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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PATRICK SHAWN BEATY¹

Appeal 2017-005963
Application 12/867,980
Technology Center 1600

Before ERIC B. GRIMES, RYAN H. FLAX, and DAVID COTTA,
Administrative Patent Judges.

GRIMES, *Administrative Patent Judge.*

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method and apparatus for determining the amount of blood in a blood culture, which have been rejected as being directed to patent-ineligible subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

“Rapid and reliable detection of microorganisms in the blood is among the most important functions of the clinical microbiology laboratory.

¹ Appellant identifies the Real Party in Interest as Becton, Dickinson and Company. Appeal Br. 1.

Several different blood culture systems and approaches are available to laboratories.” Spec. 1:11–13.

Optimal performance of a blood culture system . . . is dependent on collecting the correct amount of blood per sample. Culture of a sample below the optimal level can affect organism recovery based on a decreased probability of obtaining viable organisms from the limited blood volume. Culture of a sample above the optimum level can reduce the recovery of viable organisms by failing to properly dilute or remove inhibitors in the sample or by creating an unfavorable competitive situation with blood competing with any microbes present in the specimen for nutrients such as oxygen or sugar.

Id. at 1:23–30.

The Specification discloses

[d]ata transformation methods . . . that provide an estimate of the rate of metabolism and the change in rate of metabolism with time that allows an estimate of the initial rates of metabolic activity in the blood culture vessel that can be standardized to the amount of blood present and allow an estimate of the amount of blood in the blood culture.

Id. at 2:12–16.

Claims 1–32, 35, 36, and 38–64 are on appeal. Claim 1 is illustrative and reads as follows:

1. A method of determining an amount of blood in a blood culture in a vessel, the method comprising:
 - 1) obtaining a blood sample;
 - 2) combining the blood sample in a vessel with a blood culture media;
 - 3) monitoring changes in the biological state of the sample over time using a sensor, wherein the biological state is one of CO₂ concentration, O₂ concentration, pH, a rate of change in CO₂ concentration, a rate of change in O₂ concentration, or a rate of change in pH;

wherein the amount of blood in the sample is determined by:

(A) calculating a normalization relative value for each respective measurement in a plurality of measurements of the biological state of the blood culture in the vessel, each measurement in the plurality of measurements taken at a different time point between a first time point and a second time point, between (i) the respective measurement and (ii) an initial biological state of the blood culture measured at an initial time point, thereby forming a plurality of normalization relative values for each of a plurality of predetermined fixed interval of time points;

(B) determining, for each respective predetermined fixed interval of time points between the first time point and the second time point, a first derivative of the normalization relative values for measurements of the biological state in the respective predetermined fixed interval of time points, thereby forming a plurality of rate transformation values, wherein the plurality of rate transformation values comprises a plurality of sets of rate transformation values, wherein each respective set of rate transformation values in the plurality of sets of rate transformation values is for a different set of contiguous time points between the first time point and the second time point;

(C) computing, for each respective set of rate transformation values in the plurality of sets of rate transformation values, an average relative transformation value as a measure of central tendency of each of the rate transformation values in the respective set of rate transformation values, thereby computing a plurality of average relative transformation values; and

(D) determining the amount of blood in the blood culture in the vessel based on a measure of central tendency of the plurality of average relative transformation values.

Claims 31 and 35 are also independent. Claim 31 is directed to a blood amount determination apparatus comprising a sensor and memory having instructions for carrying out the steps recited in claim 1. Claim 35 is

directed to a method like that of claim 1, but also requires “outputting the amount of blood . . . or displaying the amount of blood” in the culture.

DISCUSSION

The Examiner has rejected all of the claims on appeal under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Ans. 2. The Examiner finds that the claims are directed to an abstract idea—specifically, mathematical processes—and that the physical steps of the claimed process “are well-known, conventional and routine data-gathering steps.” *Id.* at 2–3 (citing Berndt²).

We agree with the Examiner that claim 1 is directed to a patent-ineligible method. The Supreme Court has

set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts. First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, “[w]hat else is there in the claims before us?” To answer that question, 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.

