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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RAMU SHARAT CHANDRA,
ACHALESH KUMAR PANDEY,
DAVID STEPHEN MUENCH, and
NIRANJAN GOKULDAS PAI¹

Appeal 2017-009924
Application 14/562,925
Technology Center 3600

Before BENJAMIN D. M. WOOD, JEREMY M. PLENZLER, and
PAUL J. KORNICZKY, *Administrative Patent Judges*.

WOOD, *Administrative Patent Judge*.

DECISION ON APPEAL

¹ Appellants state that the real party in interest is General Electric Company.
App. Br. 3.

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 20–39. Claims 1–19 have been canceled. Final Act. 2. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

THE INVENTION

The claims are directed to a system and method for predicting and managing life consumption of gas turbine parts. Claim 20, reproduced below, is illustrative of the claimed subject matter:

20. A method comprising:

obtaining an operating characteristic of a gas turbine using a sensor of a system of an industrial power plant;

determining an estimated operating characteristic of the gas turbine based on the operating characteristic using an estimator of the system;

in a life prediction module of the system;

obtaining the estimated operating characteristic and the operating characteristic;

determining an operating criterion of the gas turbine based on the estimated operating characteristic and the operating characteristic using a criterion identifier;

transmitting the operating criterion to a damage identifier for computing a cumulative damage from a failure mode for a component of the gas turbine using the operating criterion; and

transmitting the cumulative damage to a prediction unit for predicting an estimate of a remaining useful life of the component of the gas turbine;

transmitting the estimate of the remaining useful life of the component from the prediction unit

of the life prediction module to a weightage identifier of the system for assigning operating weightages to a plurality of gas turbine parameters, wherein the estimate of the remaining useful life of the component of the gas turbine is one of the plurality of gas turbine parameters;

transmitting the operating weightages of the plurality of gas turbine parameters from the weightage identifier to an optimizer of the system for generating a set point for operating the gas turbine based on the operating weightages of the plurality of gas turbine parameters; and

transmitting the set point from the optimizer to a turbine controller of the system to adjust the operating characteristic of the gas turbine to meet the set point, thereby managing the remaining useful life of the gas turbine.

REFERENCES

Seeley	US 5,042,295	Aug. 27, 1991
Fuller	US 7,203,554 B2	Apr. 10, 2007
Mabe	US 2006/0228214 A1	Oct. 12, 2006
Hardwicke	US 2011/0296810 A1	Dec. 8, 2011
Callan	US 2013/0116996 A1	May 9, 2013

REJECTIONS²

Claims 20–39 stand rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter.

Claims 20–23 and 29–35 stand rejected under 35 U.S.C. § 103 as unpatentable over Hardwicke and Fuller.

² The Examiner withdrew rejections of claims 20 and 33 under 35 U.S.C. § 112(b). Ans. 3–4.

Claims 24–26 stand rejected under 35 U.S.C. § 103 as unpatentable over Hardwicke, Fuller, and Callan.

Claims 27 and 28 stand rejected under 35 U.S.C. § 103 as unpatentable over Hardwicke, Fuller, and Seeley.

Claim 36 stands rejected under 35 U.S.C. § 103 as unpatentable over Hardwicke, Fuller, and Mabe.

ANALYSIS

Claims 20–39—Rejected as Directed to Patent-Ineligible Subject Matter

The Examiner rejects claims 20–39 as directed to patent-ineligible subject matter. Final Act. 6–8. To determine whether a claim falls within a judicially recognized exception to patent eligibility under 35 U.S.C. § 101, we apply the two-step framework set forth in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70 (2012), and reaffirmed in *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 217–218 (2014). For the first *Alice* step (Step 2A of the USPTO’s Subject Matter Eligibility Guidance as incorporated into MPEP § 2106), we determine whether the claims at issue are directed to a patent-ineligible concept such as an abstract idea, law of nature, or natural phenomenon. *Alice*, 573 U.S. at 217–221 (citing *Mayo*, 566 U.S. at 78–79). If so, we advance to the second *Alice* step (Step 2B of the USPTO’s Subject Matter Eligibility Guidance) where “we consider the elements of each claim both individually and ‘as an ordered combination’ to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application” of the otherwise patent-ineligible concept. *Id.* (quoting *Mayo*, 566 U.S. 78–79).

