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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ROALD GUNNAR VAN BORSELEN¹

Appeal 2017-006154
Application 13/493,930
Technology Center 3600

Before JAMES P. CALVE, WILLIAM A. CAPP, and
ARTHUR M. PESLAK, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Office Action rejecting claims 1–29. Appeal Br. 1.² We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE and enter a NEW GROUND OF REJECTION pursuant to our authority under 37 C.F.R. § 41.50(b).

¹ PGS GEOPHYSICAL AS is identified as the real party in interest. Appeal Br. 1.

² All citations to the Appeal Brief are to the Supplemental Appeal Brief filed on December 1, 2016.

CLAIMED SUBJECT MATTER

Claims 1, 9, 17, and 24 are independent. Claim 1 is reproduced below.

1. An apparatus comprising:
 - one or more processors;
 - one or more storage media storing instructions, which, when processed by the one or more processors, causes:
 - deriving values of an upgoing wavefield at a plurality of different locations from scattered wavefield data obtained by a plurality of underwater sensors at the plurality of different locations, the plurality of different locations corresponding to a plurality of different underwater depths;
 - deriving values of a downgoing wavefield at the plurality of different locations from the scattered wavefield data at the plurality of different locations;
 - extrapolating the values of the upgoing wavefield at the plurality of different locations to extrapolated values of the upgoing wavefield at a plurality of first locations, the plurality of first locations all corresponding to a first underwater depth;
 - extrapolating the values of the downgoing wavefield at the plurality of different locations to extrapolated values of the downgoing wavefield at a plurality of second locations, the plurality of second locations all corresponding to a second underwater depth;
 - determining one or more surface-related multiple wavefield contributions at a plurality of third locations from the extrapolated values of the up going wavefield at the plurality of first locations and the extrapolated values of the downgoing wavefield at the plurality of second locations.

Appeal Br. 23 (Claims App'x).

REJECTIONS

Claims 1–29 are rejected under 35 U.S.C. § 112, first paragraph, for lack of an adequate written description.

Claims 1–29 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

Claims 1–29 are rejected under 35 U.S.C. § 103(a) as unpatentable over Sollner (US 2010/0091610 A1, pub. Apr. 15, 2010) and van Borselen (US 2009/0251992 A1, pub. Oct. 8, 2009).

ANALYSIS

We enter a New Ground of Rejection of claims 1–29 as directed to patent ineligible subject matter under the judicial exception to 35 U.S.C. § 101. To determine patent-eligibility, we perform a two-step analysis. First, we determine if the claims are directed to a patent-ineligible concept like an abstract idea. *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014). If so, we determine if the claims contain an “inventive concept” that transforms the abstract idea into a patent-eligible application. *Id.* at 2357.

Alice Step One: Claims 1–29 Are Directed to an Abstract Idea

As an initial matter, we find that independent claims 1, 9, 17, and 24 are directed to the same subject matter despite the different statutory classes because they derive values of upgoing and downgoing wavefields at plural different locations from underwater sensors, extrapolate the values of those upgoing and downgoing wavefields to plural first and second locations at first and second underwater depths, respectively, and determine one or more surface-related multiple wavefield contributions. Appeal Br. 23–29 (Claims App’x). There is no meaningful difference in their scope in this regard.

Dependent claims recite features of the scattered wavefield data that is obtained by the underwater sensors as comprising measurements of pressure or velocity wavefields that can be obtained by wavefield decomposition and details of the first and second underwater depths and claimed locations. *Id.*

