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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte STEVEN DIAMOND, GABRIEL RISK, STANLEY HU, ALBERT SHIH-YOUNG LIU, and MARTIN HELLIWELL

Appeal 2018-009096
Application 13/434,707
Technology Center 2800

Before BRADLEY R. GARRIS, JEFFREY T. SMITH, and KAREN M. HASTINGS, *Administrative Patent Judges*.

SMITH *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–20, all of the pending claims. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Atieva, Inc. Appeal Br. 1.

The following rejections are presented for appeal:

I. Claims 1, 3–6, 11, 12, 15, and 16 are rejected under 35 U.S.C. § 103(a) as unpatentable over Emori (US 2009/0085516 A1), in view of Toya, (US 6,304,061 B1) and in further view of Ishikawa (US 7,508,166 B2).

II. Claims 13 and 14 are rejected under 35 U.S.C. § 103(a) as unpatentable over Emori, Toya, Ishikawa, and Harvey (US 5,760,587).

III. Claim 2 is rejected under 35 U.S.C. § 103(a) as unpatentable over Emori, Toya, Ishikawa, and Berkowitz (US 2012/0001594 A1).

IV. Claims 7–9 and 17–19 are rejected under 35 U.S.C. § 103(a) as unpatentable over Emori, Toya, Ishikawa, and Gilman (US 8,670,885 B2).

IV. Claim 10 is rejected under 35 U.S.C. § 103(a) as unpatentable over Emori, Toya, Ishikawa, and Sakai (US 6,608,482 B2)

VI. Claim 20 is rejected under 35 U.S.C. § 103(a) as unpatentable over Emori, Toya, Ishikawa, and Ito (US 5,825,155).

Appellant's invention relates to battery pack management systems that performs estimates of battery pack state of charge (SOC) based on measurements of voltages of constituent battery blocks obtained during battery pack charging and/or discharging operations. (Spec. ¶ 19.) Independent claims 1, 11, 12, and 20 are presented in the appeal and representative claim 1 is reproduced from the appendix to the Appeal Brief below:

> 1. A method of operation within a battery system having a plurality of battery blocks coupled in series between terminals of a battery pack, the method comprising:

measuring respective charging and discharging voltages of the battery blocks while charging and discharging the battery blocks;

determining a state-of-charge of the battery pack based, at least in part, on the charging and discharging voltages of the battery blocks;

detecting an anomalous battery block exhibiting outlier upper and lower peak voltages with both upper peak voltage, during charging, and lower peak voltage, during discharging, exceeding statistical thresholds;

adjusting a state-of-charge of one or more of the battery blocks downward, responsive to determining that an upper peak battery block voltage of each of the one or more of the battery blocks during the charging reaches a predetermined proximity to a high operating limit that prevents damage during the charging, wherein the adjusting downward comprises discharging the one or more of the battery blocks into one or more other battery blocks;

adjusting a state-of-charge of a further one or more of the battery blocks upward, responsive to determining that a lower peak battery block voltage of each of the further one or more battery blocks during the discharging reaches a further predetermined proximity to a low operating limit that prevents damage during the discharging; and

adjusting a state-of-charge of the anomalous battery block to center the outlier upper peak voltage and the outlier lower peak voltage, relative to the high operating limit and the low operating limit.

OPINION

Having considered the respective positions advanced by the Examiner and Appellant in light of this appeal record, we reverse the Examiner's rejections based on the arguments presented by Appellant. We add the following.

We limit our discussion to the independent claims 1, 11, 12, and 20.

The Examiner finds Emori teaches a battery management system that detects an anomalous battery block exhibiting outlier upper and lower peak voltages with both upper peak voltage, during charging, and lower peak voltage, during discharging, exceeding statistical thresholds as required by independent claim 1. (Final Act. 4; Emori ¶ 59.) The Examiner finds Fig. 14, step 807 describes repeatedly measuring voltages at individual cells. (Advisory Act. 2; Emori ¶ 194, Fig 23).

The Examiner finds Emori does not teach adjusting downward comprises discharging the one or more of the battery blocks into one or more other battery blocks as required by claim 1.[2] (Final Act. 5). The Examiner finds Ishikawa teaches these limitations particularly Fig. 1 exhibiting charge condition adjusting apparatus of high voltage battery and Fig. 2 discharging circuits 31–35. (Final Act. 5).

The Examiner also finds Emori does not teach adjusting a state-of-charge of the anomalous battery block to center the outlier upper peak voltage and the outlier lower peak voltage, relative to the high operating limit and the low operating limit as required by claim 1. (Final Act. 6). The Examiner finds Toya teaches these limitations. (Final Act. 6; Toya Cols. 3, 4, 5, 6, and 7, Figs. 1, 2, 3, 4, 6 and 7).

> The Examiner concludes it would have been obvious
>
> to modify an automotive power supply system with a battery module that measure individual voltage cells to implement abnormality diagnosis to adjust SOC (state of charge) of the battery cells teaching of Emori and incorporate charge condition adjusting apparatus for

[2] Similar limitations appear in independent claims 11, 12, and 20.

> quicker charge equalization among battery blocks using discharging circuits for faster and less complex process teaching of Ishikawa and further include controlling battery charging and discharging method to prevent over-charging and over-discharging of the battery array teaching of Toya to enable longer battery life and operation (Emori, Abstract, Fig 1, 14, 22, [0064]; Ishikawa, Abstract, Fig 1, 2, Col 3, Ln 25-49, Col 5, Ln 43-59; Toya, Abstract, Fig 3-7, Col 3, Ln 16-38). (Final Act. 7).

