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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte STEWART TRICKETT

Appeal 2018-002084
Application 14/208,876[1]
Technology Center 2800

Before KAREN M. HASTINGS, JAMES C. HOUSEL, and JEFFREY R. SNAY, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant seeks our review under 35 U.S.C. § 134(a) of the Examiner's decision rejecting claims 1–20.

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

We AFFIRM.

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[1] Appellant identifies the real party in interest as CGG SERVICES SA. (Appeal Br. 2).

Independent claim 1 below is illustrative of the subject matter on appeal (emphases added):

> 1. A method of interpolating seismic data indicative of a surveyed geographical area of interest, comprising:
>
> transmitting seismic waves with seismic sources;
>
> recording seismic data with seismic receivers;
>
> determining that one or more traces of the seismic data is missing or is corrupt or is noisy;
>
> *interpolating with a computing device the seismic data using a pairwise Hankel tensor*;
>
> *performing tensor completion for the pairwise Hankel tensor to obtain interpolated seismic data*;
>
> combining the seismic data with the interpolated seismic data to obtain a set of trace data of the geographical area of interest; and
>
> generating an image of the surveyed geographical area of interest based on the set of trace data.

The Examiner maintains the following rejections[2]:

(a) claims 1–20 under 35 U.S.C. § 101 as being directed to non-statutory subject matter; and

(b) claims 1–20 under 35 U.S.C. § 103 as being unpatentable over Applicant's Admitted Prior Art ("AAPA") in view of Baumstein et al. (US 2010/0212909 A1, published Aug. 26, 2010) ("Baumstein").

[2] We refer to the Specification, filed Mar. 13, 2014 ("Spec."); the Final Office Action notice emailed Jan. 26, 2017 ("Final Act."), Appeal Brief, filed June 14, 2017 ("Appeal Br."); the Examiner's Answer, notice emailed Oct. 20, 2017 ("Ans."), and the Reply Brief filed Dec. 7, 2017 ("Reply Br.").

ANALYSIS

§ 101 Rejection

Claims 1–20 are rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

The first step in analyzing whether a claim is directed to patent-eligible subject matter is determining whether the claim is directed to one of the patent-ineligible concepts: laws of nature, natural phenomena, and abstract ideas (*Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Services v. Prometheus Labs., Inc.*, 566 U.S. 66 (2012))). If a claim is directed to a patent-ineligible concept, the second step in the analysis is to determine whether additional elements of the claim, "both individually and 'as an ordered combination,'" "'transform the nature of the claim' into a patent-eligible application" (*Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 79, 78)). Thus, 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.* at 2357 (alteration in original) (quoting *Mayo*, 566 U.S. at 77)).

Here, the Examiner finds claim 1 is directed to the abstract ideas of collecting information, analyzing the information, and displaying certain results, similar to the claims of *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016) (Final Act. 3–6). The Examiner also finds claim 1 is directed to the abstract idea of organizing information through mathematical correlations, as in *Digitech Image Tech., LLC. v. Electronics for Imaging, Inc.*, 758 F.3d 1344 (Fed. Cir. 2014) (*id.* at 3, 5). The Examiner finds the additional claim elements, when considered individually and as an ordered combination, do not amount to significantly more because

they are recited at a high level of generality and perform generic functions without an indication that the combination of elements improves a technology or improves the functioning of a computer (*id.* at 3–4, 6–7). The Examiner makes similar findings for claims 2–20 (*id.* at 7–9).

Appellant asserts claim 1 is not directed to an abstract idea because claim 1 differs from the claims of *Electric Power Group* and *Digitech* (Appeal Br. 5–6; Reply Br. 3). Specifically, Appellant contends the claims of *Electric Power Group* were directed to the real-time monitoring of a known underlying physical reality (i.e., an electric grid) while claim 1 seeks to uncover an underlying physical reality through in-depth elaborate processing of the seismic data (Appeal Br. 6). Appellant argues the step of transmitting seismic waves does not correspond to collecting information, the step of determining one or more traces of seismic data is missing, corrupt, or noisy, as recited in claim 1, is not analyzing information, as in *Electric Power Group*, and the step of combining the seismic data with interpolated seismic data does not correspond to collecting and analyzing information because *Electric Power Group* did not combine data with expected or new data from an interpolation (*id.* at 6–7).