We determine the claims are directed to the abstract idea of collecting information and analyzing it as data gathering and processing claims, e.g. by collecting wavefield data such as pressure and velocity from conventional underwater sensors in conventional ways and processing that data to derive values that are extrapolated to determine multiple wavefield contributions. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1353–54 (Fed. Cir. 2016) (collecting information including particular content that does not change its character as information is an abstract idea); *TDE Petroleum Data Solutions, Inc. v. AKM Enter., Inc.*, 657 F. App'x 991, 992–93 (Fed. Cir. 2016) (automated method for determining the state of a well operation by storing plural states for well operation, receiving mechanical and hydraulic well operation data from plural systems, determining the data's validity, and automatically selecting a state of the well operation “is the sort of data gathering and processing claim that is directed to an abstract idea under step one of [*Alice*]”) (non-precedential); *Automated Tracking Solutions, LLC v. Coca-Cola Co.*, 2018 WL 935455, at *2–3 (Fed. Cir. Feb. 16, 2018) (system for locating, identifying, and tracking an object with a first transponder associated with an object, a reader to receive data from the transponder, a processor coupled to the reader to generate detection information of the transponder, and a storage device merely to collect data from sensors, analyze that data, and determine results based on the analysis of the data) (non-precedential).

We also determine the claims are directed to the abstract idea of calculating and comparing regions in underwater space through steps people go through in their minds or by mathematical algorithms as mental processes with the incidental use of processors that do not impose a meaningful limitation on the abstract idea. *See Elec. Power Grp.*, 830 F.3d at 1353–54 (analyzing information by the steps people go through in their minds or by mathematical algorithms are abstract ideas and mental processes); *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1371–73, 1375 (Fed. Cir. 2011) (all claimed steps can be performed in the human mind or by a human using pen and paper where the incidental use of a computer to perform the mental process does not impose a sufficiently meaningful limit on the claim scope); *Coffelt v. NVIDIA Corp.*, 680 F. App'x 1010, 1011 (Fed. Cir. 2017) (claims directed to calculating and comparing regions in space, including a particular steradian region of space, is a purely arithmetic exercise that recites nothing more than a mathematical algorithm that could be implemented using a pen and paper); *Digitech Image Techs. LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1350–51 (Fed. Cir. 2014) (claims directed to organizing information through mathematical correlations was not tied to a specific structure or machine and employed mathematical algorithms to manipulate existing information to generate additional information that is not patent eligible).

Appellant discloses that marine seismic survey techniques are known in the petroleum industry at least for the past few decades. Spec. ¶ 1. The survey process involves generating sound waves from a seismic source and detecting those waves with seismic receivers or sensors in a towed array to derive upgoing and downgoing wavefields. *Id.* ¶ 2.

Appellant discloses a method for predicting surface-related multiples based on wavefield measurements at different depths. The method can be implemented on an apparatus that includes one or more processors and one or more storage media storing instructions. *Id.* ¶ 17. Determining surface-related multiple wavefield contributions comprises convolving a downgoing wavefield with an upgoing wavefield. *Id.* ¶ 21. Appellant discloses other techniques of wavefield decomposition, extrapolation, convolution, etc., to predict surface-related multiples. *Id.* ¶¶ 75–77. Appellant further discloses LaPlace transformations and equations to calculate upgoing and downgoing wavefields values, and to extrapolate those values. *Id.* ¶¶ 52–68. No other details are provided for determining the surface-related multiple wavefield contributions except “techniques” that include, without limitation, wavefield decompositions, wavefield extrapolations, convolutions, forward domain transformation, reverse domain transformations, etc. *See id.* ¶¶ 75–77.

Therefore, the claims recite the abstract ideas identified above at a very high level of generality with implementation on conventional sensors and processors without reciting any particular transformative features. That the claims recite generic processors, storage media, and sensors does not make the claims any less abstract for step one. *In re TLI Commc’ns LLC Pat. Litig.*, 823 F.3d 607, 613 (Fed. Cir. 2016) (mere recitation of concrete, tangible components does not confer patent eligibility on an abstract idea). *Audatex N.A., Inc. v. Mitchell Int’l, Inc.*, 703 F. App’x 986, 989–90 (Fed. Cir. 2017) (non-precedential) (claims were directed to abstract idea of providing a vehicle valuation by collecting and using vehicle information for damaged vehicle with well-known computer technology as tools to collect data and generate reports).

Alice Step Two: The Claims Lack an “Inventive Concept”?

