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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YI YANG, MAYURA ARUN MADANE, and PRACHI SURESH
ZAMBARE

Appeal 2019-001010
Application 14/525,354
Technology Center 2800

Before BEVERLY A. FRANKLIN, BRIAN D. RANGE, and LILAN REN,
Administrative Patent Judges.

RANGE, *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, 3–11, and 13–20. 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. Appellant identifies the real party in interest as Eaton Corporation. Appeal Br. 2.

CLAIMED SUBJECT MATTER²

Appellant describes the invention as relating to systems for characterizing and identifying operating modes of electric loads. Spec. 1:9–

12. Claim 1 is illustrative:

1. A system to characterize and identify one of a plurality of different operating modes of a number of electric loads, said system comprising:

a processor;

a sensor providing a voltage signal for one of said electric loads to said processor;

a current sensor providing a current signal for said one of said electric loads to said processor; and

a routine executed by said processor and structured to characterize said different operating modes using steady state and voltage-current trajectory features determined from said voltage and current signals, and to identify a particular one of said different operating modes based on a plurality of operating mode membership functions of said steady state and voltage-current trajectory features,

wherein said different operating modes comprise a no load mode, a parasitic mode, an active mode, and a standby mode.

² In this Decision, we refer to the Final Office Action dated November 17, 2017 (“Final Act.”), the Appeal Brief filed March 16, 2018 (“Appeal Br.”), the Examiner’s Answer dated September 14, 2018 (“Ans.”), and the Reply Brief filed November 14, 2018 (“Reply Br.”).

REJECTION

The Examiner maintains the rejection of claims 1, 3–11, and 13–20 under 35 U.S.C. § 101 as directed to unpatentable subject matter. Final Act. 2; Ans. 3.

OPINION

We review the appealed rejections for error based upon the issues identified by Appellant and in light of the arguments and evidence produced thereon. *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential), *cited with approval in In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) (“[I]t has long been the Board’s practice to require an applicant to identify the alleged error in the examiner’s rejections.”). After considering the evidence presented in this Appeal and each of Appellant’s arguments, we are not persuaded that Appellant identifies reversible error. Thus, we affirm the Examiner’s rejections for the reasons expressed in the Final Office Action and the Answer. We add the following primarily for emphasis.

The Appellant does not argue any claims separately. We therefore limit our discussion to claim 1. All remaining claims stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv) (2013).

A. Principles of Law

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. The Supreme Court, however, has long interpreted 35 U.S.C. § 101 to include 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 id.* 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, 67–68 (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 183 n.7 (quoting *Corning v. Burden*, 56 U.S. (15 How.) 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. “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.* (alterations in original) (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 has published revised guidance on the application of § 101. *See* 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (USPTO Jan. 7, 2019) (“Guidance”). According to 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 activities 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) (9th ed. Rev. 08.2017, Jan. 2018)).

If a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, the Guidance looks 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, 84 Fed. Reg. at 56; *see also, e.g., Ex parte Kimizuka*, Appeal 2018-001081 (July 1, 2019) (informative).

B. The Examiner’s Rejection

The Examiner determines that claim 1 is directed to a judicial exception: an abstract idea. Final Act. 2–3. In particular, the Examiner determines that claim 1 is directed to “characterizing said different operating modes using steady state and voltage-current trajectory features determined from said voltage and current signals, and to identify a particular one of said different operating modes based on a plurality of operating mode membership functions of said steady state and voltage-current trajectory features.” *Id.* at 2 (emphasis removed). As further explained herein, this “characterizing” is a mathematical operation. The Examiner determines that the claims are similar to those our reviewing court has identified as abstract ideas. *Id.* at 3 (citing *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d

1366 (2011) and *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016)). The Examiner also determines that the claim does not include any additional elements that amount to significantly more than the abstract idea itself. *Id.* at 2.

C. Guidance Step 1: Does claim 1 fall within a statutory category?

Pursuant to 35 U.S.C. § 101 and consistent with Step 1 of the Guidance, we first consider whether the claimed subject matter falls within the four statutory categories explicitly set forth in § 101: “[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 system having physical components such as a processor and sensors and, thus, falls within the “machine” category. Consequently, we proceed to the next step of the analysis.

D. Guidance Step 2A Prong 1: Does the claim recite a judicial exception?

Pursuant to the U.S. Supreme Court’s *Mayo* and *Alice* framework and consistent with the next step of the Guidance, we consider whether the claim recites a judicial exception. Guidance, 84 Fed. Reg. at 51. The Guidance synthesizes the key concepts identified by the courts as abstract ideas into three primary subject-matter groupings: mathematical concepts, certain methods of organizing human activities (e.g., a fundamental economic practice), and mental processes. *Id.* at 52. For the reasons discussed below, claim 1 recites a mathematical formula or equation that fall in the Guidance’s mathematical concepts grouping.