During examination, the Examiner bears the initial burden of establishing a prima facie case of obviousness. *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). "Rejections 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." *KSR Int'l v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see also*, *Ball Aerosol and Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 993 (Fed. Cir. 2009) ("[T]he analysis that 'should be made explicit' refers not to the teachings in the prior art of a motivation to combine, but to the court's analysis.").

The first issue on appeal is:

Did the Examiner err in determining that Emori teaches a battery management system that: adjusts the state of charge of the one or more battery blocks downward based on the upper peak battery block voltage of each of the one or more battery blocks determined during charging; and adjusts the state of charge of the one or more battery blocks upward based

on the lower peak battery block voltage of each of the one or more battery blocks determined during discharging as required by independent claims 1 or a method of operation within a battery system that comprises measuring the respective charging and discharging voltages of the battery blocks while charging and discharging the battery blocks as required by independent claims 11?

We answer this question in the affirmative.

Appellant argues Emori's diagnostics procedure (paragraph 59), that includes measuring the terminal voltage at a given battery cell, is performed prior to connection of the batteries to the inverter, and does not include measurements made during charging and during discharging of the battery as required by independent claims 1 and 11. (Appeal Br. 8–10.)

Emori discloses the introduction of an electrical load, such as by an inverter, results in noise that affects the detection of the voltage accuracy. Emori specifically states:

> [T]he terminal voltage at each battery cell is cyclically detected and the average of a plurality of measurement values obtained by measuring the terminal voltage a plurality of times is used as a measurement value. When the electrical load is an inverter, there is bound to be significant noise. Under such circumstances, the detection accuracy can be greatly improved by using the average of a plurality of digitized values.
> (Emori ¶ 54.)

Consequently, we agree with Appellant that Emori's disclosure in paragraph 59 that the 4.2V terminal voltage represents an overcharge state and not a measurement made during charging and the 2.5V terminal voltage

represents an over-discharge state and not a measurement made during discharging. (Appeal Br. 10; Emori ¶ 59.)

Emori discloses the introduction of an electrical load, such as by an inverter, results in noise that affects the detection of the voltage accuracy. Emori specifically states:

> The voltages at the battery cells are measured before the relays RLP, RLN and RLPRE are turned on, i.e., before the inverter 220 and the battery unit 9 become electrically connected with each other. In other words, the voltages at the battery cells are measured before starting the power supply to the inverter 220 and thus, accurate detection of the states of charge SOCs is enabled based upon the terminal voltages at the battery cells measured prior to the current supply.
> (Emori ¶ 198.)

Thus, we also agree with Appellant that the measurement of terminal voltages at the battery cells in step 807, Fig. 14, and paragraph 194 describes measuring voltages while the battery cells are disconnected from the inverter and not being charged through the inverter nor being discharged through the inverter. (Appeal Br. 10–11.)

The second issue on appeal is:

Did the Examiner err in determining that the combination of Emori and Ishikawa teach a battery management system that adjusts the state-of-charge of the battery blocks comprising discharging the one or more of the battery blocks into one or more other battery blocks as required by claims 1, 11, 12, and 20?

We answer this question in the affirmative.

The Examiner relies on Ishikawa's discharging circuits 31–35 as describing adjusting a state-of-charge of the battery blocks comprises discharging the one or more of the battery blocks into one or more other battery blocks. (Final Act. 5; Ishikawa col. 5.)

Appellant argues the Examiner's interpretation of Ishikawa is not consistent with the disclosure of the reference. (Appeal Br. 12.)

Ishikawa specifically discloses connecting unit cell C_m to the cell-discharging resistor Rdc for discharging the unit cell C_m through the cell-discharging resistor Rdc, but does not discharge the unit cell C_m into one or more other battery blocks. (Ishikawa col. 5, ll. 44–59.) As such, we agree with Appellant that the teachings of Ishikawa cited by the Examiner does not support the interpretation of the discharge circuits 31–35 as describing discharging one or more of the battery blocks into one or more other battery blocks as required by the claimed invention.

For the foregoing reasons we do not sustain the Examiner's rejection of independent claims 1, 11, 12, and 20 for the reasons presented by Appellant and given above. We likewise reverse the Examiner's decision to reject dependent claims 2–10 and 13–19 since these rejections are premised on the Examiner's unsupported combination of Emori and Ishikawa. We need not reach whether the Examiner's reliance on other references in addition to Emori and Ishikawa for the rejection of the dependent claims was supported by the evidence of record because the base combination of Emori and Ishikawa cannot stand.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Basis/References	Affirmed	Reversed
1, 3–6, 11, 12, 15, and 16	103(a)	Emori, Toya, and Ishikawa		1, 3–6, 11, 12, 15, 16
13 and 14	103(a)	Emori, Toya, Ishikawa, and Harvey		13,14
2	103(a)	Emori, Toya, Ishikawa, and Berkowitz		2
7–9 and 17–19	103(a)	Emori, Toya, Ishikawa, and Gilman		7–9, 17–19
10	103(a)	Emori, Toya, Ishikawa and Sakai		10
20	103(a)	Emori, Toya, Ishikawa, and Ito		20
Overall Outcome				1–20

REVERSED