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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAVID MOTL and VOJTECH FILIP

Appeal 2017-010532
Application 13/398,114
Technology Center 2800

Before CATHERINE Q. TIMM, RAE LYNN P. GUEST, and DEBRA L. DENNETT, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellants[2] appeal from the Examiner's decision to reject claims 1–19 under 35 U.S.C. § 101 as directed

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[1] In explaining our Decision, we cite to the Specification of February 16, 2012 (Spec.), Final Office Action of June 3, 2016 (Final), Appeal Brief of April 3, 2017 (Appeal Br.), Examiner's Answer of June 16, 2017 (Ans.), and Reply Brief of August 7, 2017 (Reply Br.).

[2] Appellants identify the real party in interest as Tescan, A.S. Appeal Br. 2.

to non-statutory subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

The subject matter of the claims relates to a method and apparatus for material analysis (*see, e,g.*, claims 1, 5, 9, 15). Claim 1 is illustrative:

> 1. A computer-implemented method of material analysis by a focused electron beam using characteristic X-rays and back-scattered electrons comprising the steps of:
>
> [1] specifying an adequately large set P of chemical elements which might occur in an assayed sample;
>
> [2] determining an interval of energies of X-ray photons I_i corresponding with an emission line for each element p_i from the set P;
>
> [3] deflecting the focused electron beam consecutively into points on the assayed sample;
>
> [4] creating an electron map B, where values B(x, y) stored in the electron map B are related to the points on the assayed sample with coordinates (x, y) and correlate with an intensity of back-scattered electrons generated in these points;
>
> [5] creating a spectral map S by establishing a histogram of energies of X-ray radiation emitted at these points;
>
> [6] creating an X-ray map M_i for each element P_i from the set P, where values $M_i(x, y)$ stored in the map M_i are related to the points on the sample with coordinates (x, y) and correlate with intensity of X-ray radiation with energy within interval I_i emitted in these points, the values $M_i(x, y)$ being computed as a total number of X-ray energies recorded in the spectral map S as energies emitted from a point on the sample with coordinates (x, y) and have energy within interval I_i;

> [7] converting the X-ray maps M_i and the electron map B into a differential map D using a multi-channel edge-detection algorithm;
>
> [8] performing image segmentation using a watershed transformation applied to the differential map D in order to search for particles to produce a set Q of particles, where each particle is assigned a sequence number j, and a map R of particle distribution, where values R(x, y) stored in the map R are related to the points on the sample with coordinates (x, y) and correspond with the sequence number of the particle;
>
> [9] setting a value of coefficient a and determining spectrum X_j of X-ray radiation for each particle q_j from the set Q based on the spectral map S using the coefficient a, where the values $X_j(E)$ are accumulated values of the intensity of X-ray radiation with energy E;
>
> [10] computing total number of X-ray events that were recorded in spectrum X_j with energies within intervals I_i corresponding to each element p_i from the set P and each particle q_j from the set Q in order to get determined values $N_{i,j}$; and
>
> [11] displaying, on a display device, an image representing a spatial distribution of particles of the assayed sample based upon the preceding steps.

Appeal Br. 11–12 (claims appendix) (numbering added).

Claim 9 is similarly directed to a computer-implemented method of material analysis, but is broader in scope as it does not require the initial specifying and determining steps of claim 1. Nor does it require creating a spectral map S or setting a value of coefficient a and determining spectrum X_j, among other things.

Claims 5 and 15 are directed to equipment for material analysis including a scanning electron microscope that has devices for detecting

back-scattered electrons and X-ray radiation and converting analog signals to digital signals, a processing unit that performs the data processing steps of the method, and a display device that displays an image based on an output of the processing unit.

OPINION

Appellants do not argue any claim apart from the others. Appeal Br. 5–10. We select claim 1 as representative to resolve the issues on appeal.

We agree with the Examiner that the claims are directed to non-statutory subject matter because they do not amount to significantly more than an abstract idea embodied in a mathematical algorithm. Final 4–5; Ans. 4–15. We adopt the Examiner's reasoning as our own and add the following for emphasis.

Section 101 states that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." But even if a claim at first blush appears to be directed to one of the statutory classes of invention listed in § 101, it may be not eligible for a patent. "Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70–72 (2012) (quoting *Diamond v. Diehr,* 450 U.S. 175, 185 (1981) (quoting *Gottschalk v. Benson,* 409 U.S. 63, 67 (1972)). Thus, a claim that, due to the drafting efforts of the applicant, appears to fit into one of the statutory

classes, but, in fact, would unduly pre-empt others from making and using the basic tools of scientific and technological work, is not patentable. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354–55, 57 (2014).

