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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ARI STUDNITZER, ZACHARY BONIG, RYAN EAVY, FRANK KMIEC, BARRY GALSTER, and PAUL CALLAWAY

Appeal 2017-009688
Application 14/074,668
Technology Center 3600

Before ROBERT E. NAPPI, CARL L. SILVERMAN, and JASON M. REPKO, *Administrative Patent Judges*.

REPKO, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants[1] appeal under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1–26. App. Br. 2.[2] We have jurisdiction under 35 U.S.C. § 6(b). We reverse.

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[1] According to Appellants, the real party in interest is the Chicago Mercantile Exchange Inc., an organization having a place of business in Chicago, Illinois. App. Br. 2.

[2] Throughout this opinion, we refer to the Final Rejection ("Final Act.") mailed July 18, 2016; the Advisory Action mailed October 6, 2016 ("Adv. Act."); the Appeal Brief ("App. Br.") filed December 15, 2016; the Examiner's Answer ("Ans.") mailed May 10, 2017; and the Reply Brief ("Reply Br.") filed July 7, 2017.

THE INVENTION

Appellants' invention purportedly improves the efficiency of high-performance electronic trading systems. *See, e.g.*, Spec. ¶ 43. In particular, the invention relates to "implied matching." *See id.* ¶¶ 81–88. A "real" or "outright" order is an order for a particular financial instrument that is actually received from a market participant. *Id.* ¶ 82. Implication occurs when an order is matched by combining counter orders that share a common, or otherwise interdependent, component financial instrument. *Id.* ¶ 81. To create these matches, the system must synthesize "implied" orders in order books other than the outright order's order book. *Id.* This implied matching allows a partial trade of the incoming outright order to be executed. *Id.* Identifying an implied match, however, can be complex when there are many potential order combinations. *See id.* ¶¶ 84–85. Because of this complexity, conventional trading systems cannot efficiently calculate all possible implied markets. *Id.* ¶ 86.

To address this problem, the invention uses system-generated synthetic orders and multiple hardware match engines. *Id.* ¶ 88. In particular, the invention listens for all match events. *Id.* ¶ 88. The invention then uses a set of self-maintained "shadow order books" to identify, calculate, or derive implied matches. *Id.* If an implied match is identified, the invention generates one or more "synthetic orders" into the necessary markets and injects them into the incoming-order stream. *Id.* The synthetic orders are not real transactions from real traders. *Id.* Yet the synthetic orders are processed like any other orders to create the necessary implied matches. *Id.* The system uses multiple hardware match engines for each order book representing a market. *Id.* ¶ 220. Because the invention can

access match events from multiple markets, the invention can identify a wider array of implied intra- and inter-market matches. *Id.*

Claim 1 is reproduced below with our emphasis added:

> 1. A system for improving efficiency of an electronic trading system comprising a plurality of hardware match engines coupled therewith, each of the plurality of hardware match engines implementing a market for an associated financial instrument comprising at least one component, each hardware match engine being operative to attempt to match an incoming order for a transaction for the associated financial instrument with at least one other previously received but unsatisfied order for a transaction counter thereto for the associated financial instrument, to at least partially satisfy one or both of the incoming order or the at least one other previously received order, the system comprising:
>
> a first logic component, coupled with each of the plurality of hardware match engines, operative to receive match event data from each of the plurality of hardware match engines indicative of whether the hardware match engine was able to match an incoming order to that hardware match engine for at least one transaction for the associated financial instrument associated with that hardware match engine with at least one previously received but unsatisfied order for a transaction counter thereto for the associated financial instrument, in at least partial satisfaction of one or both of the incoming order or the at least one other previously received order;
>
> the first logic component being further operative to, when the match event data indicates that the incoming order has not been fully satisfied, to attempt to identify a set of previously received but unsatisfied orders received by any of the plurality of match engines wherein, for any residual of each particular of the at least one component of the associated financial instrument of the incoming order, the set includes a previously received but unsatisfied order for a counter transaction for another financial instrument comprising at least the particular component to at least partially satisfy one or both of the residual of the particular component of the associated financial instrument of the

incoming order or the component of the determined previously received order and wherein the first logic component is further operative to attempt to identify and include in the set, for any component of the financial instrument of any previously received but unsatisfied orders included in the set and not at least partially satisfied by any of the components of the associated financial instrument of the incoming order, another previously received but unsatisfied order for a counter transaction for a financial instrument including at least the component of the financial instrument of the previously received but unsatisfied order, such that the incoming order together with the set of previously received but unsatisfied orders, if the transactions for the financial instruments thereof were completed there between, includes no fully unsatisfied orders; and

a second logic component operative to, when the incoming order together with the identified set of previously received but unsatisfied orders, if the components of the financial instruments thereof were completed there between, include no fully unsatisfied orders, generate, for each financial instrument of the incoming order and the set of previously received but unsatisfied orders, a set of unique synthetic counter orders, each for a transaction of another of the financial instruments of the incoming order and the set of previously received but unsatisfied orders comprising at least one component in common, and *submit each synthetic counter order to the particular hardware match engine of the plurality of hardware match engines associated with the financial instrument for which the counter order is for.*

THE EVIDENCE

The Examiner relies on the following as evidence:

O'Callahan	US 2006/0253354 A1	Nov. 9, 2006
Bauerschmidt et al.	US 2007/0118460 A1	May 24, 2007
Siddall et al.	US 2011/0313905 A1	Dec. 22, 2011

Investopedia, *What is a Stripped Bond*? http://www.investopedia.com/ask/answers/127.asp (Apr. 28, 2007); http://web.archive.org/web/20070428145455/http://www.investopedia.com/ask/answers/127.asp (last accessed Jan. 15, 2015) ("Investopedia").

THE REJECTIONS

Claims 1–26 stand rejected under 35 U.S.C. § 101 as directed to patent-ineligible subject matter. Final Act. 2–5.

Claims 1, 2, 4–14, and 16–26 stand rejected under 35 U.S.C. § 103 as unpatentable over Siddall, Bauerschmidt, and O'Callahan. Final Act. 5–28.

Claims 3 and 15 stand rejected under 35 U.S.C. § 103 as unpatentable over Siddall, Bauerschmidt, O'Callahan, and Investopedia. Final Act. 29.

THE REJECTION UNDER 35 U.S.C. § 101

The Supreme Court's two-step framework guides our analysis. *See Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 134 S. Ct. 2347, 2355 (2014). In *Alice* step one, "[w]e must first determine whether the claims at issue are directed to a patent-ineligible concept," such as an abstract idea. *Id.* If the claims are "directed to an abstract idea," we consider the claim limitations "both individually and 'as an ordered combination'" to determine whether the additional elements "'transform the nature of the claim' into a patent-eligible application" in *Alice* step two. *Id.* (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 79, 78 (2012)). The Supreme Court has described this analysis "as a search for an 'inventive concept.'" *Id.* (internal citation omitted).

The Examiner rejected claims 1–26 under 35 U.S.C. § 101 because (1) the claims are directed to an abstract idea of trade matching and (2) the

claims lack an inventive concept. Final Act. 2–5. According to the Examiner, the claims do not improve a technology or how a computer functions. *Id.* at 3. The Examiner finds that the claimed features "undertake their roles in performance of their activities according to their generic functionalities which are well-understood, routine and conventional." *Id.* The Examiner finds that the claims "apply the abstract idea on a computer, and [are] . . . considered to amount to nothing more than requiring a generic computer system to merely carry out the abstract idea itself." *Id.* at 4.

Appellants argue that the claims recite a unique electronic trading-system architecture, which is more than trade matching in the abstract. App. Br. 8–9. Appellants argue that the claimed system processes more transactions than conventional systems and does so without modifications to the hardware match engines. *Id.* at 12. According to Appellants, the claimed invention solves a technical problem and improves the way computers handle these trades. Reply Br. 2–6.

We agree with Appellants that the claims recite more than the idea of matching unsatisfied orders. App. Br. 15. But even assuming the claims are directed to the abstract idea of trade matching, the claimed invention imposes meaningful limits on this concept. *Id.* For the reason discussed below, we find no support for the Examiner's assertion that the claimed system performs well-understood, routine, and conventional functions. *See, e.g.*, Final Act. 3; Adv. Act. 2.

Specifically, the claimed invention purports to solve a technical problem with electronic trading-system architectures. *See* Spec. ¶ 87. According to the Specification, conventional trading systems lack an efficient way to determine the possible implied markets. *Id.* ¶ 86. In these

systems, the implication process occurs within the match engine. *Id.* The match engine could be privy to all relevant markets—i.e., all order books that the implication process requires. *Id.* ¶ 87. But the match engine's computational capacity limits the number of order books that it can manage, and in turn, the degree of implication. *Id.* For instance, as the number of contracts involved in the implication increases, the number of possible combinations grows exponentially. *Id.* ¶ 85.

The claimed improvement allows electronic trading systems to match unsatisfied orders across multiple hardware match engines by creating synthetic counter orders. Reply Br. 12; Spec. ¶¶ 81–88. In particular, the claimed invention moves part of the implication process outside the match engine. Spec. ¶ 88. In independent claim 2, an "implicator"[3] listens to all match events and attempts to identify, calculate, or derive implied matches. Claim 2 further recites an "order generator"[4] that generates synthetic counter orders and submits them to the hardware match engines associated with the corresponding financial instrument.

With these features, the claimed solution does not require a modification to the match engines to process the implied trades. *Id.* ¶¶ 87–88, *discussed in* Reply Br. 12. Also, the invention does not require the match engine to access all order books needed for the implication process. App. Br. 12. Instead, the synthetic orders are processed by the hardware

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[3] This function is recited as a first logic component in independent claim 1. Independent claims 14 and 26 recite similar limitations as method steps or means-plus function limitations.

