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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/152,217	01/10/2014	Patrice GUILLAUME	0336-240-2/100414	2724
11171	7590	03/03/2020	EXAMINER	
Patent Portfolio Builders, PLLC P.O. Box 7999 Fredericksburg, VA 22404			FAIRBANKS, BRENT ALAN	
			ART UNIT	PAPER NUMBER
			2862	
			NOTIFICATION DATE	DELIVERY MODE
			03/03/2020	ELECTRONIC

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PATRICE GUILLAUME and GILLES LAMBARE

Appeal 2019–000580
Application 14/152,217
Technology Center 2800

BEFORE JEFFREY T. SMITH, BEVERLY A. FRANKLIN, and
MICHAEL G. McMANUS, *Administrative Patent Judges*.

FRANKLIN, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner’s decision to reject claims 1–4, 7–15, and 18–20. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies the real party in interest as CGG SERVICES SA. Appeal Br. 2

CLAIMED SUBJECT MATTER

Claim 1 is illustrative of Appellant's subject matter on appeal and is set forth below (text in bold identifying abstract ideas):

1. A method, stored in a memory and executed on a processor, for minimizing a cost function associated with non-linear tomography, said method comprising:
 - acquiring seismic data for exploring a geophysical structure probed using seismic excitations;
 - adding a dip constraint term measuring mismatch between expected dips according to a velocity model of the geophysical structure, and migrated dips for selected offset dependent events from the seismic data, to a cost function of said nonlinear tomography;**
 - adjusting said velocity model, by minimizing said cost function associated with said non-linear tomography; and**
 - outputting an adjusted velocity model,** which provides an image of the geophysical structure usable for assessing presence of oil and gas.

REFERENCES

The prior art relied upon by the Examiner is:

Name	Reference	Date
Krebs	US 5,696,735	Dec. 9, 1997
Grandi	US 2012/0158382 A1	June 21, 2012
Patrice Guillaume et al., <i>Kinematic Invariants: An Efficient and Flexible Approach for Velocity Model Building</i> 78 th Annual SEG Meeting 2008		

REJECTIONS

1. Claims 1–4, 7–15, and 18–20 are rejected under 35 U.S.C. § 112(a) or 35 U.S.C. § 112 (pre-AIA), first paragraph, as failing to comply with the written description requirement.

2. Claims 1–4, 7–15, and 18–20 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.

3. Claims 1, 3, 12, 14, 15, and 18 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Krebs in view of Grandi.

4. Claims 2, 10, 11, 13, 19, and 20 are rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Krebs in view of Grandi and further in view of Guillaume.

OPINION

Appellant does not present any substantively distinct arguments for any dependent claims. *See* Appeal Br. *passim*. Therefore, consistent with the provisions of 37 C.F.R. § 41.37(c)(1)(iv) (2013), we limit our discussion to claim 1, and all other claims on appeal stand or fall together with claim 1. 37 C.F.R. § 41.37(c)(1)(iv) (2017).

Upon consideration of the evidence and each of the respective positions set forth in the record, we find that the preponderance of evidence supports the Examiner’s findings and conclusion that the subject matter of Appellants’ claims are unpatentable over the applied art and for being directed to patent-ineligible subject matter. We sustain each of the Examiner’s rejections under 35 U.S.C. §§ 101 and 103(a) essentially for the reasons set forth in the Final Office Action and in the Answer, and affirm. However, with regard to the written description rejection under 35 U.S.C. § 112, 1st paragraph, we reverse for the reasons stated *infra*.

Rejection 1

We agree with Appellant that there is adequate written description support for the claims for the reasons provided on pages 4–6 of the Appeal Brief. Therein, Appellant points to the Background section of the Specification for disclosing how the generation of images (profile) is well known in seismic data acquisition and processing techniques. Spec, [0003]. Appeal Br. 5. We thus reverse Rejection 1.

Rejection 2

A. Standard for Patent Ineligibility

With regard to the 35 U.S.C. § 101 rejection, we note that an invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[l]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g., Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

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 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.” *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 176; *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 published revised guidance on the application of § 101. *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Guidance”). Under the Guidance, we first 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)).

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 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 Guidance.

B. Analysis

For the reasons stated below, and based on the findings and analysis provided by the Examiner at pages 3–6 of the Final Office Action and pages 5–17 of the Answer, we determine that claim 1 is directed to an abstract idea and does not contain an inventive concept sufficient to transform the claimed abstract idea into a patent-eligible application. We therefore sustain the Examiner's rejection under 35 U.S.C. § 101.

1. Guidance Step 1

Under Step 1 of the Guidance, we consider whether the claimed subject matter falls within one of the four statutory categories set forth in § 101, namely a “[p]rocess, machine, manufacture, or composition of matter.” Guidance, 84 Fed. Reg. at 53—54; see 35 U.S.C. § 101. Claim 1 recites a “method” and, thus, falls within the “process” category. Consequently, we proceed to the next step of the analysis.

