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Hologic/Vista IP Law Group
2160 Lundy Ave.
Suite 230
San Jose, CA 95131

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JIACHAO LIANG and JIMMY R. ROEHRIG

Appeal 2018-007275
Application 14/384,636
Technology Center 3700

Before JENNIFER D. BAHR, EDWARD A. BROWN, and
MICHAEL J. FITZPATRICK, *Administrative Patent Judges*.

FITZPATRICK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant, Hologic Inc.,¹ appeals under 35 U.S.C. § 134(a) from the Examiner's final decision rejecting claims 1, 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ Hologic Inc. is the applicant and identifies itself as the sole real party in interest. Appeal Br. 1.

STATEMENT OF THE CASE

The Specification

The Specification explains that “MRI imaging is well-known for medical applications, in which three dimensional (i.e., volumetric) imaging information of a patient’s body region is acquired for diagnostic purposes.” Spec. 2:26–28. In one application of MRI, “a set of images may be acquired before the administration of a contrast agent, and thereafter for several time periods after the contrast agent has entered the blood stream.” *Id.* at 3:26–28.

Appellant’s claimed invention relates to “a system and method for analyzing MRI imaging information which computes and displays output information that reflects or is otherwise indicative of an absorption rate of a contrast agent in the volume of tissue.” *Id.* at 1:10–15.

The Rejected Claims

Claims 1, 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39 are pending and all are rejected. Final Act. 1. Claims 1, 16, and 21 are independent. Appeal Br. 10–13. Claim 1 is representative and reproduced below.

1. A magnetic resonant imaging (MRI) review workstation, comprising:
 - a control processor; and
 - a display integrated or otherwise operatively coupled with the control processor, wherein the control processor is configured to receive and analyze magnetic resonant imaging information pertaining to an imaged volume of tissue, and to cause to be displayed on the display output information that reflects or is otherwise indicative of an absorption rate of a contrast agent in the volume of tissue, wherein the displayed output information is derived from a signal intensity ratio for

the tissue volume that has been normalized to take into account an actual absorption rate of the contrast agent in the tissue volume.

Appeal Br. 10.

The Appealed Rejections

The following rejections are before us for review:

1. claims 1, 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39 under the judicial exception to 35 U.S.C. § 101 (Final Act. 2);
2. claims 1, 2, 4, 9, 14, 16–18, 21–24, 27, 34, and 37–39 under 35 U.S.C. § 103(a) as unpatentable over Huisman² and Hoffman³ (*id.* at 3); and
3. claims 6 and 26 under 35 U.S.C. § 103(a) as unpatentable over Huisman, Hoffman, and Brix⁴ (*id.* at 7).

DISCUSSION

Rejection 1 – Patent Ineligibility

The Examiner rejected claims 1, 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39 under the judicial exception to 35 U.S.C. § 101. Final Act. 2. Appellant argues all claims together. Appeal Br. 3–6. Accordingly, we select claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Claim 1 is directed to a “magnetic resonant imaging (MRI) *review* workstation.” Appeal Br. 10 (emphasis added). It is not an actual MRI

² US 2008/0125643 A1, published May 29, 2008 (“Huisman”).

³ Ulf Hoffmann et al., “Pharmacokinetic Mapping of the Breast: A New Method for Dynamic MR Mammography,” 33 MRM 506–514 (1995).

⁴ Gunnar Brix et al., “Microcirculation and Microvasculature in Breast Tumors: Pharmacokinetic Analysis of Dynamic MRI Image Series,” 54 MAGNETIC RESONANCE IN MEDICINE 420–29 (2004).

scanner. The only required physical components of the claimed MRI review workstation are “a control processor” and “a display.” *Id.* The remaining claim language is directed to how the processor is configured. *Id.* More specifically, the processor is configured to do various things with respect to data, namely “receive and analyze” data and “cause to be displayed on the display” data that has been “derived from a signal intensity ratio for the tissue volume that has been normalized to take into account an actual absorption rate of the contrast agent in the tissue volume.” *Id.* The Examiner rejected claim 1 (and all pending claims) as patent ineligible under the judicial exception to 35 U.S.C. § 101. Final Act. 2.

