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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MICHAEL G. GLAVICIC and
JEFFREY A. GILBERT

Appeal 2018-002985
Application 13/579,770
Technology Center 2800

Before MICHELLE N. ANKENBRAND, MONTÉ T. SQUIRE, and
AVELYN M. ROSS, *Administrative Patent Judges*.

ROSS, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from a rejection of claims 1–3, 5–14, 17–21, 23, and 25. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ In our Decision we refer to the Specification filed August 17, 2012 (“Spec.”), the Final Office Action appealed from dated March 29, 2017 (“Final Act.”), the Appeal Brief filed August 23, 2017 (“Appeal Br.”), the Examiner’s Answer dated November 27, 2017 (“Ans.”), and the Reply Brief filed January 25, 2018 (“Reply Br.”).

² We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). According to Appellant, Rolls Royce Corporation is the real party in interest. Appeal Br. 3.

STATEMENT OF THE CASE

The subject matter on appeal relates to systems and methods for determining the crystallographic texture of a polycrystalline material using an ultrasonic waveform generator. Spec. ¶ 1. According to the Specification, components used in high-temperature and severe environments, such as gas-turbine engines, are often formed of polycrystalline materials like titanium or titanium alloys. *Id.* ¶ 2. Because properties such as “local yield strength, dwell fatigue resistance, or the like, may be affected by the crystal orientation on a microscopic or macroscopic level,” “knowledge of the orientation of crystal axes may be important.” *Id.* ¶ 3. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A system comprising:
 - an ultrasonic waveform generator configured to generate an ultrasonic waveform that propagates through a sample;
 - an ultrasonic waveform detector configured to detect the reflected ultrasonic waveform that propagated through the sample; and
 - a data analysis device configured to:
 - receive from the ultrasonic waveform detector ultrasonic waveform data representative of the reflected ultrasonic waveform that propagated through the sample;
 - select a portion of the ultrasonic waveform data;
 - apply a Fast Fourier Transform to the portion of the ultrasonic waveform data to transform the portion from a time domain to a frequency domain;
 - identify a dominant frequency of the portion in the frequency domain; and
 - determine a characteristic of a crystallographic texture for the portion based on at least one equation that relates the dominant frequency of the portion to the characteristic of the crystallographic texture for the portion.

Appeal Br. 18 (Claims App.). Claims 13 and 25, the remaining independent claims, are directed to a method and a non-transitory computer readable storage medium having instructions for performing the method, respectively. *Id.* at 22, 25.

REJECTION

The Examiner maintains the rejection of claims 1–3, 5–14, 17–21, 23, and 25 under 35 U.S.C. § 101 as directed to non-statutory subject matter. Final Act. 2.

Appellant argues independent claims 1, 13, and 25 and does not separately argue the dependent claims. *See generally* Appeal Br. Appellant does not present any argument for claims 13 and 25 separate from the argument advanced in support of claim 1. We, therefore, limit our discussion to claim 1, and claims 2 –3, 5–14, 17–21, 23, and 25 stand or fall with that claim. 37 C.F.R. § 41.37(c)(1)(iv) (2016).

OPINION

We review the appealed rejection for error based upon the issues Appellant identifies 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 Appellant’s arguments, we are persuaded that Appellant identifies reversible error. We add the following.

Patent Eligible Subject Matter

Section 101 of the Patent Act provides that “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof” is patent eligible. 35 U.S.C. § 101. However, the Supreme Court has long recognized certain exceptions to this section including “[l]aws of nature, natural phenomena, and abstract ideas.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

To determine whether a claim falls within an excluded category, the Supreme Court’s two-step framework, described in *Mayo* and *Alice*, guides us. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is “directed to” and whether that concept is directed to an abstract idea. *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 methods for 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)). However, not every claim that recites a mathematical formula is patent ineligible.