2. Guidance Step 2A Prong 1

Under Step 2A Prong 1 of the Guidance, we evaluate “whether the claim recites a judicial exception, i.e., an abstract idea, a law of nature, or a natural phenomenon.” Guidance, 84 Fed. Reg. at 54; *see Alice*, 573 U.S. at 216. Claim 1 recites a method for minimizing a cost function associated with non-linear tomography involving the steps of

(1) acquiring seismic data for exploring a geophysical structure probed using seismic excitations; (2) adding a dip constraint term measuring mismatch between expected dips according to a velocity model of the geophysical structure, and migrated dips for selected offset dependent events from the seismic data, to a cost function of said nonlinear tomography; (3) adjusting said velocity model, by minimizing said cost function associated with said non-linear tomography; and (4) outputting an adjusted velocity model, which provides an image of the geophysical structure usable for assessing presence of oil and gas. *See* Br. 19 (Claims Appendix).

Consistent with the Examiner’s analysis as set forth on pages 3–6 of the Final Office Action, we determine that claim 1 recites a judicial exception, i.e., an abstract idea. As stated by the Examiner (Final Act. 4), the highlighted portions of the claim (as highlighted in claim 1 on page 2 of this decision and also on page 4 of the Final Office Action (see the text in bold)) constitute an abstract idea (mathematical concepts).

The mere fact, however, that claim 1 recites an abstract idea in the form of mathematical concepts does not automatically render the claim patent-ineligible. *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.”). Thus, we proceed to the Step 2A Prong 2 of the Guidance.

3. Guidance Step 2A Prong 2

Under Step 2A Prong 2 of the Guidance, we must “(a) [i]dentify 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.” Guidance, 84 Fed. Reg. at 54—55. Additional elements that merely add insignificant extra-solution activity to an abstract idea fail to integrate the abstract idea into a patent-eligible practical application. *See id.* at 55.

We refer to page 5 of the Final Office Action wherein the Examiner discusses the additional elements (the other elements recited in claim 1 that are not in bold text (see page 2 of this decision having a copy of Appellant’s claim 1). On the record before us, we determine that claim 1, as a whole, does not integrate the judicial exception into a practical application. Claim 1 includes the additional element of providing an image of the geophysical structure usable for assessing presence of oil and gas. We agree with the Examiner that this element is merely insignificant extra-solution activity, such as outputting the result of the claimed algorithm, recited at a high level of generality. Final Act. 5. Thus, this additional element does not integrate the abstract idea into a practical application. Guidance, 84 Fed. Reg. at 55, 55 n.31; MPEP § 2106.05(g).

Appellant’s arguments in the Appeal Brief (pages 6–14) do not reveal reversible error in the Examiner’s analysis and findings in this regard. Appellant’s contentions are not persuasive for the reasons stated by the Examiner in the Answer. Ans. 5–17. We add that to the extent the arguments are conclusory, we are unpersuaded by such argument. *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984); *see also In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (explaining that mere lawyer’s arguments or

conclusory statements, which are unsupported by concrete factual evidence, are entitled to little probative value).

Having determined that claim 1 recites a judicial exception but the additional elements recited in the claim do not integrate the judicial exception into a practical application, i.e., the claim is directed to mathematical concepts, we proceed to Step 2B of the Guidance.

4. Guidance Step 2B

Under Step 2B of the Guidance, we determine whether the claim provides an “inventive concept,” i.e., whether the additional elements beyond the judicial exception, individually and in combination, amount to “significantly more” than the judicial exception itself. Guidance, 84 Fed. Reg. at 56. According to the Guidance, “simply appending well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality,” is indicative that an inventive concept is absent. *Id.* at 56.

Consistent with the Examiner’s findings and analysis (Final Act. 5), we determine that claim 1 is directed to an abstract idea, e.g., a method for minimizing a cost function, and simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, and thus, fails to provide an inventive concept sufficient to transform the abstract idea into patent-ineligible subject matter.

We refer to the Examiner’s stated position on page 5 of the Final Office Action. Therein, the Examiner states that claim 1 includes the additional elements of a memory and a processor. The Examiner states that these elements and/or steps are merely generic computer components performing generic computer functions which are well-understood, routine,

and conventional in the art; as such, they do not meaningfully limit the claim to be more than just the abstract idea. The Examiner also states that claim 1 includes the additional elements of acquiring seismic data for exploring a geophysical structure probed using seismic excitations. The Examiner states that this element is merely insignificant extra-solution activity, such as mere data gathering, recited at a high level of generality and/or in a well-understood, routine, and conventional way, of the information needed to carry out the claimed algorithm. We agree, and add that the Specification indicates that acquiring seismic data was well-understood, routine, conventional and known in the art. *See* Spec. ¶ [003]. We also do not find Appellant’s argument persuasive of error in the Examiner’s analysis and findings in this regard for the reasons expressed by the Examiner in the Answer. Ans. 5–17.

