



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/468,702	08/26/2014	John F. Christensen	1576-1460	3171
10800	7590	06/09/2020	EXAMINER	
Maginot, Moore & Beck LLP One Indiana Square, Suite 2200 Indianapolis, IN 46204			SMITH, ERIC R	
			ART UNIT	PAPER NUMBER
			1726	
			MAIL DATE	DELIVERY MODE
			06/09/2020	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

*Ex parte* JOHN F. CHRISTENSEN, BERND SCHUMANN, and  
TIMM LOHMANN

---

Appeal 2019-004720  
Application 14/468,702  
Technology Center 1700

---

Before CATHERINE Q. TIMM, KAREN M. HASTINGS, and  
JULIA HEANEY, *Administrative Patent Judges*.

HEANEY, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE<sup>1</sup>

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the Examiner's decision to reject claims 1–12. *See* Final Act. 1. We have jurisdiction under 35 U.S.C. § 6(b).

---

<sup>1</sup> This Decision refers to the Specification filed Aug. 26, 2014 (“Spec.”), Final Office Action dated Aug. 8, 2018 (“Final Act.”), Appeal Brief dated Jan. 8, 2019 (“Appeal Br.”), Examiner’s Answer dated Mar. 26, 2019 (“Ans.”), and Reply Brief dated May 28, 2019 (Reply Br.).

<sup>2</sup> 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 Robert Bosch GmbH. Appeal Br. 2.

We AFFIRM.

### CLAIMED SUBJECT MATTER

The claims are directed to a solid state battery with a columnar solid electrolyte separator between an anode and cathode. *See Spec.* ¶¶ 11, 39. Claim 1, reproduced below with paragraphing added for readability and italics indicating the limitations at issue, is the sole independent claim on appeal:

1. A bipolar solid state battery, comprising:
  - a first cell stack including
    - a first solid-electrolyte separator positioned between a first cathode and a first anode*, wherein the first solid-electrolyte separator includes
      - a first solid-electrolyte layer adjacent to the first cathode,
      - a second solid-electrolyte layer adjacent to the first anode,
      - and a plurality of solid-electrolyte columns extending between the first solid-electrolyte layer and the second solid-electrolyte layer,
      - wherein the first solid-electrolyte layer, the second solid-electrolyte layer, and the plurality of solid-electrolyte columns define a plurality of microstructure cavities therebetween;*
    - a first base layer including a first base portion positioned directly beneath the first anode;
    - a second cell stack including a second solid-electrolyte separator positioned between a second cathode and a second anode;
    - a second base layer including a second base portion positioned directly beneath the second anode; and
    - a thermally insulating medium surrounding the first cell stack and the second cell stack.

Appeal Br. 20 (Claims Appendix).

## REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Hama	JP 2009193729 A	Aug. 27, 2009
Laramie	US 2015/0010804 A1	Jan. 8, 2015
Kosugi	JP 2006261009 A	Sep. 28, 2006
Bailey	US 6,287,719 B1	Sep. 11, 2001
Fujii	US 2014/0220391 A1	Aug. 7, 2014

## REJECTIONS

1. Claims 1, 2, 4, and 5 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Hama and Laramie. Final Act. 2.
2. Claims 6 and 7 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Hama, Laramie and Kosugi. Final Act. 5–6.
3. Claims 1–4 and 8–10 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Bailey, Kosugi, and Laramie. Final Act. 6, 9.
4. Claims 11 and 12 are rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Bailey, Kosugi, Laramie and Fuji. Final Act. 9.

## OPINION

### *Rejections 1 and 2*

As we state above, the Examiner rejects claims 1, 2, 4, and 5 under 35 U.S.C. § 103 as being unpatentable over the combination of Hama and

Appeal 2019-004720  
Application 14/468,702

Laramie (Rejection 1) and rejects claims 6 and 7 under 35 U.S.C. § 103 as being unpatentable over the combination of Hama, Laramie and Kosugi (Rejection 2).

Appellant's arguments are directed to claim 1 and, although the Appeal Brief includes separate headings relating to the rejections of claims 2 and 4–7, those sections do not present further substantive argument. Appeal Br. 11–12. Accordingly, we focus our discussion on claim 1.

The Examiner finds that Hama teaches the limitations of the battery recited in claim 1, except that Hama does not specifically teach a first solid–electrolyte separator having the structure recited in claim 1. Final Act. 2–3 (citing Hama Fig. 2, ¶¶ 28, 33–39). The Examiner finds that Laramie teaches a separator including a first ion–conducting layer, second ion–conducting layer, and a plurality of ion–conducting columns extending between the first and second ion–conducting layers and defining microstructure cavities between the columns. *Id.* at 3–4 (citing Laramie Fig. 3, ¶¶ 32, 34, 38, 58). The Examiner further finds that Laramie's ion–conducting layers and columns are formed of a solid material capable of conducting the ions used in the cathode and anode, which the Examiner interprets as a “solid–electrolyte” material as recited in claim 1. *Id.* The Examiner further finds that Laramie teaches its structure provides mechanical strength while maintaining favorable ionic pathways, and thus provides an evidence–based rationale for combining the teachings of Hama and Laramie. *Id.* at 4, citing Laramie ¶¶ 26, 27. *See also* Ans. 16 (finding that Laramie teaches applying the claimed structure “in a position between a first cathode and first anode provides a protection function and necessarily a separation function, along with improved mechanical strength and ionic conductivity”).

