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NORTON ROSE FULBRIGHT US LLP
1301 Avenue of the Americas
NEW YORK, NY 10019-6022

EXAMINER
ISHIZUKA, YOSHIHISA

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ALEXANDER SCHMIDT[1]

Appeal 2016-005601
Application 13/132,861
Technology Center 2800

Before BRADLEY R. GARRIS, JAMES C. HOUSEL, and MERRELL C. CASHION, JR., *Administrative Patent Judges*.

GARRIS, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's decision rejecting claims 13, 14, 17, 18, and 20–24. We have jurisdiction under 35 U.S.C. § 6.

We AFFIRM.

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[1] Robert Bosch GmbH is identified as the real party in interest. App. Br. 1.

Appellant claims a method for determining a charge state of a secondary intercalation cell having an anode, a cathode, a separator, and an electrolyte phase comprising:

determining the charge state by back-calculating with an electrochemical simulation model in which physical-chemical properties in the anode and the cathode are considered in simplified form as being homogeneously distributed;

determining simulation model Butler-Volmer reaction kinetics for the anode and the cathode; and

expanding the Butler-Volmer reaction kinetics on the anode side by a potential component in the electrolyte phase of the anode (sole independent claim 13).

Further details of Appellant's claimed method are set forth in representative claim 13, a copy of which taken from the Claims Appendix of the Appeal Brief appears below.

> 13. A method for determining a charge state of a secondary intercalation cell having an anode, a cathode, a separator, and an electrolyte phase which saturates the anode, the cathode, and the separator, the method comprising:
>
> determining the charge state by back-calculating based on measured variables, which are measured on the intercalation cell, with an electrochemical simulation model, in which simulation model physical-chemical properties in the anode and the cathode are considered in simplified form as being homogeneously distributed in the anode and in the cathode in each case;
>
> determining simulation model Butler-Volmer reaction kinetics in each case for the anode and the cathode; and
>
> expanding the Butler-Volmer reaction kinetics on the anode side by a potential component ($\Phi 2$) in the electrolyte phase of the anode,

> wherein, for the anode-side expansion of the Butler-Volmer reaction kinetics, the potential component in the electrolyte phase of the anode is estimated based on a charge or discharge current of the cell, a mean electrical conductivity of the electrolyte phase, and a thickness of an anode-separator-cathode sandwich;
>
> wherein an overpotential ηs,a of the Butler-Volmer reaction kinetics of the anode, which are expanded by a potential component in the electrolyte phase of the anode, is calculated according to
>
> ηs,a = Φs,a- Ua(cs,a) – Φ2(k,I,L) – ΦSEI
>
> where Φs,a is the voltage drop in the solid phase at a charge or discharge current I of the cell, Ua(cs,a) is the open-circuit voltage of the anode as a function of concentration cs,a of atoms, molecules and/or ions which are intercalated in the active particles of the anode during the intercalation, ΦSEI is the potential drop due to the film resistance on the surface of the anode, and Φ2(k,I,L) is the potential component in the electrolyte phase of the anode as a function of mean electrical conductivity k of the electrolyte phase, charge or discharge current I of the cell, and thickness L of the anode-separator-cathode sandwich;
>
> wherein the potential component Φ2(k,I,L) in the electrolyte phase of the anode is calculated according to Φ2 = k-1 •L• I(t), where k is the mean electrical conductivity of the electrolyte phase, L is the thickness of the anode-separator-cathode sandwich, and I(t) is the charge or discharge current of the cell as a function of time t;
>
> wherein the mean electrical conductivity k of the electrolyte phase is weighted using a weighting w.

The Examiner rejects all appealed claims under 35 U.S.C. § 112, 2nd paragraph, as indefinite.

Under 35 U.S.C. § 103(a), the Examiner rejects independent claim 13 as unpatentable over Nishi (WO 2008/026525 A1, published March 6, 2008, with EP 2 124 288 A1, published Nov. 25, 2009, relied on and cited to as the English equivalent) in view of Imamura (US 2002/0180448 A1, published

Dec. 5, 2002) and Li (US 2008/0243461 A1, published Oct. 2, 2008) and rejects remaining dependent claims 14, 17, 18, and 20–24 as unpatentable over these references alone or in combination with an additional prior art reference.

Finally, the Examiner rejects all appealed claims under 35 U.S.C. § 101 as directed to ineligible subject matter.

