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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HIDEAKI KATAYAMA, TOSHIHIRO ABE,
NOBUAKI MATSUMOTO, FUSAJI KITA, and SHIGEO AOYAMA

Appeal 2019-000124
Application 11/666,921
Technology Center 1700

Before KAREN M. HASTINGS, RAE LYNN P. GUEST,
DONNA M. PRAISS, *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 36–38 and 40–45. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ In this Decision, we refer to the Specification filed May 3, 2007 (“Spec.”), the Final Office Action dated Sept. 12, 2017 (“Final Act.”), the Appeal Brief filed Apr. 9, 2018 (“Appeal Br.”), and the Examiner’s Answer dated Aug. 2, 2018 (“Ans.”).

² We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. MAXELL HOLDINGS LTD., is identified as the real party in interest. Appeal Br. 1.

STATEMENT OF THE CASE

The invention relates to a separator for an electrochemical device, such as a lithium secondary battery and a supercapacitor used as power sources for portable equipment. Spec. ¶¶ 1, 2. The Specification describes the separator comprising a porous base heat-resistant to temperatures of 150°C or higher and further comprising filler particles for the purpose of preventing an internal short-circuit to secure the shape stability of the separator, especially at high temperature. *Id.* ¶¶ 20, 21.

Claims 36, 40, and 42, reproduced below, are illustrative of the subject matter on appeal (disputed limitations italicized).

36. A porous base comprising inorganic filler particles and having a heat-resistant temperature of not lower than 150 °C, the porous base being formed by integrating a number of inorganic filler particles with a binder,

wherein a number average diameter of the inorganic filler particles is in a range of 0.1 μm to 5 μm, and

the inorganic filler particles include plate-like boehmite particles being stable with respect to nonaqueous electrolyte.

40. A separator for an electrochemical device, comprising a porous film comprising a porous base and a resin, wherein

the porous base is the porous base according to claim 36,

the resin includes at least one shutdown resin selected from the group consisting of resin A that has a melting point in a range of 80 °C to 130 °C, and resin B that absorbs an

electrolyte and swells due to heating, and the swelling degree is increased as the temperature rises, and

the separator for an electrochemical device has a thickness of not more than 30 μm .

42. The separator for an electrochemical device according to claim 40, wherein air permeability expressed as a *Gurley value is in a range of 10 to 300 (sec/100mL)*.

Appeal Br. (Claims Appendix).

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 in light of the case law presented in this Appeal and each of Appellant’s arguments, we are not persuaded of reversible error in the appealed rejections.

The Examiner rejects claims 36–38 and 40–45 as follows. Final Act. 3–7.

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis
36–38, 40, 45	103(a)	Bauer, ³ Kido ⁴
41	103(a)	Bauer, Kido, Tsukuda ⁵
42	103(a)	Bauer, Kido, Wensley ⁶
43	103(a)	Bauer, Kido, Doi ⁷
44	103(a)	Bauer, Kido, Abe ⁸

Appellant separately argues the rejections of claims 36 and 42 and relies on the dependency of claims 41, 43, and 44 from claim 36. Appeal Br. 6–11. Therefore, in view of the lack of arguments directed to claims 37, 38, 40, and 45, the claims stand or fall with claim 36. 37 C.F.R. § 41.37(c)(1)(iv). We consider the arguments advanced by Appellant in support of patentability of claim 36 to the extent applicable to the separate rejections of claims 41, 43, and 44. We separately address claims 36 and 42 below.

Claim 36

Appellant contends that the Examiner erred in rejecting claim 36 over the combined teachings of Bauer and Kido because Bauer requires the solids in its separator to be electrochemically inert in the electrolyte and Kido's plate boehmite particles have high catalytic activity. Appeal Br. 6–7. According to Appellant, it therefore would not be obvious that the alumina particles of Bauer are replaced by the boehmite particles of Kido. *Id.* at 7.

³ US 6,632,561 B1, issued Oct. 14, 2003.

⁴ US 6,403,007 B1, issued June 11, 2002.

⁵ US 6,511,774 B1, issued Jan. 28, 2003.

⁶ US 6,881,515 B2, issued Apr. 19, 2005.

⁷ GB 2 097 637 A, published Feb. 27, 1980.

⁸ US 2006/0246356 A1, published Nov. 2, 2006.

Appellant also asserts that Kido discloses a reaction of phase transformation from boehmite to alumina at around 500°C producing water. *Id.* at 7–8.

Appellant argues that because water needs to be prevented from entering Bauer’s battery as much as possible, it would not have been obvious to combine Kido and Bauer since Kido requires a reaction that produces water to impart flame retardance to plastics. *Id.* at 8. Appellant also contends that Kido does not relate to a nonaqueous electrolyte, therefore the combination with Bauer cannot lead to a porous base comprising inorganic filler particles with “the inorganic filler particles . . . being stable with respect to nonaqueous electrolyte” as recited in claim 36. *Id.*

The Examiner responds that Kido recognizes that boehmite and alumina are substitutable for use as a filler in separating membranes and does not require the plate boehmite always to be converted to plate alumina. Ans. 9 (citing Kido 1:6–14, 5:25–30). The Examiner finds that Bauer does not disclose any processing temperatures that reach 500°C. *Id.* The Examiner also responds that claim 36 does not require a nonaqueous electrolyte. *Id.* The Examiner finds that Bauer discloses a separator comprising alumina as a filler for providing a separator with improved mechanical strength and dimensional stability at high temperature and Kido is relied upon for teaching that boehmite and plate alumina are substitutable in separating membranes. *Id.* at 10.