Appellant argues that the rejections should be reversed for several reasons: (1) the Examiner has failed to show that Provisional Application 61/842,936 (“the ’936 Provisional”) supports the teachings of Laramie upon which the Examiner relies; (2) Laramie does not disclose a separator as recited in claim 1; and (3) Laramie does not disclose cavities as recited in claim 1. We address each of these arguments below.

*Provisional Application*

Appellant argues that Laramie is not available as prior art because the Examiner has failed to show that the ’936 Provisional supports Laramie’s teachings upon which the Examiner relies, such as Laramie Figure 3. Appeal Br. 5–6. The Examiner responds in the Answer by including citations to relevant portions of the ’936 Provisional that support the findings as to Laramie. Ans. 13–18. Appellant does not dispute that the cited portions provide support. *See* Reply Br. Thus, Appellant has not identified a reversible error in the Examiner’s finding that the ’936 Provisional provides support.”

We have also reviewed the Examiner’s and the Appellant’s arguments on the issue raised by the Examiner in the Answer, of whether Appellant’s Provisional Application 61/870,836 (“the ’836 Provisional”) sufficiently supports the limitation “a thermally insulating medium surrounding the first cell stack and the second cell stack” recited in claim 1. *Compare* Ans. 12, *with* Reply Br. 2–3. Specifically, the Examiner finds that the ’836 Provisional “makes no mention of a thermally insulating medium.” *Id.* at 12. Appellant responds by arguing that the ’836 Provisional expressly provides support for a thermally insulating medium because it discloses a fluorinated oil, and “oils are notoriously well known thermal insulators.”

Appeal 2019-004720  
Application 14/468,702

Reply Br. 2–3 (citing '836 Provisional ¶ 24). Having reviewed Appellant's argument and the disclosure of the '836 Provisional, we find that it provides adequate support for the thermally insulating medium limitation recited in claim 1. Paragraph 24 of the '836 Provisional describes halogenated oils used between the layers of packaging of Appellant's battery, and the references relied upon by Appellant in the Reply Brief, U.S. Patent Nos. 9,689,631 and 5,447,389, show that a person of ordinary skill in the art would have understood that DuPont's Krytox fluorinated oil is thermally insulating. *See id.*

#### *Separator*

Appellant argues that Laramie does not disclose a separator between the first cathode and the first anode. Appeal Br. 6–7, 9–10. Specifically, Appellant argues that Laramie's Figure 3 shows a protective structure that is part of the anode electrode, and therefore cannot be between the cathode and anode as required by claim 1. *Id.* Appellant further relies on Laramie ¶ 117 as teaching that its protective structure is distinct from a separator. *Id.* at 10.

Appellant's arguments do not persuasively identify reversible error. The Examiner's proposed modified structure of Hama would result in a stack of layers comprising Laramie's base layer with an active electrode species, Laramie's solid electrolyte protective structure formed on the base layer, Hama's solid electrolyte layer formed on the protective structure, and a cathode layer above the solid electrolyte layer. Appellant's argument that Laramie's protective structure is not a "separator" because it is not separate from the anode is not persuasive because the Specification does not provide a special definition for "separator." *See Ans. 13; In re Icon Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007) ("we look to the

Appeal 2019-004720  
Application 14/468,702

specification to see if it provides a definition for claim terms, but otherwise apply a broad interpretation.”). We determine that a person of ordinary skill in the art would have understood that Laramie’s protective structure has the elements of the solid–electrolyte separator recited in claim 1, and that in the modification of Hama proposed by the Examiner, Laramie’s structure would have been positioned between a cathode and an anode. *See Ans.* at 13–14 (citing Laramie, Fig. 3, ¶¶ 25, 65).

### *Cavity*

Appellant argues that Laramie’s solid electrolyte columns do not define cavities because Laramie’s cavities are filled and formed prior to the formation of the solid electrolyte columns. Appeal Br. 7–9; Reply Br. 5–9. Appellant’s arguments do not persuasively identify reversible error. Claim 1 does not require any particular process steps, and the limitation of solid electrolyte columns defining cavities is a structural limitation, not a process limitation. Therefore, Appellant’s arguments based on Laramie’s process steps are unavailing. Laramie’s solid electrolyte columns surround the filled cavities and therefore provide physical definition to the cavities. *See Ans.* 15.

Accordingly, we affirm Rejections 1 and 2.

