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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* YONG K. CHO, MARK K. ERICKSON,  
DOUGLAS A. HETTRICK, and TODD M. ZIELINSKI<sup>1</sup>

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Appeal 2017-009973  
Application 13/744,456  
Technology Center 3700

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Before JEFFREY N. FREDMAN, JOHN E. SCHNEIDER, and  
RYAN H. FLAX, *Administrative Patent Judges*.

FLAX, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) involving claims to a method and system for monitoring respiratory function. Claims 1–27 are on appeal as rejected under 35 U.S.C. § 101. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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<sup>1</sup> Appellants identify the Real Party in Interest as “Medtronic, Inc.” Appeal Br. 3. We herein refer to the Specification of Jan. 18, 2013 (“Spec.”); the Final Office Action of May 31, 2016 (“Final Action”); Appeal Brief of Jan. 3, 2017 (“Appeal Br.”); Examiner’s Answer of May 18, 2017 (“Answer”); and Reply Brief of July 18, 2017 (“Reply Br.”).

STATEMENT OF THE CASE

Claims 1 is representative and is reproduced below:

1. A method for monitoring respiratory function, comprising:

sensing, in a tissue field of a patient and by an implantable medical device, a first thoracic impedance waveform for at least one breath of the patient;

determining, by the implantable medical device, a first inspiration slope value in response to the first thoracic impedance waveform;

comparing, by the implantable medical device, the first inspiration slope value to a first threshold slope value of the patient and determining an increase in the first inspiration slope value based on the comparison;

determining, by the implantable medical device, a magnitude of decrease in mean impedance of the tissue field of the patient in which the first thoracic impedance waveform is sensed;

determining, by the implantable medical device, an indication of respiratory function of the patient, wherein the indication of respiratory function comprises pulmonary edema in response to at least determining both the increase in the first inspiration slope value and the magnitude of decrease in mean impedance being greater than a threshold impedance decrease value; and

storing, by the implantable medical device, the determined indication of respiratory function.

Appeal Br. 33 (Claims App'x).

The following rejections are appealed:

Claims 1–11, 24, and 25 stand rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. Final Action 4.

Claims 12–22, 26, and 27 stand rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. *Id.*

Claim 23 stands rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. *Id.*

#### DISCUSSION

“[T]he examiner bears the initial burden . . . of presenting a *prima facie* case of unpatentability. If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant.” *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992). We have considered those arguments made by Appellants in the Appeal Brief and properly presented in the Reply Brief; arguments not so presented in the Briefs are waived. *See* 37 C.F.R. § 41.37(c)(1)(iv) (2015); *see also Ex parte Borden*, 93 USPQ2d 1473, 1474 (BPAI 2010) (informative) (“Any bases for asserting error, whether factual or legal, that are not raised in the principal brief are waived.”).

“Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.” *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012) (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Claims directed to *nothing more* than abstract ideas (such as mathematical algorithms), natural phenomena, and laws of nature are not eligible for patent protection. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *accord* MPEP § 2106 (II) (discussing *Diehr*).

In analyzing patent-eligibility questions under the judicial exception to 35 U.S.C. § 101, the Supreme Court instructs us to “first determine whether the claims at issue are directed to a patent-ineligible concept.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014). If the

claims are determined to be directed to an ineligible concept we then move to a second step and “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.” *Id.* (quoting *Mayo*, 566 U.S. at 97).

The Federal Circuit has “recognize[d] 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)). However, “we continue to ‘treat[ ] analyzing information by steps people [could] go through in their minds, or by ***mathematical algorithms, without more, as essentially mental processes within the abstract-idea category.***”” *Synopsys*, 839 F.3d at 1146–47 (emphasis added) (quoting *Electric Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) (citations omitted)); *see also Electric Power Grp.*, 830 F.3d at 1353 (“collecting information, analyzing it, and displaying certain results of the collection and analysis” “fall[s] into a familiar class of claims ‘directed to’ a patent-ineligible concept,” that of the abstract idea). The Federal Circuit has recognized that “a claim for a *new* abstract idea is still an abstract idea.” *Synopsys*, 839 F.3d at 1151.

