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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* SUDHAKAR JAGANNATHAN, JOHN HAROLD MILLER,  
LAYNA LANIER MENDLINGER, and TRAVIS ZACHARY TORREY

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Appeal 2019-003285  
Application 13/664,871  
Technology Center 1700

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Before JEFFREY B. ROBERTSON, BRIAN D. RANGE, and  
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

DECISION ON APPEAL<sup>1</sup>

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>2</sup> appeals from the Examiner's decision to reject claims 1–24. Appeal Br. 4. We have jurisdiction under 35 U.S.C. § 6(b).

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<sup>1</sup> This Decision includes citations to the following documents: Specification filed October 31, 2012 (“Spec.”); Final Office Action mailed November 29, 2017 (“Final Act.”); Appeal Brief filed October 29, 2018 (“Appeal Br.”); and Examiner's Answer mailed January 10, 2019 (“Ans.”).

<sup>2</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as Exide Technologies. Appeal Br. 2.

We affirm.

### CLAIMED SUBJECT MATTER

Appellant states the invention relates to an absorbed glass mat (AGM) valve regulated lead-acid (VRLA) battery. Spec. 3. Claim 1, reproduced below, is illustrative of the claimed subject matter (Appeal Br., Claims App. 13):

1. An absorbed glass matt (AGM) valve regulated lead-acid (VRLA) battery, comprising:

a positive plate comprising a positive active material;  
a negative plate comprising a negative active material;  
wherein the negative active material comprises  
a composition comprising a carbon additive;  
an AGM separator;  
and an electrolyte;

wherein the positive plate, the negative plate, the separator, and the electrolyte are disposed in a container comprising a valve; and

wherein the electrolyte is present in an amount that ranges from 100 to 150 % by volume based on the total pore volume of the separator.

### REFERENCES

The prior art relied upon by the Examiner is:

| <b>Name</b>                           | <b>Reference</b>   | <b>Date</b>       |
|---------------------------------------|--------------------|-------------------|
| Chalasani                             | US 6,265,108 B1    | July 24, 2001     |
| Boden et al.<br>(hereinafter "Boden") | US 2009/0325068 A1 | December 31, 2009 |

|   |  |                   |
|---|--|-------------------|
| Dickinson, V et al.<br>(hereinafter<br>“Dickinson”) | US 2010/0015531 A1                                       | January 21,2010   |
| Wang  | US 2011/0274969 A1                                       | November 10, 2011 |
| Atanassova et al.<br>(hereinafter<br>“Atanassova”)  | WO 2011/053670 A1,<br>citations to US<br>2012/0211703 A1 | May 5, 2011       |

### REJECTIONS

1. The Examiner rejected claims 1–9 and 15–24 under 35 U.S.C. § 103(a) as unpatentable over Chalasani and Atanassova. Final Act. 2–7.
2. The Examiner rejected claims 10 and 11 under 35 U.S.C. § 103(a) as unpatentable over Chalasani, Atanassova, and Dickinson. Final Act. 7–9.
3. The Examiner rejected claims 12–14 under 35 U.S.C. § 103(a) as unpatentable over Chalasani, Atanassova, Dickinson, Boden, and Wang. Final Act. 9–12.

### OPINION

#### *Rejection 1*

Appellant presents separate arguments with respect to the claims 1, 7, and 17–24 subject to this rejection. *See* Appeal Br. 5–11. We select claims 1, 7, and 21–24 as representative for disposition of this appeal, with the patentability of the other claims standing or falling with claims 1, 7, and 21–24. 37 C.F.R. § 41.37(c)(1)(iv).

