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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SOREN-OLIVER DEININGER
and ERYK WOLSKI

Appeal 2017-000075
Application 13/110,541[1]
Technology Center 2800

Before CATHERINE Q. TIMM, WESLEY B. DERRICK, and DEBRA L. DENNETT, *Administrative Patent Judges*.

DENNETT, *Administrative Patent Judge*.

DECISION ON APPEAL[2]

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[1] Appellants identify Bruker Daltonik GmbH as the real party in interest. Appeal Br. 1.

[2] In our Opinion, we refer to the Specification filed May 18, 2011 ("Spec."); the Final Action mailed September 9, 2015 ("Final Act."); the Appeal Brief filed February 22, 2016 ("Appeal Br."); the Examiner's Answer mailed July 27, 2016 ("Ans."); and the Reply Brief filed September 26, 2016 ("Reply Br.").

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's Final rejection of claims 1–10. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

The subject matter on appeal relates to methods for normalizing mass spectra acquired by imaging mass spectrometry, particularly by imaging tissue sections using matrix assisted laser desorption/ionization. Spec. ¶ 1. Claims 1 and 3, reproduced below, are illustrative of the claimed subject matter:

> 1. A method for normalizing mass spectra of a mass spectrometric imaging data set of a tissue section, comprising:
>
> acquiring a set of mass spectra at a plurality of spatially-separated pixel locations of the tissue section;
>
> modifying each of the mass spectra by applying an intensity value exclusion list of mass values that correspond to compounds that are inhomogeneously distributed within the tissue section and produce mass signals with high intensity or large areas under the peak at only a portion of the pixel locations; and
>
> determining the p-norm of each of the modified mass spectra.
>
> 3. A method for normalizing mass spectra of a mass spectrometric imaging data set of a tissue section comprising the steps:
>
> (a) acquiring a set of mass spectra at a plurality of spatially-separated pixel locations of the tissue section;
>
> (b) calculating first normalization factors for each mass spectrum by a p-norm;
>
> (c) calculating second normalization factors for each mass spectrum by

> (c1) the p-norm of the mass spectrum after modification by applying an exclusion list of mass values that correspond to compounds that are inhomogeneously distributed within the tissue section and produce mass signals with high intensity or large areas under the peak at only a portion of the pixel locations,
>
> (c2) the p-norm of the mass spectrum transformed by square rooting the intensity values,
>
> (c3) the median of the mass spectrum, or
>
> (c4) the median absolute deviation of the noise level of the mass spectrum, and
>
> (d) normalizing each mass spectrum by the corresponding first normalization factor, when the first and second normalization factors match in a statistical test, otherwise normalizing each mass spectrum by the corresponding second normalization factor.

Appeal Br. 9–10 (Claims App'x) (some indenting added for clarity).

REJECTIONS

In response to Appellants' amendment of May 20, 2015, the Examiner newly rejects claims 1–10 under 35 U.S.C. § 101 as directed to non-statutory subject matter. Final Act. 2.

OPINION

The rejections under Section 101 are based on the Examiner's determination that the claims are directed to ineligible subject matter because the "claim(s), as a whole, considering all claims elements both individually and in combination, do not amount to significantly more than an abstract idea." Final Act. 2.

The Supreme Court gives us the following two-step analysis 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 Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S.Ct. 2347, 2355 (2014) (citations omitted).

The "directed to" inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether "their character as a whole is directed to excluded subject matter." *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015); *see also Genetic Techs. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1375 (Fed. Cir. 2016) (inquiring into "the focus of the claimed advance over the prior art").

"The 'abstract idea' step of the inquiry calls upon us to look at the 'focus of the claimed advance over the prior art' to determine if the claim's 'character as a whole' is directed to excluded subject matter.'" *Affinity Labs of Texas v. DirectTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016) (citing *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016).

The Specification describes the invention as providing "methods for normalizing mass spectra acquired by imaging mass spectrometry." Spec. ¶ 1. Normalization is defined as "the process of multiplying (or dividing) a mass spectrum with an intensity-scaling factor (normalization factor f) to expand or reduce the range of the intensity axis. It is used to compare mass spectra of varying intensity." *Id.* ¶ 7. The Specification explains that the intrinsic properties of a tissue and the preparation of a tissue section for imaging can lead to artifacts in normalized mass images. *Id.* ¶ 8. Appellants resolve this artifact problem by normalizing mass spectra of a mass spectrometric imaging data in a variety of methods. *Id.* ¶ 17. The focus is on manipulating data. The claims as a whole are focused on the concept of normalizing mass spectra of a mass spectrometric imaging data set of a tissue section. Appeal Br. 9–10 (Claims App'x).

Rejection of claim 1

The Examiner finds that claim 1 is directed to the abstract idea of modifying each of the mass spectra by applying an intensity value exclusion list of mass value, and determining the p-norm of each of the modified mass spectra. Final Act. 3. The Examiner finds that "every step of claim 1 is either a step of normalization or a step done purely in service of the normalization." Ans. 3.