There is an abundance of cases where the Federal Circuit has held that, for example, manipulating, organizing, analyzing, and displaying data using generic computer components is not patent-eligible under the common law application of 35 U.S.C. § 101. The Federal Circuit, in *Intellectual Ventures I LLC v. Capital One Financial Corp.*, 850 F.3d 1332 (Fed. Cir. 2017), where the claims were held to be directed to a computer programmed

to edit XML documents, “conclude[d] [the claims were,] . . . at their core, directed to the abstract idea of collecting, displaying, and manipulating data.” *Id.* at 1339–40. Even though the patent at issue in *Intellectual Ventures I* indicated its invention provided a concrete solution to a particular problem in computer programming, it “at best, . . . limit[ed] the invention to a technological environment for which to apply the underlying abstract concept,” which did “not render an otherwise abstract concept any less abstract.” *Id.* at 1340 (citing *Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1259 (Fed. Cir. 2016)). Under step two of the *Alice* analysis, the court in *Intellectual Ventures I* held that claims reciting generic computer components or elements and their functions, e.g., organizing, mapping, identifying, defining, detecting, and modifying, “merely describe[d] the functions of the abstract idea itself” and were not sufficient to supply significantly more than the abstract idea so as to confer patent-eligibility. *Id.* at 1341.

The Federal Circuit has established in several other cases that collecting, classifying, storing, and organizing data, regardless of whether such data manipulations are limited to a particular technological environment, is an abstract idea and, without more (which cannot be provided by generic components or steps used in their routine and customary ways), is not patent eligible. *See, e.g., Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335 (Fed. Cir. 2018) (claims directed to manipulating data for selective display using routine and conventional instructions/programming not patent-eligible); *SAP America, Inc. v. Investpic, LLC*, 890 F.3d 1016, 1018 (Fed. Cir. 2018) (claims directed to “nothing but a series of mathematical calculations based on selected information and the

presentation of the results of those calculations” is merely an advancement in an abstract idea and patent-ineligible, even though physical things like databases and processors are claimed); *Electric Power Grp.*, 830 F.3d 1350 (“claim[s] [to] systems and methods for performing real-time performance monitoring of an electric power grid by collecting data from multiple data sources, analyzing the data, and displaying the results” was not patent-eligible even though limited to a particular technological environment); *In re TLI Communications LLC Patent Litigation*, 823 F.3d 607 (Fed. Cir. 2016) (collecting and organizing data in the form of digital images is abstract and patent ineligible, and using computer systems in their generic ways do not add an inventive concept); *Content Extraction and Transmission LLC v. Wells Fargo Bank, Nat’l Ass’n*, 776 F.3d 1343 (Fed. Cir. 2014) (extracting data from documents, recognizing information therefrom, and storing the information is abstract).

Further, simply applying an abstract idea to a natural phenomenon does not make it patent-eligible. In *In re BRCA1*, the Federal Circuit held that a claimed method for *screening* a germline of a human subject for an alteration of the BRCA1 gene by *comparing* a sample BRCA1 gene sequence with a reference, wild-type germline sequence of BRCA1 gene was directed to an abstract idea — a “mental process of ‘comparing’ and ‘analyzing’ two gene sequences.” *In re BRCA1– and BRCA2–Based Hereditary Cancer Test Patent Litigation*, 774 F.3d 755, 763–64 (Fed. Cir. 2014) (citation omitted) (“allowing a patent on the comparison step could impede a great swath of research relating to the BRCA genes, and it is antithetical to the patent laws to allow these basic building blocks of scientific research to be monopolized.”).

Further, our reviewing court has held that detecting, measuring, and/or comparing natural phenomena using known and conventional techniques is not patent-eligible. For example, in *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371 (Fed. Cir. 2015), the Federal Circuit held claims directed to amplifying cffDNA from a plasma or serum sample and detecting paternally inherited cffDNA to make a diagnosis using well-understood, routine, and conventional methods, like PCR amplification, were directed to a patent-ineligible natural phenomenon, without more to supply an inventive concept. As another example, in *Cleveland Clinic Foundation v. True Health Diagnostics LLC*, 859 F.3d 1352 (Fed. Cir. 2017), the Federal Circuit held claims directed to comparing levels of MPO (an enzyme) in a subject's blood to reference samples to diagnose risk of cardiovascular disease, i.e., detecting and measuring and comparing a natural phenomenon, to be directed to a patent-ineligible observation of a law of nature using conventional detection and statistical methods, which did not confer patent-eligibility.

