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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARK GOVONI

Appeal 2018-002840¹
Application 14/178,682
Technology Center 2100

Before ELENI MANTIS MERCADER, NORMAN H. BEAMER, and
ADAM J. PYONIN, *Administrative Patent Judges*.

PYONIN, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the
Examiner's Final Rejection of claims 2–4, 6–12, and 14–23. Final Act. 2.
We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ The Government of the United States, as represented by the Secretary of the Army, is identified as the real party in interest. Appeal. Br. 2.

STATEMENT OF THE CASE

Appellant's disclosure relates to the "production of an array pattern and an element pattern for an antenna." Abstract. Claims 6, 8, and 16 are independent, and are reproduced below for reference:

6. A system, comprising:
a production component configured to produce an element pattern with an array pattern for an antenna; and
an output component configured to output the element pattern,
where the production component is configured to produce the element pattern by way of a normal random variable sequence and where the production component, the output component, or a combination thereof are implemented, at least in part, as non-software.

8. A non-transitory computer-readable medium that stores processor-executable instructions that when executed by a processor cause the processor to perform a method, the method comprising:
collecting a parameter set;
generating a pattern set; and
causing the pattern set to be outputted,
where:
the pattern set comprises a randomized array pattern for an antenna that is based, at least in part, on the parameter set and
the pattern set comprises a randomized element pattern for the antenna that is based, at least in part, on the parameter set.

16. A system, comprising:
a processor;
a non-transitory computer-readable storage medium communicatively coupled to the processor and storing

processor executable components to facilitate operation of components comprising:

a reception component that receives a parameter set, the parameter set comprising an antenna parameter set and an equation variable set;

a production component that produces a pattern set that is based, at least in part, on the parameter set; and

an output component that causes output of the pattern set,

where:

the pattern set comprises a randomized array pattern for an antenna and a randomized element pattern for the antenna,

the randomized element pattern is such that a monitoring apparatus does not identify the antenna as an object of interest, and

the randomized array pattern is such that the monitoring apparatus does not identify the antenna as the object of interest.

The Examiner's Rejections

R1: Claims 2–4, 6–12, and 14–23 stand rejected under 35 U.S.C. § 101 as being directed to ineligible subject matter. Final Act. 14.

R2: Claims 3, 4, 6, 7, and 22 stand rejected under 35 U.S.C. § 103 as being unpatentable over Das, “Optimal angular locations of elements for asymmetric circular array antennas,” 2010, 2010 IEEE Symposium on Industrial Electronics and Applications, pages 681–685, in view of Buchanan, “A study of aperiodic (Random) arrays of various geometries,” 2011, Texas A&M University, 215 pages. Final Act. 17.

R3: Claim 21 stands rejected under 35 U.S.C. § 103 as being unpatentable over Das, Buchanan, and Hauer (US 3,268,893; Aug. 23, 1966). Final Act. 23.

R4: Claim 2 stands rejected under 35 U.S.C. § 103 as being unpatentable over Das, Buchanan, Hauer, and Panicali, “A probabilistic approach to large circular and spherical arrays,” 1969, IEEE Transactions on Antennas and Propagation, volume AP-17, number 4, pages 514–522. Final Act. 26.

R5: Claims 8, 10–12, and 14–17 stand rejected under 35 U.S.C. § 103 as being unpatentable over Das, Hauer, and Panicali. Final Act. 28.

R6: Claim 23 stands rejected under 35 U.S.C. § 103 as being unpatentable over Das, Buchanan, Hauer, and Panicali. Final Act. 39.

R7: Claims 9 and 18–20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Das, Hauer, Panicali, and Wang, “Low RCS dipole array synthesis based on MOM-PSO hybrid algorithm,” 2009, Progress in Electromagnetic Research, volume 94, pages 119–132. Final Act. 41.

ANALYSIS

We have reviewed the Examiner’s rejection in light of Appellant’s arguments. We have considered in this Decision only those arguments Appellant actually raised in the Briefs. Any other arguments Appellant could have made but chose not to make are deemed waived. *See* 37 C.F.R. § 41.37(c)(1)(iv). We are not persuaded of Examiner error; we adopt the Examiner’s findings and conclusions as our own, and we add the following for emphasis.

A. Rejection R1: Non-statutory Subject Matter

The system of claim 6 includes (a) “a production component configured to produce an element pattern with an array pattern for an antenna” and (b) “an output component configured to output the element

pattern”; claim 16 recites similar “output” and “production” components. Claim 8 includes method steps of “generating a pattern set” and “causing the pattern set to be outputted.”

