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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JASON D. FUHR, STEVEN J. WOOD,
DALE B. TRESTER, and GARY P. HOUCHIN-MILLER

Appeal 2019-000836
Application 14/065,172
Technology Center 1700

Before DONNA M. PRAISS, BRIAN D. RANGE, and
MICHAEL G. MCMANUS, *Administrative Patent Judges*.

PRAISS, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Pursuant to 35 U.S.C. § 134(a), Appellant² appeals from the Examiner's decision to reject claims 1–3, 5, 6, 9–12, and 30–36. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In this Decision, we refer to the Specification filed Oct. 28, 2013 (“Spec.”), the Final Office Action dated Dec. 13, 2017 (“Final Act.”), the Appeal Brief filed May 16, 2018 (“Appeal Br.”), the Examiner’s Answer dated Sept. 4, 2018 (“Ans.”), and the Reply Brief filed Nov. 5, 2018 (“Reply Br.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Johnson Controls Advanced Power Solutions LLC is identified as the real party in interest. Appeal Br. 2.

STATEMENT OF THE CASE

The subject matter on appeal relates to lithium-ion batteries and, more particularly, a battery that includes one or more terminals that are integrally formed with the body or cover of the battery. Spec. ¶¶ 2, 6. According to the Specification, an arrangement of twelve cylindrical battery cells or other numbers of cells may be utilized in different embodiments with different chemistries of the cells for different voltages. *Id.* ¶ 107. The Specification describes Figure 29's embodiment having three rows of thirteen total battery cells. *Id.* ¶ 108. Appellant's Figure 29 is reproduced below.

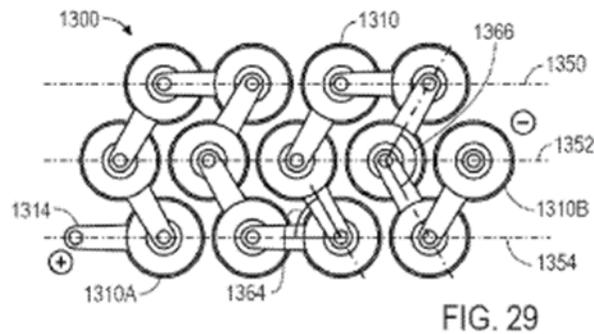


Figure 29 above is a top view of battery cells arranged in a battery module. Spec. ¶ 42. According to the Specification, Figure 29 depicts end cells 1310A and 1310B coupled to a number of intermediate cells 1310 that help to increase the voltage difference available through the terminal connections of battery module 1300. *Id.* ¶¶ 109, 110. The cells in the second row are described as “staggered” relative to the cells in both the first row and the third row for tighter packing of the cells within the battery module. *Id.* ¶ 108.

Claim 1 is illustrative and reproduced from the Claims Appendix to the Appeal Brief (disputed limitations italicized).

1. A lithium-ion battery module, comprising:

a plurality of lithium-ion battery cells electrically coupled between a first terminal connection and a second terminal connection of the lithium-ion battery module and disposed in a first row, a second row, and a third row, wherein the second row is disposed between and adjacent to the first and third rows, and wherein the lithium-ion battery cells in the second row are offset relative to the lithium-ion battery cells in the first and third rows;

wherein the plurality of lithium-ion battery cells comprises a first end lithium-ion battery cell electrically coupled to the first terminal connection, a second end lithium-ion battery cell electrically coupled to the second terminal connection, and intermediate lithium-ion battery cells electrically coupled to each other between the first and second end lithium-ion battery cells, wherein *the first end lithium-ion battery cell is disposed in the second row, and wherein the second end lithium-ion battery cell is disposed in the third row*; and

wherein each intermediate lithium-ion battery cell in the first row is electrically coupled to an adjacent lithium-ion battery cell in the first row and to a lithium-ion battery cell in the second row, wherein each intermediate lithium-ion battery cell in the second row is electrically coupled to a lithium-ion battery cell in the first row and to a lithium-ion battery cell in the third row, *wherein the plurality of lithium-ion battery cells is positioned within the lithium-ion battery module in a hexagonal arrangement having at least one line of reflection symmetry, and wherein the plurality of lithium-ion battery cells comprises only thirteen lithium-ion battery cells.*

ANALYSIS

We review the appealed rejections for error based upon the issues Appellant identifies, 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)

("[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 argued claims and Appellant's arguments, we are not persuaded of reversible error in the appealed rejections.