Turning to the claims on appeal, although there are three separate rejections under § 101, which are respective of the three independent claims on appeal, these rejections are substantially identical in their factual determinations, rationale, and conclusions, as the claims are substantially similar in most respects. Similarly, although Appellants' arguments separate the claims into groups respective of the independent claims and their rejections, Appellants' arguments are essentially the same for each group. Therefore, we address all rejections together; claim 1, as noted above, is representative.

The Examiner determined, pursuant to *Alice* step one, that the claims “are directed to a mathematical algorithm for correlating changes in slope of a waveform and mean values of a waveform with respiratory function, a concept which is essentially a mathematical relationship, which has been held to be abstract.” Final Action 4. The Examiner identified that the claims’ *determining* a slope value, *comparing* slope value to a threshold, *determining* a magnitude of decrease in mean impedance, and *determining* an indication of respiratory function limitations, are each a part of and directed to the mathematical algorithm constituting the abstract idea. Answer 4; *see also* Spec. Fig. 7 (illustrating an algorithm within the scope of the claims).

Pursuant to *Alice* step two, the Examiner determined that any additional claim elements, i.e., elements not directed to the abstract idea of the mathematical algorithm, (i.e., the *implantable medical device* for claim 1; the *impedance sensor*, *memory*, and *processor* for claim 12; and the *computer-readable medium* and, maybe, *processor* for claim 23) are generic components performing non-specific tasks and do not amount to significantly more than the judicial exception itself. *Id.* at 4–5; *see also id.* at 5 (identifying that the prior art of record<sup>2</sup> evidences that the components of the claims were well known as used for determining pulmonary edema using the techniques claimed). We discern no error in the Examiner’s determinations and adopt the Examiner’s findings of fact and rationale in

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<sup>2</sup> US 2005/0085734 A1 (published Apr. 21, 2005) (“Tehrani”); US 2009/0024176 A1 (published Jan. 22, 2009) (“Yun”); US 2009/0275854 A1 (published Nov. 5, 2009) (“Zielinski”); US 2005/0124908 A1 (published June 9, 2005) (“Belalcazar”).

support of the rejections. *See* Final Action 4–6; Answer 2–9; *see also* Advisory Action of Oct. 6, 2016.

As noted above, Appellants’ arguments are essentially the same for each rejection and all claims. Appellants argue the claims are not directed to an abstract idea because they involve sensing an impedance signal, which Appellants contend is somehow transformatory in nature because electricity interacts with the body’s physiology. Appeal Br. 7; *see also id.* at 31–32. Appellants argue “the claims do not seek to tie up all applications of an abstract idea,” i.e., they are not preemptive, but have meaningful limitations that limit the use of the mathematical algorithm to analysis of respiratory function. *Id.* at 10, 18, 22, 27–29. Appellants argue the Examiner’s rejections are not sufficiently specific as to how the claim limitations are directed to a mathematical algorithm; Appellants take issue with the fact that the abstract idea identified by the Examiner is not expressly recited in the claims. *Id.* at 11–12, 23. Appellants also argue their claims are analogous to those at issue in *Enfish, LLC*, which the Federal Circuit held to be patent-eligible. *Id.* at 12, 24; *see also Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016). Appellants argue that, considering the claims as a whole, they are not directed to abstract ideas because they recite specific steps to achieve concrete results that are not abstract, e.g., an implantable medical device is not an abstract idea. Appeal Br. 13, 25. Appellants also argue their claims are like those found patent-eligible by the Supreme Court in *Diehr* and by the Federal Circuit in *Bascom* because they offer an improvement in the technical field of detecting pulmonary edema. *Id.* at 14, 25, 30; *see also Diehr*, 450 U.S. 175; *Bascom Global Internet Serv., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341 (Fed. Cir. 2016). Appellants argue that

“determining . . . an indication of respiratory function . . .” is not a routine or conventional step in the art because the Examiner has not cited any evidence that it is routine or conventional. Appeal Br. 15, 19, 26.

Appellants’ arguments are not persuasive. Under the facts here, the precedent of our reviewing court requires that the rejections be affirmed. As determined by the Examiner, the claims are directed to an abstract idea, i.e., a mathematical algorithm, without more to provide an inventive concept.

