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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHN THEODORE ETGEN and CHUNLEI CHU

Appeal 2018-009166
Application 14/677,585
Technology Center 2800

Before CATHERINE Q. TIMM, ROMULO H. DELMENDO, and
LILAN REN, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

The Applicants¹ (“Appellants”) appeal under 35 U.S.C. § 134(a) from the Primary Examiner’s final decision to reject claims 1–20.² We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

¹ The real party in interest is identified as “BP Exploration Operating Company Ltd., a wholly owned subsidiary of BP, PLC” (Corrected Appeal Brief filed June 19, 2018 (“Appeal Br.”), 2 (not paginated)).

² Appeal Br. 5–13; Final Office Action entered November 16, 2017 (“Final Act.”), 2–8; Examiner’s Answer entered July 25, 2018 (“Ans.”), 2–11.

I. BACKGROUND

The subject matter on appeal relates to seismic data imaging (Specification filed April 2, 2015 (“Spec.”), ¶ 3). The Appellants state that a common technique used in imaging seismic data is known as data “migration,” which uses a “velocity model” (or more generally, a “subsurface attribute model”) that results in an image of the subterranean formation (*id.* ¶ 9). The Appellants explain, however, that the “[s]eismic image quality dependency on the migration velocity model becomes progressively higher as geological complexity increases” and that certain degrees in imperfections in the velocity models are expected (*id.* ¶ 10). The Appellants explain that, for example, in the Gulf of Mexico where salt is a dominant structural element, “inadequate velocity models have long been recognized as one of the main obstacles to the delivery of good quality seismic images” (*id.* ¶ 11). The Appellants’ improved technique is described as “directed to resolving, or at least reducing, one or all of the problems” in the described prior art techniques (*id.* ¶ 12).

Representative claim 1 is reproduced from the Claims Appendix to the Appeal Brief, as follows:

1. A method for use in seismic exploration, comprising:
 - accessing a set of seismic data representative of a subterranean geological formation and a subsurface attribute model of the subterranean geological formation;
 - performing a wavefield extrapolation on the seismic data in the subsurface attribute model;
 - applying a time-shift extended imaging condition to the extrapolated wavefields;
 - forming shot-indexed, time shift gathers for each image pixel of the subsurface attribute model from the conditioned extrapolated wavefields;

adaptively focusing the gathers using a processor, the adaptive focusing comprising determining for each trace in the gather the amount of time shift to apply to yield a zero time lag for that trace and applying the determined time shift to each respective trace; stacking the adaptively focused gathers using the processor; and imaging the subterranean geological formation from the stacked, adaptively focused gathers using the processor.

(Appeal Br. 14 (Claims Appendix)). The two other independent claims, namely claims 8 and 14, are directed to a computing apparatus and a non-transitory program storage medium encoded with instructions, respectively (*id.* at 15–16, 17).

II. REJECTION ON APPEAL

Claims 1–20 stand rejected under 35 U.S.C. § 101 as patent-ineligible because these claims are directed to a judicial exception without reciting significantly more (Ans. 2–11; Final Act. 2–8).

III. DISCUSSION

1. *The Examiner's Position*

The Examiner finds that, except for the “accessing a set of seismic data” and the “imaging the subterranean geological formation” steps, the limitations in all other steps recited in claim 1 constitute an abstract idea (Final Act. 2–3). In the Examiner’s view, the limitations constituting the abstract idea are “analogous to” collecting information, analyzing it, and displaying certain results of the collection analysis, which have been identified as patent-ineligible in court decisions (*id.* at 3 (citing, e.g., *Elec. Power Grp. v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016))). The Examiner

acknowledges that the claim “does contain ‘additional elements’ other than the abstract idea, but [finds that] these are not sufficient to make the claim as a whole amount to significantly more than the abstract idea itself” (*id.*; *see also id.* 3–4). The Examiner states that “[r]ather than being a particular limited application of the abstract idea which serves to improve a specific method or device, the claim would tend to monopolize the abstract idea itself in practice” (*id.* at 4).

2. *The Appellants’ Principal Contentions*

The Appellants contend that the claims on appeal are not directed to an abstract idea because claims “directed to improvements to computer-related technologies or technological processes beyond computer improvements do not present an ‘abstract idea’ under the first part of the *Alice/Mayo*^[3] test” (Appeal Br. 5–6 (citing MPEP §§ 2106.04(a)(1), 2106.06(b); *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016); *In re Abele*, 684 F.2d 902 (CCPA 1982), *overruled in part on other grounds*, *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008) (en banc), *aff’d sub nom, Bilski v. Kappos*, 561 U.S. 593 (2010)).

Specifically, the Appellants assert that “[s]eismic imaging is a long, well established technology stretching well back into the last century that has long enjoyed a status as patent eligible subject matter” (*id.* at 6). Consistent with that approach and legal precedents, the Appellants argue that the claimed invention is patent-eligible because it is an improvement over existing technology (*id.* at 7). According to the Appellants, seismic data

³ *See Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 217–18 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)).

imaging involves transformation of raw seismic data into an image of a subterranean geological formation consistent with *Abele*, which stands for the proposition that a computer-implemented process is patent-eligible where the data operated upon is representative of real world objects (*id.* at 7–10).

Furthermore, the Appellants argue that under the second prong of the *Alice/Mayo* test, the improvements amount to “significantly more” (*id.* at 10–11). According to the Appellants, the Examiner “stripped out the individual elements of the claims and considered them individually rather than the claim as a whole as is required” and failed to support the allegation that the improvements were merely conventional, routine, or well-known as required by PTO policy (*id.* at 11–12).

3. *Opinion*

For the reasons discussed below, we agree with the Appellants that the claimed subject matter has not been shown to be patent-ineligible as directed to a judicial exception without reciting significantly more. Because the Examiner’s reasoning is basically the same for both independent claims 1, 8, and 14 (Final Act. 2–6), we focus our discussion solely on claim 1.

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. The Supreme Court, however, has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[I]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g.*, *Alice*, 573 U.S. at 216.

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court’s two-step framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo*, 566 U.S. at 75–77). In accordance

with that framework, we first determine what concept the claim is “directed to.” *See Alice*, 573 U.S. at 219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk.”); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) (“Claims 1 and 4 in petitioners’ application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and thus patent-ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 69 (1972)). Concepts determined to be patent-eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that “[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Supreme Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . 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.” *Id.* (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine 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*, 573 U.S. at 221 (quotation marks omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

The PTO recently published revised guidance on the application of § 101 with regard to the first step of the *Alice/Mayo* test (i.e., Step 2A of the USPTO’s Subject Matter Eligibility Guidance as incorporated into MPEP § 2106). USPTO’s January 7, 2019, *2019 Revised Patent Subject Matter Eligibility Guidance* (“Revised Guidance”). 84 Fed. Reg. 50 (Jan. 7, 2019). Thus, under Step 1 of the Guidance, as revised, we determine whether the claimed subject matter falls within the four statutory categories: process, machine, manufacture, or composition of matter. Step 2A of the Guidance is two-pronged, under which we look to whether the claim recites:

- (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing

human activity such as a fundamental economic practice, or mental processes); and

(2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).

See 84 Fed. Reg. at 54–55.

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then, under Step 2B, look to whether the claim:

(3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or

(4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See 84 Fed. Reg. at 56.

We find that, under Step 1 of the Guidance, claim 1 falls within the four statutory categories of patent subject matter identified by 35 U.S.C. § 101. Specifically, claim 1 recites a method for use in seismic exploration.

Under Step 2A, we find that claim 1 recites the steps of “performing a wavefield extrapolation on the seismic data in the subsurface attribute model,” “applying a time-shift extended imaging condition to the extrapolated wavefields,” and “forming shot-indexed, time shift gathers for each image pixel of the subsurface attribute model from the conditioned extrapolated wavefields.” Although these steps, when read in isolation may be considered as mental processes or abstract ideas, the claimed subject matter as a whole is directed to “an improvement in the functioning of a

computer or other technology or technological field” as we explain further below and is, therefore, patent-eligible. 84 Fed. Reg. at 53 (“[A]n improvement in the functioning of a computer or other technology or technological field may render a claim patent eligible at step one of the Alice/Mayo test even if it recites an abstract idea, law of nature, or natural phenomenon.”); *Diehr*, 450 U.S. at 187 (“[A] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer.”). *See also In re Bilski*, 545 F.3d at 963 (“[E]lectronic transformation of the data itself into a visual depiction in *Abele* was sufficient.”).

Consistent with the Appellants’ position (Appeal Br. 6–10 (relying on Spec. ¶¶ 18, 69, 93; Figs. 5A and 5B)), we find that the invention recited in claim 1 is described as providing an improvement in a computer-implemented technology, namely seismic data imaging. *See, e.g.*, Spec. ¶ 7 (“The processing [of seismic data] is . . . computationally intensive . . . [and] therefore uses large, powerful computing systems with large, high capacity storage to perform this part of the analysis.”); ¶ 12 (“The presently disclosed technique is directed to resolving, or at least reducing, one or all of the problems mentioned [in the Specification]”); ¶ 34 (“The method operates inside an otherwise conventional seismic migration algorithm by applying an extended imaging condition with a series of positive and negative time shifts, including zero (a zero time shift corresponding to the conventional imaging condition), and preserving the migrated records without stacking.”).

Because the subject matter recited in claim 1 is described as an improvement in computer-implemented seismic data imaging technique and that description has not been adequately addressed or rebutted by the

Examiner, we conclude that the rejection fails at Step 2A of the Guidance. Therefore, we need not reach Step 2B.

That being said, the Examiner's mere citation to conventional seismic data imaging techniques (Ans. 9–10) fails to rebut the Appellant's position that the claims are directed to an improvement to a computer-implemented technology, let alone support a finding that the described improvements captured by the claimed subject matter as a whole were well-understood, routine, and conventional. *See Berkheimer v. HP Inc.*, 881 F.3d 1360, 1369 (Fed. Cir. 2018) (explaining that improvements described in the specification, to the extent they are captured in the claims, must be considered in determining whether the invention describes well-understood, routine, and conventional activities).

IV. SUMMARY

The Examiner's final decision to reject claims 1–20 as patent-ineligible under 35 U.S.C. § 101 is reversed.

REVERSED