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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MATTHEW S. CASEY

Appeal 2019-006181
Application 14/461,193
Technology Center 2800

Before CATHERINE Q. TIMM, JEFFREY S. SMITH, and MERRELL C. CASHION, JR., *Administrative Patent Judges.*

TIMM, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1–14 under 35 U.S.C. § 101 as patent-ineligible. We have jurisdiction under 35 U.S.C. § 6(b).

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as ExxonMobil Upstream Research Company, a wholly owned subsidiary of Exxon Mobil Corporation. Appeal Br. 4. Related entities include ExxonMobil Chemical Company, an unincorporated division of Exxon Mobil Corporation; ExxonMobil Chemical Patents Inc., a wholly owned subsidiary of Exxon Mobil Corporation; and ExxonMobil Research and Engineering Company, a wholly owned subsidiary of Exxon Mobil Corporation. *Id.*

We AFFIRM.

CLAIMED SUBJECT MATTER

The claimed subject matter relates to methods of modeling subsurface reservoirs for use in the field of geophysical prospecting. Spec. ¶¶ 2–3. Appellant's method integrates well log data and seismic data into a single subsurface reservoir model. *See, e.g.*, claims 1 and 14; Spec. ¶ 2.

According to the Specification, most methods of modeling reservoirs are limited to a certain subset of scales or are stationary. Spec. ¶ 3. The stationary methods allow only global specification of the frequency content. Spec. ¶ 13. But non-stationary, multi-scale transforms allow a modeler to incorporate a given frequency of variation at a particular location in space, or in the model. *Id.* Non-stationary multi-scale transforms use higher domain order (order > 1**)** joint representations of data. Spec. ¶ 11.

Appellant's method uses a non-stationary, multi-scale transform to combine multiple data sources into one coherent reservoir model. Spec. ¶ 14. Examples of these non-stationary multi-scale transforms include wavelet transforms (Debauchies 1992), ridgelets (Candes 1998), curvelet transforms (Candes and Donoho 2004), and second generation wavelets and lifting schemes (Sweldens 1998). Spec. ¶ 15. A method for processing data with these representations can take the form of an equation, an algorithm, or a heuristic. *Id.*

Appellant uses the non-stationary, multi-scale transform to transform the data of two models: (1) a subsurface model and (2) a reservoir property model (e.g., a geostatistical forward model). Spec. ¶¶ 9, 14. Processing occurs to combine the transformed data of the two models into a joint

domain model and this joint domain model is then inverse transformed to obtain a reservoir model in space domain. Spec. ¶¶ 9, 14–16.

Claim 1 is illustrative of Appellant's method and is reproduced below with references to disclosures in the Specification and Figures:

> 1. A method for integrating well log and seismic data into a single subsurface reservoir model, comprising:
>
> (a) obtaining seismic data and well log data from a subsurface region;
>
> (b) inverting the seismic data and applying a petrophysical transformation to generate a subsurface model of a reservoir property [Fig. 7: step 71; *see also* Figs. 8 and 10: step 2 (acoustic/elastic impedance inversion) and step 3 (petrophysical transformation)];
>
> (c) generating a reservoir property model of the reservoir property using the well log data [Fig. 7: step 72 (geostatistical simulation); *see also* Spec. ¶ 9 and Figs. 8 and 10 (geostatistical forward model)];
>
> (d) transforming the subsurface model and the reservoir property model to a joint domain, of order greater than (>) 1 [Spec. ¶ 11 ("Non-stationary multi-scale transforms use higher domain order (order > 1) joint representations of data" such as a "joint representation of 'scale' and 'space'"); Spec. ¶ 15 (examples of Wavelet transform (Debauchies 1992), Ridgelets (Candes 1998), Curvelet transform (Candes and Donoho 2004), Second generation wavelets and Lifting schemes (Sweldens 1998); and Claims 2–3];
>
> (e) processing the transformed subsurface model and the transformed reservoir property model in the joint domain to coherently combine the transformed subsurface model and the transformed reservoir property model into a joint domain model [Fig. 7: step 73 (information processing theory); Spec. ¶¶ 18–22 (describing heuristic method and convex combination with spatially co-located weighting coefficients); and Claims 4–6]; and

> (f) inverse transforming the joint domain model to obtain a reservoir model in space domain [step 74 in Fig. 7; inverse wavelet transform in Figs. 8 and 10];
>
> wherein (b)–(f) are performed using a computer.

