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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARK S. OLSSON, RAY MEREWETHER,
PAUL G. STUART, MICHAEL J. MARTIN,
CHRISTOPH H. MAIER, and AMOS H. JESSUP

Appeal 2017-004471
Application 13/189,844
Technology Center 2800

Before MICHAEL P. COLAIANNI, JAMES C. HOUSEL, and
MICHAEL G. McMANUS, *Administrative Patent Judges*.

HOUSEL, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellants¹ appeal from the Examiner's decision rejecting claims 1 and 3–25, which constitute all the claims pending in this application. We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.²

¹ According to Appellants, the real party in interest is SeeScan, Inc. Appeal Br. 1.

² Our decision refers to the Specification (Spec.) filed July 25, 2011, the Examiner's Final Office Action (Final) dated December 4, 2015, Appellants'

STATEMENT OF THE CASE

The invention relates to methods for locating buried or otherwise inaccessible pipes and other conduits, cables, conductors, and inserted transmitters. Spec. ¶ 3.

Claim 1, reproduced below from the Claims Appendix to the Appeal Brief, is illustrative of the subject matter on appeal.

1. A graphical user interface (GUI) display method in a portable locator system for locating a utility line coupled to a phase-encoded modulated electromagnetic (EM) reference signal, the method comprising the steps of:
 - measuring, at the locator system, a three dimensional magnetic field generated at least in part based on the phase-encoded modulated EM reference signal;
 - determining a current flow based on the measured magnetic field;
 - determining a direction of the current flow based on the phase-encoding of the modulated EM reference signal; and
 - displaying, on the GUI, a representation of the direction of the current flow.

REJECTIONS

The Examiner maintains, and Appellants request our review of, the following grounds of rejection:

1. Claims 1 and 3–24 under 35 U.S.C. § 101 as directed to non-statutory subject matter;

Appeal Brief (Appeal Br.) filed September 6, 2016, the Examiner's Answer (Ans.) dated November 18, 2016, and Appellants' Reply Brief (Reply Br.) filed January 18, 2017.

2. Claims 1, 3, 14, 24, and 25 under 35 U.S.C. § 102(b) as anticipated by Waite;^{3,4}
3. Claims 11–13, 15, and 16 under 35 U.S.C. § 103(a) as unpatentable over Waite; and
4. Claims 17–23 under 35 U.S.C. § 103(a) as unpatentable over Waite in view of Olsson.⁵

ANALYSIS

Rejection of Claims 1 and 3–24 under 35 U.S.C. § 101

To determine whether subject matter is patentable under 35 U.S.C. § 101, the Supreme Court has set forth a two part test “for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014). The first step in the analysis is to “determine whether the claims at issue are directed to one of those patent-ineligible concepts,” such as an abstract idea. *Id.* (citation omitted). For computer-related technologies, “the first step in the *Alice* inquiry . . . asks whether the focus of the claims is on the *specific asserted improvement* in computer capabilities” (which would be eligible subject matter) or instead “on a process that qualifies as an ‘abstract idea’ for which *computers are invoked merely as a tool*” (which would be ineligible subject matter). *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335-36, 1338 (Fed. Cir. 2016) (emphasis added). “If the claims are not directed to an abstract idea [or other patent-ineligible concept], the inquiry ends. If the

³ Waite et al., US 2005/0096879 A1, published May 5, 2005 (“Waite”).

⁴ The Examiner has withdrawn claims 7–10 from this ground of rejection (Ans. 3).

⁵ Olsson et al., US 2004/0070399 A1, published April 15, 2004 (“Olsson”).

claims are ‘directed to’ an abstract idea, then the inquiry proceeds to the second step of the *Alice* framework.” *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1312 (Fed. Cir. 2016). Moreover, the Federal Circuit has recognized “that defining the precise abstract idea of patent claims in many cases is far from a ‘straightforward’ exercise.” *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1150 (Fed. Cir. 2016) (quoting *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014)). In view of this, the Federal Circuit has defined the “‘basic thrust’” of a claim, something that is wholly consistent with the description of an invention, to determine what abstract idea the claim may be directed to. 839 F.3d at 1150–51.

The Examiner finds claim 1 is directed to an abstract idea, particularly “of an algorithm for measuring and determining a direction of a signal flow”. Final 3. The Examiner further notes that the courts have identified mathematical algorithms as a type of abstract idea. Ans. 5, citing *Diamond v. Diehr*, 450 U.S. 175 (1981) and *Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016). In addition, the Examiner finds that performance of the recited algorithm does not improve the underlying functionality of a computer used in its performance, but instead the results from the performance of the algorithm are merely displayed. Ans. 7. Moreover, the Examiner finds that, unlike *Diamond*, the claims recite neither any particular machine nor any particular improvement to a specific technological field. *Id.* at 5.