*Claim 1*

*The Examiner's Rejection*

In rejecting claim 1 as obvious over Chalasani and Atanassova, the Examiner found Chalasani discloses an absorbed glass matt (AGM) valve regulated lead-acid battery (VRLA) having a positive plate, negative plate, where the negative plate includes an AGM separator and electrolyte. Final Act. 2. The Examiner found Chalasani discloses the electrolyte is present in an amount over 100% by volume based on the total pore volume of the separator, as recited in claim 1, because Chalasani discloses the VRLA battery is in a flooded state. *Id.* (citing Chalasani, col. 1, ll. 55–57). The Examiner found Chalasani does not disclose a negative plate including a negative active material where the negative active material includes a composition comprising a carbon additive. *Id.* at 3. The Examiner found Atanassova discloses a valve regulated lead-acid battery including a negative active material comprises carbon additive (carbon black). *Id.* (citing Atanassova ¶ 12). The Examiner determined it would have been obvious to have modified Chalasani to include a carbon additive in the negative active material to increase electrical charge conductivity of the active material in the discharge state, thereby improving charge acceptance and increasing mechanical properties of the electrode. *Id.* (citing Atanassova ¶¶ 7, 11).

*Appellant's contentions*

Appellant acknowledges that Chalasani discloses some of the separator material is flooded, but Appellant argues Chalasani discloses an additional separator material that provides a surface for oxygen reduction reactions that is only moistened, which does not teach or suggest the

electrolyte amount recited in claim 1. Appeal Br. 6. Appellant contends that although Atanassova discloses a battery paste useful in two different types of batteries, Atanassova does not disclose a single-flooded VRLA battery. *Id.* at 7.

*Issue*

Did Appellant establish sufficiently that the Examiner reversibly erred in determining the valve regulated lead-acid battery recited in claim 1 would have been obvious over Chalasani and Atanassova?

*Discussion*

We are not persuaded by Appellant’s argument that Chalasani fails to disclose a separator with an electrolyte present “in an amount that ranges from 100 to 150% by volume based on the total pore volume of the separator” as recited in claim 1. Appellant’s main argument is the “additional separator material 32” disclosed in Chalasani is only “moistened” and, as a result, Chalasani does not disclose the amount of electrolyte recited in claim 1. Appeal Br. 6–7. However, as the Examiner points out, the rejection does not rely on separator material 32, but rather separators 30 as disclosed in Chalasani. Ans. 14–15. As the Examiner further explains, Chalasani discloses separators 30 are “soaked” in electrolyte such that the separators would contain “at least 100% by volume” of electrolyte and overlap the range recited in claim 1. *Id.* (citing Chalasani, col. 1, ll. 55–57; Spec. 4). The Examiner also points out that claim 1 does not exclude additional separators, such as separator 32 in Chalasani, from being present. *Id.* at 14.

We agree with the Examiner that Chalasani discloses separators with electrolyte present in amounts overlapping claim 1. That is, Chalasani discloses a VRLA battery that has “electrolyte in a flooded state” where the “separators [are] fully submerged in the electrolyte.” Chalasani, col. 1, ll. 55–57. Chalasani discloses separators 30 are fully submerged in electrolyte and separator material 32 is in contact with the electrolyte and is “always moistened with electrolyte.” *Id.* at col. 2, ll. 37–41; Fig. 1. The Specification describes that “saturated” AGM batteries means that “the AGM system is flooded and that there is excess electrolyte within the cell.” Spec. 2. The Specification also defines “saturated” as “an amount of electrolyte that is 100% by volume based on the total pore volume of the separator.” *Id.* at 4. Thus, Chalasani discloses separators having electrolyte present in amounts overlapping claim 1. In addition, because Chalasani discloses that electrolyte is present in a “flooded state” and the Specification describes “flooded” as including “excess” electrolyte within the cell, Chalasani discloses separators having electrolyte present in amounts overlapping the amounts of “greater than 100” % by volume recited in claims 17–20. *See* Ans. 16.

As to the presence of separator material 32 in Chalasani, we agree with the Examiner that claim 1, which recites a “valve regulated lead-acid (VRLA) battery, comprising” and “the negative active material comprising,” both of which utilize the open-ended transitional phrase “comprising” that does not exclude the presence of additional separator materials with electrolyte presence in amounts less than those recited in claim 1.