Section 101 provides that “[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101. However, the Supreme Court has “long held that this provision contains an important implicit exception: [l]aws of nature, natural phenomena, and abstract ideas are not patentable.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

In analyzing patent-eligibility questions under the judicial exception to 35 U.S.C. § 101, we “first determine whether the claims at issue are directed to a patent-ineligible concept.” *Alice*, 573 U.S. at 218. If the claims are determined to be directed to an ineligible concept, then 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.” *Id.* at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 77 (2012)).

On January 7, 2019, the Director issued “2019 Revised Patent Subject Matter Eligibility Guidance,” which explains how the Director directs that patent-eligibility questions under the judicial exception to 35 U.S.C. § 101 be analyzed. 84 Fed. Reg. 50–57 (“Revised Guidance”).

Per the Revised Guidance, the first step of *Alice* (i.e., Office Step 2A) consists of two prongs. In Prong One, we must determine whether the claim recites a judicial exception, i.e., an abstract idea, a law of nature, or a natural phenomenon. 84 Fed. Reg. at 54 (Section III.A.1.). If it does not, the claim is patent eligible. *Id.* With respect to the abstract idea category of judicial exceptions, an abstract idea must fall within one of the enumerated groupings of abstract ideas in the Revised Guidance or be a “tentative abstract idea,” with the latter situation predicted to be rare. *Id.* at 51–52 (Section I, enumerating three groupings of abstract ideas), 54 (Section III.A.1., describing Step 2A Prong One), 56–57 (Section III.D., explaining the identification of claims directed to a tentative abstract idea).

If a claim does recite a judicial exception, we proceed to Step 2A Prong Two, in which we must determine if the “claim as a whole integrates the recited judicial exception into a practical application of the exception.” *Id.* at 54 (Section II.A.2.) If it does, the claim is patent eligible. *Id.*

If a claim recites a judicial exception and fails to integrate it into a practical application, we then proceed to the second step of *Alice* (i.e., Office Step 2B). In that step, we then evaluate the additional limitations of the claim, both individually and as an ordered combination, to determine whether they provide an inventive concept. *Id.* at 56 (Section III.B.). In particular, we look to whether the claim:

- Adds a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field, which is indicative that an inventive concept may be present; or
- simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception, which is indicative that an inventive concept may not be present.

Id.

Revised Guidance Step 2a Prong One

In Prong One of Step 2a, we determine whether claim 1 recites a judicial exception (i.e., a law of nature, natural phenomenon, or abstract idea).

The Examiner determined that claim 1 recites an abstract idea, namely a mathematical relationship. Final Act. 2. As discussed below, we agree with the Examiner.

Claim 1 recites that “the displayed output information is derived from a signal intensity ratio for the tissue volume that has been normalized to take into account an actual absorption rate of the contrast agent in the tissue volume.” Appeal Br. 10. Thus, the claim recites a mathematical relationship between a normalized signal intensity ratio and an actual absorption rate and, thus, also between the displayed output information and the actual absorption rate. *See also* Spec. 15:13–16 (stating that the control processor also employs a mathematical relationship between a normalized signal intensity ratio and a pre-contrast relaxation value of the tissue volume: “[A]s is depicted in FIG. 9, the MRI review workstation controller (aka ‘control processor’) of embodiments of the present invention is preferably

programmed to compute the so-called normalized signal intensity ratio based, at least in part, upon a pre-contrast relaxation value of the tissue volume.”).

