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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KAZUHIRO DONOUE, TAKAO INOUE,
DENIS YAU WAI YU, and MASAHISA FUJIMOTO

Appeal 2011-010503
Application 11/814,234
Technology Center 1700

Before ROMULO H. DELMENDO, LINDA M. GAUDETTE, and
GRACE KARAFFA OBERMANN, *Administrative Patent Judges*.

OBERMANN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants seek relief under 35 U.S.C. § 134 from the rejection of claims 1-6 and 8-14 as unpatentable under 35 U.S.C. § 103(a) in view of *Torimae* (US 2004/0234858 A1, pub. Nov. 25, 2004). We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

Claim 1 is illustrative of the subject matter on appeal:

1. A nonaqueous electrolyte secondary battery comprising:

a positive electrode (1) including a collector and a mixture layer, formed on said collector, containing a positive electrode active material containing lithium iron phosphate, a conductive agent and a binder with said mixture layer exhibiting a mixture filling density is in the range of 1.7 g/cm^3 to 2.4 g/cm^3 after electrode formation; and

a nonaqueous electrolyte (5) containing a solvent containing ethylene carbonate and chain ether.

Appellants separately argue two groups of claims; the first group consists of claims 1-6 and 12-14; and the second group consists of claims 8-11. App. Br. 7, 12. We select claim 1 as representative of the first group and claim 8 as representative of the second group. Claims 2-6 and 12-14 stand or fall with claim 1. Claims 9-11 stand or fall with claim 8.

The Examiner finds that Torimae discloses a “density of the positive electrode active material [that] is at least 1.4 g/cm^3 .” Ans. 3 (citing Torimae ¶ [0043] (emphasis omitted)). Claim 1, by contrast, specifies “a mixture filling density [] in the range of 1.7 g/cm^3 to 2.4 g/cm^3 ,” which Appellants argue “is critical” and renders the invention patentable over Torimae in view of proffered evidence of unexpected results. App. Br. 7-8. Specifically, Appellants advance Table 1 in the Specification, which summarizes test results of inventive examples that have filling densities ranging from 1.7 to 2.4 g/cm^3 as well as one comparative example having a filling density of 1.5 g/cm^3 . *Id.* 8-9 (reproducing Table 1).

Appellants contend that the data in Table 1 shows “likely small incremental increases in discharge capacity based on filling density from a level below 1.5 g/cm^3 up to 1.5 g/cm^3 .” *Id.* 9. Appellants further contend

that the evidence shows “small incremental” improvements when the filling density is between 2.1 and 2.4 g/cm³ and “extraordinarily rapid response in discharge capacity” for densities between 1.7 and 2.4 g/cm³. *Id.* at 10.

Table 1 in fact shows a significant increase in discharge capacity when filling density increases from 1.5 to 1.7 g/cm³ and from 1.7 to 1.8 g/cm³, a very modest increase in discharge capacity from 1.8 to 1.9 g/cm³, another significant increase from 1.9 to 2.1 g/cm³, and another very modest increase from 2.1 to 2.4 g/cm³. Spec. at Table 1. In our opinion, even if this data establishes a lower limit on the range of filling densities that will achieve unexpected results, it is insufficient to establish a trend establishing an upper limit thereon. *Cf. In re Kollman*, 595 F.2d 48, 56 (CCPA 1979) (acknowledging that in some cases several data points may enable an ordinary artisan “to ascertain a trend in the exemplified data which would allow him to reasonably extend the probative value thereof”). Specifically, as the Examiner points out, Appellants come forward with no data for filling densities of “2.5 [g/cm³] and beyond,” and we have no way of knowing whether a significant increase, sandwiched between modest increases, as reported in Table 1 when the density is raised from 1.9 to 2.1 g/cm³, might similarly occur when the filling density is raised beyond 2.4 g/cm³. Ans. 7.

Appellants thus fail to establish criticality of the upper limit of the range specified in claim 1. Compare *In re Inland Steel Co.*, 265 F.3d 1354, 1366 (Fed. Cir. 2001) (“Inland did not offer comprehensive test results for the magnetic properties of steel produced under the ‘574 claims at antimony levels greater than 0.02%.”). In other words, we find no basis in Appellants’ evidence or argument to conclude that unexpected results are obtained when the density is 2.4 g/cm³, as specified in claim 1, but not when the density is

2.5 g/cm³, as encompassed by Torimae's range of "at least 1.4 g/cm³." Torimae ¶ [0042]. On this record, we agree with the Examiner that Appellants' evidence of unexpected results is not commensurate in scope with claim 1 and, therefore, is insufficient to rebut the prima facie case of obviousness. Ans. 8 ("the criticality of the claimed range is not proven").

As for claim 8, we agree with Appellants that the specified solvent "must include 1,2-dimethoxyethane (DME)," for example, a mixture of ethylene carbonate (EC) and DME. App. Br. 13; *see* claim 8. We also agree with the Examiner's view that Torimae places no limit on the solvent, which can comprise, for example, a mixture of EC and DME, or a mixture of EC and diethyl carbonate (DEC). Ans. 5 (citing Torimae ¶ [0046]). We agree that Torimae treats these two solvent combinations equally, without suggesting a preference for either combination. App. Br. 13, 14.

Appellants argue that the data reflected in Table 2 in the Specification establishes that the use of DME achieves unexpected results sufficient to rebut the obviousness determination. App. Br. 13 (reproducing Table 2). We agree that Table 2 shows that a solvent comprising a 3:7 ratio of EC:DME greatly outperforms, in terms of discharge capacity per active material, a solvent comprising a 3:7 ratio of EC:DEC. Spec. at Table 2. However, that is the only informative comparison reflected in the data. The other inventive examples comprising DME (Examples 6-9) are not compared to solvents of similar proportions that contain no DME. *Id.*

It is curious to us that the result reported for the solvent comprising a 5:5 ratio of EC:DME (Example 9) is significantly inferior to the results achieved in the other inventive examples containing DME. In the absence of a comparative example, we are left to wonder whether a solvent comprising

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a 5:5 ratio of EC:DEC would outperform the inventive solvent comprising a 5:5 ratio of EC:DME. On this record, the single comparative example (relating to solvents in 3:7 ratios) is insufficient to overcome the prima facie case of obviousness. We agree with the Examiner that Appellants' evidence of unexpected results is not commensurate in scope with claim 8, which places no limit on the volume ratios of the components. Ans. 9.

No persuasive argument or evidence of reversible error having been brought forward by Appellants, we affirm the rejection of claims 1-6 and 8-14 as unpatentable over Torimae.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136.

AFFIRMED

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