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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte HOLGER SCHMITT, PETER FORTHMANN,
and MICHAEL GRASS

Appeal 2019-000338
Application 14/396,407
Technology Center 1600

Before DONALD E. ADAMS, RICHARD M. LEBOVITZ, and
DAVID COTTA, *Administrative Patent Judges*.

LEBOVITZ, *Administrative Patent Judge*.

DECISION ON APPEAL

The Examiner rejected the claims under 35 U.S.C. § 101 as reciting patent ineligible subject matter. Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject the claims. 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 Koninklijke Philips N.V., Eindhoven, NL. Appeal Br. 2.

STATEMENT OF THE CASE

Claims 1–26 stand finally rejected under 35 U.S.C. § 101 as directed to a judicial exception (i.e., a law of nature, a natural phenomenon, or an abstract idea) without significantly more. Final Act. 3; Ans. 8.²

Independent claim 1 is representative and reproduced below (for reference, bracketed numbers have been added):

1. A method, comprising:

[1] determining at least one characteristic about a stenosis in a vessel of a patient from image data of the stenosis, wherein the image data is generated by at least one imaging system selected from a group consisting of a computed tomography (CT) imaging system, a three dimensional (3D) rotational X-ray system and a magnetic resonance imaging (MRI) system;

[2] mapping the at least one characteristic to [2a] a pre-defined stenosis characteristic to fractional flow reserve value look up table;

[3] identifying the fractional flow reserve value in the look up table corresponding to the at least one characteristic, wherein [3a] the at least one characteristic about a stenosis in a vessel of a patient comprises at least one selected from a group consisting of: a length of the stenosis, a diameter of the stenosis, a vessel curvature, a distance of the stenosis to a branching point, and a vessel type;

[4] visually presenting the image data and the identified fractional flow reserve value on an output device; and

[5] wherein each step of the method is performed by a configured processor.

² Rejections under §§ 112, 102, and 103 were withdrawn in the Examiner's Answer. Ans. 8.

PRINCIPLES OF LAW

Under 35 U.S.C. § 101, an invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” However, not every discovery is eligible for patent protection. *Diamond v. Diehr*, 450 U.S. 175, 185 (1981). “Excluded from such patent protection are laws of nature, natural phenomena, and abstract ideas.” *Id.* The Supreme Court articulated a two-step analysis to determine whether a claim falls within an excluded category of invention. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014); *Mayo Collaborative Servs. v. Prometheus Labs, Inc.*, 566 U.S. 66, 75–77 (2012).

In the first step, it is determined “whether the claims at issue are directed to one of those patent-ineligible concepts.” *Alice*, 573 U.S. at 217. If it is determined that the claims are directed to an ineligible concept, then the second step of the two-part analysis is applied in which it is asked “[w]hat else is there in the claims before us?” *Id.* The Court explained that this step involves

a search for an ‘inventive concept’ — *i.e.*, an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’

Alice, 573 U.S. at 217–18 (citing from *Mayo*, 566 U.S. at 75–77).

Alice, relying on the analysis in *Mayo* of a claim directed to a law of nature, stated that in the second part of the analysis, “the elements of each claim both individually and ‘as an ordered combination’” must be considered “to determine whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application.” *Alice*, 573 U.S. at 217.

The PTO has published revised guidance on the application of 35 U.S.C. § 101. USPTO’s January 7, 2019 Memorandum, *2019 Revised Patent Subject Matter Eligibility Guidance*, 84 Fed. Reg. 50, 51–57 (2019) (“2019 Eligibility Guidance”). This guidance provides additional direction on how to implement the two-part analysis of *Mayo* and *Alice*.

Step 2A, Prong One, of the 2019 Guidelines, looks at the specific limitations in the claim to determine whether the claim recites a judicial exception to patent eligibility. In Step 2A, Prong Two, the claims are examined to identify whether there are additional elements in the claims that integrate the exception in a practical application, namely, is there a “meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception.” 84 Fed. Reg. 54 (2. Prong Two).