We agree with the Examiner that independent claim 6 “is directed to a system that produces an element pattern for an antenna” (Final Act. 14) and the claimed production component “perform[s] abstract mathematical calculations and data manipulation.” Final Act. 14–15, citing *In re Abele*, 684 F.2d 902 (CCPA 1982). The Examiner further finds, and we agree, that the limitation of “‘produce the element pattern by way of a normal random variable sequence,’ appears to be a mathematical algorithmic calculation” (Ans. 4) and that the “process could be performed mentally” (Ans. 5).

We find the independent claims are comparable to concepts our reviewing courts have found to be abstract. *See 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)); *see also 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 steps people go through in their minds, or by mathematical algorithms”); *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.”).

Additionally, we are not persuaded by Appellant’s comparison of the independent claims to claims found patent eligible by our reviewing court, such as the claims in *McRO, Inc. v. Bandai Namco Games America Inc.*, 837 F.3d 1299 (Fed. Cir. 2016), *Enfish, LLC v. Microsoft Corp.*, 822, F.3d 1327 (Fed. Cir. 2016), and *Finjan, Inc. v. Blue Coat Systems, Inc.*, 879 F.3d 1299 (Fed. Cir. 2018). *See* Appeal Br. 4–6, Reply Br. 2–5. Unlike the claims in these cases, Appellant’s claims do not provide improvements to the underlying technology: the claims may be performed in the human mind and/or by use of generic computer technology. *See*, for example, Spec. ¶ 47 et seq., displaying “sample code in MATLAB” that can be “employed to practice aspects disclosed herein.” *See also* Spec. ¶¶ 21–23; *cf. Synopsys*, 839 F.3d at 1152 (“given that the claims are for a mental process, assignment conditions, which merely aid in mental translation as opposed to computer efficacy, are not an inventive concept that takes the Asserted Claims beyond their abstract idea”); *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014) (“after *Alice*, there can remain no doubt: recitation of generic computer limitations does not make an otherwise ineligible claim patent-eligible”).

Thus, we agree with the Examiner that “Appellant’s claimed invention is not directed to an improvement in the computer functionality itself, but on an abstract idea for which the computer is invoked merely as a tool.” Ans. 10.

We further are not persuaded by Appellant’s comparison of the independent claims to the claims of *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017), in which the Federal Circuit found “the claims here result in a system that reduces errors in an inertial system that

tracks an object on a moving platform.” *Id.* at 1348. Appellant argues that “[t]he unconventional nature of [Appellant’s] claims clearly is in line with *Thales*” (AppealBr. 7) and “[a]s *Thales* recited non-conventional mounting, the claims here recite non-conventional array and element patterns, specifically thorough randomness and not optimization as is disclosed by Das.” Reply Br. 4. Appellant’s argument is not persuasive, as the present claims are not directed to an antenna array and element patterns; rather, the claims are directed to systems and a medium for designing an antenna, and encompass mental processes. Further, the Examiner has shown that employment of randomness in antenna design is a conventional solution. *See* Final Act. 29, citing Hauer 7:37–42, which states that

[i]n all of the embodiments of the present invention a transmitted random signal incorporating energy dispersed over a wide angle has been used. An enemy consequently has great difficulty in detecting the presence of the radar, and more so in detecting the characteristics of the radar signal due to its random form.

Therefore, we are not persuaded the Examiner erred in determining “[t]he claims, both as a whole and the individual claim elements, do not appear to have an element or combination of elements that is sufficient to ensure that the claim in practice amounts to significantly more than the abstract idea itself.” Ans. 8.

Accordingly, we are not persuaded the Examiner erred in finding the claims patent ineligible.

B. Rejections R2–R7: Obviousness

Appellant argues that “the entire purpose of Das is to produce an optimized element pattern” and thus “it would be a frustration of purpose to

combine Das with anything that goes against this optimization — including anything random discussed in Panicali or Hauer.” Appeal Br. 11. Appellant admits that Das teaches using “chromosomes [] built with random value genes,” but contends that “[t]he fact that the chromosomes are constructed from genes of random values does not mean the chromosomes themselves are random any more than random sized stones can be used to build a wall of a non-random height.” Appeal Br. 12. Appellant further contends that “the probabilistic and random nature has to do with what is used to construct chromosomes, not the actual selection of element location.” Appeal Br. 13.

We are not persuaded of error. We agree with the Examiner that an ordinarily skilled artisan would “*extract[] component teachings of Das and combine[] those teachings with the teachings of Hauer and Panicali,*” and that “the test [for obviousness] is what the combined teachings of those references would have suggested to those of ordinary skill in the art.” Ans. 17. Das teaches an optimization method for an antenna having a “[g]eometry of [an] N element Asymmetric non-uniform circular array of isotropic radiators.” Das 682, Fig. 1; *see also* Fig. 2.