In contesting these rejections, Appellant does not present separate arguments specifically directed to the dependent claims under rejection (App. Br. 3–5). Therefore, the dependent claims will stand or fall with their parent independent claim 13.

We sustain each of the Examiner's rejections for the reasons expressed in the Final Action, the Answer, and below.

The § 112, 2nd paragraph, Rejection

The Examiner determines that the appealed claims are indefinite because the independent claim equation "$\Phi 2=k\text{-}1 \cdot L \cdot I(t)$" does not possess the same units on the left and right hand sides (Final Action 4; *see also id.* at 2).

In contesting this rejection, the Appellant states that, "in the prior art rejection, the Examiner purports to have found the potential component $\Phi 2$ in the asserted combination" (App. Br. 3) and argues that "[i]t cannot both be true that the potential component is indefinite in the particular way asserted by the Examiner, yet also found in the prior art" (*id.*).

The Examiner responds by explaining that in the prior art rejection the claims were interpreted as encompassing a narrow embodiment wherein the potential component $\Phi 2$ is limited to a given region or area (*see* Final Action 10) (i.e., whereby the units on the left and right hand sides of the

equation are equivalent) but that the claims are still indefinite with respect to broader embodiments wherein Φ2 is not so limited (i.e., whereby the aforementioned units on the left and right hand sides of the equation are different) (Ans. 2–3).

In the Reply Brief, Appellant "stands on the arguments submitted in the Appeal Brief" (Reply Br. 1). As a consequence, on this record, Appellant fails to challenge the Examiner's determination that the appealed claims, while encompassing a narrow embodiment which is definite, also encompass broader embodiments which are indefinite.

We sustain, therefore, the § 112, 2nd paragraph, rejection of all appealed claims.[2]

The § 103 Rejections

In rejecting claim 13, the Examiner finds that Nishi discloses a method for determining a charge state of a secondary intercalation cell (Final Action 5–7) but is silent regarding the claim features relating to a mean electrical conductivity of the electrolyte phase and wherein this mean electrical conductivity is weighted using a weighting w (*id.* at 7). With respect to these deficiencies, the Examiner finds that Imamura teaches the mean electrical conductivity feature (*id.* at 7–8) and that Li teaches the feature of using a weighted average (*id.* at 8). Based on these findings, the Examiner concludes that it would have been obvious to modify Nishi by

[2] We are able to assess the § 103 and § 101 rejections of the appealed claims based on the Examiner's undisputed determination that the claims encompass a narrow and definite embodiment even though they also encompass broader and indefinite embodiments.

using a mean conductivity of the electrolyte phase as taught by Imamura and wherein the mean conductivity is weighted as taught by Li "because a mean conductivity using a weighted average would give a better [and] more accurate measure of the average" (*id.* at 10).

Appellant argues that "Li (at paragraph [0073]) merely refers to a 'weighted average of thermal conductivities' . . . [and] does not, however, disclose applying a weighting w to a mean electrical conductivity of an electrolyte phase" (App. Br. 4). Appellant further argues that "the Office Action fails to specifically articulate what teachings or suggestions in Nishi and Imamura would have motivated one of ordinary skill in the art to combine such a disparate reference, Li, to provide the above features of claim 13" (*id.*).

Appellant's argument lacks persuasive merit. In responding to this argument, the Examiner explains that the rejection relies on the combined teachings of Imamura and Li wherein Imamura is relied on for teaching a mean electrical conductivity of an electrolyte phase and Li is relied on for teaching the use of a weighted average (Ans. 5–6). Moreover, the Examiner convincingly articulates the motivation for combining these reference teachings in the manner required by claim 13, namely, "to more accurately reflect an appropriate value" (*id.*; *see also* Final Action 10). Finally, the Examiner correctly points out that Appellant cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references (Ans. 6, citing *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) and *In re Keller*, 642 F.2d 413, 426 (CCPA 1981)).

Significantly, Appellant's Reply Brief does not rebut the Examiner's position in any of these respects (Reply Br. 4 ("As for the prior art

rejections, Appellant chooses to stand on the arguments in the Appeal Brief.")).

Under these circumstances, we also sustain the § 103 rejections of the appealed claims.

The § 101 Rejection

This rejection is based on the Examiner's determination that the appealed claims are directed to ineligible subject matter "because the claim(s) as a whole, considering all claim elements both individually and in combination, do not amount to significantly more than an abstract idea . . . of a mathematical relationship or formula" (Final Action 4–5).

