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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NAOKI MIZUNO, MICHIHIKO IRIE, and KEN SHIMIZU

Appeal 2017-010868
Application 14/342,875
Technology Center 1700

Before ADRIENE LEPIANE HANLON, N. WHITNEY WILSON, and JEFFREY R. SNAY, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants[1] appeal under 35 U.S.C. § 134(a) from the Examiner's October 21, 2016 decision finally rejecting claims 1–3 ("Final Act."). We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We reverse.

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[1] Appellants identify the real party in interest as Toray Battery Separator Film Co., Ltd. (Br. 1).

CLAIMED SUBJECT MATTER

The application on appeal describes a battery separator comprising a porous membrane A and a porous membrane B which is laminated onto porous membrane A (Abstract). Porous membrane A comprises a polyolefin resin while porous membrane B comprises a fluororesin and inorganic particles or cross-linked polymer particles (*id.*). The inorganic or cross-linked polymer particles comprise 80 wt% to 97 wt% of porous membrane B and have an average diameter not less than 1.5 times and less than 50 times the average pore size of porous membrane A (*id.*), and must meet certain specific expressions, as set forth in claim 1. The claimed battery separator is said to have excellent heat resistance and processability (*id.*). Details of the claimed invention are set forth in representative claim 1, as reproduced below from the Claims Appendix:

> 1. A battery separator comprising: a porous membrane A comprising a polyolefin resin, and a porous membrane B laminated thereon comprising a fluororesin and inorganic particles or cross-linked polymer particles,
>
> wherein the particles comprise 80 wt% to 97 wt% of the porous membrane B and have an average diameter being not less than 1.5 times and less than 50 times the average pore size of the porous membrane A, and the fluororesin infiltrates in trace amounts deep into pores of the porous membrane A, and infiltration in trace amounts is determined by Expression 1 and infiltration deep into pores is determined by Expression 2:
>
> $$0.01 \leq absT_{(1200)} \leq 0.30 \qquad (1)$$
>
> $absT_{(1200)}$: infrared spectroscopic absorbance of an absorption having a peak at or near 1,200 cm^{-1} per 10 μm thickness of the porous membrane A, as measured by infrared spectroscopy (transmission method) after peeling the porous membrane B off the porous membrane A; and

$$0.001 \leq absR_{(1200)} \leq 0.030 \quad (2)$$

$absR_{(1200)}$: infrared spectroscopic absorbance of a maximum peak at or near 1,200 cm^{-1}, as measured by infrared spectroscopy (reflection method) on the surface of the porous membrane A that is opposite to the porous membrane B.

REJECTIONS

I. Claims 1 and 2 are rejected under 35 U.S.C. § 103(a) as unpatentable over Lee.[2]

II. Claim 3 is rejected under 35 U.S.C. § 103(a) as unpatentable over Lee, and further in view of Katayama.[3]

The Examiner also finally rejected all of the claims on appeal under 35 U.S.C. § 112, second paragraph as being indefinite. However, this rejection was withdrawn (Ans. 3) and is not, therefore, before us.

DISCUSSION

Because we decide this appeal based on a limitation in claim 1 and common to each of the claims on appeal, we focus our discussion on the rejection of claim 1 as unpatentable over Lee.

With regards to Rejection I, the Examiner finds that Lee discloses a porous battery separator comprising a porous polyolefin resin substrate having a fluororesin and inorganic particles laminated thereon (Final Act. 3, citing Lee, Abstract, ¶ 47). The Examiner further finds that Lee discloses that the fluororesin infiltrates into the pores of the porous membrane, and

[2] Lee et al., US 2009/0111025 A1, published April 30, 2009.
[3] Katayama et al., US 2007/0264577 A1, published November 15, 2007.

that the inorganic particles are present in an amount of 80 wt% (Final Act. 3, citing Lee, Abstract, ¶ 48). The Examiner also finds that Lee teaches that the controlling and optimizing of the pore size and porosity of the composite porous separator is a result-effective variable by increasing the ion conductivity, safety and quality of the separator (*id.*, citing Lee, Abstract, ¶ 32).

The Examiner determines that it would have been obvious to optimize the pore size and porosity of the inorganic particles and the composite membrane and optimize how much and how deep the fluororesin infiltrates into the pores of the porous membrane by routine experimentation to fall within the claimed ranges "because Lee . . . teaches that the ion conductivity, safety and quality of the separator can be improved" (Final Act. 3, citing Lee, Abstract, ¶ 32). The Examiner also finds that Lee does not specifically disclose the claimed absorbance expressions (*id.* at 4), but that such "absorbance expressions are inherent given that the materials used, particle size, porosity and the die coating method of the prior art and the claimed invention are the same" (Ans. 2–3).

Appellants argue, *inter alia*, that: (1) although Lee discloses both pore and particle sizes which overlap with the claimed amounts, Lee does not disclose any ranges for the ratio of the particle diameter and the pore size of porous membrane A, much less an overlapping range; and (2) Lee's silence with respect to the ratio of the particle size and pore diameter of membrane A shows that this ratio is not a result effective variable which would suggest optimization of the ratio to the claimed range (Br. 6–7).

Appellants' arguments are persuasive. The Examiner finds that Lee teaches that controlling and optimizing of the pore size and porosity of the

composite porous separator is a result effective variable by increasing the ion conductivity, electrolyte swellability, safety and quality of the separator (Ans. 4–5, citing Lee, Abstract, ¶¶ 18, 32). The Examiner also finds that Lee discloses pore sizes for the membrane and particle diameters for the inorganic particles which fall within the claimed ranges, and determines that where claimed ranges overlap or lie inside ranges disclosed by the prior art a prima facie case of obviousness exists (Final Act. 3–4; Ans. 6).

However, as argued by Appellants, the claim does not recite ranges for particle diameter and pore size, but instead recites a ratio between those two characteristics (between 1.5 and 50). The Examiner has not found that Lee discloses an embodiment in which the disclosed pore size and particle diameter have the claimed relationship, nor has the Examiner provided a persuasive explanation of why a person of skill in the art would have selected these parameters so as to achieve the claimed ratio (*see* Final Act. 3–4; Ans. 6–7). In addition, the Examiner has not shown that the claimed parameter (i.e. the ratio of particle size to pore diameter) was recognized as a result-effective variable, and thus, has not demonstrated that optimization of this variable would have been obvious.

To establish a prima facie case of obviousness, the Examiner must show that each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of those of ordinary skill in the art or the inferences and creative steps a person of ordinary skill in the art would have employed. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417–18 (2007). In the absence of a proper prima facie case of obviousness, an applicant who complies with the other statutory requirements is entitled to a

patent. *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998); *see also In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). On the record before us, the Examiner has not made findings which show that the claimed ratio of the particle diameter to the average pore size is either described or would have been obvious in light of the teachings of the prior art, or would have been obvious based on the knowledge or inferences and creativity of the ordinary artisan. Accordingly, we reverse each rejection of claims 1–3.

CONCLUSION

We REVERSE the rejection of claims 1 and 2 under 35 U.S.C. § 103(a) as unpatentable over Lee.

We REVERSE the rejection of claim 3 under 35 U.S.C. § 103(a) as unpatentable over Lee, and further in view of Katayama.

REVERSED