Appellants argue that the claims are not directed to an abstract idea, asserting that an algorithm is not an abstract idea, but a specific process for generating a result. Appeal Br. 3. Appellants acknowledge that an abstract

idea per se may not be patentable, but contend that “a particular process for making a measurement or generating some other output using an algorithm is clearly patentable.” *Id.*, citing *Diamond v. Diehr supra*. Appellants assert that *Diamond* held that “while mathematical formulas in the abstract are not patentable, a process for generating a particular result is patent eligible.” *Id.* Appellants urge that the claims here are directed to a method to generate a particular output, “which in this case does not reflect an actual physical phenomenon but rather a metaphorical representation (i.e., the concept of ‘current direction’).” *Id.* Appellants further urge that current direction, in the context of both this case and in *Waite*, is a metaphor for modeling crosscoupling of AC signals between underground conductors . . . and as such is a tool for modeling the underground layout of multiple crosscoupled connectors, not simply a measurement of a ‘law of nature’ or a ‘natural phenomenon.’” *Id.* at 4.

Appellants further argue that the Examiner’s rejection fails the *Alice* and *Enfish* tests. Appeal Br. 4, citing *Alice v. CLS Bank supra* and *Enfish v. Microsoft supra*. Appellants contend that the claims satisfy step one of the *Alice* test because they are directed to “an improved way of determining information about a buried utility and its associated underground environment using the metaphorical construct of ‘current direction.’” *Id.* Appellants further assert that the claims “provide improvements in the technology of providing a visual representation of detected buried utilities and their environment by using an improved method of determining and displaying the ‘current direction.’” *Id.*

Under step one of the *Alice* framework, we note, claims 1 and 3 recite a measurement step, two steps of determining a current flow and a direction of current flow, and a display step. Appellants disclose a cycle-skipping phase-encoding method “for encoding and transmitting relative phase information,” preferably by “periodically phase-flipping an alternating-current (AC) drive waveform by dropping half-cycles at predetermined intervals.” Spec. ¶ 158. Appellants further disclose “an exemplary mathematical method by which a cycle-skipping technique can be used to calculate phase and current direction.” *Id.* ¶ 160. However, although much of this mathematical method is used to produce the half-cycle modulation patterns, i.e. a phase-encoded modulated EM reference signal, claims 1 and 3 do not recite any step of producing or generating this phase-encoded modulated EM reference signal.

The first step of the methods of claims 1 and 3 is merely a data gathering step for providing data on which the algorithm’s mathematical operations are performed to determine current flow and the direction of current flow as seen in Figure 18F. Spec. ¶ 160. Figures 18A–18F, and in particular, Figure 18F, depict the “exemplary mathematical method” or algorithm for using the cycle-skipping technique to calculate phase and current direction. *Id.* Once the algorithm is performed, the final step of claims 1 and 3 merely displays the results on a display. *See also id.* at ¶¶ 161–162. “Information as such is an intangible” and, regarding the first step of *Alice*, our reviewing court has “treated collecting information, including when limited to particular content (which does not change its character as information), as within the realm of abstract ideas.” *Electric Power*, 830 F.3d at 1353. Similarly, the Federal Circuit “treat[s] analyzing information

by steps people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract-idea category.” *Id.* at 1354; *see also Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) (“Without additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible.”).

The claim language, in light of the Specification, thus supports the Examiner’s determination that the claims are directed to the abstract idea of “an algorithm for determining a direction of current flow.” Indeed, courts have regarded algorithms performing mathematical operations in various forms as abstract ideas. *See Diamond v. Diehr supra* (the Arrhenius equation); *Gottschalk v. Benson*, 409 U.S. 63 (1972) (an algorithm for converting binary coded decimal to pure binary); *Mackay Radio*, 306 U.S. 86 (1939) (a formula describing certain EM standing wave phenomena); *Parker v. Flook*, 98 U.S. 2522 (1978) (a formula for computing an alarm limit); *In re Grams*, 888 F.2d 835 (Fed. Cir. 1989) (an algorithm for calculating parameters indicating an abnormal condition); *In re Abele*, 684 F.2d 902 (CCPA 1982) (calculating the difference between local and average data values). Therefore, we are not persuaded that the Examiner erred in determining claims 1 and 3 are directed to an abstract idea under step one of the *Alice* framework.

If a claim is directed to a patent-ineligible concept, the second step in the analysis is to determine whether additional elements of the claim, “both individually and ‘as an ordered combination,’” “‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 134 S. Ct. at 2355 (quoting

Mayo Collaborative Services v. Prometheus Laboratories, Inc., 566 U.S. 66, 78–79 (2012)). Thus, 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 78). In other words, the second step is to “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.’” *Id.* (citing *Mayo*, 566 U.S. at 72–73).

