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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte YOSHIHIRO OKADA and TAKAO KUWABARA

Appeal 2018-002225
Application 14/179,567
Technology Center 2800

Before CATHERINE Q. TIMM, CHRISTOPHER L. OGDEN, and LILAN REN, *Administrative Patent Judges*.

REN, *Administrative Patent Judge*.

DECISION ON APPEAL[1]

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[1] In this Decision, we refer to the Final Office Action of March 21, 2017 (Final Act.), Appeal Brief of June 15, 2017 (App. Br.), Examiner's Answer of October 31, 2017 (Ans.), and Reply Brief of December 27, 2017 (Reply Br.).

STATEMENT OF THE CASE

Appellants[2] appeal under 35 U.S.C. § 134 from a rejection of claims 1, 2, 4–8, and 10–14. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm-in-part.

CLAIMED SUBJECT MATTER

The claims are directed to a radiographic imaging device and radiographic imaging method. Spec. 1. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. A radiographic imaging device comprising:
>
> a radiation detection element including a plurality of same sized hexagonal shaped pixels that detect radiation and are arrayed in a honeycomb pattern; and
>
> a pixel density conversion section that performs interpolation processing such that first image data obtained from the radiation detection element is converted into second image data representing an image of a plurality of pixels arrayed in a square grid pattern, wherein, in the radiographic imaging device, the following Formula (1) is satisfied,
>
> $d2max \leq d1max \leq (2 \times SI)$ Formula (1)
>
> wherein d1max denotes the length of a longest diagonal of the hexagonal shaped pixels, S1 denotes the surface area of the hexagonal shaped pixels, and d2max denotes the length of a diagonal of the square lattice of the second image data.

Claims Appendix (App. Br. 36).

[2] Appellants identify the real party in interest as Fujifilm Corporation of Tokyo, Japan. App. Br. 3.

REFERENCES

The prior art references relied upon by the Examiner in rejecting the claims on appeal are:

Wada	US 2009/0009637 A1	Jan. 08, 2009
Watanabe	US 2009/0032680 A1	Feb. 05, 2009
Yokogawa	US 2010/0171854 Al	July. 08, 2010
Toraichi	US 2011/0199394 Al	Aug. 18, 2011

REJECTIONS

Claims 1 and 8 are rejected under 35 U.S.C. § 101. Final Act. 7.

Claims 1, 2, 4, 5, 8, 10, 12, and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wada and Yogokawa. Final Act. 8.

Claims 4, and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wada and Yogokawa, and further in view of Watanabe. Final Act. 10.

Claims 6 and 13 are rejected under 35 U.S.C. §103(a) as being unpatentable over Wada and Yogokawa, and further in view of Toraichi. Final Act. 11.

Claims 1, 7, 8, and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wada and Watanabe. Final Act. 12.

OPINION

Eligibility

The Examiner rejects claim 1 because it is directed to an abstract idea without significantly more. Final Act. 7. The Examiner determines that while the claim recites an apparatus, the identified abstract idea is a "mathematical interpolation and mathematical relationship"–specifically, the "'interpolation processing' between the hexagonal and square pixel shapes/sizes." *Id.* Appellants fault the Examiner for failing to "state the concept to which the claims are allegedly directed" and that the "Examiner's explanation . . . is difficult to understand." App. Br. 10, 13. As to the Examiner's determination that the claim does not recite additional elements that amount to significantly more than the abstract idea (Final Act. 7–8), Appellants decline to address this issue as "unnecessary" relying on the argument that "the claims are not directed to an abstract idea." App. Br. 19; *see also id.* at 10.

Section 101 states that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." But even if a claim at first blush appears to be directed to one of the statutory classes of invention listed in § 101, it may be ineligible for a patent. "Phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70–72 (2012) (quoting *Diamond v. Diehr,* 450 U.S. 175, 185 (1981) (quoting *Gottschalk v. Benson,* 409 U.S. 63, 67 (1972)). Thus, a claim that, due to the

drafting efforts of the applicant, appears to fit into one of the statutory classes, but, in fact, would unduly pre-empt others from making and using the basic tools of scientific and technological work, is not patentable. *Alice Corp. Pty. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354–55, 57 (2014).

In *Alice*, the Court extended a framework that had been used in *Mayo* for distinguishing claims pre-empting laws of nature, natural phenomena, and abstract ideas from claims amounting to patent-eligible applications of those concepts. *Alice*, 134 S. Ct. at 2355. As stated in *Alice*,

> First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. If so, we then ask, "what else is there in the claims before us?" To answer that question, we consider the elements of each claim both individually and as an ordered combination to determine whether the additional elements transform the nature of the claim into a patent-eligible application. We have described step two of this analysis as a 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.

