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patentadmin@boeing.com
bmatthias@millermatthiashull.com
ynunez@millermatthiashull.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RICKY LANCE HANEY,
LOYAL BRUCE SHAWGO, and MARK DAVID ROGERS¹

Appeal 2018-003482
Application 14/251,490
Technology Center 2800

Before JEFFREY T. SMITH, KAREN M. HASTINGS, and
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's decision finally rejecting claims 1 and 4–20. We have jurisdiction under 35 U.S.C. § 6.

We REVERSE.

Appellant claims a method of determining a multi-temperature profile of an object from spectral data collected from the object (independent claims 1 and 13) and an apparatus for determining a

¹ The Boeing Company is identified as the real party in interest and Appellant (App. Br. 2).

multi-temperature profile of an object (independent claim 14). The method comprises collecting spectral data from the object using at least one thermal sensor configured to capture spectral data over a plurality of wavelengths (independent claims 1 and 13). The method further comprises communicating the spectral data to a computer programmed to set a current value for residual radiation to total radiation collected from the object; identify a black body profile that best fits the spectral data over the plurality of wavelengths; infer a temperature from the identified profile; and outputting each temperature inferred from the selected profile to a display (*id.*). The apparatus comprises thermal sensor configured to capture spectral data over a plurality of wavelengths and a processor programmed to assign a current value for residual radiation; identify a black body profile that best fits the spectral data over the plurality of wavelengths; infer a temperature from the identified profile; and a display coupled to the processor and configured to display each temperature inferred from the identified black body profile (independent claim 14). Further details of the claimed method and apparatus are set forth in representative claims 1 and 14. A copy of these claims, taken from the Claims Appendix of the Appeal Brief, appears below.

1. A method of determining a multi-temperature profile of an object from spectral data collected from the object, the spectral data covering a plurality of wavelengths, the method comprising:

collecting the spectral data from the object using at least one thermal sensor configured to capture spectral data over a plurality of wavelengths;

communicating the spectral data to a computer programmed to:

(a) initially set a current value for residual radiation to total radiation collected from the object;

- (b) identify a black body profile that best fits the spectral data over the plurality of wavelengths;
- (c) infer a temperature from the identified profile;
- (d) update the current value for residual radiation by subtracting an amount of radiation corresponding to the identified black body profile; and
- (e) return to (b) until the current value for residual radiation reaches a termination criterion; and
outputting each temperature inferred at (c) to a display.

14. Apparatus for determining a multi-temperature profile of an object, the apparatus comprising:

- at least one thermal sensor for capturing spectral data of the object over a plurality of wavelengths;
- a processor programmed to:
 - initially assign a current value for residual radiation;
 - identify a black body profile that best fits the spectral data of the object over the plurality of wavelengths;
 - infer a temperature of the object from the identified black body profile;
 - update the current value for residual radiation by subtracting an amount of radiation corresponding to the identified profile; and
 - return to identifying a black body profile for another temperature until the current value for residual radiation reaches a termination criterion; and
 - a display coupled to the processor and configured to display each temperature inferred from the identified black body profile.

Independent claim 13 is directed to a method that is similar to claim 1.

The Examiner rejects claims 1 and 4–20 under 35 U.S.C. § 101 “because the claimed invention is directed to a judicial exception . . . without significantly more” (Final Action 3) (emphasis omitted). Specifically, the Examiner determines that the claims belong to the statutory class of a process but that

[c]laim 1 is directed to an abstract idea of a ‘Mathematical Relationships/Formulas’; collecting the spectral data from the object using at least one thermal sensor configured to capture spectral data over a plurality of wavelengths: this a known conventional to implement an abstract idea communicating the spectral data to a computer programmed to: recites nothing more than a conventional routine and well understood technique of using a computer is a general purpose computing device

(*id.*) (emphasis omitted). The Examiner presents similar statements for independent claims 13 and 14 (*id.* at 4–5).