Appellant further argues *Digitech* differs from claim 1 because the former refers to existing data while the latter generates new data (*id.* at 7). Appellant asserts the claims are similar to the patentable claims of *In re Abele*, 684 F.2d 902 (CCPA 1982), which regarded an improvement to the CAT scan process, because Appellant's invention also regards a computer-aided method in which reflected and refracted signals are attenuated while traveling through an environment (Reply Br. 3).

Appellant's arguments are unpersuasive. We agree with the Examiner that claim 1 is similar to the claims of *Electric Power Group*. The claims of *Electric Power Group* were directed to systems and methods for performing real-time performance monitoring of an electric power grid by collecting data from multiple sources, analyzing the data, and displaying the results (830 F.3d at 1351–1352). The Federal Circuit noted that collecting information has been treated as within the realm of abstract ideas, "analyzing information by steps people go through in their minds, or by mathematical algorithms, without more, as essentially mental processes within the abstract-idea category," and "merely presenting the results of abstract processes of collecting and analyzing information, without more" is abstract and thus the claims focused on the combination of these abstract ideas (*id.* at 1353–1354). Recently, the Federal Circuit summarized such a situation in this way:

> We have explained that claims focused on "collecting information, analyzing it, and displaying certain results of the collection and analysis" are directed to an abstract idea. *Electric Power*, 830 F.3d at 1353. "Information as such is an intangible," hence abstract, and "collecting information, including when limited to particular content (which does not change its character as information), [i]s within the realm of abstract ideas." *Id.* (citing cases). So, too, is "analyzing information ... by mathematical algorithms, without more." *Id.* at 1354 (citing cases, including *Parker v. Flook*, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978), and *Gottschalk v. Benson*, 409 U.S. 63, 93 S.Ct. 253, 34 L.Ed.2d 273 (1972)). And "merely presenting the results of abstract processes of collecting and analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis." *Id.* (citing cases). The claims here are directed at abstract ideas under those principles.

SAP America, Inc. v. InvestPic, LLC, 890 F.3d 1016, 1021 (Fed. Cir. 2018).

Here, the method of claim 1 collects information (i.e., transmits seismic waves and records seismic data, as explained by the Examiner (Final Act. 4; Ans. 4)), analyzes the information (i.e., determines if one or more traces of the seismic data is missing, corrupt, or noisy, interpolates the seismic data using a pairwise Hankel tensor, performs tensor completion to obtain interpolated seismic data, combines the seismic data with the interpolated seismic data (Final Act. 5)), and presents the results (i.e., generates an image of a surveyed geographical interest based on the combined data). Thus, *Electric Power Group* demonstrates that claim 1 is directed to abstract ideas (i.e., the collection of information, the analysis of information, and presentation of the results) under the first step of analyzing whether a claim is directed to patent-eligible subject matter.

As explained by the Examiner, Appellant attempts to distinguish claim 1 from the claims of *Electric Power Group* on the basis of technical differences but the similarities between the claims regard the abstract ideas they are directed to: the collection, analysis, and display of information (*id.* at 3–4). Appellant's arguments merely highlighting technical distinctions do not explain why claim 1 is not directed to an abstract idea or a collection of abstract ideas (i.e., the collection, analysis, and display of information), as in *Electric Power Group*. Although claim 1 displays different results, uses a different type of information, and uses a different type of analysis (i.e., interpolation with pairwise Hankel tensors), the recitations of claim 1 are directed to information collection, information analysis, and presenting the results, as discussed above. For the same reasons, Appellant's arguments

regarding the differences between claim 1 and the claims of *Digitech* also do not identify a reversible error.

