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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* CLAYTON P. DAVIS, MITCHELL R. BELZER,  
BENJAMIN P. DOLGIN, JAMES C. ZELLNER,  
JOHN T. ISHIBASHI, and  
JOSEPH C. LANDRY

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Appeal 2017-003401  
Application 12/757,251  
Technology Center 2800

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Before RAE LYNN P. GUEST, N. WHITNEY WILSON, and  
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

WILSON, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants<sup>1</sup> appeal under 35 U.S.C. § 134(a) from the Examiner's October 19, 2015 decision rejecting claims 1, 4–6, 8, 10–15, 18–20, 22, 24–29, 31–33, 35, and 37 (“Non-Final Act.”). We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We affirm.

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<sup>1</sup> Raytheon Company is identified as the real party in interest (Appeal Br. 2).

### CLAIMED SUBJECT MATTER

Appellants' disclosure relates to a method of navigation which includes receiving a magnetic field signal from a magnetic field transducer (Abstract). The magnetic field signal is proportional to sensed magnetic fields associated with magnetic field sources (*id.*). A processor processes the magnetic field signal to determine magnetic field axes of rotation corresponding to rotations of the sensed magnetic fields, and using the magnetic field axes of rotation to render a position of the magnetic field transducer (*id.*).

Details of the claimed invention are set forth in representative claims 1, 15, and 29, which are reproduced below from the Claims Appendix to the Appeal Brief:

1. A method of navigation for providing a location of a rotating object, comprising:

receiving a magnetic field signal from a rotating magnetic field transducer, the magnetic field signal proportional to sensed magnetic fields associated with a plurality of magnetic field sources;

in a processor, processing the magnetic field signal to determine a plurality of magnetic field axes of rotation corresponding to rotations of the sensed magnetic fields;

using the plurality of magnetic field axes of rotation to render a position of the magnetic field transducer comprising:

determining a plurality of orientations of the magnetic field axes of rotation relative to a predetermined coordinate system; and

using the plurality of orientations of the magnetic field axes of rotation to render the position of the magnetic field transducer; and

performing a differential geometric technique to minimize a loss function.

15. A navigation system to provide a location of a rotating object, comprising:

a processor to receive a magnetic field signal from a rotating magnetic field transducer, the magnetic field signal proportional to sensed magnetic fields associated with a plurality of magnetic field sources;

a memory coupled to the processor, the memory including program instructions for providing navigation information by:

processing the magnetic field signal to determine a plurality of magnetic field axes of rotation corresponding to rotations of the sensed magnetic fields;

using the plurality of magnetic field axes of rotation to render a position of the magnetic field transducer comprising determining a plurality of orientations of the magnetic field axes of rotation relative to a predetermined coordinate system; and

using the plurality of orientations of the magnetic field axes of rotation to render the position of the magnetic field transducer; and

performing a differential geometric technique to minimize a loss function.

29. A computer-readable medium having encoded thereon software for providing navigation information for providing a location of a rotating object, said software comprising instructions for:

determining a plurality of magnetic field axes of rotation corresponding to rotations of magnetic fields sensed by a rotating magnetic field transducer and associated with a plurality of magnetic field sources; and

processing the plurality of magnetic field axes of rotation to render a position of the magnetic field transducer including:

determining a plurality of orientations of the magnetic field axes of rotation relative to a predetermined coordinate system; and

using the plurality of orientations of the magnetic field axes of rotation to render the position of the magnetic field transducer; and

performing a differential geometric technique to minimize a loss function.

## REJECTIONS

I. Claims 29, 31–33, 35, and 37 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

II. Claims 15, 18–20, 22, and 24–28 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception.

III. Claims 29, 31–33, 35, and 37 are rejected under 35 U.S.C. § 101 as being directed to a judicial exception.

IV. Claims 1, 4–6, 8, 10–15, 18–20, 22, 24–29, 31–33, 35, and 37 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

V. Claims 1, 4, 5, 8, 10–15, 18, 19, 22, 24–29, 31, 32, 35, and 37 are rejected under 35 U.S.C. § 103(a) as unpatentable over Zeller<sup>2</sup> in view of Tunay.<sup>3</sup>

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<sup>2</sup> Zeller et al., US 2005/0077085 A1, published April 14, 2005.

<sup>3</sup> Tunay, US 2007/0038410 A1, published February 15, 2007.

