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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KEVIN K. CHAN,
SIVANANDA K. KANAKASABAPATHY,
BABAR A. KHAN,
MASAHARU KOBAYASHI,
EFFENDI LEOBANDUNG,
THEODORUS E. STANDAERT, and
XINHUI WANG

Appeal 2017-009360
Application 14/601,288
Technology Center 2800

Before ROMULO H. DELMENDO, KAREN M. HASTINGS, and JAMES C. HOUSEL, *Administrative Patent Judges*.

PER CURIAM.

DECISION ON APPEAL

The Appellant[1] appeals under 35 U.S.C. § 134(a) from the Primary Examiner's decision to reject claims 1–4 and 8–18.[2] We have jurisdiction under 35 U.S.C. § 6(b).

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[1] International Business Machines Corporation, the Appellant, is identified as the real party in interest. Appeal Brief filed on December 28, 2016, hereinafter "Appeal Br.," 2.

[2] Appeal Br. 4–19; Reply Brief filed on June 19, 2017, hereinafter "Reply Br.," 1–14; Final Office Action (notice emailed on July 26, 2016) hereinafter "Final Act.," 2–11; Examiner's Answer (notice emailed on April 19, 2017), hereinafter "Ans.," 2–14.

We affirm.

I. BACKGROUND

The subject matter on appeal relates to methods in a computer-aided design system for generating a functional design model of an integrated FinFET and deep trench capacitor structure (e.g., an eDRAM). Specification filed on January 21, 2015, hereinafter "Spec.," ¶¶ 8, 12–13. This method for generating a functional design model for an integrated FinFET is *not* the same as the method for manufacturing the FinFETs, which are alleged to provide excellent scalability and provide more volume than conventional gate structures but are difficult to integrate with other devices and/or structures due to their three dimensional structures. *Id.* ¶¶ 2–3.

Representative claim 1 is reproduced from page 21 of the Appeal Brief, as follows (emphases added):

> 1. *A method in a computer-aided design system for generating a functional design model of an integrated FinFET and deep trench capacitor structure using a computer readable hardware storage device in a computing device for manufacturing the integrated FinFET and the deep trench capacitor structure*, the method comprising:
>
> generating a functional representation of a physical structure of the integrated FinFET and the deep trench capacitor structure, using the computing device, of a plurality of deep trench capacitors formed in a silicon on insulator (SOI) substrate, each of the plurality of deep trench capacitors having a fin structure;
>
> generating a functional representation of the physical structure of the integrated FinFET and the deep trench capacitor structure, using the computing device, of a plurality of SOI fins each of which having ends in contact with respective fin structures of the deep trench capacitors;
>
> generating a functional representation of the physical

structure of the integrated FinFET and the deep trench capacitor structure, using the computing device, of an insulator material on the fin structures of the plurality of deep trench capacitors; and

generating a functional representation of the physical structure of the integrated FinFET and the deep trench capacitor structure, using the computing device, of a gate structure extending over the insulator material and the SOI fins,

wherein each of the SOI fins are between the fin structures of the deep trench capacitors such that ends of the SOI fins contact ends of the fin structures of the deep trench capacitors,

wherein the functional representation of the fin structures and the SOI fins are formed simultaneously,

wherein the functional representation of the fin structures are a functional representation of polysilicon fins, and

wherein the functional representation of the insulator material is oxide material blanket deposited on the polysilicon fins and the SOI fins, and subsequently removed from the SOI fins prior to formation of the gate structures.

II. REJECTION ON APPEAL

On appeal, the Examiner maintains[3] the following rejection (Ans. 3–9; Final Act. 2–6):

Claims 1–4 and 8–18 under 35 U.S.C. § 101.

[3] It appears that the rejection of claim 2 under pre-AIA 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement; the rejection of claim 6 under pre-AIA 35 U.S.C. § 112, second paragraph, as being indefinite; the rejection of claims 1 and 3–6 under pre–AIA 35 U.S.C. § 102(e) as being anticipated; and the rejection of claims 2, 12, and 13 under pre–AIA 35 U.S.C. § 103(a) have been withdrawn by the Examiner in view of the after-final rejection Amendment filed September 26, 2016, which was entered by the Examiner via the Advisory Action dated October 28, 2016.

III. DISCUSSION

The Supreme Court of the United States reaffirmed the long-held principle that 35 U.S.C. § 101 contains an "'important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable.'" *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Assoc. for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2116 (2013)). The Court provided a two-step analytical framework for determining whether a claim is patent eligible. *Id.* at 2355. The first step requires determining whether the claim is directed to one of these exceptions, such as an abstract idea. *Id.* If so, the second step requires determining "'[w]hat else is there in the claims before us?'" *Id.* (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1297 (2012). That step involves searching for an inventive concept—i.e., an element or combination of elements in the claim that is "'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [abstract idea] itself.'" *Id.* (quoting *Mayo*, 132 S. Ct. at 1294).

Applying this analytical framework, we discern no reversible error based on our consideration of the Appellant's arguments on appeal. As stated above, 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*, 134 S. Ct. at 2355.

Here, the Examiner finds claim 1 is directed to an abstract idea of generating a functional design model in which functional representations of physical structures of an integrated FinFET and deep trench capacitor structure via a computing device are generated. Ans. 3–5. The Examiner

further finds claim 1 is directed to an abstract idea analogous to the abstract idea in *Ultramercial v. Hulu, LLC*, 772 F.3d 709 (Fed. Cir. 2014). *Id.* at 5.

The Appellant contends the claimed invention does not correspond to a concept that the courts have identified as an abstract idea (e.g., an idea itself, certain methods of organizing human activity, or mathematical relationships/formulas, as outlined in *July 2015 Update on Subject Matter Eligibility* (hereinafter "July 2015 Update")), and the claimed invention does not correlate with the invention in *Ultramercial*, which is directed to an eleven step process for displaying an advertisement in exchange for access for copyrighted material. Appeal Br. 4–9; Reply Br. 3.

The Appellant's arguments are unpersuasive. The July 2015 Update states the claimed invention in *Ultramercial* falls within the category of "certain methods of organizing human activity," which is an exception to subject matter eligibility. *July 2015 Update on Subject Matter Eligibility* 4. The July 2015 Update states that "certain methods of organizing human activity" includes "managing human mental activity." *Id.* However, the July 2015 Update further classifies the claimed invention of *Ultramercial* as falling under the subject matter eligibility exception category of "an idea 'of itself,'" which includes mental processes. *Id.* at 5. Thus, although the claimed invention in *Ultramercial* was specifically directed to the abstract idea of using advertising as an exchange or currency (*Ultramercial*, 772 F.3d at 715), *Ultramercial* still demonstrates that claimed inventions directed to ideas (e.g., mental processes) or certain methods of organizing human activity (e.g., management of human mental activity) are directed to patent-ineligible concepts.

Although the Inventors' Specification also describes a different, *patent-eligible* invention directed to semiconductor structures and methods of manufacturing an integrated FinFET and deep trench capacitor structure (Spec. ¶ 1), claim 1 is not directed to such a structure or method, but to a method using a generic computing device to generate a functional design model. Appeal Br. 21. Thus, the claimed method essentially corresponds to the mental process a person undertakes in designing such a structure by imagining the individual components and their shapes, imagining how they look and operate together, and representing these thoughts on paper, except in the claimed method, the representation is aided by a computer specified in general terms. These representations are mental steps—regardless of whether they are performed on a general purpose computer or in one's mind and paper—that amount to an abstract idea, similar to that in *Ultramercial*.

To the extent the Appellant desires a court decision providing a more direct correlation between their claimed invention and a patent-ineligible concept, *Synopsys, Inc. v. Mentor Graphics Corporation*, 839 F.3d 1138 (Fed. Cir. 2016), may fulfill such a need. The claimed invention in *Synopsys* was "directed to the abstract idea of translating a functional description of a logic circuit into a hardware component description of the logic circuit," something that was "performed mentally or by pencil and paper by one of ordinary skill in the art." *Id.* at 1139.

The Appellant argues the Examiner has overgeneralized the claimed invention and has not addressed the specific requirements of claim 1, which results in incorrectly concluding the claimed invention is directed to an abstract idea. Reply Br. 2, 11–13. These arguments are also unpersuasive. The Federal Circuit has recognized "that defining the precise abstract idea of

patent claims in many cases is far from a 'straightforward' exercise." *Id.* at 1150 (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 the particular abstract idea to which the claim may be directed. *Id.* at 1150–51. Here, claim 1 recites a method for generating a functional design model of an integrated FinFET and deep trench capacitor structure by generating functional representations of various structures with a computing device. The mere fact that the claims are directed to a *new* abstract idea does not make the abstract idea patent-eligible. *Id.* at 1151 ("[A] claim for a new abstract idea is still an abstract idea."). Thus, it is not an overgeneralization or oversimplification to state that claim 1 is directed to the abstract idea of generating functional representations of physical structures for a functional design model of an integrated FinFET and deep trench capacitor structure, which includes the mental performance of such an operation. *Id.* at 1152 ("[G]iven 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.").

In view of the above, we agree with the Examiner's finding that claim 1 is directed to an abstract idea.

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*, 132 S. Ct. at 1297, 1298).

Here, the Examiner finds the individual elements of claim 1 perform according to their routine and expected functions (i.e., generating a functional representation of a structure via a computing device). Ans. 6. The Examiner finds the elements of claim 1, when considered as an ordered combination, is merely the combination of generic computer functionalities that do not make the claimed invention substantially more than the abstract idea to which the invention is directed. *Id.* at 6–7. The Examiner further finds the claimed invention does not present a technical improvement or an improvement to the functioning of a computer but merely applies the abstract idea on a generic computer system. *Id.* at 7–8.

The Appellant asserts the Examiner agreed claim 1 includes subject matter (e.g., the limitation "wherein the functional representation of the insulator material is oxide material blanket deposited on the polysilicon fins and the SOI fins, and subsequently removed from the SOI fins prior to formation of the gate structures") that is not known in the prior art; the claimed invention is used for manufacturing processes for semiconductor devices; the limitations of claim 1 go beyond merely implementing an abstract idea on a computer; and that when the elements of claim 1 are considered individually and in combination they present an improvement to a technical field. Appeal Br. 9–10; Reply Br. 4–7, 9–14.

The Appellant's arguments are unpersuasive. With regard to the Appellant's arguments that claim 1 includes subject matter not found in the prior art and thus patentable under 35 U.S.C. §§ 102 and 103, the Federal Circuit has stated:

> In *Alice*, the Supreme Court described an "inventive concept" as "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 (quoting *Mayo*, 132 S. Ct. at 1294) (alteration in original). Synopsys equates the inventive concept inquiry with novelty and contends that the Asserted Claims contain an inventive concept because they were not shown to have been anticipated by (35 U.S.C. § 102) or obvious over (35 U.S.C. § 103) the prior art. *See* Appellant's Opening Br. 43 ("[T]he district court ignored the fact that the methods in the asserted claims of the Gregory patents were entirely novel solutions and could not be found anywhere in the prior art."). That position misstates the law. It is true that "the § 101 patent-eligibility inquiry and, say, the § 102 novelty inquiry might sometimes overlap." *Mayo*, 132 S. Ct. at 1304. But, a claim for a *new* abstract idea is still an abstract idea. The search for a § 101 inventive concept is thus distinct from demonstrating § 102 novelty.

Synopsys, 839 F.3d at 1151. Thus, as we discussed previously in step 1, a finding of patentability under §§ 102 and 103 does not immediately direct one to find a claimed invention is directed to eligible subject matter under § 101, which requires its own analysis. Again, "a claim for a new abstract idea is still an abstract idea." *Id.*

The Appellant's arguments that the claimed invention is used for manufacturing processes of semiconductors and goes beyond merely implementing an abstract idea on a computer are also unpersuasive. Claim 1 does not require any step of actually manufacturing the integrated FinFET and deep trench capacitor structure. For instance, the language "wherein the functional representation of the insulator material is oxide material blanket deposited on the polysilicon fins and the SOI fins, and subsequently removed from the SOI fins prior to formation of the gate structures" does not regard an operation performed during the design method recited in claim 1. The limitation regards a step for a method of manufacture to be performed subsequently to the claimed design process.

When considering the elements of claim 1, the Examiner correctly finds claim 1 is merely the application of an abstract idea on a generic computer, the sort of situation the Supreme Court determined to be patent-ineligible in *Alice*. Ans. 7–9. Specifically, the Supreme Court determined the claims at issue in *Alice* simply recite the performance of an abstract idea by a generic computer. *Alice*, 134 S. Ct. at 2351.

Claim 1 recites generating functional representations via a computing device for various physical structures of an integrated FinFET and deep trench capacitor structure. No specific design process is recited, other than generating functional representations for specific structures via a computing device, and no particular computing device is required by claim 1. Indeed, the Appellant's Specification states that machines used for the design process "include, but are not limited to, any machine used in an IC design process" which encompass "any machines for programming functionally equivalent representations of the design structures into any medium (e.g. a machine for programming a programmable gate array)." Spec. ¶ 26.

Therefore, claim 1 involves the sort of matter the Supreme Court cautioned against in *Alice* by stating "transformation into a patent-eligible application requires more than simply stat[ing] the [abstract idea] while adding the words 'apply it.'" *Id.* at 2357 (quoting *Mayo*, 132 S. Ct. at 1294). Nor does the mere performance of an abstract idea by a generic computer tie a claimed process to a particular machine. *Ultramercial*, 772 F.3d at 716–17. Implementing the idea on a general purpose computer does not transform it into a patentable apparatus; the idea remains a pre-empted mental process. *See Alice*, 134 S. Ct. at 2354 ("We have described the concern that drives this exclusionary principle as one of pre-emption."),

citing *Bilski v. Kappos*, 130 S. Ct. 3218, 3231 (2010) ("upholding the patent 'would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea'").

The Appellant cites various cases demonstrating that patent eligible subject matter can involve the non-conventional, non-generic arrangement of known, conventional components (Appeal Br. 10) and computer technology can be directed to patent eligible subject matter (Appeal Br. 10–11). However, the Appellant has not directed us to evidence substantiating any improvement in terms of structural components or computer technology to provide an improvement in a technological field or to improve the functioning of a computer (i.e., the computing device). For instance, the Appellant cites the advantages disclosed in paragraph 13 of the Specification ("i.e., the claimed invention can reduce issues in traditional FinFET technology, such as 'fin to neighboring deep trench shorts' and 'a passing wordline (PWL) to deep trench capacitor shorts'") to support the argument that the method of claim 1 presents an improvement to a technical field. Appeal Br. 10. These advantages, however, are directed to the structure of the integrated FinFET and deep trench capacitor structure once it has been manufactured or to the method of its manufacture, not to the design process recited in claim 1.

In view of the above, the Appellant's arguments do not identify a reversible error in the Examiner's findings that the elements of claim 1, considered individually and as an ordered combination, do not add significantly more to transform the abstract idea into patent-eligible subject matter. *Synopsis*, 839 F.3d at 1152 ("[G]iven 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.").

For these reasons and those set forth in the Examiner's Answer, the Appellant's arguments do not identify a reversible error in the Examiner's rejection of claim 1.

The Appellant presents separate arguments for independent claim 11 similar to those argued for claim 1. Appeal Br. 11–16. These arguments are unpersuasive for the reasons discussed above and for those explained in the Examiner's Answer.

For dependent claims 2, 4, 8–10, 12–15, 17, and 18, the Appellant cites limitations of the claims; argues the limitations are not well-understood, routine, and conventional activities; and asserts the claimed invention are improvements to a technology or technical field that goes beyond generally linking an abstract idea to a particular technical environment. *Id.* at 16–19. In order to overcome the Examiner's rejection, the Appellant must identify with sufficient particularity what the Examiner did wrong, i.e., identify a reversible error in the examiner's rejection. *In re Jung*, 637 F.3d 1356, 1365–66 (Fed. Cir. 2011); *Ex parte Frye*, 94 USPQ2d 1072 (BPAI 2010). The Appellant's arguments, which are general in nature and lacking in any degree of specificity, do not identify a reversible error. *Cf. In re Lovin*, 652 F.3d 1349, 1356–57 (Fed. Cir. 2011).

As a result, we uphold the Examiner's § 101 rejection of claims 1–4 and 8–18.

V. SUMMARY

The Examiner's decision to reject claims 1–4 and 8–18 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