Appellants' argument disputing the Examiner's identification of the abstract idea of claim 1 is unpersuasive. *See* Appeal Br. 3. Appellants direct us to nothing that suggests the Examiner improperly identifies claim 1 as directed to an abstract idea or improperly identifies the abstract idea.

Nor do we agree with Appellants' contention that the Examiner finds "that the only relevant part of the claims for the purposes of an analysis under 35 U.S.C. § 101 is the last step of the claimed method" (determining the p-norm of each of the modified mass spectra). *Id.; see also* Reply Br. 2–3. The Examiner discusses each of the three steps of the claim separately and as a whole. Final Act. 3. Appellants' contention that, because the Examiner finds that "every step of claim 1 is either a step of normalization or a step done purely in the service of the normalization," the Examiner gives less weight to some steps than others (Reply Br. 2) is disproved by the Final Action and Answer. As a consequence, Appellants' discussion of *Bascom Global Internet Services, Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016) is unconvincing.

For example, despite Appellants' contention (Appeal Brief 4), the Examiner does not ignore the step of "acquiring a set of mass spectra at a plurality of spatially-separated pixel locations of the tissue section;" rather, the Examiner considers the step and finds it to be "merely [a step] of data gathering" (*see* Final Act). The Examiner finds that the "acquiring" step does not clarify how the data is acquired, which may be retrieval of data from data storage. *Id.* at 8. The acquired data is used only in the context of mathematical operations on the data acquired. Appeal Br. 9–10 (Claims App'x *(compare* claim 1, *with* 3)). Linking the claim to a particular technological environment, in this case the field of mass spectrometric imaging, does not confer patent eligibility on an abstract idea. *Alice*, 134 S.Ct. at 2358 (citing *Bilski v. Kappos*, 130 S.Ct. 3218, 3230 (2010).

The "acquiring" step is insufficient to make the claim into significantly more than a patent upon the ineligible concept itself. *See Alice*,

134 S.Ct. at 2355. "Information as such is an intangible." *Elec. Power Grp, LLC*, 830 F.3d at 1354 (Fed. Cir. 2016) (citations omitted). Collecting information, including when limited to particular content (which does not change its character as information) is treated as within the realm of abstract ideas, as is analyzing information by mathematical algorithms. *Id.*

Appellants' arguments suggesting that the original source of the data is a tissue sample and the large size of the dataset somehow transforms the claim as a whole into something significantly more than an abstract idea are unpersuasive. *See id.* at 4–5. According to Appellants, claim 1 differs significantly from the claims in *Parker v. Flook*, 437 U.S. 584 (1978), in that *Flook* involved only a single measured value plugged into a formula, while "the multiple mass spectra are complex representations of a physical sample, and how they are arranged and/or modified has a profound impact on the result of the analysis." Appeal Br. 4–5. Appellants contend that simply applying a selected normalization function to the mass spectra, without modification by applying an intensity value exclusion list as in claim 1, may not achieve the best result. *Id.* at 5. However, Appellants provide no legal authority—and we know of none—supporting that achieving a better result in the mathematical manipulation of data turns an abstract idea into patentable subject matter. *Id.* An improvement in the mathematical manipulation of data is still an abstract idea.

Appellants contend that the Examiner disregards the step of modifying the mass spectra when stating that it is "a mere selection of which data to acquire in the normalization process." Appeal Br. 5. Appellants explain that the spectra are modified by applying an intensity value exclusion list to the mass spectrometric data. *Id.*

However, Appellants do not explain how "applying an intensity value exclusion list" to data in the "modifying" step is anything other than performing mathematical operations, however complex. The Examiner finds that nothing more is done with the modification of the mass spectra other than to determine the p-norm. Such activity covers an abstract idea. *See Digitech Image Techs., LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) (Process that started with data, added an algorithm, and ended with a new form of data was directed to an abstract idea.). That the calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter. *FairWarning IP, LLC v. Iatric Systems, Inc.*, 839 F.3d 1089, 1098 (Fed. Cir. 2016).

Appellants characterize the claimed invention as improving a process of "analyzing a tissue section," and draw an analogy to the claims in *Diamond v. Diehr*, 101 S.Ct. 1048 (1981). *Id.* at 7.

The abstract-idea process of analysis, without any particular assertedly inventive technology for performing the function, remains an abstract idea, and not significantly more. *See Elec. Power Grp, LLC*, 830 F.3d at 1354. Claim 1 differs significantly from the process in *Diehr*, which uses a mold for precisely shaping uncured synthetic rubber under heat and pressure and then curing the rubber in the mold so that the product will retain its shape and be functionally operative after the molding is completed. *Diehr*, 101 S.Ct. at 1052. The Court in *Diehr* held

> That respondents' claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing cannot be disputed. The respondents' claims describe in detail a step-by-step method for

> accomplishing such, beginning with the loading of a mold with raw, uncured rubber and ending with the eventual opening of the press at the conclusion of the cure. Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws.

