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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte AHMET KEMAL OZDEMIR, PHILIPPE CAPRIOLI,
ALI OZBECK, DIRK-JAN VAN MANEN, and
MASSIMILIANO VASSALLO

Appeal 2017-009065
Application 12/688,391¹
Technology Center 2800

Before DANIEL N. FISHMAN, KEVIN C. TROCK, and
NABEEL U. KHAN, *Administrative Patent Judges*.

KHAN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Final Rejection of claims 1–26. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ Appellants identify WesternGeco, LLC as the real party in interest. App. Br. 3.

STATEMENT OF THE CASE

THE INVENTION

According to Appellants, “[t]he invention generally relates to deghosting and interpolating seismic data.” Spec. ¶ 1.

Exemplary independent claim 1 is reproduced below.

1. A method comprising:

receiving seismic data indicative of measurements acquired by seismic sensors, the measurements being associated with a measurement noise;

estimating at least one characteristic of the measurement noise;

deghosting the seismic data based at least in part on said estimated at least one characteristic of the measurement noise, the deghosting producing a wavefield corresponding to a propagation direction; and

simultaneously interpolating the wavefield and performing the deghosting,

wherein the simultaneously interpolating comprises processing the seismic data on a processor-based machine.

REFERENCES AND REJECTIONS

1. Claims 1–26 stand rejected under 35 U.S.C. § 112(a) as failing to comply with the written description requirement. Final Act. 2–3.

2. Claims 1–26 stand rejected under 35 U.S.C. § 112(b) as being indefinite. Final Act. 3–4.

3. Claims 1–26 stand rejected under 35 U.S.C. § 101 as directed to a judicial exception to statutory subject matter. Final Act. 4–8.

4. Claims 1, 4, 6–10, 13, 15–19, 22, 24, and 25 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ozdemir et al. (US

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2008/0275649 A1, published Nov. 6, 2008) (hereinafter “Ozdemir”), and Ozbek et al. (US 2009/0296523 A1, published Dec. 3, 2009) (hereinafter “Ozbek”). Final Act. 8–12.

5. Claims 2, 3, 11, 12, 20, and 21 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ozdemir, Ozbek, and Deffenbaugh et al. (US 2009/0135670 A1, published May 28, 2009). Final Act. 12–13.

6. Claims 5, 14, and 23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Ozdemir, Ozbek, and Turnbull (US 2009/0281732 A1, published Nov. 12, 2009). Final Act. 13–15.

7. Claim 26 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Ozdemir, Ozbek, and Robertsson et al. (US 2006/0291328 A1, published Dec. 28, 2006) (hereinafter “Robertsson”). Final Act. 15–16.

ANALYSIS

REJECTION UNDER 35 U.S.C. § 112(A)

Claim 1

The independent claims, which previously recited “*jointly* interpolating the wavefield and performing the deghosting” were amended to recite “*simultaneously* interpolating the wavefield and performing the deghosting.” Req. for Con’t Examination, Feb. 9, 2016. The Examiner finds that although the Specification describes the interpolation and deghosting as being performed jointly, it does not disclose them being performed simultaneously. Final Act. 2–3. Thus, the Examiner finds the Specification lacks support for the claims as amended in such a way as to reasonably convey to one skilled in the art that the inventor had possession

of the claimed invention at the time the application was filed. Final Act. 2–3.

Appellants point to equation 18 and its associated solutions as evidence that “the specification describes multiple ways to jointly, or simultaneously, interpolate a wavefield and perform deghosting.” App. Br. 8–9 (citing Spec. ¶¶ 26, 27, 29, and 32).

The written description requirement is satisfied where the disclosure “reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). The Specification states “techniques and systems are described herein for jointly deghosting and interpolating seismic data.” Spec. ¶ 21. The paragraphs that Appellants point to as support for “simultaneously” interpolating the wavefield and performing deghosting are also characterized as techniques for “solv[ing] the *joint* interpolation and deghosting problem.” Spec. ¶ 21 (emphasis added). Although the Specification describes the disclosed techniques as jointly deghosting and interpolating seismic data repeatedly, it does not describe these techniques as “simultaneously” deghosting and interpolating seismic data.