If the claim is “directed to” an abstract idea, we then 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 USPTO published revised guidance on the application of § 101. *See Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“2019 Guidance”) *updated by USPTO, October 2019 Update: Subject Matter Eligibility* (available at <https://go.usa.gov/xp88j>) (“2019 Update”); *see also* October 2019 Patent Eligibility Guidance Update, 84 Fed. Reg. 55942 (Oct. 18, 2019) (notifying public that October update was available). Under Step 1 of the 2019 Guidance, 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 exception, 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* 2019 Guidance 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));

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

See 2019 Guidance at 56.

Step 1 (statutory category)

As an initial matter, the claims must recite at least one of four recognized statutory categories, namely, machine, process, article of manufacture, or composition of matter. MPEP § 2106(I); *see* 35 U.S.C. § 101. Claim 1 recites a system, i.e., apparatus. Appeal Br. 18 (Claims App.). Furthermore, there is no dispute that claim 1 falls within a statutory category. *See generally* Final Act.

Step 2A, Prong 1 (recites a judicial exception)

According to Step 2A of the 2019 Guidance, we first consider whether the Examiner erred in determining that the claim recites a judicial exception. The Examiner determines that claim 1 “is directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more.” Final Act. 2. In particular, the Examiner identifies (1) “selecting a portion of the ultrasonic wave form data” as abstract and “similar to the concept of data recognition and storage,” (2) “applying a Fast Fourier Transform to the portion of the ultrasonic waveform data to transform the portion from a time domain to a frequency domain” as abstract and “similar to the concept of organizing information through mathematical correlations,” (3) “identifying a dominant frequency of the portion in the frequency domain” as abstract and “similar to the concept of data

recognition and storage,” and (4) “determining a characteristic of a crystallographic texture for the portion based on the dominant frequency” as abstract and also “similar to the concept of data recognition and storage.” Final Act. 2–3. The Examiner explains that the courts have determined the identified concepts to be abstract ideas that “relate to a mental process that can be transformed in the human mind, or by a human using a pen and paper.” *Id.* at 3.

Appellant contends that “[t]he Examiner’s rejection was in error as the Examiner failed to establish that the claimed subject matter is ineligible under 35 U.S.C. § 101.” Appeal Br. 6. Appellant argues that the claimed system is “a complex industrial process that recites meaningful limitations of specific system features and transformations” and “is clearly not an attempt to tie up use of mathematical relationships to relate (an identified) dominant frequency of a (selected) portion (of ultrasonic waveform data received by the data analysis device and transformed by Fast Fourier Transform) to the characteristic of the crystallographic texture for the portion.” Reply Br. 4; *see also* Appeal Br. 9 (same).

We are unpersuaded by Appellant’s arguments, and instead agree with the Examiner that the claims recite abstract ideas, for the reasons that follow. Applying the construct set forth in the 2019 Guidance, we must first determine whether claim 1 recites a judicial exception to patent eligibility. 2019 Guidance at 54. The 2019 Guidance identifies three judicially-expected groupings:

- (a) mathematical concepts including “mathematical relationships, mathematical formulas or equations, mathematical calculations”;
- (b) certain methods of organizing human activity, such as “fundamental economic principles or practices,”

“commercial or legal interactions,” and “managing personal behavior or relationships or interactions between people”; and (c) mental processes including “observation, evaluation, judgment, [and] opinion.”

Id. at 52.

Based on existing Supreme Court and Federal Circuit precedent, the 2019 Guidance has identified “mental processes” as including “concepts performed in the human mind (including an observation, evaluation, judgment, opinion).” *Id.* at 52. The “mental processes” judicial exception also includes concepts that a human can perform with a pen and paper, as well as those that a human can perform entirely in the mind. *See* 2019 Update, 9 (“a claim that encompasses a human performing the step(s) mentally with the aid of a pen and paper recites a mental process”).

Here, independent claim 1 recites, *inter alia*, “selecting a portion of the ultrasonic wave form data,” “apply[ing] a Fast Fourier Transform to a portion of the ultrasonic waveform data to transform the portion from a time domain to a frequency domain,” “identifying a dominant frequency of the portion in the frequency domain,” and “determining a characteristic of a crystallographic texture for the portion based [on the] dominant frequency” which involve mental processes, i.e., abstract ideas. Appeal Br. 18 (Claim App.). These process limitations are shown below at 48, 50, 52, and 54 in the process flow of Figure 4.