[4] This function is recited as a second logic component in independent claim 1. Independent claims 14 and 26 recite similar limitations as method steps or means-plus-function limitations.

match engines like any other orders. *See id.* ¶ 88. This technical improvement allows implied matches across a wider variety of markets compared to conventional methods and increases the complexity and variety of combination financial instruments. *Id.*

Appellants' invention is not a mere automation of a known process on a generic computer, as the Examiner finds. *See, e.g.*, Final Act. 3; Adv. Act. 2. Rather, the claimed method and system solve a problem—i.e., computational inefficiencies in conventional trading systems—in a particular technical way. *See Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (finding the claims were not directed to an abstract idea where the claims recited a technical solution involving "a specific type of data structure designed to improve the way a computer stores and retrieves data in memory").

On this record, we do not sustain the Examiner's rejection of claims 1–26 under 35 U.S.C. § 101.

THE REJECTION OVER SIDDALL, BAUERSCHMIDT, AND O'CALLAHAN

Claim 1 recites, in part, a second logic component operable to (1) generate unique synthetic counter orders for each financial instrument of the incoming order and the previously received unsatisfied orders, and (2) "submit each synthetic counter order to the particular hardware match engine of the plurality of hardware match engines associated with the financial instrument for which the counter order is for." Independent claim 2 recites an order generator that performs a similar function. Independent claims 14 and 26 recite similar limitations as method steps or means-plus-function limitations.

In the rejection of claims 1, 2, 14, and 26, the Examiner finds that the combination of Siddall and O'Callahan collectively teach generating and submitting synthetic orders to multiple match engines. Final Act. 7 (citing Siddall ¶¶ 20, 25, 29, claim 1, claim 3), 10 (citing O'Callahan Abstract, ¶¶ 51, 54); Final Act. 12–16, 19–22, 25–28 (rejecting claims 2, 14, and 26). The Examiner finds that a synthetic order can be broadly interpreted to be an implied spread or an implied order, which is taught by Siddall. Ans. 18. According to the Examiner, Siddall's trade system is able to interact with other trade engines, and O'Callahan teaches that multiple matching engines in a trading system is known. *Id.* at 17–18.

Appellants argue that the proposed combination does not teach or suggest generating and submitting synthetic orders to multiple match engines. App. Br. 24–25; Reply Br. 8. Appellants argue that Siddall's notifications are not the recited synthetic orders. App. Br. 24. According to Appellants, a synthetic order is generated for a transaction of another financial instrument of an incoming order and a previously received but unsatisfied order. *Id.* at 25. Appellants argue that O'Callahan's engines operate on the appropriate incoming orders for different products independently. *Id.*; Reply Br. 8.

We agree with Appellants that the references, individually or in combination, do not teach or suggest the generate and submit functions recited in claims 1, 2, 14, and 26. App. Br. 24–25; Reply Br. 8.

Even if Siddall teaches interacting with other trade engines, the Examiner has not shown that Siddall's interaction involves submitting synthetic counter orders in the manner claimed. *See* Final Act. 7; Ans. 17–18. Specifically, Siddall's implied-spread-determination module 208

determines that an implied spread exists and sends a notification. Siddall ¶¶ 20, 47. Yet Siddall does not handle the implication process in the same way as the claimed invention. Instead, Siddall uses the notification to execute multiple trades to match the legs of the implied spread. *Id.* ¶ 50. For example, the user's monitor could display a notification that an implied match exists, and the user can then respond accordingly. *Id.* ¶ 48. Thus, the Examiner has not shown that Siddall synthesizes an order for multiple match engines.

To be sure, O'Callahan teaches multiple matching engines. *See* O'Callahan ¶ 54. But O'Callahan allocates different exchange-traded-products to different matching engines. *Id.* O'Callahan's engines execute trades by paring corresponding marketable buy-sell orders. *Id.* Notably, O'Callahan places the non-marketable orders in an order book until they are marketable. *Id.* In this way, O'Callahan's engines independently process the appropriate orders for different products, as Appellants argue. *See* Reply Br. 8.

Neither Siddall nor O'Callahan, individually or in combination, generates and submits the necessary orders to each match engine to effect the necessary transaction satisfying the particular leg. Unlike Siddall and O'Callahan, the claimed invention handles implied matches by generating synthetic orders for each financial instrument of the incoming order and previously received unsatisfied orders. And Bauerschmidt does not cure this deficiency because it was relied upon for the first logic component, not generating and matching synthetic match orders. *See* Final Act. 8–9, 13–14, 19–22, 25–28. On this record, we agree that the Examiner has not shown that the references teach or suggest (1) generating the recited synthetic

counter orders and (2) submitting them to multiple match engines, as recited in claims 1, 2, 14, and 26. *See* Reply Br. 7.

Thus, we do not sustain the Examiner's rejection of independent claims 1, 2, 14, and 26, and dependent claims 4–13, and 16–25.

THE REMAINING OBVIOUSNESS REJECTION

We do not sustain the Examiner's rejections of dependent claims 3 and 15. Investopedia was not relied upon to teach the limitation missing from Siddall, Bauerschmidt, and O'Callahan, and, thus, does not cure the deficiency discussed above. *See* Final Act. 29. Therefore, for the same reasons discussed above in connection with claims 2 and 14, we do not sustain the rejection of claims 3 and 15.

DECISION

We reverse the Examiner's decision to reject claims 1–26.

REVERSED