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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JING LI¹

Appeal 2019-001289
Application 13/725,475
Technology Center 1600

Before JEFFREY N. FREDMAN, JOHN G. NEW, and JAMIE T. WISZ,
Administrative Patent Judges.

NEW, *Administrative Patent Judge.*

DECISION ON APPEAL

¹ Appellant identifies the United States of America, as represented by the Administrator of the National Aeronautics and Space Administration (“NASA”), as the real party-in-interest. App. Br. 1.

SUMMARY

Appellant files this appeal under 35 U.S.C. § 134(a) from the Examiner's Non-Final Rejection of claims 35–52 as unpatentable under 35 U.S.C. § 101 as being directed to nonstatutory subject matter.

We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

NATURE OF THE CLAIMED INVENTION

Appellant's claimed invention is directed to a method for sensing the presence of at least one specified chemical component in a patient's sample gas, associated with a disease, and for associating presence of the disease with presence of the specified chemical component concentration in an identified concentration range. Abstr.

REPRESENTATIVE CLAIM

Claim 35 is representative of the claims on appeal and recites:

35. A system for medical diagnosis, the system comprising:

a plurality of nanostructure sensors disposed on one or more substrates, the plurality of nanostructure sensors comprising at least a first nanostructure sensor and a second nanostructure sensor, wherein each nanosensor is configured to provide a different sequence of electrical parameter values than another nanosensor of the plurality of nanosensors when exposed to a sample gas over a duration of time;

an analyzer system, comprising a processor and memory, configured to perform the following steps:

receiving a sequence of electrical parameter values measured from each nanostructure sensor of the plurality

of nanosensors, each of the sequences corresponding to measured electrical values from a measurement mechanism;

generating a normalized amplitude value for one of the measured electrical values measured from each of the plurality of nanostructure sensors to form a set of amplitude values for the sample gas;

determining the presence of at least a first specified component in the sample gas by:

comparing a normalized amplitude value for the first nanostructure sensor for the sample gas with a reference amplitude value for the first nanostructure sensor for the first specified component to generate a compared value for the first nanostructure sensor;

repeating the comparing step for each of the other sensors of the plurality of nanostructure sensors to generate a set of the compared values;

aggregating the compared values to generate a set of aggregated compared values, wherein the aggregating includes a weighted summation of the compared values, and

based on the aggregated compared values, determining whether the specified component is likely present in the sample gas.

App. Br. 10.

ISSUES AND ANALYSES

We decline to adopt the Examiner's conclusion that the claims on appeal are directed to nonstatutory subject matter. We address the arguments raised by Appellant below.

Issue

Appellant argues that the Examiner erred in concluding that the claims are directed to an abstract idea, and thus to a judicial exception to Section 101. App. Br. 3–4.

Analysis

The Examiner concludes that claims 35–52 do not recite something significantly different than a judicial exception. Non-Final Act. 3. The Examiner finds that claim 35 and the dependent claims encompass the abstract idea of mathematical manipulations that relate the amplitudes of electrical signals from each of a plurality of nanostructure sensors in order to diagnose the presence or absence of a particular gas. *Id.* The Examiner finds that these mathematical manipulations also include normalizing signal amplitudes and calculated weighted sums of amplitudes of signals. *Id.*

The Examiner finds that these mathematical manipulations are analogous to the Arrhenius equation in *Diamond v. Diehr*, 450 U.S. 175 (1981), which was also found to be an abstract idea. Non-Final Act. 3–4. The Examiner further finds that the elements in addition to the judicial exception, amount to providing nanostructure sensors that measure gases in contact with the sensors using electrical signals. *Id.* at 4. The Examiner finds that these additional elements are routine and conventional in the prior art. *Id.*

In performing an analysis of patentability under Section 101, we follow the framework set forth by the Supreme Court in *Mayo Collaborative Servc's v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012). We are also mindful

of, and guided by, the United States Patent and Trademark Office’s 2019 *Revised Patent Subject Matter Eligibility Guidance*, 84(4) Fed. Reg. 50–57 (January 7, 2019) (the “Guidance”).

Appellants’ claim 35 recites: “A system for medical diagnosis, the system comprising...” Claim 35 continues on to recite: “a plurality of nanostructure sensors disposed on one or more substrates” and “an analyzer system, comprising a processor and memory.” Because this claimed “system” possesses an actual physical embodiment in the form of a plurality of nanostructure sensors and an analyzer, and following the first step of the *Mayo* analysis, we find that the claims are directed to a composition of matter, and therefore falls into one of the broad statutory categories of patent-eligible subject matter under 35 U.S.C. § 101.

In the next step of the *Mayo* analysis, we determine whether the claims at issue are directed to a nonstatutory, patent-ineligible concept, i.e., a law of nature, a phenomenon of nature, or an abstract idea. *Mayo*, 566 U.S. at 70–71. If the claims are so directed, we next consider the elements of each claim both individually and “as an ordered combination” to determine whether additional elements “transform the nature of the claim” into a patent-eligible application. *Id.* at 78–79; *see also Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1375 (Fed. Cir. 2015). Specifically, the Supreme Court considered this second step as determining whether the claims recite 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.” *Mayo*, 566 U.S. at 72–73.