In particular, claim 1 recites “a routine executed by said processor and structured to characterize said different operating modes using steady state

and voltage-current trajectory features determined from said voltage and current signals, and to identify a particular one of said different operating modes **based on a plurality of operating mode membership functions** of said steady state and voltage-current trajectory features.” Appeal Br. 12 (Claims App.) (emphasis added). The recited “membership functions” are mathematic relationships or formulas that calculate whether signal data corresponds to one of the recited operating modes (“wherein said different operating modes comprise a no load mode, a parasitic mode, an active mode, and a standby mode”). In other words, the recited phrase quoted above is a textual replacement for mathematic equations. The Specification provides an example of a “sigmoid member function $f()$,” and we reproduce that example function below.

$$f(x) = \frac{1}{1 + e^{\frac{-(x-\alpha)}{\beta}}}$$

(Eq. 4)

Spec. 12:3–16. The mathematic function reproduced above is Equation 4 of the Specification. The Specification indicates that the sigmoid membership function depends on values of α , β , and x where α is “the center of the sigmoid function for the selected feature,” β is “the width of the sigmoid function for the selected feature,” and x is “the test data point of the selected feature.” *Id.*

Because claim 1 recites a mathematical formula or equation, the claim recites a concept that falls within the Guidance’s mathematical operation grouping and thus recites an abstract idea. Guidance, 84 Fed. Reg. at 52 n. 12, 14, and 15.

E. Guidance Step 2A Prong 2: Is the claim “directed to” the recited judicial exception?

Because claim 1 recites an abstract idea, we now determine, pursuant to the precedent of the U.S. Supreme Court and our reviewing court and consistent with the Guidance, whether the recited judicial exception is integrated into a practical application. Guidance, 84 Fed. Reg. at 51. According to the Guidance, when a claim recites a judicial exception and fails to integrate the exception into a practical application, the claim is “directed to” the judicial exception. *Id.*

The claim may integrate the judicial exception when, for example, it reflects an improvement to technology or a technical field. *Id.* at 55. Here, Appellant argues that claim 1 improves existing functions and methods and that prior methods of identifying operating modes of loads “suffer from disadvantages in terms of accuracy, robustness, and applicability, and do not differentiate between a parasitic mode or low power mode.” Appeal Br. 7–10.

Here, the Examiner determines that claim 1 is directed to the abstract idea characterizing different operating modes using steady state and voltage-current trajectory features determined from said voltage and current signals and identifying a particular one of said different operating modes based on a plurality of operating mode membership functions of said steady state and voltage-current trajectory features. Final Act. 2. The identification of operating mode is performed using a mathematical operation—a membership function. As explained above, the membership function is a mathematical formula or equation and is abstract.

Appellant’s argument that claim 1 is directed to a technological improvement rather than an abstract idea (Appeal Br. 6–8) is not persuasive for three reasons. First, and perhaps most importantly, to the extent claim 1 provides any improvement, the improvement is only in the abstract idea (use of mathematic member functions). Ans. 4; *see also infra*. Appellant does not argue that claim 1’s sensors or processor recitations represent an improvement; rather, the alleged improvement is in the recited mathematic “routine.” Second, Appellant does not persuasively explain why or how claim 1 provides an improvement over existing technology and does not provide evidence of improvement. *See* Spec. 1:8–3:17 (identifying prior methods for identifying electric load). Third, claim 1 collects information and performs a calculation with the information. The claim does not use the information in any way and does not use the information to improve any device.

Claim 1 is distinguishable from technology-based integrations addressed by our reviewing court. *See, e.g., Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1337 (Fed. Cir. 2016) (holding that patent-eligible claim was directed to self-referential table to improve computer databases); *McRO, Inc. v. Bandai Namco Games Am.*, 837 F.3d 1299 (Fed. Cir. 2016) (explaining that patent-eligible claim focused on specific asserted improvement in computer animation), *cited in* Appeal Br. 6, 8–9; Reply Br. 2–3. Claim 1, instead, is more akin to claims our reviewing court has held are not patent-eligible. *See, e.g., Digitech Image Techs., LLC*, 758 F.3d 1344, 1350 (Fed. Cir. 2014) (holding that claims to a “process of organizing information through mathematical correlations” are directed to an abstract idea even though the patentee argued that use of calculated profile would be useful for

capturing, transforming, or rendering a digital image); *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1167 (holding claims patent eligible and distinguishing *McRO* where claims were directed to “a mathematical technique with no improved display mechanism”); *see also ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 773 (Fed. Cir. 2019) (holding that claims were patent ineligible where claims were “directed to the abstract idea of communicating over a network for device interaction”).

