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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* SHAI ZEMACH

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Appeal 2019-003479  
Application 14/178,344  
Technology Center 2100

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Before JUSTIN BUSCH, JOYCE CRAIG, and JASON M. REPKO,  
*Administrative Patent Judges.*

BUSCH, *Administrative Patent Judge.*

DECISION ON APPEAL

Appellant<sup>1</sup> appeals under 35 U.S.C. § 134(a) from a Final Rejection of claims 1–36. We have jurisdiction over the pending claims under 35 U.S.C. § 6(b).

We affirm.

STATEMENT OF THE CASE

*Introduction*

Appellant’s disclosure generally relates to “a system for monitoring heated water in a boiler and forecasting usage needs.” Spec. 1:9–10; *see id.*,

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<sup>1</sup> We use the term Appellant to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Shai Zemach as the real party in interest. Appeal Br. 3.

Abstract. More specifically, the claimed subject matter includes methods and systems to determine and display a real-time estimated amount of water remaining in a water boiler, as well as additional values derived from the amount of water remaining, based on measurements received from at least three sensors outside the boiler tank that are retrofit to the water boiler—the three sensors being (1) a temperature that measures the water in the cold-water intake pipe, (2) a temperature sensor that measures the water in the hot-water outlet pipe, and (3) a flow meter that measures the water flow rate in the outlet pipe. Spec. 2:2–14, Figs. 1, 2. Claims 1, 23, 26, and 35 are independent claims, and representative claim 23 is reproduced below:

23. A method for providing a real-time estimate of available hot water in a water boiler tank, the method comprising the steps of:

(a) retrofitting an intake temperature sensor and flow meter on an intake pipe outside the water boiler tank and an outlet temperature sensor on an outlet pipe outside the water boiler tank;

(b) receiving flow data of water running through said intake pipe connected to the water boiler, from said flow meter operationally coupled to said intake pipe;

(c) receiving an outlet temperature measurement of water in said outlet pipe connected to the water boiler tank from said outlet temperature sensor in said outlet pipe; and

(d) receiving an intake temperature measurement of water in said intake pipe connected to the water boiler tank from said intake temperature sensor operationally coupled to said intake pipe;

(e) calculating an estimated amount of hot water in the water boiler tank based on said flow data, outlet temperature measurement and intake temperature measurement.

*The Pending Rejections*

Claims 1–36 stand rejected under 35 U.S.C. § 101 as being directed to patent-ineligible subject matter. Ans. 5–6.

Claims 23–26 stand rejected under 35 U.S.C. § 103 as obvious in view of Harbin (US 2010/0004790 A1; Jan. 7, 2010), Wacknov (US 2006/0230772 A1; Oct. 19, 2006), and Min (US 2012/0227681 A1; Sept. 13, 2012). Ans. 7–10.

Claims 27–35 stand rejected under 35 U.S.C. § 103 as obvious in view of Harbin, Wacknov, Min, and Lahyani (WO 2012/081014 A1; June 21, 2012). Ans. 10–12.

ANALYSIS

Appellant argues the claims as a group. *See* Appeal Br. 10–23.<sup>2</sup> Therefore, we select independent claim 1 as representative of all pending claims rejected under 35 U.S.C. § 101, and we select independent claim 23 as representative of all pending claims rejected under 35 U.S.C. § 103. *See* 37 C.F.R. § 41.37(c)(1)(iv).

REJECTION UNDER 35 U.S.C. § 101

If a claim falls within one of the statutory categories of patent eligibility, the Supreme Court’s two-step framework guides our analysis of patent eligibility under 35 U.S.C. § 101—i.e., evaluating whether the claim is directed to a judicially recognized exception. *Alice Corp. v. CLS Bank*

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<sup>2</sup> Appellant filed a first brief on August 6, 2018. In response to receiving a Notice of Non-Compliant Appeal Brief that required a new Claims Appendix, Appellant submitted a second brief on September 17, 2018. Throughout this decision, we refer to first brief as “Brief” and cite to it as “Appeal Br.,” and we refer to the second brief as “Supplemental Brief” and cite to it as “Supp. Br.”