VI. Claims 6, 20, and 33 are rejected under 35 U.S.C. § 103(a) as unpatentable over Zeller in view of Tunay, and further in view of Gilboa.<sup>4,5</sup>

#### DISCUSSION

Appellants argue the claims according to the following groupings:

(1) Claims 1, 10–15, 24–29, and 37 under § 103(a) over Zeller in view of Tunay.

(2) Claims 4, 8, 18, 22, 31, and 35 under § 103(a) over Zeller in view of Tunay.

(3) Claims 5, 19, 32 under § 103(a) over Zeller in view of Tunay.

(4) Claims 6, 20, and 33 under § 103(a) over Zeller in view of Tunay and Gilboa.

(5) Claims 15 and 29 under § 101.

(6) Claims 1, 4–8, 10–15, 18–20, 22, 24–29, 31–33, 35, and 37 under § 112, second paragraph as indefinite.

(Appeal Br. 6–7).

***Claim 1 as unpatentable over Zeller in view of Tunay.*** Appellants indicate that claims 1, 10–15, 24–29, and 37 stand or fall together.

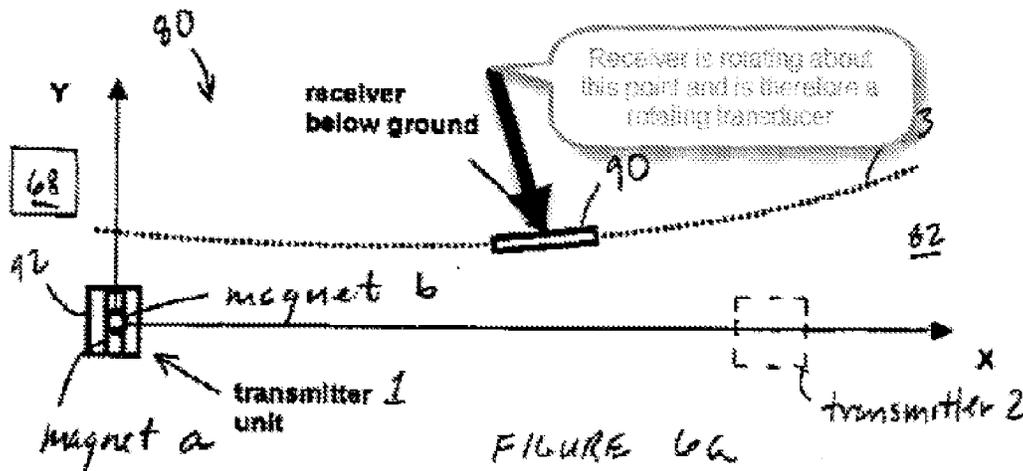
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<sup>4</sup> Gilboa, US 2001/0038354 A1, published November 8, 2001.

<sup>5</sup> In the Non-Final Rejection, the Examiner refers to Kawano et al. (US 2010/0049033 A1, published Feb. 25, 2010) instead of Gilboa (Non-Final Act. 22). However, the Examiner corrects this error in the Answer (Ans. 19–20), and Appellants appear to have understood the nature of the rejection.

Accordingly, we focus our discussion on the rejection of claim 1 over Zeller in view of Tunay.<sup>6</sup>

Appellants contend that the cited art does not disclose or suggest the step of receiving a magnetic field signal from a rotating magnetic field transducer (Appeal Br. 8). The Examiner finds that this step is taught by Zeller, in particular magnetic field transducer **90** as shown in the following annotated version of FIG. 6a:



Annotated FIG. 6a is a diagrammatic, plan view of a region in which a system for tracking an in ground device such as, for example, a boring tool is implemented using at least one transmitter having at least one rotating magnet.

The Examiner finds that Zeller’s magnetic transducer **90** moves along drill path **93** (the dotted line) as shown in FIG. 6a (Ans. 2). The Examiner further finds that, as transducer **90** moves along drill path **93**, it is rotating around a virtual point at the center of the circle defined by drill path **93**

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<sup>6</sup> Appellants’ heading on page 7 of their Appeal Brief references “Zeller in view of Stokar,” but we presume that this is an error as the rejection is plainly Zeller in view of Tunay.