We also determine that the claims lack an “inventive concept” or step to transform the abstract idea into a patent-eligible application. The claimed sensors and processors are conventional. The velocity sensor is “a sensor configured to directly or indirectly measure particle velocities.” *Id.* ¶ 30. The “pressure sensor refers to a sensor configured to directly or indirectly measure pressure.” *Id.* ¶ 31. The arrangement of sensors in streamers is conventional. *Id.* ¶¶ 32–37, 84–86, Figs. 1–4B, 7.

Any innovation is limited to the abstract idea, which is not sufficient to make the abstract ideas patent eligible. “The ‘novelty’ of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.” *Diamond v. Diehr*, 450 U.S. 175, 188–89 (1981); *Versata Dev. Grp., Inc. v. SAP Am., Inc.*, 793 F.3d 1306, 1335 (Fed. Cir. 2015) (claims improved abstract idea not a computer’s performance). *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1303–04 (2012) (patent eligibility of an abstract idea does not depend on its alleged novelty or non-obviousness); *Two-Way Media Ltd. v. Comcast Cable Commc’ns.*, 874 F.3d 1329, 1339–40 (Fed. Cir. 2017) (“Eligibility and novelty are separate inquiries.”).

Appellant discloses the “techniques” as implemented by one or more special-purpose computing devices that perform the claimed techniques by being hardwired to do so or having application-specific integrated circuits or field programmable gate arrays programmed to perform the techniques. *Id.* ¶ 83. Thus, no innovative computer or software architecture or functionality is claimed beyond a computer programmed to perform the abstract idea.

The computer may include general purpose processors programmed in firmware, memory, or other storage and may be desktop computers, portable computers, handheld devices, servers, “or any other device that incorporates hard-wired and/or program logic to implement the techniques.” *Id.* ¶¶ 83–86. The claims thus recite sensors and computers as generic tools used to implement an abstract idea without any *technological* advances in seismic imaging or computers. *See Elec. Power*, 830 F.3d at 1354–55 (limiting the claims to a particular technological environment of power-grid monitoring does not make the claims patent-eligible, nor does the use of off-the-shelf, conventional computer, network and display technology to gather, send, and present the desired information); *Audatex N.A., Inc. v. Mitchell Int’l, Inc.*, 703 F. App’x 986, 990 (Fed. Cir. 2017) (claims add computer functionality to increase the speed and efficiency of an abstract idea rather than improve technological infrastructure or solve challenges particular to the Internet); *TDE*, 657 F. App’x at 993 (“claim 1 simply recites generic computer functions that amount to nothing more than the goal of determining the state of an oil well operation.”); *OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1363 (Fed. Cir. 2015) (“the claims describe the automation of the fundamental economic concept of offer-based price optimization through the use of generic-computer functions.”); *Two-Way*, 874 F.3d at 1339 (merely reciting an abstract idea performed on generic computer components does not “not contain an inventive concept”); *Coffelt*, 680 F. App’x at 1011 (same); *Digitech*, 758 F.3d at 1351 (“a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible”); *Shortridge v. Found. Constr. Payroll Serv., LLC*, 655 F. App’x 848, 853 (same).

Even if Appellant developed a novel hardware or software feature or functionality, the claims do not recite such features. *See Automated Tracking*, 2018 WL 935455, at *5 (claims do not use conventional RFID components in a non-conventional combination or arrangement).

Claims 1–29 For Lack Of Written Description

The Examiner determines that the claims lack an adequate written description because the “different,” “first,” “second,” and “third” locations recited in each of independent claims 1, 9, 17, and 24 are not defined in the Specification. Final Act. 2–4. The Examiner determines the Specification fails to sufficiently describe “multiple wavefield contributions” because the “contributions” do not seem to correspond to a specific numerical result and lack any clear unit definition, a skilled artisan would have to guess at what the Appellants mean in the claims. *Id.*

“The written description requirement provides that a patentee’s application for a patent must ‘clearly allow persons of ordinary skill in the art to recognize that [he] invented what is claimed.’” *Transperfect Global, Inc. v. Matal*, 703 F. App’x 953, 962 (Fed. Cir. 2017) (non-precedential) (quoting *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc)). The test for sufficiency is “whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad*, 598 F.3d at 1351.