Alice, 134 S. Ct. at 2355 (internal quotation marks and citations to *Mayo* omitted).

The *Alice/Mayo* analysis begins with the question "whether the claims at issue are directed to a patent-ineligible concept." *Alice*, at 2355. "[T]he 'directed to' inquiry applies a stage-one filter to claims, considered in light of the specification, based on whether 'their character as a whole is directed to excluded subject matter.'" *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016) (quoting *Internet Patents Corp. v. Active Network, Inc.*, 790 F.3d 1343, 1346 (Fed. Cir. 2015)).

Because Appellants' argument is solely directed to whether claim 1 is directed to an abstract idea, step one of the *Alice/Mayo* analysis is the sole issue raised by Appellants on appeal. *See* App. Br. 19 ("Because the claims are not directed to an abstract idea, the inventive concept step of the *Alice* analysis is unnecessary."); *see also* Reply Br. 3–5 (arguing that the Examiner improperly applied step one of the *Alice/Mayo* analysis).

Claim 1 recites a radiographic imaging device with "a pixel density conversion section that performs interpolation processing." The Specification provides that the pixel density conversion section is part of "image processing apparatus 50" that "is configured as a server computer." Spec. 8, 22. The Specification provides that the "program for performing this pixel density conversation is stored in the ROM 62 or the HDD 66." *Id.* at 8. That is, the pixel density conversion is an algorithm that "is performed on image data" and the image data "express[es]" certain images – in this case, radiographic images. *Id.*

Appellants argue that "it is readily apparent that the claims include more than generalized pixel conversion" because "the claims are set within a specific technical context: a radiographic imaging device and method." App. Br. 15. According to Appellants, the recited conversion is "specifically from hexagonal pixels in a honeycomb pattern to square pixels in a grid pattern," and "these relationships prevent problems with generalized pixel conversion; namely, resolution and sensitivity are increased and the waste of signals from the pixels is prevented." *Id.* However, the relationships between these pixels are represented by a mathematical equation, and Appellants' arguments do not adequately explain why the claim, as a whole, is directed to anything other than the

result of a mathematical formula to convert image data from one form to another. *See McRo, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016) ("We . . . look to whether the claims . . . focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea . . . .").

Contrary to Appellants' arguments, the Examiner correctly rejects claim 1 under section 101 based on the determination that processing data through mathematical relations or algorithms is an abstract idea and there is not significantly more in the claim. Final Act. 7; Ans. 6, 9. The Federal Circuit has recognized "that defining the precise abstract idea of patent claims in many cases is far from a 'straightforward' exercise." *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1150 (Fed. Cir. 2016) (quoting *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1257 (Fed. Cir. 2014)). In view of this, the Federal Circuit has defined the "basic thrust' of a claim, something that is wholly consistent with the description of an invention, to determine what abstract idea the claim may be directed to. *Id.* at 1150–51.

The Specification and relevant case law support the Examiner's determination that claim 1 is directed to the abstract idea of using a generic computer to execute an algorithm for processing data. *See* Spec. 8, 12; *see also Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) ("Without additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible."); *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1093 (Fed. Cir. 2016) (abstract ideas include collecting information and analyzing that information "by

mathematical algorithms"); *Synopsis, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1146–47 (Fed. Cir. 2016) ("[W]e continue to 'treat[] 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.'" (second alteration in original) (citation omitted)); *Intellectual Ventures I LLC v. Capital One Fin. Corp.*, 850 F.3d 1332, 1340 (Fed. Cir. 2017) (organizing, displaying, and manipulating data is an abstract idea).

With regard to Appellants' argument based on *Research Corp. Tech. v. Microsoft Corp.*, 627 F.3d 859 (Fed. Cir. 2010), as the Examiner points out, the case predates *Alice* and therefore does not apply the *Alice/Mayo* analysis. Ans. 10. *Research Corp.* analyzes patent eligibility in the "context" that "this court also will not presume to define 'abstract' beyond the recognition that this disqualifying characteristic should exhibit itself so manifestly as to override the broad statutory categories of eligible subject matter and the statutory context that directs primary attention on the patentability criteria of the rest of the Patent Act." 627 F.3d at 868. But because it predates *Alice*, the *Research Corp.* holding "that the invention is not abstract" does not necessarily support Appellants' argument that the claims in that case are not "abstract ideas" under Step 1 of the *Alice/Mayo* frame work. In particular, *Research Corp.* does not clearly distinguish between the question of whether the invention is an "abstract idea" (step one of the *Alice/Mayo* framework) and whether the invention recites additional elements that amount to significantly more than the judicial exception (step two of the *Alice/Mayo* framework). *Cf. Research Corp.*, 627 F.3d at 868–869 (noting that the claims "incorporate algorithms and formulas that control

the masks and halftoning" and include interface and output devices such as a printer).

