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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ROALD VAN BORSELEN,
PETER M. VAN DAN BERG, and JACOB T. FOKKEMA

Appeal 2017-010043
Application 13/407,049
Technology Center 2800

Before MICHAEL P. COLAIANNI, N. WHITNEY WILSON, and JENNIFER R. GUPTA, *Administrative Patent Judges*.

GUPTA, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

Appellants[2] appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–20, which constitute all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

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[1] In this Decision, we refer to the Specification filed February 28, 2012 ("Spec."), the Non-Final Office Action dated October 3, 2016 ("Non-Final Act."), the Appeal Brief filed February 28, 2017 ("Appeal Br."), the Examiner's Answer dated May 18, 2017 ("Ans."), and the Reply Brief filed July 18, 2017 ("Reply Br.").

[2] Appellants identify the real party in interest as PGS Geophysical AS. Appeal Br. 1.

The subject matter on appeal relates to methods and systems for deghosting marine seismic wavefields using cost-functional minimization. Spec. ¶ 11. Claim 1, reproduced below, is illustrative of the claims on appeal.

> 1. An exploration-seismology computer system that deghosts wavefield data obtained from one or more receivers of a data acquisition surface, the exploration-seismology computer system comprising:
>
> one or more processors;
>
> one or more data-storage devices; and
>
> a deghosting routine stored in one or more of the one or more data-storage devices and executed by the one or more processors, the routine directed to
>
> transforming the wavefield data associated with each receiver from a spacetime domain to a spectral domain to form a scattered wavefield matrix in the spectral domain;
>
> computing a deghosted wavefield matrix at zero depth from the scattered wavefield matrix;
>
> iteratively computing a deghosted wavefield matrix that minimizes a cost functional formed from a multiplicative regularization factor and a matrix norm of a residue matrix, each element of the residue matrix is a difference between an element of the scattered wavefield matrix and an element of the deghosted wavefield matrix adjusted to approximate a corresponding element of the scattered wavefield matrix; and
>
> generating an image of the subterranean formation using at least in part the deghosted wavefield matrix, the image revealing structural information about the subterranean formation.

Appeal Br. 15 (Claims App.).

REJECTION ON APPEAL

Claims 1–20 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more. Ans. 2.

ANALYSIS

We review the appealed rejection for error based upon the issues identified by the Appellants and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential) (*cited with approval* in *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) ("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections")). After considering the evidence presented in this Appeal and each of Appellants' arguments, we are not persuaded that Appellant identifies reversible error. Thus, we affirm the Examiner's rejection for the reasons expressed in the Non-Final Office Action and the Answer. We add the following.

Appellants present separate arguments for the patentability of claims 1, 3 and 13. Appeal Br. 5–13. We select claim 1 as representative of the rejected claims, and will address the separate arguments presented for claims 3 and 13 below.

Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S. Ct. 2347 (2014), identifies a two-step framework for determining whether claimed subject matter is judicially-excepted from patent eligibility under § 101. According to *Alice* step one, "[w]e must first determine whether the claims at issue are directed to a patent-ineligible concept," such as an abstract idea. *Alice*, 134 S. Ct. at 2355. The second step requires examining "the elements of the

claim to determine whether it contains an 'inventive concept' sufficient to 'transform' the claimed abstract idea into a patent-eligible application." *Alice*, 134 S. Ct. at 2357 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72, 79 (2012)).

The Examiner determined that the claims are directed to mathematical relationships and formulas for performing a deghosting routine and concluded that the subject matter of the claims is directed to the judicial exception of abstract ideas. Non-Final Act. 2–3; Ans. 2–3.

To the extent Appellants argue that claim 1's character as a whole, considered in light of the Specification, is not directed to an abstract idea, we are unpersuaded. *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) (step 1 "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.'")