The Examiner rejects claims 1–3, 5, 6, 9–12, and 30–36 as follows.

Final Act. 2–23.

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis
1–3, 5, 12, 31, 33, 34, 36	103(a)	Hasenauer, ³ Seman ⁴
6	103(a)	Hasenauer, Seman, Asaka ⁵
9, 10	103(a)	Hasenauer, Seman, Nishiyama ⁶
11	103(a)	Hasenauer, Seman, Ripoll Anton ⁷
30, 32, 35	103(a)	Hasenauer, Seman, Song ⁸

We address each of the rejections below.

Rejection 1

Appellant argues the rejection of claims 1–3, 5, 12, 31, 33, 34, and 36 as a group. Appeal Br. 8–20. We select claim 1 as representative of the group. Accordingly, claims 2, 3, 5, 12, 31, 33, 34, and 36 will stand or fall

³ EP 0 320 831 A2, published Dec. 10, 1988. Citations herein to the written disclosure are from a machine-generated translation in the record.

⁴ US 2006/0026822 A1, published Feb. 9, 2006.

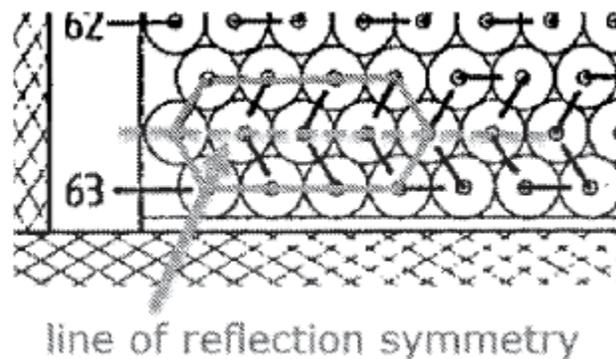
⁵ US 2002/0006544 A1, published Jan. 17, 2002.

⁶ US 6,174,618 B1, issued Jan. 16, 2001.

⁷ US 2002/0021107 A1, published Feb. 21, 2002.

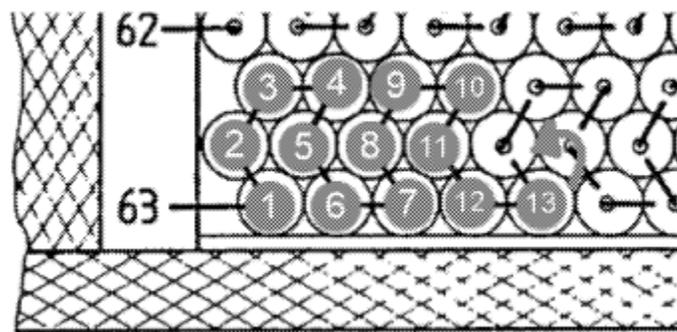
⁸ US 2014/0002942 A1, published Jan. 2, 2014.

with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv). Appellant contends the Examiner erred in rejecting claim 1 because neither Hasenauer nor Seman discloses a battery module having only thirteen electrically connected battery cells disposed in a hexagonal arrangement, having a line of symmetry, and having the claimed end cell locations. Appeal Br. 13–14. According to Appellant, Hasenauer’s annotated Figure 1 does not include a hexagonal shape if one of the end cells is moved to the central row. Appeal Br. 17. Appellant contends that the Examiner’s annotated cells include cells which are not even electrically connected together. *Id.* Annotated Hasenauer’s Figure 1 is shown below.



According to Hasenauer, Figure 1 above shows memory cells of each module arranged offset to one another so that there is a total of a hexagonal arrangement of the entire memory cells within the high temperature storage battery. Hasenauer 3–4. Appellant asserts that it would not have been obvious to a person having ordinary skill in the art to reduce Hasenauer’s 360–500 sodium-sulfur cells to only thirteen lithium-ion battery cells absent hindsight from Appellant’s disclosure. Appeal Br. 18. Similarly, Appellant argues that the Examiner improperly relies on tighter packing taught by Appellant’s disclosure to rearrange Hasenauer’s storage battery, truncate the number of cells, and change the type of cells. *Id.* at 19.