We are also not persuaded by Appellant’s argument that, because Atanassova discloses “[t]he present battery paste may be used in both

flooded cell and valve regulated lead-acid batteries” (Atanassova ¶ 64), Atanassova “in no way indicates a teaching for a single flooded, VRLA battery.” Appeal Br. 7. The Examiner interpreted Appellant’s argument to be that Atanassova is non-analogous art. Ans. 15. To the extent Appellant’s argument is that Atanassova is non-analogous art, we agree with the Examiner that Atanassova is analogous art to the instant invention because Atanassova discloses valve regulated lead-acid batteries (Atanassova ¶¶ 5, 64). *Id.*

However, we understand Appellant to be arguing that Atanassova discloses a paste for either a flooded cell battery or a valve regulated lead-acid battery, but not a single battery that is a valve regulated lead-acid battery in a flooded state. We are not persuaded by this argument because it does not address the Examiner’s rationale for combining Chalasani with Atanassova, which as discussed above, is to obtain the advantages of the carbon additive disclosed in Atanassova, namely increasing electrical conductivity of the active material in the discharge state in order to improve charge acceptance and increased mechanical properties of the electrode. Final Act. 3 (citing Atanassova ¶¶ 7, 11). Appellant does not provide a sufficient argument that a battery that is both a valve regulated lead-acid battery and in a flooded state would not also benefit from the carbon additive in Atanassova.

Indeed, in *KSR*, the Supreme Court explained, “[w]hen a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417



(2007). “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *Id.* at 421. Moreover, the Supreme Court stated “[a]s our precedents make clear, however, the analysis [under 35 U.S.C. § 103] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418. Accordingly, Appellant has not demonstrated the Examiner’s reliance on Atanassova constitutes reversible error.

*Claim 7*

Claim 7 depends from claim 1 and further recites “wherein the carbon additive has a specific surface area that ranges from 5 m<sup>2</sup>/g to 50 m<sup>2</sup>/g.”

The Examiner found that Chalasani, as modified by Atanassova, includes a carbon additive with a surface area of about 80 m<sup>2</sup>/g to about 2100 m<sup>2</sup>/g, which does not explicitly disclose the claimed range of 5 m<sup>2</sup>/g to 50 m<sup>2</sup>/g, but that it would have been obvious to select a surface area close enough to the upper portion of the claimed range such that one of ordinary skill in the art would have expected the same results, because the specific area of the carbon additive in the prior art is close to the claimed range. *Id.* at 4–5; Ans. 17–18.

Regarding claim 7, Appellant argues Atanassova does not teach or suggest a carbon additive having a specific surface area of 5 m<sup>2</sup>/g to 50 m<sup>2</sup>/g. because the lower range of “about 80 m<sup>2</sup>/g” is more than a 50% increase over the upper end value in Atanassova, which does not overlap claim 7. *Id.* at 10.

We are not persuaded by Appellant's argument. As the Examiner further explained in the Answer, the rejection does not rely on overlapping ranges, but rather that the range disclosed in Atanassova is sufficiently close to the claimed range to support a prima facie case of obviousness. Ans. 17–18. The Examiner explained that although the 30 m<sup>2</sup>/g difference between the lower end of the range disclosed in Atanassova and the upper end of the range recited in claim 7 may not seem close, in view of the broad range of surface areas disclosed both in Atanassova (2020 m<sup>2</sup>/g) and in the Specification (1995 m<sup>2</sup>/g), a minor difference of 30 m<sup>2</sup>/g of the total range is within the scope of the art in the absence of evidence of criticality.<sup>3</sup> *Id.* Appellant does not provide a response to the Examiner's position,<sup>4</sup> which appears to be reasonable in the absence of sufficient arguments to the contrary.

