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BUCHANAN, INGERSOLL & ROONEY PC
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANDREW J. KALOTAY

Appeal 2018-001020
Application 13/398,655
Technology Center 3600

Before CARL L. SILVERMAN, ALEX S. YAP, and JASON M. REPKO, *Administrative Patent Judges*.

REPKO, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant[1] appeals under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1–20. Br., cover page.[2] We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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[1] According to Appellant, the real party in interest is Andrew Kalotay Associates Inc. Br. 1.

[2] Throughout this opinion, we refer to the Final Rejection ("Final Act."), mailed June 3, 2016; the Appeal Brief ("Br."), filed August 24, 2016; and the Examiner's Answer ("Ans."), mailed November 30, 2016.

THE INVENTION

Appellant's invention calculates the borrowing cost of municipal debt. Spec. ¶ 11. Municipal-debt securities can be issued as a series of individual bonds. *Id.* ¶ 2. These bonds may have different maturity dates and coupons. *Id.* Current practice represents the cost of borrowing with the True Interest Cost (TIC). *Id.* ¶ 4. TIC is a single discount rate that equates the portfolio-based debt service of the proposed issue to the proceeds received by the municipality. *Id.* But TIC does not take options into account. *Id.* ¶ 10.

To solve this problem, the invention calculates the option-adjusted TIC (OATIC) by adding the option value V to the proceeds P and finds the single discount rate that equates the present value of the debt service to P+V. *Id.* ¶ 11. The option value V can be calculated using industry-standard methods. *Id.* ¶ 12.

Claim 1 is reproduced below:

> 1. A method of calculating the borrowing cost of municipal debt, comprising:
>
> receiving, by a valuation module of a processor of a computing device, terms, yield curve and interest rate volatility data for a plurality of municipal debt offerings;
>
> specifying, by the valuation module of the processor of the computing device, an evolution of interest rates for each of the plurality of municipal debt offerings;
>
> calculating, by the valuation module of the processor of the computing device, an option value V for each of the plurality of municipal debt offerings;
>
> determining, by the valuation module of the processor of the computing device, proceeds P for each of the plurality of municipal debt offerings; and

calculating, by a calculation module of the processor of the computing device, an Option-Adjusted True Interest Cost (OATIC) for each of the plurality of municipal debt offerings by:

adding the respective option value V to the respective proceeds P; and

finding a single discount rate that equates a present value of respective debt service for the plurality of municipal debt offerings to P+V.

THE EVIDENCE

The Examiner relies on the following as evidence:

Chen	US 2003/0023525 A1	Jan. 30, 2003
Butcher, III	US 7,373,328 B1	May 13, 2008

W.M. Boyce & A.J. Kalotay, Optimum Bond Calling and Refunding, INTERFACES, pp. 36–49 (Nov. 1979) ("Boyce");

The Municipal Finance Opportunity Cost (2004) ("Municipal");

WM Financial Strategies, Bond Pricing – The Problem With Premium Pricing, http://www.munibondadvisor.com/PremiumPricing.htm (Mar. 23, 2007) ("WM");

Andrew J. Kalotay & Qi Fu, A Financial Analysis of Consumer Mortgage Decisions (June 2009) ("Kalotay").

THE REJECTIONS

Claims 1–20 stand rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. Final Act. 16–19.

Claims 1, 9, 16, and 17 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Applicant-Admitted Prior Art (AAPA), Chen, and WM.[3] Final Act. 19–31.

Claims 2, 10, and 18 stand rejected under 35 U.S.C. § 103(a) as unpatentable over AAPA, Chen, WM, and Municipal. Final Act. 31–35.

Claims 3 and 19 stand rejected under 35 U.S.C. § 103(a) as unpatentable over AAPA, Chen, WM, and Butcher. Final Act. 35–36.

Claims 4, 11, and 20 stand rejected under 35 U.S.C. § 103(a) as unpatentable over AAPA, Chen, WM, and Boyce. Final Act. 36–37.

Claims 5–8 and 12–15 stand rejected under 35 U.S.C. § 103(a) as unpatentable over AAPA, Chen, WM, Boyce, and Kalotay. Final Act. 37–40.

THE REJECTION UNDER 35 U.S.C. § 101

Principles of Law

An invention is patent-eligible if it claims a "new and useful process, machine, manufacture, or composition of matter." 35 U.S.C. § 101. However, the Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: "[l]aws of nature, natural phenomena, and abstract ideas" are not patentable. *E.g.*, *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Supreme Court's two-step framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus*

[3] The Examiner takes Official Notice of certain features in the rejections of claims 8, 11, 15–18, and 20. Final Act. 27–31, 35–40.

Labs., Inc., 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is "directed to." *See Alice*, 573 U.S. at 219 ("On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement risk."); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) ("Claims 1 and 4 in petitioners' application explain the basic concept of hedging, or protecting against risk.").

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 69 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as "molding rubber products" (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); "tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores" (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1854))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Supreme Court held that "[a] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula." *Diehr*, 450 U.S. at 176; *see also id.* at 191 ("We view respondents' claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula."). Having said that, the Supreme Court also indicated that a claim "seeking patent protection for that formula in the abstract . . . 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." *Id.* (citing *Benson* and *Flook*); *see, e.g.*, *id.* at 187 ("It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.").

If the claim is "directed to" an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where "we must examine the elements of the claim to determine whether it contains an 'inventive concept' sufficient to 'transform' the claimed abstract idea into a patent-eligible application." *Alice*, 573 U.S. at 221. "A claim that recites an abstract idea must include 'additional features' to ensure 'that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].'" *Id.* (quoting *Mayo*, 566 U.S. at 77). "[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention." *Id.*

The PTO recently published revised guidance on the application of § 101. USPTO's January 7, 2019 Memorandum, *2019 Revised Patent Subject Matter Eligibility Guidance* ("Memorandum"). Under that guidance, we first look to whether the claim recites:

> (1) any judicial exceptions, including certain groupings of abstract ideas (i.e., mathematical concepts, certain methods of organizing human activities such as a fundamental economic practice, or mental processes); and
>
> (2) additional elements that integrate the judicial exception into a practical application (*see* MPEP § 2106.05(a)–(c), (e)–(h)).

Only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim:

> (3) adds a specific limitation beyond the judicial exception that is not "well-understood, routine, conventional" in the field (*see* MPEP § 2106.05(d)); or
>
> (4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception.

See Memorandum.

The Judicial Exception

The Examiner determines that representative[4] claim 1 is directed to an abstract idea of calculating the borrowing cost of municipal debt, which is a fundamental economic principle and a mathematical concept. Final Act. 10, 16. We agree.

Claim 1 recites a method that receives terms, a yield curve, and interest-rate volatility data for municipal debt offerings. The recited method also specifies the evolution of the interest rates. For each municipal debt offering, the method obtains two values, then adds those values together. The first value is an option value ("V"). The second value is the proceeds ("P"). According to the Specification, the invention overcomes problems of conventional calculations because it includes the option's value in the calculation of the borrowing cost. Spec. ¶ 11.

[4] Appellant argues claims 1–20 as a group. *See* Br. 7–17. We select independent claim 1 as representative of claims 1–20. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Calculating borrowing cost is at least a fundamental economic principle or practice. In this way, the claim is similar to other concepts held to be abstract ideas. *See Alice*, 573 U.S. at 219–20 (intermediated settlement); *Bilski*, 561 U.S. at 611 (hedging). Apart from the limitations to the valuation module, all other recited features are included in this abstract idea because they merely support the calculation by gathering the information. *See* Ans. 3–4; Final Act. 10 (discussing the fundamental economic principle).

Also, the claim expressly recites the mathematical calculation for OATIC. In this way, the OATIC calculation is a recited abstract idea. Final Act. 10 (discussing mathematical formulas). Such mathematical calculations have been determined to be abstract ideas. *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1163 (Fed. Cir. 2018) (holding that claims to a "series of mathematical calculations" are directed to an abstract idea).

Contrary to Appellant's argument (Br. 6–9), we see no error in the Examiner's characterization of the recited steps as "calculating the borrowing cost of municipal debt." Each recited function either involves gathering data for this calculation (i.e., receiving and specifying) or calculating the cost itself (i.e., calculating option value V, proceeds P, and the corresponding OATIC).

Thus, claim 1 recites an abstract idea.

Integration into a Practical Application

The recited abstract idea is not integrated into a practical application. Indeed, claim 1 recites features in addition to the abstract idea of calculating the borrowing cost of municipal debt. Namely, claim 1 recites a "valuation module of a processor of a computing device" and a "calculation module of

the processor of the computing device." As we discuss below, these additional elements do not integrate the judicial exception into a practical application. *See* Memorandum 20–22 (citing MPEP § 2106.05(a)–(c), (e)–(h)).

Claim 1 does not purport to improve the functioning of the computer itself or any other technology or technical field. *See Alice*, 573 U.S. at 210, *cited in* MPEP § 2106.05(a). For example, Appellant has not shown that the recited modules improve a computer's operating efficiency. Rather, claim 1 purportedly improves the borrowing-cost calculations for debt instruments with an option. *See, e.g.*, Br. 8; Spec. ¶¶ 10–11. Claim 1 only uses a computer as a tool for calculating.