If the claim recites a judicial exception that is not integrated into a practical application, then as in the *Mayo/Alice* framework, Step 2B of the 2019 Guidelines instructs us to determine whether there is a claimed inventive concept to ensure that the claims define an invention that is significantly more than the ineligible concept, itself. 84 Fed. Reg. 56. In making this determination, we must consider whether there are specific limitations or elements recited in the claim “that are not well-understood, routine, conventional activity in the field, which is indicative that an inventive concept may be present” or whether the claim “simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception, indicative that an inventive concept may not be present.” 84 Fed. Reg. 56 (footnote omitted).

With these guiding principles in mind, we proceed to determine whether the claimed subject matter in this appeal is eligible for patent protection under 35 U.S.C. § 101. As explained in more detail below, we conclude that the claims are directed to patent-eligible subject matter.

Step 2A, Prong One

In Step 2A, Prong One, of the 2019 Guidelines, the specific limitations in the claim are examined to determine whether the claim recites a judicial exception to patent eligibility, namely whether the claim recites an abstract idea, law of nature, or natural phenomenon.

Step [1] of claim 1 recites “determining at least one characteristic about a stenosis in a vessel of a patient from image data of the stenosis.” The recited step of “determining” a characteristic about stenosis falls into the mental process grouping because, as defined in the 2019 Guidelines, it is an “observation, evaluation, judgement, opinion” that can be “performed in the human mind.” 84 Fed. Reg. 52.

Step [2] of “mapping” the characteristic to [2a] “a pre-defined stenosis characteristic to fractional flow reserve value look up table” is also a mental process for the same reason as step [1], namely, it can be performed in the human mind, where a human looks for the characteristic in the image data and then refers to the “look up table” to find it from the “pre-defined” list.

In step [3], the “fractional flow reserve value” that corresponds to the characteristic is identified in the look up table. This step is also a mental process because a human can refer to the table and search it visually to find the “fractional flow reserve value” and thus this is a step that can be “performed in the human mind.” 84 Fed. Reg. 52.

The “fractional flow reserve value” (“FFR”) is defined in the Specification as “a measurement of a pressure difference value across vessel stenosis, and the FFR value has been used to determine the likelihood that the stenosis impedes oxygen delivery to the heart muscle. Generally, an FFR value expresses the maximal flow down a vessel in the presence of a stenosis compared to the maximal flow in the hypothetical absence of the stenosis.” Spec. 1:8–12. FFR represents a natural property of a blood vessel and the identification of this value, and its correlation with [3a] a characteristic of stenosis is therefore a law of nature or natural phenomena and a judicial exception to patent eligibility.

The claim further requires [4] “visually presenting the image data and the identified fractional flow reserve value on an output device.” This step does not appear to fall into any of the groupings identified in the 2019 Guidelines as an abstract idea: it is not (a) a mathematical concept because it does not recite an equation or formula; it does not (b) organize human activity; and it is not (c) a mental process because the visual presentation of the image data is presented to a output device, and therefore cannot be performed wholly in the human mind.

All the steps are performed by a “configured processor,” which we understand to be a computer because the Specification describes it as executing computer readable instructions stored in a computer readable memory (Spec. 4:16–16–18; 8:6–8). However, while the steps are performed on a computer, steps [1]–[3] still constitute abstract ideas, namely, mental processes performed in the human mind. *BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1348 (Fed. Cir.

2016) (“An abstract idea on ‘an Internet computer network’ or on a generic computer is still an abstract idea”).

In sum, we find that claims recite judicial exceptions to patent eligibility, and we therefore proceed to Step 2A, Prong 2 of the analysis to determine whether the abstract ideas are integrated into a practical application.

Step 2A, Prong Two

Under Prong Two of Step 2A, when determining whether the exception is integrated into a practical application, as per the *Mayo/Alice* framework, we must look at the claim elements individually and “as an ordered combination” to determine whether the additional elements integrate the recited abstract idea into a practical application.

Appellant argues that the claimed method is an improvement in computer-related technology, one of the categories of practical applications specifically listed in the 2019 Guidelines. 84 Fed. Reg. 55.