*Int'l*, 573 U.S. 208, 217 (2014). We also consider the United States Patent and Trademark Office's revised guidance for applying the *Alice* framework when evaluating subject matter eligibility under 35 U.S.C. § 101. USPTO, 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) ("Guidance"); USPTO, *October 2019 Patent Eligibility Guidance Update* (Oct. 18, 2019), <https://www.uspto.gov/PatentEligibility> ("Guidance Update"); *see also* Manual of Patent Examining Procedure ("MPEP") §§ 2106.04, 2106.05 (9th ed., Rev. 10.2019, June 2020).

As part of our inquiry, we "look at the 'focus of the claimed advance over the prior art' to determine if the claim's 'character as a whole' is directed to excluded subject matter." *Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1257 (Fed. Cir. 2016); *see Alice*, 573 U.S. at 217 ("First, we determine whether the claims at issue are directed to one of those patent-ineligible concepts."). The Guidance breaks this "directed to" inquiry ("Step 2A") into two prongs of analysis: (i) does the claim *recite* a judicial exception (e.g., an abstract idea) ("Prong 1"), and (ii) if so, is the judicial exception integrated into a practical application ("Prong 2"). Guidance, 84 Fed. Reg. at 54.

If we determine the claim is directed to an abstract idea, we then examine "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." *Alice*, 573 U.S. at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 78, 79 (2012)). That is, we examine the claims for an "inventive concept," "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*, 573 U.S. at 217–18 (alteration in original) (quoting *Mayo*, 566 U.S. at 72–73); *see* Guidance, 84 Fed. Reg. at 56 (directing us to consider whether the additional claim elements add “a specific limitation or combination of limitations that are not well-understood, routine, conventional activity in the field” or “simply append[] well-understood, routine, conventional activities previously known to the industry” (“Step 2B”)).

*Guidance Step 2A (The Alice “Directed To” Inquiry)*

The Examiner determines the claims are directed to “receiving sensor data, comparing said sensor data, and calculating using said sensor data.” Final Act. 6; *see* Ans. 4–5 (explaining that “as a whole, the claims are directed towards a system for collecting data and performing a calculation for display” and the “focus or character of the claims is not directed to ‘the simplicity and adaptability to existing boiler systems’”). The Examiner determines the claimed concept is “an idea of itself” similar to concepts the Federal Circuit previously identified as abstract. Final Act. 6 (citing *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016)).

In general, we agree with the Examiner that the claims as a whole are directed to an abstract idea. *See* Guidance, 84 Fed. Reg. at 52. More specifically, we determine the claims are directed to calculating a usage value derived from the amount of hot water remaining in a water tank, which is calculated based on received measurements from sensors in a retrofit water boiler system (hereinafter, “calculating a water usage value”).<sup>3</sup> We

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<sup>3</sup> Some claims calculate the amount of available hot water but do not calculate a value based on that amount of available hot water.

discuss our reasoning with respect to the Guidance’s two prongs of the “directed to” inquiry in the following subsections.

The Examiner’s characterization of the claims as being directed to “an idea of itself” is consistent with the Federal Circuit’s determination that claims focusing on mental processes are abstract. Although we describe the abstract idea slightly differently than the Examiner, the Examiner’s characterization of the idea is not erroneous. “An abstract idea can generally be described at different levels of abstraction.” *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1240 (Fed. Cir. 2016). The level of abstraction an examiner uses to describe an abstract idea need not “impact the patentability analysis.” *Apple*, 842 F.3d at 1241. That is true here. Regardless of the level of generality used to describe the abstract idea recited, the claims are directed to an abstract idea. *Cf. Accenture Glob. Servs., GmbH v. Guidewire Software, Inc.*, 728 F.3d 1336, 1344–45 (Fed. Cir. 2013) (“Although not as broad as the district court’s abstract idea of organizing data, it is nonetheless an abstract concept.”).

This characterization is consistent with how Appellant describes the claimed embodiments of the invention. At a high level, the claims themselves recite that they are methods and systems “for providing a real-time estimate of available hot water in a water boiler tank.” Supp. Br. 8 (claim 23); *see also* Supp. Br. 4 (claim 1 reciting a “retrofit water boiler monitoring and forecast system,” emphasis added), 9 (claim 26 reciting “method for calculating an estimated amount of hot water in a water boiler tank”). Moreover, Appellant explicitly states that “[t]he claimed invention relates to retrofit system and corresponding method for monitoring, forecasting and providing a real-time estimate of the amount of available hot

water in a water boiler tank.” Appeal Br. 8; *see also* Appeal Br. 15 (“The instant solution resolves a specifically identified problem of providing real-time information when the system is in use.”). The Specification also supports this characterization. *See, e.g.*, Spec. 1:9–11 (“The present invention relates . . . to a system for monitoring heated water in a boiler and forecasting usage needs.”), 7:17–20 (“it is to be understood that the *invention is not limited* in its application to the details of design and the *arrangement of the components set forth* in the following description or illustrated in the drawings,” emphases added), 9:19–22 (“The processing unit uses flow rate algorithms, and in some embodiments, additional temperature and usage information ( e.g. the volume of the boiler tank, thermostat activity, historical usage and the like), to deduce the approximate amount of hot water remaining in the boiler.”) Figs. 6–7, Title (“REAL-TIME BOILER FORECAST SYSTEM AND METHOD”).

Consistent with our Guidance and case law, and as explained further below, we conclude that calculating a water usage value is directed to an abstract idea because, similar to the claims held ineligible in *Electric Power*, it is a process that could be performed mentally. *See* Guidance, 84 Fed. Reg. at 52 (explaining that claims that recited concepts performed in the human mind recite abstract ideas); *Elec. Power*, 830 F.3d 1350.

Appellant argues the “claims are directed to a retrofit system, unique in its simplicity and adaptability to existing boiler systems” and the claimed “uniqueness over the cited prior art is based on the **placement** of the sensors (outside the water tank) and the fact that there are so **few** sensors.” Appeal Br. 11. Appellant argues the Examiner failed to consider the claims as a whole because, although the calculations are important, the calculations



“have not been argued as unique over the prior art, rather the structure of the machinery has been shown to be unique and unexpected.” Appeal Br. 11–12.

We disagree. Although the claims recite the particular placement of the temperature sensors and flow rate meter, the particular placement is necessary to collect the measurements used in the claimed calculation. In other words, the claims are directed to calculating a water usage value and, in order to perform the abstract idea (i.e., the calculation), the water boiler system must be able to measure the values used in the calculation.

Guidance Step 2A, Prong 1 (Recite an Abstract Idea)

The Examiner determines the recited steps—i.e., receiving sensor data (from two temperature sensors and a flow rate meter), calculating an amount of available hot water based on the received sensor data, and displaying a real-time usage value calculated based on the amount of available hot water, and displaying the calculated value—merely describe the concept of collecting sensor data, calculating a value using the collected data, and displaying the result. Ans. 4; *see also* Final Act. 6 (citing *Elec. Power*, 830 F.3d 1350). As such, and consistent with the Guidance, the Examiner concludes the claims recite an abstract idea. We agree that the concept recited in the claims is an abstract idea and, more specifically, falls within the Guidance category of mental processes (alternatively, the focus of the claim—calculating a water usage value based—falls within the category of mathematical concepts). Ans. 4–5; Final Act. 6; *see* 84 Fed. Reg. at 52.

More specifically, claim 1 is reproduced below and includes the claim limitations that recite aspects of the abstract idea emphasized in *italics*:

1. A retrofit water boiler monitoring and forecast system, for a water boiler system which includes a water boiler tank, a cold-water intake pipe, a hot-water outlet pipe, the retrofit system comprising:

(a) an intake temperature sensor, configured to measure a water temperature in the cold-water intake pipe;

(b) a flow meter, configured to measure a flow rate of water running through the water boiler system;

(c) an outlet temperature sensor, configured to measure a water temperature in the hot-water outlet pipe;

(d) a processing unit, adapted to receive sensor data from said intake temperature sensor, said flow meter, and said outlet temperature sensor even when said water is running through the boiler system, and configured to calculate an amount of available hot water in the water boiler, said amount of available hot water indicative of a delta value between a current time when said water temperature of said water flowing through in said outlet pipe is above a predetermined temperature and a future time when said water flowing through said outlet pipe will drop below said predetermined temperature, said amount of available hot water being calculated according to said water temperature in the intake pipe, a present said flow rate and said water temperature in the outlet pipe and a heating duration of a heating element of the water boiler; and

(e) a display panel operationally coupled to said processing unit, said display panel configured to display at least one *estimated Real-Time Usage Value (RTUV)*, calculated by said processing unit based on said amount of available hot water;

wherein all components of the retrofit system are added to the water boiler system outside of the water boiler tank.

In other words, the abstract mental process or mathematical concept of calculating a water usage value includes the portion of claim 1 that uses the various input values received at the processing unit from the various sensors to calculate an amount of available hot water in the water boiler and

calculating a “Real-Time Usage Value” based on the amount of available hot water.

Appellant argues that, under Step 1 of *Alice*, the Examiner has not considered the claims as a whole because the Examiner has ignored the unique placement of the sensors. *See* Appeal Br. 11–12. Appellant does not dispute that the above-identified steps constitute mental processes and mathematical concepts and, therefore, under this prong of our analysis, Appellant does not contest that the claims *recite* an abstract idea. For the reasons discussed above, we determine claim 1 recites an abstract idea.

Guidance Step 2A, Prong 2 (Integrate Into a Practical Application)

Because the claims recite an abstract idea, we next determine whether the claims integrate the abstract idea into a practical application. Guidance, 84 Fed. Reg. at 54. To determine whether the judicial exception is integrated into a practical application, we identify whether there are “*any additional elements recited in the claim beyond the judicial exception(s)*” and evaluate those elements to determine whether they integrate the judicial exception into a recognized practical application. Guidance, 84 Fed. Reg. at 54–55 (emphasis added); *see also* MPEP §§ 2106.04(d), 2106.05(a)–(c), (e)–(h).

As noted above, the portions of claim 1 not italicized—i.e., the inlet and outlet temperature sensors, the flow rate meter, the processing unit that receives the sensor data and calculates the two values (an amount of available hot water and an estimated RTUV), a display panel that displays the RTUV, and the fact that all these components “are added to the water boiler system outside of the water boiler tank”—are the additional limitations beyond the abstract idea. Appellant also separately argues claim

3 is directed to eligible subject matter. Claim 3, which depends directly from claim 1, further recites that the “processing unit activates said heating element when said amount of available hot water is below a predefined threshold.” Supp. Br. 5. We also treat claim 3’s additional limitation of the processing unit activating a heating element to be an additional limitation beyond the abstract idea.

Here, we determine the additional limitations do not integrate the judicial exception into a practical application. More particularly, the claims do not recite (i) an improvement to the functionality of a computer or other technology or technical field (*see* MPEP § 2106.05(a)); (ii) use a “particular machine” to apply or use the judicial exception (*see* MPEP § 2106.05(b)); (iii) a particular transformation of an article to a different thing or state (*see* MPEP § 2106.05(c)); or (iv) any other meaningful limitation (*see* MPEP § 2106.05(e)). *See also* Guidance, 84 Fed. Reg. at 55.

The Examiner determines the additional limitations do not add significantly more to the abstract idea because they do not improve the functioning of a computer or another technology. Final Act. 6. The Examiner explains that the processing unit and display panel and their claimed functions “are merely a recitation of generic computer structure that serves to perform generic computer functions.” Ans. 5; *see FairWarning IP, LLC v. Iatric Sys., Inc.*, 839 F.3d 1089, 1096 (Fed. Cir. 2016). The Examiner determines the recited sensors (the two temperature sensors and the flow meter) are merely data gathering, and the fact that the system components are retrofit to the outside of a water boiler tank simply links the abstract idea to a particular field of use. Ans. 5; *see* Ans. 6 (“adding sensors to the exterior of pipes for collecting data is extra-solution activity for

performing the data gathering”). Therefore, the Examiner concludes the claims are directed to an abstract idea.

Appellant argues the “*uniqueness* [of the claims] *over the cited prior art* is based on the **placement** of the sensors (outside the water tank) and the fact that there are so **few** sensors.” Appeal Br. 11–12 (*italics added*). Appellant argues that, “even if . . . the calculation is regarded as an abstract idea, such a calculation is significantly more than an abstract idea and can only be accurately calculated based on real-time sensor data received from the aforementioned temperature sensors and flow meter.” Appeal Br. 13. Appellant repeatedly argues that the sensor placement and the resulting capabilities were not present *in the prior art*, and asserts that the “placement and manner of receiving sensor data is not merely ‘extrasolution activity’ but rather goes to the heart of the invention.” Appeal Br. 13. Relatedly, Appellant contends the claims recite significantly more because they recite a “specific structure to the retrofit system.” Appeal Br. 15 (citing *Trading Techs. Int’l, Inc. v. CQG, Inc.*, 675 F. App’x 1001 (Fed. Cir. 2017)). Finally, Appellant argues claim 3’s recited limitation that activates a heating element is similar to a robotic arm assembly. Supp. Br. 2.

As an initial matter, we note that Appellant’s repeated assertion that the placement of the sensors is unique over the prior art does not directly address whether the sensor placement integrates the abstract idea into a practical application. *See Diamond v. Diehr*, 450 U.S. 175, 188–89 (1981) (*emphasis added*) (“The ‘novelty’ of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.”). Furthermore, to the extent Appellant argues the

claims recite significantly more than an abstract idea because they include physical structure, the fact that the claims include components that “necessarily exist[s] in the physical, rather than purely conceptual, realm’ is beside the point.” *Alice*, 573 U.S. at 224 (citation omitted).

As discussed above, the particular placement of sensors outside the water boiler tank is necessary to collect the particular data (i.e., the water temperature in the cold-water intake pipe, the water temperature in the hot-water outlet pipe, and the flow rate of water running through the system) used in the calculations. Accordingly, we agree with the Examiner that the limitations reciting sensors configured to collect various data constitute data gathering because the limitations simply describe generic sensors to measure/gather the required data, which is insufficient to integrate the abstract idea into a practical application. Guidance, 84 Fed. Reg. at 55; *see* MPEP § 2106.05(g). We also agree with the Examiner, *see* Ans. 5, that the limitation reciting that “all components of the retrofit system are added to the water boiler system outside of the water boiler tank” merely generally links the use of the abstract idea to a particular technological environment or field of use because the limitation merely describes the locations of the sensors necessary to gather the data used in the calculation(s). This, too, is insufficient to integrate the abstract idea into a practical application. Guidance, 84 Fed. Reg. at 55; *see* MPEP § 2106.05(h).

Appellant does not argue that any of the components themselves (i.e., the sensors, processing unit, or display panel) improve a computer or other technology, instead asserting the particular *arrangement* of the sensors improves on conventional water boilers. *See* Appeal Br. 14. We agree with the Examiner that the processing unit and display panel are generic computer

components performing generic computer functions—processing and displaying data, respectively. *See* Ans. 5; Spec. 8:20–24 (“Processor 120 is a general purpose microprocessor . . . Processing unit 120 may include a plurality of microprocessors and/or additional components known in the art.”), 10:18–20 (describing the display panel only by its function of displaying data); Guidance, 84 Fed. Reg. at 55; MPEP § 2106.05(f). Similarly, the sensors are also generic components that measure either a temperature or flow rate. *See* Spec. 9:6–13 (describing the temperature sensors and flow meter at a high level of generality); Guidance, 84 Fed. Reg. at 55; *see* MPEP § 2106.05(f).

To the extent Appellant’s claimed retrofit system provides an improvement, the improvement lies in identifying a calculation using particular data to calculate an amount of available hot water remaining and, optionally, an additional water-usage value based on that amount. As such, Appellant’s claims, at most, improve the abstract idea itself. For at least the foregoing reasons, the claims do not integrate the judicial exception into a practical application. Accordingly, the claims are directed to an abstract idea.

Finally, the additional limitation of activating a heating element recited in dependent claim 3 also is merely extra-solution activity because the additional limitation merely requires sending a signal to the heating element. Furthermore, this additional step simply applies the abstract idea when the amount of available hot water is below a threshold.

*Guidance Step 2B (Inventive Concept/Significantly More)*

Because we determine representative claim 1 is directed to an abstract idea, we evaluate whether the claims include an inventive concept. *See*

Guidance, 84 Fed. Reg. at 56. As stated in the Guidance, many of the considerations to determine whether the claims amount to “significantly more” under step two of the *Alice* framework already are considered as part of determining whether the judicial exception has been integrated into a practical application. Guidance, 84 Fed. Reg. at 56. Thus, at this point of the analysis, we determine whether the claims (1) add a specific limitation, or combination of limitations, that is not well-understood, routine, conventional activity in the field, or (2) simply append well-understood, routine, conventional activities at a high level of generality. Guidance, 84 Fed. Reg. at 56.

As explained above, the additional elements recited in the claims are the generic sensors, the processing unit, the display panel, and the fact that the components are retrofit outside the water boiler tank. Appellant argues that the “specific placement of the sensors” was not well-understood, routine, and conventional in the field. *See* Appeal Br. 14. However, the evidence of record does not support Appellant’s assertion, nor does Appellant point to anything in the Specification suggesting that the particular arrangement of sensors was beyond what was well-understood, routine, and conventional in the art.

The Specification explains that it would “be highly advantageous to have a real-time indication of the amount of available hot water for use in a household.” Spec. 1:25–26. The Specification explains that the temperature sensors and flow meter are adapted to be attached to either the outlet pipe or the inlet/intake pipe and convey their measurements to a processing unit. Spec. 9:7–13; *see also* Spec. 11:5–17 (describing that the sensors measure temperatures and a flow rate of the water in the inlet and outlet pipes then



transmit the sensed data to the processing unit). That the sensors are retrofit to outside an existing water boiler's water tank necessarily follows from the fact that the abstract idea requires collecting data from the particular locations (inlet and outlet pipes) that are outside the water tank. The Specification does not place any emphasis on the sensor placement or describe the placement in a way to suggest that the placement or arrangement was beyond what was well-understood, routine, and conventional. *See Berkheimer* Memorandum 3; MPEP § 2106.05(d).<sup>4</sup>

Additionally, Harbin describes retrofitting existing water heaters and adding temperature sensors and a flow meter to the inlet and outlet pipes outside the water tank in a water boiler system. *See* Harbin ¶¶ 71 (describing adding “optional sensors including an inlet temperature sensor 610, an outlet temperature sensor 608, and a flow rate sensor 606” to existing water heaters and that “the sensors may be used to determine existing or remaining water heater available hot water capacity at a given point in the use cycle”), 114 (describing that water “usage may be estimated by monitoring the upper and lower temperature sensors 608, 610” and that a

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<sup>4</sup> On April 19, 2018, the Deputy Commissioner for Patent Examination Policy issued a memorandum titled: Changes in Examination Procedure Pertaining to Subject Matter Eligibility, Recent Subject Matter Eligibility Decision (*Berkheimer v. HP, Inc.*) (i.e., “the *Berkheimer* Memorandum”) (discussing the *Berkheimer* decision, *Berkheimer v. HP Inc.*, 881 F.3d 1360 (Fed. Cir. 2018)) (available at <https://www.uspto.gov/sites/default/files/documents/memo-berkheimer-20180419.PDF>). A specification that describes additional elements “in a manner that indicates that the additional elements are sufficiently well-known that the specification does not need to describe the particulars of such additional elements to satisfy 35 U.S.C. § 112(a)” can show that the elements are well-understood, routine, and conventional. *Berkheimer* Memorandum at 3.

“temperature sensor 610 may be installed at the inlet pipe”), 140–145 (describing retrofitting temperature sensors to the outside of a water tank), Fig. 6 (depicting temperature sensors 608, 610 and flow rate meter 606 installed on the inlet and outlet pipes *outside* a water tank). Wacknov also teaches sensors on water pipes *outside* a water tank. *See* Wacknov ¶¶ 45 (describing sensors to measure properties such as temperature, pressure, and flow, in a plumbing system), 48 (describing temperature sensors to sense the temperature of the hot water in an outlet pipe and the cold water in an inlet pipe), 65 (“This sensor measures the outside surface temperature of the pipe and can be mounted without cutting or modifying hot water piping 203 in any way.”), Fig. 2 (depicting temperature sensor 204 measuring the water temperature in outlet pipe 203, which is outside water tank 202). Min depicts a flow rate sensor attached to the inlet pipe outside the water tank. *See* Min ¶ 4, Fig. 1.

“Whether a particular technology is well-understood, routine, and conventional goes beyond what was simply known in the prior art.” *Berkheimer v. HP Inc.*, 881 F.3d at 1369. “The mere fact that something is disclosed in a piece of prior art, for example, does not mean it was well-understood, routine, and conventional.” *Id.* Nevertheless, Harbin, Wacknov, and Min provide evidence that the particular claimed arrangement of sensors outside the water tank was at least known and used in the art. In combination with Appellant’s minimal description in the Specification, the weight of the evidence supports a finding that the recited sensor placement was well-understood, routine, and conventional. For the reasons discussed *supra*, we sustain the Examiner’s rejection of claims 1–36 under 35 U.S.C. § 101.

REJECTION UNDER 35 U.S.C. § 103

The Examiner rejects claims 23–26 as obvious in view of Harbin, Wacknov, and Min, and the Examiner rejects claims 27–35 as obvious in view of Harbin, Wacknov, Min, and Lahyani. Final Act. 7–12. The Examiner finds Harbin teaches: (1) receiving flow rate data of water running through an intake pipe from a flow meter coupled to the intake pipe; (2) receiving a temperature measurement of water running through an outlet pipe from a temperature sensor coupled to the outlet pipe; and (3) receiving a temperature measurement of water running through an intake pipe from a temperature sensor coupled to the intake pipe, but Harbin fails to teach or suggest retrofitting the three recited sensors on the respective pipes. Final Act. 7–8 (citing Harbin ¶ 71); Ans. 8 (explaining “that Harbin explicitly teaches the use of an inlet sensor 610, an outlet temperature sensor 608 and flow rate sensor 606 in paragraph [0071] and Figure 6.”). The Examiner finds Wacknov teaches attaching temperature sensors to the outside of a water *pipe* and Min teaches attaching a flow rate meter on the outside of a water pipe. Final Act. 8 (citing Wacknov ¶ 65; Min ¶ 58).

Appellant argues Harbin’s temperature sensors are inside the water tank and, therefore, fail to teach or suggest water temperature sensors located outside the water tank. Appeal Br. 17. Appellant asserts Wacknov fails to cure this deficiency because “Wacknov does not in fact teach retrofitting temperature sensors **outside the water boiler tank.**” Appeal Br. 18. Specifically, Appellant acknowledges that Wacknov teaches monitoring temperature sensors outside a water pipe, but contends this teaching “is of no moment whatsoever” because the claims recite “retrofitting temperature sensors **outside the boiler tank**, not outside the

pipe as taught by Wacknov.” Appeal Br. 18. Appellant argues modifying Harbin with Wacknov’s teachings to remove the sensors from inside the tank would render Harbin inoperable for its intended purpose that need to measure the water temperatures inside the tank. Appeal Br. 18–21.

Appellant’s arguments are not persuasive because they do not address the Examiner’s findings. Appellant’s arguments all are based on an assertion that Harbin’s upper and lower temperature sensors are used to measure the temperature of the upper and lower volumes of water in the tank. Appellant is correct that Harbin’s temperature sensors 301 and 302 (and elements 307a and 307b) are used to measure temperatures in the upper and lower portions of the tank, respectively. *See* Harbin ¶¶ 51 (explaining that thermostats 301 and 302 “measure[] the temperature in the [lower/upper] portion of the water heater’s tank”), 53 (identifying “temperature sensors 307a and 307b” that sense the temperature of the upper and lower volumes, respectively), Fig. 3.

However, the Examiner does not find these thermostats or temperature sensors teach the recited temperatures sensors. Instead, the Examiner finds “optional sensors including an inlet temperature sensor 610, and outlet temperature sensor 608, and a flow rate sensor 606” teach or suggest the three recited sensors. Harbin ¶ 71; *see* Final Act. 8 (citing Harbin ¶ 71). Figure 6 at least suggests locating these sensors *outside the water tank*. *See* Harbin, Fig. 6. Harbin teaches the inlet sensor’s “preferred location would be a *distance from the upper portion of the water heater* to avoid conducted heat from the water heater.” Harbin ¶ 71 (emphasis added). We agree with the Examiner that Harbin’s disclosures at least suggest that the sensors are outside the water tank.

As Appellant notes, the Examiner merely relies on Wacknov and Min to teach that the sensors can be mounted *outside the pipes*, not outside the water tank. Because we disagree with Appellant’s assertion that Harbin fails to teach placing the sensors outside the tank, Appellant’s arguments that one would not modify Harbin to place the sensors outside the tank and that doing so would render Harbin inoperable also are unpersuasive.

For these reasons, we agree with the Examiner that the combination of Harbin, Wacknov, and Min teaches or suggests the subject matter recited in representative claim 23. Accordingly, we sustain the Examiner’s rejection of representative claim 23 and claims 24–35, which Appellant does not argue separately with particularity.

#### DECISION SUMMARY

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>References / Basis</b>	<b>Affirmed</b>	<b>Reversed</b>
1–35	101	Eligibility	1–35	
23–26	103	Harbin, Wacknov, Min	23–26	
27–35	103	Harbin, Wacknov, Min, Lahyani	27–35	
<b>Overall Outcome</b>			1–35	

#### TIME PERIOD FOR RESPONSE

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. § 41.50(f).

AFFIRMED