With regard to the second step in the analysis set forth by *Alice*, Appellant asserts claim 1 recites significantly more than data processing because it provides an effective method to correct and complete seismic data for exploring a geographical area of interest (Appeal Br. 7–8). Appellant argues the detection of missing, corrupt, or noisy traces, the interpolation of data, and combination of data to generate an image depend on the underlying physical reality of the geographical area of interest and therefore claim 1, as a whole, is significantly more than the mathematical operation of interpolation (*id.* at 8).

These arguments are also unpersuasive. The limitations of claim 1 do not tie the recited steps to an underlying physical reality of a geographical area of interest argued by Appellant. Nor do the additional elements of claim 1, considered individually and as an ordered combination, transform the nature of claim 1 into patent-eligible subject matter. As stated by the Examiner, the additional limitations are recited at a high level of generality and perform generic functions (Final Act. 3–4, 6–7; Ans. 6–7). As explained by the Federal Circuit in *Digitech*, although an application of a mathematical formula to a known structure or process may be deserving of patent protection (758 F.3d at 1350, quoting *Diamond v. Diehr*, 450 U.S. 175, 187 (1981)) and "[a] claim may be eligible if it includes additional inventive features such that the claim scope does not solely capture the abstract idea," (*id.*, citing *Alice*), a claim does not become eligible "merely by adding the words 'apply it'" (*id.*, quoting *Bancorp Servs., LLC v. Sun Life Assurance Co. of Can. (U.S.)*, 687 F.3d 1266, 1276 (Fed. Cir. 2012)). Here,

as with the claims of *Digitech*, "[w]ithout additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible" (*id.* at 1351, citing *Parker v. Flook*, 437 U.S. 584, 595 (1978)).

Appellant's contention that claim 1 is similar to claims in *Thales Visionix Inc. v. U.S.*, 850 F.3d 1343 (Fed. Cir. 2017) (Appeal Br. 8) is also unpersuasive. The claims of *Thales* were directed to an unconventional arrangement of inertial sensors and calculations based on a different reference frame to reduce errors (850 F.3d at 1348–1349). As stated by the Examiner (Ans. 6), Appellant does not explain that although their invention regards conventional or generic steps or components (e.g., when considered individually), they are combined in an unconventional manner that provides an improvement and thus patent-eligible subject matter under step two of *Alice*. *See Amdocs (Israel) Limited v. Openet Telecom, Inc.*, 841 F.3d 1288, 1300 (Fed. Cir. 2016) (citing *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256–59 (Fed. Cir. 2014) and *BASCOM Glob. Internet Servs. Inc. v. AT & T Mobility LLC*, 827 F.3d 1341, 1349–52 (Fed. Cir. 2016)). Appellant's arguments that the claims are similar to the claims of *In re Abele* (Reply Br. 3) are also unpersuasive in view of the above analysis regarding *Electric Power Group* and *Digitech*.

In view of the above, Appellant's arguments do not identify a reversible error in the Examiner's § 101 rejection of claim 1.

Appellant argues independent claims 2 and 11 are also not directed to an abstract idea and amount to significantly more than an abstract idea by citing the arguments discussed above for claim 1, along with similar

arguments (Appeal Br. 8–10). For the reasons discussed above, these arguments are not persuasive.

In addition, Appellant asserts claim 11 is not directed to an abstract idea because it recites a hardware element: "a receiver configured to acquire transmitted seismic data indicative of a surveyed geographical area of interest" (*id.* at 10). As explained by the Examiner, the additional limitations of claim 11, including the receiver, are recited at a high level of generality and perform generic functions (Final Act. 3–4, 6–7). Further, Appellant's Specification (Spec. ¶ 86) indicates that such a receiver is a generic component and not itself an improvement or an unconventional arrangement. Nor is there is an indication that the overall system of claim 11 is an unconventional combination, as in *Thales* (Ans. 6). Therefore, Appellant's arguments also do not identify a reversible error in the Examiner's § 101 rejections of claims 2 and 11.