In *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014), the Supreme Court reiterated the following two-step analysis (previously set forth in *Mayo Collaborative Services v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1300 (2012)) for distinguishing patents that claim patent-ineligible laws of nature, natural phenomenon, and abstract ideas from those that claim patent-eligible applications of those concepts:

> First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, what else is there in the claims before us? . . . We have described step two of this analysis as a search for an inventive concept--i.e., an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself.

Alice, 134 S. Ct. at 2355.

Appellant cites *In re Bilski*, 545 F.3d 943, 954 (Fed. Cir. 2009) and *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1333 (Fed. Cir. 2010) (App. Br. 3–4) as support for contending that "the [claimed] method of determining the charge state of a secondary intercalation cell (1) cannot

be performed without a machine and (2) the calculations could not be performed entirely in the human mind[, and,] [a]ccordingly, claims 13, 14, 17, 18 and 20 to 24 are directed to statutory subject matter" (*id.* at 4).

The Examiner responds to this contention by finding that, "[e]ven though some mathematical calculations may be difficult to perform and calculate in the human mind, it is still possible [whereby] [i]t may take some time but a human mind could perform the claimed steps" (Ans. 5).

Appellant's contention is unpersuasive for a number of reasons. Initially, we emphasize that Appellant in the Reply Brief does not dispute the Examiner's above quoted finding (Reply Br. 1–4). Moreover, we observe that Appellant does not identify any claim language or any disclosure in the Specification requiring the claimed method to be performed with a machine such as a computer in such a manner as to render the claimed method patent-eligible subject matter under § 101. Finally, we point out that the *Bilski* and *SiRF* Federal Circuit cases cited by Appellant are of questionable value in analyzing the § 101 issue before us because these cases were decided before, and thus did not have the guidance provided by, the Supreme Court in *Mayo* and *Alice*.

Appellant also argues that "the claims here . . . are not directed to any human activity or fundamental economic practice [and] . . . are not *directed to* a judicial exception" (Reply Br. 2).

However, in the record before us, Appellant does not dispute the Examiner's previously quoted determination that the claims are directed to a mathematical relationship or formula. A mathematical formula is judicially recognized as patent-ineligible subject matter. *See Parker v. Flook*, 437 U.S. 584, 585–86, 594–95 (1978).

Appellant further contends that "this case resembles *SiRF Technology Inc. v. International Trade Commission*, 601 F.3d 1319 (Fed. Cir. 2010), in which the Federal Circuit held that, despite the claims at issue containing calculation steps, the claimed invention was directed not to the calculations as such, but to the use of those calculations for the accomplishment of a specific technological purpose" (Reply Br. 4). Appellant expands this contention by urging that "[s]imilarly, the claims here are not directed merely to the performance of these calculations and use of the model in an unspecified way [but rather] [t]hese claims direct and focus these calculations for the accomplishment of a technical improvement in the art of intercalated cells by improving upon the way that their SOC [i.e., state of charge] is measured" (*id.*).

For a number of reasons, Appellant's contentions have no convincing merit. As indicated earlier, *SiRF* is of questionable value as support for Appellant's position because it precedes the guidance provided by *Mayo* and *Alice*. Moreover, in *SiRF*, the GPS receiver was considered to place a meaningful limitation on the claims because "without a GPS receiver it would be impossible to generate pseudoranges or to determine the position of the GPS receiver whose position is the precise goal of the claims" (*SiRF*, 601 F.3d at 1332). In contrast, claim 13 merely recites a mathematical formula for determining a charge state of a secondary intercalation cell and recites no application to the operation of the cell or any other device. *Compare Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1349 (Fed. Cir. 2017) ("Far from claiming the equations themselves, the claims seek to protect only the application of physics to the unconventional configuration of sensors as disclosed."). Finally, we point out that, contrary to Appellant's apparent belief, a patent-ineligible abstract idea of a mathematical formula is

not transformed into a patent-eligible invention by "limiting the use of an abstract idea 'to a particular technological environment'" (*Alice*, 134 S. Ct. at 2358, quoting *Bilski v. Kappos*, 561 U.S. 593, 610–11 (2010)).

Because Appellant fails to show error on the Examiner's part, we also sustain the § 101 rejection of all appealed claims.

Conclusion

The decision of the Examiner is affirmed.

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