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EXAMINER
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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 ANDREW ROBERT LEHANE and ANTONY J. A. KIRKHAM

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Appeal 2017-011728
Application 14/578,198
Technology Center 2800

_____

Before LINDA M. GAUDETTE, JENNIFER R. GUPTA, and
JANE E. INGLESE, *Administrative Patent Judges*.

INGLESE, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant[1] requests our review under 35 U.S.C. § 134(a) of the
Examiner's decision to finally reject claims 1–20. We have jurisdiction over
this appeal under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE CASE

Independent claims 1 and 12 illustrate the subject matter on appeal
and are reproduced below:

    1.   An apparatus comprising:
        a symbol generator that receives an ordered sequence of
signal values and converts said ordered sequence of signal

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[1] Appellant is the applicant, Keysight Technologies, Inc., which, according
to the Appeal Brief, is the real party in interest. Appeal Brief filed May 16,
2017 ("App. Br."), 1.

values into an ordered sequence of symbols, each symbol
having a plurality of states; and

  a finite state machine (FSM) that receives said ordered
sequence of symbols and generates a match signal if said
ordered sequence of symbols includes a target sequence
specified by a regular expression that includes a counting
limitation for one of said symbols, wherein

  said FSM includes a counting state including a counter
that counts instances of said one of said symbol.

12. A method for operating a data processing system to
detect a signal pattern in a signal comprising an ordered
sequence of signal values, said method comprising:

  converting said ordered sequence of signal values and
converts said ordered sequence of signal values into an ordered
sequence of symbols,[2] each symbol having a plurality of
states; and

  implementing an FSM in said data processing system,
said FSM receiving said ordered sequence of symbols and
generating a match signal if said ordered sequence of symbols
includes a target sequence specified by a regular expression that
includes a counting limitation for one of said symbols, wherein

  said FSM includes a counting state including a counter
that counts instances of said one of said symbol.

App. Br. 9, 11 (Claims Appendix).

  The Examiner sets forth the rejection of claims 1–20 under 35 U.S.C.
§ 101 in the Final Office Action entered September 15, 2016 ("Final Act."),
and maintains the rejection in the Examiner's Answer entered July 21, 2017
("Ans.").

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[2] We note claim 12 appears to include a redundant recitation: "converting
said ordered sequence of signal values and converts said ordered sequence of
signal values."

DISCUSSION

Upon consideration of the evidence relied upon in this appeal and each of Appellant's contentions, we affirm the Examiner's rejection of claims 1–20 under 35 U.S.C. § 101 for the reasons set forth in the Final Office Action, the Answer, and below.

For purposes of this appeal, to the extent that Appellant presents arguments directed to specific claims, we address those claims separately consistent with 37 C.F.R. § 41.37(c)(1)(iv).

In *Alice Corp. v. CLS Bank International*, 134 S. Ct. 2347 (2014), the Court identified a two-step framework for determining whether claimed subject matter is judicially excepted from patent eligibility under § 101. In the first step, "[w]e must . . . determine whether the claims at issue are directed to a patent-ineligible concept," such as an abstract idea. *Alice*, 134 S. Ct. at 2355. The second step involves "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,'" and is more than "well-understood, routine, conventional activit[y]." *Alice*, 134 S. Ct. at 2355, 2359 (first alteration in original) (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72–73 (2012)).

The Examiner applies *Alice*'s two-step framework in rejecting the claims under 35 U.S.C. § 101. Final Act. 5–6. In the first step, the Examiner determines that the claims are directed to a finite state machine that receives a sequence of inputs and generates an output according to a comparison of the input with a condition (target sequence) based on

mathematical equations or logical relations (a regular expression that includes a counting of input symbols). Final Act. 6; Ans. 7–8. The Examiner finds that a finite state machine is an ideal mathematical computation model used to design computer programs and sequential logic circuits, and is conceived as an abstract machine that can be in one of a finite number of states. Final Act. 6; Ans. 6–7. The Examiner determines that the claims are therefore directed to an algorithm that implements a finite state machine—a mathematical computation model—which is similar to other concepts identified by the Federal Circuit as abstract, such as collecting information, analyzing it, and displaying certain results of the collection and analysis. Final Act. 6; Ans. 8 (citing *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)).

For the second step of the *Alice* framework, the Examiner determines that the additional elements recited in the claims do not amount to significantly more than the judicial exception (the abstract idea). Final Act. 6. Specifically, the Examiner determines that the recited symbol generator constitutes a generic processing element that processes input data, such as a keyboard input device that generates symbols (alpha numeric characters). *Id.* The Examiner determines that the signal digitizer recited in claims 8, 9, 19, and 20 is a conventional device available in the art, such as an analog-to-digital converter. *Id.* The Examiner concludes that the claims are therefore directed to non-statutory subject matter. *Id.*

Claim 1

Appellant argues that paragraph 23 of the Specification provides a definition of a "finite state machine" that "overrides the normal

interpretation" of this phrase adopted by the Examiner. App. Br. 5. Appellant argues that the Examiner's assertion that the definition of "finite state machine" provided in the Specification is the "ordinary and customary definition" of this phrase ignores the word "machine." *Id.*

We give claim terms the broadest reasonable interpretation consistent with the Specification as it would be interpreted by one of ordinary skill in the art. *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed. Cir. 2007) (During prosecution of patent applications, "the PTO must give claims their broadest reasonable construction consistent with the specification. . . . Therefore, we look to the specification to see if it provides a definition for claim terms, but otherwise apply a broad interpretation."). Under the broadest reasonable interpretation, the words of a claim must be given their plain meaning, unless the plain meaning is inconsistent with the Specification. *In re Zletz*, 893 F.2d 319, 321 (Fed. Cir. 1989).

Paragraph 23 of Appellant's Specification as originally filed indicates that "[a]n FSM [finite state machine] is a machine that has a plurality of states connected by 'directed edges.'" Spec. ¶ 23. The Specification indicates that "[a]t each processing cycle, the FSM moves from its current state to a next state when a new input word is received by the FSM." *Id.* The Specification explains that when the FSM receives an input word having a value equal to the value corresponding to an edge, and the FSM is in the state associated with the input side of the edge, the FSM changes to the state associated with the output side of the edge and then proceeds to process the next input word. *Id.* The Specification further explains that certain

transitions give rise to the FSM reporting a match that includes information associated with the transition. *Id.*

This description of a finite state machine provided in Appellant's Specification corresponds to the description of "Finite State Machines" set forth in evidence provided by the Examiner to establish the plain and ordinary meaning of this phrase. Final Act. 2–3 (citing *Automata Theory*, https://cs.stanford.edu/people/eroberts/courses/soco/projects/2004-05/automata-theory/basics.html). Specifically, the evidence provided by the Examiner indicates that finite state machines are abstract machines consisting of a set of states (a plurality of states), a set of input events (input words), a set out output events (reporting a match), and a state transition function (changing from the state associated with the input side of the edge to the state associated with the output side of the edge). *Id.* The Examiner's evidence further explains that finite state machines are ideal computation models, or mathematical models of a machine, which can be used in mathematical problem analysis and recognition of regular languages. *Id.*

Therefore, contrary to Appellant's arguments, the Examiner does not ignore the word "machine" in the phrase "finite state machine," but instead provides evidence indicating that a "finite state machine" is not an actual machine, but rather is a mathematical model of a machine. In addition, the description of a "finite state machine" provided in Appellant's Specification corresponds to the plain and ordinary meaning of this phrase, contrary to Appellant's arguments.

Claim 1 recites a finite state machine that receives an ordered sequence of symbols and includes a counting state having a counter that

counts instances of a particular symbol. Claim 1 recites that the finite state machine generates a match signal if the ordered sequence of symbols includes a target sequence specified by a regular expression that includes a counting limitation for the counted symbol. Claim 1 is therefore directed to the abstract idea of an algorithm for manipulating or analyzing data or information (an ordered sequence of symbols) to generate additional data or information (a match signal indicative of a target sequence that meets a counting limitation). *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) (explaining that abstract ideas include collecting information and analyzing that information "by steps people go through in their minds, or by mathematical algorithms"); *Synopsys, 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, 1340–41 (Fed. Cir. 2017) (organizing, displaying, and manipulating data is an abstract idea).

Appellant does not dispute the Examiner's finding that the symbol generator recited in claim 1, which receives an ordered sequence of signal values and converts the ordered sequence of signal values into an ordered

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sequence of symbols in which each symbol has a plurality of states, constitutes a generic processing element. *Compare* Final Act. 6, *with* App. Br. 3–7. Accordingly, claim 1 is directed to converting gathered data into a different form of data using a generic processing element, and analyzing the converted data to generate new data or information—corresponding to a mathematical algorithm. The features of claim 1, considered individually and as an ordered combination, therefore, do not constitute an inventive concept that transforms the abstract idea into a patent-eligible application of the abstract idea. *See, e.g.*, *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715–16 (Fed. Cir. 2014) (holding the claims insufficient to supply an inventive concept because they did not "do significantly more than simply describe [the] abstract method," but rather are simply "conventional steps, specified at a high level of generality" (quoting *Alice*, 134 S. Ct. at 2357)); *In re Bilski*, 545 F.3d 943, 963 (Fed. Cir. 2008) (en banc) (characterizing data gathering steps as insignificant extra-solution activity).