Claim 1 also recites “a processor,” “a sensor providing a voltage signal for one of said electric loads to said processor,” and “a current sensor providing a current signal for said one of said electric loads to said processor.” Appeal Br. 12 (Claims App.). The Examiner finds that claim 1’s processor and sensors are well known in the art and cites evidence to support the finding. Ans. 3. Appellant does not persuasively refute the Examiner’s evidence. Claim 1 recites the “processor” and “sensor[s]” in a broad functional manner, and the Specification does not further limit the processor or sensors. Rather, the Specification defines “processor” broadly and generically. Spec. 5:20–24. Similarly, the Specification lacks technical detail as to how the recited sensors operate. *See, e.g.*, Spec. 15:5–21 (referencing sensors but not referencing how the sensors work). Mere data gathering or use of a physical data gathering device does not necessarily render an otherwise patent-ineligible claim eligible. *See, e.g., Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1348 (Fed. Cir. 2014) (holding that use of generic computer and scanner did not make claim patent eligible); *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1375 (Fed. Cir. 2011) (explaining that

obtaining transaction data for later verification was insufficient to render the claim eligible in that case).

We further note that the Guidance identifies various indicia of integration, and claim 1 does not include these indicia. 84 Fed. Reg. at 55. For example, “[t]ransformation and reduction of an *article* ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.” *Bilski*, 561 U.S. at 604 (emphasis added), *quoted in* MPEP § 2106.05(c). Yet “not all transformations . . . infuse an otherwise ineligible claim with an ‘inventive concept.’” *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014). Claim 1 does not transform any physical object or substance. The claim is thus distinguishable from claims that courts have determined were patent eligible because of transformation. *See, e.g., Diehr*, 450 U.S. at 184 (holding that claims directed to process that transforms rubber were patent eligible).

Appellant emphasizes that claim 1 is directed to a novel and improved method of identifying operating statuses of loads. Appeal Br. 6–7; Reply Br. 2–3. Appellant further argues that the Federal Circuit’s explanation of its *McRO* decision in *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089 (Fed. Cir. 2016) favors patent eligibility where claims improve an existing technological process. Appeal Br. 6–7.

We do not agree with Appellant’s view of *FairWarning*. *FairWarning* holds that the claims at issue there were directed to the abstract idea of “collecting and analyzing information to detect misuse and notifying a user when misuse is detected.” *FairWarning IP*, 839 F.3d at 1094. The decision emphasizes that, while that the claims at issue recited rules and the patent eligible claims of *McRO* also recited rules, *McRO*’s claims provided

“a specific asserted improvement in computer animation.” *Id.* at 1094. The *FairWarning* claims, in contrast, were “not directed to an improvement in the way computers operate.” *Id.* at 1095.

Here, claim 1 is more similar to the patent ineligible claims of *FairWarning* than the patent eligible claims of *McRO*. In particular, like the claims in *FairWarning*, claim 1 does not improve how a computer operates. Rather, claim 1 provides, at most, an improved mathematic process. Our reviewing court has consistently held that “[a] claim for a new abstract idea is still an abstract idea,” *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1151 (Fed. Cir. 2016), and we see no inconsistency in *FairWarning*’s holding.

On this record, claim 1 is directed to the identified abstract idea. *See* Final Act. 2–3.

F. Guidance Step 2B: Does the claim provide an inventive concept?

Pursuant to the second step of the *Mayo/Alice* test and consistent with the Guidance, we next determine whether a claim provides an inventive concept, additional elements (i.e., claim recitations beyond the identified patent ineligible subject matter) are considered both individually and in combination with the claim as a whole to determine whether the elements (1) add a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field or (2) simply append well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception. Guidance, 84 Fed. Reg. at 56. Also, we reevaluate our conclusions about the additional elements discussed in the previous step. *Id.*

Here, as explained above, the Examiner finds that the recited processor and sensors are well understood and conventional and provides evidence supporting this point. Ans. 4–6. Claim 1, as a whole, combines conventional equipment with what is, at most, a new mathematical concept. In this circumstance, the claim does not provide additional elements that provide an inventive concept.

Appellant argues that claim 1 does “not pre-empt all methods of identifying operating loads” and instead recites “a particular solution for solving the problem of accurately identifying operating modes of loads in a particular, sufficiently concrete, way.” Appeal Br. 8 (internal quotation marks omitted). As explained above, however, the “solution” and “way” Appellant refers to is math that does not extend beyond the judicial exception explained above. The gathering of data is claimed (and explained in the Specification) at a high level of generality, and Appellant does not persuasively dispute that claim 1’s processor or sensors are not well-understood, routine, and conventional activity. *See* Spec. 1:13–3:17 (referring to various prior art systems and methods that also measure current and voltage).

Moreover, while broad preemption of practical uses of a patent-eligible concept “may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015). Here, while claim 1 may not preempt every method of identifying an operating mode of loads, the claim, as a practical matter, preempts any use of a mathematic membership function as recited to identify a no load mode,

parasitic mode, active mode, or standby mode. As such, preemption weighs in favor of unpatentability in this instance.

On this record, claim 1's limitations—considered individually and in combination—do not provide an inventive concept. Final Act. 2–3; Ans. 3–5. Because Appellant's arguments do not establish Examiner error, we sustain the Examiner's rejection.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3–11, 13–20	101	Eligibility	1, 3–11, 13–20	

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