We agree with Appellants that the Specification describes the claimed subject matter with sufficient detail to reasonably convey to a skilled artisan that Appellants’ possessed this subject matter. Indeed, Appellants explain in detail where those disclosures are found. *See Appeal Br. 6–10.*

Appellants describe the claimed subject matter as using a towed array of sensors (pressure, velocity) to detect seismic events as a way to determine subterranean formations in the sea. Spec. ¶¶ 1–3. Because the sensors are placed on flexible streamers, sensors 106-1–106-N are located at *different* locations (longitudinal direction, underwater depths) that form an acquisition surface as shown in Figure 1. *Id.* ¶¶ 17, 29–37, 45, 46, Figs. 1, 3A–3C.

After deriving values from the sensors at these “different locations,” Appellants describe how the plurality of values from the different locations are extrapolated with mathematical formulas to a plurality of *first locations* 302-1–302-N for upgoing wavefields (waves that propagate upwardly from a subterranean formation) and to a plurality of *second locations* 208-1–208-N for downgoing wavefields (waves that propagate downwardly as reflected from the water surface). *Id.* ¶¶ 2, 17–19, 45–64, Figs. 3B and 3C.

The extrapolated values at the first and second locations are combined (convolved) to determine the claimed “surface-related multiple wavefield contributions,” which Appellants indicate “refers to scattered wavefield component(s) – such as represented with a ray-path constituent – comprising both (1) reflection(s) from the sea floor and/or subterranean layers below the sea floor and (2) reflection(s) from the sea surface.” *Id.* ¶¶ 38–40. The upgoing and downgoing multiple ray-path constituents 310, 316 (Figs. 4A, 4B) obtained from extrapolation “may be summed to obtain surface-related multiple contributions in the total scattered pressure wavefield” and these surface-related multiple contributions may be *subtracted* from the measured pressure wavefield at the receiver locations. *Id.* ¶¶ 28, 38, 51, 64–77. Thus, Appellants attempt to account for the effects of various things and remove unwanted effects from their calculations and claim this very broadly.

Appellants identify parts of their disclosure that address the rejection of the Examiner. Appeal Br. 6–10. The Examiner responds that these cites fail to address the issues raised in the rejection. Ans. 10. The Examiner does not explain why the portions of the disclosure cited by Appellants do not provide an adequate written description, however. The thrust of the Examiner’s rejection appears to be a concern with the abstract nature of the claimed subject matter. The new ground of rejection addresses this issue. However, we do not sustain the rejection of claims 1–29 for lack of an adequate written description.

Claims 1–29 As Being Indefinite.

The Examiner also determines that claims 1–29 are indefinite because of the identified terms that lack an adequate written description and because the steps do not produce a tangible result. Final Act. 4–5. Because we find that an adequate written description was provided by Appellants, we do not sustain this rejection. We determine that a skilled artisan would be able to understand the metes and bounds of the claims when interpreted in light of Appellants’ Specification. Merely claiming broadly does not render a claim indefinite. *See Ultimex Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009).

*Claims 1–29
Unpatentable Over Sollner and van Borselen*

Resolution of the appeal of this rejection turns on whether or not van Borselen teaches or suggests “determining one or more surface-related multiple wavefield contributions at a plurality of third locations from the extrapolated values” of the upgoing and downgoing wavefields as claimed.

The Examiner finds that Sollner teaches all other claimed features except the surface-related multiple wavefield contributions, for which the Examiner relies on teachings in van Borselen at paragraphs 28 and 29 of a deghosting process to remove a “ghost” signal. Final Act. 6–7; Ans. 11.