We accordingly sustain the Examiner's rejection of claim 1 under 35 U.S.C. § 101.

Claim 12

Appellant argues that the "claims relate to a data processing system executing a software system that implements the recited FSM together with a symbol generator that receives an ordered sequence of signal values and converts that ordered sequence into an ordered sequence of symbols." App. Br. 6. Appellant contends that the "invention improves the ability of a data processing system to provide real-time triggering to an apparatus that views an incoming signal based on patterns in the incoming signals," which "is

clearly an improvement in a technological field" that falls under *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016). *Id.*

The inquiry under *Enfish* is whether claim 12 is directed to a method that improves the relevant computing technology, or is instead directed to a process that is itself an abstract idea, and merely invokes generic processes and machinery. *Enfish*, 822 F.3d at 1335–36 (The first step of *Alice* considers whether the "focus of the claims is on the specific asserted improvement in computer capabilities . . . or, instead, on a process that qualifies as an 'abstract idea' for which computers are invoked merely as a tool."). The data processing system recited in claim 12 is used as a tool to implement the finite state machine, as explained in Appellant's Specification. Specifically, the Specification indicates that the

> FSM of the present invention is preferably implemented in special purpose hardware to provide the speed needed to implement a real-time trigger for a high speed oscilloscope or similar instrument. However, embodiments could be implemented on general purpose data processing systems if the speed of the incoming data stream was sufficiently low.

Spec. ¶ 63.

Thus, the data processing system recited in claim 12 acts as a tool to implement the finite state machine and carry out the recited algorithm. Contrary to Appellant's arguments, unlike the situation in *Enfish* where the claims were directed to a specific improvement to computer functionality, claim 12 recites "a process that qualifies as an 'abstract idea' for which computers are invoked merely as a tool." *Enfish*, 822 F.3d at 1336.

Although Appellant asserts that the method of claim 12 improves the ability of a data processing system to provide real-time triggering to an

apparatus that views an incoming signal based on patterns in the incoming signals, Appellant does not direct us to any factual evidence supporting this assertion, such as evidence of record comparing Appellant's method to existing technology. App. Br. 5–6. Unsupported attorney arguments cannot take the place of evidence necessary to resolve a disputed question of fact. *Schulze*, 346 F.2d 600, 602 (CCPA 1965) ("Argument in the brief does not take the place of evidence in the record.").

Although Appellant further argues that the "specification clearly recites the benefits of the claimed invention in providing a trigger system for use in digital oscilloscopes," and the invention is therefore eligible for patenting under *Enfish*, Appellant does not direct us to any particular disclosure in the Specification supporting this assertion. App. Br. 6. Nonetheless, although the Specification may describe benefits of Appellant's claimed invention, we find no disclosure in the Specification indicating that Appellant's invention is directed to an improvement in computer capabilities and functionality relative to the prior art (unlike the situation in *Enfish*), and Appellant does not direct us to any such disclosure. *Id.*

We accordingly sustain the Examiner's rejection of claim 12 under 35 U.S.C. § 101.

Claims 2–11 and 13–20

Appellant contends that the Examiner does not meet the "burden of providing fact-based arguments with respect to the limitation of each claim as to why the additional limitations do not rescue a rejected independent claim" because claims 2, 6, 8, 9, and 10 "each recite additional hardware" and "the other dependent claims recite limitations on the FSM itself which

go beyond the Examiner's definition." App. Br. 7. Appellant's assertions, however, do not meet the requirements for separate consideration under 37 C.F.R. § 41.37(c)(1)(iv). *Cf. In re Baxter Travenol Labs.*, 952 F.2d 388, 391 (Fed. Cir. 1991) ("It is not the function of this court to examine the claims in greater detail than argued by an appellant.").

We accordingly sustain the Examiner's rejection of claims 2–11 and 13–20 under 35 U.S.C. § 101.

DECISION

We affirm the Examiner's rejection of claims 1–20 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