For instance, Appellant argues that claim 1 offers "a technical solution to the technical problem of determining borrowing costs of municipal debt for instruments that have optionality." Br. 8. We disagree that this is a technical problem. Rather, current industry practice represents the cost of borrowing using TIC. Spec. ¶ 4. But TIC does not take options into account. *Id.* ¶ 10. So the claimed invention calculates the OATIC. *Id.* ¶ 11. Yet claim 1's method does not recite a technical solution for doing so. The recited method merely adds "the respective option value V to the respective proceeds P." Then the method finds "a single discount rate that equates a present value of respective debt service for the plurality of municipal debt offerings to P+V." Essentially, the computer is used for its basic calculating function.

Appellant argues that the claimed technical solution requires "specifically configured computer networks." Br. 10–11. According to Appellant, existing computer networks do not "consider optionality in

determining the effectiveness and suitability of municipal debt instruments." *Id.* at 10.

But claim 1 does not recite how the computer or network meaningfully contributes to the claimed data gathering or calculations. Instead, claim 1 merely adds "a calculation module of the processor" to perform the calculations. The recited modules are merely generic computer components. *See* Spec. ¶¶ 107–108. Such generic components are insufficient to integrate the judicial exception into a practical application. *See* MPEP § 2106.05(a).

Although a computer is recited, claim 1 does not apply or use the abstract idea in a "particular machine." *See Bilski*, 561 U.S. at 604. A general-purpose computer that merely executes the judicial exception using conventional computer functions, as is the case here, is not a particular machine. *Ultramercial, Inc. v. Hulu, LLC,* 772 F.3d 709, 716–17 (Fed. Cir. 2014), *cited in* MPEP § 2106.05(b). Thus, we agree with the Examiner that claim 1 does not recite an improvement to computer technology. Final Act. 18.

Appellant further contends that the claim's "core features" and the "technical result" show that claim 1 is not directed to an abstract idea. Br. 8–9. The identified "core features," however, merely obtain data for the calculation (terms, yield curve, volatility date, and interest-rate evolution) and then perform the calculation (calculating an option value, determining proceeds, and calculating OATIC). As such, these features are part of the abstract idea itself.

Thus, claim 1 does not integrate the judicial exception into a practical application. On this record, we are unpersuaded that the Examiner erred in determining that claim 1 is directed to an abstract idea. Final Act. 16–18.

The Inventive Concept

Claim 1 also lacks an inventive concept.

To determine whether claim 1 provides an inventive concept, we consider the additional elements, individually and in combination, to determine whether (1) they add a specific limitation beyond the judicial exception that is not well-understood, routine, conventional activity in the field or (2) simply append well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception. Memorandum 23.

Here, we agree with the Examiner that claim 1's additional elements merely use a generic computer to perform the abstract idea and append well-understood, routine, conventional activities. Final Act. 18–19. Claim 1 recites a "valuation module of a processor of a computing device" and a "calculation module of the processor of the computing device." These components are merely software executing on a generic processor. *See id.* at 18 (citing Spec. ¶¶ 17, 70, 91–102, 105, 108; Fig. 1). In fact, the valuation module uses the Black-Derman-Toy or Black-Karasinski process to specify the evolution of interest rates. Spec. ¶ 80. According to the Specification, these processes are well-understood, routine, conventional algorithms. *See id.* ¶ 12 (explaining that these processes are industry standard).

Appellant argues that the claims are similar to those in *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245 (Fed. Cir. 2014). Br. 13–15. In

Appellant's view, the claims are rooted in computer networks. *Id.* at 14–15. For example, Appellant argues that existing computer networks cannot calculate OATIC. *Id.* Appellant argues that the Examiner's analysis does not consider the claimed limitations in combination. *Id.* at 15–16. We disagree.

The Examiner explained that the recited abstract idea includes gathering data and calculating the cost using that data. *See* Ans. 4; Final Act. 19. Considering the elements in combination, Appellant has not shown that the recited calculations improve operating efficiency or otherwise operate in an unconventional way. Similar to Appellant's claims, the Federal Circuit has recognized that "an invocation of already-available computers that are not themselves plausibly asserted to be an advance, for use in carrying out improved mathematical calculations, amounts to a recitation of what is 'well-understood, routine, [and] conventional.'" *SAP Am.*, 898 F.3d at 1170 (alteration in original) (citing *Mayo*, 566 U.S. at 73). Thus, the additional elements, individually and in combination, do not provide an inventive concept. *See* Memorandum 23.

Essentially, Appellant's inventive-concept argument focuses on an improved borrowing-cost calculation. *See* Br. 14–16. According to Appellant, the claimed features improve a network because the calculations account for a particular feature: "optionality." *See, e.g., id.* at 14. So claim 1 does not recite any purportedly inventive networking technology. Instead, Appellant's alleged inventive concept is part of the abstract idea itself. But "[w]hat is needed is an inventive concept in the non-abstract application realm." *SAP Am.*, 898 F.3d at 1168.