Thus, we determine the additional elements recited in claim 1 beyond the abstract idea, individually and in combination, do not amount to “significantly more” than the abstract idea itself. *Alice*, 573 U.S. 217–218.

Accordingly, we affirm the Examiner’s rejection of claims 1 and 3–9 under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter.

Rejections 3–4

Appellant argues that neither this cited portion in Krebs nor its entire disclosure disclose any difference (i.e., mismatch) between expected dips and migrated dips, and even if *arguendo*, migration error were considered as corresponding to the claimed dip constraint term, there is no inherent or express disclosure of the migration error being added to a cost function of non-linear tomography. Appeal Br. 15–16.

We are unpersuaded by this line of argument for the reasons expressed by the Examiner on pages 17–18 of the Answer. Therein, the Examiner explains how Krebs teaches calculating incorrect positions of dips in the seismic model, and how Krebs teaches the calculation of a migration error. The Examiner states that using a broadest reasonable interpretation, the migration error is calculated from an expected and a measured position of a “dip”. Ans. 18. The Examiner states that Krebs teaches calculation of this error as “to the extent that the velocity model nevertheless produces traveltimes that are inconsistent with the measured traveltimes, some dips will be mispositioned. The Examiner states that same error quantification procedure discussed above in conjunction with time migration, steps 76 through 86, can be employed in conjunction with the depth migration to determine the amount of migration error at borehole 8.” Krebs, col. 11, ll. 44–50. Ans. 18.

Appellant also argues that the Examiner acknowledges that Krebs is silent relative to the cost function of non-linear tomography, but relies on Grandi to provide this missing element. Appeal Br. 16. Appellant argues that Grandi refers to a cost function used to optimize velocity change parameter so as to minimize the difference between every combination of surveys (Grandi, ¶¶ [0034] and [0057]). Appellant submits that it is not inherent nor obvious that Grandi’s cost function is a nonlinear tomography cost function.

We are unpersuaded by this line of argument for the reason expressed by the Examiner on pages 18–19 of the Answer. Therein, the Examiner explains that Grandi teaches a non-linear tomography cost function and refers to ¶ [0035] of Grandi in this regard. The Examiner also states that

Grandi discloses “[a]s in the prior art we apply warping for correcting the differences due to 4D changes between a base seismic and a monitor seismic. EP 1 865 340 cast the warping as a non-linear inverse problem to obtain an interval attribute such as relative velocity change (¶ [0054])”.

Ans. 19. The Examiner also states that the background of Grandi discloses “[m]oreover the inversion becomes even more highly non-linear for fields that induce subsidence and have potentially large time shift (¶ [0009])”. Therefore, the Examiner submits that Grandi clearly teaches a non-linear tomography cost function. We agree. No reply brief has been filed to dispute these findings.

Appellant further argues that the Examiner fails to demonstrate that a skilled artisan would have been motivated to add Krebs’s migration error with Grandi’s plural vintage-related cost function with a reasonable expectation of success. Appeal Br. 16. Appellant submits that Krebs and Grandi do not address the same situation: Krebs referring to processing a single vintage, while Grandi optimizing differences between pairs among at least three vintages.

We are unpersuaded by this line of argument for the reason expressed by the Examiner on page 20 of the Answer. Therein, the Examiner states that both Krebs and Grandi are in the art of seismic imaging. The Examiner states that it would have been obvious to have modified Krebs in view of Grandi to improve the speed of computing a velocity model of the geophysical structure, and refers to ¶ [0075] of Grandi in this regard. We agree. We add that absent supporting evidence, Appellant’s assertion amounts to a mere conclusory statement that is entitled to little, if any,

probative weight. *See, e.g., In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997).

On page 17 of the Appeal Brief, Appellant submits that the Examiner refused to enter the Amendment After Final. This is a petitionable matter and therefore not under our consideration herein.

In view of the above, we affirm Rejections 3 and 4.

CONCLUSION

We affirm the Examiner's decision.

DECISION SUMMARY

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1-4, 7-15, 18-20	112(a)	Written Description		1-4, 7-15, 18-20
1-4, 7-15, 18-20	101	Eligibility	1-4, 7-15, 18-20	
1, 3, 12, 14, 15, 18	103	Krebs, Grandi	1, 3, 12, 14, 15, 18	
2, 10, 11, 13, 19, 20	103	Krebs, Grandi, Guillaume	2, 10, 11, 13, 19, 20	
Overall Outcome			1-4, 7-15, 18-20	

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