Appeal Br. 15 (Claims Appendix).

OPINION

According to the framework set forth by the Supreme Court, evaluating patent eligibility under 35 U.S.C. § 101 involves two steps: "we first determine whether the claims at issue are directed to a patent-ineligible concept" and, "[i]f so, we then '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.'" *Packet Intelligence LLC v. NetScout Sys., Inc.*, 965 F.3d 1299, 1307 (Fed. Cir. 2020) (quoting *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 217, 221 (2014).

The USPTO has issued guidelines for applying the two-step framework of *Alice*. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) ("2019 PEG"), which was updated on October 17, 2019. *See October 2019 Patent Eligibility Guidance Update*, available at uspto.gov/PatentEligibility ("October 2019 PEG Update").

Under the 2019 PEG framework, we look to see whether the claim recites:

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

interactions, or mental processes) (designated as Step 2A (Prong One) in the 2019 PEG); and

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

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to see whether the claim provides an inventive concept (designated Step 2B).

After considering Appellant's claims under the *Alice* framework using the 2019 PEG and October 2019 PEG Update as a guide, we determine that Appellant has not identified a reversible error in the Examiner's conclusion that Appellant's claims are ineligible for a patent under 35 U.S.C. § 101.

We determine, like the Examiner did, that the claims recite mathematical concepts in accordance with the guidelines of Step 2A, Prong One. Indeed, there is no question that some of the elements of the claims are based on mathematical concepts. *Compare* Final Act. 2, *and* Ans. 5–6, *with* Appeal Br. 6–11, *and* Reply Br. 4. Mathematical concepts include mathematical relations and mathematical calculations. 2019 PEG, at 52. The Examiner determines that the entirety of steps (b) though (f) of claim 1 are based on mathematical relationships. Final Act. 2. Appellant acknowledges that step (d) is based on mathematical concepts. Reply Br. 4. But Appellant contends that the claims "do not directly recite such mathematical concept." Reply Br. 4. The implication of Appellant's argument is that the claims are eligible at Step 2A, Prong One. We disagree for the following reasons.

The claims recite mathematical relationships and, thus, fall within the "mathematical concepts" judicial exception of Prong One. Inverting data, applying transformations, and generating models from data are methods of

converting data from one form to another using calculations within mathematical algorithms. Also, the processing of step (e) is a processing of model data using mathematical relationships and calculations. That steps (b) through (f) are steps of computing using mathematical relationships is clear from the Specification. *See* Spec. ¶ 17 ("The present inventive method also includes the use of fast versions of these algorithms. The fast versions use computational methods to compute the equivalent results of the transforms with some efficient computational method."). Because the claims recite mathematical relationships and calculations, they recite abstract ideas under Step 2A, Prong One.

We agree with the Examiner that claim 1 recites judicial exceptions, i.e., abstract ideas, in the form of mathematical concepts and thus, we move to Step 2A, Prong Two to evaluate whether the mathematical concepts are integrated into a practical application. A claim that integrates the recited judicial exception into a practical application is patent-eligible.

We agree with the Examiner that claim 1 does not integrate the mathematical concepts of steps (b) through (f) into a practical application. Ans. 6–7. To evaluate whether the mathematical concepts are integrated into a practical application, we: (a) identify whether there are any additional elements recited in the claim beyond the judicial exception(s); and (b) evaluate those additional elements individually and in combination to determine whether they integrate the exception into a practical application, using one or more of the considerations laid out by the Supreme Court and the Federal Circuit. 2019 PEG, at 54–55.

As pointed out by the Examiner, the only elements of claim 1 that do not recite a mathematical concept are step (a), the step of obtaining seismic

data and well log data from a subsurface region, and the recitation of performing steps (b) through (f) on a computer. Final Act. 2.

