United States Court of Appeals for the Federal Circuit

ABT SYSTEMS, LLC,
Plaintiff-Appellant

THE UNIVERSITY OF CENTRAL FLORIDA BOARD OF TRUSTEES, on behalf of the University of Central Florida,
Plaintiff

v.

EMERSON ELECTRIC CO.,
Defendant-Cross-Appellant

2014-1618, 2014-1700

Appeals from the United States District Court for the Eastern District of Missouri in No. 4:11-cv-00374-AGF, Judge Audrey G. Fleissig.

Decided: August 19, 2015

MICHAEL P. MAZZA, Michael P. Mazza, LLC, Glen Ellyn, IL, argued for plaintiff-appellant. Also represented by DANA D. ALVARADO.

LINDA E.B. HANSEN, Foley & Lardner LLP, Milwaukee, WI, argued for defendant-cross-appellant. Also represented by JEFFREY COSTAKOS, KADIE M. JELENCHICK.

Before PROST, *Chief Judge*, CLEVENGER, and SCHALL, *Circuit Judges*.

SCHALL, *Circuit Judge*.

This is a patent case. The University of Central Florida ("University") is the assignee of U.S. Patent No. 5,547,017 ("the '017 patent"), titled "Air Distribution Fan Recycling Control." The patent is licensed to ABT Systems, LLC ("ABT"). ABT and the University sued Emerson Electric Co. ("Emerson") and three other defendants in the United States District Court for the Northern District of Illinois for infringement of claims 1–5 of the '017 patent. Eventually, the case was transferred to the United States District Court for the Eastern District of Missouri and proceeded to trial before a jury against Emerson alone after its three co-defendants settled. Following trial, the jury found the asserted claims not invalid by reason of obviousness and infringed by Emerson's "Big Blue" thermostats. Based on a royalty rate of $2.25 per unit, the jury awarded damages in the amount of $311,379 on sales of 138,891 thermostats. *ABT Sys., LLC v. Emerson Elec. Co.*, No. 4:11-cv-00374-AGF, 2013 WL 5567713, at *2 (E.D. Mo. Oct. 9, 2013).

ABT appeals three rulings of the district court relating to damages. It contends these rulings were erroneous and impacted its damages award. For its part, Emerson cross-appeals the district court's denial of its motion for judgment as a matter of law ("JMOL") that claims 1–5 of the '017 patent are invalid by reason of obviousness. *See id.* at *3.

For the reasons set forth below, we hold that the district court erred in denying Emerson's motion for JMOL of invalidity. We therefore reverse the judgment of non-invalidity, vacate the judgment of infringement, and remand the case to the district court for dismissal of the

complaint. In view of this disposition, it is not necessary for us to address ABT's appeal, which is rendered moot.

BACKGROUND

I.

Armin Rudd is the sole inventor named on the '017 patent. He assigned the patent to the University, his employer at the time of the invention. The University then licensed the patent to ABT. The technology involved in the '017 patent relates to heating, ventilation, and air conditioning ("HVAC") systems.

The '017 patent explains that prior art thermostats for forced-air HVAC systems typically have two modes of operation for the system fan. The first is for operating the fan only when there is a call for heating or cooling from the thermostat. This is necessary in order to distribute air from the heating or cooling elements to the space to be conditioned. Often, this is referred to as a thermostat's "auto" mode. The patent also explains that some prior art thermostats include settings for continuous system fan operation (i.e., "constant fan mode"), causing the fan to run irrespective of a call for heating or cooling.

The '017 patent claims an apparatus for running an HVAC system fan intermittently during periods when there is no call for heating or cooling. In particular, the '017 patent claims a forced central air system with a "recycle control" for periodic fan operation when the system is not heating or cooling. The periodic fan operation begins "a preselected time period" after the fan stops at the end of a heating or cooling cycle, or after the termination of "constant fan mode" operation. Claim 1 is the only independent claim at issue. It reads as follows:

> 1. A fan recycling control apparatus for a central air conditioning (CAC) system comprising:
>
> a circulating fan;

> a central air conditioning system with ducts to distribute cooled and heated conditioned air throughout a building;
>
> a thermostat for activating and deactivating both the central air conditioning system and the circulating fan;
>
> said activating causing a continuous fan operation, said deactivating causing no fan operation, said thermostat further having a selectable constant fan mode, and
>
> a *recycle control* for periodically activating and deactivating only the circulating fan *after a preselected time period, since the central air conditioning system has been deactivated, or the circulating fan has been deactivated* from the selectable constant fan mode.

