

**United States Court of Appeals
for the Federal Circuit**

**BOSCH AUTOMOTIVE SERVICE SOLUTIONS,
LLC,**
Appellant

v.

**JOSEPH MATAL, PERFORMING THE FUNCTIONS
AND DUTIES OF THE UNDER SECRETARY OF
COMMERCE FOR INTELLECTUAL PROPERTY
AND DIRECTOR, U.S. PATENT AND TRADEMARK
OFFICE,**
Intervenor

2015-1928

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2014-00183.

Decided: December 22, 2017

TIMOTHY M. MCCARTHY, Clark Hill, PLC, Chicago, IL, argued for appellant. Also represented by DAVID J. MARR.

FRANCES LYNCH, Office of the Solicitor, United States Patent and Trademark Office, Alexandria, VA, argued for intervenor. Also represented by THOMAS W. KRAUSE, ROBERT MCBRIDE, SCOTT WEIDENFELLER.

Before NEWMAN, CHEN, and HUGHES, *Circuit Judges*.

CHEN, *Circuit Judge*.

This appeal arises from the inter partes review (IPR) of U.S. Patent No. 6,904,796 (the '796 patent) owned by Bosch Automotive Service Solutions LLC (Bosch). The Patent Trial and Appeal Board (Board) granted the IPR petition filed by Autel U.S. Inc. and Autel Intelligent Technology Co. Ltd. (Autel) and instituted the IPR on claims 1, 4–15, and 20–22 of the '796 patent. Bosch filed a patent owner response and a “contingent” motion to amend, seeking to substitute amended claims 23–38 for original claims 1, 4–15, and 20–22 in the event that the Board found the challenged claims unpatentable. In its final decision, the Board found all challenged claims unpatentable and also denied Bosch’s contingent motion to amend. *Autel U.S. Inc. v. Bosch Auto. Serv. Sols. LLC*, No. IPR2014-00183, 2015 WL 2149218 (P.T.A.B. May 5, 2015) (Final Written Decision). Bosch now appeals.¹ For the reasons below, we affirm the Board’s finding of unpatentability of claims 1, 4–15, and 20–22, and we vacate and remand its denial of Bosch’s motion to amend as to proposed substitute claims 23–38.

BACKGROUND

I. The '796 Patent

The '796 patent, titled “Remote Tire Monitoring System,” relates to a handheld tool for (i) activating remote tire pressure monitoring system (RTMS) tire sensors and

¹ After Bosch filed its opening brief, Autel informed the court that it would not participate in the appeal. The Director of the United States Patent and Trademark Office intervened to defend the Board’s decision.

(ii) communicating with a vehicle's RTMS receiving unit. *See* '796 patent col. 1, ll. 6–8; col. 2, ll. 49–63. RTMS sensors measure air pressure in each of a vehicle's tires and, when activated, communicate pressure and other tire-specific information to a receiving unit in the vehicle via radio frequency (RF) signals. *Id.* col. 1, ll. 16–23. The RTMS receiving unit can then use that information to alert the driver, via visual or audible alarm, of a specific tire characteristic such as low tire pressure. *Id.* col. 1, ll. 25–32.

According to the '796 patent, different manufacturers in the RTMS field use different types of devices and/or signals for activating RTMS tire sensors, including magnets, valve core depressors, continuous wave signals, and modulated signals. *Id.* col. 4, l. 33 – col. 6, l. 32. These manufacturers also use different methods to transmit data from the tire sensor to the receiving unit, including RF signals at particular frequencies including 315 MHz, 433 MHz, and 916 MHz. *Id.* col. 2, ll. 38–48. The '796 patent's claimed activation tool is intended to work with all of these known RTMS architectures; it incorporates, into a single, handheld tool, all the known, different ways to activate RTMS tire sensors as well as the different ways known to communicate with a vehicle's receiving unit. *Id.* col. 2, ll. 49–63. The '796 patent contends that “[i]n this manner, a technician tasked to install a new tire or to rotate tires can utilize a single tool to work with remote tire monitoring systems made by different manufacturers.” *Id.* col. 2, ll. 60–63. When a technician moves from working on one vehicle to another vehicle that has a different RTMS activation system, the technician can simply switch between different modes of operation using a switch on the tool. *Id.* col 10, l. 66 – col. 11, l. 2.

The '796 patent recites various apparatus claims drawn to this universal activation tool and method claims for using the tool. Claim 1 is representative of the claimed apparatus:

1. A tool comprising a plurality of means for activating remote tire monitoring system tire sensors, the plurality of means selected from the group consisting of a magnet, a valve core depressor, means for generating continuous wave signals, and means for generating modulated signals, wherein the tool is capable of activating a plurality of tire sensors, each of the plurality of tire sensors utilizing a different method for activating the said tire sensor.

Id. col. 12, l. 64 – col. 13, l. 4. Method claim 20 is representative of the functions the claimed tool performs, i.e., activating the sensor, receiving data from the tire sensor, and transmitting the tire sensor data to the RTMS's receiving unit:

20. A method, comprising the steps of:

activating a remote tire monitoring system tire sensor;

receiving a tire sensor signal containing data from the activated tire sensor; and

transmitting some or all of the data received from the tire sensor to a remote tire monitoring system receiving unit, wherein the activating step, the receiving step, and the transmitting step are all performed by a single tool, and wherein the tool comprises a plurality of means for activating remote tire monitoring system tire sensors.

Id. col. 16, ll. 1–10 (as amended by Certificate of Correction dated Oct. 11, 2005).

II. IPR Institution and Prior Art

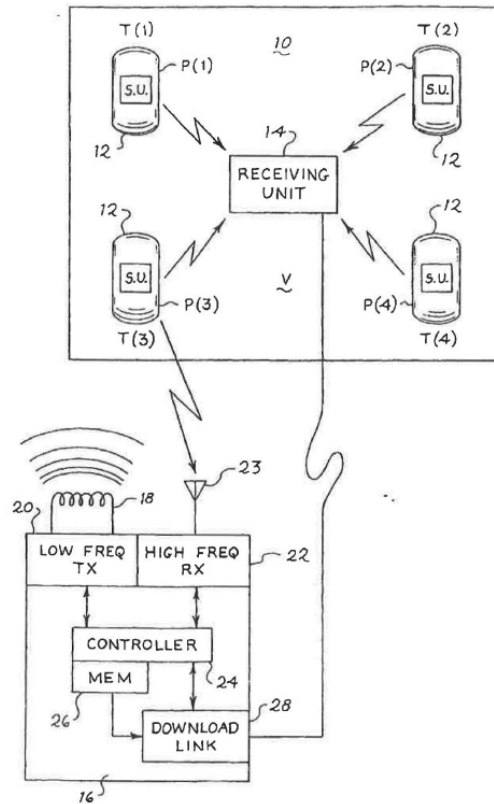
On May 7, 2014, the Board instituted review of claims 1, 4–15, and 20–22 of the '796 patent based on Autel's

petition alleging unpatentability on multiple obviousness and anticipation grounds.² Those grounds included claims 1 and 4–14 as likely obvious over the combination of European Patent Publication No. 1 026 015 A2 (McClelland), U.S. Patent Application Publication No. 2003/0080862 (Kranz), U.S. Patent No. 6,414,592 (Dixit), and British Patent No. 2305074 (Howell). The Board also instituted review of claim 15 as likely obvious in view of the same combination of McClelland, Kranz, Dixit, and Howell, plus two additional references. And it instituted review of claims 20–22 as likely anticipated by and, in the alternative, obvious over, McClelland alone.

A. McClelland

McClelland describes an RTMS for monitoring internal pressure of a vehicle's tires and transmitting tire pressure readings via RF transmission to a receiving unit located in the vehicle. The McClelland RTMS is shown in Figure 1, reproduced below:

² Autel also sought review of, and the Board instituted on, claim 16. However, that claim was cancelled during the IPR and is not at issue in this appeal.



As shown in Figure 1, each tire (T) has its own tire monitor 12 that transmits tire pressure signals to the receiving unit 14. Receiving unit 14 provides a warning to the operator of the vehicle when the indicated tire pressure of any tire is outside a predetermined range.

McClelland activates each tire monitor 12 using a signal from an exciter unit 16, comprised of a low frequency transmitter circuit 20, high frequency receiver unit 22, and memory 26. McClelland discloses using a low frequency signal of approximately 125 kHz for activating the tire monitors and also states that “other frequencies or ranges of frequencies may be suitable.” J.A. 626. According to McClelland, the exciter unit 16 may be a handheld unit carried by a service technician and brought near the tires for activation of each tire monitor,

during assembly or servicing of the vehicle. In particular, “[t]he operator may, for example, press a button or otherwise activate the exciter [16] to energize the tire monitor [12] and provide an activation signal.” J.A. 629. In response to an activation signal, the tire monitor 12 transmits tire-specific information to the exciter unit 16. The exciter unit 16 then communicates that information to the receiving unit 14.

B. Kranz

Kranz similarly discloses a system referred to as a reader for determining whether the tires on a vehicle have low pressure. The Kranz reader transmits a modulated frequency signal to activate and request pressure information from RF tags co-located with the tires. The RF tags process the request and transmit tire information—including pressure and an RF tag ID corresponding to a particular tire—back to the reader. Kranz discloses that, in one embodiment, the reader is a handheld unit with an integrated display.

C. Dixit

Dixit discloses a tire condition sensor unit 18 at each tire to transmit sensed tire conditions (such as temperature and pressure) and tire location information to a vehicle-based central unit. Dixit Figure 2, reproduced below, shows a handheld transmitter tool 44 for communicating with RF receiver 46 associated with each tire condition sensor unit 18.

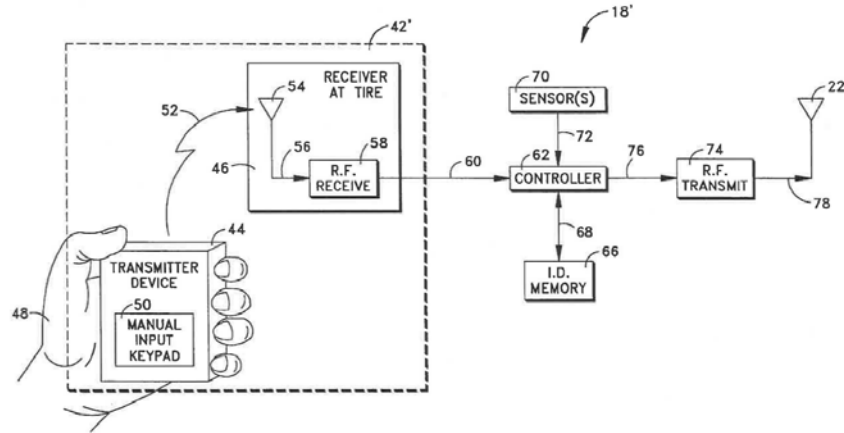


Fig.2

Dixit explains that the handheld transmitter communicates with each of the different tire condition sensor units for a particular vehicle. Dixit also contemplates that the handheld transmitter “communicate[s] with tire condition sensor units within different tire condition communication systems at different vehicles.” According to Dixit, the handheld transmitter is designed to serve as a “universal tool” that can communicate information to various tire condition sensor units, regardless of sensor type.

D. Howell

Howell seeks to address the problem caused by the proliferation of different, incompatible radio frequency identification (RFID) tags and transponders, like those employed in RTMS systems. Howell explains that “[c]urrently, there is no common carrier modulation and data transmission system agreed between manufacturers for such transponders and the systems chosen by different manufacturers of tags and readers vary widely and are generally incompatible with one another.” As a result, “a reader made by one manufacturer for reading a particular

type of tag or transponder will not normally be able to read tags or transponders manufactured by another supplier.” Given the absence of a single communication standard, Howell teaches a handheld reader for determining “the modulation system and/or data transmission system of a data storage device thereby allowing data stored by different manufacturer’s data storage devices to be read.” In other words, Howell teaches a handheld tool designed to communicate with tags and transponders from different manufacturers.

E. Claim Construction

In its Institution Decision, the Board construed certain “means-plus-function” limitations of the challenged claims. Relevant to this appeal, the Board determined that the structures disclosed in the specification corresponding to the recited “means for activating remote tire monitoring system tire sensors” (in independent claims 1, 7, 9, 13, and 15) are: a magnet, a valve core depressor, and a frequency generating circuitry and microprocessor for generating and transmitting continuous wave signals and modulated signals. The Board also construed a “plurality of means” for activating these tire sensors (in independent claims 1, 7, 9, 11, 13, and 15) as two or more means.

III. Patent Owner’s Response and Contingent Motion to Amend

In Bosch’s Patent Owner Response, Bosch acknowledged that the ’796 patent’s disclosed and claimed “means for activating” tire sensors were all known in the prior art, but it argued there was no motivation to combine these different, known activation means into the claimed universal tool. Bosch also argued that objective indicia—including commercial success, licensing, and industry praise—support the ’796 patent’s nonobviousness.

Bosch simultaneously filed a Contingent Motion to Amend, wherein it proposed to amend certain claims by inserting “means for recording” and “means for selecting” limitations, in the event the Board found the original claims unpatentable. Proposed substitute claim 23, intended to replace claim 1, is representative of the proposed changes to the apparatus claims and is shown below with the newly added language underlined:

23. A tool comprising:

a plurality of means for activating remote tire monitoring system tire sensors, the plurality of means selected from the group consisting of a magnet, a valve core depressor, means for generating continuous wave signals, means for generating modulated signals, means for recording a most recent means for activating signal that was utilized to successfully activate a tire sensor, and means for selecting the recorded means for activating as the first means for activating to be used, wherein the tool is capable of activating a plurality of tire sensors, each of the plurality of tire sensors utilizing a different method for activating the said tire sensor.

J.A. 923. Proposed substitute claim 36, intended to replace claim 20, is representative of the proposed changes to the method claims:

36. A method, comprising the steps:

activating a first remote tire monitoring system tire sensor using a one of a plurality of means for activating remote tire monitoring system tire sensors, the plurality of means selected from the group consisting of a magnet, a valve core depressor, means for generating continuous wave signals, and means for generating modulated signals;

receiving a tire sensor signal containing data from the activated first tire sensor;

recording the one of the plurality of means for activating; ~~and~~

transmitting some or all of the data received from the first tire sensor to a remote tire monitoring system receiving unit, and

activating a second remote tire monitoring system tire sensor using the recorded means for activating;

wherein the activating step, the receiving step, the recording steps, and the transmitting step are all performed by a single tool, and wherein the tool comprises a plurality of means for activating remote tire monitoring system tire sensors.

J.A. 929.

IV. Final Written Decision

In the Final Written Decision, the Board concluded that all challenged claims were unpatentable and denied Bosch's contingent motion to amend.

As to claims 1 and 4–14, the Board held that it would have been obvious to a person of ordinary skill in the art to incorporate McClelland's continuous wave activation signal and Kranz's modulated activation signal into a single activation tool to minimize the number of tools that a technician needs to use for collecting tire pressure data from different vehicles that use different means for activating RTMS tire sensors. The Board pointed to the universal tools taught by Dixit and Howell for motivation to create a similar universal tool that would result from combining McClelland and Kranz. The Board also held that the additional disclosure of two-way communication between the tool and receiving unit, found in claim 15, was rendered obvious by McClelland, Kranz, Dixit, and

Howell in combination with additional tertiary references. Finally, the Board found method claims 20–22 both anticipated and obvious in view of McClelland’s tool, which can use multiple activation frequencies (e.g., 125 kHz, “other frequencies,” and other “ranges of frequencies”) and, therefore, discloses a “plurality of means for activating” sensors. The Board also found Bosch’s asserted objective indicia to be both lacking a sound evidentiary foundation and untethered from the claims of the ’796 patent.

The Board then denied Bosch’s contingent motion to amend. First, the Board found that the proposed apparatus claims were indefinite because the ’796 specification fails to disclose sufficient structure corresponding to the claimed “means for recording a most recent means for activating signal that was utilized to successfully activate a tire sensor.” Second, the Board found that Bosch failed to carry its burden of proof that the proposed substitute claims would have been patentable over the prior art.

Bosch filed a timely appeal of the Board’s decision. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review the Board’s decisions under the standards set forth in the Administrative Procedure Act (APA), 5 U.S.C. § 706. *Pride Mobility Prods. Corp. v. Permobil, Inc.*, 818 F.3d 1307, 1313 (Fed. Cir. 2016). We must set aside the Board’s actions if they are “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law” or “unsupported by substantial evidence.” 5 U.S.C. § 706(2). We review the Board’s legal conclusions de novo and its factual findings for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). A finding of fact is supported by substantial evidence if a reasonable mind might accept the evidence as adequate support for the finding. *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938).

I. Claims 1 and 4–15

Bosch first challenges the Board’s determination that claims 1 and 4–15 are unpatentable as obvious. Bosch argues the Board erred in (1) finding a motivation to combine McClelland, Kranz, Howell, and Dixit;³ and (2) disregarding Bosch’s evidence of nonobviousness.

A claim is unpatentable if the differences between the claimed subject matter 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. 35 U.S.C. § 103;⁴ *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). “Obviousness is a question of law based on underlying findings of fact.” *Merck & Cie v. Gnosis S.P.A.*, 808 F.3d 829, 833 (Fed. Cir. 2015), *cert.*

³ For claim 15, Bosch argues only that “because there exists no proper motivation for initially combining McClelland, Kranz, Dixit, and Howell to support a finding of obviousness [of claim 1], it is also improper to combine these references with or without Pacsai ’467 and Gaborit to find that claim 15 is obvious.” Bosch Opening Br. 47–48. Bosch does not independently argue the patentability of claim 15, and therefore, it stands or falls with claims 1 and 4–14. *See In re Kaslow*, 707 F.2d 1366, 1376 (Fed. Cir. 1983) (“Since the claims are not separately argued, they all stand or fall together.”).

⁴ Congress amended § 103 when it passed the Leahy-Smith America Invents Act (AIA). Pub. L. No. 112–29, § 3(c), 125 Stat. 284, 287 (2011). Because the application that led to the ’796 patent has never contained a claim having an effective filing date on or after March 16, 2013 (the effective date of the statutory changes enacted in 2011), or a reference under 35 U.S.C. §§ 120, 121, or 365(c) to any patent or application that ever contained such a claim, the pre-AIA § 103 applies. *Id.* § 3(n)(1), 125 Stat. at 293.

denied, 137 S. Ct. 297 (2016). The underlying findings of fact include the scope and content of the prior art, the differences between the prior art and the claimed invention, whether there is a motivation to combine prior art references, the level of ordinary skill in the art, and relevant objective indicia of nonobviousness. *Id.*

A. Motivation to Combine

Bosch argues that those skilled in the art at the time of invention lacked motivation to combine the various, known activation means for activating tire sensors into one handheld tool. We disagree.

As Bosch concedes, each of the claimed means of RTMS sensor activation was known in the prior art. For example, McClelland discloses a tool that activates RTMS tire sensors using a continuous wave signal, and Kranz discloses an activation tool using modulated signals. Dixit and Howell both recognize that different manufacturers use sensors that are not compatible with a single tool and both references disclose a single, handy tool having the versatility to communicate with sensors by different manufacturers. Based on these disclosures, the Board reasonably found that an ordinarily skilled artisan would have been motivated by the known compatibility issues in the art of RTMS systems and the known solution of a universal communication tool disclosed by both Dixit and Howell to combine the different activation means of McClelland and Kranz into a single universal tool. Substantial evidence supports this finding.

Bosch's principal challenge to the Board's motivation to combine reasoning is that "the type of system and tool of Dixit was so objectively very different from the device of the '796 patent, that there would be no contemporaneous motivation nor design need to combine the teachings of Dixit with the other cited references." Bosch's Opening Br. 41. Bosch contends that because Dixit's tool only programs the various tire sensors with information and

does not trigger the sensors to respond, Dixit's disclosure would be irrelevant to a person of skill in the art looking to create a universal activation tool. Bosch's characterization of Dixit's tool is not incorrect, but its argument is unpersuasive.

Dixit, like McClelland and Kranz, relates to handheld RTMS tools. Thus, it is from the same field of endeavor as McClelland, Kranz, and the '796 patent and is "reasonably pertinent to the particular problem with which the inventor is involved." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). That Dixit does not disclose a universal RTMS *activation* tool (which would make Dixit an anticipatory reference) or provide an express motivation to combine different means for *activating* RTMS sensors does not render its teachings irrelevant. See *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985) ("A reference must be considered for everything it *teaches* by way of technology and is not limited to the particular *invention* it is describing and attempting to protect.") (emphasis in original). Dixit discloses the proliferation of different RTMS tire sensors during the relevant time and teaches the benefit of using one "generic or universal tool" to "communicate with tire condition sensor units within different tire condition communication systems at different vehicles." J.A. 651. The Board properly recognized that "[e]ven though Dixit itself addressed the issue of only transmitting a data signal to a transponder for storage in an associated memory, as opposed to transmitting *and receiving* a response signal, . . . the general problem of disparate RTMS communication components and protocols was known and defined in the prior art." J.A. 26. Thus, substantial evidence supports the Board's finding that Dixit teaches the advantage of having a universal tool in the RTMS environment that can communicate with tire sensors in different RTMS systems. That finding is relevant to the obviousness inquiry because, when combined with the known problem

of incompatible RTMS transmission protocols, it provides a rational underpinning for the skilled artisan’s combination of multiple activation means into a single tool.

B. Objective Indicia

Bosch next argues that the Board failed to properly credit Bosch’s objective indicia of nonobviousness. According to Bosch, it presented persuasive evidence of commercial success, licensing, and industry praise that establishes the patentability of the ’796 patent claims. “Evidence of [objective indicia] is only relevant to the obviousness inquiry ‘if there is a nexus between the claimed invention and the [objective indicia].” *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006)). To determine whether a nexus exists, “[o]ur cases require consideration of whether ‘the marketed product embodies the claimed features.’” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1222 (Fed. Cir. 2016) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000)); see also *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996) (noting whether the requisite nexus exists is a question of fact).

i. Commercial Success

Bosch relied on two pieces of evidence to establish commercial success: (i) the declaration of Mr. Patrick Pierce, Bosch’s director of marketing and diagnostic product management; and (ii) claim charts comparing commercially sold reset tools to the claims of the ’796 patent.

We agree with the Board that the Pierce declaration lacks a proper evidentiary foundation. Mr. Pierce states in his declaration that Bosch makes several models of reset tools and asserts, without explanation, that he “understand[s] that all of Bosch’s reset tools are covered

by the '796 Patent.” J.A. 592. Mr. Pierce also states that Bosch licensed the '796 patent to two other companies, Bartec and ATEQ, in addition to selling its own reset tools and that “Bosch had achieved by 2011, through sales of its own products and licensed products, 89 percent of the United States market.” J.A. 594. As the Board recognized, however, the Pierce declaration lacks any explanation or analysis to support his asserted “understand[ing]” that these commercial reset tools are covered by, or coextensive with, the claims of the '796 patent. The Board permissibly concluded that this conclusory testimony lacks foundation. *See, e.g., In re Cree, Inc.*, 818 F.3d 694, 703–04 (Fed. Cir. 2016) (agreeing with the Board that an expert declaration that merely repeats, in conclusory fashion, that the success of the product is due to the claimed invention is insufficient to establish a nexus).

We also agree with the Board that Bosch’s second piece of support, the claim charts, is flawed. In comparing claim 1 to one of Bosch’s reset tools, the chart apparently relies on a “Quick Start Guide” for Bosch’s Part No. 3833 as evidentiary support for the features of a particular Bosch reset tool. The Board properly recognized, however, that the cited Quick Start Guide was not filed as an exhibit nor was there any other testimony or evidence corroborating the contents of the Quick Start guide. Thus, the Board concluded that the claim chart both violates the rule against hearsay and lacks foundation. Moreover, the Board noted that Bosch submitted no evidence comparing Bosch’s other allegedly successful reset tools to the claims. The Board also found that Bosch’s remaining claim charts, which sought to compare Bartec’s AirAware 21240 and ATEQ’s VT 55 products to claim 1 similarly violate the rule against hearsay and lack foundation. We review such evidentiary rulings under the abuse of discretion standard. *REG Synthetic Fuels, LLC v. Neste Oil Oyj*, 841 F.3d 954, 958 (Fed. Cir. 2016) (reviewing Board’s hearsay finding in IPR proceeding under

abuse of discretion). Having reviewed these claim charts, and finding them lacking in foundation, we see no error in the Board's decision not to credit them.

ii. Licensing

Bosch presented evidence that two companies—ATEQ and Bartec—licensed the '796 patent as part of agreements to settle litigation. We have explained, however, that the mere fact of licensing, without more, is generally not a strong indication of nonobviousness if it cannot also be shown that the licensees did so out of respect for the patent rather than to avoid litigation expense. *See 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.’” *Id.* (quoting *EWP Corp.*, 755 F.2d at 908).

Here, both of the licenses relied on by Bosch were admittedly entered into for the express purpose of settling litigation. There is no evidence in the record that these agreements arose out of a recognition and acceptance of the merits of the claimed invention, rather than solely to avoid the costs of defending against further litigation. Given the lack of evidence that these licenses were entered into out of respect for the '796 patent, it was reasonable for the Board to assign less credit to the licensing evidence. *See Iron Grip*, 392 F.3d at 1324 (noting that licenses “may constitute evidence of nonobviousness; however, only little weight can be attributed to such evidence if the patentee does not demonstrate a nexus between the merits of the invention and the licenses of record” (quoting *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995))).

iii. Industry Praise

Finally, Bosch asserts that its RTMS tool garnered industry praise and awards, demonstrating its nonobviousness. In particular, Bosch submitted evidence that its 3834 and 3834EZ tools received two “Top 20 Tool” awards from an industry magazine. As with Bosch’s other objective indicia arguments, the Board found that Bosch did not tie these tools to the claims of the ’796 patent. We agree. Just as with Bosch’s evidence of commercial success, Bosch presented no evidence to establish that the tools receiving these awards fall within the claimed subject matter of the ’796 patent.

iv. Conclusion on Obviousness

Based on our review of the entirety of the record, we conclude that the Board did not err in its obviousness determination and that substantial evidence supports its factual findings underpinning its conclusions. We therefore affirm the Board’s decision that claims 1 and 4–15 are unpatentable as obvious.

II. Claims 20–22

Bosch next argues that the Board erred in finding claims 20–22 unpatentable as anticipated because McClelland does not disclose the requisite plurality of means for activating sensors. According to Bosch, McClelland contemplates using only one means for activating the sensors—a 125 kHz signal. And it contends McClelland’s assertion that “other frequencies or ranges of frequencies may be suitable” is insufficient to support a finding of anticipation because that phrase does not describe the invention at the level of complete detail found in the claims.

We disagree. The ’796 patent states that “each different frequency of [continuous wave] signal generated [by the tool] constitutes a different means for activating RTMS tire sensors.” ’796 patent col. 5, ll. 27–30. Alt-

hough McClelland explains that the preferred embodiment transmits a 125 kHz continuous wave signal, it also contemplates that exciter unit 16 can also transmit at “other frequencies,” and, in particular, transmit signals using “ranges of frequencies.” J.A. 626. We therefore find that substantial evidence supports the Board’s finding that McClelland discloses the requisite plurality of activation means, as that term is used in the ’796 patent. Because we affirm the Board’s finding of anticipation, we do not address the Board’s alternative finding that claims 20–22 are also obvious.

III. Motion to Amend

Because we affirm the Board’s decision that the original claims are unpatentable, we next address Bosch’s argument that the Board erred in denying its contingent motion to amend. We review that denial under the APA, 5 U.S.C. § 706. *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1306 (Fed. Cir. 2015). We set aside the Board’s action if it is “arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.” 5 U.S.C. § 706(2)(A). The Board rejected proposed amended claims 23–35 as indefinite under 35 U.S.C. § 112, ¶ 2⁵ and proposed amended claims 36–38 as unpatentable over the prior art. Among other arguments, Bosch challenged the Board’s rejection of both sets of proposed amended claims on the grounds that the Board impermissibly placed the burden on Bosch to establish patentability.

⁵ Paragraphs 2 and 6 of 35 U.S.C. § 112 were replaced by § 112(b) and § 112(f) respectively when the AIA took effect. Because the application resulting in the ’796 patent was filed before that date, we refer to the pre-AIA version of § 112. See AIA § 4(c), (e), 125 Stat. at 296–97.

A. Proposed Substitute Claims 23–35

Proposed substitute claims 23–35 all include the added means-plus-function limitation of “means for recording a most recent means for activating signal that was utilized to successfully activate a tire sensor.” The Board concluded that this means-plus-function limitation could not be construed and thus was indefinite because the portions of the figures and written description on which Bosch relied for the disclosure of an algorithm for performing the recited function lacked sufficient disclosure.⁶

Paragraph 6 of 35 U.S.C. § 112 allows “[a]n element in a claim for a combination” to “be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” However, for a claim element recited in means-plus-function format, “the specification must contain sufficient descriptive text by which a person of skill in the field of the invention would know and understand what structure corresponds to the means limitation.” *Typhoon Touch Techs., Inc. v. Dell*,

⁶ Bosch did not raise the issue either before the Board or on appeal of whether the Board has the statutory authority to reject proposed amended claims that introduce indefinite language on § 112 grounds. This issue is thus not before us. We do note that inter partes review is the successor to inter partes reexamination, see *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2137 (2016), and that in the inter partes reexamination context, we have observed that it was appropriate to raise § 112 challenges to proposed amended claims. See *In re NTP, Inc.*, 654 F.3d 1268, 1276 n.6 (Fed. Cir. 2011) (citing 37 C.F.R. §§ 1.552(a) (ex parte reexamination), 1.906(a) (inter partes reexamination)).

Inc., 659 F.3d 1376, 1383–84 (Fed. Cir. 2011) (quoting *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008)). When no structure in the specification is linked to the function in a means-plus-function claim element, that claim is indefinite under 35 U.S.C. § 112, ¶ 2. *AllVoice Computing PLC v. Nuance Commc'ns, Inc.*, 504 F.3d 1236, 1241 (Fed. Cir. 2007) (“[A] means-plus-function clause is indefinite if a person of ordinary skill in the art would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim.”).

Compliance of a means-plus-function claim with the definiteness requirement of § 112, ¶ 2 is a question of law which may involve underlying factual findings. *See Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1377–78 (Fed. Cir.), *cert. denied*, 136 S. Ct. 569 (2015); *BASF Corp. v. Johnson Matthey Inc.*, No. 2016-1770, 2017 WL 5559629, at *3 (Fed. Cir. Nov. 20, 2017). We review the overarching legal question de novo and any related factual findings for substantial evidence. *Biosig*, 783 F.3d at 1378; *Gartside*, 203 F.3d at 1316.

We have previously held that a party challenging patent validity on indefiniteness grounds carries the burden of proof. *See, e.g., Chicago Bd. Options Exch., Inc. v. Int’l Sec. Exch., LLC*, 748 F.3d 1134, 1141 (Fed. Cir. 2014). In *Aqua Products, Inc. v. Matal*, this Court recently ruled that the patent owner does not bear the burden of proof on the patentability of its proposed amended claims. 872 F.3d 1290 (Fed. Cir. 2017). Rather, the petitioner bears the burden of proving that the proposed amended claims are unpatentable “by a preponderance of the evidence.” 35 U.S.C. § 316(e). This burden of proof allocation applies for questions of indefiniteness, as with other questions of unpatentability.

In this case, the Board impermissibly assigned the burden of proof on the issue of indefiniteness to Bosch.

See J.A. 46, 49 (“[W]e determine that Bosch has not met its burden . . .”). For that reason, we vacate the Board’s denial of Bosch’s contingent motion to amend with respect to proposed claims 23–35 and remand for the Board to evaluate the patentability of those proposed amended claims consistent with our direction in *Aqua Products*. See *Aqua Products*, 872 F.3d at 1311 (“[W]here the challenger ceases to participate in the IPR and the Board proceeds to final judgment, *it is the Board* that must justify any finding of unpatentability by reference to the evidence of record in the IPR.”) (O’Malley, J.) (emphasis in original).

B. Proposed Substitute Claims 36–38

The Board also impermissibly assigned the burden of proof to Bosch as to proposed claims 36–38. In its final decision, the Board concluded that it was “unpersuaded that Bosch has demonstrated that the proposed substitute claims are patentable” over the prior art. J.A. 51. Citing its “informative” decision in *Idle Free Systems, Inc. v. Bergstrom, Inc.*, No. IPR2012-00027, 2013 WL 5947697 (P.T.A.B. June 11, 2013), the Board stated that “[t]he patent owner bears the burden of proof in demonstrating patentability of the proposed substitute claims over the prior art in general, and, thus, entitlement to add these claims to its patent.” *Id.* For the same reasons as stated above, we vacate the Board’s denial of Bosch’s contingent motion to amend with respect to proposed claims 36–38 and remand for the Board to evaluate the patentability of those proposed amended claims consistent with our direction in *Aqua Products*. See *Aqua Products*, 872 F.3d at 1311 (“[W]here the challenger ceases to participate in the IPR and the Board proceeds to final judgment, *it is the Board* that must justify any finding of unpatentability by reference to the evidence of record in the IPR.”) (O’Malley, J.) (emphasis in original).

CONCLUSION

For the foregoing reasons, we *affirm* the Board's decision that claims 1, 4–15, and 20–22 are unpatentable in view of the asserted prior art. We *vacate* the Board's denial of Bosch's contingent motion as to proposed substitute claims 23–38 and *remand* for further proceedings consistent with this opinion.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND
REMANDED**

COSTS

No costs.