling air both in a left-right and an up-down direction.

Rejection I as applied to claim 22 also is sustained.

Rejection II

Claim 19 additionally recites an operation controller for restricting use of a battery pack when cooling medium flow rate deviates from a temperature-dependent reference value. The Examiner finds that Tamura discloses relay units and a control circuit that, together, control use of the disclosed battery pack. Final Act. 7 (citing Tamura ¶ 21). The Examiner also finds that Okuda teaches comparing a measured cooling air flow rate with a temperature-dependent reference value to determine whether a battery pack cooling system is functioning normally. *Id.* at 8. In light of these teachings, the Examiner determines one of ordinary skill in the art would have had a reason to configure Tamura's controller to restrict use of the battery pack in response to measured cooling air flow rate. *Id.*; Reply Br. 15–16.

Appellant argues that Okuda teaches generating a warning signal in response to determination of deficient cooling air flow, but does not teach restricting use of the battery pack. Appeal Br. 12; Reply Br. 3. Appellant's argument is not persuasive. Tamura teaches that the relay units and control circuit "are capable of allowing and prohibiting electric current supply to the cell stack." Tamura ¶ 21. Tamura's control circuit also regulates cooling air flow based on temperature. *Id.* ¶ 24. Although Okuda teaches generating a warning signal rather that restricting battery use when deficient cooling is detected, the purpose of Okuda's warning signal was to indicate deficient battery operation. Appellant does not persuade us of error in the Examiner's determination that one of ordinary skill in the art would have had a reason to apply that information to restrict or cease use of the deficiently-cooled battery through use of Tamura's control circuit.

Rejection II is sustained.

Rejection III

Appellant does not separately argue Rejection III except to rely on the same argument discussed above in connection with Rejection II—namely, that the relied-upon prior art does not teach use of a controller to restrict use of a battery pack. Accordingly, we sustain Rejection III for the reasons given above.

Rejection IV

Claim 8 additionally recites that the controller outputs risk information in response to detection of deficient cooling medium flow. Claim 9 further requires that the outputted risk information is differential. The Examiner relies on Drozdz and Kreiner as evidence of a reason to program Tamura's controller to output risk information based on a deficient cooling air flow. Final Act. 10–11. Appellant argues that Drozdz and Kreiner teach outputting a visual or audible warning, and that such warning "does not provide risk information." The Examiner responds that a generated warning signal constitutes risk information because it "indicates that there is a risk of the battery not being properly cooled." Ans. 17. Appellant does not challenge the Examiner's reasoning in the Reply Brief.

We are not persuaded of error in the Examiner's determination that the prior art teaching of generating a visual or audible warning serves to provide risk information. Accordingly, Rejection IV is sustained.

DECISION

The Examiner's decision rejecting claims 1–3, 6–9, 19, 20, and 22 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).

AFFIRMED