'017 patent claim 1 (emphases added). Dependent claims 2–5 set forth limitations directed to specific types of HVAC system heating and cooling modes. They also set forth limitations relating to various types of heat sources for the system.

The specification of the '017 patent touts the benefits of running the fan periodically after a preselected time from heating or cooling deactivation based on fan "recycle control." Those benefits include reduced air stagnation, dilution of point sources of indoor air pollution, and improved air cleaning. At the same time, periodic "recycle control" is said to reduce energy consumption in comparison to the "constant fan mode" operation of prior art thermostats.

II.

Emerson manufactures various products, including thermostats for use in HVAC systems. One of Emerson's products is the Big Blue thermostat, so named because of

its blue user interface screen. In 2009, ABT and the University sued Emerson for patent infringement, alleging that the so-called Comfort Circulating Fan Feature ("CFF") of the Big Blue thermostat infringed claims 1–5 of the '017 patent. As noted, following trial, the jury found the asserted claims not invalid as obvious and infringed and awarded ABT damages.

At trial, in support of its invalidity defense, Emerson relied primarily on four prior art references in the field of HVAC systems and thermostats. Specifically, it argued that the asserted claims of the '017 patent would have been obvious in view of U.S. Patent No. 2,013,136, to Frank Cornelius ("Cornelius"); U.S. Patent No. 4,838,482, to John Vogelzang ("Vogelzang"); U.S. Patent No. 2,953,908, to Dan Petrone et al. ("Petrone"); and/or U.S. Patent No. 5,020,332, to Eiji Nakatsuno et al. ("Nakatsuno"). After the jury found the '017 patent not invalid and infringed, Emerson filed a motion for JMOL to set aside the verdict.

The district court denied Emerson's motion. *ABT Sys.*, 2013 WL 5567713, at *1, *3. The court reasoned that "[t]he jury could have reasonably found, based upon the evidence, that the prior art relied upon by Defendant did not disclose 'periodic' fan operation that was dependent upon the deactivation of the heating or cooling function of the system, and further that was adaptable to modern air conditioning systems." *Id.* at *3. The court stated: "The jury could have also found from the evidence that there was a long-felt need for a periodic fan recycle control as disclosed in the Rudd Patent." *Id.* The court continued that it could not "say as a matter of law that the claimed invention is not more than the predictable use of prior art elements according to their established functions." *Id.* (internal quotation marks omitted). Emerson timely cross-appealed the district court's denial

of its motion. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

DISCUSSION

I.

The standard for reviewing the grant or denial of JMOL is not unique to patent law; the law of the regional circuit therefore applies. *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1328 (Fed. Cir. 2008). The Eighth Circuit has instructed that decisions on motions for JMOL are to be reviewed de novo, using the same standard that the trial court applied. *Penford Corp. v. Nat'l Union Fire Ins. Co.*, 662 F.3d 497, 503 (8th Cir. 2011). JMOL against a party on an issue is appropriate if "the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue." Fed. R. Civ. P. 50(a). In deciding a JMOL motion, "all reasonable inferences [are to be drawn] in favor of the nonmoving party without making credibility assessments or weighing the evidence." *Penford*, 662 F.3d at 503 (quoting *Phillips v. Collings*, 256 F.3d 843, 847 (8th Cir. 2001)).

The standard for determining the validity of patent claims is governed by our precedent. We have held that invalidity must be established by clear and convincing evidence. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1347 (Fed. Cir. 2012); *see also Commil USA, LLC v. Cisco Sys., Inc.*, 135 S. Ct. 1920, 1929 (2015) (noting that Congress is presumed to have chosen a "clear and convincing standard" to overcome the presumption of validity of an issued patent). A patent claim is invalid for obviousness if the "differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a) (2006). Obviousness under 35 U.S.C.

§ 103 is a mixed question of fact and law. *Transocean*, 699 F.3d at 1347. On appeal from a jury verdict on the issue of obviousness, "we review all of the jury's explicit and implicit factual findings for substantial evidence. We then examine the legal conclusion [on the issue] de novo to determine whether it is correct in light of the factual findings that we find adequately supported." *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012).

II.

A.

Emerson asks us to vacate the district court's denial of JMOL and to hold claims 1–5 of the '017 patent obvious in view of the Cornelius, Vogelzang, Petrone, and/or Nakatsuno prior art references.

Cornelius describes a furnace system with a circulation fan that cycles on and off when there is no call for heat from the thermostat. It teaches the ability "to intermittently start and stop" the fan when there is no call for heat in order to "circulate air within the house." Cornelius col. 9 ll. 23–42. Cornelius discloses a "timing device" for "operating the [circulation fan] motor at predetermined intervals," so as to keep the room condition maintained "from the standpoint of temperature, air motion and cleanliness." *Id.* Cornelius does not expressly teach the timer being tied to the deactivation of the heating elements, as required by claim 1 of the '017 patent.

Vogelzang discloses an HVAC system that provides for movement of air and prevents stagnation through a "cycle position" option on a thermostat. Vogelzang col. 2 ll. 36–46 ("A conventional fan cycler 35 is connected to energize the fan relay 33 periodically such as several times an hour to maintain periodic air flow through the air cleaner 30 and to move the air about in the space 10.").

Vogelzang explains that the "invention is concerned with a means for cycling the operation of the fan during periods when there is no operation of the heating apparatus or cooling apparatus." *Id.* col. 1 ll. 31–40. Like Cornelius, Vogelzang discloses periodic fan operation when there is no call for heating or cooling. Also like Cornelius, Vogelzang does not explicitly teach running the fan periodically as a direct function of when the heating or cooling elements are deactivated. It instead relies on a timer that is energized when a user places the thermostat in the "cycle position." *Id.* col. 2 ll. 46–48.

The Petrone patent describes a control for a fan in a forced-air cooling system. The fan of Petrone stops when the call for cooling ends, at which point there is a delay before the fan begins to operate independent of a call for cooling. Petrone col. 6 ll. 64–71, col. 7 ll. 7–15 ("fan motor will be stopped and at a predetermined time delay thereafter . . . the time delay switch will cause reenergization of the fan motor"). The delay in Petrone is described as permitting sufficient time for water to drain from the cooling coils so as not to allow moisture to be blown into the area to be cooled. *Id.* col. 4 ll. 18–22. Petrone does not disclose periodic circulation of air after deactivation of the cooling elements, but, instead, just a "single-shot" fan operation for purposes of coil drainage.

Similar to Petrone, Nakatsuno discloses a system wherein the system fan "may be operated for a length of time $\Delta t2$ a predetermined time $\Delta t1$ after the stop of the compressor." Nakatsuno col. 10 ll. 7–15 ("the drive and stop of the indoor fan may be operatively associated with the drive and stop of the compressor"); *see also id.* at Fig. 11(a). Unlike Petrone, however, Nakatsuno suggests that the fan may also be "intermittently driven . . . to improve . . . comfortableness and also to minimize . . . energy consumption" during periods when there is no call for heating or cooling from the system. *Id.* col. 9 l. 67 to col. 10 l. 6.

B.

Citing *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 416–17 (2007), Emerson argues that claims 1–5 of the '017 patent would have been obvious because they represent a "combination of familiar elements according to known methods" that does no more than "yield predictable results." As it did in the district court, Emerson focuses on the "recycle control" limitation in the last paragraph of claim 1, since the parties agree that the other limitations of claim 1, as well as the added limitations of claims 2–5, were known in the prior art. In that regard, Emerson contends that Mr. Rudd admitted at trial that the motivation for "recycle control," as well as the means for implementing "recycle control," were known in the art. Emerson states that Mr. Rudd admitted that a pause immediately following the end of a cooling cycle is necessary to prevent moisture from blowing back into the system. Emerson also states that Mr. Rudd conceded that having a fan run periodically after the end of a cooling cycle would necessarily save energy when compared to running a fan continuously in a "constant fan mode."

Emerson contends that Cornelius, Vogelzang, and Nakatsuno all disclose a periodic fan used to circulate air to keep the air uniform in the air conditioned space, just as in claim 1 of the '017 patent. Specifically, it states that Cornelius teaches a timer used to operate the system fan at predetermined intervals to maintain a desirable temperature; that Vogelzang indicates that periodically cycling the fan when there is no call for heating or cooling can move air throughout the space to prevent stagnation; and that Nakatsuno discloses a fan that can be run intermittently to improve comfort and conserve energy. Emerson points out that its expert, Dr. Sherman, testified that those three references all address the same air stagnation problem set forth in the '017 patent.

Emerson further urges that a person of ordinary skill would have been motivated to combine the prior art periodic fans of Cornelius, Nakatsuno, and Vogelzang with prior art timers to begin air circulation after an initial pause or delay. It reasons that if a person of ordinary skill had been assembling a thermostat in conjunction with the prior art periodic fan of Cornelius or Vogelzang, he or she would naturally have caused the fan to operate intermittently after the call for heating or cooling ended. Emerson contends that, since there would have been no need for the fan to circulate air immediately after the call for heating or cooling ended, as a matter of common sense, one of skill in the art would have inserted a pause before additional circulation was initiated. Moreover, in Emerson's view, Petrone and Nakatsuno both teach a delay or pause in fan operation following the end of a heating or cooling cycle as being dependent on the time at which the heating or cooling cycle ends. Emerson therefore argues that under a proper application of *KSR* no reasonable jury could have found the asserted claims of the '017 patent not obvious, and the district court thus erred in denying its motion for JMOL.

In response, ABT first states that Emerson's appeal is an attempt to retry credibility and factual determinations made by the jury. It argues that, in view of its verdict, the jury necessarily found ABT's witnesses, Mr. Rudd and Dr. Siegel, more credible than Emerson's technical expert, Dr. Sherman, and its prior art expert, Mr. Vogelzang. It contends also that the jury implicitly found that secondary considerations of obviousness, such as long-felt need, weighed in its favor. ABT asserts that the jury's decision to credit its witnesses and to find secondary indicia of nonobviousness is supported by substantial evidence.

Rather than mounting a strong challenge to the merits of Emerson's theory of obviousness based on the disclosures of the prior art references, ABT takes the position that Emerson's argument is flawed because the references

upon which it relies are either non-enabled or teach away. ABT first contends that Nakatsuno and Cornelius are non-enabling and, therefore, cannot be fully factored into the obviousness analysis. Nakatsuno, it argues, only teaches "single-shot" fan operation after a cooling system compressor deactivates. It states that Nakatsuno does not enable multiple, periodic fan cycles because only a single fan cycle is disclosed in the specification. Continuing, ABT argues that, like Nakatsuno, Cornelius is non-enabling because it does not disclose any electrical connection between the thermostat that controls the call for fan activation and the timer used to create periodic cycles based on the end of heating. It states that the timer of Cornelius is not synced with the deactivation of the heating device, since the "timing device" operates "independently of temperature conditions." Cornelius col. 1 ll. 46–50. Relatedly, ABT states that Vogelzang fails to disclose the periodic fan cycle being dependent on the last heating or cooling cycle. Finally, it urges that Nakatsuno and Petrone—the so-called "single-shot" fan operation references—teach away because they are for a purpose (i.e., coil drainage) "unrelated" to the benefits described in the '017 patent. Because ABT believes that Cornelius, Nakatsuno, Vogelzang, and Petrone are non-enabled or teach away, it argues that a person of skill in the art would have had no reason to combine their teachings.

III.

Having considered the parties' arguments and the evidence of record, we hold, as a matter of law, that the district court erred in denying Emerson's motion for JMOL that claims 1–5 of the '017 patent are invalid as obvious.

A.

Recognizing that nonobviousness was determined by a jury, we assign due deference to the jury's verdict. In analyzing the jury's decision, "[w]e first presume that the

jury resolved the underlying factual disputes in favor of the verdict [] and leave those presumed findings undisturbed if they are supported by substantial evidence." *Kinetic Concepts*, 688 F.3d at 1356–57 (quoting *Jurgens v. McKasy*, 927 F.2d 1552, 1557 (Fed. Cir. 1991)). Next, we "examine the [ultimate] legal conclusion [of nonobviousness] de novo to see whether it is correct in light of the presumed jury fact findings." *Id.* at 1357 (quoting *Jurgens*, 927 F.2d at 1557) (second alteration added). In recreating the facts as they may have been found by the jury, and in applying the *Graham* factors, "we assess the record evidence in the light most favorable to the verdict winner." *Richardson-Vicks, Inc. v. Upjohn* Co., 122 F.3d 1476, 1479 (Fed. Cir. 1997). The *Graham* factors are: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art at the time of the invention; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). In this case, there are few, if any, relevant differences between the parties' understanding of the scope and content of the prior art, the differences between the prior art and the claims, and the level of ordinary skill in the art.

As seen, the issue of nonobviousness revolves around the "recycle control" limitation of claim 1. That limitation reads as follows:

> [A] *recycle control* for periodically activating and deactivating only the circulating fan *after a preselected time period*, *since the central air conditioning system has been deactivated, or the circulating fan has been deactivated* from the selectable constant fan mode.

'017 patent claim 1 (emphases added).

Both ABT's expert, Dr. Siegel, and Emerson's expert, Dr. Sherman, agreed that Nakatsuno discusses intermittent or periodic cycling, but only directly teaches a "single-

shot" fan cycle after a predetermined delay following deactivation of the central air system. Dr. Siegel, explained that "[s]o that is to say there is not a periodic recycling of the fan [disclosed in Nakatsuno]. There is a single time after the air conditioning has finished its job of cooling, satisfied the thermostat, where the fan shuts off one time to allow the coil to drain." Trial Tr. at 107:18–22, *ABT Sys.*, No. 4:11-cv-00374-AGF (E.D. Mo. Feb. 20, 2013), ECF No. 486. Nakatsuno, according to Dr. Siegel, addresses the problem of draining the coils after a cooling cycle. Dr. Siegel acknowledged, however, that Nakatsuno discusses "intermittent fan operation." *Id.* at 155:4–21. Dr. Siegel testified similarly with respect to the Petrone reference—and Dr. Sherman did not disagree: that it only discloses a "single-shot" fan for purposes of coiling drainage. Dr. Siegel's testimony is supported by the record; we must therefore presume that the jury resolved any factual disputes about Nakatsuno's and Petrone's "single-shot" fan operation in ABT's favor. Thus, a reasonable juror could have found that, while technology for activating a fan after a predetermined time period following the end of a heating or cooling cycle existed in the prior art, it may have been implemented as a single event at the end of a cooling cycle for purposes of draining cooling coils.

The experts also were in general agreement with regard to the prior art teaching periodic fan cycling during a period where there is no call for heating or cooling. Dr. Siegel testified that the timers of Cornelius and Vogelzang are not described as being directly associated with, or linked to, the end of a heating or cooling cycle. Further, both Dr. Siegel and Dr. Sherman agreed that the timer of Cornelius is not explicitly reset after the end of a heating or cooling cycle. In that regard, Dr. Siegel explained that Cornelius's timer "could make the fan go on and off on a predetermined cycle but it couldn't control that -- couldn't link that to the operation of the thermo-

stat or the rest of the system." *Id.* at 112:17–20. In other words, according to Dr. Siegel, Cornelius does not teach "activating and deactivating only the circulating fan after a preselected time period, since the central air conditioning system has been deactivated," as set forth in claim 1. Vogelzang likewise does not teach a periodic fan that operates as a function of when a heating or cooling cycle ends. Like Cornelius, Vogelzang discloses a timer that may be unassociated with the deactivation of the heating and cooling cycles.

B.

In view of the undisputed facts, as well as those that are presumed to have been resolved by the jury in ABT's favor, the issue of obviousness thus turns on whether, at the time of the Rudd invention, a person of ordinary skill would have combined elements from the several prior art references. Specifically, the question is whether a person of skill would have combined references that disclose "single-shot" fan operation as a function of the time when heating or cooling cycles end with references that teach periodic fan cycles during periods of time when there is no call for heating or cooling.

Dr. Siegel testified that there would have been no motivation to combine elements of Cornelius and/or Vogelzang with Petrone and/or Nakatsuno to create a periodic fan cycle that was dependent on the end of a cooling or heating cycle. In his view, the references do not explain how a person of skill might "plug[]" the "single-shot" fan references into the periodic cycle references, and he stated that there would be logistical and enablement issues in making a "single-shot" system work with "heating, constant fan and cooling" modes. *Id.* at 116:20–118:22. Dr. Siegel also testified that the prior art references do not show the control logic required by the claims of the '017 patent. In response, Dr. Sherman took the position that it would have been a logical and ordinary step for a person

of skill in the art to use the prior art to create a periodic fan that is dependent on the end of a heating or cooling cycle.

The parties agree that Vogelzang sets forth every limitation of asserted claim 1 except tying periodic fan cycles directly to the deactivation of the heating or cooling elements or to the end of "constant mode" operation. Indeed, Vogelzang addresses the same problem identified by the '017 patent (i.e., air stagnation during periods without heating or cooling) in a nearly identical manner. Vogelzang discloses a "cycle position" option for a thermostat having a "conventional fan cycler . . . connected to energize the fan relay" so that it can "maintain periodic air flow through the air cleaner 30 and . . . move the air about in the space." Vogelzang col. 2 ll. 36–42. Vogelzang also describes energizing the relay for a "predetermined number of times each hour to cycle fan relay 33 such as[] 6 short operations each hour." *Id.* col. 2 ll. 43–46. The reason for this, the patent explains, is to cycle the fan "during periods when there is no operation of the heating apparatus or cooling apparatus" in order to "provide for the treatment of the air through by [sic] the air cleaner." *Id.* col. 1 ll. 32–38. Vogelzang, though, does not *necessarily* start the periodic cycle based on the deactivation of the heating and cooling elements.

For its part, Cornelius discloses elements similar to Vogelzang. It teaches a furnace that works in conjunction with a thermostat and a timing device "to intermittently start and stop the [circulation fan] motor 14 for ventilating a room or rooms when the room thermostat 110 does not call for heat." Cornelius col. 9 ll. 23–26. As in Vogelzang and the '017 patent, the stated purpose of the invention is to address stagnation, temperature, and cleanliness. *Id.* col. 9 ll. 40–42; *see also id.* col. 9 ll. 26–34 ("In particular this scheme is adapted for the ventilation of sleeping rooms where the windows remain closed during the night and when the room thermostat is manu-

ally or automatically lowered to produce a temperature of, say, 55° F. There are many nights when the furnace would not operate as the house would not cool to this temperature."). Cornelius does not, however, disclose a "constant fan mode," as required by claim 1. And, it does not teach *necessarily* setting the timing device as a function of the end of a heating cycle.

Nakatsuno, however, does disclose operation of a system fan at a predetermined time following the deactivation of an air conditioning compressor. Nakatsuno states, in relevant part:

> As far as the *intermittent operation* of the indoor fan is concerned, the drive and stop of the indoor fan *may be operatively associated with the drive and stop of the compressor* as shown in FIG. 11(a) and, alternatively, *the indoor fan may be operated for a length of time Δt2 a predetermined time Δt1 after the stop of the compressor* as shown in FIG. 11(b).

Nakatsuno col. 10 ll. 7–15 (emphases added); *see also id.* at Figs. 11(a), (b). Nakatsuno thus discloses using the end of a cooling cycle as part of the function for turning on the system fan during periods where there is no call for heating or cooling. Additionally, even presuming that Nakatsuno fails to disclose periodic fan cycles by only specifically describing a "single-shot" fan, it plainly suggests such cycles:

> [An] indoor fan can be *intermittently driven* at the predetermined number of revolution [sic] regardless of whether the compressor is being operated or held still, so that the difference between respective temperatures in top and bottom regions in the space to be air-conditioned can be minimized by the circulation effect thereby to improve the comfortableness and also to minimize the energy consumption.

Id. col. 9 l. 67 to col. 10 l. 6 (emphasis added).[1]

In *KSR*, the Supreme Court instructed that "when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." 550 U.S. at 416. The Court stated that "[i]f a person of ordinary skill can implement a predictable variation [of a prior art reference with other prior art components], § 103 likely bars its patentability." *Id.* at 417. Here, the timer of Vogelzang or Cornelius, modified by the predetermined and compressor-dependent interval of Nakatsuno or Petrone, would have yielded a predictable result: the system fan would activate periodically following the end of a heating or cooling cycle—the invention claimed in the '017 patent.[2]

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[1] Petrone teaches a fan that stops when the call for cooling ends and restarts after a predetermined interval. However, it does not teach such operation for the purpose of alleviating air stagnation. Rather, it teaches a delay for purposes of allowing the cooling coils to drain condensation. Petrone col. 4 ll. 18–22, col. 7 ll. 7–15.

[2] The cited references do not "teach away," as ABT argues, because it is clear that none come near to "'criticiz[ing], discredit[ing], or otherwise discourag[ing]' investigation into the invention claimed." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009) (quoting *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004)). Additionally, ABT's suggestion that Cornelius and Nakatsuno are non-enabled is misplaced, since even "[a] non-enabling reference may qualify as prior art for the purpose of determining obviousness," *Symbol Tech., Inc. v. Opticon, Inc.*, 935 F.2d 1569, 1578 (Fed. Cir. 1991), and even "an inoperative device . . . is prior art for all that it teaches," *Beckman Instruments,*

It is well settled that, even where references do not explicitly convey a motivation to combine, "any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id.* at 420. We have made clear that "a court . . . may find a motivation to combine prior art references in the nature of the problem to be solved." *Ruiz v. A.B. Chance Co.*, 357 F.3d 1270, 1276 (Fed. Cir. 2004). As pertinent here, "this form of motivation to combine evidence is particularly relevant with simpler mechanical technologies." *Id.*; *see also Pro-Mold & Tool Co., Inc. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996).

In our view, if, at the time of the invention claimed in the '017 patent, a person of ordinary skill had looked at Vogelzang, he or she would have found it nearly obvious from that disclosure itself to set the periodic fan to run as a function of when the heating or cooling cycle ended. That is because the nature of the problem to be solved in both the '017 patent and Vogelzang (as well as Cornelius and Nakatsuno) is to alleviate air stagnation during periods of no heating or cooling. As Dr. Sherman testified, "a person of ordinary skill would realize that the easiest and best thing to do would be to start with an off period, a delay before doing this cycling since the purpose is to mix the air and the air has just been mixed." Trial Tr. at 69:20–25, *ABT Sys.*, No. 4:11-cv-00374-AGF (E.D. Mo. Feb. 19, 2013), ECF No. 485. Thus, setting a delay timer or control based on the end of the heating or cooling cycle, similar to the concept in Nakatsuno or Petrone, would have been naturally implemented by a person skilled in the art. In other words, it would have been

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Inc. v. LKB Produkter AB, 892 F.2d 1547, 1551 (Fed. Cir. 1989).

obvious to set the timer of Vogelzang or Cornelius based on the end of a heating or cooling cycle, as disclosed in Nakatsuno (or Petrone), regardless of for how long the time interval was to be set.

C.

The fourth *Graham* factor, objective evidence of non-obviousness, includes factors such as "commercial success, long-felt but unresolved need, failure of others, copying, and unexpected results." *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 663 (Fed. Cir. 2000); *see also id.* at 667 (explaining that "secondary considerations, when present, must be considered in determining obviousness"). As noted, in arguing in support of the district court's denial of Emerson's JMOL motion, ABT relies on the considerations of commercial success and long-felt need, the latter of which was cited by the district court in its opinion. *ABT Sys.*, 2013 WL 5567713, at *3. We are not persuaded by ABT's argument.

ABT's reliance on commercial success is undermined as a matter of law by ABT's failure to introduce evidence related to the nexus between periodic fan operation and the commercial success of products embodying the invention claimed in the '017 patent. *See Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1391 (Fed. Cir. 1988) (explaining that "nexus" is used to "designate a legally and factually sufficient connection between the proven success and the patented invention"). The items that ABT presented as evidence in support of its commercial success argument were, in large part, advertisements and press releases for Mr. Rudd's products, not market share information or industry praise or recognition for the novelty of the fan recycler feature claimed in the '017 patent. *See In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996) ("This court has noted in the past that evidence related solely to the number of units sold provides a very weak showing of commercial success, if any."); *Demaco*,

851 F.2d at 1392 ("When the thing that is commercially successful is not coextensive with the patented invention . . . the patentee must show prima facie a legally sufficient relationship between that which is patented and that which is sold."). Also, there is no evidence in the record that Emerson's products were sold as a result of the Big Blue's CFF recycler feature. The record is thus lacking evidence that the alleged success of Emerson's product in the market was driven by any novel aspect of the claimed invention. *J.T. Eaton & Co. v. Atl. Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997) ("[C]ommercial success of the product must be due to the merits of the claimed invention beyond what was readily available in the prior art.").

We are also not persuaded by ABT's argument that commercial success is demonstrated by the number of licenses taken under the '017 patent. While licenses can sometimes tilt in favor of validity in close cases, they cannot by themselves overcome a convincing case of invalidity without showing a clear nexus to the claimed invention. *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) ("Our cases specifically require affirmative evidence of nexus where the evidence of commercial success presented is a license, because it is often 'cheaper to take licenses than to defend infringement suits.'"); *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1358 (Fed. Cir. 2000) ("[T]he mere existence of these licenses is insufficient to overcome the conclusion of obviousness, as based on the express teachings in the prior art that would have motivated one of ordinary skill to modify [other prior art]."). Here, ABT points to no evidence that the licenses it cites were taken based on the merits of the invention claimed in the '017 patent. *See Iron Grip*, 392 F.3d at 1324.

ABT's argument that there was a long-felt need for the invention embodied in the claims of the '017 patent likewise does not lead us to a different result. The disclo-

sures of the prior art references—and especially Vogelzang's "cycle position" option for running a system fan "during periods when there is no operation of the heating apparatus or cooling apparatus" to help mix air—eliminate any serious contention that there was a long-felt need for the invention claimed in the '017 patent. *See Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311–12 (Fed. Cir. 2006) ("[I]f the feature that creates the commercial success was known in the prior art, the success is not pertinent."). ABT's argument of a long-felt need ignores the scope of claim 1, which does not set forth limits on how long or how often periodic fan operation is to be performed. In addition, claim 1 does not limit in any way the control logic for implementing such periodic operation.

D.

In sum, even assuming that the jury correctly resolved pertinent factual disputes in favor of ABT, the prior art still renders the claims of the '017 patent obvious as a matter of law. *See Boston Sci. Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 990 (Fed. Cir. 2009) ("When we consider that, even in light of a jury's findings of fact, the references demonstrate an invention to have been obvious, we may reverse its obviousness determination."); *Richardson-Vicks*, 122 F.3d at 1479 (a jury verdict "does not mean that we are free to abdicate our role as the ultimate decision maker on the question of obviousness. That decision remains within our province"). Here, all of the claimed limitations are expressly found in the cited prior art references. At the same time, the motivation or rationale for combining those references can be found in the nature of the problem addressed, if not directly from the disclosures of the references themselves. Finally, ABT's argument based upon secondary considerations of nonobviousness is not supported by the record. Thus, we hold that claims 1–5 of the '017 patent are invalid as a matter of law by reason of obviousness.

CONCLUSION

For the foregoing reasons, we vacate the district court's denial of Emerson's JMOL motion and reverse the judgment that claims 1–5 of the '017 patent are not invalid as obvious. We also vacate the judgment of infringement. The case is remanded to the district court for entry of judgment in favor of Emerson and dismissal of ABT's complaint.

REVERSED-IN-PART, VACATED-IN-PART, and REMANDED

COSTS

Each party shall bear its own costs.