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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte H. ROY MILLER

Appeal 2017–001674
Application 11/894,254
Technology Center 3600

Before ANTON W. FETTING, BRUCE T. WIEDER, and AMEE A. SHAH, *Administrative Patent Judges.*

FETTING, *Administrative Patent Judge.*

DECISION ON APPEAL

STATEMENT OF THE CASE[1]

H. Roy Miller (Appellant) seeks review under 35 U.S.C. § 134 of a final rejection of claims 1, 3, 4, 7–13, 38, 41, 43, 45, and 46. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

The Appellant invented a form of strategic planning and revenue management in transportation and other operations. Specification para. 2.

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[1] Our decision will make reference to the Appellant's Appeal Brief ("Br.," filed April 6, 2016) and the Examiner's Answer ("Ans.," mailed August 25, 2016), and Final Action ("Final Act.," mailed August 6, 2015).

An understanding of the invention can be derived from a reading of exemplary claim 1, which is reproduced below (bracketed matter and some paragraphing added).

> 1. A computer–implemented method of strategic planning for a first transportation organization including:
>
> (a) operating one or more processors to derive a set of demographics
>
> representing potential sales of transportation by the first transportation organization between origins and destinations using one or more multi-player game models
>
> by applying an internal strategy of the first transportation organization and predicted external strategies of one or more competitive organizations to information about the market for transportation between the origins and destinations,
>
> at least one of the strategies including responses to one or more changes in the information about the market;
>
> (b) operating the one or more processors to develop:
>
> (i) a feasible schedule for transportation based on the demographics derived in step (a) and at least one set of resources associated with the first transportation organization
>
> whereby the schedule is associated with the internal strategy used in step (a),
>
> such schedule specifying assignment of available, particular vehicles and available, particular crewmembers to specific transportation operations between specific ones of the origins and specific ones of the destinations at specific times,
>
> and
>
> (ii) costs for the assigned available, particular vehicles and available, particular crewmembers

calculated based at least in part on assignment of the available, particular vehicles and the available, particular crewmembers to the specific transportation operations between the specific ones of the origins and the specific ones of the destinations at the specific times;

(c) operating the one or more processors to evaluate a financial result for the schedule developed in step (b)

whereby the financial result is associated with the internal strategy used in step (a),

the financial result for the schedule being based at least in part on the costs of the assigned available, particular vehicles and available, particular crewmembers developed in step (b);

(d) repeating steps (a), (b), and (c) using a plurality of different internal strategies;

and

(e) selecting the internal strategy associated with the best financial result.

The Examiner relies upon the following prior art:

Walker	US 2002/0156659 A1	Oct. 24, 2002
Shetty	US 2003/0191678 A1	Oct. 9, 2003
Goel	US 7,418,409 B1	Aug. 26, 2008

Adler, Competition in a deregulated air transportation market, European Journal of Operational Research 129 (2001) 337–345

Ahuja, A Neighborhood Search Algorithm for the Combined Through and Fleet Assignment Model with Time Windows, NETWORKS-2004, Published online in Wiley InterScience (www.interscience.wiley.com), 2004

Claims 1, 3, 4, 7–13, 38, 41, 43, 45, and 46 stand rejected under 35 U.S.C. § 101 as directed to non–statutory subject matter.

Claims 1, 3, 4, 11–13, 38, 41, and 43 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Adler and Shetty.

Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Goel.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Walker.

Claims 45 and 46 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Ahuja.

ISSUES

The issue of eligible subject matter turns primarily on whether the claims recite more than abstract conceptual advice of what a computer is to provide without implementation details.

The issues of obviousness turn primarily on whether Adler's iterative optimization algorithm performs the steps of the claims.

FACTS PERTINENT TO THE ISSUES

The following enumerated Findings of Fact (FF) are believed to be supported by a preponderance of the evidence.

Facts Related to the Prior Art

Adler

01. Adler is directed to evaluating the most profitable hub-and-spoke (HS) network for an airline in a competitive environment. Adler 337: Introduction.