*Claims 21–24*

Regarding claims 21–24, which depend from claim 1, the Examiner determined that because the lead-acid battery of Chalasani, as modified by Atanassova, is an AGM VRLA having carbon additive in the negative active material and the electrolyte is present greater than 100% by volume, it necessarily has the discharge capacity recited in claim 21, the charge acceptance recited in claim 22, amount of electrolyte recited in claim 23, and the durability recited in claim 24. *Id.* at 6–7.

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<sup>3</sup> We observe that the Examiner's calculation that the difference in surface areas amounts to a 0.01% difference does not appear to be accurate (30/2020=0.0148 (1.5%); 30/1995=0.0150 (1.5%)). In view of the above discussion, we view the Examiner's apparent error to be harmless.

<sup>4</sup> Appellant did not file a reply brief to the Examiner's Answer.

Regarding claim 23, Appellant argues because Chalasani utilizes a non-starved separator material it does not follow that Chalasani would necessarily and inherently satisfy the same water consumption tests as the claimed, differently constructed battery. *Id.* at 9–10. Similarly, for the recitation of discharge capacity in claim 21, the charge acceptance in claim 22, and durability in claim 24, Appellant contends it does not follow from the teachings in Chalasani that such properties would be met. *Id.* at 10–11.

We are not persuaded by Appellant’s arguments, largely for similar reasons as discussed above with respect to claim 1, namely, Chalasani discloses separators including amounts of electrolyte overlapping the amounts recited in claim 1. In addition, as explained by the Examiner, Appellant has not provided sufficient arguments that the presence of additional separator material 32 in Chalasani would mean that the water consumption test in claim 23, the discharge capacity in claim 21, the charge acceptance in claim 22, or durability in claim 24 would not be satisfied. Ans. 16–17.

That is, the Examiner has provided sufficient support for the position that the properties recited in claims 21–24 would be met due to the structure resulting from the combination of Chalasani and Atanassova and Appellant has not provided sufficient evidence that such properties would not have been met. “[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. . . . Whether the rejection is based on ‘inherency’ under 35 U.S.C. s [sic] 102, on ‘prima facie obviousness’ under 35 U.S.C. s [sic] 103, jointly or alternatively, the burden of proof is the same . . . (footnote

omitted).” *In re Fitzgerald*, 619 F.2d 67, 70 (CCPA 1980) (quoting *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977)).

In sum, we affirm the Examiner’s rejection of claims 1–9 and 15–24.

### *Rejection 2*

For claims 10 and 11, which depend from claim 1 and recite pore sizes for the carbon additive, Appellant does not present separate argument regarding these claims, but rather relies on the dependency of claims 10 and 11 as a basis for patentability. Appeal Br. 11. Accordingly, we affirm the Examiner’s rejection of claims 10 and 11 for similar reasons discussed above for claim 1.

### *Rejection 3*

Claims 12 and 13 depend from claim 1, and further recite “wherein the carbon additive has a degradation onset temperature that ranges from 500 °C to 750 °C” and “wherein the carbon additive has a degradation onset temperature that ranges from 100 °C to 350 °C,” respectively.

Claim 14 depends from claim 1, and further recites “wherein the carbon additive has a microporosity-to-mesoporosity ratio that ranges from 99: 1 to 1:99.”

In rejecting claims 12–14, which depend from claim 1, the Examiner found Chalasani in view of Atanassova renders obvious the limitations of independent claim 1, as discussed above. Final Act. 9. The Examiner found Dickinson discloses enhanced negative plates with a carbon additive such as activated carbon having a meso-pore volume of greater than about 0.1 cm<sup>3</sup>/g and a meso-pore size of about 20 Angstroms to about 320 Angstroms. *Id.*

The Examiner found Dickinson does not explicitly disclose the claimed range of less than 20 Angstroms (corresponding to pore sizes that are microporous, Spec. 4), but found the upper limit of pore sizes that are microporous disclosed in Dickinson is close enough to the upper portion of the claimed range such that the skilled artisan would have expected the same results. *Id.*; Ans. 20.