As set out in the Specification, Appellants' computational methods for deghosting seismic data are described with reference to "numerous equations," "utilize a multiplicative regularization factor that avoids experimentally based tuning processes," and "are repeatable and capable of automation, because the computational methods . . . do not require heuristic human judgment." Spec. ¶ 22; *see also id.* ¶¶ 26–39. Thus, we determine that there is a sufficient basis for the Examiner to conclude that under step 1 of the *Alice* analysis, claim 1 is directed to an abstract idea of a deghosting routine executed by the one or more processors, the routine directed to transforming the wavefield data to form a scattered wavefield matrix, computing a deghosted wavefield matrix from the scattered wavefield matrix, and computing a deghosted wavefield matrix that minimizes a cost

functional formed from a multiplicative regularization factor and a matrix norm of a residue matrix. Non-Final Act. 2–3; *see Diamond v. Diehr*, 450 U.S. 175, 191 (1981) ("[a] mathematical formula . . . is not accorded the protection of our patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment") (citation omitted); *In re Grams*, 888 F.2d 835, 837 (Fed. Cir. 1989) ("Mathematical algorithms join the list of non-patentable subject matter not within the scope of section 101."); *see also Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) ("Without additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible."); *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353–54 (Fed. Cir. 2016) (discussing how "collecting information" and "analyzing information by steps people go through in their minds, or by mathematical algorithms, without more" are abstract ideas).

Step two of the *Alice* analysis involves "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 (alteration in original) (quoting *Mayo*, 566 U.S. at 72–73).

Appellants argue that "the elements of claims 1–20 considered alone and in combination describe specific operations that transform the claims into patent eligible subject matter and are clearly more than a simple statement of the abstract idea of deghosting marine seismic data." Appeal Br. 11. Appellants further argue that "[t]he claims are directed to an ordered combination . . . that result in a deghosted wavefield matrix, which can be

used to generate clearer images of the earth's interior." *Id.* Appellants, however, do not persuasively explain how the elements individually, or as an ordered combination, transform claim 1 into patent-eligible subject matter.

The Examiner found that the claims employ additional conventional devices (processors, data-storage devices, receivers, and a computer system) for performing their common functions. Non-Final Act. 3. The Examiner further found that the additional element of generating an image is "outputting a result of the abstract idea and is insignificant extra solution activity." *Id.* The Examiner, therefore, determined that, the "additional elements of a processor, data storage devices, and step of generating an image[, alone and in combination,] are not significantly more than the abstract idea and do not provide meaningful limitations beyond generally linking the deghosting routine to a marine seismic environment." Ans. 6–7; *see also* Non-Final Act. 3–4; *see also Alice*, 134 S. Ct. at 2358 ("[T]he mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention."); *Elec. Power*, 830 F.3d at 1354 (explaining that the step of displaying the results of the calculations was not enough to constitute significantly more than the abstract idea); *id.* ("limiting the claims to the particular technological environment . . . is, without more, insufficient to transform them into patent-eligible applications of the abstract idea at their core."). Appellants fails to persuasively explain why the Examiner's reasoning is mistaken.

Appellants argue that "claims 1–20 are described in sufficiently specific terms as to not prohibit inventive activity and, therefore, are not a drafting effort designed to monopolize or preempt a building block of innovation." Appeal Br. 12. Appellants further argue that their claims "are

not an attempt to monopolize already known or age old methods for generating images of a subterranean formation based on deghosted marine seismic data." *Id.*

Appellants' arguments are not persuasive because although "preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility." *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015). Additionally, where claims are deemed to recite only patent ineligible subject matter under the two-step *Alice* framework, as the Examiner has done here, "preemption concerns are fully addressed and made moot." *Id.*

Appellants argue dependent claims 3 and 13 separately. Appeal Br. 11–12; Reply Br. 7–8.

Appellants' argument that dependent claims 3 and 13 comprise significantly more than the abstract idea because they "describe a specific process of computing the total number of compute cycles" (Appeal Br. 11–12; Reply Br. 7–8) is unpersuasive. Dependent claims 3 and 13 recite further details for how the deghosted wavefield matrix is computed, which include "computing cubic equation coefficients," "computing a real-valued root of the cubic equation," "computing a conjugate gradient direction," and "updating the deghosted wavefield . . . based on the real-valued root multiplied by the conjugate gradient direction." These additional recitations are directed to additional mathematical calculations for performing the deghosting routine. Consequently, a preponderance of the evidence supports the Examiner's conclusion that "[c]laims 3 and 13 only recite further details of the abstract idea (the deghosting routine)" (Ans. 7), and are therefore also patent ineligible.

The remaining arguments have been carefully considered but are unpersuasive as to error in the rejection.

DECISION

For the above reasons, the rejection of claims 1–20 under 35 U.S.C. § 101 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