02. Adler describes a game theoretic environment, in which each airline chooses a network including hub(s) and their connections to the spoke airports. This is attained through an integer linear program. Subsequently, learning about competitors' decisions, airlines attempt to maximize profits using a nonlinear mathematical program. Adler 338: Bottom left–Top right columns.

03. Adler describes airlines choosing their strategic network and decision variables in two stages to facilitate the game-theoretic approach. First, all airlines choose their networks and whether or not to offer services concurrently, then they choose frequencies, plane sizes and airfares simultaneously, based on the knowledge of all the airlines' choices during the first stage. Adler 339: Bottom left column.

04. Adler describes an integer linear programming approach being used to generate potential networks, the profitability of which will

be subsequently evaluated by a nonlinear mathematical programming model. There are many possible methods of producing a connected HS network, the most direct of which is to simply connect spoke nodes to a chosen set of hub nodes according to a minimum distance criterion using integer linear programming. Adler 339: Top right column.

05. Adler describes the integer linear programing as minimizing distance and may result in an almost pure HS system if one of the hubs is geographically further away from all other nodes. Since the hubs are supposed to represent the "centre" of the network, with all other nodes acting as spokes, a second solution, whereby both hubs have a reasonable number of connections, may also be considered. In addition, a single hub may be unable to satisfy the demand, given the severe congestion of large airports around the world. Adler 339: Bottom right column.

06. Adler describes the mathematical program being based on a micro-economic model for an airline acting under deregulation. Decision variables include airfare per origin-to-destination trip, traveler type and airline, aircraft size per leg per airline and frequency per directed leg per airline. The nonlinear mathematical program is also solved per airline per network chosen. An airline's profit function is maximized subject to three sets of constraints. The profit function is based on an airline's revenue and cost functions. The revenue function includes receipts based on airfares, maximal demand and the airline's

market share, which in turn is based on travelers' utility functions. The airline's operating cost function is assumed to be a constant elasticity-of-substitution function. Adler 340: Top left column.

Shetty

07. Shetty is directed to scheduling systems. Shetty para. 1.

08. Shetty describes disruptions in an airline scheduling system being entered into a computer program and ranked by a common denominator such as cost by simulating the effects of the disruptions on the actual servicing of the schedules. Disruptions are prioritized based on their impact on the system if left unattended. Each disruption is then considered individually based on its rank, with the cascaded cost of proposed solutions calculated. The least cost solution is scheduled, and the next highest ranking cost disruption is then processed, until all schedule disruptions are resolved. The program is initialized periodically for entry of disruptions affecting that period, such as daily. Shetty para. 6.

ANALYSIS

Claims 1, 3, 4, 7–13, 41, 43, and 45 rejected under 35 U.S.C. § 101 as directed to non–statutory subject matter

Method claim 1 recites iteratively performing the steps of deriving a set of demographics representing potential sales of transportation, developing a feasible schedule for transportation based on the demographics and

developing costs for the assigned variables, and evaluating a financial result, and then selecting an internal strategy associated with the optimal result. Thus, claim 1 recites a classic format of an operations research optimization algorithm, modelling some objective function under defined constraints to derive an optimal solution. None of the limitations recite implementation details for any of these steps, but instead recite functional results to be achieved by any and all possible means. Data reception, analysis and modification, and display are all generic, conventional data processing operations to the point they are themselves concepts awaiting implementation details. The sequence of data reception-analysis-display is equally generic and conventional. The ordering of the steps is therefore ordinary and conventional. As an optimization algorithm, iteratively modifying variables representing model parameters under a set of constraints with some objective function is the prototypical sequence of steps. The remaining claims merely describe parameters used in the algorithm, with no implementation details.

The Supreme Court

> set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts. First, [] determine whether the claims at issue are directed to one of those patent-ineligible concepts. [] If so, we then ask, "[w]hat else is there in the claims before us? [] To answer that question, [] 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. [The Court] 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."