More specifically, in this second step of the *Mayo* analysis, we look to whether the claim recites one of the judicially-created exceptions to Section

101, i.e., an abstract idea, a law of nature, or a natural phenomenon. *See* Guidance 54 (step 2A, prong 1). If we determine that the claim is directed to a judicial exception, we then determine whether the limitations of the claim reciting the judicial exception are integrated into a practical application. *Id.* (Step 2A, Prong 2).

Finally, if we determine that the claim is directed to a judicially-created exception to Section 101, we evaluate the claims under the next step of the *Mayo* analysis, considering the elements of each claim both individually and “as an ordered combination” to determine whether additional elements “transform the nature of the claim” into a patent-eligible application. *Mayo*, 566 U.S. at 78–79; 2019 Guidance at 56 (Step 2B).

Claim 35 recites, in relevant part:

receiving a sequence of electrical parameter values measured from each nanostructure sensor of the plurality of nanosensors, each of the sequences corresponding to measured electrical values from a measurement mechanism;

generating a normalized amplitude value for one of the measured electrical values measured from each of the plurality of nanostructure sensors to form a set of amplitude values for the sample gas;

determining the presence of at least a first specified component in the sample gas by:

comparing a normalized amplitude value for the first nanostructure sensor for the sample gas with a reference amplitude value for the first nanostructure sensor for the first specified component to generate a compared value for the first nanostructure sensor;

repeating the comparing step for each of the other sensors of the plurality of nanostructure sensors to generate a set of the compared values;

aggregating the compared values to generated a set of aggregated compared values, wherein the aggregating includes a weighted summation of the compared values,
and

based on the aggregated compared values, determining whether the specified component is likely present in the sample gas.

These steps are performed by the processor and are reliant upon a series of algorithms that are disclosed by Appellant's Specification. *See* Spec. 9–15. Consequently, we agree with the Examiner that these steps recited in claim 35 are directed to an a mathematical concept, i.e., a manipulation of numerical data or a mathematical calculation, and, therefore, to an abstract idea. *See* Guidance 52; Step 2A, prong 1.

However, our analysis does not end here. Rather, we next look to see whether the limitations of the claim reciting the judicial exception are integrated into a practical application. *See* Guidance Step 2A, prong 2. With respect to this latter step, the Guidance advises us that: “A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes a meaningful limit on the judicial exception, such that the claim is more than a drafting effort designed to monopolize the judicial exception.” Guidance 54. The Guidance then informs us that: “[w]hen the exception is so integrated, then the claim is not directed to a judicial exception.” *Id.*

We find that, in the claims on appeal, the abstract idea recited in the claims is integrated into a practical application that: “appl[ies] ... the judicial exception in a manner that imposes a meaningful limit on the judicial exception.” The claimed system comprises an array of nanostructure sensors that are coupled to an analyzer, the purpose of which is to measure “different sequence[s] of electrical parameter values ... when exposed to a sample gas over a duration of time.” The various measurements collected by the nanostructure sensors are then analyzed in the analyzer unit, using the algorithms disclosed in Appellant’s Specification, to: “determin[e] whether the specified component is likely present in the sample gas.”

We therefore find that, although independent claim 35 recites an abstract idea, the idea is integrated into a practical application, *viz.*, the determination of whether a given gaseous component is present in the measured sample. In short, we find that sensors and analyzer implement the judicial exception in conjunction with a particular machine or manufacture that is integral to the claim. *See* Guidance 55. As such, we conclude that the claim is not directed to a judicial exception.

The Examiner’s citation to *Diamond v. Diehr* is certainly appropriate, but the Examiner’s reliance upon the case is misplaced. In *Diehr*, the algorithm in question, the Arrhenius equation, was employed in a device that was used to continuously measure the temperature of rubber being cured inside a mold press. *Diehr*, 450 U.S. at 178. The temperature measurements were then automatically relayed into a computer which repeatedly recalculated the cure time by use of the Arrhenius equation, until the rubber was perfectly cured, at which time, the computer signaled the press to open the mold. *Id.* at 178–79.

In finding the claims patentable, the Court pointed out that: “[T]he respondents here do not seek to patent a mathematical formula. Instead, they seek patent protection for a process of curing synthetic rubber. Their process admittedly employs a well-known mathematical equation, but they do not seek to pre-empt the use of that equation.” *Diehr*, 450 U.S. at 187. The Court therefore held that: “Arrhenius’ equation is not patentable in isolation, but when a process for curing rubber is devised which incorporates in it a more efficient solution of the equation, that process is at the very least not barred at the threshold by § 101.” *Id.* at 188.

The same reasoning applies to the claims presently before us. We do not dispute the Examiner’s finding that the claims recite an abstract mathematical idea, but we find that the abstract calculations recited in claim 35 are, like the use of the Arrhenius equation in *Diehr*, integrated into a practical application, *viz.*, the detection by the claimed device of the presence of a specific gaseous component present in a sampled gas. We consequently conclude that the claims are not directed to an abstract idea, and we reverse the Examiner’s rejection of the claims. *See* Guidance 54.

DECISION

The Examiner’s rejection of claims 35–52 under 35 U.S.C. § 101 is reversed.

REVERSED

Claims Rejected	Basis	Affirmed	Reversed
35–52	§ 101		35–52
Overall Outcome			35–52