The USPTO recently published revised guidance on applying step 2A. *See 2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50 (Jan. 7, 2019) (“Revised Guidance”).³ The Revised Guidance establishes a “two-prong inquiry” for determining whether a claim is directed to a judicial exception. *Id.* at 54. In prong one, we determine whether the claim *recites* a judicial exception, such as laws of nature, natural phenomena, or abstract ideas. *Id.* If so, we look to whether the claim recites additional elements that *integrate* the judicial exception *into a practical application*. *Id.* at 50. Thus, a claim is directed to a judicial exception only if the claim recites a judicial exception *and* does not integrate that exception into a practical application. *Id.*

The Patent Eligibility Guidance also clarifies what constitutes an “abstract idea”: a matter will be treated as an abstract idea if it falls within the following specific groupings:

- (a) Mathematical concepts—mathematical relationships, mathematical formulas or equations, mathematical calculations;
- (b) Certain methods of organizing human activity—fundamental economic principles or practices (including hedging, insurance, mitigating risk); commercial or legal interactions (including agreements in the form of contracts; legal obligations; advertising, marketing or sales activities or behaviors; business relations); managing personal behavior or relationships or interactions between people (including social activities, teaching, and following rules or instructions); and
- (c) Mental processes—concepts performed in the human mind (including an observation, evaluation, judgment, opinion).

³ Available at <https://www.govinfo.gov/content/pkg/FR-2019-01-07/pdf/2018-28282.pdf>.

Id. at 52 (footnotes omitted). “Claims that do not recite matter that falls within these enumerated groupings of abstract ideas should not be treated as reciting abstract ideas” except in rare circumstances. *Id.* at 53.

Appellants argue claims 20–39 as a group. App. Br. 10–15. We select claim 20 as representative of the group, and decide the appeal of this rejection on the basis of claim 20 alone. 37 C.F.R. § 41.37(c)(1)(iv).

For step 2A, the Examiner finds that “[a]ll limitation[s] [in claim 20] starting with ‘obtaining...,’ ‘determining...,’ and ‘transmitting...’ are mere data gathering and manipulation, and therefore an abstract idea.” Final Act. 6. For step 2B, the Examiner finds that the additional limitations, when considered both individually and as a combination, do not amount to significantly more than the abstract idea. *Id.* at 6–7.

Appellants respond that claim 20 is not directed to an abstract idea because “the claimed invention is directed to an improvement in the functioning of a computer (i.e., detecting damage in a single rotor blade).” App. Br. 14. Appellants also assert that “[e]ven if, *arguendo*, independent Claim 20 may be interpreted as an abstract idea under Step 2A of the *Alice* test, independent Claim 20 does not preempt all possible uses of the abstract idea under Step 2B of the *Alice* test.” *Id.*

USPTO Step 2A, Prong 1

Under step 2A, Prong 1, we consider whether the claims recite a judicial exception. Independent claim 20 recites, *inter alia*, “determining an estimated operating characteristic of the gas turbine based on the operating characteristic using an estimator of the system.” The Specification states that the estimator “may include a Kalman filter” that “uses a mathematical model to compute the estimated operating characteristics.” Spec. ¶¶ 19, 20.

But claim 20 does not itself require a Kalman Filter or any specific mathematical model. Indeed, claim 20 does not require any mathematical calculation. Thus, for example, determining the estimated operating characteristic from an obtained operating characteristic may only require access to a look-up table, or the application of an operator's expertise. Thus, this "determining" limitation can be performed in the human mind, and, as such, is a mental process recognized as an abstract idea. Revised Guidance, 52.

Claim 20 also recites "in a life prediction module . . . determining an operating criterion of the gas turbine based on the estimated operating characteristic and the operating characteristic using a criterion identifier." The Specification states that the operating criterion "is representative of values indicative of wear on the gas turbine component and may include, for example, stress at a location in the component, strain at the location in the component, temperatures at the location of the component, or combinations thereof." *Id.* ¶ 23. The only description in the Specification regarding how an operating criterion is determined invokes the involvement of the human mind: "In one embodiment, the location may be identified based [on] expert knowledge of part designers, distress noted at locations in fielded parts, or a combination thereof." *Id.* Thus, the step of determining an operating criterion is a mental process; therefore, this step recites an abstract idea.

Other steps are also recitations of mental processes. Claim 20 does not specify how "assigning operating weightages to a plurality of gas turbine parameters" is done, and the Specification teaches that it may be done by an operator. *Id.* ¶ 39. Thus, this limitation encompasses human judgment, a mental process. For similar reasons, we determine that the steps of

“generating a set point for operating the gas turbine based on the operating weightages of the plurality of gas turbine parameters, and “predicting an estimate of a remaining useful life of the component of the gas turbine,” are also recitations of mental processes, which are abstract ideas.

Step 2A, Prong 2.

We now consider whether the additional steps of claim 20 integrate the recited abstract ideas into a practical application. According to the Revised Guidance, courts have recognized that additional elements that merely add “insignificant extra-solution activity” to a judicial exception do not integrate the judicial exception into a practical application. Revised Guidance, 55. Such is the case here. Claim 20 recites “obtaining” various data, e.g., an operating characteristic and an estimated operating characteristic. Claim 20 also recites “transmitting” data between various functional components, such as “transmitting the operating criterion to a damage identifier” and “transmitting the cumulative damage to a prediction unit.” The “obtaining” steps constitute data gathering, which has been recognized as insignificant extra-solution activity. *In re Bilski*, 545 F.3d 943, 963 (Fed. Cir. 2008) (*en banc*), *aff’d sub nom Bilski v. Kappas*, 561 U.S. 593 (2010). Likewise, the steps requiring transmitting data are insignificant extra-solution activity because they are unrelated to how the data is determined. *See Amdocs (Israel) Limited v. Openet Telecom, Inc.*, 841 F.3d 1288, 1311 (Fed. Cir. 2016) (activity that is unrelated to how a solution is achieved constitutes extra-solution activity).