The Examiner found Boden discloses expanders for lead-acid batteries where carbon additive such as carbon black and/or graphite is added to the negative plate. *Id.* at 10. The Examiner determined it would have been obvious to modify Chalasani, as modified by Atanassova, by using carbon black to lessen or minimize the accumulation of lead sulfate on the surface of the negative plate during high rate PSOC battery operation and/or to increase the electrochemical efficiency, the reserve capacity, the cold cranking performance and the life cycle life of lead-acid batteries. *Id.*

The Examiner found Wang discloses a current collector for lead acid battery, wherein carbon additive such as carbon nanotube is added to the negative plate. *Id.* at 11. The Examiner determined it would have been obvious to have modified Chalasani in view of Atanassova by using carbon nanotubes as a carbon additive for the advantage of providing a stable negative electrode. *Id.* The Examiner also determined that the Specification does not disclose any specific method to make the carbon additive leading to the claim limitations in claims 12–14 such that the carbon additives disclosed in the prior art necessarily have the claim limitations in claims 12–14. *Id.* at 12.

Regarding claims 12–14, Appellant contends the Examiner never mentions the terms “degradation temperature” or “microporosity-to-

mesoporosity ratio” in the rejection nor does the Examiner assert that the cited art teaches or suggests the claimed ranges. Appeal Br. 12.

Although we appreciate Appellant’s position as to the clarity of the Examiner’s rejection, we are not persuaded by Appellant’s arguments. The Examiner explained that one of ordinary skill in the art would appreciate that the degradation onset temperatures are properties of the carbon material, and that micro/mesoporosity is a structure of the carbon material that imparts properties on the carbon material. Ans. 19. The Examiner found Dickinson discloses carbon additives having meso-pores in a range of about 20 Angstroms to 500 Angstroms, and further noted that at 20 Angstroms, Dickinson discloses a microporosity-to-mesoporosity ratio of 50:50 because the porosity can be considered microporous or mesoporous at 20 Angstroms. *Id.* at 19–20; Dickinson ¶ 22; Spec. 8. The Examiner also points out that the cited prior art discloses active carbon materials as disclosed in the Specification include graphite disclosed in Atanassova and Boden, activated carbon disclosed in Dickinson, carbon black disclosed in Boden, or carbon nanotubes disclosed in Wang. *Id.* at 19; Spec. 5–6. The Examiner also stated that Appellant has not provided any particular evidence of criticality, nor has Appellant challenged the Examiner’s position that it would have been obvious to optimize the recited ratio. *Id.* at 20. Thus, the Examiner’s position appears to be that it would have been obvious to have selected carbon additives having the structures disclosed in the prior art, which would result in the particular “degradation temperatures” or “microporosity-to-mesoporosity ratios” recited in claims 12–14.

Appellant does not provide any particular response to the Examiner's positions and, in particular, the Examiner's further explanations in the Answer. As a result, we affirm the Examiner's rejection of claim 12–14.

#### DECISION SUMMARY

In summary:

| <b>Claims Rejected</b> | <b>35 U.S.C. §</b> | <b>Reference(s)/Basis</b>                    | <b>Affirmed</b> | <b>Reversed</b> |
|------------------------|--------------------|--|-----------------|-----------------|
| 1–9, 15–24             | 103(a)             | Chalasan, Atanassova                         | 1–9, 15–24      |                 |
| 10, 11                 | 103(a)             | Chalasan, Atanassova, Dickinson              | 10, 11          |                 |
| 12–14                  | 103(a)             | Chalasan, Atanassova, Dickinson, Boden, Wang | 12–14           |                 |
| <b>Overall Outcome</b> |                    |  | 1–24            |                 |

#### 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