Appellant cites to *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1313 (Fed. Cir. 2016) in support of its argument that the claimed subject matter is not directed to a judicial exception.

In *McRO*, the claims were directed to a method for automating 3-D animator tasks “to produce accurate and realistic lip synchronization and facial expressions in animated characters” that previously could only be produced by human animators. *McRO*, 837 F.3d at 1307. The steps of the claims comprised performing manipulations on “output morph weights” . . . to produce lip synchronization and facial expression control of said animated characters.” *Id.* at 1308. While the claims involved the manipulation of data, e.g., generating morph weight sets to animate lip and facial expressions

of three dimensional characters, the court found that “the automation goes beyond merely ‘organizing [existing] information into a new form’ [as in *Digitech Image Technologies, LLC v. Electronics for Imaging, Inc.*, 758 F.3d 1344, 1348 (2014)], or carrying out a fundamental economic practice.” *McRO*, 837 F.3d at 1315. Instead, the court found that the “claimed process uses a combined order of specific rules that renders information into a specific format that is then used and applied to create desired results: a sequence of synchronized, animated characters.” *Id.* The court found that the claims did not “simply use a computer as a tool to automate conventional activity,” but instead were an improvement to computer animation. *Id.*

The rejected claims in this case are different from those in *McRO*. The only requirement of claim 1 is that FFR value obtained from the look up table in step [3] is presented on an output device. The information is not rendered into a format that enabled an improvement to a technology as in the *McRO* claims, but rather only requires that information from the look up table is displayed on an output device, without acting on the information by specific rules. We reach this conclusion even if the claim required the FFR value to be displayed on the “image data” recited in [4] because displaying information on an image is generic and does not constitute a specific improvement to a technology.

Our conclusion is consistent with *Enfish, LLC v. Microsoft Corporation*, 822 F.3d 1327 (Fed. Cir. 2016). In *Enfish*, the claims addressed by the court were directed to a data storage and retrieval system for a computer system that comprised a logical table including logical rows and logical columns for indexing data in the table. *Enfish*, 822 F.3d at 1336. The court referred to the logical table as a “self-referential table” and found

that the table functioned differently from a conventional database and provided “a specific type of data structure designed to improve the way a computer stores and retrieves data in memory.” *Id.* at 1336, 1339.

In this case, while the claims involve a “look up” table (step [3]), this table does not improve the way that a computer functions as it did in *Enfish*, but rather it allows the FFR value to be determined non-invasively (Spec. 1:26–28.), for example, “using a synthetic software artery model(s)” (Spec. 4:2–3) for subsequent output, rather than applying it to improve a technology (e.g. to improve a computer’s function). Thus, the table in claim 1 embodies the natural relationship between a stenosis characteristic and an FFR value, but does not apply that relationship to any practical application.

This case is distinguishable from *Diamond v. Diehr*, 450 U.S. 175 (1981). In *Diehr*, the claims were directed to a method of operating a rubber-molding press to mold a compound by curing it in a mold cavity. *Application of Diehr*, 602 F.2d 982, 983–84 (CCPA 1979). The temperature in the mold during the rubber-molding process was constantly determined and provided to a digital computer. *Id.* The computer calculated the Arrhenius equation for the reaction time during the cure to determine when the compound was cured and to automatically open the press. *Id.* Although the claim recited a mathematical algorithm, the Arrhenius equation, the Court held that the claim was eligible for a patent.

[W]hen 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.

Diehr, 450 U.S. at 192–93.

In this case, the look up table recited in [2] and [3] of the claim is not used to control a process as the formula was in *Diehr*. A FFR value is identified from the table and displayed, but the claims do not require that it be used in any way to accomplish or affect how a process is carried out. The display of the FFR value does not place a meaningful limit on the abstract idea. 84 Fed. Reg. 54.

In *Finjan, Inc. v. Blue Coat Sys.*, 879 F.3d 1299, 1305 (Fed. Cir. 2018), the court found claims to be patent-eligible because “the method of claim 1 employs a new kind of file that enables a computer security system to do things it could not do before.”