Simply put, “[i]nformation as such is an intangible,” collecting it and analyzing it by mathematical algorithms without more is abstract, and manipulating information with routine tools “is abstract as an ancillary part of such collection and analysis.” *Electric Power Grp.*, 830 F.3d at 1353–54. Here, similar to *Electric Power Group*, the claims merely require collecting data in a conventional way, and manipulating that data for analytical purposes using a conventional computer component programmed to do so; these steps do not transform the abstract ideas of the claims into a patent-eligible invention. Also, similar to *Cleveland Clinic*, 859 F.3d at 1352, the claims are directed to measuring a natural biological phenomenon (pulmonary edema). Detecting, measuring, and/or comparing natural phenomena using known and conventional techniques is not patent-eligible.

The claims here are also not unlike those of *SAP America, Inc.*, which included a claim for a system and recited processing information in a new way to generate a report, which was argued to be an improvement in the field of financial analysis; the claims also recited non-abstract components like a database and processors. The Federal Circuit held that the claims were directed to an abstract idea – analyzing information by mathematical algorithms, with the steps occurring in the non-physical realm, and the

additional claimed components being merely routinely available things like computers using their already available basic functions, all together being a patent-ineligible concept. Similarly, here, we are confronted with claims, be them method, system, or computer-readable medium claims, that recite a mathematical algorithm including determining a slope relating to inspiration and measured impedance, comparing this to a threshold, determining a magnitude of mean impedance decrease, and then identifying a correlation between these things and a physical condition, i.e., pulmonary edema. All this is directed to a mathematical algorithm, like that illustrated by Appellants in the Specification's Figure 7. The other claimed features, such as an implantable medical device, a processor, a memory, or an impedance sensor, are not claimed to be used in a new and unconventional way or to be themselves improved in any way, but are standard components used in generic ways, as explained in the Specification. *See, e.g.*, ¶¶ 117–119.

Moreover, the facts here are unlike those of *Enfish*, *Diehr*, and *Bascom*. Unlike *Enfish*, where the Federal Circuit found the claims to be patent-eligible, here, although the claims are similarly directed, essentially, to a software solution or something similar to it, they are not “directed to a specific implementation of a solution to a problem in the software arts,” as were the claims in *Enfish*. *See Enfish*, 822 F.3d at 1339. Unlike *Diehr*, where the Supreme Court held that the claims were not directed to a mathematical algorithm, but instead to a process for manufacturing rubber, here the claims are directed solely to a mathematical algorithm, using conventional data collecting sensors and computer devices in generic ways, to achieve a non-physical result (i.e., storing a determination of pulmonary edema). *See Diehr*, 450 U.S. at 176. Unlike *Bascom*, where the claims

provided a software solution applicable to solve a problem specific to the software-based environment of the internet, the claims here are directed to a new way of making calculations on data routinely used in analyzing cardiac and pulmonary conditions, even pulmonary edema specifically. *See Bascom*, 827 F.3d 1343–45, 1350–51; *see also* Final Action 5 (citing Tehrani (Abstract, ¶¶ 8, 15–16, 29, 82 (determining pulmonary edema by measuring respiration parameters)); Yun (¶¶ 18, 21, 31, 38, 58, 64 (measuring respiratory impedance and inspiration waveform slopes using IMD to determine pulmonary edema)); Zielinski (Abstract, ¶ 3, Figure 1 (measuring impedance waveforms using IMD to evaluate pulmonary edema)); and Belalcazar (Abstract, ¶¶ 4, 21, 32, 56 (diagnosing pulmonary edema by sensing impedance using IMD and processor))).

Appellants have argued that there is no evidence that the additional claim elements, noted above, not directed to the abstract idea, are merely generic components used in conventional and routine ways. We note that such a determination is a question of fact, as discussed in *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018). Appellants’ arguments are not persuasive in view of the aforementioned evidence cited by the Examiner to the contrary. *See* Final Action 5 (citing Tehrani, Yun, Zielinski, and Belalcazar); and Specification as cited *supra*.

Appellants’ tie-up argument is also unpersuasive. “While preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility.” *Ariosa*, 788 F.3d at 1379.

For the reasons set forth above, pursuant to the precedent of our reviewing court, we affirm the § 101 rejections.

Appeal 2017-009973  
Application 13/744,456

SUMMARY

The rejections of the claims as directed to patent-ineligible subject matter are each affirmed.

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)(1)(iv).

AFFIRMED