(Ans. 2–3). The Examiner also finds that Zeller teaches that transducer **90** can be contained in a boring tool, which has pitch and roll and, therefore, is rotating (Ans. 4, citing Zeller ¶ 154). As the boring tool rolls, according to the Examiner, transducer **90** which is contained therein necessarily rolls (i.e., rotates) (Ans. 4, citing the American Heritage Dictionary definition of “roll”: “[t]o turn around or revolve on an axis”).

Appellants argue that

one of ordinary skill in the art would recognize that the point in space added by the Examiner cannot possibly be a center of a circle that covers the entire bore path 93 (e.g., the arrow added by the Examiner cannot reach the bore path 93 where in intersects with the Y-Axis)

(Appeal Br. 9). This argument is not persuasive because, as noted by the Examiner, even if the entire drill path is not known or not circular, at least for the portion shown in FIG. 6a, transducer **90** is rotating around the point shown in the annotated figure.

Appellants further argue that a person of skill in the art would not understand transducer **90** as rotating because Zeller does not explicitly recite that it rotates, while it does state that other magnets do rotate (Reply Br. 2–3). This argument is not persuasive either. Even if Zeller does not specifically state that transducer **90** rotates, the Examiner has shown how, at least in the path illustrated in FIG. 6a, transducer **90** is rotating. A person of skill in the art would also have been able to see and understand this at the time of invention.

It is well established that “the PTO must give claims their broadest reasonable construction consistent with the specification. Therefore, we look to the specification to see if it provides a definition for claim terms, but

otherwise apply a broad interpretation.” *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007) (citation omitted). The Specification provides an example in which “a magnetic field transducer is rotating (i.e., its orientation is changing over time).” Spec. 11. Thus, the Specification uses the term “rotating” broadly as it relates to the magnetic field transducer. Appellants have not persuasively argued that the term “rotating magnetic field transducer” has a meaning as used in claim 1 other than its broad meaning as used in the Specification. Accordingly, it is properly construed as broad enough to cover the change in orientation over time of transducer 90 as it moves along the drill path 93 as shown in Zeller.

***Claim 4 as unpatentable over Zeller in view of Tunay.*** Appellants state that claims 4, 8, 18, 22, 31, and 35 stand or fall together (Appeal Br. 11). Accordingly, we focus our discussion on the rejection of claim 4 over Zeller in view of Tunay.<sup>7</sup>

Appellants contend that the art does not disclose or suggest that using the plurality of magnetic field axes of rotation to render the position of the magnetic field transducer further comprises determining a number of angles between the magnetic field axes of rotation and rendering the position of the magnetic field transducer using the number of angles (Appeal Br. 11–12).

The Examiner finds that this limitation is taught by Zeller (Non-Final Act. 18, citing Zeller, Fig. 4, ¶¶ 181–182, 195–200). In particular, the Examiner finds that “Zeller discloses rendering three axes of rotation by

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<sup>7</sup> Appellants’ heading on page 7 of their Appeal Brief references “Zeller in view of Stokar,” but we presume that this is an error as the rejection is plainly Zeller in view of Tunay.

finding the  $b_x$ ,  $b_y$ , [and]  $b_z$  values at a plurality of rotation angles” (Non-Final Act., 2–3, citing Zeller ¶¶ 181–182). The Examiner further finds that Zeller therefore finds a plurality of rotation axes with corresponding rotation angles, and uses these to find the position of the transducer (Non-Final Act. 3).

Appellants first argue that the Examiner does not adequately explain how the cited teachings from Zeller correspond to the claimed limitations (Appeal Br. 12). This argument is not persuasive because the Examiner provides a very detailed explanation of the findings underlying the rejection (Ans. 15–18) which Appellants concede is an adequate explanation of the rejection (Reply Br. 4).

Appellants also argue that claim 4 requires that the recited magnetic fields of rotation are associated with a plurality of magnetic field sources (set forth in independent claim 1). Appellants argue that the Examiner’s findings regarding this limitations are supported solely by Zeller’s FIG. 7, which shows only a single rotating magnet A and, therefore, cannot meet the claimed requirement of a plurality of magnetic fields (Reply Br. 4). This argument is not persuasive, because the Examiner finds that the plurality of magnetic field sources recited in claim 1 are satisfied by the presence of transmitters 1 and 2 as shown in Zeller’s FIG. 6a and FIG. 6b (Non-Final Act. 15). Appellants do not challenge this finding and, therefore, do not show reversible error in it. While the Examiner’s detailed discussion of the rejection focuses on the presence of a rotating magnet in Zeller’s FIG. 7b (*see*, Ans. 15–19), this discussion does not discount the presence of multiple transmitters in Zeller’s system as shown in FIG. 6a.