In *Alice*, the Court extended a framework that had been used in *Mayo* for distinguishing claims pre-empting laws of nature, natural phenomena, and abstract ideas from claims amounting to patent-eligible applications of those concepts. *Alice*, 134 S. Ct. at 2355. As stated in *Alice*:

> 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?" To answer that question, we consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application. 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 (internal quotation marks and citations to *Mayo* omitted).

Although each step involves its own separate inquiry, the two stages involve overlapping scrutiny of the content of the claims. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016).

The *Alice* analysis begins with the question "whether the claims at issue are directed to a patent-ineligible concept." *Alice*, at 2355. "[T]he '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. '" *Enfish, LLC v. Microsoft Corp.*, 822 F.3d

1327, 1335 (Fed. Cir. 2016) (quoting *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015)).

One way to determine what the claim is "directed to" is to focus on the claimed advance over the prior art. *Genetic Techs. Ltd. v. Merial L.L.C.*, 818 F.3d 1369, 1375 (Fed. Cir. 2016). The advance cannot wholly reside in patent-ineligible concepts themselves such as mathematical formulas and algorithms. *See Parker v. Flook,* 437 U.S. 584, 591 (1978) ("The process itself, not merely the mathematical algorithm, must be new and useful.").

Looking to the written description of Appellants' Specification, we determine that the advance resides in the mathematical formulas and algorithms the computer processing unit uses to configure data for displaying an image.

The method uses a conventional scanning electron microscope, which Appellants depict in Figure 1. Spec. ¶¶ 3, 28, 34, 37, Fig. 4. This microscope includes an electron gun 1 that creates a beam of accelerated electrons that pass through coils that deflect the beam so it impacts consecutively on assayed sample 4 at various points, most often in a regular rectangular grid. Spec. ¶ 3. On impact, the electrons interact with material at the impact point to create back-scattered electrons (BSE) 6 and X-ray radiation 7. Spec. ¶¶ 3, 4. The back-scattered electrons 6 are detected by detector 8 and the X-ray radiation 7 is detected by detector 10 and the signals are converted to digital signals in analog-to-digital converter 9 and pulse processor 11, respectively. Spec. ¶¶ 4, 5.

Turning to the steps of the method, we note that some of the steps involve mental steps of inputting data. Specifically, the first two steps

recited in claim 1 are steps of entering information by, e.g., keyboard, into the computer system. Spec. ¶ 44. Also, the step of setting a value of coefficient a (in step 9) is a mental step. According to the Specification, "[c]oefficient a is determined by an experienced user prior to starting the analysis based on a knowledge of the nature of the assayed samples." Spec. ¶ 50. "[M]ental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Benson*, 409 U.S. at 67.

Moreover, the Specification makes clear that the first five steps of claim 1 were known steps in the data analyzing process, i.e., up to the step of creating an X-ray map M_i. Spec. ¶ 34. These known steps include step [3] of deflecting the focused electron beam consecutively into points on the assayed sample, which is the only particularly feature Appellants argue renders the claim patent eligible, even though the step was conventional and known in focused electron beam material analysis processes at the time of the invention. Appeal Br. 7. The last step, step 11, is merely a step of displaying the data resulting from the algorithm of the prior steps. Thus, the advance lies in steps 6–10.

The problem is that the steps said to be unconventional, i.e., steps 6–10, are steps of manipulating data performed by computer without any new equipment and merely in a method where data is gathered, computers are used as tools to manipulate data that is then displayed. It is, thus, merely an advance in the algorithm itself. An improvement to a mathematical algorithm is simply not the type of improvement our patent laws, as currently written, were designed to protect. As stated in *Flook*, "if a claim is

directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory." *Flook*, at 595 (quoting *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977)).

Considering the elements of claim 1 both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application as required in step 2 of the *Alice* framework does not change the result. As we said above, the scanning electron microscope and its method of use were conventional and the displaying of the resulting data does not amount to significantly more than the ineligible mental steps and mathematical algorithms of the claim. This conclusion is evinced from our discussion above.

Appellants' own discussion of the advance in the Specification supports the Examiner's determination. Appellants have not identified a reversible error in the Examiner's determination that the claims are directed to non-statutory subject matter.

CONCLUSION

We sustain the rejection of claims 1–19 under 35 U.S.C. § 101.

DECISION

The Examiner's decision is affirmed.

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).

AFFIRMED