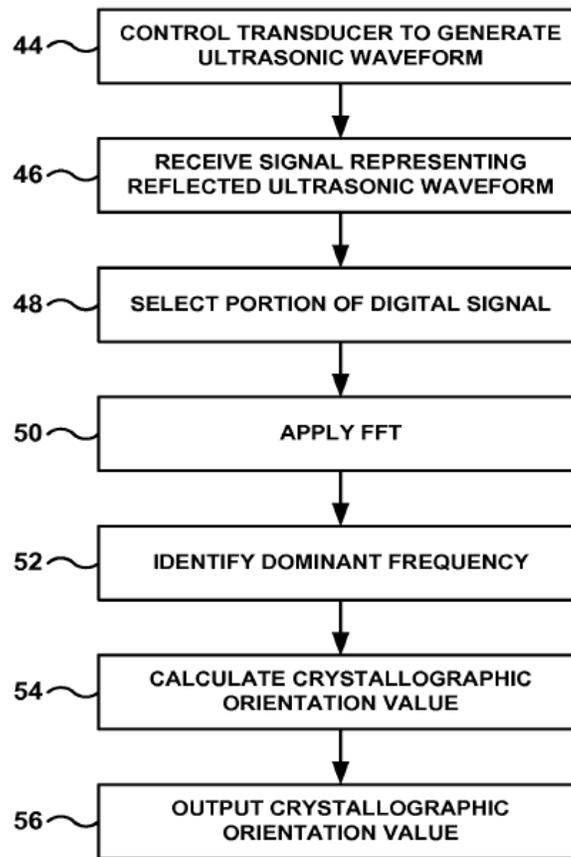


FIG. 4

Figure 4 “is a flow diagram of an example technique for performing an ultrasonic crystallographic texture measurement.” Spec. ¶16; *see also id.* ¶ 96 (same). According to the Specification, analysis module 32 (not shown) “select[s] a portion of the digital signal (48) by selecting a subset of time values and associated amplitude values and frequency values,” that is, identifying and isolating certain data associated with the digital signal. *Id.* ¶ 103. The Specification then explains that analysis module 32 “applies a Fast Fourier Transform (FFT) to the selected portion to convert the portion from the time domain to the frequency domain (50).” *Id.* ¶ 104. That conversion, as the Examiner finds, involves applying an algorithm based on

a mathematical relationship. Ans. 4–5. Once Fast Fourier Transform has been applied 50, “[a]nalysis module 32 may automatically identify the dominant frequency (52), or may output the signal transformed into the frequency domain, enabling a user 42 to manually identify the dominant frequency (52).” Spec. ¶ 104. After the dominant frequency is identified, analysis module 32 “utilizes the identified dominant frequency of the portion to calculate a crystallographic orientation of the portion (54)” by “utilizing Equation 3.” *Id.* ¶¶ 105–106 (referencing Spec. ¶ 48). These limitations recite mental processes because they identify portions of measured data for analysis, which are concepts a human can perform with a pen and paper or entirely in the mind. 2019 Update 7.

In view of the foregoing, we do not discern a reversible error in the Examiner’s determination that claim 1 recites abstract subject matter.

Step 2A, Prong 2 (integration into a practical application)

Having determined that claim 1 recites a judicial exception, i.e., an abstract idea, our analysis under the 2019 Guidance turns to whether the claim includes additional elements that integrate the abstract idea into a practical application. 2019 Guidance at 54. In other words, we must now determine whether claim 1 is directed to the abstract idea itself, or whether it is instead directed to some technological implementation or application of, or improvement to, the abstract idea such that there is a meaningful limit imposed on the judicial exception. *See* 2019 Guidance, 84 Fed. Reg. 54–55; *see also, e.g., Alice*, 573 U.S. at 223 (discussing *Diamond v. Diehr*, 450 U.S. 175 (1981)).