***Claim 5 as unpatentable over Zeller in view of Tunay.*** Appellants state that claims 5, 19, and 32 stand or fall together (Appeal Br. 11). Accordingly, we focus our discussion on the rejection of claim 5 over Zeller in view of Tunay. The Examiner finds that Zeller discloses determining at least three rotation angles and that any rendered position would include position information (Non-Final Act. 18–19; Ans. 19). Appellants do not make substantive arguments indicating that these findings are erroneous, arguing only that they are insufficiently detailed (*see*, Appeal Br. 13–14; Reply Br. 5). However, the Examiner has cited to specific portions of Zeller in a manner adequate to support the rejection (Non-Final Act. 18–19). Accordingly, we affirm this rejection.

***Claim 6 as unpatentable over Zeller in view of Tunay and Gilboa.*** Appellants state that claims 6, 20, and 33 stand or fall together. Accordingly, we focus our discussion on the rejection of claim 6 over Zeller in view of Tunay and Gilboa.

Appellants argue that the art does not teach that the number of angles is 6 (Appeal Br. 15). However, the Examiner explains that Zeller teaches this limitation in the same manner as it teaches the requirements of claims 4 and 5 (Ans. 20–21). Appellants make the same arguments in this regard as were made in connection with claim 4 (Reply Br. 5), and they are similarly unpersuasive. Appellants also argue that Gilboa does not disclose or suggest that the rendered position includes position and orientation information (Appeal Br. 15–16). However, the Examiner does not rely on Gilboa as teaching this limitation, but instead relies on Zeller (Ans. 21–22).

***Rejections under 35 U.S.C. § 101.*** With respect to Rejection I (the first rejection of claims 29, 31–33, 35, and 37 under § 101), the Examiner determines that claim 29 encompasses transitory forms of signal transmission because the claim does not recite “a non-transitory computer-readable medium” and, therefore, that the claims encompass non-patentable subject matter and are not compliant with § 101 (Non-Final Act. 4–5). Appellants do not argue this rejection, which we therefore summarily affirm.

Appellants argue Rejections II and III together (Appeal Br. 17–18). The Supreme Court has long held that “laws of nature, natural phenomena, and abstract ideas are not patentable.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)). The “abstract ideas” category embodies the longstanding rule that an idea, by itself, is not patentable. *Alice*, 134 S. Ct. at 2354 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)).

In *Alice*, the Supreme Court reiterated an analytical two-step framework previously set forth in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012), “for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Alice*, 134 S. Ct at 2355. The first step in the analysis is to “determine whether the claims at issue are directed to one of those patent-ineligible concepts,” such as an abstract idea. *Id.* If the claims are directed to a patent-ineligible concept, the second step in the analysis is to consider the elements of the claims “individually and ‘as an ordered combination’” to determine whether there are additional elements that “‘transform the nature of the claim’ into a patent-eligible application.”

*Id.* (quoting *Mayo*, 566 U.S. 66 at 79–78). In other words, the second step is to “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.’” *Id.* (brackets in original) (quoting *Mayo*, 566 U.S. 66 at 72–73).

With respect to claim 15, the Examiner determines that the claim is directed to a judicial exception because it is directed to a navigation system to provide a location of a rotating object, most of which recites laws of nature in the forms of mathematical algorithms (Non-Final Act. 5–6). The Examiner further determines that the claims “do not include additional elements that are sufficient to amount to significantly more than the judicial exception because the bulk of the claim is directed towards processing[,] amounting to a law of nature in the form of mathematical algorithms” (Non-Final Act. 6). The Examiner finds that the only non-mathematical features in the claims are the rotation magnetic field transducer, the processor, the memory, and the plurality of field sources, but determines that the magnetic field sources and the transducer are not positively recited and therefore not required in the claims (*id.*). Therefore, according to the Examiner, the remaining non-mathematical features are only a generic processor and memory which would routinely be used in any computer implementation of program instructions (*id.*).

