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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DAVID J. VAN TOL and KEITH W. MALANG

Appeal 2019-001106
Application 14/739,011
Technology Center 2800

Before JEFFREY T. SMITH, N. WHITNEY WILSON, and
BRIAN D. RANGE, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant¹ appeals from the Examiner's decision to reject claims 1–19, which constitutes all the claims pending in this application. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Appellant claims a method for detecting a mechanical coupling between an ultrasonic probe and an ultrasonic transducer of an ultrasonic surgical device (independent claim 10) and an ultrasonic surgical device

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 Covidien LP. Appeal Br. 1.

(independent claim 1). The method comprises sensing current from the ultrasonic transducer; performing frequency response analysis based on the sensed current; calculating the first and second resonant frequency and the first and second anti-resonant frequency of the ultrasonic transducer; calculating the first and second coupling coefficient based on the first and second resonant frequency and the first anti-resonant frequency and determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second coupling coefficients.

(independent claim 10). The ultrasonic surgical device comprises a controller configured to receive sensed current from the sensor; perform a frequency response analysis based on the sensed current; calculate the first and second resonant frequency and the first and second anti-resonant frequency of the ultrasonic transducer; and determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second resonant frequencies and the first and second anti-resonant frequencies (independent claim 1). Further details of the claimed method and apparatus are set forth in representative claims 1 and 10. A copy of these claims, taken from the Claims Appendix of the Appeal Brief, appears below.

1. An ultrasonic surgical device comprising:
 - a power source configured to generate power;
 - an ultrasonic transducer electrically coupled to the power source and configured to generate ultrasonic motion in response to the generated power;
 - a sensor configured to sense current of the generated power supplied to the ultrasonic transducer;
 - and
 - an ultrasonic probe configured to be mechanically couplable to the ultrasonic transducer;
 - a controller configured to:

- receive sensed current from the sensor;
- perform a frequency response analysis based on the sensed current;
- calculate a first resonant frequency and a first anti-resonant frequency of the ultrasonic transducer prior to coupling the ultrasonic probe based on the frequency response analysis;
- calculate a second resonant frequency and a second anti-resonant frequency of the ultrasonic transducer based on the frequency response analysis prior to determining whether the ultrasonic probe is coupled to the ultrasonic transducer; and
- determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second resonant frequencies and the first and second anti-resonant frequencies.

10. A method for detecting a mechanical coupling between an ultrasonic probe and an ultrasonic transducer of an ultrasonic surgical device, the method comprising:

- applying alternating current (AC) signals to the ultrasonic transducer without the ultrasonic probe being mechanically coupled to the ultrasonic transducer;:
- sensing current of the AC signals supplied to the ultrasonic transducer;
- performing a frequency response analysis based on the sensed current;
- calculating a first resonant frequency and a first anti-resonant frequency of the ultrasonic transducer without the ultrasonic probe being mechanically coupled to the ultrasonic transducer based on the frequency response analysis;
- calculating a second resonant frequency and a second anti-resonant frequency of the ultrasonic transducer based on the frequency response analysis prior to determining whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer;
- calculating a first coupling coefficient based on the first resonant frequency and the first anti-resonant frequency;

calculating a second coupling coefficient based the second resonant frequency and the second anti-resonant frequency; and

determining whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second coupling coefficients.

The Examiner rejects claims 1–19 under 35 U.S.C. § 101 “because the claimed invention is directed to a judicial exception . . . without significantly more” (Final Action 2). Specifically, the Examiner determines the following limitations of claim 1 are directed to an abstract idea:

perform a frequency response analysis based on the sensed current;

calculate a first resonant frequency and a first anti-resonant frequency of the ultrasonic transducer prior to coupling the ultrasonic probe based on the frequency response analysis;

calculate a second resonant frequency and a second anti-resonant frequency of the ultrasonic transducer based on the frequency response analysis prior to determining whether the ultrasonic probe is coupled to the ultrasonic transducer; and

determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second resonant frequencies and the first and second anti-resonant frequencies.

(*id.* at 3) (emphasis omitted). The Examiner presents similar statements for independent claim 10 (*id.* at 4). The Examiner further determines claim limitations in addition to the abstract idea are “additional elements” that are not sufficient to make the claim as a whole amount to significantly more than the abstract idea itself (*id.* at 5).

Appellant argues “[c]laims 1 and 10 as a whole are directed to an improvement of ultrasonic surgical instrument and clearly do not seek to tie up the abstract idea, which the Examiner identifies as the computational instructions performed by a controller in communication with a current

sensor.” (App. Br. 6 (citing *McRO, Inc. v. Bandai Namco Games Am., Inc.* 837 F.3d 1299 (Fed. Cir. 2016))). In particular, Appellant argues that “the claim’s description of an ultrasonic surgical device including a power source, an ultrasonic transducer, an ultrasonic probe, and a sensor, forming a specific structure that uses a controller to determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer makes it clear that claims 1 and 10 as a whole would clearly amount to significantly more than any recited exception.” (*id.* at 7).

OPINION

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[I]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g., Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014) (internal quotations and citation omitted).