Appellants, however, appear to admit that the term “simultaneously” and the term “jointly” are equivalent or interchangeable, at least to the extent that the disclosed techniques which explicitly describe “jointly” deghosting and interpolating the seismic data, also describe “simultaneously” deghosting and interpolating the seismic data. *See* App. Br. 9 (“the specification describes multiple ways to *jointly, or simultaneously, interpolate a wavefield and perform deghosting*” (emphasis added)). Thus,

to the extent the terms simultaneously and jointly are synonymous in the context of the claims, we agree the sections of the Specification describing joint techniques for deghosting and interpolating data, provide support for “simultaneously interpolating the wavefield and performing the deghosting.”

Accordingly, we do not sustain the Examiner’s rejection of claim 1 as failing the written description requirement.

Claim 26

Claim 26 recites “wherein simultaneously interpolating the wavefield and performing the deghosting comprises inverting an equation relating a deghosting operator, the wavefield and the measurement noise to determine the wavefield at interpolated positions.” The Examiner finds there is no single equation that relates a deghosting operator, a wavefield, and a measurement noise that is inverted as part of simultaneously interpolating the wavefield and performing the deghosting. Final Act. 3. In particular the Examiner finds paragraph 37 of the Specification does not make clear which equations disclosed in the Specification are being inverted.

Appellants argue equation 18 “clearly shows a single equation relating a deghosting operator, the wavefield, and the measurement noise.” App. Br. 10. Appellants allege “by setting forth Eq. 18 and different solutions to this equation, the Specification demonstrates that the inventor had possession of the claimed invention.” App. Br. 10–11 (citing to Spec. ¶¶ 29, 30).

Although equation 18 relates a deghosting operator, the wavefield, and the measurement noise, we do not discern from the Specification where such an equation is inverted. The paragraphs Appellants cite to do not disclose inverting equation 18. *See* Spec. ¶¶ 29, 30.

Accordingly, we sustain the Examiner's rejection of claim 26 as failing the written description requirement.

REJECTION UNDER 35 U.S.C. § 112(B)

The Examiner finds "it is unclear from the specification as originally filed, as to how the step of 'simultaneously interpolating the wavefield and performing the deghosting' is performed because from the claim language, the deghosting produces the wavefield corresponding to a propagation direction." Final Act. 3-4.

Appellants argue,

"how" a claimed act is performed is not a proper basis to sustain a § 112, second paragraph rejection. In other words, questioning "how" a claimed act is performed neither sets forth a basis to challenge the claim as failing to set forth the subject matter that Appellants regard as their invention nor sets forth a basis to challenge the claim as failing to particularly point and distinctly the metes and bounds of the subject matter.

App. Br. 12.

"A claim is indefinite when it contains words or phrases whose meaning is unclear." *Ex Parte McAward*, 2017 Pat. App. LEXIS 8537 (P.T.A.B. Aug. 25, 2017) (precedential) (citing *In re Packard*, 751 F.3d 1310, 1314 (Fed. Cir. 2014)). The Examiner takes issue with the claim requiring that the deghosting produces the wavefield, but also requires simultaneously interpolating the wavefield and performing the deghosting. In other words, it is unclear to the Examiner, how interpolation of a wavefield may be performed while the wavefield is being produced, but has not yet been produced. *See* Ans. 11 ("If deghosting produces the wavefield, it is unclear as to how the wavefield can be simultaneously interpolated.") While we understand the Examiner's concern, we agree with Appellants that

such an issue, alone, is not the basis for an indefiniteness rejection and does not sufficiently relate to the clarity of the terms used in the claim. For example, the Examiner does not explicitly find that the meaning of the term “simultaneously” is unclear in the context of the claim. Questions regarding “how” a claim may be performed or whether the claimed method is possible to perform, may raise issues under the enablement requirement, but not under the indefiniteness requirement.

Accordingly, we do not sustain the Examiner’s rejection of claims 1–26 under 35 U.S.C. § 112(b).

REJECTION UNDER 35 U.S.C. § 101

Under 35 U.S.C. § 101, a patent may be obtained for “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.” The Supreme Court has “long held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable.” *Alice Corp. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)). The Supreme Court in *Alice* reiterated the two-step framework previously set forth in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 132 S. Ct. 1289, 1300 (2012), “for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of these concepts.” *Alice*, 134 S. Ct. at 2355.

The first step in that analysis is to “determine whether the claims at issue are directed to one of those patent-ineligible concepts,” such as an abstract idea. The Court acknowledged in *Mayo* that “all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural

phenomena, or abstract ideas.” *Mayo*, 132 S. Ct. at 1293. We, therefore, look to whether the claims focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016).