The Examiner responds that Hasenauer's Figures 1–7 disclose a plurality of battery cells in a tight, compact packing arrangement and adjusting the number of cells to reach an optimum voltage for a device's need would have been within the level of skill of a person of ordinary skill in the art, routine experimentation, and would not produce any new or unexpected results. Ans. 24 (citing Hasenauer Title, Figs. 1–7). The Examiner additionally cites Maleki⁹ as evidence that it was known to tightly pack battery cells. *Id.* at 25. The Examiner determines that modifying Hasenauer with Seman's lithium-ion battery cells would have been obvious for providing large energy density. *Id.* at 26–27 (citing Seman Title, Abstract, Figs. 1–16, ¶¶ 7, 28–35). Regarding reducing Hasenauer's number of cells, the Examiner responds that it is within the ambit of a person of ordinary skill in the art to adjust the number of cells to reach an optimum voltage needed for a device. *Id.* at 28, 33. The Examiner provides an annotated figure that numbers 13 consecutive cells in Hasenauer's battery module and indicates with an arrow how the thirteenth cell would be positioned within the battery module to form a hexagonal arrangement having at least one line of reflection symmetry and have compact packing. *Id.* at 29–30. The Examiner's annotated figure is shown below.



⁹ US 6,797,427 B2, issued Sept. 28, 2004.

The Examiner's annotated figure above shows that cell numbered 13 is connected to cell numbered 12 and the figure's arrow indicates that cell numbered 13 is moved into the second row when truncated at 13 cells in the battery pack. The Examiner determines that it would have been obvious to a person having ordinary skill in the art to modify Hasenauer's battery cells with Seman's lithium-ion battery cells because Seman discloses it was known to have a battery module of lithium-ion battery cells for the purpose of providing large energy density. *Id.* at 36. The Examiner cites Song for the nominal voltage of a lithium-ion battery cell. *Id.* (citing Song, Title, Abstract, ¶¶ 11, 14, 32).

In the Reply Brief, Appellant asserts that the specific arrangement and quantity of battery cells claimed "is patentable because it provides distinct benefits for particular types of batteries." Reply Br. 5. Appellant directs us to the Specification's paragraph 107 for disclosing energy density advantages for particular battery contexts. *Id.* (quoting paragraph 107 "it may be desirable for the battery module 1300 to include thirteen cells 1310 instead of twelve, as shown in FIG. 29, to reach a desired power output of the battery module 1300"). Appellant maintains that the chemistry and number of battery cells claimed are not within the range taught by Hasenauer. *Id.* at 5–6. Regarding the Examiner's annotated Hasenauer figure, Appellant maintains the Examiner relies on hindsight bias, that the number of cells exceeds thirteen, and that cell "13" located in a hexagonal position is electrically connected to cell 12 via a fourteenth cell. *Id.* at 6–8. Appellant argues that Maleki does not remedy the deficiencies of the cited art because it does not teach only thirteen electrochemical cells. *Id.* at 9.

Appellant's arguments do not persuade us that the Examiner reversibly erred in rejecting the claims as obvious over the modified combination of Hasenauer and Seman. Appellant does not adequately rebut the Examiner's finding (Ans. 24) that it was known to a person having ordinary skill in the art to tightly pack battery cells in a battery module. The Examiner's finding is supported by the teachings of Hasenauer, and this tightly packed battery cell module configuration is further evidenced by Maleki. Hasenauer Figs. 1–7; Maleki Figs. 4, 6. Moreover, the Hasenauer translation describes the cells being arranged “offset to one another, so that there is a total of a hexagonal arrangement of the entire memory cells 2 within the high-temperature storage battery.” Hasenauer 3:1–3. Thus, the arrangement of battery cells in a tightly packed pattern, which Hasenauer describes as “offset to one another,” to form an overall hexagonal arrangement of all the cells, as required by claim 1, is not a patentable distinction over the cited prior art. Nor is the Examiner's rejection over a tightly packed battery cell arrangement that forms a hexagonal battery cell module based on improper hindsight because such characteristics are disclosed by Hasenauer.

