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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte LILONG LI

Appeal 2017-005471
Application 13/433,570
Technology Center 2800

Before MICHAEL P. COLAIANNI, CHRISTOPHER L. OGDEN, and
JENNIFER R. GUPTA, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant¹ appeals under 35 U.S.C. § 134(a) from the Examiner's final decision rejecting claims 1–3, 5–8, and 12–19 in the above-identified application.² We have authority pursuant to 35 U.S.C. § 6(b). We affirm.

¹ Appellant identifies Baker Hughes Incorporated as the real party in interest. Appeal Brief 2, July 25, 2016 [hereinafter Appeal Br.].

² Final Office Action, Feb. 26, 2016 [hereinafter Final Action]; Examiner's Answer, Dec. 20, 2016 [hereinafter Answer]; *see also* Appeal Br.; Reply Brief, Feb. 15, 2017 [hereinafter Reply Br.].

BACKGROUND

Appellant's invention relates to estimating properties of an earth formation. Spec.³ abstract. Appellant's disclosure includes, for example, equations by which one may use nuclear magnetic resonance (NMR) data from an earth formation to estimate its permeability. *See* Spec. ¶¶ 18–21.

Claim 15, reproduced below, is representative of the invention:

15. An apparatus for estimating a property of an earth formation, the apparatus comprising:
- a carrier configured to be conveyed through a borehole penetrating the earth formation;
 - a nuclear magnetic resonance (NMR) tool disposed at the carrier and configured to perform NMR measurements on a sensitive volume in the formation to provide a distribution of relaxation times;
 - a processor coupled to the NMR tool and configured to:
 - identify peaks in the distribution of relaxation times;
 - determine an area under each identified peak;
 - select a peak having a maximum underlying area from the identified peaks;
 - select a plurality of other peaks from the identified peaks using a selection criterion, wherein the selection criterion comprises selecting a peak that is adjacent to the peak having the maximum underlying area and the adjacent peak has an area that meets or exceeds a threshold; and
 - average the relaxation times for the peak having a maximum underlying area and the plurality of other peaks to provide an average relaxation time;
 - estimate the property using the average relaxation time;
- a drilling rig for drilling a borehole based on the estimated property.

³ Specification, Mar. 29, 2012 [hereinafter Spec.].

Appeal Br. 15–16 (formatting altered for clarity). Method claim 1 and computer-readable medium claim 19 are also independent and include similar limitations. *See id.* at 13–14, 16–17.

The Examiner maintains the following grounds of rejection:

1. Claims 1–3, 5–8, and 12–19 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. *See* Final Action 2–3; Answer 3–6.

2. Claims 15–18 are rejected under 35 U.S.C. § 101 as failing to recite patentable subject matter. *See* Final Action 3–4, 6–8; Answer 7–13.

Appellant argues the rejected claims as a group. *See* Appeal Br. 5–11. Therefore, consistent with 37 C.F.R. § 41.37(c)(1)(iv), we limit our discussion to independent claim 15, which is common to both rejections. Claims 1–3, 5–8, 12–14, and 16–19 fall with claim 15.

DISCUSSION

Lack of Written Description

Claim 15 recites “a drilling rig for drilling a borehole based on the estimated property.” Appeal Br. 16. The Examiner finds that the original disclosure does not support this limitation. Final Action 2–3. While Figure 1 shows a drilling rig, the Examiner finds that “the original disclosure does not disclose drilling based on the estimated property nor any kind of invention to do so based on the estimated property, as claimed.” *Id.* at 3.

Appellant points to paragraph 1 of the Specification, which states, “Boreholes are drilled deep into the earth for many applications such as hydrocarbon exploration, geothermal production, and carbon dioxide sequestration. Different types of measurements are usually performed on a

geologic formation tools in order to efficiently use production resources.” Appeal Br. 6 (quoting Spec. ¶ 1). According to Appellant, a person of ordinary skill in the art “would understand that one type of production resource for the applications disclosed above is a drilling rig.” *Id.* (citing Spec. ¶¶ 15, 24, Fig. 1 (disclosing the drilling rig and other associated equipment for operating, analyzing, and controlling the apparatus and methods disclosed in the Specification)). Appellant also argues that a skilled artisan

would understand that the application is about efficiently using production resources with respect to geologic formations by using more accurate estimates of formation properties. By efficiently using production resources, production costs can be controlled. Hence, the production resources can be used more efficiently by using more accurate estimates of a formation property with the apparatuses and methods disclosed herein.

Appeal Br. 6. Appellant argues that a skilled artisan would recognize paragraph 1 of the Specification as an implied disclosure of using a drilling rig for drilling a borehole based on the estimated property. *See* Reply Br. 2–3.