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court’s two-step framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is “directed to.” *See Alice*, 573 U.S. at 219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk.”); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) (“Claims 1 and 4 in petitioners’ application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and, thus, patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1853))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that “[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Supreme Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, . . . and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine the

elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221 (citation omitted). “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

The PTO recently published revised guidance on the application of § 101. USPTO’s January 7, 2019, Memorandum, *2019 Revised Patent Subject Matter Eligibility Guidance* (“Memorandum”). Under that guidance, we first look to whether the claim recites:

(1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activities such as a fundamental economic practice, or mental processes); and

(2) additional elements that integrate the judicial exception into a practical application (*see* MANUAL OF PATENT EXAMINING PROCEDURE (MPEP) § 2106.05 (a)–(c), (e)–(h) (9th Ed., Rev. 08.2017, Jan. 2018)).²

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim:

(3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, conventional” in the field (*see* MPEP § 2106.05(d)); or

² The Examiner determines that certain claim elements are routine and conventional (*see, e.g.*, Ans. 13–16). This determination is not relevant to steps (1) and (2) of the Guidance analysis. *See* Guidance.

(4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See Memorandum.

Appellant's invention is directed to an ultrasonic surgical device for verifying integrity of mechanical coupling between an ultrasonic probe and an ultrasonic transducer of the ultrasonic surgical device (independent claim 1) and a method for detecting a mechanical coupling between an ultrasonic probe and an ultrasonic transducer of an ultrasonic surgical device (independent claim 10). (Spec. ¶ 4). The Specification discloses that when the ultrasonic transducer is not mechanically coupled or attached to the ultrasonic probe, the ultrasonic transducer cannot deliver desired mechanical motion so as to obtain desired therapeutic effects. (*id.* ¶ 3). The Specification teaches that there is a need to notify the clinician of the presence or absence of the connection of the ultrasonic probe and the ultrasonic transducer. (*id.*). The Specification teaches an ultrasonic surgical device for detecting a defect in a connection between an ultrasonic transducer and an ultrasonic probe of an ultrasonic surgical device. (*id.* ¶ 28).

Independent claim 1 describes an ultrasonic surgical device comprising a controller configured to:

- receive sensed current from the sensor;
- perform a frequency response analysis based on the sensed current;
- calculate a first resonant frequency and a first anti-resonant frequency of the ultrasonic transducer prior to coupling the ultrasonic probe based on the frequency response analysis;
- calculate a second resonant frequency and a second anti-resonant frequency of the ultrasonic transducer based on

the frequency response analysis prior to determining whether the ultrasonic probe is coupled to the ultrasonic transducer; and
determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second resonant frequencies and the first and second anti-resonant frequencies.

Independent claim 10 requires the following steps:

applying alternating current (AC) signals to the ultrasonic transducer without the ultrasonic probe being mechanically coupled to the ultrasonic transducer;

sensing current of the AC signals supplied to the ultrasonic transducer;

performing a frequency response analysis based on the sensed current;

calculating a first resonant frequency and a first anti-resonant frequency of the ultrasonic transducer without the ultrasonic probe being mechanically coupled to the ultrasonic transducer based on the frequency response analysis;

calculating a second resonant frequency and a second anti-resonant frequency of the ultrasonic transducer based on the frequency response analysis prior to determining whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer;

calculating a first coupling coefficient based on the first resonant frequency and the first anti-resonant frequency;

calculating a second coupling coefficient based the second resonant frequency and the second anti-resonant frequency; and

determining whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second coupling coefficients.

In applying the Guidance to the claims on appeal, we determine that each of independent claims 1 and 10 recites an abstract idea of a mathematical concept (e.g., a mathematical relationship) in view of the “calculating” steps of the claims. We also determine, however, that these independent claims recite additional elements that integrate the

mathematical concept into a practical application for the reasons explained below.

The Specification disclosures noted above reflect that the mathematical concept of the independent claims improves an ultrasonic surgical device for verifying integrity of mechanical coupling between an ultrasonic probe and an ultrasonic transducer of the ultrasonic surgical device. *See* MPEP § 2106.05(a). That is, the claim “purport[s] to improve the functioning of” a “technology or technical field.” *Alice*, 573 U.S. at 223. In this instance, the independent claims integrate the mathematical concept into a practical application of the concept by specifically defining a method of calculating the first and second coupling coefficient based on the first and second resonant frequency and the first anti-resonant frequency and determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second coupling coefficients. (independent claim 10). The ultrasonic surgical device comprises a controller configured to receive sensed current from the sensor; perform a frequency response analysis based on the sensed current; calculate the first and second resonant frequency and the first and second anti-resonant frequency of the ultrasonic transducer; and determine whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer based on the first and second resonant frequencies and the first and second anti-resonant frequencies. (Independent claim 1). Therefore, the claims do not attempt to monopolize the mathematical concept itself, but rather define a specific method that employs the mathematical concept to achieve multiple improvements in the technological process of determining whether the ultrasonic probe is mechanically coupled to the ultrasonic transducer. *See Diehr*, 450 U.S. at 176 (1981) (“A claim drawn to subject matter otherwise

statutory does not become nonstatutory simply because it uses a mathematical formula.”); *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”).

In summary, the independent claims recite a mathematical concept, but also recite additional elements that integrate the mathematical concept into a practical application. Each of these independent claims as a whole applies, relies on, or uses the mathematical concept in a manner that imposes a meaningful limit on the mathematical concept, whereby the claims are more than a drafting effort designed to monopolize the concept. For these reasons, we ultimately determine that the independent claims, and concomitantly the claims depending therefrom, define patent eligible subject matter.

Accordingly, we do not sustain the Examiner’s rejection of claims 1–19 under 35 U.S.C. § 101 as directed to a judicial exception without significantly more.

The decision of the Examiner is reversed.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1-19	§ 101		1-19
Overall Outcome			1-19

REVERSED