Here, the Examiner finds claims 1 and 3 do not recite additional elements sufficient to transform the abstract idea into patent eligible subject matter. Ans. 3. In particular, the Examiner finds that these claims recite elements that amount to no more than “mere instructions to implement the idea on a computer, and or recitation of generic computer structure that serves to perform generic computer functions that are well-understood, routine, and conventional activities previously known to the pertinent industry (i.e., the displaying of the direction of current flow).” *Id.*

Appellants argue that even if the claims are directed to an abstract idea, the claims nevertheless satisfy the second step of the *Alice* test, because the claims “can be considered as an improvement in how a computer processor determines information about a buried utility and its associated environment by providing an improved method of computation in calculating utility position through use of the metaphorical concept of ‘current direction.’” *Id.* at 5.

As discussed above, claims 1 and 3 recite additional elements/steps of measuring, at a portable locator system, a three-dimensional magnetic field generated at least in part based on the phase-encoded modulated EM

reference signal and displaying, on a graphical user interface (GUI) a representation of the direction of current flow. As indicated above, the remaining determining steps represent the algorithm or abstract idea of determining current flow and direction of current flow from the measurement from the reference signal by the performance of a series of mathematical operations. The measurement step is merely a data gathering step for the algorithm, which itself is insufficient to transform the algorithm into a patent-eligible invention. The display step merely displays the results of performance of the algorithm and is insufficient post-solution activity that does not transform the algorithm into a patent-eligible invention. *See Electric Power Group*, 830 F.3d at 1355; *In re Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 716 (Fed. Cir. 2014); *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1370 (Fed. Cir. 2011); *Grams supra*. Further, even taken as an ordered combination of elements, claims 1 and 3 merely recite a necessary data gathering step, the algorithm for manipulating that data via two determination steps, and a display step for displaying the results of the algorithm.

Appellants attempt to distinguish over *Electric Power* by asserting that their claims “are used to aid in finding information about buried utilities based on electronic machine detection and processing of signals emitted from the utility and have nothing to do with measuring instantaneous current direction.” Reply Br. 3. However, Appellants’ claimed method uses a portable locator system which has not been recited with any particularity. Appellants disclose that portable locators are known in the art. Spec. ¶ 9. Further, claims 1 and 3 do not recite, as part of the method, the production or generation of the reference signal that is to be measured in the claimed

method. More importantly, the claims in *Electric Power*, similarly to claims 1 and 3 here, included data gathering steps, an algorithm for processing the gathered data, and display steps for displaying the results of thereof. We, therefore, are not persuaded that the claims here distinguish from those in *Electric Power* in a manner such that this decision would not assist in guiding our decision here.

As such, we are unable to identify an ‘inventive concept,’ i.e., an element or combination of elements that is ‘sufficient to ensure that the claimed methods in practice amount to significantly more than a claim upon the abstract idea itself. Therefore, we are not persuaded that the Examiner erred in determining claims 1 and 3 fail to recite additional elements or an ordered combination of elements which identify an inventive concept or are sufficient to transform the otherwise ineligible abstract idea into a patent eligible invention under step two of the *Alice* framework.

Appellants further assert that various dependent claims relate to different advantageous ways of processing phase-encoded signals (for claims 2, 4, and 6) and novel ways of presenting the determined information to a user (for claims 18–20). Appeal Br. 5. However, Appellants merely repeat the limitations of these claims and do not explain with any particularity how these claims do not fail the *Alice* test for the same reasons as presented for claims 1 and 3. Appellants’ unexplained arguments provide no basis to reject the Examiner’s findings on those points. *See* 37 C.F.R. § 41.37(c)(1)(iv) (“A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim.”); *see also In re Lovin*, 652 F.3d 1349, 1357 (Fed. Cir. 2011) (holding that “the Board reasonably interpreted Rule 41.37 to require more substantive

arguments in an appeal brief than a mere recitation of the claim elements and a naked assertion that the corresponding elements were not found in the prior art”); *see also In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

Appellants do not separately argue any of the remaining claims. Accordingly, we sustain the Examiner’s rejection of claims 1 and 3–24 as directed to non-statutory subject matter under 35 U.S.C. § 101.

Rejection of Claims 1, 3, 14, 24, and 25 under 35 U.S.C. § 102(b)

The Examiner finds Waite discloses a GUI display method in a portable locator system for locating a utility line as recited in claims 1 and 3, including measuring a three-dimensional magnetic field generated at least in part based on a phase-encoded modulated EM reference signal, determining current flow and direction of current flow, and displaying a representation of the direction of current flow on the GUI. Final 4–6. With regard to the measuring of the three-dimensional magnetic field, the Examiner finds that such fields are inherently three-dimensional. *Id.* at 4–5; *see also* Ans. 10. In addition, the Examiner finds that modulation of a signal from 100 MHz to 99 MHz would equate to removal of one or more whole or fractional cycles. Ans. 13.