In response, the Examiner finds that the portions of the Specification relating to a drilling rig are for drilling boreholes for gathering data, not for further drilling based on the estimated property. *See* Answer 5. The Examiner also finds that paragraph 1 of the Specification does not specifically refer to drilling a borehole based on the estimated property, just “broad aspects of borehole operation in general terms,” which can refer to many other actions that take place after estimating a property. *Id.* at 5 (emphasis omitted). For example, the Examiner suggests one might use the estimated permeability of an earth formation “for monitoring the integrity

and possible leakage in the drilled wellbore,” and take actions such as repairing a leak, treating fluid to reduce relative permeability, or plugging or sealing off problem zones in a wellbore. *Id.* at 5–6.

The written description requirement asks “whether the disclosure of the application relied upon 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) (citing *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562–1563 (Fed. Cir. 1991)). The disclosure may convey possession of the invention “in any way.” *In re Ruschig*, 379 F.2d 990, 996 (C.C.P.A. 1967). However, “it is the specification itself that must demonstrate possession.” *Ariad*, 598 F.3d at 1352; *cf. Martin v. Mayer*, 823 F.2d 500, 505 (Fed. Cir. 1987) (“It is ‘not a question of whether one skilled in the art *might* be able to construct the patentee’s device from the teachings in the disclosure Rather, it is a question whether the application necessarily discloses that particular device.” (quoting *Jepson v. Coleman*, 314 F.2d 533, 536 (CCPA 1963))).

The Specification states, in the context of using drilled boreholes, that measurements including permeability are useful “to efficiently use production resources.” Spec. ¶ 1. The Specification also describes drilling rigs and associated equipment in the context of drilling a borehole for obtaining property measurements. *See id.* ¶¶ 15, 24, Fig. 1. However, the Specification never specifically discloses, in any way that Appellant points out, that one may use a drilling rig for drilling a borehole based on the estimated property. Even if a skilled artisan would have found it obvious, based on the Specification, to use an estimated property for subsequently drilling a borehole, the Specification does not actually disclose using the

estimated property in this way. Thus, we find no reversible error in the Examiner's finding that the Specification does not reasonably convey to a skilled artisan that Appellant had possession of the claimed invention.

Ineligible Subject Matter

Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S.Ct. 2347, 2355 (2014) delineates a two-step framework for determining whether an invention is ineligible for patent protection under 35 U.S.C. § 101. In the first step, we must “determine whether the claims at issue are directed to a patent-ineligible concept,” such as a law of nature, natural phenomenon, or abstract idea. *Id.* at 2355. In accordance with this step, the Examiner determines that claim 15 is “directed to a judicial exception [to 35 U.S.C. § 101] (i.e., a law of nature, a natural phenomenon, or an abstract idea).” Final Action 3. In particular, the Examiner determines that the steps performed by the recited processor “are directed to mathematical concepts (algorithms) and human activity.” *Id.* at 3–4. According to the Examiner, the steps “are directed to [a] combination of human evaluation involving identification of peaks and selecting peaks . . . and usage of mathematical concepts involving determining areas, averaging and estimating.” Answer 11.

Appellant argues that the invention is not directed to an abstract idea, but rather to the problem of “improving the efficient use of production resources,” which includes “using a drilling apparatus in conjunction with a processor configured to execute a new and unobvious method that provides a more accurate estimate of a formation property than was previously available.” Appeal Br. 8–9; *see also* Reply Br. 5–6 (citing *McRo, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016)). According to Appellant, the Examiner acknowledges that the steps performed by the

processor were new and unobvious. Appeal Br. 9 (citing Final Action 4–6). Appellant also asserts that the recited rules regarding operations on peaks do not preempt all processes for estimating a property of an earth formation using NMR data. *See* Reply Br. 6–7.

In the Reply Brief, Appellant also argues that the Examiner has not considered the claimed invention as a whole (including the carrier, the NMR tool, and the drilling rig) in determining whether it is directed to a judicial exception. *See* Reply Br. 4.

An invention is directed to a patent-ineligible concept if it “begins and ends” with that concept. *See Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1376 (Fed. Cir. 2015). This is the case, for example, when the claims “amount[] to nothing more than observing or identifying the ineligible concept itself.” *See Rapid Litig. Mgmt. Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, 1048 (Fed. Cir. 2016). For example, “collecting information, including when limited to particular content (which does not change its character as information) [is treated as] within the realm of abstract ideas.” *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016). Likewise, “analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, [are] essentially mental processes within the abstract-idea category.” *Id.* at 1354. A claim directed to data collection and analysis remains an abstract idea if it recites the use of generic, conventional equipment merely as tools to carry out the data collection and analysis steps. *See McRo*, 837 F.3d at 1314 (“We . . . 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.”).

Appellant does not contest the Examiner’s determination, *see* Answer 11–12, that the carrier, the NMR tool, and the processor used for data collection are conventional machinery used in the drilling art. Nor does Appellant contest the Examiner’s determination, *see id.* at 13, that the recited drilling rig is structurally indistinguishable from rigs known in the prior art. Rather, Appellant characterizes the invention as “using [a] drilling apparatus in conjunction with a processor configured to execute a new and unobvious method that provides a more accurate estimate of a formation property than was previously available.” Appeal Br. 8–9. Thus, Appellant’s claimed inventive contribution begins with collecting data and ends with analyzing it, although it uses conventional equipment as a tool in doing so. The invention as a whole is therefore directed to an abstract idea.