Appellant does not argue dependent claims 3–10 and 12–20 separately from claims 2 and 11. Appeal Br. 5–10.

For these reasons and those set forth in the Examiner's Answer, we sustain the Examiner's § 101 rejection of claims 1–20.

§ 103 Rejection

Claims 1–20 are rejected under 35 U.S.C. § 103 as being unpatentable over AAPA in view of Baumstein.

The Examiner finds the AAPA discloses the limitations of claim 1 but does not disclose a pairwise Hankel tensor (Final Act. 10–11). The Examiner finds Baumstein does not explicitly disclose a pairwise Hankel tensor but discloses a fourth order tensor encompassing a subset of fourth

order tensors that would meet the condition set forth in paragraph 55 of the Specification for when a fourth order tensor is a pairwise Hankel tensor (*id.* at 11). The Examiner concludes it would have been obvious to modify the AAPA in view of Baumstein "to gain the benefit of analyzing multiple geophysical data sets" (*id.* at 12).

Appellant's principal argument on appeal[3] is that Baumstein does not disclose a pairwise Hankel tensor (Appeal Br. 11–14). Specifically, Appellant contends paragraph 55 of Appellant's Specification sets forth the condition met by a fourth order pairwise Hankel tensor but Hankel tensors are not a subset of fourth order tensors and "although there are tensors which are both fourth-order and Hankel tensors" pairwise Hankel tensors are not fourth-order tensors and vice-versa (Appeal Br. 11–12; Reply Br. 1–3).

Appellant's arguments are persuasive. Paragraph 55 of Appellant's Specification states "[a] fourth-order tensor T is considered to be a pairwise Hankel tensor when it meets the following condition:"

$$T(i_1,i_2,i_3,i_4) = T(j_1,j_2,j_3,j_4) \quad \text{whenever} \quad i_1+i_2 = j_1+j_2 \text{ and } i_3+i_4 = j_3+j_4.$$

Baumstein discloses a method for enhancing geophysical data for analysis of hydrocarbons (Baumstein ¶ 2). Baumstein discloses a need for interpolation to make seismic data suitable for many modern data processing techniques and that interpolation addresses missing data and overcomes aliasing distortions "by incorporating statistical and physical assumptions about the seismic data and seismic data of other types into an enhanced iterative method for interpolation" (*id.* ¶ 63). Baumstein discloses that two types of seismic data (e.g., free surface (FS) data and water bottom (WB) data) may

[3] Appellant does not dispute that the AAPA is prior art (Appeal Br. 11–13).

be combined for interpolation by using the linearized conservation of momentum equation:

$$T(x, t) = \int_{-\infty}^{\infty} c(x, t-\tau) : \nabla u(x, \tau)\, d\tau \equiv \int_{-\infty}^{\infty} c_{ijkl}(x, t-\tau)\partial_k u_l(x)\, d\tau$$

where c_{ijkl} is a fourth-order tensor and each of indices i, j, k, l can take the values of 1, 2, or 3 (*id.* ¶¶ 71–73 (*see* equation (2))).

It is unclear from Baumstein's disclosure whether it's fourth-order tensor would indeed satisfy the conditions set forth in paragraph 55 of Appellant's Specification. Nor does the Examiner explain how the fourth order tensor disclosed by Baumstein encompasses a pairwise Hankel tensor (e.g., how Baumstein's tensor would have values meeting the conditions set forth in paragraph 55 of the Specification). As a result, the Examiner has not set forth a prima facie case of obviousness for claim 1. A preponderance of the evidence in the record does not support a conclusion of obviousness.

Appellant makes similar arguments for claims 2 and 11 (Appeal Br. 12–13). Claims 3–10 and 12–20 depend from claims 2 and 11.

For the reasons discussed above, we do not sustain the Examiner's § 103 rejection of claims 1–20 over AAPA and Baumstein.

DECISION

The Examiner's rejection of claims 1–20 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED