NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

ECOFACTOR, INC.,
Appellant

v.

GOOGLE LLC,
Appellee

2024-1367, 2024-1368

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2022-00969, IPR2022-00983, IPR2023-00355, IPR2023-00356.

Decided: July 8, 2025

MATTHEW AICHELE, Russ August & Kabat, Washington, DC, argued for appellant. Also represented by KRISTOPHER DAVIS, REZA MIRZAIE, JAMES PICKENS, PHILIP WANG, Los Angeles, CA.

ELIZABETH LAUGHTON, Smith Baluch LLP, Washington, DC, argued for appellee. Also represented by MATTHEW A. SMITH.

Before TARANTO, STOLL, and STARK, *Circuit Judges*.

TARANTO, *Circuit Judge*.

EcoFactor, Inc. owns U.S. Patent No. 8,596,550, which relates to heating, ventilation, and air conditioning (HVAC) systems. Google LLC successfully petitioned for inter partes reviews of the '550 patent.[1] In the reviews, the Patent Trial and Appeal Board of the Patent and Trademark Office determined that all challenged claims were unpatentable for obviousness under 35 U.S.C. § 103. *Ecobee Technologies ULC v. EcoFactor, Inc.*, IPR2022-00983, 2023 WL 7493563 (P.T.A.B. Nov. 13, 2023) (*Decision I*); *Ecobee Technologies ULC v. EcoFactor, Inc.*, IPR2022-00969, 2023 WL 7602838 (P.T.A.B. Nov. 13, 2023) (*Decision II*). EcoFactor appealed, and we now affirm.

I

A

The '550 patent relates to programmable thermostats used in HVAC systems that "automate the process of reducing conditioning during times when the space is unoccupied, or while occupants are sleeping, and thus reduce energy consumption." '550 patent, col. 1, lines 20–25. With typical programmable thermostats, a mismatch "between the preferences of the occupants and the actual settings employed" can lead to dissatisfaction and discomfort of the occupants, who might respond by manually overriding the programmed setting. *Id.*, col. 1, line 45, through col. 2, line 8. The '550 patent proposes a programmable thermostat

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[1] Google's petitions were subsequently joined with those of Ecobee Technologies ULC. J.A. 1 n.1; J.A. 46 n.1. For simplicity, and in line with how the parties discuss the proceedings, we refer exclusively to Google as the petitioner throughout. *See* EcoFactor Opening Br. at 6 n.3; Google Response Br. at 5 n.1.

system that adapts its long-term programming in response to such manual thermostat-setting changes. *Id.*, col. 2, lines 9–12. The system also "take[s] into account both outside weather conditions and the thermal characteristics of individual homes in order to . . . achieve the best possible balance between comfort and energy savings." *Id.*, col. 2, lines 12–17.

The "thermal mass," or "speed with [which] the temperature inside a given building will change in response to changes in outside temperature," may be calculated using temperature readings from inside and outside the house as well as data regarding the timing of air conditioning cycles. *Id.*, col. 5, lines 21–29. The system uses that thermal mass to "predict, at any given time on any given day, the rate at which inside temperature should change for given inside and outside temperatures," which, in turn, determines when the HVAC system should be turned on to reach the desired temperature at the desired time. *Id.*, col. 5, lines 30–40.

The patent states that manual overrides are generally not recorded by the thermostat (or communicated to the system), but must be detected by calculating the difference between the setpoint as recorded by the thermostat and the scheduled setpoint. *Id.*, col. 5, lines 44–47; *id.*, col. 5, line 54, through col. 6, line 19. The system can use manual override data to determine whether a change in baseline programming is warranted, *i.e.*, if the occupants' preferences (as evidenced by the manual override) do not align with the scheduled programming. *Id.*, col. 7, lines 3–43.

The independent claims recite as follows:

> 1. A method for detecting manual changes to the setpoint for a thermostatic controller comprising:
>
> accessing stored data comprising a plurality of internal temperature measurements taken within a structure and a plurality of outside temperature

measurements relating to temperatures outside the structure;

using the stored data to predict a rate of change of temperatures inside the structure in response to at least changes in outside temperatures;

calculating with one or more computer processors, scheduled programming of the thermostatic controller for one or more times based on the predicted rate of change, the scheduled programming comprising at least a first automated setpoint at a first time;

generating with one or more computer processors, a difference value based on comparing an actual setpoint at the first time for said thermostatic controller to the first automated setpoint for said thermostatic controller;

detecting a manual change to the first automated setpoint by determining whether said actual setpoint and said first automated setpoint are the same or different based on said difference value; and

logging said manual change to a database associated with the thermostatic controller.

Id., col. 8, lines 7–30 (emphases added).

9. A method for incorporating manual changes to the setpoint for a thermostatic controller into long-term programming of said thermostatic controller comprising:

accessing stored data comprising a plurality of internal temperature measurements taken within a structure and a plurality of outside temperature

> measurements relating to temperatures outside the structure;
>
> **using the stored data to predict a rate of change of temperatures inside the structure in response to at least changes in outside temperatures;**
>
> calculating scheduled programming of setpoints in the thermostatic controller based on the predicted rate of change, the scheduled programming comprising at least a first automated setpoint at a first time and a second automated setpoint at a second time;
>
> **comparing the actual setpoint at the first time for said thermostatic controller to the first automated setpoint for said thermostatic controller;**
>
> detecting a manual change to the first automated setpoint by determining whether said actual setpoint and said first automated setpoint are the same or different;
>
> changing the second automated setpoint at the second time based on at least one rule for the interpretation of said manual change.

Id., col. 8, line 50, through col. 9, line 6 (emphases added).

> 17. An apparatus for detecting manual changes to the setpoint for a thermostatic controller comprising:
>
> at least a programmable communicating thermostat;
>
> at least a remote processor;
>
> at least a network connecting said remote processor and said communicating;

> at least a database comprising a plurality of internal temperature measurements taken within a structure and a plurality of outside temperature measurements relating to temperatures outside the structure;
>
> **computer hardware comprising one or more computer processors configured to use the stored data to predict a rate of change of temperatures inside the structure in response to changes in outside temperatures;**
>
> the one or more computer processors configured to calculate scheduled setpoint programming of the programmable communicating thermostat for one or more times based on the predicted rate of change, the scheduled programming comprising one or more automated setpoints;
>
> at least a database that stores the one or more automated setpoints associated with the scheduled programming for said programmable communicating thermostat;
>
> at least a database that stores actual setpoint programming of said programmable communicating thermostat; and
>
> **the one or more computer processors configured to compare the one or more automated setpoints associated with said scheduled setpoint programming with said actual setpoint programming**.

Id., col. 9, line 26, through col. 10, line 17 (emphases added).

B

Google petitioned for two inter partes reviews of the '550 patent on May 5, 2022, one addressing claims 1–16, the other addressing claims 17–23. The petitions asserted

that the challenged claims were unpatentable for obviousness under a combination of U.S. Patent Pub. Nos. 2004/0117330 ("Ehlers") and 2005/0040250 ("Wruck"). Ehlers discloses an energy management system that "collects and stores information relevant to the temperature and other HVAC conditioning of a building," "tracks and learns the thermal gain characteristics of the home," and modifies system settings (*e.g.*, future scheduled setpoints) accordingly. *Decision I*, at *4 (citing J.A. 5121 ¶ 88; J.A. 5134–35 ¶¶ 253–54, 256; J.A. 5139 ¶ 295); *Decision II*, at *3–4 (same). Wruck describes a system for remote configuration of programmable thermostats, which "permits the user to control the set point and temporarily override scheduled setpoints." *Decision I*, at *7 (citing J.A. 5190–92 ¶¶ 2–5, 14–15; J.A. 5202 ¶ 104); *Decision II*, at *7 (same).

The Board issued its final written decisions determining that all challenged claims were unpatentable for obviousness on November 13, 2023. *Decision I*, at *18; *Decision II*, at *18. EcoFactor timely appealed to this court, and we have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

II

We review the Board's legal conclusions without deference and its factual determinations for substantial-evidence support. *In re Jolley*, 308 F.3d 1317, 1320 (Fed. Cir. 2002); *In re Lister*, 583 F.3d 1307, 1311 (Fed. Cir. 2009). Obviousness is an issue of law whose resolution depends on underlying findings of fact. *Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1003 (Fed. Cir. 2023); *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The Board's ultimate obviousness conclusion is subject to de novo review, but "the subsidiary factual findings are reviewed for substantial evidence." *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1366 (Fed. Cir. 2016) (citing *In re Gartside*, 203 F.3d 1305, 1312, 1316 (Fed. Cir. 2000)). What the prior art discloses is a question of fact, so the Board's findings about such disclosures are reviewed

for substantial-evidence support. *Corephotonics*, 84 F.4th at 1003. Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Consolidated Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938).

EcoFactor makes three arguments on appeal, each relating to limitations contained in all the challenged claims: first, that Ehlers does not teach predicting rates of change in indoor temperature, EcoFactor Opening Br. at 21–40; second, that the combination of Ehlers and Wruck does not teach comparing automated setpoints with actual setpoint programming, *id.* at 40–48; and third, that the relevant artisan would lack motivation to combine Ehlers and Wruck in the manner asserted by the Board, *id.* at 48–49.

We reject EcoFactor's first argument in our decision issued today in *EcoFactor, Inc. v. Google LLC*, No. 24-1027, which involves the same issue about what Ehlers teaches. We do not repeat our discussion of the point here. We address EcoFactor's other two arguments.

A

The independent claims of the '550 patent recite comparing, at a given time, the scheduled setpoint with the actual setpoint. *See* '550 patent, col. 8, lines 22–24 (claim 1) ("comparing an actual setpoint at the first time . . . to the first automated setpoint"); *id.*, col. 8, lines 65–67 (claim 9) (same); *id.*, col. 10, lines 14–17 (claim 17) ("compar[ing] the one or more automated setpoints associated with [the] scheduled setpoint programming with [the] actual setpoint programming."). The Board determined that, under either Ehlers alone or a combination of Ehlers and Wruck, the relevant artisan would find this limitation obvious. *Decision I*, at *13–17; *Decision II*, at *14–16.

In particular, the Board found that, based on Ehlers alone, the relevant artisan "would have known to compare the user's 'actual' setpoint programming with 'automated'

setpoints in the scheduled setpoint programming" because Ehlers discloses using "a comparison between values to determine whether to take certain actions." *Decision I*, at *14; *Decision II*, at *15. This finding is supported by substantial evidence. Ehlers discloses decision-making "based on a simple comparison between the actual cost and a predetermined value which may have been input by the customer." J.A. 5131 ¶ 215. The Board credited Google's expert's testimony that such a comparison supports the obviousness of comparing the actual and scheduled setpoint programming: "To determine whether two numbers are [the] same or different from each other, [the relevant artisan] would have understood that one would compare them." J.A. 5053–54 ¶ 125; J.A. 15047–48 ¶ 103; *see Decision I*, at *14; *Decision II*, at *15.

EcoFactor asserts that obviousness under Ehlers alone was not properly before the Board. EcoFactor Opening Br. at 47–48. The Board determined, to the contrary, that Google "contends that Ehlers singly . . . render[s] obvious this limitation." *Decision I*, at *13; *Decision II*, at *15. That determination is supported by Google's petitions, which state: "Based on Ehlers alone, it would have been obvious to compare one or more automated setpoints associated with the scheduled setpoint programming with the actual setpoint programming." J.A. 1019; J.A. 10020.

EcoFactor's remaining arguments focus on the combination of Ehlers and Wruck. EcoFactor Opening Br. at 40–47. The Board determined that the combination of Ehlers and Wruck, "to the extent [the limitation] was not already obvious from Ehlers," would render it obvious "to compare an automated setpoint associated with scheduled setpoint programming with the actual setpoint programming in order to determine whether they are the same or different from each other, and thus detect a manual change." *Decision II*, at *15; *see Decision I*, at *14 (similar). The Board found that Wruck "teaches to determine whether the 'Delta value' between the 'actual temporary setpoint' and the

original, scheduled temperature setpoint is not equal to zero, and if so, to display the temporary temperature setpoint." *Decision I*, at *15; *Decision II*, at *15; *see* J.A. 5204, tbl. 28.

EcoFactor argues that Wruck does not explain what the "Delta value" means or state that the "Delta value" is a comparison of two things. EcoFactor Opening Br. at 41–46. But even if Wruck does not contain such explicit disclosure, that would not indicate error in the Board's decision, as the Board credited Google's expert's testimony that Wruck "d[id] not need to provide a more detailed description for [the relevant artisan] to understand that Wruck is, at least, suggesting a comparison of values (scheduled and actual setpoints) and a determination of a difference between those values." J.A. 6479–80 ¶ 30; J.A. 16379–80 ¶ 30; *see Decision I*, at *15; *Decision II*, at *16. Moreover, Dr. Palmer, EcoFactor's expert, acknowledged that the term "delta" "generally refers to a change," and that a "delta value" would indicate a "change in something." J.A. 6389, line 18, through J.A. 6390, line 1.

B

Finally, EcoFactor challenges the Board's finding that a relevant artisan would have been motivated to combine the teachings of Ehlers and Wruck. EcoFactor Opening Br. at 48–49. EcoFactor argues that "[w]ithout any explanation of 'Delta value' [in Wruck], there is no reason why [the relevant artisan] would look at Wruck for comparing or determining the difference between two setpoints." *Id.* at 48. This argument fails for the reasons discussed above regarding the substantial-evidence support for the Board's findings regarding Wruck: Additional explanation of "Delta value" was not necessary to the Board's obviousness determination.

III

We have considered EcoFactor's remaining arguments and find them unpersuasive. For the foregoing reasons, we affirm the Board's determination that all asserted claims of the '550 patent are unpatentable for obviousness.

AFFIRMED