Appellant’s arguments do not persuade us that the Examiner reversibly erred in rejecting claim 36 as obvious over the teachings of Bauer and Kido. Specifically, we are not persuaded that the Examiner erred in finding that Kido teaches boehmite is a suitable substitute as a flame-retardant filler. The record supports the Examiner’s finding. Kido 1:7–8;

Ans. 9–10. Appellant’s argument (Appeal Br. 7–8) that Kido requires an endothermic reaction to convert boehmite to a plate alumina to make it suitable as a flame-retarding filler is not persuasive because the argument is based on a specific embodiment disclosed by Kido rather than Kido’s general teaching that boehmite and alumina are both suitable fillers. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Because Kido discloses that both boehmite and alumina are suitable fillers, and that boehmite is a raw material of alumina, the Examiner’s finding that Kido discloses but does not require that alumina be obtained by calcining the plate boehmite is both reasonable and supported by the record. Ans. 9; Kido 1:7–8, 1:59–60.

Appellant’s argument (Appeal Br. 8) that Kido’s reaction produces water while Bauer’s lithium ion battery requires preventing water from entering the battery is not persuasive because it is based on the same argument that Kido requires transformation from boehmite to alumina. 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.*, 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.”). In addition, Appellant does not dispute the Examiner’s finding (Ans. 9) that Bauer does not disclose any processing temperatures that reach 500°C for such a reaction to occur.

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 Bauer and Kido. Accordingly, we affirm the Examiner's rejection of claim 36 as well as claims 37, 38, 40, and 45 under 35 U.S.C. § 103(a) over Bauer and Kido for the above reasons and those provided by the Examiner.

Claims 41, 43, 44

Claims 41, 43, and 44 each depend from claim 40. Claim 40 is directed to a separator for an electrochemical device comprising, *inter alia*, a porous base according to claim 36. Appeal Br. (Claims Appendix). The Examiner rejects claims 41, 43, and 44 over the combination of Bauer and Kido and additionally relies on Tsukuda, Doi, and Abe, respectively, for the additional recitations in the dependent claims. Final Act. 5–7. Because we find Appellant's arguments unpersuasive of error in the Examiner's combination of Bauer and Kido for the reasons discussed above, we likewise affirm the Examiner's rejection of claims 41, 43, and 44 for the same reasons.

Claim 42

Appellant contends that the Examiner erred in rejecting claim 42 because Wensley does not disclose the Gurley values of its coating 14 and the entire separator. Appeal Br. 10. According to Appellant, because Wensley's coating 14 does not contain a solid like Bauer's first layer, it is not porous, thus the Gurley values of coating 14 and the entire separator are much larger than the upper range recited in claim 42 (300 sec/100 cc). *Id.*

The Examiner responds that Wensley teaches a membrane for a separator that has an air permeability Gurley value of no more than 300 sec/100 cc. Ans. 10 (citing Wensley 3:25–27). The Examiner also finds that Wensley teaches that the coating on the membrane does not fill the pores. *Id.* (citing Wensley 2:29–34). The Examiner concludes that Wensley will have an air permeability Gurley value of no more than 300 sec/100 cc for such a membrane for a separator as requested by claim 42. *Id.* The Examiner provides Yoo as further evidence that a porous separator membrane that comprises a coating that does not fill the pores of the porous membrane provides a separator with an air permeability of less than 300 sec/100 cc. *Id.* (citing Yoo 3:39–44, 4:40–54, 12:42–44 (Example 1)).

Appellant’s arguments do not persuade us that the Examiner reversibly erred in rejecting claim 42 over the cited prior art references. The cited record in this Appeal supports each of the Examiner’s findings regarding the Gurley value for a porous separator. Appellant does not dispute the Examiner’s evidence that the air permeability value required by claim 42 would be met by a separator that also contains particles. Yoo 3:39–44; Ans. 10.

Accordingly, we affirm the Examiner’s rejection of claim 42 under 35 U.S.C. § 103(a).

CONCLUSION

For these reasons and those the Examiner provides, we uphold the Examiner’s rejection of claims 36–38 and 40–45 under 35 U.S.C. § 103(a) as obvious over the cited prior art references.

DECISION SUMMARY

In summary:

Claim(s) Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
36–38, 40, 45	103(a)	Bauer, Kido	36–38, 40, 45	
41	103(a)	Bauer, Kido, Tsukuda	41	
42	103(a)	Bauer, Kido, Wensley	42	
43	103(a)	Bauer, Kido, Doi	43	
44	103(a)	Bauer, Kido, Abe	44	
Overall Outcome			36–38, 40–45	

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)(1)(iv).

AFFIRMED