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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte NEIL E. BARTLETT, ROBERT J. BLAINEY,
BARNABY P. DALTON, DHARMENDRA P. GUPTA,
MOHAMMAD FAHHAM A. KHAN, NHO SINH LOUIS LY,
JAMES A. SEDGWICK, LIOR VELICHOVER,
and KAI-TING A. WANG¹

Appeal 2018-000879
Application 14/519,473
Technology Center 2100

Before ROBERT E. NAPPI, ERIC S. FRAHM, and JAMES M. REPKO,
Administrative Patent Judges.

NAPPI, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's Final Rejection of claims 10, 11, 13, 15–17, 19, and 21–25. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ According to Appellants, International Business Machines Corporation is the real party in interest. App. Br. 2.

Invention

The invention is directed to a program executed by a computer, for conducting a non-recursive cascading reduction. Spec. ¶¶ 42–45. The program receives an array of values from a data source on which to iteratively perform a series of steps for each index in the array. *Id.* ¶¶ 17–18, 22. The steps include determining the index as a current index and retrieving a value from the array of values. *Id.* ¶ 18. The program then includes determining a reduction depth for the current index based on a number of trailing ones in a binary representation of the current index for elements on a stack to be accumulated. *Id.* ¶¶ 26–27. The program then iteratively conducts a reduction operation on the current value and one or more values on the stack according to the reduction depth. *Id.* ¶¶ 28–30. Claim 10 is illustrative of the invention and are reproduced below.

10. A computer program product for conducting non-recursive cascading reduction, the computer program product comprising:

at least one non-transitory computer readable storage medium and program instructions stored on the at least one non-transitory computer readable storage medium, the program instructions comprising instructions to:

- receive an array of values from a data source;
- iteratively perform the following for each index in the array:
 - determine the index as a current index;
 - retrieve a value from the array of values, the retrieved value located in the array of values at the current index;
 - determine a reduction depth for the current index based on a number of trailing ones in a binary representation of the current index;

push the retrieved value onto a stack; and
conduct reduction operations on the stack
until a number reductions equal to the determined
reduction depth have been performed or the stack
is empty, each reduction operation comprising:

 popping at least one value from the
 stack; and

 performing an operation using the at
 least one value.

Independent claim 16 recites similar limitations as claim 10.

Examiner's Rejection

The Examiner has rejected claims 10, 11, 13, 15–17, 19, and 21–25 under 35 U.S.C. § 101 for being directed to patent-ineligible subject matter. Final Act. 3–4; Adv. Act. 2; Ans. 2–4^{2, 3}.

Principles of Law

Patent-eligible subject matter is defined in 35 U.S.C. § 101 of the Patent Act, which recites:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

² Throughout this Decision we refer to the Appeal Brief (“App. Br.”) filed May 22, 2017, Final Office Action (“Final Act.”) mailed Dec. 20, 2016, Advisory Act (“Adv. Act.”) mailed on Mar. 6, 2017, and the Examiner’s Answer (“Ans.”) mailed Sept. 6, 2017.

³ Examiner withdrew the rejection of claims 10, 11, 13, 15–17, 19, and 20 under 35 U.S.C. § 112(a), and the rejection of claims 10–21 under 35 U.S.C. § 112(b). Adv. Act. 1; Ans. 4. The Examiner withdrew the nonstatutory double patenting rejection of claims 10–21. Ans. 5.

There are, however, three judicially created exceptions to the broad categories of patent-eligible subject matter in 35 U.S.C. § 101: laws of nature, natural phenomena, and abstract ideas. *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2354 (2014); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 70 (2012). Although an abstract idea itself is patent ineligible, an application of the abstract idea may be patent eligible. *Id.* at 2355. Thus, we must 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.* (citing *Mayo*, 566 U.S. at 78–80). The claim must contain elements or a combination of elements that are “sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [abstract idea] itself.” *Id.* (citing *Mayo*, 566 U.S. at 72–73).

The Supreme Court sets forth a two-part “framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Id.* at 2355. First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts. *Mayo*, 566 U.S. at 76–77. If so, we then ask, “[w]hat else is there in the claims before us?” *Id.* at 77–78. To answer that question, we 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.* at 78–79. The court has described step two of this 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.* at 71–73.

Analysis

We have reviewed the Appellants’ arguments in the Briefs (App. Br. 4–13; Reply Br. 2–4), the Examiner’s rejections (Final Act. 3–4, 7), the Advisory Action (Adv. Act. 2), and the Examiner’s response to Appellants’ arguments (Ans. 5–7). Appellants’ arguments have not persuaded us of error in the Examiner’s conclusion that the claims are directed to patent-ineligible subject matter.

Appellants argue on pages 4 through 7 of the Appeal Brief and pages 2 through 4 of the Reply Brief that the precepts of *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014) demonstrate that independent claim 10 is directed to patent-eligible subject matter. Specifically, Appellants argue that the claim 10 which recites reducing operations by pushing and popping values from a stack is directed to a claimed solution that is rooted in computer technology to overcome a problem that specifically arises in computer technology alone. App. Br. 4–5. Appellants argue:

the Federal Circuit found that when “the claimed solution is necessarily rooted in computer technology in order to overcome a problem specifically arising in the realm of computer networks” the claims may not be directed to an abstract idea under 35 U.S.C. §101. *Id.* at 1257. In particular, the Federal Circuit found that “these claims stand apart because they do not merely recite the performance of some business practice known from the pre-Internet world along with the requirement to perform it on the Internet.” *Id.* at 1257. “In short, the claimed solution amounts to an inventive concept for resolving this particular Internet-centric problem, rendering the claims patent-eligible.” *Id.* at 1259.

App. Br. 4. Appellants assert that similar to *DDR*, appealed claim 10 focuses on a solution to overcome technical problems that are solely rooted in computer technology by controlling the timing and manner in which a computer performs reduction operations. *Id.* at 7; Reply Br. 3. Further, Appellants argue that the Specification describes how the program product for conducting non-recursive cascading reduction recited in claim 10 overcomes technical problems associated with current reduction practices on computers to make the computers run more efficiently. App. Br. 4–5.

In response to Appellants’ arguments, Examiner finds that claim 10 merely recites operations to solve a mathematical problem using a generic computer performing generic computer functions. Ans. 5. In addition, Examiner concludes that:

the stack is analogous to a reentrant shift register in *Gottschalk v. Benson*, pushing data onto and popping data out the stack are analogous to right and left shifting the data in the reentrant shift register by a defined number of places or until a condition met in *Gottschalk v. Benson*, and conducting reduction operations is analogous to masking binary 1 and adding binary 1s in certain positions of the shift register in *Gottschalk v. Benson*. Therefore, the claimed invention is clearly directed to an abstract idea of solving a mathematical problem similar to *Gottschalk v. Benson* rather than to an improvement of another computer related technology or technical field or the functioning of a computer itself.

Id. at 5–6.

We agree with the Examiner’s determination that the reduction operations recited in claim 10 are equivalent to an algorithm for converting binary-coded decimal to pure binary as recited in *Gottschalk*. Ans. 6. The Supreme Court in *Gottshalk* held that “[t]he mathematical formula involved

here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.” *Id.* at 72

In addition, Appellants state that the Examiner fails to take into account the fundamental differences between *Gottshalk* and “the accumulation of large collections of floating point numbers on a computer as disclosed in the present application.” Reply Br. 4. These arguments have not persuaded us that *Gottshalk*, as applied by the Examiner, does not control in the instant case. Claim 10 is directed to the addition of numerical values, and as such is reciting an abstract mathematical algorithm, putting it in the same category as the claims the Supreme Court considered in *Gottshalk* which was also found to be solely to a mathematical algorithm, and as in *Gottshalk*, the claim would be a patent on the algorithm itself.

The “conduct reduction operations” limitation as recited in claim 10 merely recites performing an operation, and does not add significantly more to the claim recited as a whole. Examining claim 10 in light of the precepts of the courts analysis in *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016), we find the claims to be broadly preemptive. The court in *McRO* held that claims directed to “limited rules in a process specifically designed to achieve an improved technological result in conventional industry practice” are not directed to an abstract idea and therefore, a preemption concern did not arise, the conventional industry practice being animation. *McRO*, 837 F.3d at 1315–16. However, that is not the case with the reduction operations recited in claim 10, which involve mathematical operations, which are just reciting steps to perform floating

point summation. The claim as currently recited does not disclose an improvement to the computer technology on which it is performed only an improvement to how numbers are being added on a generic computing system. This is similar to *Alice*, in which it was previously found that the recitation of the computer in the claim amounted to mere instructions to apply the abstract idea on a generic computer. 134 S. Ct. at 2359–60. Here the claim recites instructions which control how values are added and interact with the stack, which the Examiner has found, this involves the use of generic computer structure. Final Act. 7, Answer 3. In addition, Appellants’ arguments that the case at hand is in line with *Enfish*, because it provides a technological improvement namely, the reduction of overhead and increased accuracy. App. Br. 7–9. We disagree. In *Enfish*, the Federal Circuit noted that if the claimed invention results in an improvement to computer-related technology, the claims may not be abstract concept. *Enfish LLC v. Microsoft Corporation*, 822 F.3d 1327, 1335 (Fed. Cir. 2016). However, as recited above, the claims are not geared towards a technological improvement, but solely an improvement in the mathematical realm of how numbers can be added more efficiently.

Accordingly, we sustain the Examiner’s rejection of independent claim 10 and dependent claims 11, 13, 15, 24, and 25, grouped with claim 10, as being directed to patent-ineligible subject matter.

Appellants argue that independent claim 16, includes similar limitations to that discussed with respect to claim 10 and as such the rejection is not in error for the same reasons. App. Br. 4–12; Reply Br. 2–4. We concur and similarly sustain the Examiner’s rejection of independent

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claim 16 and dependent claims 17, 19, and 21–23 as being directed to patent-ineligible subject matter.

DECISION

We affirm the Examiner’s rejections of claims 10, 11, 13, 15–17, 19, and 21–25 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