Rejected claim 1 does not employ computer functionality to achieve a useful improvement as in *Finjan* and *Enfish*. None of steps [1]–[4] involve improving the way a computer operates. Rather, the purpose of the abstract ideas recited in the claims is to improve the approach for determining a FFR value for a stenosis of a vessel (Spec. 2:7–8). The steps are performed on a generic computer, using the computer as a computing device without affecting its functionality. Likewise, Appellant’s argument that *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc.*, 880 F.3d 1356 (Fed. Cir. 2018) “changed the landscape of the 101 analysis again and taught that an improvement to the qualifying computer functionality” may be patent-eligible (Appeal Br. 23) is inapplicable because an improvement to computer functionality is not recited in claim 1.

Appellant further argues that the “claimed aspects provide an *improvement* to the technical field of generating and/or utilizing finding unique identifiers for medical findings, including providing the advantages discussed above, via executing the series of process ‘rules’ or steps as

defined by the claims.” Appeal Br. 7. Appellant contends that the claimed steps “act in concert” and “integrate specifically-claimed rules described above as ‘building blocks’ into ‘something more,’” which Appellant describes as the “the structure of the limited rules of the inventions claimed” into “a specific implementation.” *Id.* at 8. The “limited rules” of the claim, as discussed in Step 2, are the abstract ideas of determining specific characteristics of stenosis from image data and then in steps [2] and [3] looking up the corresponding value in a lookup table. These are not the same type of rules identified in *McRO*, 837 F.3d at 1308 which involved specific manipulations (e.g., “generating an intermediate stream of output morph weight sets and a plurality of transition parameters between two adjacent morph weight sets by evaluating said plurality of sub-sequences against said first set of rules”) to produce lip synchronization and facial expressions. Rather, the claimed steps are recited in a wholly generic way, namely, [1] determining characteristics about stenosis without explaining how they are determined; [2] mapping characteristics without claiming a specific process as to how the mapping is accomplished; [3] identifying a FFR value from a look up table, where the claim does not recite how the look up table is populated with the information or recite a specific process as to how the identification is made; and [4] visually presenting the information, but with no specific requirement of the visual form of the information or how the results of the previous steps shape the format of the presented information.

Appellant argues, citing *Synopsys, Inc. v. Mentor Graphics Corporation*, 839 F.3d 1138 (2016), that because the claims require “the use of processors, and/or computer readable storage medium having computer

readable instructions encoded therewith . . . the claims must be construed as requiring a computer and an imaging system with the recited modalities to perform the recited steps, rather than as a series of ‘mental steps.’” Appeal Br. 6–7. This argument is not persuasive. The *Synopsys* court expressly stated “we need not decide whether a computer-implemented version of the invention would not be “directed to” an abstract idea.” *Synopsis*, 839 F.3d at 1149. In contrast, in *BASCOM Glob.*, 827 F.3d at 1348, the court stated that an abstract idea performed on a computer is still an abstract idea. The rejected claim, as a whole, describes how to generally apply or execute the concept as a “computer-implemented method.” In other words, the claim merely links the recited abstract idea generally to a computer environment, and thus does no more than represent a drafting effort to monopolize the abstract idea in a computer implementation. Guidance at 55.

Appellant also states the claims should be eligible under *In re Abele*, 684 F.2d 902 (CCPA 1982). Appeal Br. 9. In that case, which was decided well before *Mayo* and *Alice*, the court held that the recitation of a mathematical algorithm in the claim did not make it ineligible for a patent under 35 U.S.C. § 101 because it was integrated into an improved CAT scan process. *Abele*, 684 F.2d at 909. Appellant has not identified in this case how the look up table of steps [2] and [3] is integrated into the recited “at least one imaging system,” recited in step [1]. The look up table does not change the way the imaging is performed or the output of the imaging.