Alice Corp. Pty. Ltd. v. CLS Bank Int’l, 134 S. Ct. 2347, 2355 (2014) (citations omitted).

Here, claim 1 is directed to the abstract idea of determining the amount of blood in a culture vessel using a series of calculations that are

² Berndt et al., WO 2006/023470 A1, March 2, 2006.

based on changes in CO₂ concentration, O₂ concentration, or pH. So the next question is, what else is there in the claims before us?

Berndt states that, in “the field of growth-based detection of microorganisms in sealable containers, such as blood culture bottles,”

[u]sually, the presence of biologically active agents such as bacteria or mycobacteria in a patient’s body fluid is determined using culture vials. A small quantity of body fluid is injected through the enclosing rubber septum into the sterile vial containing a culture medium. The vial is incubated at 37°C and monitored for bacterial growth. . . . Changes in the carbon dioxide [CO₂] concentration are usually monitored using chemical sensors disposed on the inner walls of the culture bottles.

Berndt 1:13–20. Thus, Berndt provides evidence that it was routine and conventional to obtain a blood sample, combine the sample with a blood culture medium, and monitor changes in the CO₂ level in order to determine bacterial growth in a blood culture.

Claim 1 on appeal recites the same conventional data-gathering steps but analyzes the data in a new way. However, a method of analyzing data in a different way is still nothing more than data analysis. “Information as such is an intangible. Accordingly, . . . collecting information, including when limited to particular content (which does not change its character as information), [is] within the realm of abstract ideas.” *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016) (citations omitted). “In a similar vein, . . . analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, [is] essentially mental processes within the abstract-idea category.” *Id.* at 1354. And “merely presenting the results of abstract processes of collecting and

analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis.”
Id.

Electric Power Group is directly applicable here: “The advance [the claims] purport to make is a process of gathering and analyzing information of a specified content, then displaying the results, and not any particular assertedly inventive technology for performing those functions. They are therefore directed to an abstract idea.” *Id.*

Appellants argue that the claimed method is patent eligible under the standard of *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016) and *McRo, Inc. v. Bandai Namco Games Am., Inc.*, 837 F.3d 1299 (Fed. Cir. 2016). Appeal Br. 6–8.

We do not find Appellants’ argument persuasive. The Federal Circuit has made clear that the claims at issue in both *McRo* and *Enfish* were held to be patent-eligible because they were directed to improvements in computer functionality. *See SAP America, Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1167 (Fed. Cir. 2018):

The claims in *McRO* were directed to the creation of something physical—namely, the display of “lip synchronization and facial expressions” of animated characters on screens for viewing by human eyes. [*McRo*, 837 F.3d] at 1313. The claimed improvement was to how the physical display operated (to produce better quality images), unlike (what is present here) a claimed improvement in a mathematical technique with no improved display mechanism.

See also id. at 1168 (The claims in *Enfish* “were patent-eligible because they were directed to improvements in the way computers and networks carry out their basic functions. *Enfish*, 822 F.3d at 1335–36.”).

The claims of the instant application, by contrast, are not directed to “an improvement to computer functionality itself.” *Enfish*, 822 F.3d at 1336. In fact, the method of claim 1 does not even require using a computer: all of the “calculating,” “determining,” and “computing” steps can be done by a person using a pencil and paper or even in the human mind. To the extent that a computer would be used in the claimed method, it is used only in its conventional role of carrying out calculations; “the focus of the claims is not any improved computer or network, but the improved mathematical analysis.” *SAP America*, 898 F.3d at 1168. *McRo* and *Enfish* therefore do not support the patent-eligibility of claim 1.

Appellants also argue that the “claims do not ‘tie up’ the use of normalization relative values, rate transformation values, or average relative transformation values. Instead, Applicant’s claims use these computational techniques as steps in a way to determine ‘an amount of blood (*e.g.*, a volume of blood) in a blood culture vessel.” Appeal Br. 8–9 (quoting Spec. 2:11). Appellants’ arguments on this point focus on claim 31, which (as noted previously) is directed to a blood amount determination apparatus comprising a sensor and memory having instructions for carrying out the steps recited in claim 1. *Id.* at 10–12.

