UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/414,543	01/24/2017	John Michael Fife	80734/1101	9334

32642 7590 08/18/2020
STOEL RIVES LLP - SLC
201 SOUTH MAIN STREET, SUITE 1100
ONE UTAH CENTER
SALT LAKE CITY, UT 84111

EXAMINER	
HENRY, MATTHEW D	

ART UNIT	PAPER NUMBER
3683	

NOTIFICATION DATE	DELIVERY MODE
08/18/2020	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patlaw@stoel.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOHN MICHAEL FIFE

Appeal 2020-002155
Application 15/414,543
Technology Center 3600

Before JAMES P. CALVE, CYNTHIA L. MURPHY, and ROBERT J. SILVERMAN, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the decision of the Examiner to reject claims 1–26, which are all of the pending claims. *See* Appeal Br. 1, 11. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

[1] "Appellant" refers to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies Enel X North America, Inc. as the real party in interest. Appeal Br. 1.

CLAIMED SUBJECT MATTER

Appellant's disclosure relates to controllers to control an electrical system. Spec. ¶ 2. Claims 1, 11, and 25 are independent. Claim 1 is reproduced below.

> 1. A controller to optimize overall economics of operation of an electrical system, the controller comprising:
>
> a communication interface to connect to an electrical system, the electrical system including one or more components that are automatically adjustable based on a set of control values for a set of control variables, the one or more components comprising one or more devices selected from the group consisting of a load, a generator, and an energy storage system (ESS); and
>
> one or more processors to:
>
> determine the set of control values for the set of control variables to effectuate a change to the one or more components of the electrical system toward meeting a controller objective for economical optimization of the electrical system, the set of control values determined by the one or more processors utilizing an optimization algorithm to identify the set of control values in accordance with one or more constraints and a plurality of cost elements associated with operation of the one or more components of the electrical system, the optimization algorithm comprising a cost function including a sum of the plurality of cost elements, the plurality of cost elements including at least time of use (ToU) supply charges and demand charges;
>
> wherein the ToU supply charges comprise charges for electrical energy from an electrical grid based on one or more supply rates of the electrical energy multiplied by a total energy provided to the electrical system by the electrical grid during one or more time windows corresponding to the one or more supply rates,
>
> wherein the demand charges comprise charges for the electrical energy from the grid based on one or more demand rates multiplied by a maximum rate of electrical energy

provided to the electrical system by the electrical grid during one or more corresponding demand time windows; and

automatically control operation of the one or more components of the electrical system based on the optimization algorithm by automatically performing, based on the determined set of control values, at least one action selected from the group consisting of increasing or decreasing an amount of power consumed by the load, increasing or decreasing generation by the generator, and charging or discharging the ESS.

Appeal Br. 29–30 (Claims App.).

REJECTIONS

Claims 1–6, 8–12, 14–17, and 20–25 are rejected under 35 U.S.C. § 103 as unpatentable over Wang (US 2015/0355655 A1, pub. Dec. 10, 2015), Marhoefer (US 2009/0048716 A1, pub. Feb. 19, 2009), and Schaefer (US 2010/0174643 A1, pub. July 8, 2010).

Claims 7, 18, and 19 are rejected under 35 U.S.C. § 103 as unpatentable over Wang, Marhoefer, Schaefer, and Ghosh (US 2014/0365022 A1, pub. Dec. 11, 2014).

Claims 13 and 26 are rejected under 35 U.S.C. § 103 as unpatentable over Wang, Marhoefer, Schaefer, and Bozchalui (US 2013/0226637 A1, pub. Aug. 29, 2013).

ANALYSIS

Claims 1–6, 8–12, 14–17, and 20–25 Rejected over Wang, Marhoefer, and Schaefer

Appellant presents the same arguments for each independent claim and does not argue the dependent claims separately. *See* Appeal Br. 11–27. We select claim 1 as the representative claim. 37 C.F.R. § 41.37(c)(1)(iv). Claims 2–6, 8–12, 14–17, and 20–25 stand or fall with claim 1.

Regarding claim 1, the Examiner finds that Wang teaches a method of using a controller to optimize overall economics of operation of an electrical system including receiving configuration elements that specify constraints of the electrical system, defining plural cost elements for operating the system, receiving a set of process (control) variables to be used to determine values for the economical optimization of the system, determining control values for the control variables by using an optimization algorithm to identify a set of control values where the optimization algorithm comprises a cost function including a sum of the plural cost elements, and controlling operation of the system based on the optimization algorithm. Final Act. 5–9. The Examiner finds that Wang lacks a communication interface to control operation of the components automatically but Marhoefer teaches an interface and processor that control energy optimization toward a controller objective for one or more components based on control values that optimize energy production and minimize energy costs. *Id.* at 9–11. The Examiner determines it would have been obvious to modify Wang with Marhoefer's automatic control to improve efficiency of Wang's system and better optimize electrical power generation to ensure electrical energy is not wasted. *Id.* at 12; Ans. 8.

The Examiner finds that Wang, as modified, does not teach a time of use supply charge or demand charge, but Schaefer optimizes energy usage and minimizes costs by tracking a plurality of cost elements including time of use supply charges and demand charges as claimed. Final Act. 12–14. The Examiner determines it would have been obvious to modify Wang by using Schaefer's cost algorithm to control electrical systems to regulate energy use by customers to ensure their needs are met while reducing the total cost of power generation and energy use. *Id.* at 15; *see* Ans. 4–5.

Appellant argues that Schaefer does not, in combination with the other references, teach an optimization algorithm for a cost function that includes time of use supply charges and demand charges. Appeal Br. 12. Appellant also argues that Wang and Marhoefer do not teach cost elements including time of use supply charges and demand charges, and Schaefer does not cure this deficiency because it lacks an optimization algorithm comprising a cost function that sums a plurality of cost elements including demand charges as recited in claim 1. *Id.* at 13. Appellant further argues that Schaefer teaches that utility companies may charge a demand charge but optimizing a demand charge is considerably different and much harder than calculating a demand charge as Schaefer does. *Id.* at 14. Appellant argues that Schaefer gathers information to calculate a demand charge but does not include a demand charge in a cost function of an optimization algorithm, which is much more difficult than calculating a demand charge. *Id.* at 15. Appellant also asserts that Schaefer teaches away from optimization by recording and reporting only demand charges and teaching that prospective consideration of demand charges is done by the user or unskilled operator and not the system. *Id.*

These arguments are not persuasive. Wang optimizes flexible power generation factors/costs by using an algorithm to identify control values for constraints with a cost function that sums costs including a flexible index of costs. Wang ¶¶ 9–22; *see* Final Act. 5–9. Schaefer tracks flexible costs for energy systems as time of use supply charges and demand charges. Schaefer ¶¶ 40–44, 116; Final Act. 5–15. Schaefer teaches to track the flexible costs in energy systems. The Examiner proposes to improve Wang's optimization model by using such flexible energy costs to establish control values thereby providing more efficient, cost-effective energy usage. *See* Final Act. 15.

We do not agree that Schaefer teaches away from optimization of its cost functions using Wang's optimization model. *See* Appeal Br. 15. Wang optimizes flexible constraints of an electrical power system by using a multi-dimensional flexible model for power generation costs. *See* Wang ¶¶ 17, 18, 20–24. Wang's model uses a flexible index of power generation costs but does not identify specific costs to optimize. *See id.* ¶¶ 8–18. Because Wang does not identify particular flexible costs, the Examiner relies on Schaefer to teach base demand and base time of use as two flexible energy costs that are tracked for electrical energy systems. *Id.* ¶¶ 40–44. The Examiner proposes to track these flexible costs in Wang's flexible, multi-variable optimization model to optimize energy usage and cost by reducing peak demand through cost adjustments. Final Act. 15; *see* Ans. 3–5.

Wang does not discourage using such costs in Wang's flexible cost optimization model. Nor does Schaefer for that matter. *See In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (a reference teaches away if a skilled artisan would be led in a direction divergent from the path taken by an applicant).

The Examiner is not modifying Schaefer. The issue is whether it would have been obvious to modify Wang's flexible optimization model for power generation costs, which already considers flexible cost constraints, to optimize operations using time of use and demand energy as flexible costs. In this regard, Wang optimizes energy costs using a flexible index of power generation costs. Wang ¶¶ 9–22. Schaefer calculates flexible energy costs by considering time of use and demand energy usage. Schaefer ¶¶ 40–77. A skilled artisan reasonably would consider flexible time of use and demand charges of Schaefer when optimizing energy usage and reducing flexible energy costs with Wang's model to improve optimization of flexible costs.

We disagree with Appellant's position that adding Schaefer's costs to Wang would have been beyond the level of ordinary skill in the art, because the prior art of record evidences otherwise. For example, Wang evidences that it would be within the ken of one of ordinary skill to incorporate cost-related parameters when developing a multi-dimensional, flexible power generation cost optimization model. Wang ¶¶ 17–24. Wang adjusts models and cost factors to account for different flexible factors, including cost, to provide a comprehensive optimization of economic efficiency, safety, and reliability while also considering flexible power generation costs of the system to optimize cost. *See id.* ¶¶ 2, 7–24.

The Examiner proposes to modify Wang's model to sum the demand rate charges taught as BaseDemand in Schafer and the amount of energy consumed at a specific rate during the day taught as BaseUse in Schaefer to generate a total energy cost in Wang. Ans. 3–5. The Examiner explains that Schaefer teaches summing time of use and demand energy rates to generate energy costs. Ans. 4. The Examiner cites Schaefer's teaching of using these costs in a controller to control and optimize energy usage and device settings through a site management application. Schaefer ¶ 123; Ans. 4. Schaefer's calculation of time of use and demand energy in a control system to optimize energy costs provides a motivation for a skilled artisan to modify Wang's flexible power generation cost optimization model to consider time of use and demand energy costs among the flexible index of power generation costs of Wang's model for better optimization and energy efficiency control. The consideration of such flexible costs in Wang's flexible optimization system would produce similar benefits in Wang. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

Appellant's argument that Schaefer lacks an optimization algorithm with a cost function, even if accurate, does not undermine the Examiner's reason to combine the teachings of Wang and Schaefer to render obvious this claimed subject matter. Wang teaches an optimization algorithm and flexible cost function. Schaefer teaches that usage and demand energy costs are flexible costs that utilities consider when calculating a cost function for an energy production system. Schaefer ¶ 40.

Appellant also argues that Wang and Marhoefer are not combinable because Wang relates to technology in front of the meter (i.e., on the grid to generate electrical power to the grid) whereas Marhoefer optimizes the use or consumption of energy behind the meter for consumers of power from the grid. Appeal Br. 24–25. Appellant argues that Wang is directed to massive, complex generation systems, but Marhoefer is directed to small consumer systems so combining Marhoefer's goal of optimizing power consumption (decreasing reliance on the grid) with Wang would render Wang inoperable for its intended purpose of optimizing a cost of generating power because minimizing a flow of money from a consumer to the grid, as Marhoefer teaches, is misaligned to Wang's purpose of maximizing profits. *Id.* at 25.

"If references taken in combination would produce a 'seemingly inoperative device,' . . . such references teach away from the combination and thus cannot serve as predicates for a prima facie case of obviousness." *In re Urbanski*, 809 F.3d 1237, 1243 (Fed. Cir. 2016) (quoting *McGinley v. Franklin Sports, Inc.*, 262 F.3d 1339, 1354 (Fed. Cir. 2001)). But we see no reason why Wang's optimization model and system would be rendered inoperable merely by modifying it to include Marhoefer's communication interface and processor to control components of the system automatically.

Both references optimize the mix of energy from available sources to meet energy demands while optimizing cost. Final Act. 10–12. Therefore, both references are concerned with the optimization of energy usage. Ans. 7–8. Marhoefer teaches a user interface that allows a user to select values for constants, variables, and profiles used in various energy optimization formulas and to display a system's performance and progress towards achieving optimization objectives. Marhoefer ¶ 96.

The Examiner reasons that incorporating Marhoefer's interface and automatic control into Wang's electrical power optimization system would better optimize Wang thereby ensuring electricity is not wasted. Ans. 8–9. Marhoefer teaches advantages of implementing an energy cost optimization model similar Wang's model on a user interface, processor, and controller to allow a user to select control values of control variables to optimize energy usage costs. Marhoefer ¶¶ 95–99. These teachings would provide similar benefits in Wang to optimize energy costs. *See KSR*, 550 U.S. at 417.

In view of these teachings, we disagree with the argument that "grid side equipment of Wang simply cannot be modified to be controlled by behind-the-meter equipment and teachings of Marhoefer [because] [t]he Wang and Marhoefer systems have totally different factors and optimization schemes and objectives." Appeal Br. 26. Essentially, the Examiner relies on Marhoefer's teachings to automate Wang's model for similar results of controlling values of control variables to optimize energy costs.

"A reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment." *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012) (citing *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985)).

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

KSR, 550 U.S. at 418. As a result, "[o]n the issue of obviousness, the combined teachings of the prior art as a whole must be considered." *EWP*, 755 F.2d at 907; *see also KSR*, 550 U.S. at 421 ("A person of ordinary skill is also a person of ordinary creativity, not an automaton.").

We are not persuaded by Appellant's arguments that a skilled artisan would not appreciate that Wang's model to optimize energy costs could be implemented on an interface and processor, as Marhoefer teaches, in order to automate control. To the extent it would not have been apparent, from Wang itself, to implement Wang's flexible optimization model with such generic computer components for the standard incentives of automation, Marhoefer teaches to use such components with such multi-variable energy optimization models as a way to automate and operate more efficiently to minimize total energy cost. Marhoefer ¶¶ 2, 20–23, 95–99, Fig. 3.

Appellant argues that Schaefer teaches an equation not a cost function that establishes a relationship between multiple variables. Reply Br. 4–6. Inasmuch as there is even a prior-art-distinguishing difference between an equation and a function, this argument is not persuasive because the alleged equation in paragraph 40 of Schaefer is in the format V_{Base} (period), which Schaefer describes as a baseline primary energy billed value for a period of time in dollars. Schaefer ¶¶ 40, 41. Thus, it establishes a relationship between two variables, namely, a billed value and a period of time. *Id.*

Appellant's Specification provides no example of a cost function to guide our interpretation of the claim language. A multivariate optimization algorithm is disclosed at paragraph 89, but no cost function is identified. Paragraph 91 indicates that costs and benefits can be summed into a net cost function, which may be referred to as the "cost function" but no exemplary cost function is described. Paragraph 93 indicates that a cost $f_c(X)$ may consider control parameter values in *X*. Appellant's Figure 10 illustrates Cost Function $f_c(X)$ 102 with no further description. Thus, the Examiner's finding that Schaefer teaches a cost function is consistent with the broadest reasonable interpretation of the term in light of the Specification.

Nor are we persuaded that Schaefer does not control electrical systems and costs. *See* Reply Br. 6; Appeal Br. 13–15. Schaefer uses data from web based server software to alter device settings and control devices to avoid unacceptable energy costs. Schaefer ¶ 123 ("data from the web based server software can be sent through the site gateway to the same devices to alter their settings"). Schaefer predicts threshold levels and has means to control energy devices and settings to reduce energy costs similar to Wang's energy cost optimization model. *See id.*; Ans. 4–5.

Thus, we sustain the rejection of claim 1 and claims 2–6, 8–12, 14–17, and 20–25, which fall with claim 1. *See* Appeal Br. 27.

Claims 7, 13, 18, 19, and 26

The Examiner rejects claims 7, 13, 18, 19, and 26 over Wang, Marhoefer, Schaefer, and either Ghosh or Bozchalui. *See* Final Act. 27–34. Appellant argues that Ghosh and Bozchalui do not cure the deficiencies of Wang, Marhoefer, and Schaefer as to claims 1, 11, and 25 from which claims 7, 13, 18, 19, and 26 depend respectively. Appeal Br. 16, 20, 23, 27.

Because we sustain the rejection of independent claims 1, 11, and 25, these arguments are not persuasive. Thus, we also sustain the rejection of dependent claims 7, 13, 18, 19, and 26.

CONCLUSION

In summary:

Claims Rejected	**35 U.S.C. §**	**Reference(s)/ Basis**	**Affirmed**	**Reversed**
1–6, 8–12, 14–17, 20–25	103	Wang, Marhoefer, Schaefer	1–6, 8–12, 14–17, 20–25	
7, 18, 19	103	Wang, Marhoefer, Schaefer, Ghosh	7, 18, 19	
13, 26	103	Wang, Marhoefer, Schaefer, Bozchalui	13, 26	
Overall Outcome			1–26	

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).

AFFIRMED