UNITED STATES PATENT AND TRADEMARK OFFICE

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte BERNDT GAMMEL

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Appeal 2017-008563
Application 13/942,096
Technology Center 2400

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Before ALLEN R. MacDONALD, ROBERT E. NAPPI, and
SHARON FENICK, *Administrative Patent Judges*.

MacDONALD, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Appellant appeals under 35 U.S.C. § 134(a) from a final rejection of claims 1–8, 17, and 19–21. Claims 9–16, 18, and 22–24 have been withdrawn from consideration pursuant to 37 C.F.R. § 1.142(b) as being drawn to a nonelected Species. Final Act. 2. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Representative Claim

Representative claim 1 under appeal reads as follows;

> 1. An apparatus for encrypting an input memory address to obtain an encrypted memory address, comprising:
>
> an input interface configured to receive the input memory address being an address of a memory, and
>
> an encryption module configured to encrypt the input memory address depending on a cryptographic key to obtain the encrypted memory address,
>
> wherein the encryption module is configured to encrypt the input memory address by applying a map mapping the input memory address to the encrypted memory address, wherein the encryption module is configured to apply the map by conducting a multiplication and a modulo operation using the cryptographic key and a divisor of the modulo operation, such that the map is bijective,
>
> wherein the apparatus is implemented using a hardware apparatus or using a computer or using a combination of a hardware apparatus and a computer.

App. Br. 14 (Claims Appendix).

Rejection on Appeal

The Examiner rejected claims 1–8, 17, and 19–21 under
35 U.S.C. § 101 for being directed to patent-ineligible subject matter. *See*
Final Act. 4.[1]

Issue on Appeal

Did the Examiner err in rejecting claim 1 as being directed to patent-ineligible subject matter?

ANALYSIS

We have reviewed the Examiner's rejections in light of Appellant's
arguments that the Examiner has erred. We disagree with Appellant's
contention that the Examiner erred. Instead, we concur with the conclusions
reached by the Examiner. Except as noted below, we adopt as our own the
reasoning set forth by the Examiner in the Final Office Action and
Examiner's Answer.

A. *Section 101 Case Law*

Under 35 U.S.C. § 101, a patent may be obtained "for any new and
useful process, machine, manufacture, or composition of matter, or any new
and useful improvement thereof." The Supreme Court has "long held that
this provision contains an important implicit exception: Laws of nature,

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[1] We select claim 1 as representative. Separate patentability, in compliance
with 37 C.F.R. § 41.37(c)(iv), is not argued for claims 2–8, 17, and 19–21.
See App. Br. 5–11. Except for our ultimate decision, the rejection of claims
2–8, 17, and 19–21 is not discussed further herein.

natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)). The Supreme Court in *Alice* reiterated the two-step framework previously set forth in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012), "for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 134 S. Ct. at 2355. The first step in that analysis is to "determine whether the claims at issue are directed to one of those patent-ineligible concepts," such as an abstract idea. *Id.* The Court acknowledged in *Mayo* that "all inventions at some level embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." *Mayo*, 566 U.S. at 71. Therefore, 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 and otherwise merely recite generic processes and machinery. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1336 (Fed. Cir. 2016). If the claims are not directed to an abstract idea, the inquiry ends. Otherwise, the inquiry proceeds to the second step, in which the elements of the claims are considered "individually and 'as an ordered combination' to determine whether the additional elements '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).

B. *Alice/Mayo – Step 1*

The Examiner determines claim 1 is directed to performing a mathematical operation (i.e., encryption) on received input data. *See* Final Act. 4. Appellant contends claim 1 is not directed to an abstract idea under 35 U.S.C. § 101 because:

> *[The claims] do not merely perform a "mathematical operation".* [The claims] represent significantly more than just a mathematical algorithm, and qualify as "significantly more" than a mere abstract idea[.] [*Claim 1 recites a] memory address [that] points to a physical place on a physical device. This memory address is encrypted and secured by simple read-out access. This encryption secures the location in the physical device . . . from unauthorized access*. An attacker/intruder [does not know the] location/address within the physical device's memory the sought information is stored due to the address being encrypted. Consequently, the attacker cannot simply read out the needed data just by applying electrical control signals because it is unknown to the attacker as to which memory cells comprise the relevant data and the encryption key is not available to the attacker.
>
> . . . .
>
> In interpreting 35 U.S.C. § 101, the courts have been concerned with . . . claims that seek to cover conventional human activity or mathematical algorithms, such as might be performed solely in a person's mind or using pencil and paper. [Claim 1 is] directed to none of these - encrypting memory addresses by mapping the input memory address to the encrypted memory address by conducting multiplication and modulo operations using both a cryptographic key and a divisor *does not involve "mental steps," and cannot be carried out with pencil and paper. The pending claims are thus directed to specific techniques for encrypting input memory addresses. They do not represent abstract mathematical operation on data.*

App. Br. 6–8 (Appellant's emphasis omitted; panel's emphasis added).

The Examiner responds:

> [M]athematical relationships are one of the identified judicial exceptions and **encryption is a well-known mathematical relationship.** Applicant's own claims show that the **encryption is a mathematical relationship by using a mathematical formula** (see, for example, claim 3). The ability to perform the steps to be performed "mentally" or "with pencil and paper" is not a requirement for the judicial exception, however, the encryption steps performed in the claims can be performed this way. Taking, by way of example, the formula from claim 3: $a' = a\ k\ (\mathrm{mod}\ p)$; is merely multiplying two values (a and k) and taking the modular value between this result and another value (p) (note that the modular value is merely the remainder from the division of the two values). The claims put no limitations on the sizes of these values or the number of times these operations are performed. **As such, these mathematical relationships are capable of being performed "mentally" or "with pencil and paper". Therefore, the claims relate to an abstract idea that is a judicial exception.**

Ans. 3–4 (emphasis added).

We are unpersuaded by Appellant's arguments. Contrary to Appellant's assertion, we conclude the character of claim 1 as a whole is directed to a mathematical operation of performing a mapping function on an input memory address to obtain an output memory address. Such claimed subject matter is similar to subject matter found by our reviewing courts to be abstract. *See Gottschalk v. Benson*, 409 U.S. 63, 67 (1972) ("a scientific truth, or the mathematical expression of it, is not [a] patentable invention" (citation omitted)); *see also Parker v. Flook*, 437 U.S. 584, 595 (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" (citation omitted)); *Diamond v. Diehr*, 450 U.S. 175, 191 (1981) ("[a] mathematical formula . . . is not accorded the protection of our

patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment" (citation omitted)); *In re Grams*, 888 F.2d 835, 837 (Fed. Cir. 1989) ("mathematical algorithms join the list of non-patentable subject matter not within the scope of section 101").

Appellant argues claim 1 is not directed to a mathematical operation because claim 1 recites an encryption of a memory address, where the encryption of the memory address secures the memory address from unauthorized access, and thus, changes the nature of a physical device associated with the memory address. *See* App. Br. 7. However, the claim fails to recite the technical details that describe the securing of the memory address from unauthorized access via the encryption of the memory address. Further, the claim fails to recite the usage of the encrypted (and secured) memory address by the physical device. Thus, the claim fails to recite the improvement to the field of encrypted memory device access that Appellant argues the claim is directed to.

In light of the above, the Examiner correctly concluded that claim 1 recites a mathematical operation that is merely limited to the technological environment of memory address encryption, and thus, is directed to an abstract idea.[2] To the extent that Appellant is arguing that claim 1 recites

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[2] We further agree with the Examiner's finding that claim 1, when interpreted under the broadest reasonable interpretation, is capable of being performed "mentally" or "with pencil and paper," although we also agree with the Examiner that this finding is not a prerequisite for a finding that a claim is directed to a judicial exception, such as an abstract idea. *See* Ans. 3–4. More specifically, claim 1 recites "an input memory address," and thus, only requires applying a mathematical operation on a single memory address to encrypt the single memory address. The claim defines

additional elements that amount to "significantly more" than the abstract idea, that issue is distinct from whether claim 1 is directed to a mathematical operation of performing a mapping function on an input memory address to obtain an output memory address. Appellant's arguments that claim 1 is directed to "significantly more" are addressed *infra*.

C. *Alice/Mayo – Step 2*

The Examiner determines claim 1 does not include additional elements that are sufficient to amount to significantly more than an abstract idea because the claim merely recites general purpose hardware. *See* Final Act. 4–5. Appellant contends claim 1 has sufficiently more to transform the claim from an allegedly abstract idea into patent-eligible subject matter because:

> The apparatus of claim 1 *is ... not simply a generic computer structure that serves to perform generic computer functions that are well-understood, routine, and conventional activities previously known to the industry*. To the contrary, the apparatus of claim 1 *is a particular machine with a specific purpose* e.g., controlling access to particular memory cells by obscuring their addresses (i.e., the location/address within memory of the illegitimately sought information) by encryption.

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the "input memory address" as "an address of a memory," but does not define the size of the address. Thus, in at least one embodiment, the "input memory address" can be a single memory address that comprises a single bit value. Further, the claim recites a "cryptographic key" and a "divisor," but also fails to define the sizes of the aforementioned recitations. Thus, in at least one embodiment, the "cryptographic key" and "divisor" can also be single bit values. Therefore, the recited "multiplication" and "modulo operation" can merely be simple mathematical operations performed on the aforementioned single bit values. We agree with the Examiner's conclusion that such mathematical operations, at the very least, could clearly be performed mentally or with pencil and paper.

> The apparatus of claim 1 and the hardware elements associated
> with it represent *meaningful limitations that transforms data
> such that the claim as a whole amounts to "significantly more"
> than the abstract idea itself*. The apparatus of claim 1 thus in
> effect "applies the judicial exception with, or by use of, a
> particular machine".
>
> The apparatus of claim 1 also represents *"improvements
> to another technology of technical field"*. Specifically, claim 1
> provides *improvements to the field of encrypted memory device
> access*, more specifically improvements to the field of memory
> address encryption for securely accessing memory devices. The
> apparatus of claim 1 includes "*a specific limitation other than
> what is well-understood, routine, and conventional in the
> field*".

App. Br. 7 (Appellant's emphasis omitted; panel's emphasis added).

The Examiner responds:

> [T]he independent claims merely relate to reading a memory
> address which every computing device does when reading from
> memory and then applying mathematical operations to this value
> (the dependent claims provide more detail to the mathematics
> applied not to the device itself). *There is no protection, and
> therefore no improvement, of the physical device provided in
> the claims as there are only steps related to obtaining a memory
> address and applying the mathematical operations related to
> encryption to said memory address.*

Ans. 3 (emphasis added).

We do not agree with Appellant's argument. The issue before us is
what is claimed, rather than what is disclosed in Appellant's Specification.
Beyond a general allegation that the improvement (i.e., the protection of the
memory addresses from unauthorized access via the obscuring of the
memory address) is due to the claimed invention, Appellant's argument fails
to specify particular limitations in claim 1 which provide the technical

improvement disclosed in Appellant's Specification and argued by Appellant.

We agree with the Examiner that, besides the recited mathematical operation, claim 1 merely recites: (a) steps related to obtaining a memory address and applying the mathematical operation to the obtained memory address; and (b) well-understood, routine, and conventional elements found in a general purpose computer device (e.g., "hardware apparatus," "computer, "interface," "module," etc.). *See* Ans. 2–3. Such recitations are not sufficient to transform claim 1 from an abstract idea into patent-eligible subject matter. In light of the above, the Examiner correctly concluded that claim 1 does not amount to significantly more than an abstract idea.

D. *Other 101 Arguments*

Appellant further contends the Examiner's rejection of claim 1 under 35 U.S.C. § 101 is inconsistent with examination guidelines issued by the Office. *See* App. Br. 8–11. More specifically, Appellant contends:

> The first of [the] examples [included in the USPTO's published "Abstract Idea Examples" corresponding to the 2014 Interim Guidance on Subject Matter Eligibility] involves hypothetical claims directed to "isolating and removing malicious code from electronic messages". ***Notably, the [USPTO] indicates that these hypothetical claims are not directed to an abstract idea, despite being no less directed to a "mathematical operation" than the presently pending claims***. A second [example] is directed to an actual case, *DDR Holdings, LLC v. Hotels.com.* The claims in *DDR Holdings* were directed to the automatic generation and transmitting of web pages in response to activation of a link using data identified with a source web page having certain visually perceptible elements. ***These claims were held by the [Federal Circuit] to be directed to eligible subject matter, despite their involving "data manipulation." As the***

court noted, the claims at issue did not recite a mathematical algorithm[.] The same is true of the pending claims — they clearly do not recite a mathematical algorithm[.]

. . . [The USPTO's May 2016 Update: Memorandum --- Recent Subject Matter Eligibility Decisions (*Enfish, LLC v. Microsoft Corp.* and *TLI Communications LLC v. A.V Automotive, LLC*)] notes that the [Federal Circuit] recently held [in *Enfish*] that "claimed database software designed as a 'self-referential' table is patent eligible under 35 U S.C. § 101 because it is not directed to an abstract idea." The memorandum further notes that . . . *claims directed to improvements in computer-related technology, "including claims directed to software, are not necessarily abstract."* . . .

A review of the pending independent claims . . . indicates that each claim is directed to *specific improvements in computer-related technology*. More specifically, the claims are directed to *[an improved] apparatus that, among other things, [encrypts] memory addresses by mapping the input memory address to the encrypted memory address by conducting multiplication and modulo operations using both a cryptographic key and a divisor. Thus, the present claims are directed to improvements in computer-related technology.*

App. Br. 8–10 (Appellant's emphasis omitted; panel's emphasis added).

The Examiner responds:

[N]one of [the] decisions or memorandums cited by Appellant *relate to the Abstract Idea of Mathematical Relationships.* The claims in these decisions are shown to be more than an Abstract Idea, however, *these claims are drastically different and therefore do not relate to the present claims.* Furthermore, cited portions [of] the memorandums related to "describing a claim at a high level of abstraction" are not applicable . . . [because] the Examiner has directly tied the specific claim language to the identified Abstract Idea and [the] "additional elements."

Ans. 4 (emphasis added).

We are not persuaded by Appellant's argument. Regarding the hypothetical claims in the USPTO's published "Abstract Idea Examples" corresponding to the 2014 Interim Guidance on Subject Matter Eligibility, we agree with the Examiner that the hypothetical claims are drastically different from claim 1, and we disagree with Appellant's characterization of the hypothetical claims as being directed to a "mathematical operation." *See* Ans. 4; *see also* App. Br. 9. Instead, the hypothetical claims are directed to physically isolating a received communication on a memory sector and extracting malicious code from the communication to create a sanitized communication in a new data file. Furthermore, the hypothetical claims recite the technical details as to how the processor physically isolates the received communication, extracts the malicious code, and creates the sanitized communication in a new data file. As previously described, such technical details are not present in claim 1.

Regarding Appellant's argument that claim 1 is similar to the claims in *DDR Holdings, LLC v. Hotels.com*, 773 F.3d 1245, 1257 (Fed. Cir. 2014), this argument is also not persuasive. Appellant states that, in *DDR*, the court stated that the claims at issue did not recite a mathematical algorithm, and merely alleges that the same is true of claim 1 (i.e., that claim 1 clearly does not recite a mathematical algorithm). *See* App. Br. 9. However, Appellant provides no persuasive analysis as to why claim 1 is similar to the claims at issue in *DDR*. In *DDR*, the court determined that the claims at issue were necessarily rooted in computer technology in order to address the Internet-centric problem of how to provide user access to computer-implemented applications over the Internet. *DDR*, 773 F.3d at 1257. In contrast, the mapping of an input memory address to an output memory address via a

mathematical operation (i.e., multiplication and modulo operation), as recited in claim 1, is not necessary rooted in computer technology, as the claim fails to link either the input memory address or output memory address to any functionality performed by the claimed computer or hardware apparatus.

Further, Appellant's argument that claim 1 is similar to the claims in *Enfish*, 822 F.3d at 1335, is also not persuasive. In *Enfish*, the court determined that the claims at issue were directed to a specific improvement in computer functionality embodied in a self-referential table for a computer database as recited in the claims. *Enfish*, 822 F.3d at 1336–38. Unlike the claims in *Enfish*, claim 1 fails to recite the technical details that describe the argued improvement of securing of the memory address from unauthorized access via the encryption of the memory address, as previously described.

In light of the above, we sustain the rejection of claims 1–8, 17, and 19–21 under 35 U.S.C. § 101.

E. *Other Issues*

Appellant also argued the Examiner's finding that claims 1–8 and 17 invoke 35 U.S.C. § 112(f) is erroneous. *See* App. Br. 11–13. Regarding these claims, the Examiner found these claims invoked 35 U.S.C. § 112(f) due to the recitation of the limitations "interface configured to," "unit configured to," and "module configured to," because the aforementioned limitations used generic placeholders (i.e., "interface," "unit," and "module") coupled with functional language "configured to" without reciting sufficient structure to achieve the function. *See* Final Act. 3; *see also* Ans. 5. We agree with the Examiner that claims 1–8 and 17 invoke

35 U.S.C. § 112(f) for the reasons provided by the Examiner. Although we are not required to reach this issue (as the Examiner did not issue a rejection based on the finding that claims 1–8 and 17 invoke 35 U.S.C. § 112(f) (*see* Final Act. 3; *see also* Ans. 5)), we do so as an exercise of our discretion.

CONCLUSIONS

(1) The Examiner has not erred in rejecting claims 1–8, 17, and 19–21 under 35 U.S.C. § 101.

(2) Claims 1–8, 17, and 19–21 are not patentable.

DECISION

We affirm the Examiner's rejections of claims 1–8, 17, and 19–21 under 35 U.S.C. § 101.

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