### *Rejections 3 and 4*

As we state above, the Examiner rejects claims 1–4 and 8–10 under 35 U.S.C. § 103 as being unpatentable over the combination of Bailey, Kosugi, and Laramie (Rejection 3) and rejects claims 11 and 12 under 35 U.S.C. § 103 as being unpatentable over the combination of Bailey, Kosugi, Laramie and Fuji (Rejection 4).

Appellant's arguments are directed to claim 1 and, although the Appeal Brief includes separate headings relating to the rejections of claims 2–4 and 8–12, those sections do not present further substantive argument. Appeal Br. 15–18. Accordingly, we focus our discussion on claim 1.

The Examiner finds that Bailey teaches the limitations of the battery recited in claim 1, except that Bailey does not specifically teach a thermally insulating medium surrounding the first and second cell stack or a first solid-electrolyte separator having the structure as recited in claim 1. Final Act. 6–9 (citing Bailey Figs. 3, 4). As discussed above, the Examiner finds that Laramie teaches a separator including a first ion-conducting layer, second ion-conducting layer, and a plurality of ion-conducting columns extending between the first and second ion-conducting layers and defining microstructure cavities between the columns, and based on Laramie's teaching that its structure provides mechanical strength while maintaining favorable ionic pathways, the Examiner provides an evidence-based rationale for combining the teachings of Bailey and Laramie. *Id.* at 7; *see also* Ans. 16 (finding that Laramie teaches applying the claimed structure “in a position between a first cathode and first anode provides a protection function and necessarily a separation function, along with improved mechanical strength and ionic conductivity”). The Examiner further finds that Kosugi teaches thermally insulating medium 16 surrounding battery 13. Final Act. 8 (citing Kosugi, Fig. 1). The Examiner determines that forming a thermally insulating medium to surround the battery would have been obvious to a person of ordinary skill in the art, in order to cool the battery. *Id.*

Appellant argues, as discussed above, that Laramie does not disclose a separator or cavities as recited in claim 1. As set forth above, we do not find

those arguments persuasive of reversible error, and accordingly, we also do not find them persuasive as applied to Rejections 3 and 4. Appellant also presents two additional arguments against these rejections, which we address below.

*Elimination of Separator*

Appellant argues that Bailey's objective is to provide a polymer electrolyte to eliminate the need for a separator, and that inclusion of Laramie's separator would render Bailey unsatisfactory for its intended purpose of eliminating the non-conductive portion of a separator. Appeal Br. 14 (citing Bailey Abs.); Reply Br. 11. Appellant further argues that Bailey's objective is eliminating "the *structure* of the separator which is *not an ion conductor*" and to that end, Bailey avoids non-conductive structure by using a polymer electrolyte; consequently only "electrolyte" is present in Bailey's separator. Reply Br. 10–11 (citing Bailey Abs., 1:12–32).

Appellant's argument is not persuasive of reversible error. The Examiner's proposed combination of Bailey, Laramie, and Kosugi includes Laramie's base layer with an active electrode species, Laramie's solid electrolyte protective structure formed on the base layer, Bailey's solid polymer electrolyte layer formed on the protective structure, and a cathode layer above the solid polymer electrolyte layer. Final Act. 6–7. In other words, the Examiner does not propose replacing Bailey's polymer electrolyte layer with Laramie's solid electrolyte protective structure, and Appellant's argument directed to that structure is not responsive to the rejection. Bailey's teaching of using a polymer electrolyte layer between the positive and negative electrode of the cell into which liquid electrolyte is absorbed (Bailey 1:13–33, 2:47–49) is not in conflict with Laramie's solid-

electrolyte separator in the Examiner’s proposed combination, and would not render the combination inoperable.

*Thermal Insulation Fluid and Cooling Plate*

Appellant argues that addition of a thermal insulation fluid or a cooling plate to Bailey would make Bailey’s cell more expensive and larger, and render Bailey unsatisfactory for its intended purpose of providing a less expensive and space efficient multi-cell spiral-wound electrode construction. Appeal Br. 14–15, 17–18 (citing Bailey Abs.); Reply Br. 11–12 (citing Bailey 2:43–46, 5:62–64).

Appellant’s argument does not persuasively identify reversible error. The fact that Bailey saves cost or space by eliminating a certain feature does not mean that other features cannot be included should a benefit be realized. A person of ordinary skill would have understood tradeoffs such as cost reduction and space efficiency, and those considerations would not necessarily bar additional features in a cost benefit analysis. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (“a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine”).

Accordingly, we affirm Rejections 3 and 4.

CONCLUSION

The Examiner’s rejections are AFFIRMED.

DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1, 2, 4, 5	103	Hama, Laramie	1, 2, 4, 5	
6, 7	103	Hama, Laramie, Kosugi	6, 7	

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Reference(s)/Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1-4, 8-10	103	Bailey, Kosugi, Laramie	1-4, 8-10	
11 and 12	103	Bailey, Kosugi, Laramie, Fuji	11, 12	
<b>Overall Outcome:</b>			1-12	

**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). *See* 37 C.F.R. § 1.136(a)(1)(iv).

**AFFIRMED**