Neither of the additional elements individually or in combination integrate the mathematical concepts into a practical application. Step (a) is merely a data gathering step and is insignificant extra-solution activity. "[I]nsignificant post-solution activity will not transform an unpatentable principle into a patentable process." *Diamond v. Diehr*, 450 U.S. 175, 191–92 (1981); MPEP § 2106.05(g). As to the recitation of performing the steps on a computer, such generic computer implementation is not sufficient to transform an abstract idea into a patent eligible process. *Alice*, 573 U.S. at 223–24 ("wholly generic computer implementation is not generally the sort of 'additional featur[e]' that provides any 'practical assurance that the process is more than a drafting effort designed to monopolize the [abstract idea] itself'" (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77 (2012)). Appellant's claims take seismic data and well log data and convert that information into another type of data (joint domain model) using a computer as a tool to facilitate the calculations. A process that starts with data, applies an algorithm, and ends with a new form of data is directed to an abstract idea. *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014).

Appellant contends that the claims use a combined order of specific rules analogously to the claims determined to be eligible in *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (Fed. Cir. 2016). Appeal Br. 9. But the claims here are different that those of *McRO*. As explained in *SAP*, "[t]he claims in *McRO* were directed to the creation of something physical—namely, the display of 'lip synchronization and facial expressions' of animated characters on screens for viewing by human eyes."

SAP Am., Inc. v. InvestPic, LLC, 898 F.3d 1161, 1167–68 (Fed. Cir. 2018). Appellant's claims do not recite any step of creating something physical. A model is not a physical entity in and of itself. Although a lack of physical transformation alone is not enough to preclude eligibility, the lack of a physical transformation is a clue that the claims are directed to the abstract idea—the mathematical relationships—and do not apply, rely on, or use the mathematical relationships in a manner that imposes a meaningful limit on the abstract idea.

McRO's claim differ from the present claims in another way. *McRO's* claims recite "obtaining a first set of rules that define output morph weight set stream as a function of phoneme sequence and time of said phoneme sequence." *McRO*, 837 F.3d at 1307–08. Appellant does not point out which of their claim steps articulate similar rules. A reading of the claims and Specification provide evidence that Steps (b) through (f) are steps of transforming data from one form to another and are not rules-based in the same manner as the rule set of *McRO*. *See* Spec. ¶ 17 (referring to "computational methods.").

Appellant contends the method of the claims overcomes the difficulties with prior techniques to provide improved integration of the seismic and well log data into a single reservoir model. Reply Br. 6. But the improved integration of data is an improvement in the judicial exception itself, i.e., in the mathematical functions. The computer is used as a tool to perform the math. Thus, the improvement is in the math and not in the functioning of the computer or other technology.

It is true that "software-based innovations can make 'non-abstract improvements to computer technology' and be deemed patent-eligible subject matter" under *Alice's* step 1 "directed to" analysis. *Finjan, Inc. v.*

Blue Coat Sys., Inc., 879 F.3d 1299, 1304 (Fed. Cir. 2018) (*quoting Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335–36 (Fed. Cir. 2016)). But better calculations are not enough. *See Bancorp Servs., L.L.C. v. Sun Life Assurance Co. of Can. (U.S.)*, 687 F.3d 1266, 1278 (Fed. Cir. 2012) ("[T]he fact that the required calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter.").

Because claim 1 does not integrate the mathematical concepts of steps (b) through (f) into a practical application, we move to Step 2B. In Step 2B, we evaluate whether the claim provides an inventive concept, i.e., whether the additional elements amount to significantly more than the exception itself. 2019 PEG, at 56.

The Examiner determines that claim 1 does not recite additional elements that amount to significantly more than the judicial exception because the data gathering of step (a) is extra solution activity and the computer is recited at a high-level of generality and is performing the generic function of processing data. As stated by the Examiner, "[m]ere instructions to apply an exception using a generic computer does not provide an inventive concept." Appellant does not question these determinations nor question the Examiner's Step 2B evaluation. Reply Br. 3–7. All of Appellant's arguments focus on the Step 2A analysis. *Id.*

Thus, Appellant has not identified a reversible error in the Examiner's determination that claim 1 is patent ineligible. Claims 2–14 further limit the transforming of step (d), processing of step (e), and the joint domain order of the representation of data. In other words, the other claims merely further limit the abstract mathematical concepts recited in claim 1. As such, for the

same reasons we discuss above, the further limitations do not transform claims 2–14 into patent-eligible claims.

CONCLUSION

The Examiner's decision to reject claims 1–14 is affirmed.

DECISION SUMMARY

Claim(s) Rejected	**35 U.S.C. §**	**Reference(s)/Basis**	**Affirmed**	**Reversed**
1–14	101	Eligibility	1–14	

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). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED