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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DANIEL BERNARD KUPRATIS and KARL L. HASEL[1]

Appeal 2016-000331
Application 14/143,342
Technology Center 3700

Before LYNNE H. BROWNE, ANNETTE R. REIMERS, and PAUL J. KORNICZKY, *Administrative Patent Judges*.

REIMERS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Daniel Bernard Kupratis and Karl L. Hasel (Appellants) appeal under 35 U.S.C. § 134(a) from the Examiner's decision to reject claim 21 under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter and under 35 U.S.C. § 103(a): (1) claims 1, 4–10, and 13–16 as unpatentable over Alvanos (US 2007/0059158 A1, published Mar. 15, 2007) and Adams (US 2012/0291449 A1, published Nov. 22, 2012); (2) claim 17 as unpatentable over Alvanos, Adams, and Dunbar (US 7,334,409 B2, issued

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[1] In the Appeal Brief, United Technologies Corporation is indicated as "the real party in interest of the present application." Appeal Brief 1 (hereinafter "Appeal Br.") (filed Mar. 9, 2015).

Feb. 26, 2008); and (3) claim 18 as unpatentable over Alvanos, Adams, and Suciu (US 2009/0314881 A1, published Dec. 24, 2009). Claims 2, 3, 11, 12, 19, 20, 22, and 23 have been canceled.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

CLAIMED SUBJECT MATTER

The claimed subject matter relates to a turbine engine. *See* Spec. ¶ 4, Fig. 1. Claims 1, 10, and 21 are independent.

Claims 1 and 21 are illustrative of the claimed subject matter and recite:

> 1. A turbine engine comprising:
>
> a fan;
>
> a compressor section having at least a first portion and a second portion, wherein said first portion is configured to exhibit a higher pressure than said second portion, and wherein said second portion of the compressor section comprises a low pressure compressor;
>
> a combustor in fluid communication with the compressor section;
>
> a turbine section in fluid communication with the combustor, wherein said turbine section includes at least a first portion and a second portion and wherein said first portion includes at least two (2) stages and is configured to exhibit a higher pressure than said second portion, and wherein said second portion of the turbine section comprises a low pressure turbine, and wherein said turbine low pressure turbine drives said fan via an epicyclic gear train geared architecture driving

[2] We note that claims 5 and 16 depend from canceled claims. *See* Appeal Br. 10, 12, Claims App.

the fan and wherein the epicylclic [sic.] geared architecture includes a speed reduction greater than about 2.3;

wherein each of said compressor section second portion and said turbine section second portion includes a plurality of stages;

wherein a ratio of turbine section second portion stages to compressor section second portion stages is less than 1;

a fan bypass ratio of the turbine engine is greater than about 6.0; and

a configuration complexity metric of the low pressure compressor and low pressure turbine is in the range of about 2.63 to about 4.27, wherein the configuration complexity metric is defined by the relationship $[l+N][l+[l/Nx(S_{LPT})+Nx(S_{LPC})]]$ $/[N+(S_{LPC})/(S_{LPT})]/[2N]$, S_{LPT} is the number of turbine second portion stages, S_{LPC} is the number of compressor second portion stages, S_{LPC}/S_{LPT} is the ratio of the number of compressor second portion stages to the number of turbine second portion stages, and N is about 1.618034.

21. A method for validating a gas turbine engine comprising

determining a configuration complexity metric of a low pressure compressor and low pressure turbine in a gas turbine engine having a fan bypass ratio of the turbine engine greater than about 6.0 by determining a weighted summation of a number of low pressure compressor stages and a number of low pressure turbine stages, wherein the complexity metric is defined as $[l+N][l+[l/Nx(S_{LPT})+Nx(S_{LPC})]]/[N+(S_{LPC})/(S_{LPT})]/[2N]$, where, S_{LPT} is the number of low pressure turbine stages, S_{LPC} is the number of low pressure compressor stages, and N is about 1.618034; and

validating said gas turbine engine when said configuration complexity is in the range of about 2.63 to about 4.27.

ANALYSIS

Patent-Ineligible Subject Matter

Claim 21

The Supreme Court has established "a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs, Inc.*, 132 S. Ct. 1289, 1294 (2012)). Under that framework, we first "determine whether the claims at issue are directed to one of those patent-ineligible concepts"—i.e., a law of nature, a natural phenomenon, or an abstract idea. *Id.* If so, we secondly "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. *Id.* (quoting *Mayo*, 132 S. Ct. at 1298, 1297). The Supreme Court has described the second step of the 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.'" *Id.* (alteration in original) (quoting *Mayo*, 132 S. Ct. at 1294).

The Examiner determines that:

> Independent claim 21, when analyzed as a whole, is held to be ineligible subject matter under 35 U.S.C. 101 because the recited limitations fail to establish that the claim is not directed to an abstract idea. Claim 21 is an insufficient recitation of machine implementation or a physical transformation, since the machine ("gas turbine engine") is merely involved nominally in the steps of the process such that it covers any machine capable

> of performing the claimed steps defined by the method, which are considered to involve only data gathering and computation. Likewise, a specific computation based on observation of the construction of the nominal gas turbine engine only applies an abstract (mathematical) concept to the nominal engine. The equation, by which the claimed complexity metric is calculated, is considered to be a statement of a general concept (an equation whose result is defined only by the number of stages in parts of the nominal gas turbine engine).

Ans. 2–3[3]; *see also* Final Act. 6–9[4].

Appellants contend that the Examiner "has improperly shifted the burden of establishing patentability" to Appellants and that "the burden in a rejection under 35 USC 101 is placed on the [E]xaminer to establish that the claim is directed to an abstract idea." Appeal Br. 6 (citing MPEP 2106(2)).

Appellants do not apprise us of error by this argument. We conclude that the Examiner's analysis and remarks are sufficient to place Appellants on notice regarding the Examiner's position that claim 21 is directed to an abstract idea. *See* Final Act. 6–9; *see also* Ans. 2–3; *In re Jung*, 637 F.3d 1356, 1362 (Fed. Cir. 2011) (stating that "the PTO carries its procedural burden of establishing a prima facie case when its rejection satisfies 35 U.S.C. § 132, in 'notifying] the applicant. . . [by] stating the reasons for [its] rejection, or objection or requirement, together with such information and references as may be useful in judging of the propriety of continuing the prosecution of [the] application'" (quoting 35 U.S.C. § 132)).

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[3] Examiner's Answer (hereinafter "Ans.") (dated Sept. 2, 2015).
[4] Final Office Action (hereinafter "Final Act.") (mailed Aug. 25, 2014).

Appellants contend that:

> The claimed method is limited to the particular practical application of validating a gas turbine engine using a configuration complexity, and does not preclude other utilizations or applications of the configuration complexity, or other systems or methods of validating an engine. Further, the configuration complexity of a gas turbine is neither a law of nature, nor a physical phenomenon. As such, Claim 21 is not directed to an abstract idea.

Appeal Br. 5.

We are not apprised of error based on this argument. The Supreme Court has stated that "patents that. . . integrate the building blocks [of human ingenuity] into something more, []thereby transform[ing] them into a patent-eligible invention . . . pose no comparable risk of pre-emption, and therefore remain eligible for the monopoly granted under our patent laws." *Alice*, 134 S. Ct. at 2354-55 (citations and quotations omitted). Although preemption "might tend to impede innovation more than it would tend to promote it, 'thereby thwarting the primary object of the patent laws'" (*id.* at 2354 (citing *Mayo*, 132 S. Ct. at 1293)), "the absence of complete preemption does not demonstrate patent eligibility." *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015); *see also OIP Techs., Inc. v. Amazon.com, Inc.*, 788 F.3d 1359, 1362-63 (Fed. Cir. 2015) ("[T]hat the claims do not preempt all price optimization or may be limited to price optimization in the e-commerce setting do not make them any less abstract."). Thus, even assuming claim 21 recites a particular application of "validating a gas turbine engine" (*see* Appeal Br. 5)—such that claim 21 does not preempt the entirety of the identified abstract idea—that does not demonstrate that claim 21 is directed to patent-eligible subject matter.

We agree with the Examiner that, under the first step of the *Alice* analysis, claim 21 is directed to an abstract idea. *See* Final Act. 6–9; *see also* Ans. 2–3. Namely, the claim is directed to determining a condition and validating an object based on the condition. Such activity amounts to receiving information (i.e., determining a condition) and generating additional information (i.e., validating an object based on the condition) using an algorithm. Our reviewing courts have held claims ineligible under § 101 when directed to manipulating existing information, such as by using algorithms, to generate additional information. *See Parker v. Flook*, 437 U.S. 584, 585, 594-96 (1978) (rejecting as ineligible claims directed to (1) measuring the current value for a variable in a catalytic conversion process, (2) using an algorithm to calculate an updated "alarm-limit value" for that variable, and (3) updating the limit with the new value); *Elec. Power Grp. v. Alstom S.A.*, 830 F.3d 1350, 1353—54 (Fed. Cir. 2016) (discussing how "collecting information" and "analyzing information by steps people go through in their minds, or by mathematical algorithms, without more" are abstract ideas); *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, the Examiner determines that:

> [T]he actual steps of the process do not recite any physical transformation or any machine implementation of the method steps. To perform the method, the construction of the engine (number of low pressure compressor/turbine stages) is observed, those two numbers are inserted into an equation, and the result is checked against a range of "valid" values. Any or all of these

> steps can be performed by hand or even in the head of a person observing the engine.
>
> Even observation of the number of stages in the engine is only implied. Though it is inherent that the number of stages has to be known or verified at some point in the past, one could be handed a sheet of paper listing the low pressure stage counts of various engines and perform the claimed method on all of them without even physically encountering a gas turbine engine.

Ans. 6–7; *See CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011) (stating that "a method that can be performed by human thought alone is merely an abstract idea and is not patent-eligible under § 101").

Having determined that claim 21 is directed to an abstract idea, we now address the second step of the *Alice* framework.

Appellants contend that:

> Weighing in favor of eligibility, a plain reading of the claims reveals that the claim is more than a mere statement of a concept and describes a particular solution of the problem to be solved. As identified in the claim, the problem to be solved is "validating a gas turbine engine", and the following steps enumerate a specific and particular process and method for solving the problem. Further, the solution is implemented in a concrete and tangible manner by determining the complexity of the gas turbine engine and verifying that the complexity falls within an acceptable range. Even further still, the performance of the steps is observable because once the steps are performed the engine is either valid or invalid, whereas before the performance of the steps, the engine is not validated.

Appeal Br. 6.

Claims must include additional features that are significantly beyond "well-understood, routine, conventional activity" or a simple "instruct[ion] . . . to implement [or apply] the abstract idea [on a computer]." *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014) (quoting *Mayo*, 566 U.S. at 79); *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349 (Fed. Cir. 2016). In this case, we agree with the Examiner that (1) "nothing at all changes about [the] engine, except the application of the abstract idea of [the engine] being 'valid' or not;" (2) "the engine has not been *made* more or less complex as a result of the method–physically, it doesn't change at all;" and (3) "nothing at all has been actually done *to* the engine[] . . . The only result of the method is that an engine is conceptually placed into one or another abstract category [i.e., valid or invalid], a result which is neither concrete nor tangible." Ans. 7–8. Further, to the extent Appellants rely on the fact that the recited "gas turbine engine" is a physical structure, we note that our reviewing court has affirmed rejections under § 101 when "the only physical step involves merely gathering data for the algorithm." *See In re Grams*, 888 F.2d 835, 839 (Fed. Cir. 1989). As such, claim 21 at most requires only "mathematical algorithms to manipulate existing information to generate additional information." *Digitech*, 758 F.3d at 1351. Thus, the limitations of claim 21 do not transform the abstract idea embodied in the claim.

Concerning Appellants' contention that the claimed invention solves the problem of validating a gas turbine engine in a novel manner by using the complexity of the gas turbine engine (*see* Appeal Br. 6), even assuming that claim 21 is "a novel and nonobvious modification," as the Supreme Court has stated, "[t]he '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). As such, we are not apprised of error based on this argument.

Accordingly, claim 21, when considered "both individually and 'as an ordered combination,'" amounts to nothing more than an attempt to patent the abstract idea embodied in the steps of the claim. *See Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 78). Thus, the limitations of claim 21 fail to transform the nature of the claim into patent-eligible subject matter. *See id.* (citing *Mayo*, 566 U.S. at 78).

For the above reasons, Appellants fail to apprise us of error in the Examiner's determination that claim 21 is directed to patent-ineligible subject matter. Accordingly, we sustain the Examiner's rejection of claim 21 as being directed to patent-ineligible subject matter.

Obviousness over Alvanos and Adams

Claims 1, 4–10, and 13–16

Appellants do not offer arguments in favor of independent claim 10 or dependent claims 4–9 and 13–16 separate from those presented for independent claim 1. *See* Appeal Br. 6–7. We select claim 1 as the representative claim, and claims 4–10 and 13–16 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Appellants contend that the proposed combination of Alvanos and Adams "would not have been obvious at least because the combination would require a complete redesign of the engine systems of Alvanos." Appeal Br. 6. In particular, Appellants contend that:

> [A]ltering the structure of a gas turbine engine to incorporate a different fan bypass ratio necessitates significant structural and design changes to both the engine structure, and the operational components. This *may well* necessitate alterations within the turbine section driving the fan, within the compressor sections, and within the structural supports. Such changes would necessitate further changes to both the low pressure compressor section and the turbine section including the corresponding stage counts. In other words, alteration of the fan bypass ratio of the engine of Alvanos would require a complete redesign of the engine.

Appeal Br. 7 (emphasis added); *see also* Reply Br. 2[5].

As an initial matter, Appellants do not identify record evidence supporting the contention that the proposed combination of Alvanos and Adams "would require a complete redesign of the engine systems of Alvanos." *See* Appeal Br. 6–7; *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) ("Attorney's argument in a brief cannot take the place of evidence."). In particular, Appellants do not apprise us *how* altering the structure of Alvanos' gas turbine engine to incorporate a different fan bypass ratio, as taught by Adams, would (1) "necessitate[] significant structural and design changes to both the engine structure, and the operational components" of Alvanos and (2) "further [necessitate] changes to both the low pressure compressor section and the turbine section including the corresponding stage counts" of Alvanos. *See* Appeal Br. 6–7.

In this case, the Examiner finds that Alvanos discloses the turbine engine of claim 1 except Alvanos does "not disclose a specific bypass ratio

[5] Reply Brief (hereinafter "Reply Br.") (filed Oct. 1, 2015).

or an epicyclic geartrain driving the fan." *See* Ans. 3–4; *see also* Final Act. 9–10. The Examiner relies on Adams

> [to] teach a turbine engine having core and bypass flow paths, where the low pressure turbine (27) drives a fan (42) via an epicyclic gear train geared architecture [paragraph 0025], where the epicyclic geared architecture includes a speed reduction greater than about 2.3 . . . . As a result, the bypass ratio is greater than about 6.0 . . . , and, in at least one embodiment, about 8.0 . . . . Note that the relatively high bypass ratio is achieved *as a result of the geared architecture*.

Ans. 4 (citing Adams ¶¶ 4, 25, 29, 37); *see also* Final Act. 10.

The Examiner reasons that because both Alvanos and Adams "disclose gas turbine engines having a bypass fan structure," it would have been obvious "to modify the turbine engine of [Alvanos] utilizing a geared fan architecture, as taught by [Adams], in order to achieve a fan bypass ratio greater than about 6.0 . . . , using known methods." Ans. 4; *see also* Final Act. 10. The Examiner's findings are sound and supported by a preponderance of the evidence, and the Examiner's conclusions therefrom are based on rational underpinnings. Appellants do not provide persuasive evidence or argument apprising us of Examiner error.

Additionally, we disagree with Appellants that the Examiner's statements in the Answer "implicitly acknowledge that one of skill in the art would not know what changes would be necessary without undergoing a complete redesign of the engine." Reply Br. 2. To the contrary, the Examiner clarifies that:

> It may be the case that *no redesign is necessary at all*, however since the bypass ratio cannot be inferred from the figures [of Alvanos], a specific teaching [Adams] was used to show that a bypass ratio in the claimed ranges is not only possible, but has

> been contemplated and practiced in the art for many years, as the Appellant knows.

Ans. 9 (emphasis added).

The Examiner further takes the position that:

> [W]hile the statements *may well* be true, such drastic changes *may not* be necessary. Even if a substantial redesign were necessary, . . . every modification listed is well within the grasp of the person having ordinary skill in the art of gas turbine engine design. Furthermore, the art recognizes that the bypass ratio of a gas turbine engine is a result effective variable, affecting thrust specific fuel consumption and noise production, among other design variables, making the bypass ratio ripe for optimization by practitioners in the art.

Ans. 9.

Appellants do not provide persuasive evidence or argument to the contrary. Nor is there an indication by Appellants that the Examiner's proposed modifications are beyond the ability of one skilled in the art. *See id.*

Appellants contend that "one of skill in the art would not have had a reasonable expectation of success in creating the proposed combination. Further, the fact that a complete redesign would be required renders it apparent that the required degree of predictability is not present." Reply Br. 2; *see also* Appeal Br. 6–7.

As discussed above, Appellants do not identify record evidence supporting the contention that "a complete redesign of the engine [of Alvanos] would be required." *See* Appeal Br. 6–7; *see also* Reply Br. 2. Further, Appellants have not explained with any specificity why a person of ordinary skill in the art would not have had an expectation of success in making the proposed modification. *In re O'Farrell*, 853 F.2d 894, 903 (Fed.

Cir. 1988) (Absolute predictability that the substitution will be successful is not required; all that is required is a reasonable expectation of success).

In summary, based on the record presented, we are not persuaded the Examiner erred in rejecting independent claim 1 as unpatentable over Alvanos and Adams. Accordingly, we sustain the Examiner's rejection of claim 1 as unpatentable over Alvanos and Adams. We further sustain the rejection of claims 4–10 and 13–16, which fall with claim 1.

Obviousness over Alvanos, Adams and either Dunbar or Suciu Claims 17 and 18

Appellants contend that the addition of Dunbar or Suciu "does not cure the deficiencies of the base combination, nor does the [E]xaminer provide any further arguments or assertions in support of the base combination." *See* Appeal Br. 7–8.

For the reasons discussed above, we find no deficiencies in the Examiner's rejection of claims 1 and 10 as unpatentable over Alvanos and Adams. Accordingly, for the same reasons discussed above for claims 1 and 10, we likewise sustain the Examiner's obviousness rejections of claims 17 and 18.

DECISION

We AFFIRM the decision of the Examiner to reject claim 21 as being directed to patent-ineligible subject matter.

We AFFIRM the decision of the Examiner to reject claims 1, 4–10, and 13–16 as unpatentable over Alvanos and Adams.

We AFFIRM the decision of the Examiner to reject claim 17 as unpatentable over Alvanos, Adams, and Dunbar.

We AFFIRM the decision of the Examiner to reject claim 18 as unpatentable over Alvanos, Adams, and Suciu.

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).

AFFIRMED