We further note that the Examiner distinguishes the claims in *Research Corp.*, reasoning that, for example, unlike the claims in *Research Corp.*, "the *only* physical structure" recited in claim 1 is a generic device" "without claiming (or requiring use of) a printer, display, or even specific memory." Ans. 10; *see also id.* at 11–12 (distinguishing the claims in the claims in *Research Corp.* on various grounds including factual and technological grounds). Appellants' conclusory disagreement with the Examiner's analysis does not sufficiently identify why the Examiner erred in distinguishing the claims from the claimed invention in *Research Corp.* *See* Reply 5, 8, 9, 15, 17. Contrary to Appellants' assertion that there has been a showing of the "significant parallels" between claim 1 and those in *Research Corp.* (Reply Br. 16 (citing App. Br. 17–18)), the Appeal Brief does not compare the claims but rather asserts that the "subject matter of the present claims solves the problems specific to conventional pixel conversion and the interaction between radiographic devices and output devices, by increasing resolution and sensitivity and preserving data that would otherwise be wasted" which according to Appellants, is similar to the half-toning methods in *Research Corp.* Because claim 1 does not recite such a problem to be solved, particularly any "interaction between radiographic devices and output devices" or any increase in resolution or sensitivity as argued by Appellants, we are not persuaded that the Examiner erred in rejecting claim 1 under section 101 while factually distinguishing the claims in *Research Corp.*

Appellants' argument based on *DDR Holdings v. Hotels.com, L.P*, 773 F.3d 1245 (Fed. Cir. 2014) is not persuasive because unlike claim 1 here, the claims at issue in *DDR* "do not recite a mathematical algorithm." *Id.* at 1257. Appellants do not sufficiently explain why, given such disparity that a mathematical algorithm is lacking in *DDR*, the Examiner erred rejecting claim 1 under section 101. *See* App. Br. 16; *see also* Reply Br. 15.

We have considered Appellants' remaining arguments including that the Examiner improperly engaged in piecemeal prosecution and that the Examiner added certain case cites to the Final Office Action which were not present in the previous Non-Final Action. *See* App. Br. 8, 11; *see also* Reply 18. We find that these arguments do not identify error in the Examiner's rejection of claim 1 under section 101 applying the *Alice/Mayo* framework.

The Examiner did not conclude the claim was ineligible merely because it contains a mathematical algorithm. The Examiner took into account the entire *Alice/Mayo* framework when determining that claim 1 is directed to an algorithm which is an abstract idea, and the inventive concept resides within the algorithm itself and not in its application of any physical structure of the recited apparatus. This is not inconsistent with the view that a patent claim must be considered as a whole. *See Parker v. Flook*, 437 U.S. 584, 594 (1978) ("If a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory." (internal quotations omitted)).

Based on the foregoing, we sustain the Examiner's rejection of claim 1 under section 101. Because Appellants do not argue the 101 rejection of

claim 8 (a method claim) separately from that of claim 1, we sustain the Examiner's rejection of claim 8 under section 101. *See* App. Br. 35; *see also* 37 C.F.R. § 41.37(c)(1)(iv) (2013).

Obviousness

In rejecting claim 1 over Wada and Yokogawa, the Examiner finds that Figure 1 of Wada shows $d1max \leq \sqrt{(2 \times S1)}$ "given hexagon shaped pixel area formed by tilting square matrix." Final Act. 8. The Examiner acknowledges that the references fail to disclose "a pixel density conversion section that performs interpolation processing" that satisfies the recited formula $d2max \leq d1max$. Final Act. 8–9 (citing Wada ¶ 53 in support of the finding that a skilled artisan "would have been motivated to adjust dimensions of the output square pixel grid, including dimensions where a square pixel would fit inside a hexagonal pixel (thereby satisfying the claimed equation)" through routine optimization and citing Yokogawa Fig. 25 as support).