Similarly, Appellant's argument (Reply Br. 5) that the quantity of battery cells in the claimed battery module is patentable “because it provides distinct benefits” is not persuasive of error in the rejection of claim 1. The Specification's paragraph 107 discloses that the number of cells may be 12 or 13 or “other numbers of cells.” Spec. ¶ 107. Paragraph 107 does not describe a specific benefit to the thirteen battery cells claimed other than that expected, which is “to reach a desired power output for the battery module.” *Id.* Thus, the Specification supports the Examiner's finding (Ans. 24, 28)

that it would have been within the level of skill of a person having ordinary skill in the art to select the number of battery cells based on the desired output. Hasenauer also teaches that the number of cells is an adjustable component of a battery module. Hasenauer 3:4–5 (“It is also possible high-temperature storage batteries 1 are constructed with more or less memory cells.”). Similarly, Seman teaches that the number of lithium-ion cells specifically in a battery module is selected “to provide the desired voltage and power” of a battery pack. Seman ¶ 41.

We note that Hasenauer discloses embodiments containing many more cells than the number claimed, however, in a determination of obviousness, a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill in the art. *Merck & Co. v. Biocraft Labs. Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (“That the [prior art] patent discloses a multitude of effective combinations does not render any particular formulation less obvious.”). Moreover, “a reference is not limited to the disclosure of specific working examples.” *In re Mills*, 470 F.2d 649, 651 (CCPA 1972). Nevertheless, the number of battery cells depicted in Seman’s battery pack examples (25) is close to claim 1’s recited 13 compared to the number of battery cells depicted in Hasenauer’s embodiments. Therefore, Appellant’s argument that the number of battery cells claimed is a patentable distinction over the cited prior art is not supported by the Appeal record.

Appellant’s argument (Appeal Br. 16; Reply Br. 7) that the Examiner’s annotated Hasenauer figure fails to show a hexagonal shape when the number of cells is truncated to 13 because the twelfth and thirteenth cells are connected through a fourteenth cell is not persuasive of

error. The Examiner adequately explains with the use of an arrow that the thirteenth cell, which Appellant calls the fourteenth cell, is connected to the twelfth cell and moved into the offset position relative to the other cells as taught by Hasenauer. Moreover, as discussed above, the Examiner's finding that truncating the number of cells in Hasenauer's battery module would result in a hexagonal battery module is supported by Hasenauer's disclosure that the battery module has a hexagonal shape. Hasenauer 3:1-3.

The preponderance of the evidence in this appeal record, therefore, supports the Examiner's conclusion that the claimed subject matter would have been obvious in view of Hasenauer and Seman. Accordingly, we sustain the Examiner's rejection of claim 1 for the above reasons and those expressed in the Answer, including the Response to Argument section. Because we recognize our decision is based on reasoning which differs from that advanced by the Examiner, we denominate the affirmed rejection as a NEW GROUND OF REJECTION pursuant to 37 C.F.R. § 41.50(b).

Rejections 2-5

Appellant contends that the Examiner erred in rejecting claims 6, 9-11, 30, 32, and 35 because the additional prior art references do not cure the deficiencies of Hasenauer and Seman discussed above in connection with claim 1. Appeal Br. 20-22. Because we do not find reversible error in the Examiner's rejection of claim 1, we likewise affirm the Examiner's rejections of claims 6, 9-11, 30, 32, and 35 under 35 U.S.C. § 103(a) for the same reasons provided above with respect to claim 1.

TIME PERIOD FOR RESPONSE

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). 37 C.F.R. § 41.50(b) provides “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.”

37 C.F.R. § 41.50(b) also provides that the Appellant, **WITHIN TWO MONTHS FROM THE DATE OF THE DECISION**, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) Reopen prosecution. Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .

(2) Request rehearing. Request that the proceeding be reheard under § 41.52 by the Board upon the same record. . . .

CONCLUSION

In summary:

Claim(s) Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed	New Ground
1–3, 5, 12, 31, 33, 34, 36	103(a)	Hasenauer, Seman	1–3, 5, 12, 31, 33, 34, 36		1–3, 5, 12, 31, 33, 34, 36
6	103(a)	Hasenauer, Seman, Asaka	6		6
9, 10	103(a)	Hasenauer, Seman, Nishiyama	9, 10		9, 10

Claim(s) Rejected	35 U.S.C. §	References/Basis	Affirmed	Reversed	New Ground
11	103(a)	Hasenauer, Seman, Ripoll Anton	11		11
30, 32, 35	103(a)	Hasenauer, Seman, Song	30, 32, 35		30, 32, 35
Overall Outcome			1-3, 5, 6, 9-12, 30- 36		1-3, 5, 6, 9- 12, 30-36

AFFIRMED; 37 C.F.R. § 41.50(b)