We conclude that Appellants have demonstrated reversible error in the § 101 rejection of claim 15. In this instance, we agree with Appellants (Appeal Br. 17–18) that the claimed invention is directed to a navigation system which renders the physical position of a rotating magnetic field transducer. The claimed system is said to permit navigation in environments

where GPS cannot be used (e.g. underground, in basements, tunnels, etc.) and, also can be used regardless of the orientation of the object whose position is to be determined, which could be important if the object is a helmet worn by a person, for example (Spec. 2). Thus, we determine that the claimed invention is directed to a system that responds to a rotating magnetic field transducer to determine its location. Although a mathematical algorithm is part of this system, the claimed invention as a whole does more than apply the algorithm in a generic context. The claim presents a concrete solution for locating a rotating transducer. Accordingly, claim 15 passes the first step of the *Alice* test, which means we need not address the second step.

Accordingly, we reverse Rejection II. We also reverse Rejection III for essentially the same reasons (though we note that claims subject to Rejection III were also subject to Rejection I, which we have affirmed).

***Rejections under 35 U.S.C. § 112, second paragraph.*** The Examiner has rejected several groups of claims under 35 U.S.C. §112, second paragraph (Non-Final Act. 10–13). We address each grouping in turn.

*Claims 1, 4–6, 8, and 10–14.* The Examiner determines that the phrase “in a processor, processing the magnetic field signal” is unclear because the processor appears to be a distinct element in this limitation, but other limitations also require the use of a processor. In the examination context, the relevant inquiry under 35 U.S.C. § 112, second paragraph, “is to determine whether the claims do, in fact, set out and circumscribe a particular area with a *reasonable* degree of precision and particularity.” *In re Moore*, 439 F.2d 1232, 1235 (CCPA 1971) (emphasis added); *see also In re Packard*,

751 F.3d 1307, 1310 (Fed. Cir. 2014) (“[a] claim is indefinite when it contains words or phrases whose meaning is unclear”). “[T]he definiteness of the language employed must be analyzed—not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art.” *Moore*, 439 F.2d at 1235. In this instance, we do not agree with the Examiner that the fact that one step of the claimed method specifically recites a processor while other steps can be performed using a processor renders the claim indefinite. A person of skill in the art would be able to determine whether a particular method fell inside or outside the scope of the claim.

*Claims 8, 22, and 35.* The Examiner determines that the phrase “using the number of angles” is indefinite because “[i]t is not clear if the angles themselves are being use or if the number of them, such as the number 3 for 3 angles, is being used” (Non-Final Act. 10–11). In response, Appellants merely argue that “the phrase would be understood by one of ordinary skill in the art” (Appeal Br. 20). This argument is insufficient to show error in the rejection, as Appellants do not explain the meaning of the claim language at issue, or point to any evidence to support their contention that a person of ordinary skill in the art would understand what it means.

*Claims 15, 18–20, 24–29, 31–33, and 37.* The Examiner determines that the phrase “the memory including program instructions for providing navigation information by” is indefinite because neither the memory nor the program instructions can perform the claimed steps without a processor, and the processor essentially performs the recited steps (Non-Final Act. 11–13). We reverse this rejection because a person of skill in the art would

necessarily understand that the claimed steps are performed by the processor (which is positively recited in the claim) in conjunction with the program instructions.

### CONCLUSION

We AFFIRM the rejection of claims 29, 31–33, 35, and 37 under 35 U.S.C. §101 as being directed to non-statutory subject matter.

We REVERSE the rejection of claims 15, 18–20, 22, and 24–28 under 35 U.S.C. § 101 because the claimed invention is directed to a judicial exception.

We REVERSE the rejection of claims 29, 31–33, 35, and 37 are rejected under 35 U.S.C. § 101 as being directed to a judicial exception.

We REVERSE the rejection of claims 1, 4–6, 10–15, 18–20, 24–29, 31–33, and 37 under 35 U.S.C. § 112, second paragraph, as being indefinite.

We AFFIRM the rejection of claims 8, 22, and 35 under 35 U.S.C. § 112, second paragraph, as being indefinite.

We AFFIRM the rejection of claims 1, 4, 5, 8, 10–15, 18, 19, 22, 24–29, 31, 32, 35, and 37 under 35 U.S.C. § 103(a) as unpatentable over Zeller in view of Tunay.

We AFFIRM the rejection of claims 6, 20, and 33 are rejected under 35 U.S.C. § 103(a) as unpatentable over Zeller in view of Tunay, and further in view of Gilboa. 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).

AFFIRMED