Appellant argues that the *McRO* “discusses the absence of preemption in determining that the claimed invention was not ‘directed to’ a judicial exception. Appeal Br. 8. As explained in *McRO*:

The preemption concern arises when the claims are not directed to a specific invention and instead improperly monopolize “the

basic tools of scientific and technological work.” *Alice*, 134 S.Ct. at 2354 (quoting *Myriad*, 133 S.Ct. at 2116). The abstract idea exception has been applied to prevent patenting of claims that abstractly cover results where “it matters not by what process or machinery the result is accomplished.” *Morse*, 56 U.S. at 113; *see also Mayo*, 132 S.Ct. at 1301

McRO, 837 F.3d at 1314.

McRO also stated: “The concern underlying the exceptions to § 101 is not tangibility, but preemption.” *McRO*, 837 F.3d at 1315.

McRO found that preemption did not apply to the automation rules because:

The limitations in claim 1 prevent preemption of all processes for achieving automated lip-synchronization of 3-D characters. *McRO* has demonstrated that motion capture animation provides an alternative process for automatically animating lip synchronization and facial expressions.

Id.

However, in rejected claim 1, the three recited steps [1]–[3] of determining the characteristics of stenosis from image data, and then identifying the FFR value corresponding to the characteristic, could essentially preempt all ways using the FFR – a natural phenomenon and law of nature – “to determine the likelihood that the stenosis impedes oxygen delivery to the heart muscle” and for “planning of percutaneous coronary interventions, e.g.[,] stent placement.” Spec. 1:9–16. Moreover, even if the claims do not tie up all ways of using the FFR to determine the likelihood of impeded oxygen delivery, “the absence of complete preemption does not demonstrate patent eligibility.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F3d 1371, 1379 (Fed. Cir. 2015).

Appellant argues that the claims use *specifically* defined characteristics for stenosis and *specifically* defined FFR value look up table. Appeal Br. 6. However, we do not see how these specific characteristics and values – which are natural properties of the vessels – make the process any more specific. The steps remain the same regardless of what stenosis characteristics are identified and what FFR values are determined to correspond to these values. These steps result in the display of the natural FFR property of the vessel that corresponds to certain stenosis characteristics and thus is an expression of a natural law.

Visually presenting the information on an output device in step [4] is the type of extra-solution activity identified in the 2019 Guidelines as insufficient to integrate the judicial exceptions into a practical application. 55 Fed. Reg. 84. Appellant has not established that the display of the result is an improvement to a technology.

Step 2B

As explained in the 2019 Guidelines, if the exception is not integrated into a practical application, then Step 2B of the 2109 Guidelines, as in the *Mayo/Alice* framework, asks whether there is an inventive concept. To determine whether an unpatentable law of nature has been transformed “into a patent-eligible application of such law,” the Court in *Mayo* held that the claim as a whole must be examined to determine whether it “also contain[s] other elements or a combination of elements, sometimes referred to as an ‘inventive concept,’ sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law itself.” *Mayo*, 566 U.S. at 72–73.

Appellant identified the determination of the “fractional flow reserve value for a stenosis in a vessel based on image data” as significantly more than the judicial exceptions recited in the claims. Appeal Br. 7. Appellant also stated that “the claims describe a specific way to solve a problem with determining an FFR index as the claims provide a way to identify a fractional flow reserve index without having to perform a time consuming computational fluid dynamic simulation.” Reply Br. 3. The additional element of the claims cited by Appellant is the look up table which is used to identify the FFR value and its correspondence to the characteristic about stenosis. This step, as explained above, recites an abstract idea and a law of nature and therefore, it is our understanding cannot serve as basis for an inventive step. As held in *Parker v. Flook*, 437 U.S. 584, 591, “[t]he process itself, not merely the mathematical algorithm, must be new and useful.” Unlike in *Rapid Litigation Management Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, 1049 (Fed. Cir. 2016), where the claims were “directed to a new and useful method of preserving hepatocyte cells,” the claims here are “simply an observation or detection.”

Summary

For the foregoing reasons, the rejection of claim 1 is affirmed. Claims 2–26 fall with claim 1 because separate arguments for their patentability were not provided. 37 C.F.R. § 41.37(c)(1)(iv).

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1-26	101	Eligibility	1-26	

TIME PERIOD

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