Diehr, 101 S.Ct. at 1055. The Court held the claims in *Diehr* to be patent eligible *despite* the fact that several steps of the process used a mathematical equation, not because of it. *Id.* Claim 1 describes no such transformation of an article into a different state or thing or industrial process.

The Examiner notes that data in claim 1 are gathered by a physical process, but the claim is not to an improved method of data gathering. Ans. 5. The only improvement provided is in the calculation of the p-norm, thus the ultimate result of claim 1 "as a whole is nothing more than a better numerical result," and the claim provides no indication of how the p-norm is to be used. *Id.* *Diehr*, in contrast, employs the result of its calculations to determine the cure time of the rubber and signal the mold to open. *Diehr*, 101 S.Ct. at 1052–53.

On the record before us, Appellants do not show that the Examiner reversibly erred in rejecting claim 1 under 35 U.S.C. § 101.

Rejection of claim 3

The Examiner finds that claim 3 is directed to the abstract idea of

> (b) calculating first normalization factors for each mass spectrum by a p-norm,
> (c) calculating second normalization factors for each mass spectrum by
> (c1) the p-norm of the mass spectrum after modification by applying an exclusion list of mass values that correspond to compounds that are inhomogeneously distributed within the tissue section and produce mass signals with high intensity or

> large areas under the peak at only a portion of the pixel locations,
>
> (c2) the p-norm of the mass spectrum transformed by square rooting the intensity values,
>
> (c3) the median of the mass spectrum, or (c4) the median absolute deviation of the noise level of the mass spectrum; and (d) normalizing each mass spectrum by the corresponding first normalization factor, when the first and second normalization factors match in a statistical test, otherwise normalizing each mass spectrum by the corresponding second normalization factor.

Final Act. 4. The Examiner further finds that all of the above steps "are purely steps of abstract mathematical calculation." *Id.* The additional step is identical to the first step in claim 1, i.e., acquiring a set of mass spectra at a plurality of spatially-separated pixel locations of the tissue section. *See* Appeal Br. 10 (Claims App'x). The Examiner finds "[t]his step is merely one of data gathering" and does not transform the claim into significantly more than the abstract idea. Final Act. 5.

As with claim 1, Appellants again dispute the Examiner's identification of the abstract idea by copying the words of the claim. *See* Appeal Br. 7. We find no prejudice to Appellants in this action.

Appellants argue that "acquiring a set of mass spectra at a plurality of spatially-separated pixel locations of the tissue section is a complex and critical physical step that is directly related to the purpose of the invention, namely, the accurate determination of a spatial distribution of compounds in a tissue section." Appeal Br. 7. Appellants argue that the Examiner ignores the fact that the process of the claim involves physical interaction with the tissue section. *Id.*

However, the Examiner finds that, as the "acquiring" step does not clarify how the data is acquired, such data may be retrieved from data storage, and thus does not involve a physical step. Final Act. 8.

Even if physical measurement to acquire data is required, the Examiner finds that the "acquiring" step is a step of extra-solution data gathering of data on which the abstract steps are performed, and that the activities are routine, conventional and well-understood in the field of mass spectrometric imaging. Ans. 5–6. The Examiner finds that any physical interaction with the tissue section that is involved in acquiring a set of mass spectra does not cause the claim to amount to significantly more than an abstract idea. *Id.* at 6.

Our reviewing court treats "collecting information, including when limited to particular content, (which does not change its character as information), as within the realm of abstract ideas." *Elec. Power Grp, LLC*, 830 F.3d at 1353. As a step of collecting information, the "acquiring" step therefore does not cause claim 3 to be directed to patent-eligible subject matter. In whole, the acquiring step combined with the remaining steps of mathematical calculation fails to ensure that the claim amounts to significantly more than a patent on an ineligible concept. *See Alice*, 134 S.Ct. at 2355.

We discern no reversible error in the Examiner's rejection of claim 3 under 35 U.S.C. §101.

Rejection of dependent claims

Claim 2 depends from claim 1. Appeal Br. 9 (Claims App'x). Claims 4–6 depend, directly or indirectly from claim 3. *Id.* at 10–11. Claims 7–10 depend, directly or indirectly, from either claim 1 or claim 3. *Id.* at 11.

Appellants do present separate arguments specifically direct to any of the dependent claims. Appeal Br. 2–7; *see also* Reply Br. 1–5. Therefore, these dependent claims will stand or fall with their parent independent claims 1 and 3.

CONCLUSION

The Examiner did not err reversibly in rejecting claims 1–10 as drawn to non-statutory subject matter because the claims as a whole do not amount to significantly more than an abstract idea.

DECISION

For the above reasons, the Examiner's rejection of claims 1–10 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