The Examiner finds that claim 1’s additional elements, that is, “the sample[,] . . . [t]he data analysis device, computer/processor, [and the]

ultrasonic waveform detector/generator are routine and conventional features” do not “qualify as ‘significantly more’ than the claimed judicial exception.” Final Act. 3. The Examiner further finds that “the ultrasonic waveform detector and receiving data from an ultrasonic detector are directed to an insignificant extra solution activity of data gathering” and do not meaningfully limit or transform the abstract idea into patent eligible subject matter. *Id.*

Appellant argues we should reverse the Examiner’s rejection because, even if the claims do recite an abstract idea, “the claims are directed to significantly more than the abstract idea.” Appeal Br. 6–7. Appellant contends that the claims “recite[] meaningful limitations to sufficiently limit its practical application.” *Id.* at 9. In particular, Appellant identifies the ultrasonic waveform generator that propagates through a sample, the waveform detector that receives the reflected waveform, and a data analysis device as meaningful limitations to the practical application of the abstract idea and assert that “the claimed features provide an improvement to the technical field.” *Id.* at 6.

On this record, we are persuaded by Appellant’s arguments. Here, the additional elements beyond the identified abstract mental processes include: (i) “an ultrasonic waveform generator configured to generate an ultrasonic waveform that propagates through a sample,” (ii) “an ultrasonic waveform detector configured to detect the reflected ultrasonic waveform that propagated through the sample, and” (iii) “a data analysis device” that performs the process steps. *See* Appeal Br. 18 (Claims App.). The 2019 Guidance instructs that when the invention improves on the functioning of conventional technology or “an additional element implements a judicial

exception with, or uses a judicial exception in conjunction with a particular machine or manufacture that is integral to the claim,” such implementation may integrate the exception into a practical application. 2019 Guidance 55. In evaluating these additional elements, we conclude that claim 1 as a whole integrates the recited mental process steps into a practical application. In particular, as Appellant explains, claim 1 is “an improvement to the technical field of determining the local crystallographic texture of a polycrystalline material.” Appeal Br. 6. Consistent with Appellant’s explanation, the Specification states that “[s]uch an approach may *speed analysis* of the digital signal by analysis module 32 by reducing a number of calculations performed by analysis module 32, but may omit from the analysis a portion of the digital signal, which may reduce resolution or accuracy of the technique.” Spec. ¶ 118 (emphasis added). Therefore, Appellant’s invention is an improvement to a technical field because it improves the speed in measuring the crystallographic texture of a material. Furthermore, the additional elements implement the judicial exception on a particular machine (i.e., an ultrasonic waveform generator/detector) that is integral to the claim because the waveform generator, detector, and analysis device “play a significant part in permitting the claimed method to be performed, rather than function solely as an obvious mechanism for permitting a solution to be achieved more quickly.” See MPEP 2106.05(b) (quoting *Versata Development Group v. SAP America*, 793 F.3d 1306, 1335, 115 USPQ2d 1681, 1702 (Fed. Cir. 2015)).

For the foregoing reasons, we determine that claim 1 integrates the judicial exception into a practical application and we do not sustain the Examiner’s rejection of claim 1 under 35 U.S.C. § 101. For the same

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reasons, we also do not sustain the Examiner's rejection of claims 2-3, 5-14, 17-21, 23, and 25, under 35 U.S.C. § 101.

CONCLUSION

Appellant identifies a reversible error in the Examiner's rejection of claims 1-3, 5-14, 17-21, 23, and 25 under 35 U.S.C § 101 as directed to non-statutory subject matter.

DECISION

For the above reasons, the Examiner's rejection of claims 1-3, 5-14, 17-21, 23, and 25 is reversed.

Claims Rejected	Basis	Affirmed	Reversed
1-3, 5-14, 17-21, 23, and 25	§ 101 Eligibility		1-3, 5-14, 17-21, 23, and 25

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).

REVERSED