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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte JAMES ROGER SAMWORTH[1]

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Appeal 2018-001104
Application 13/548,725
Technology Center 2800

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Before BRADLEY R. GARRIS, DONNA M. PRAISS, and
MERRELL C. CASHION, Jr., *Administrative Patent Judges.*

GARRIS, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's
decision rejecting claims 1 and 3–15. We have jurisdiction under 35 U.S.C.
§ 6.

We REVERSE.

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[1] Reeves Wireline Technologies Limited is identified as the real party in
interest (App. Br. 3).

Appellant claims a method of determining the true formation resistivity R_t of an invaded formation surrounding a borehole wherein the formation is invaded by drilling fluid and the true formation resistivity R_t is representative of the resistivity of the formation undisturbed by the invasion (independent claims 1 and 13). The method comprises operating a logging tool in the invaded formation in order to generate two resistivity log measurements (*id.*). The method further comprises combining a deeper and a shallower of the two resistivity log measurements in accordance with a non-linear combination algorithm that is modulated by a parameter whose value is varied in dependence on previously obtained comparisons between deep and shallow log measurements forward modeled from sample data (*id.*). The step of combining in accordance with the non-linear combination algorithm comprises calculating the true resistivity R_t in accordance with a certain equation-defined expression (dependent claim 4).

Further details of the claimed method are set forth in representative claims 1 and 4. A copy of these claims, taken from the Claims Appendix of the Appeal Brief, appears below.

> 1. A method of determining true formation resistivity Rt of an invaded formation surrounding a borehole, the formation invaded by drilling fluid, the true formation resistivity Rt representative of the resistivity of the formation undisturbed by the invasion, the method comprising:
> providing comparisons between deep and shallow log measurements forward modelled from sample data;
> operating a logging tool in the invaded formation by directly injecting electric current into the invaded formation and generating two resistivity log measurements based on return of the injected

current, each resistivity log measurement having a differing depth of penetration of the invaded formation,

combining a deeper and a shallower of the two resistivity log measurements in accordance with a non-linear combination algorithm that is modulated by a parameter by varying a value of the parameter in dependence on the provided comparisons between the deep and shallow log measurements forward modelled from the sample data; and

generating a modified log output from the results of the combination, the modified log output indicating the true formation resistivity R_t of the invaded formation relative to location in the borehole.

4. A method according to claim 1, wherein the step of combining the deeper and the shallower of the two resistivity log measurements in accordance with the non-linear combination algorithm comprises calculating the true resistivity R_t in accordance with an expression $R_t = 10^{\wedge}(k^* \log (Deep) + (1-k)^* \log (Shallow))$, wherein:

"Deep" represents output of a deeper of an array of at least two current receiver electrodes in a resistivity tool;

"Shallow" represents output of a shallower of the array of the at least two current receiver electrodes; and

k is the parameter and is selected for the invaded formation under investigation.

The Examiner rejects claims 1 and 3–15 under 35 U.S.C. § 101 "because the claimed invention is directed to a judicial exception . . . without significantly more" (Final Action 9). Specifically, the Examiner determines that "the claims belong to the statutory class of a process" but that "the claims recite an abstract idea . . . [and] pertain to a judicial exception as mathematical concepts such as mathematical algorithms, mathematical relationships, mathematical formulas, and calculations without significantly more in the claims beyond those abstract ideas" (*id.*).

Appellant argues, "even though the pending claims recite a mathematical concept, additional steps of the pending claims transform the claimed process into an inventive application of the mathematical concept, thereby making the claims patent eligible because they improve an existing technological process" (App. Br. 8 (citing *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208 (2014))). In particular, Appellant argues that "the mathematical concept of claim 1 improves another technical field (namely, formation logging), is applied or used with or by a particular machine (namely, a logging tool), and confines claim 1 to a particular useful application (namely, determining resistivity of a formation)" (*id.* at 11). According to Appellant, "[t]hese details amount to significantly more than just a judicial exception and indicate that claim 1 is patent eligible" (*id.*). Appellant argues that remaining independent claim 13 also is directed to patent eligible subject matter for the reasons given with respect to claim 1 (*id.* at 13).

OPINION

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 recently published revised guidance on the application of § 101. *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) ("Guidance").[2] 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

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[2] We emphasize that neither the Examiner nor Appellant had benefit of this Guidance in advocating their respective positions concerning subject matter eligibility.

          (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).[3]

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.

In applying the Guidance to the claims on appeal, we determine, like the Examiner and Appellant, that each of independent claims 1 and 13 recites the abstract idea of a mathematical concept (e.g., a mathematical relationship). We also determine that these independent claims recite additional elements that integrate the mathematical concept into a practical application for the reasons explained below.

Appellant's Specification discloses that a known method for determining resistivity of an invaded formation surrounding a borehole is not suitable due to, for example, a need to log the borehole multiple times at differing depths or a need to use variables that are not always available on a real-time measurement basis (Spec. ¶¶ 20–26). The Specification teaches that Appellant discovered an equation-defined relationship wherein the true

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[3] The Examiner determines that certain claim elements are routine and conventional (*see, e.g.*, Ans. 13–16). This determination is not relevant to steps (1) and (2) of the Guidance analysis. *See* Guidance.

resistivity R_t of an invaded formation can be calculated rapidly in real time (i.e., without the need to use an unavailable input variable) (*id.* ¶¶ 78–80). The equation includes a parameter k whose values are established for the well under investigation in advance of logging operations via forward modeling (*id.*). According to Appellant's Specification, "the method of the invention offers significant improvements in the calculation of R_t and, in particular, is highly suitable for determining R_t in real time" (*id.* ¶ 87).

These Specification disclosures reflect that the mathematical concept of the independent claims improves the technological process or method of determining the true resistivity of an invaded formation without needing to log the borehole multiple times at differing depths and without needing to use a variable not available in real time. *See* MPEP § 2106.05(a). The independent claims integrate the mathematical concept into a practical application of the concept by specifically defining a method of determining the true resistivity of a formation invaded by drilling fluid via an algorithm modulated by a parameter, the value of which varies in dependence on measurements forward modeled from sample data. Therefore, the claims do not attempt to monopolize the algorithm itself but rather define a specific method that employs the algorithm to achieve multiple improvements in the technological process of determining true formation resistivity of an invaded formation. *See Diehr*, 450 U.S. at 176 (1981) ("A claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula."); *see also id.* at 192 ("We view respondents' claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.").

In summary, the independent claims recite a mathematical concept but also recite additional elements that integrate the mathematical concept into a practical application. Each of these independent claims as a whole applies, relies on, or uses the mathematical concept in a manner that imposes a meaningful limit on the mathematical concept, whereby the claims are more than a drafting effort designed to monopolize the concept. For these reasons, we ultimately determine that the independent claims, and concomitantly the claims depending therefrom, define patent eligible subject matter.

Accordingly, we do not sustain the Examiner's rejection of claims 1 and 3–15 under 35 U.S.C. § 101 as directed to a judicial exception without significantly more.

The decision of the Examiner is reversed.

REVERSED