On this record, Appellant has not persuaded us of error in the rejection of representative claim 1 under 35 U.S.C. § 101. Thus, we sustain the Examiner's rejection of claims 1–20, which are argued as a group. *See* n. 6 *supra*.

THE OBVIOUSNESS REJECTION OVER AAPA, CHEN AND WM

Claim 1 recites, in part,

> calculating, by a calculation module of the processor of the computing device, an Option-Adjusted True Interest Cost (OATIC) for each of the plurality of municipal debt offerings by:
>
> > adding the respective option value V to the respective proceeds P; and
> >
> > finding a single discount rate that equates a present value of respective debt service for the plurality of municipal debt offerings to P+V.

In the proposed combination of Admitted Prior Art, Chen, and WM, Examiner finds that WM teaches the recited calculation module. Final Act. 21–23. In particular, the Examiner finds that WM calculates OATIC by adding an option value to the proceeds and finds the recited discount rate. *Id.* at 21–22. According to the Examiner, WM's premium bonds have a "callable option," and WM uses the option in the calculation of TIC in the last row of the table entitled "Premium Priced Bonds –Callable in 8 Years at 100%." Ans. 22 (citing WM 2).

Appellant argues that WM does not use an option value for each debt offering. Br. 19. According to Appellant, WM uses a standard true interest cost (TIC) for a debt instrument. *Id.* at 18. Appellant also presents other arguments (*see, e.g.*, *id.* at 16–19), but we find Appellant's argument that WM does not use an option value for each debt offering persuasive and dispositive of this issue in this rejection.

Put simply, the Examiner has not supported the finding that WM uses the option value in the calculation of TIC. Ans. 22. In particular, WM teaches a premium-pricing strategy. WM 2. For non-callable bonds, premium pricing is effective because the premium paid proportionately increases as interest cost rises. *Id.* In this case, the issuer's interest cost remains unchanged. *Id.* But premium pricing is a costly approach for callable bonds. *Id.* For example, WM uses a table to illustrate this. *Id.* The table shows that when the bond's rate increases, the price paid to the issuer decreases in proportion to the added debt-service costs and the TIC increases. *Id.*

Claim 1, however, requires calculating the OATIC. This involves (1) adding the option value V and the proceeds P, and (2) finding a single discount rate that equates a present value of respective debt service for multiple municipal-debt offerings to P+V. The Examiner has not shown that WM's TIC involves these steps. *See* Final Act. 21–23; Ans. 22. To be sure, WM teaches callable options. Ans. 22. But WM uses TIC instead of OATIC to calculate the cost of issuing the bond. Br. 18–19. Although WM's TIC takes into account the underwriter's fees and the interest rate (WM 3), the Examiner has not shown how WM takes options into account using the recited OATIC calculations.

On this record, we do not sustain the Examiner's rejection of claim 1.

Nor do we sustain the Examiner's rejection of claims 9, 16[5], and 17 for similar reasons, which also recite the above-discussed OATIC calculation. *See* Br. 16–20.

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[5] In rejecting claim 16, the Examiner takes Official Notice that "instructions for displaying a report identifying the expected cost of the preferred debt

THE REMAINING OBVIOUSNESS REJECTIONS

As for claims 2–8, 10–15, and 18–20, which depend from claims 1, 9, and 16, we also do not sustain the rejection of these claims. The Examiner rejects these dependent claims as being obvious over the same references used in rejecting claims 1, 9, and 16 along with various combinations of Butcher, Municipal, Boyce, and Kalotay. Final Act. 31–40. Also, the Examiner takes Official Notice of certain features in the rejections of claims 8, 11, 15–18, and 20. *Id.* at 27–31, 35–40. But the additional references are not relied upon to teach the limitation missing from APA, WM, and Chen. *See id.* at 31–40. Nor has the Examiner taken notice of these features. *Id.* at 27–31, 34–37. So the additional references do not cure the deficiency discussed above regarding WM. *See id.* For the same reasons discussed above in connection with claims 1, 9, and 16, we do not sustain the rejections of claims 2–8, 10–15, and 18–20. *See* Br. 16–24.

CONCLUSIONS

We sustain the rejection of claims 1–20 under 35 U.S.C. § 101.

We do not sustain the rejection of claims 1–20 under 35 U.S.C. § 103.

DECISION

Because we have affirmed at least one ground of rejection with respect to each claim on appeal, we affirm the Examiner's decision to reject claims 1–20. *See* 37 C.F.R. § 41.50(a)(1).

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instrument selected by the investor" are known. Final Act. 29. This, however, does not cure the deficiency in WM, which is relied upon to teach the OATIC calculation. *See id.*

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). *See* 37 C.F.R. § 41.50(f).

AFFIRMED