If the claims are not directed to an abstract idea, the inquiry ends. Otherwise, the inquiry proceeds to the second step where the elements of the claims are considered “individually and ‘as an ordered combination,’ to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 132 S. Ct. at 1298, 1297).

Examiner’s Findings

The Examiner finds the claims are “directed to the abstract idea of an algorithm or mathematical relationship/formula.” Final Act. 4. The Examiner finds the claimed steps of estimating, deghosting, simultaneously interpolating the wavefield and performing the deghosting, all pertain to mathematical relationships and thus, directed to an abstract idea. Final Act. 4–5 (citing *Diamond v. Diehr*, 450 U.S. 175 (1981)). The steps of receiving seismic data and processing the seismic data on a processor-based machine do not add significantly more, the Examiner finds, as they are directed merely to data gathering and processing the data on a generic computer. Final Act. 5. Turning to the dependent claims, the Examiner finds they involve merely further modifying the abstract idea. Final Act. 5.

Prima Facie Case

Appellants argue the Examiner has not made a sufficient showing that the claims are patent ineligible. For example, Appellants argue the Examiner analyzes an abstracted version of the claim rather than the claim language itself and, thus, “fails to make a showing that any of the claims is directed to a judicial exception as opposed to being merely related to or pertaining to the judicial exception.” App. Br. 14. Appellants also argue the Examiner has not identified a court case with a process similar to the claimed process where the claims were found to be directed to a judicial exception to patentable subject matter. App. Br. 15.

We disagree. 35 U.S.C. § 132 sets forth a notice requirement whereby the applicant is notified of the reasons for a rejection together with such information as may be useful in judging the propriety of continuing with prosecution of the application. Our reviewing court has explained:

[A]ll that is required of the [USPTO] to meet its prima facie burden of production is to set forth the statutory basis of the rejection and the reference or references relied upon in a sufficiently articulate and informative manner as to meet the notice requirement of § 132. As the statute itself instructs, the examiner must “notify the applicant,” “stating the reasons for such rejection,” “together with such information and references as may be useful in judging the propriety of continuing prosecution of his application.” 35 U.S.C. § 132.

In re Jung, 637 F.3d 1356, 1363 (Fed. Cir. 2011). We have reviewed the decision to reject the claims for patent-ineligibility articulated by the Examiner (*see* Final Act. 4–8; Ans. 14–20) and find it meets the notice requirements of 35 U.S.C. § 132. The Examiner has set forth the statutory basis for the rejection (a judicial exception to 35 U.S.C. § 101), analyzed the claims and claim limitations under both steps of the *Alice/Mayo* framework,

and explained the rejection in sufficient detail to permit Appellants to respond meaningfully.

Step One of Alice/Mayo Test

Addressing step one of the *Alice/Mayo* test, Appellants argue the claimed steps of estimating a characteristic of measurement noise, deghosting seismic data based on the measurement noise and simultaneously interpolating the wavefield and performing deghosting is not a mathematical formula or relationship. App. Br. 14–15. According to Appellants “[n]o showing has been made that any of the claims is directed to a mathematical equation, which is clearly not the case.” App. Br. 16.

We are unpersuaded by Appellants arguments. Claim 1 recites the steps of (1) receiving seismic data from seismic sensors, the data associated with a measurement noise, (2) estimating a characteristic of the measurement noise (3) deghosting the seismic data based on the characteristic of the measurement noise, the deghosting producing a wavefield, (4) simultaneously interpolating the wavefield and performing the deghosting, and (5) wherein the interpolating comprises processing the seismic data on a processor-based machine. Steps (2), (3), and (4), which consist of estimating a characteristic of measurement noise, deghosting the data, producing a wavefield, and interpolating the wavefield, are all mathematical operations, as is evidenced by Appellants’ Specification. *See* Spec. ¶¶ 21–30. Step (1) is simply directed to gathering data upon which the subsequently claimed mathematical operations will be performed. The final element (5) of the claim merely indicates that the mathematical operations of interpolating consists of processing data on a processor-based machine. The dependent claims add additional details regarding the mathematical

operations of deghosting and interpolating but do not add elements such that the claim as a whole is not directed to an abstract idea. For example, the dependent claims describe “probability distribution[s],” “statistic[s],” “cost function[s],” and “irregularly spaced crossline measurements” as part of the estimating, deghosting, and interpolating operations.