Appellant argues, “[e]ven if it is assumed that the individual steps of claims 1, 13, and 14 are abstract ideas, when all of the steps of the claims are considered, in combination, the method performs functions that are not generic or abstract” (App. Br. 10 (citing *McRO, Inc. v. Bandai Namco Games Am., Inc.* 837 F.3d 1299 (Fed. Cir. 2016))). In particular, Appellant argues that “each of claims 1, 13, and 14 recites using a thermal sensor to collect spectral data, using a computer to process the data to infer multiple temperatures of the object, and outputting the inferred temperatures to a display” (*id.* at 10). According to Appellant, “the diverse collection of allegedly abstract ideas constitute eligible subject matter because, when taken in combination, they perform the non-generic functions of measuring multiple temperatures of an object and displaying those temperatures” (*id.*).

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: “[I]aws of nature, natural phenomena, and abstract

ideas” are not patentable. *E.g.*, *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014) (internal quotations and citation omitted).

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, 67 (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 (1853))); 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 187; *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 (citation 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

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

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* MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) § 2106.05 (a)–(c), (e)–(h) (9th Ed., Rev. 08.2017, Jan. 2018)).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.

Appellant’s invention is directed to non-contact measurement based on a method herein used in manufacturing environments to accurately monitor temperatures during processing. It may also be applied to remote sensing devices to determine temperature profiles of distant objects of interest (Spec. ¶ 43). The Specification discloses that a known method for determining multiple temperatures of an object from spectral data covering a plurality of wavelengths is not suitable for a variety of materials that do not have the same emissivity of at different wavelengths (Spec. ¶¶ 2–3). The

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.

Specification teaches that Appellant discovered utilizing a statistical approach for selecting black body profiles, accuracy may be increased as the number of discrete wavelengths increases (*id.* ¶ 22). The Specification teaches that Appellant discovered a method herein measures multiple temperatures of an object without physical contact of the object and without knowledge of the object's emissivity and without having to make assumptions about the emissivity (*id.* ¶ 36).

Independent claim 1 requires the following steps:

“(a) initially set a current value for residual radiation to total radiation collected from the object;

(b) identify a black body profile that best fits the spectral data over the plurality of wavelengths;

(c) infer a temperature from the identified profile;

(d) update the current value for residual radiation by *subtracting* an amount of radiation corresponding to the identified black body profile (emphasis added).”

Independent claim 14 requires the following steps:

“initially assign a current value for residual radiation;

identify a black body profile that best fits the spectral data of the object over the plurality of wavelengths;

infer a temperature of the object from the identified black body profile;

update the current value for residual radiation by *subtracting* an amount of radiation corresponding to the identified profile similar (emphasis added).”

Independent claim 13 also requires a series of steps involving subtraction.

In applying the Guidance to the claims on appeal, we determine, like the Examiner and Appellant, that each of independent claims 1, 13, and 14 directed to an abstract idea of a mathematical concept (e.g., a mathematical relationship) in view of the “subtracting” step of the claims. We also determine that these independent claims recite additional elements that integrate the mathematical concept into a practical application for the reasons explained below.

The Specification disclosures noted above reflect that the mathematical concept of the independent claims improves manufacturing environments by accurately monitoring temperatures of objects during processing utilizing non-contact measurements. *See* MPEP § 2106.05(a). That is, the claim “purport[s] to improve the functioning of” a “technology or technical field.” *Alice*, 573 U.S. at 223. In this instance, the independent claims integrate the mathematical concept into a practical application of the concept by specifically defining a method of determining the multi-temperature profile of an object from spectral data, the value of which varies in dependence on measurements modeled from sample data. Therefore, the claims do not attempt to monopolize the mathematical concept itself, but rather define a specific method that employs the mathematical concept to achieve multiple improvements in the technological process of accurately monitoring temperatures of objects during processing utilizing non-contact measurements. *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 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.”).

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 4–20 under 35 U.S.C. § 101 as directed to a judicial exception without significantly more.

The decision of the Examiner is reversed.

REVERSED