Appellants argue that the Examiner’s findings are factually incorrect in that, while the magnetic field may be three-dimensional, measurement of such a signal by magnetic field sensing is not inherently done in three dimensions. Appeal Br. 6. Appellants contend that coil antennae, such as described in Waite, only sense magnetic field components in a single dimensional axis and Waite only measures two discrete magnetic field components. *Id.* at 6–7. According to Appellants, “[t]hree dimensional

magnetic field measurement and signal processing as done in the locator art, and in particular as described in Waite, is not three-dimensional.” *Id.* at 6. Appellants disclose a three-dimensional magnetic field sensor having three substantially identical EM field sensors to enable measure each of the three axes of the magnetic field. *Id.* at 6–7.

Appellants’ argument is not persuasive of reversible error in the Examiner’s rejection. We note, as did the Examiner (Ans. 10), that claims 1 and 3 do not recite measuring each of the three dimensional components of the magnetic field. Instead, claims 1 and 3 recite measuring the three-dimensional magnetic field which, from a broadest reasonable interpretation, includes measurement of a single dimensional component of the magnetic field. Because Appellants concede that magnetic fields are three-dimensional and that Waite measures two dimensional components of the magnetic field, the Examiner’s finding that Waite measures a three-dimensional magnetic field is supported on the record.

Appellants next argue that the Examiner also erred in finding that Waite’s method uses a phase-encoded modulated reference signal. Appeal Br. 7. Appellants contend that Waite uses a modulated FM reference signal with a phase reference defined at the transmitter. *Id.* Appellants attempt to contrast phase-encoded modulation (PM) from frequency modulation (FM), asserting that PM relates to changing the phase angle of a single-frequency signal and whose instantaneous frequency is essentially the same at any point in time. *Id.* Appellants assert that FM, on the other hand, relates to a varying frequency signal whose instantaneous frequency at any instant is different. *Id.*

This argument is also not persuasive of reversible error. We note that Appellants fail to address the Examiner's finding that frequency modulation produces a reference signal that is phase encoded where whole cycles have been removed, e.g., moving from 100 MHz to 99 MHz removes one whole cycle per unit of time. *See* Ans. 13. Further, as the Examiner finds, Waite teaches that the transmitter 802 generates the reference signal which is a "signal select modulated FM signal with a phase reference." Final 4; Waite ¶ 86. Moreover, we note that the methods of claims 1 and 3 do not include a step of generating a phase-encoded modulated EM reference signal, only that the method measure a three-dimensional magnetic field generated at least in part based on this signal. Therefore, Appellants attempt to distinguish a PM signal from an FM signal, even if correct, is not germane to the rejection of claims 1 and 3. Appellants fail to demonstrate that any difference in a PM reference signal versus the FM reference signal in Waite would render Waite incapable of performing the utility line locating method. To the contrary, that one or more whole or fractional cycles are removed from the reference signal would not appear to render Waite's method inoperable because Waite teaches determination of signal direction is based on use of a signal with a phase reference. Thus, even though Appellants argue that Waite fails to teach intentional removal of whole or fractional cycles (Appeal Br. 8), this argument is not persuasive for the reasons given by the Examiner and above.

Appellants next argue that Waite fails to describe generating a phase-encoded modulated signal as required by claims 24 and 25. Appeal Br. 11. Claim 24 depends from claim 1 and further requires a step of generating the phase-encoded modulated EM signal, and claim 25 depends from claim 24.

The Examiner finds that Waite discloses generating a signal that has a defined phase reference and that this signal is frequency modulated. Ans. 14. As such, the Examiner determines that Waite's generated signal is a phase-encoded modulated signal, even though the signal is not phase modulated. *Id.* Appellants do not respond to or otherwise address the Examiner's findings with regard to claims 24 and 25. Therefore, Appellants' argument is not persuasive of reversible error in the Examiner's rejection of claims 24 and 25 based on Waite.

Appellants do not argue claim 14 separately. Accordingly, we sustain the Examiner's rejection of claims 1, 3, 14, 24, and 25 under 35 U.S.C. § 102(b) as anticipated by Waite.

Rejections of Claims 11–13 and 15–23 under 35 U.S.C. § 103(a)

Appellants do not argue or otherwise address these rejections. Accordingly, for the reasons given above and in the Final Office Action, we sustain these rejections.

DECISION

Upon consideration of the record, and for the reasons given above and in the Final Office Action and the Examiner's Answer, the decision of the Examiner rejecting claims 1 and 3–24 is *affirmed*.

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

AFFIRMED