Accordingly, we agree with the Examiner’s finding that the claims are directed to mathematical relationship or formula, and are thus, directed to an abstract idea. *See Parker v. Flook*, 437 U.S. 584, 595 (1978) (noting that “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,” quoting *In re Richman*, 563 F.2d 1026, 1030 (CCPA 1977)); *see also In re Salwan*, Appeal No. 2016-2079, ___ F.3d ___, 2017 WL 957239 at *3 (Fed. Cir. Mar. 13, 2017) (affirming rejection under § 101 of claims directed to “storing, communicating, transferring and reporting patient health information,” noting that “while these concepts may be directed to practical concepts, they are fundamental economic and conventional business practices”)

Step Two of Alice/Mayo Test

Addressing the second step of *Alice/Mayo* Appellants argue no showing has been made why the elements of claim 1 can be implemented using a generic computer using routine computer functions (App. Br. 15), nor why the combination of the claim’s elements do not amount to significantly more than the judicial exception (App. Br. 16). Appellants allege the claimed invention is clearly an improvement to the field of seismology measurement processing technology, and therefore, something significantly more than the abstract idea. App. Br. 15. Appellants contend

“the Final Office Action fails to show that the prior art discloses or renders obvious simultaneously interpolating a wavefield and performing deghosting, whether performed on a generic computer or otherwise.” App. Br. 15.

We are unpersuaded that the claims contain significantly more than the abstract idea of mathematical operations, relations or formulas. As explained above, the majority of the elements of claim 1 are directed to the mathematical steps of deghosting, producing a wavefield, and interpolating the wavefield. These are the “key component” of the claim, as Appellants acknowledge. App. Br. 17. The remaining step of data gathering and data processing being performed on a “processor-based machine” do not add significantly more to the abstract idea either individually or as an ordered combination.

We disagree with Appellants’ contention that the prior art does not render obvious the claims, as explained in more detail below, but regardless, a finding of novelty or nonobviousness does not necessarily lead to the conclusion that subject matter is patentable eligible. “Groundbreaking, innovative, or even brilliant discovery does not by itself satisfy the § 101 inquiry.” *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2117 (2013). Thus, Appellants’ argument that the prior art does not render obvious the claims is not persuasive in showing that the claims are directed to patent eligible subject matter.

Accordingly, we agree with the Examiner that the claim elements do not amount to significantly more than the abstract idea and sustain the Examiner’s rejection of claims 1–26 under 35 U.S.C. § 101.

REJECTION UNDER 35 U.S.C. § 103

Claim 1

The Examiner interprets “simultaneously interpolating the wavefield and performing the deghosting,” as including within its scope “jointly interpolating the wavefield and performing the deghosting.” The Examiner finds Ozdemir teaches receiving seismic data indicative of measurements acquired by seismic sensors, estimating one characteristic of the measurement noise, and deghosting the seismic data based on said estimated characteristic of the measurement noise. Final Act. 8–9 (citing Ozdemir ¶¶ 7–9, claim 37). The Examiner, however, finds Ozdemir does not explicitly teach simultaneously interpolating the wavefield and performing the deghosting, wherein the estimating and the simultaneously interpolating includes processing the seismic data on a processor-based machine. Final Act. 9. The Examiner relies on Ozbek to cure this deficiency, finding Ozbek teaches “a method of representing actual measurements of seismic wavefields as a combination of upgoing components of the seismic wavefield and ghost operators. Interpolated and deghosted seismic data are jointly determined and processed on a processor - based system.” Final Act. 9 (citing Ozbek ¶¶ 4, 6, and 22).

Appellants argue,

[t]here is no justification, however, for construing “simultaneously” to mean “jointly.” When the claim terms, such as “simultaneously,” are properly construed and assigned the patentable weights that they are due, it becomes clear that the hypothetical combination of Ozdemir and Ozbek fails to disclose or render obvious all of the elements of the claims.

App. Br. 19.

In connection with their contention that “simultaneously” was incorrectly interpreted as “jointly,” Appellants, however, only argue, “[a]lthough Ozbek generally discusses jointly interpolating and deghosting seismic data, neither Ozdemir nor Ozbek discloses or renders obvious how interpolation and deghosting may be simultaneously performed when the deghosting is based on measurement noise.” App. Br. 19. In particular, Appellants argue, “Ozbek discusses estimating the upgoing pressure component as a combination of sinusoidal basis functions but not disclose or render obvious deghosting based on a measurement noise.” App. Br. 19–20 (“Ozbek does not disclose, however, how to simultaneously interpolate and deghost when the deghosting is based on a measurement noise. Moreover, the interpolation disclosed in Ozbek is not based on a measurement noise”).

We find these arguments to be unpersuasive. Appellants have not provided sufficient reasoning or evidence in support of their argument that Ozbek does not teach or suggest simultaneously interpolating and deghosting seismic data. To the extent Appellants believe these two terms are distinct in the context of their invention, they have not persuasively argued such distinction with respect to Ozbek.

Instead, Appellants appear to focus their arguments on whether the deghosting disclosed in Ozbek is based on a measurement noise. *See* App. Br. 19, 20. However, the Examiner relies on Ozdemir, not Ozbek, as teaching deghosting based on measurement noise. Final Act. 8–9 (citing Ozdemir ¶¶ 7–9, claim 37); Ans. 23. The Examiner relies on Ozbek as teaching or suggesting simultaneously interpolating the wavefield and performing deghosting. Final Act. 9. “[O]ne cannot show non-obviousness

by attacking references individually where, as here, the rejections are based on combinations of references.” *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

Accordingly, we sustain the Examiner’s rejection of independent claim 1 and of independent claims 10 and 19 which were argued together as a group. We also sustain the Examiner’s rejection of claims 2–9, 11–18, and 20–25, which depend from one of claims 1, 10, and 19, and for which Appellants do not make arguments for separate patentability. *See* App. Br. 20, 21, and 23.

Claim 26

Claim 26 depends from claim 1 and recites “wherein simultaneously interpolating the wavefield and performing the deghosting comprises inverting an equation relating a deghosting operator, the wavefield and the measurement noise to determine the wavefield at interpolated positions.” The Examiner finds Robertsson teaches or suggests “inverting an equation relating a deghosting operator, the wavefield and the measurement noise to determine the wavefield at interpolated positions.” Final Act. 15 (citing Robertsson ¶¶ 11, 143, and 144). Specifically, the Examiner finds equation 27 found in paragraph 143 is inverted and relates a deghosting operator, the wavefield and the measurement noise, as described in paragraph 144. *Id.*

Appellants argue paragraphs 11, 143, and 144 do not disclose or render obvious inverting an equation relating a deghosting operator, a wavefield and measurement noise. App. Br. 22. Appellants argue paragraph 11 merely discusses interpolation, extrapolation, or a combination of extrapolation and interpolation. *Id.* Appellants argue paragraph 143 “does not . . . contain an equation or otherwise describe inverting such an equation

relating a deghosting operator, a wavefield, a measurement noise to determine the wavefield at interpolated positions.” *Id.* Appellants argue paragraph 144 merely identifies Eq. 27 as being an equation for two-dimensional surface multiple attenuation, but fails to disclose or render obvious inverting an equation relating a deghosting operator, a wavefield and measurement noise. *Id.* at 22–23.

Appellants’ arguments are unpersuasive. Robertsson’s paragraph 143 discloses an equation (equation 27) for a primary wavefield that is stated in the form of an inversion of other matrices. Paragraph 144 describes the wavefield in this equation as “contain[ing] no noise, ha[ving] all wavelet effects, including source and receiver ghosts, removed, and ha[ving] a trace-offset range that begins at zero offset.” Robertsson ¶ 144. By stating that the wavefield has no noise and has receiver ghosts removed, we agree with the Examiner that the equation relates the wavefield with noise and ghost operators.

Accordingly we sustain the Examiner’s rejection of claim 26 under 35 U.S.C. § 103(a).

DECISION

The Examiner’s rejection of claims 1–25 under 35 U.S.C. § 112(a) is reversed.

The Examiner’s rejection of claim 26 under 35 U.S.C. § 112(a) is affirmed.

The Examiner’s rejection of claims 1–26 under 35 U.S.C. § 112(b) is reversed.

The Examiner’s rejection of claims 1–26 under 35 U.S.C. § 101 is affirmed.

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The Examiner's rejection of claims 1–26 under 35 U.S.C. § 103(a) is affirmed.

Because we affirm at least one rejection for each of the claims, the Examiner's rejection of all such claims 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). *See* 37 C.F.R. § 41.50(f).

AFFIRMED