Alice Corp., Pty. Ltd. v CLS Bank Intl, 134 S. Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, 566 U.S. 66 (2012)).

To perform this test, we must first determine whether the claims at issue are directed to a patent-ineligible concept. The Examiner finds the claims directed to

> deriving demographics, representing sales of transportation between origin and destination using game models by applying an internal strategy of the transportation organization and predicting external strategies of competitive organization about the market for transportation between the origins and destinations, where at least one strategy includes responses to one or more changes in the information about the market; developing a feasible schedule based on the demographics, the schedule associated with the strategy and specifying assignment of available vehicles and crewmembers to specific transportation operations between the origins and the destinations; developing costs for the assigned available vehicles and crewmembers based on the assignment to the specific transportation operations, repeating all of the steps using different internal strategies, and then selecting the internal strategy associated with the best financial result.

Final Act. 14. The Examiner thus determines the claims to be directed to a series of steps directed to selecting an optimal strategy, i.e. an operations research optimization algorithm. The Examiner further determines that this "is a method of human activity and a fundamental economic practice (selecting different strategies and then selecting the strategy and schedule with the best financial result for an airline/transportation business), and accordingly, is viewed as an abstract idea." *Id.*

Although the Court in *Alice* made a determination as to what the claims were directed to, we find that this case's claims themselves and the Specification provide enough information to inform one as to what they are directed to.

The preamble to claim 1 recites that it is a method of strategic planning for a first transportation organization. The steps in claim 1 result in selecting the internal strategy associated with the best financial result. The Specification at paragraph 2 recites that the invention relates to strategic planning and revenue management in transportation and other operations. Thus, all this evidence shows that claim 1 is directed to selecting a strategy to optimize results, i.e. optimizing operating results. This is consistent with the Examiner's finding.

It follows from prior Supreme Court cases, and *Bilski* (*Bilski v Kappos*, 561 U.S. 593 (2010)) in particular, that the claims at issue here are directed to an abstract idea. Like the risk hedging in *Bilski*, the concept of optimizing operating results is a fundamental economic practice long prevalent in our system of commerce. The use of optimizing operating results is also a building block of ingenuity in the academic field of operations research. Thus, optimizing operating results, like hedging, is an "abstract idea" beyond the scope of §101. *See Alice Corp. Pty. Ltd.* at 2356.

As in *Alice Corp. Pty. Ltd.*, we need not labor to delimit the precise contours of the "abstract ideas" category in this case. It is enough to recognize that there is no meaningful distinction in the level of abstraction between the concept of risk hedging in *Bilski* and the concept of optimizing

operating results at issue here. Both are squarely within the realm of "abstract ideas" as the Court has used that term. *See Alice Corp. Pty. Ltd.* at 2357.

Further, claims involving data collection, analysis, and display are directed to an abstract idea. *Elec. Power Grp. v. Alstom S.A.,* 830 F.3d 1350, 1353 (Fed. Cir. 2016) (holding that "collecting information, analyzing it, and displaying certain results of the collection and analysis" are "a familiar class of claims 'directed to' a patent ineligible concept"); *see also In re TLI Commc'ns LLC Patent Litig.,* 823 F.3d 607, 611 (Fed. Cir. 2016); *FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1093–94 (Fed. Cir. 2016). Claim 1, unlike the claims found non-abstract in prior cases, uses generic computer technology to perform data retrieval, analysis, and transmission and does not recite an improvement to a particular computer technology. *See, e.g.*, *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314–15 (Fed. Cir. 2016) (finding claims not abstract because they "focused on a specific asserted improvement in computer animation"). As such, claim 1 is directed to the abstract idea of receiving, analyzing, and transmitting data.

The remaining claims merely describe parameters used in the algorithm. We conclude that the claims at issue are directed to a patent-ineligible concept.

The introduction of a computer into the claims does not alter the analysis at *Mayo* step two.

> the mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention. Stating an abstract idea "while adding the words 'apply it'" is not enough for patent eligibility. Nor is limiting the use of an abstract idea "'to a particular technological environment.'" Stating an abstract idea while adding the words "apply it with a computer" simply combines those two steps, with the same deficient result. Thus, if a patent's recitation of a computer amounts to a mere instruction to "implemen[t]" an abstract idea "on . . . a computer," that addition cannot impart patent eligibility. This conclusion accords with the preemption concern that undergirds our §101 jurisprudence. Given the ubiquity of computers, wholly generic computer implementation is not generally the sort of "additional featur[e]" that provides any "practical assurance that the process is more than a drafting effort designed to monopolize the [abstract idea] itself."

Alice Corp. Pty. Ltd., 134 S.Ct. at 2358 (citations omitted).

"[T]he relevant question is whether the claims here do more than simply instruct the practitioner to implement the abstract idea [] on a generic computer." *Alice Corp. Pty. Ltd.,* 134 S.Ct. at 2359. They do not.

Taking the claim elements separately, the function performed by the computer at each step of the process is purely conventional. Using a computer to perform operations research optimization amounts to electronic mathematical algorithm solving—one of the most basic functions of a computer. All of these computer functions are well-understood, routine, conventional activities previously known to the industry. *See Elec. Power Grp. v. Alstom S.A., supra. Also see In re Katz Interactive Call Processing*

Patent Litigation, 639 F.3d 1303, 1316 (Fed.Cir. 2011)("Absent a possible narrower construction of the terms 'processing,' 'receiving,' and 'storing,' . . . those functions can be achieved by any general purpose computer without special programming"). In short, each step does no more than require a generic computer to perform generic computer functions. As to the data operated upon, "even if a process of collecting and analyzing information is 'limited to particular content' or a particular 'source,' that limitation does not make the collection and analysis other than abstract." *SAP America Inc. v. InvestPic LLC*, 898 F.3d 1161, 1168 (Fed. Cir. 2018)

Considered as an ordered combination, the computer components of Appellant's method add nothing that is not already present when the steps are considered separately. The sequence of data reception-analysis-display is equally generic and conventional or otherwise held to be abstract. *See Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014) (sequence of receiving, selecting, offering for exchange, display, allowing access, and receiving payment recited an abstraction), *Inventor Holdings, LLC v. Bed Bath & Beyond, Inc.*, 876 F.3d 1372, 1378 (Fed. Cir. 2017) (sequence of data retrieval, analysis, modification, generation, display, and transmission), *Two-Way Media Ltd. v. Comcast Cable Commc'ns, LLC*, 874 F.3d 1329, 1339 (Fed. Cir. 2017)(sequence of processing, routing, controlling, and monitoring). The ordering of the steps is therefore ordinary and conventional.

Viewed as a whole, Appellant's method claims simply recite the concept of optimizing operating results as performed by a generic computer. To be sure, the claims recite doing so by advising one to use specific constraints

and let one know when a solution is reached. But this is no more than abstract conceptual advice on the parameters for such optimizing of operating results and the generic computer processes necessary to process those parameters, and do not recite any particular implementation.

The method claims do not, for example, purport to improve the functioning of the computer itself. Nor do they effect an improvement in any other technology or technical field. The Specification spells out different generic equipment[2] and parameters that might be applied using this concept and the particular steps such conventional processing would entail based on the concept of optimizing operating results under different scenarios. They do not describe any particular improvement in the manner a computer functions. Instead, the claims at issue amount to nothing significantly more than an instruction to apply the abstract idea of optimizing operating results using some unspecified, generic computer. Under our precedents, that is not enough to transform an abstract idea into a patent-eligible invention. *See Alice Corp. Pty. Ltd.* at 2360.

Further, claims directed to computational algorithms that can be performed with paper and pencil and/or the human mind, such as the recited iterative optimization algorithm, are ineligible. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1372 (Fed.Cir.2011); *also Elec. Power Group,* 830 F.3d at 1353.

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[2] Specification paragraph 92 describes generic equipment used to perform the steps.

As to Appellant's arguments, we adopt the Examiner's determinations and analysis from Final Action 14–16 and Answer 2–6 and reach similar legal conclusions.

Claims 38 and 46 rejected under 35 U.S.C. § 101 as directed to non–statutory subject matter

These are system claims performing the method of claim 1. They

> are no different from the method claims in substance. The method claims recite the abstract idea implemented on a generic computer; the system claims recite a handful of generic computer components configured to implement the same idea. This Court has long "warn[ed] ... against" interpreting § 101"in ways that make patent eligibility 'depend simply on the draftsman's art.'

Alice Corp. Pty. Ltd. at 2360. Appellant argues these on the basis of claim 1.

Claims 1, 3, 4, 11–13, 38, 41, and 43 rejected under 35 U.S.C. § 103(a) as unpatentable over Adler and Shetty

Adler is applied for all of the recited steps. Shetty is only applied for instantiating the steps in software. Adler describes integer programming, a well-known iterative optimization algorithm for optimizing some objective function under a set of constraints. Claim 1 does this. Appellant argues the distinction in the particular constraints used for the algorithm.

In particular, Appellant contends that claim 1 "requires inclusion of the specific scheduling process that assigns specific vehicles and crew members to specific transportation operations (e.g., flights) at specific times as an

element in the strategic planning operation." App. Br. 9. Appellant also contends that the recited claim is used to select strategy rather than follow the selection of strategy. *Id.* at 12–14. But Appellant makes this contention by stating "the selection of a strategy is based on comparing those specific financial results, so that the results achieved in the specific scheduling step directly influence the choice of strategy." *Id.* at 14.

As to the argument regarding use of specific constraints, such as particular personnel, Appellant contends that Adler uses generic constraints. This is unsurprising for a journal article that publishes research to the public. Generic examples are both appropriate and the best that can be used absent some particular target of the optimization. But when Adler's techniques are applied by a particular company, the company knows its particular cost and distance constraints, and both are predictable inputs to any financial optimization computation for that organization. Thus, using particular personnel, equipment, and transport network data are obvious implementations of Adler's formulas.

As to the argument that the claims produce rather than follow strategy, neither the claims nor the Specification define what is meant by strategy. Appellant's contention that the selection of strategy is based on comparing financial results means that a selection of action based on comparing financial results is within the scope of the recited strategy. Claim 1 recites that each iteration is associated with a different strategy. Iterative optimization algorithms alter the variables to re-compute the objective function in each iteration, and so that set of variable assignments represents a strategy that results in the objective function result for that iteration.

Thus, iterative optimization algorithms such as in Adler are within the scope of the claim.

Appellant's arguments regarding improper combination and teaching away are premised on the above arguments.

Claims 7 and 8 rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Goel

These claims depend from claim 1.

Claims 9 and 10 rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Walker

These claims depend from claim 1.

Claims 45 and 46 rejected under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Ahuja

These claims depend from claims 1 and 38.

CONCLUSIONS OF LAW

The rejection of claims 1, 3, 4, 7–13, 38, 41, 43, 45, and 46 under 35 U.S.C. § 101 as directed to non–statutory subject matter is proper.

The rejection of claims 1, 3, 4, 11–13, 38, 41, and 43 under 35 U.S.C. § 103(a) as unpatentable over Adler and Shetty is proper.

The rejection of claims 7 and 8 under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Goel is proper.

The rejection of claims 9 and 10 under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Walker is proper.

The rejection of claims 45 and 46 under 35 U.S.C. § 103(a) as unpatentable over Adler, Shetty, and Ahuja is proper.

DECISION

The rejection of claims 1, 3, 4, 7–13, 38, 41, 43, 45, and 46 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv) (2011).

AFFIRMED