We are not persuaded by Appellants’ argument that the claimed invention is directed to an improvement in the functioning of a computer. App. Br. 14; *see* Revised Guidance, 55 (an additional element or

combination of elements that reflect an improvement in the functioning of a computer may integrate a received judicial exception into a practical application). Appellants do not identify any specific limitation or combination of limitations that reflect improved computer functionality. Indeed, we are unable to discern any limitation in claim 20 that expressly requires computer functionality.

In sum, because claim 20 recites a judicial exception, and the additional limitations of claim 20 do not integrate the judicial exception into a practical application, claim 20 is directed to a judicial exception. The additional limitations of claims 21–39 are not sufficient to reach a different conclusion as to those claims. Accordingly, we conclude that the appealed claims are directed to a judicial exception.

USPTO Step 2B

Finally, we consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application of the otherwise patent-ineligible concept. We conclude that they do not. As noted above, the additional elements constitute insignificant extra-solution activity. As our reviewing court has held, “it is well settled that the prohibition against patenting abstract ideas cannot be circumvented by . . . adding insignificant extra-solution activity.” *Amdocs*, 841 F.3d at 1310 (citing *Bilski v. Kappas*, 561 U.S. 593, 610–11 (2010)). Appellants’ argument that claim 20 does not preempt all possible uses of the abstract idea does not persuade us of examiner error. Preemption is not a dispositive test for patent eligibility. *See Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015) (although “preemption may signal

patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility”). Thus, we sustain the Examiner’s rejection of claims 20–39 as directed to patent-ineligible subject matter.

*Claims 20–23 and 29–35—Rejected as
Unpatentable over Hardwicke and Fuller*

Appellants argue claims 20–23 and 29–35 as a group. App. Br. 21. We select claim 20 as representative of the group, and decide the appeal of these claims on the basis of claim 20 alone. 37 C.F.R. § 41.37(c)(1)(iv). Having considered all of Appellants’ arguments in support of the patentability of claim 20, we are not persuaded that the Examiner erred in rejecting claim 20 as unpatentable over Hardwicke and Fuller.

Appellants first argue that “Hardwicke does not teach or suggest the feature of determining an estimated operating characteristic using an estimator of a system of an industrial power plant based on the operating characteristic obtained by using a sensor of the system, as recited in claim 20.” App. Br. 19. Instead, according to Appellants, paragraph 30 of Hardwicke “teaches a first life parameter sub-step 330 for executing a data fusion method including a Fuzzy Reasoning method, Artificial Intelligence, fusion of M&D data with damage accumulation, fallout and unplanned models and a Bayesian method.” *Id.* But the Examiner relies on paragraphs 21–24 of Hardwick, not on paragraph 30, to teach this limitation. Final Act. 8. As the Examiner further explains in the Answer, Hardwicke’s method substep 220 calculates component cycle parameters (e.g., direct metal temperatures) based on operational parameters (e.g., compressor discharge temperature) obtained from substep 210. Ans. 6 (citing Hardwick ¶¶ 21–

22). Appellants do not address this explanation in their Reply Brief, much less show that it is erroneous.

Appellants further argue that Fuller does not teach “a weightage identifier that assigns operating weightages to a plurality of gas turbine parameters based on an estimate of the remaining useful life of the component of the gas turbine determined by a prediction unit.” App. Br. 20–21. But as the Examiner points out, Hardwicke, not Fuller, “was used to teach the limitations drawn to assigning operating weightages.” Ans. 7 (citing Final Act. 9–10). Again, Appellants do not dispute this assertion in their Reply Brief. Because we are not persuaded that the Examiner erred in rejecting claims 20–23 and 29–35 as unpatentable over Hardwicke and Fuller, we sustain the rejection.

The Remaining Rejections

Appellants have not presented arguments for separately rejected dependent claims 24–28, and 36. Therefore, for the reasons stated above, we sustain the Examiner’s rejection of claims 24–26 as unpatentable over Hardwicke, Fuller, and Callan, claims 27 and 28 as unpatentable over Hardwicke, Fuller, and Seeley, and of claim 36 as unpatentable over Hardwicke, Fuller, and Mabe.

DECISION

For the above reasons, we affirm the Examiner’s rejection of claims 20–39 under 35 U.S.C. § 101, and affirm the Examiner’s rejections of claims 20–36 under 35 U.S.C. § 103.

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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