Appellant argues that claim 1 is “not directed to ‘manipulation of data based on known mathematical relationships,’ but rather to displaying of MRI information that reflects an absorption rate of a contrast agent in the volume of tissue.” Appeal Br. 4. This argument is not persuasive because manipulating data and displaying data are not mutually exclusive; in fact, per claim 1, it is the manipulation of data based on known mathematical relationships that yields the output information that is displayed.

Accordingly, we determine that claim 1 recites an abstract idea, namely a mathematical relationship. *See* 84 Fed. Reg. 52.

Revised Guidance Step 2a Prong Two

In Prong Two of Step 2a, we determine whether claim 1 as a whole integrates the recited judicial exception (here, an abstract idea) into a practical application of the exception. We determine that claim 1 does not.

This is so because, other than the claim language directed to computing data based on mathematical relationships, claim 1 merely recites generic computer components along with certain computer-typical data manipulation capabilities. These capabilities—namely, to “receive and analyze [MRI] information” and “cause to be displayed on the display output information”—are insufficient to integrate the judicial exception into a practical application. *See* 84 Fed. Reg. at 55, n.31; MPEP 2106.05(g).⁵

⁵ In *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016), the Court held that claims directed to data manipulation were

Appellant argues that claim 1 cannot be considered abstract because it “offer[s] a technologically-rooted solution for a problem specifically arising in the realm of computer technology, as suggested by the Federal Circuit’s holding in *DDR Holdings, LLC v. Hotels.com, L.P.*, (773 F. 3d 1245 (Fed. Cir. 2014)).” Appeal Br. 4; *see also* 84 Fed. Reg. at 55 n.25 (citing *DDR Holdings* and stating that a judicial exception-reciting claim nonetheless may be patent eligible if the judicial exception is integrated into a practical application via additional claim language that “reflects an improvement in the functioning of a computer, or an improvement to other technology or technical field”; also citing MPEP § 2106.05(a)). Appellant explains that the displaying of MRI output information that reflects or is otherwise indicative of an absorption rate “is a concept that would not have existed prior to the age of computers.” Appeal Br. 4. Appellant continues as follows:

In other words, the problem that this technology is attempting to solve only exists because of advances in computer technology—receiving and analyzing magnetic resonant imaging (MRI) information to display information that reflects an absorption rate of a contrast agent in the volume of tissue—and there would be no need to solve this problem were it not for the existence of computers to receive, analyze and display the MRI information.

Id.

Appellant’s reliance on *DDR Holdings* is misplaced, as claim 1 does not provide a technologically-rooted solution for a problem specifically arising in the realm of computer technology. Appellant has not invented or

directed to an abstract idea. *Id.* (Claims directed to “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 [are] directed to an abstract idea.”).

claimed, for example, a new type of MRI scanner or a new type of electronic display. Rather, the purported invention of claim 1 is the conversion of MRI data prior to sending it to, for example, a prior art computer monitor.

Further, the additional claim language does not satisfy any of the other exemplary considerations set forth in the Revised Guidance. *See* 84 Fed. Reg. at 55; MPEP § 2106.05(b), (c), (e).

Accordingly, we determine that claim 1 does not integrate the recited judicial exception into a practical application of the exception.

Revised Guidance Step 2b

In Step 2b, we evaluate the additional limitations of claim 1, both individually and as an ordered combination, to determine whether they provide an inventive concept. 84 Fed. Reg. at 56 (Section III.B.). However, claim 1 does not include any limitations beyond the recitations of the abstract idea, insignificant extra-solution activity, and conventional computer components (i.e., “a control processor” and “a display”) for performing the extra-solution activity.

For the foregoing reasons, we affirm the rejection, under the judicial exception to 35 U.S.C. § 101, of claim 1, as well as claims 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39, which fall therewith. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Rejection 2– Obviousness (Huisman and Hoffman)

The Examiner rejected claims 1, 2, 4, 9, 14, 16–18, 21–24, 27, 34, and 37–39 as rendered obvious by Huisman and Hoffman. Final Act. 3. Appellant argues these claims together. Appeal Br. 7–8. Accordingly, we select claim 1 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner rejected claim 1 as obvious over Huisman alone and alternatively over Huisman in view of Hoffman. Final Act. 3. This decision addresses the latter rejection only.