Appellants’ argument regarding preemption does not persuade us that the apparatus of claim 31 or the method of claim 1 are eligible for patenting. Regarding claim 31, Appellants do not argue that the recited sensor is not routine and conventional. Rather, Appellants argue that the claimed “apparatus explicitly includes a few essential structural components and sets of electronically encoded instructions that utilize sensor data, normalization

relative values, rate transformation values, and average relative transformation values in a very specific way to determine the amount of blood in a vessel.” Appeal Br. 11. Appellants thus rely on the same relevant limitations with respect to claim 31 as are recited in the method of claim 1.

However, “[w]here a patent’s claims are deemed only to disclose patent ineligible subject matter under the *Mayo* framework, as they are in this case, preemption concerns are fully addressed and made moot.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015). Appellants’ argument based on lack of preemption is therefore unpersuasive.

Appellants argue that—in *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014); *SiRF Technology, Inc. v. ITC*, 601 F.3d 1319 (Fed. Cir. 2010); and *Research Corp. Technologies, Inc. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010)—the claims “were directed to improved processes for analyzing data and the Federal Circuit held that all of these inventions were directed to eligible subject matter under 35 U.S.C. § 101.” Appeal Br. 12. *See also id.* at 19–21 (discussing *SiRF Technology*).³

This argument is not persuasive. *SiRF Technology* and *Research Corp. Technologies* were both decided in 2010, before the Supreme Court prescribed the *Mayo/Alice* two-step framework for determining patent-

³ In the Reply Brief, Appellants present an argument based on *Trading Techs. Int’l, Inc. v. CQG, Inc.*, 675 F. App’x 1001 (Fed. Cir. 2017). Reply Br. 5–6. The cited case, however, is nonprecedential and therefore does not control over precedential cases of the Federal Circuit.

eligibility. *SiRF Technology and Research Corp. Technologies* therefore did not apply the currently controlling standard for patent-eligibility.

The *DDR Holdings* court applied the *Mayo/Alice* test for patent eligibility. See *DDR Holdings*, 773 F.3d at 1255. We conclude, however, that the outcome of *DDR Holdings* does not control here because the facts of the instant appeal distinguish it from that case.

In *DDR Holdings*, the claims were

directed to systems and methods of generating a composite web page that combines certain visual elements of a “host” website with content of a third-party merchant. For example, the generated composite web page may combine the logo, background color, and fonts of the host website with product information from the merchant.

773 F.3d at 1248. The point of the claimed invention was to allow a host website to “display a third-party merchant’s products, but retain its visitor traffic,” *id.* at 1249, rather than having visitors taken away from the host website when they clicked on the merchant’s advertisement on the host site, *id.* at 1248.

The *DDR Holdings* court noted that the claims at issue were similar to some earlier cases “in the sense that the claims involve both a computer and the Internet.” *Id.* at 1257. The court held, however, that

these claims stand apart because they do not merely recite the performance of some business practice known from the pre-Internet world along with the requirement to perform it on the Internet. Instead, the claimed solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks.

Id. The court concluded that “the claimed solution amounts to an inventive concept for resolving [a] particular Internet-centric problem, rendering the claims patent-eligible.” *Id.* at 1259.

Importantly with respect to the instant appeal, the *DDR Holdings* court noted that, “after *Alice*, there can remain no doubt: recitation of generic computer limitations does not make an otherwise ineligible claim patent-eligible” and that “[w]e know that mathematical algorithms, including those executed on a generic computer, are abstract ideas.” *Id.* at 1256.

DDR Holdings does not support the patent-eligibility of the instant claims because, as discussed above, claim 1 does not even require the use of a computer and, to the extent that a computer would be used, it would do nothing more than carry out calculations in the conventional manner of using computers. *See id.* (“[I]n *Bancorp Servs., L.L.C. v. Sun Life Assur. Co. of Canada (U.S.)*, 687 F.3d 1266, 1278 (Fed. Cir. 2012), the claims recited no more than the use of a computer ‘employed only for its most basic function, the performance of repetitive calculations,’ to implement [an] abstract idea. . . . Such claims are not patent-eligible.”).