The recitation of a “drilling rig” in claim 15 does not change the nature of the invention as being directed to an abstract idea. Claim 15 recites a drilling rig that is “for drilling a borehole based on the estimated property.” However, we do not interpret this language as imposing any structure on the drilling rig beyond that of a conventional drilling rig known in the art. We give claims their broadest reasonable interpretation consistent with the Specification. *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1256 (Fed. Cir. 2007). Claim 15 is directed to an apparatus; thus, absent any reference in claim 15 to the drilling rig’s structure (e.g., some configuration of the rig that depends on the estimated property), the broadest reasonable interpretation of the limitation “for drilling a borehole based on the estimated property” is an intended use of the drilling rig, which does not

limit the claim. This is consistent with the Specification, which describes a generic drilling rig and does not describe any extra steps or equipment for drilling “based on the estimated property.”

We are also unpersuaded by Appellant’s argument regarding preemption. While preemption is a driving concern for patent eligibility, *see Alice*, 134 S.Ct. at 2354, “questions on preemption are inherent in and resolved by the § 101 analysis.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015) (citing *Alice*, 134 S.Ct. at 2354). “Where a patent’s claims are deemed only to disclose patent ineligible subject matter under the [Court’s two-step] framework . . . preemption concerns are fully addressed and made moot.” *Id.*

Consequently, because claim 15 is directed to a result (e.g., more accurately estimating an earth formation property from NMR data) that is an abstract idea, and merely invokes conventional processes and machinery to achieve that result, the Examiner has not reversibly erred in determining that claim 15 is directed to an abstract idea under step one of the *Alice* framework.

Step two of the *Alice* Framework is “a search for an ‘inventive concept’—i.e., an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’” *Alice*, 134 S.Ct. at 2355 (quoting *Mayo Collaborative Svcs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 73 (2012)). Claim elements do not constitute an “inventive concept” if, apart from the ineligible concepts themselves, they involve “well-understood, routine, conventional activity previously engaged in by researchers in the field.” *Mayo*, 566 U.S. at 73.

In accordance with this step, the Examiner determines that the claim “does . . . not include additional elements that are sufficient to amount to significantly more than the judicial exception.” Final Action 4. In particular, according to the Examiner, the carrier configured to be conveyed through the borehole, and the use of the NMR tool, “are merely extra-solution activity as it pertains to known and conventional data collection method[s].” *Id.*; *see also* Answer 11–12 (characterizing these steps as “well understood, routine, conventional activities previously known to the industry, recited at high level of generality.” (emphasis omitted)). The Examiner also determines that the “drilling rig for drilling a borehole based on the estimated property” recites an intended use or function of the rig, and does not limit the claim by requiring further action based on the estimated property. *See* Final Action 4; Answer 13.

Appellant argues that the limitation “‘a drilling rig for drilling a borehole based on the estimated property’ is a structural limitation that performs a physical action that is significantly more than the abstract idea alleged by the Examiner.” *Id.* at 10. In the Reply Brief, Appellant also argues that the Examiner has not considered the carrier and the NMR tool in determining whether the invention is significantly more than the exception. *See* Reply Br. 4–5. Appellant further argues that the invention is significantly more than a judicial exception because it is an “[i]mprovement[] to another technology or technical field,” which according to Appellant is “the field of hydrocarbon production technology.” Reply Br. 5 (quoting USPTO, 2014 *Interim Guidance on Patent Subject Matter Eligibility*, ¶ I.B.1).

As discussed above, we interpret the limitation “for drilling a borehole based on the estimated property” in claim 15 to be an intended use for the recited drilling rig, and not a constraint on its structure. Because the recited carrier, NMR tool, processor and drilling rig are well-understood, routine, and conventional equipment previously used in the industry, none of these elements, either alone, in combination, or in combination with the abstract idea, constitutes an inventive concept, such that the invention recited in claim 15 is significantly more than the abstract idea itself.

To the extent that the algorithm for estimating a property recited in claim 15 is an improvement to the art of hydrocarbon production technology, this improvement is essentially attributable to the abstract idea itself, and it is therefore not “significantly more” than the abstract idea. *Cf. Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 131 (1948) (holding that an invention directed to a natural principle, “however ingenious the discovery of that natural principle may have been,” was “no more than the discovery of some of the handiwork of nature and hence is not patentable.”)

For the above reasons, Appellant has not shown reversible error in the Examiner’s rejection of claim 15 or any of the other claims. Thus, we affirm the Examiner’s rejections of claims 1–3, 5–8, and 12–19.

DECISION

The Examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended. *See* 37 C.F.R. § 1.136(a)(1)(iv) (2016).

AFFIRMED