The Examiner found that Huisman discloses all of the subject matter of claim 1 except that it “fails to disclose the control processor is configured to cause to be displayed output information of a signal intensity ratio that is normalized to take into account an actual absorption rate of the contrast agent in the tissue volume.” *Id.* at 6. The Examiner found that Hoffman teaches “that signal intensities were normalized on the signal intensity S_0 , which is the signal intensity ratio.” *Id.* (citing Hoffman 510 (Figure 5)).⁶ The Examiner concluded that “[i]t would have been obvious to the skilled artisan to modify Huisman to normalize and display the signal intensity ratio, as taught by Hoffman, in order to show the relationship of the ratio with contrast agent concentration.” *Id.*

Appellant’s sole argument against the rejection of claims 1 as obvious over the combination of Huisman and Hoffman is that the latter does not teach the limitation for which the Examiner has cited it. Appeal Br. 8. Appellant’s argument is reproduced below:

The Examiner points to the text describing figure 5 (publication page 510) of Hoffman, which includes the statement (regarding the line-graph depicted in Fig. 5): ‘The *signal intensities were normalized on the signal intensity S_0 of the solution with $T_1 = 1202$ ms and are plotted against the [contrast media] concentrations.*’ (Emphasis added by Applicant). However, the claimed invention requires that the depicted signal intensity ratio has been normalized *to take into account an actual absorption*

⁶ Hoffman is directed to a “dynamic contrast-enhance MRI technique” for mammography. Hoffman 506 (Abstract).

rate of the contrast agent in the tissue volume; and not normalized on the signal intensity S_0 of the solution.

Id.

The Examiner disagrees with the Appellant's construction, determining that "a normalization is [merely] an operation that is performed and results in an actual absorption rate being taken into account." Ans. 8.

Applying that construction, the Examiner finds that

As Hoffman performs the normalization on the signal intensity ratio, it follows that an actual absorption rate is taken into account. . . . Since signal intensity is commonly known to be a measure of contrast agent concentration, it follows that the normalized signal intensity in Hoffman *reflects (or takes into account)* the absorption rate. Therefore, the limitation is met.

Id. (emphasis added). We agree with the Examiner's construction and application of that construction to Hoffman.

In its Reply, Appellant merely repeats the same argument and does not respond to the substance of the Examiner's Answer. *See* Reply Br. 3 ("However, the claimed invention requires that the depicted signal intensity ratio has been normalized *to take into account an actual absorption rate of the contrast agent in the tissue volume; and not normalized on the signal intensity S_0 of the solution, as taught by Hoffman.*"). Accordingly, Appellant has not apprised us of error in the rejection.

For the foregoing reasons, we affirm the rejection of claim 1 as unpatentable over Huisman and Hoffman, as well as claims 2, 4, 9, 14, 16–18, 21–24, 27, 34, and 37–39, which fall therewith. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Rejection 3 – Obviousness (Huisman, Hoffman, and Brix)

The Examiner rejected claims 6 and 26 as rendered obvious by Huisman, Hoffman, and Brix. Final Act. 7. Claims 6 and 26 ultimately depend from claims 1 and 21, respectively. Appellant argues against the rejection of claims 6 and 26 solely based on Brix not curing the alleged deficiency in the rejection of claims 1 and 21 over Huisman and Hoffman. As discussed above, however, Appellant has not shown such error or deficiency. Thus, we likewise affirm the rejection of claims 6 and 26 as unpatentable over Huisman, Hoffman, and Brix.

DECISION

The Examiner's rejection of claims 1, 2, 4, 6, 9, 14, 16–18, 21–24, 26, 27, 34, and 37–39 is affirmed.

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