Figure 1 of Wada shows two groups of "photoelectric converting elements" each "arranged in like a square grid." Wada ¶ 32. The Examiner does not explain why this figure and the accompanying text support the obviousness finding particularly when there is no mention of any "hexagon" or "hexagon shaped pixel area" as stated at Final Act. 8. The Examiner also does not explain why Figure 1 of Wada provides a comparative relation between a length and a surface area. Final Act. 8.

Moreover, Wada ¶ 53 describes "a processing for interpolating pixel data" using "honeycomb/square converting unit 16." Wada ¶ 53 describes that the conversion is to "convert image data constituted by honeycomb-shaped pixel data into image data constituted by square grid-shaped pixel

data, thereby enhancing a resolution." The record before us, however, does not clearly show each and every limitation of the claim is described or suggested by the prior art or would have been obvious based on the knowledge of the skilled artisan or the inferences and creative steps such skilled artisan would have employed. *In re Fine*, 837 F.2d 1071, 1074 (Fed. Cir. 1988); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Specifically, the Examiner does not explain why a skilled artisan, based on the teaching of Wada, would achieve the honeycomb/square conversion based on the comparative relations using the specific parameters such as "the length of a longest diagonal of the hexagonal shaped pixels" as well as "the surface area of the hexagonal shaped pixels" as recited in claim 1. *See* Final Act. 9 (stating, without sufficient explanation or evidentiary support, that a skilled artisan "would have been motivated to adjust dimensions of the output square pixel grid" which does not address the recited dimensions of "the hexagonal shaped pixels"). The record before us lacks evidence that Wada discloses any result-effective variables that may be used to achieve the pixel conversion. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1295 (Fed. Cir. 2012).

Yokogawa Figure 25 cited by the Examiner in support of the obviousness rejection shows "an example of the interpolation of pixels." Yokogawa ¶ 185. Other than a conclusory statement that this figure shows $d2max \leq d1max$, the record does not clearly show why the cited figure teaches or suggests the recited formula. *See* Final Act. 9 (stating that "Yokogawa teaches a specific image sensor system to interpolate from hexagonal shaped pixels to square pixels (*see* Yokogawa, fig 25) which

enables the ability to provide de-mosaicking and to improve spatial resolution ([0184-86]), where d2max ≤ d1max (*see* fig 25)").

In the Examiner's Answer, the Examiner appears to have annotated Figure 25 of Yokogawa – although the record does not explicitly state so – and states again that the figure "explicitly shows an example where d2max ≤ d1max." Ans. 15–16. Because the record before us does not show why the figure on page 16 of the Answer is different from Figure 25 of Yokogawa, we decline to rely on such evidence for this appeal.

The Examiner alternatively rejects claim 1 for obviousness based on Watanabe and Wada. Final Act. 11; *see also* App. Br. 35. Acknowledging that the "combined teaching of Watanabe and Wada fails to explicitly disclose d2max ≤ d1max, the Examiner again cites Wada ¶ 53 finding that "would have been motivated to adjust dimensions of the output square pixel grid, including dimensions where a square pixel would fit inside a hexagonal pixel (thereby satisfying the claimed equation)." *Id.* at 12. Based on our analysis with regard to Wada ¶ 53 for the rejection based on Wada and Yokogawa *supra*, the record before us lacks evidence that Wada discloses any result-effective variables such as the recited comparative relation between "the length of a longest diagonal of the hexagonal shaped pixels" and "the length of a diagonal of the square lattice of the second image data." *In re Applied Materials*, 692 F.3d at 1295.

Based on the record before us, we cannot sustain the obviousness rejection of claim 1 because of the lack of evidence that the prior art references would lead a skilled artisan to arrive at the recited formula with the particular dimensions including both the length and surface area of the relevant pixels. The obviousness rejection of claim 1 over Wada in view of

Yokogawa is not sustained. The obviousness rejection of claim 1 over Watanabe and Wada is not sustained.

The obviousness rejections of claim 8 cannot be sustained for the same reasons.

The obviousness rejections of claims dependent from claim 1 or claim 8 (namely, claims 2, 4–7, and 10–14) suffer from the same defects as the rejections of claims 1 and 8. The Examiner's application of the additionally applied references does not cure the deficiencies.

DECISION

The Examiner's rejection of claims 1 and 8 under section 101 is affirmed.

The Examiner's rejection of claims 1, 2, 4–8, and 10–14 under section 103 are reversed.

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-IN-PART