One of ordinary skill in the art would recognize several important teachings from the disclosure of Das:

1. for any given array configuration such as the configuration shown in Figure 1, an “array factor” can be calculated. *See* Das 681, equation (2);
2. other quantities, such as a side lobe level, first null beamwidth, and a cost function, can be derived. *See* Das 682, equation (3); and
3. starting with an initial uniform angle spacing, a real coded genetic algorithm will use a randomization method to select final placement

of the elements forming the asymmetric non-uniform circular array such that the cost function is minimized. *See* Das 682–683, Sections III and IV.

See Final Act. 17–18; Ans. 16, 24. Thus, we find Das teaches the recitation “by way of a . . . random variable sequence,” within the meaning of the claim. Further, one skilled in the art, aware of the teachings of Buchanan, Hauer, and Panicali, would also recognize the importance of random placement of array elements in antenna design. In particular, one of ordinary skill in the art would recognize the following teachings from the other cited references:

1. “collaborative beamforming” uses a randomly distributed antenna array which can “suppress sidelobe behavior.” Buchanan *iii–iv*;
2. a “transmitted random signal incorporating energy dispersed over a wide angle” results in “[a]n enemy consequently has great difficulty in detecting the presence of the radar and more so in detecting the characteristics of the radar signal due to its random form.” Hauer 7:37–42; and
3. random placement of elements in a circular array follows a probability distribution that allows a designer to select a number of elements so that the resulting pattern possesses particular beam properties.
Panicali 516–517, Section III, equations (26), (28), Table I.

See Final Act. 18–19, 29–30.

Here, the rejections involve a combination of the teachings of Das and (1) Buchanan (Rejection 2), or (2) Hauer (Rejections 3–7). The Examiner relies on Das as teaching the components and steps used to calculate properties of an antenna beam pattern generated using a particular number

and placement of elements in a circular array. This teaching is separate from Das's optimization; we agree with the Examiner that such teaching is not frustrated when combined with the use of randomization of the placement of elements as taught by Buchanan, Hauer, and Panicali. *See* Ans. 20; *see also* Ans. 16. We note Das teaches the randomization is used for the purposes of optimization. *See* Ans 16; Das 682–683. Separately, we also agree with the Examiner that the references each teach optimizing an antenna and thus one of ordinary skill, in view of the combined references, would optimize an antenna (such as by using randomization) in order to reach the desired solution. *See* Ans. 22.

Appellant's arguments ignore the teachings of Das that an arbitrary placement of elements in a circular array has quantities that can be analytically calculated; instead, Appellant's arguments focus on the teachings of Das, that using a genetic algorithm, the placement of elements can be determined so as to optimize a cost function. Based on the record before us, we see no reason that one of ordinary skill would not combine the cited references in the manner claimed. Accordingly, we are not persuaded the Examiner erred in Rejections 2–7 as argued by Appellant, and we affirm the rejections of independent claims 8 and 16, as well as claims 2–4, 7–12, and 14–22 not argued separately. *See* Appeal Br. 8–15.

C. Rejections R2 and R6: Obviousness

Appellant argues the Examiner erred in the rejection of independent claim 6 and dependent claim 12, because Buchanan's Gaussian distribution of elements in a normalized circular aperture "is far short of teaching a normal random variable sequence." Appeal Br. 15. Appellant contends

Buchanan’s teaching “relates to normalization of an outcome (i.e., normalization on where to place elements) while claims 6 and 23 recite a sequence used to produce an element pattern.” Appeal Br. 16.

We are not persuaded of error. The Examiner finds, and we agree, that

Figure 38 above shows a random element pattern that are Gaussian distributed, and the term, “normal random variable,” means a Gaussian random variable. The terms[] “normal distribution,” and “Gaussian distribution” have the same meaning.

Ans. 32. The Examiner reasonably interprets the claimed “sequence” as corresponding to the set of points the Examiner refers to as “a random element pattern.” Appellant does not point to any definition of the term “sequence” appearing in the disclosure. Accordingly, we affirm the rejection of independent claim 6 and dependent claim 23.

DECISION

The Examiner’s decision rejecting claims 2–4, 6–12, and 14–23 under 35 U.S.C. § 101 is affirmed.

The Examiner’s decision rejecting claims 2–4, 6–12, and 14–23 under 35 U.S.C. § 103 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)(1)(iv). *See* 37 C.F.R. § 41.50(f).

AFFIRMED