Appellants argue that the claimed invention amounts to significantly more than a judicial exception because it “(1) offers an improvement to a technical field and (2) includes unconventional steps that confine the claim to a particular useful application.” Appeal Br. 13–14. With regard to improvement to a technical field, Appellants argue that patent-eligibility of the instant claims is supported by *Diamond v. Diehr*, 450 U.S. 175 (1981), in which the Court stated

that “when a claim containing a mathematical formula implements or applies that formula in a structure or process

which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.”

Id. at 14 (quoting *Diehr*, 450 U.S. at 192).

We do not agree that *Diehr* supports patent-eligibility of the claims on appeal. In *Diehr*, “[t]he claimed invention [was] a process for molding raw, uncured synthetic rubber into cured precision products.” *Diehr*, 450 U.S. at 177. The claimed process “us[ed] well-known time, temperature, and cure relationships to calculate by means of the Arrhenius equation when to open the press and remove the cured product.” *Id.* at 177–78. The Court noted that the “claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing.” *Id.* at 184.

The method of claim 1, by contrast, does not result in transforming an article into a different state or thing. Claim 1 recites conventional steps of gathering data (obtaining a blood sample, combining it with culture media, and monitoring changes in, e.g., CO₂ concentration), followed by mathematical steps to transform those data into different data (the amount of blood in the culture vessel). Gathering data and transforming it to other data does not amount to a patent-eligible method. *See Electric Power Group*, 830 F.3d at 1353, 1354 (“[C]ollecting information, including when limited to particular content (which does not change its character as information), [is] within the realm of abstract ideas” and “analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, [is] essentially mental processes within the abstract-idea category.”).

Appellants also argue that the claimed method includes unconventional steps. Appeal Br. 16. Appellants argue that the claims “describe in significant detail how various mathematical concepts (e.g., normalization relative values, rate transformation values, and average relative transformation values) can be used in combination with a vessel with a blood culture media and a sensor to determine the amount of blood in the vessel.” *Id.* at 17.

This argument is also unpersuasive. As discussed above, the physical steps recited in claim 1 were routine and conventional, as evidenced by Berndt. The only unconventional steps recited in the claimed method are the mathematical steps used to transform routinely-gathered data into data indicating the volume of blood in the culture vessel. But a mathematical algorithm, even an innovative one, is not patent-eligible. *See SAP America*, 898 F.3d at 1163 (“[T]he advance lies entirely in the realm of abstract ideas, with no plausibly alleged innovation in the non-abstract application realm. An advance of that nature is ineligible for patenting.”); *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 577 (2013) (“Groundbreaking, innovative, or even brilliant discovery does not by itself satisfy the § 101 inquiry.”). The Federal Circuit has recognized 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).

Finally, Appellants argue that “[t]he advantages of [the] invention become readily apparent when the claims are viewed as a whole” because the “invention as claimed provides a ‘more efficient solution’ to the ‘[r]apid and reliable detection of microorganisms in the blood,’ . . . by ‘determining

an amount of blood (e.g., a volume of blood) in a blood culture vessel.”
Appeal Br. 19. Appellants argue that, “[b]y focusing on the individual structural elements of Applicant’s claims and ignoring how the structural elements work together, Examiner has failed to appreciate that the claims as a whole do amount to significantly more than the judicial exception.” *Id.*

We are not persuaded. As discussed above, claim 1 recites conventional data-gathering steps, as evidenced by Berndt, followed by a mathematical algorithm to transform the gathered data into different data that indicate the volume of blood in a culture vessel. We therefore agree with the Examiner that the claimed method is not eligible for patenting under the controlling standard set out in *Alice* and *Mayo*.

We affirm the rejection of claims 1 and 31 under 35 U.S.C. § 101. Claims 2–30, 32, 35, 36, and 38–64 were not argued separately and therefore fall with claims 1 and 31. 37 C.F.R. § 41.37(c)(1)(iv).

SUMMARY

We affirm the rejection on appeal.

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).

AFFIRMED