Appellants argue that there are at least two points of distinction between van Borselen’s teachings and the claimed determining of surface related multiple wavefield contributions. First, Appellants argue that the claimed determining of surface-related multiple wavefield contributions is based on *both* extrapolated values of the *upgoing* wavefield at the plurality of first locations and the extrapolated values of the *downgoing* wavefield at the plurality of second locations, whereas van Borselen determines a ghost signal from a single reflection from the water surface without any reflection from the subterranean formation. Appeal Br. 17 (citing van Borselen ¶ 17). Van Borselen describes how seismic waves are reflected from the water surface downwardly where they are recorded by the receivers as a “ghost” signal. Van Borselen ¶ 17. This reflected ghost signal interferes with the signal measured by the receiver directly from the actual seismic event, e.g., by amplifying or attenuating some frequencies. *Id.* We agree.

Although the test for obviousness is what the combined teachings of the references indicate to a skilled artisan (*see* Ans. 11–12), we are not persuaded a skilled artisan would have been motivated to use the deghosting teaching of van Borselen, which only addresses the downward wavefield, to determine surface-related *multiple* wavefield contributions, which are based on the downward *and* upward wavefields or that a skilled artisan would have had a reasonable expectation of success in using this deghosting technique in Sollner to achieve the claimed multiple wavefield contributions.

We are not as persuaded, however, by Appellants' argument that van Borselen *removes* ghost reflections from marine seismic data whereas the claims *determine* surface-related multiples. Appeal Br. 17. In this regard, Appellants disclose that the determined surface-related multiple wavefield contributions may be *subtracted* from the measured scattered pressure wavefield at the receivers' locations. Spec. ¶¶ 46, 68, 73, 74. The fact that van Borselen removes ghost data does not negate the fact that van Borselen first must determine the ghost signal to subtract it from other data.

However, Appellants do appear to distinguish ghost source data from the upgoing and downgoing wavefield data used in their claims by noting that ghost sources may be taken into account in some embodiments (*id.* ¶ 75) or for bandwidth deghosting of marine seismic streamer data (*id.* ¶ 70). For this reason, we are not persuaded that a skilled artisan would have been motivated to use van Borselen's ghost signal determination technique in Sollner to determine surface-related multiple wavefield contributions from extrapolated upgoing and downgoing wavefields as claimed.

Thus, we do not sustain the rejection of claims 1–29 as unpatentable over Sollner and van Borselen.

DECISION

We reverse the rejections of claims 1–29 under 35 U.S.C. § 112, first and second paragraphs.

We reverse the rejection of claims 1–29 under 35 U.S.C. § 103(a) as unpatentable over Sollner and van Borselen.

We enter a new ground of rejection under 37 C.F.R. § 41.50(b) of claims 1–29 as being directed to non-statutory subject matter under the judicial exception to 35 U.S.C. § 101.

This decision contains a new ground of rejection pursuant to 37 C.F.R. § 41.50(b). Section 41.50(b) provides “[a] new ground of rejection pursuant to this paragraph shall not be considered final for judicial review.” Section 41.50(b) also provides:

When the Board enters such a non-final decision, the appellant, within two months from the date of the decision, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of the appeal as to the rejected claims:

(1) *Reopen prosecution.* Submit an appropriate amendment of the claims so rejected or new Evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the prosecution will be remanded to the examiner. The new ground of rejection is binding upon the examiner unless an amendment or new Evidence not previously of Record is made which, in the opinion of the examiner, overcomes the new ground of rejection designated in the decision. Should the Examiner reject the claims, appellant may again appeal to the Board pursuant to this subpart.

(2) *Request rehearing.* Request that the proceeding be reheard under § 41.52 by the Board upon the same Record. The request for rehearing must address any new ground of rejection and state with particularity the points believed to have been misapprehended or overlooked in entering the new ground of rejection and also state all other grounds upon which rehearing is sought.

Further guidance on responding to a new ground of rejection can be found in the Manual of Patent Examining Procedure § 1214.01.

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).

REVERSED; 37 C.F.R. § 41.50(b)