

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROPEL ORTHODONTICS, LLC,
Petitioner,

v.

ORTHOACCEL TECHNOLOGIES, INC.,
Patent Owner.

Case IPR2018-00296
Patent 9,662,184 B2

Before HYUN J. JUNG, SCOTT A. DANIELS, and
JOHN D. HAMANN, *Administrative Patent Judges*.

DANIELS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a)

I. INTRODUCTION

A. Background

Petitioner Propel Orthodontics, LLC, (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–27 of U.S. Patent No. 9,662,184 B2 (“the ’184 patent”). Paper 2 (“Pet.”). Orthoaccel Technologies, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7. In addition, the Board granted Petitioner’s request for a Reply to Patent Owner’s Preliminary Response, which was subsequently filed by Petitioner. Paper 8.

We instituted an *inter partes* review of claims 1–27 of the ’184 patent on all of the grounds asserted by Petitioner. Paper 10 (“Inst. Dec.”). Patent Owner timely filed a Patent Owner Response (Paper 17, “PO Resp.”). Petitioner subsequently filed a Reply (Paper 21, “Pet. Reply”), and Patent Owner timely filed a Sur-Reply to Petitioner’s Reply (Paper 26, “PO Sur-Reply”).

Petitioner filed a Motion to Exclude (Paper 27, “Mot. Exclude”) and Patent Owner filed an Opposition to Patent Owner’s Motion to Exclude (Paper 29, “Opp. Mot. Exclude”).

Oral argument was held on February 13, 2019, in Alexandria, Virginia. (Paper 35, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6(b). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). Having reviewed the arguments of the parties and the supporting evidence, we find that Petitioner has demonstrated by a preponderance of the evidence that each of challenged claims—i.e., claims 1–27 of the ’184 patent—is unpatentable.

B. Additional Proceedings

Petitioner states that the ’184 patent is asserted against it in Case No. 3:17-cv-03801-RS in the United States District Court, Northern District of

California. Pet. 66. Petitioner also identifies *OrthoAccel Technologies, Inc. v. Propel Orthodontics, LLC, et al.*, No. 18-1534 (Fed. Cir. 2018) (Appeal of Order Denying Motion for Preliminary Relief entered in Case 3:17-cv-03801-RS, on January 3, 2018).¹ Paper 6.

C. The '184 Patent

The '184 patent (Ex. 1001), titled “Vibrating Dental Devices,” describes an orthodontic device, e.g., a vibrating “bite plate,” and “method for movement of one or more teeth by applying differential vibration to selected areas of a bite plate.” Ex. 1001, 7:32–34. Bite plate 1 as shown in Figure 2A is reproduced below.

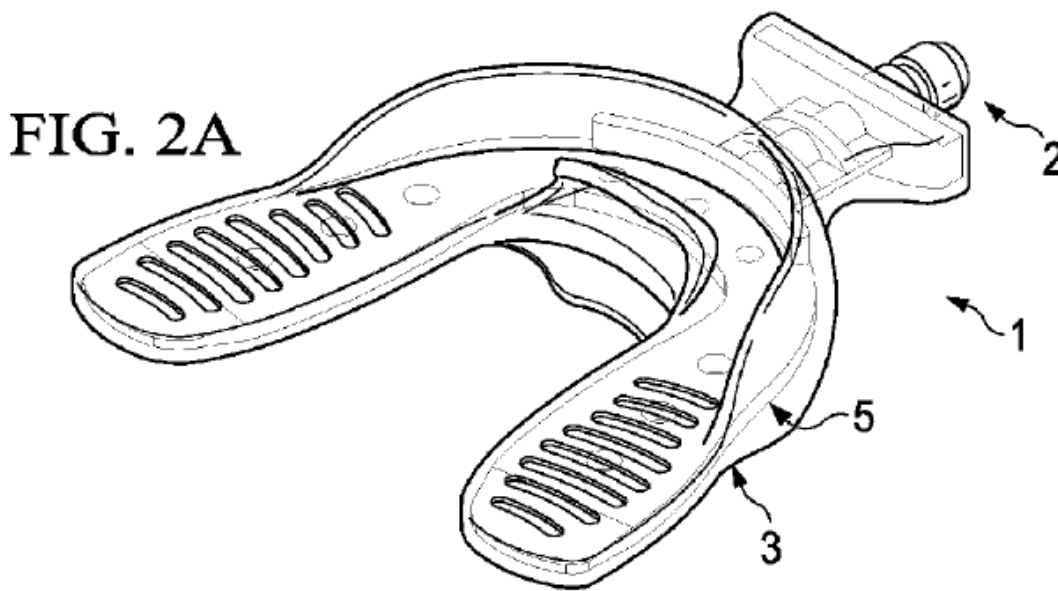


Figure 2A of the '184 patent, above, depicts bite plate 1 having connector 2 for attaching a motorized extraoral vibratory device (not shown). *See id.* at 7:53–54. The '184 patent explains that compared to conventional static force orthodontic devices “[a] faster method of orthodontic remodeling for a

¹ Oral argument was held at the Federal Circuit on March 5, 2019.

patient [is] wearing a vibrating orthodontic remodeling device for about 20 minutes a day to accelerate[] tooth movement.” *Id.* at Abstract.

D. Illustrative Claim

Of the challenged claims, claims 1, 10, and 19 are independent. Each of dependent claims 2–9, 11–18, and 20–27 depends from its respective independent claim 1, claim 10, or claim 19. Claim 1, reproduced below, illustrates the claimed subject matter with particular claim limitations, specifically the limitation of “1 to 20 minutes” that is found in each challenged independent claim, shown in italics:

1. A faster method of orthodontic remodeling, comprising:
 - a) a patient wearing an orthodontic appliance biting an orthodontic remodeling device, said orthodontic remodeling device comprising:
 - i) an extraoral housing containing a power source operably coupled to an actuator operably coupled to a processor that controls said actuator;
 - ii) said extraoral housing operably connected to an intraoral U-shaped bite plate;
 - iii) said bite plate having upper and lower vertical rims on a facial edge thereof to contact both arches of teeth; and
 - iv) wherein during use said orthodontic remodeling device is held in place only by teeth clamping on the bite plate and said orthodontic remodeling device vibrates at a frequency from 0.1 to 400 Hz; and
 - b) *activating said orthodontic remodeling device for 1 to 20 minutes daily;*
wherein said method provides accelerated tooth movement as compared to without using said orthodontic remodeling device.

Ex. 1001, 13:28–49 (emphasis added).

E. The Alleged Grounds of Unpatentability

Petitioner contends that the challenged claims are unpatentable on the following specific grounds.²

References	Basis	Claims Challenged
Lowe ³	§ 102	1–8, 10–16, and 19–26
Lowe and Ting ⁴	§ 103	9, 17, 18, 26, and 27
Lowe and Mao ⁵	§ 103	9, 17, 18, 26, and 27

II. CLAIM CONSTRUCTION

A. Legal Standard

In this *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard).⁶

Claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *In re Translogic*

² Petitioner supports its challenge with a Declaration of Dr. Sumit Yadav, (Ex. 1002). Correspondingly, Patent Owner supports its Response with a second Declaration of Dr. Ricupito, (Ex. 2010). *See infra*.

³ Ex. 1003, U.S. Patent Appl’n. Pub. 2008/0227046 A1 (Sept. 18, 2008).

⁴ Ex. 1012, WO 2007/146187 A2 (Dec. 21, 2007).

⁵ Ex. 1013, U.S. Patent No. 7,029,276 B2 (Apr. 18, 2006).

⁶ On October 11, 2018, the USPTO revised its rules to harmonize the Board’s claim construction standard with that used in federal district court. Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (to be codified at 37 C.F.R. pt. 42). This rule change, however, applies to petitions filed on or after November 13, 2018, and therefore does not apply to this proceeding. *Id.*

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Tech., Inc., 504 F.3d 1249, 1257 (Fed. Cir. 2007), *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) (“Although words in a claim are generally given their ordinary and customary meaning, a patentee may choose to be his own lexicographer and use terms in a manner other than their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history.”). We apply this standard to the claims of the ’184 patent.

B. wherein said . . . accelerated tooth movement is about 0.5 mm per week

Dependent claims 9, 17, 18, 26, and 27 include the limitation “wherein said . . . accelerated tooth movement is about 0.5 mm per week.” We did not find it necessary to construe the meaning of this phrase in our Decision on Institution; however, we determined that the limitation of “about 0.5 mm per week” is a requirement of dependent claims 9, 17, 18, 26, and 27. Inst. Dec. 6–7. Although Petitioner argued prior to institution that this limitation should not be given any patentable weight, neither party provides any further substantive analysis in post-institution briefing. *See* PO Resp. 34–36; Pet. Reply 6–27.

The claim is explicit that the recited “accelerated tooth movement” has a particular rate. *Id.* at 13:66–67. The rate “about 0.5 mm per week” is a reasonably concrete value, providing some modicum of textual definitiveness that is more than superfluous narrative. *Id.* Thus, we are not persuaded that the specifically recited tooth movement rate of “about 0.5 mm per week” is merely an intended result or laudatory phrase. *Cf. Minton v. Nat’l Ass’n of Sec. Dealers, Inc.*, 336 F.3d 1373, 1381 (Fed. Cir. 2003) (“A whereby clause in a method claim is not given weight when it simply expresses the intended result of a process step positively recited.”).

We also note that in its Sur-Reply, Patent Owner states generally “that the challenged claims do not define a rate of tooth movement.” PO Sur-Reply 3. It is not clear, however, from this statement that Patent Owner has entirely conceded that the rate of “0.5 mm per week” is not a limitation.

Overall, we are not apprised of any reason to alter our previous determination. For purposes of completeness of our Decision, we address this limitation in our anticipation and obviousness analyses and treat “about 0.5 mm per week” as a requirement of dependent claims 9, 17, 18, 26, and 27.

III. ANALYSIS

A threshold question in this proceeding is whether the ’184 patent’s claims are entitled to the benefit of earlier filing dates of related applications (which include Lowe) under 35 U.S.C. § 120. If the answer to this question is that the ’184 patent *cannot* properly claim priority back at least to Parent Patent Application U.S. 11/773,849 to Lowe, (“the ’849 Parent Application” or “Lowe”), then Lowe is § 102(b) prior art to the claims of the ’184 patent and we must address Petitioner challenges. Otherwise, each of Petitioner’s anticipation and obviousness challenges fail on their face if the ’184 patent can claim priority to Lowe.

As discussed below, we determine that Lowe *is* § 102(b) prior art to the claims of the ’184 patent.

A. Petitioner’s Motion to Exclude Dr. Ricupito’s Testimony

Because this issue bears directly on the evidence we will consider in this proceeding, we must determine initially whether to grant Petitioner’s Motion to Exclude Dr. Ricupito’s testimony. Petitioner argues that we should exclude Dr. Ricupito’s testimony (Ex. 2010) in its entirety under Fed.

R. Evid. 702.⁷ Mot. Exclude, 1. We disagree. Dr. Ricupito’s declaration may have some deficiencies, which we discuss in the following sections of this Decision in our substantive discussion of the evidence. The Board, however, acts as both the gatekeeper of evidence and as the weigher of evidence. Rather than excluding evidence that is allegedly confusing, misleading, untimely, and/or irrelevant, we will simply not rely on it or give it little or no probative weight, as appropriate, in our analysis. Similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well positioned to determine and assign appropriate weight to evidence presented, including giving it no weight. *See, e.g., Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (“One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received . . .”).

Thus, in this *inter partes* review, the better course is to have a complete record of the evidence to facilitate public access as well as appellate review. Accordingly, we deny Petitioner’s Motion to Exclude Exhibit 2010.

⁷ “The policy considerations for excluding expert testimony, such as those implemented by the gatekeeping framework established by the Supreme Court in *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579 (1993), are less compelling in bench proceedings such as *inter partes* reviews than in jury trials.” *Nestle Healthcare Nutrition, Inc. v. Steuben Foods, Inc.*, Case IPR2015-00249, slip op. at 23 (PTAB June 2, 2016) (Paper 76).

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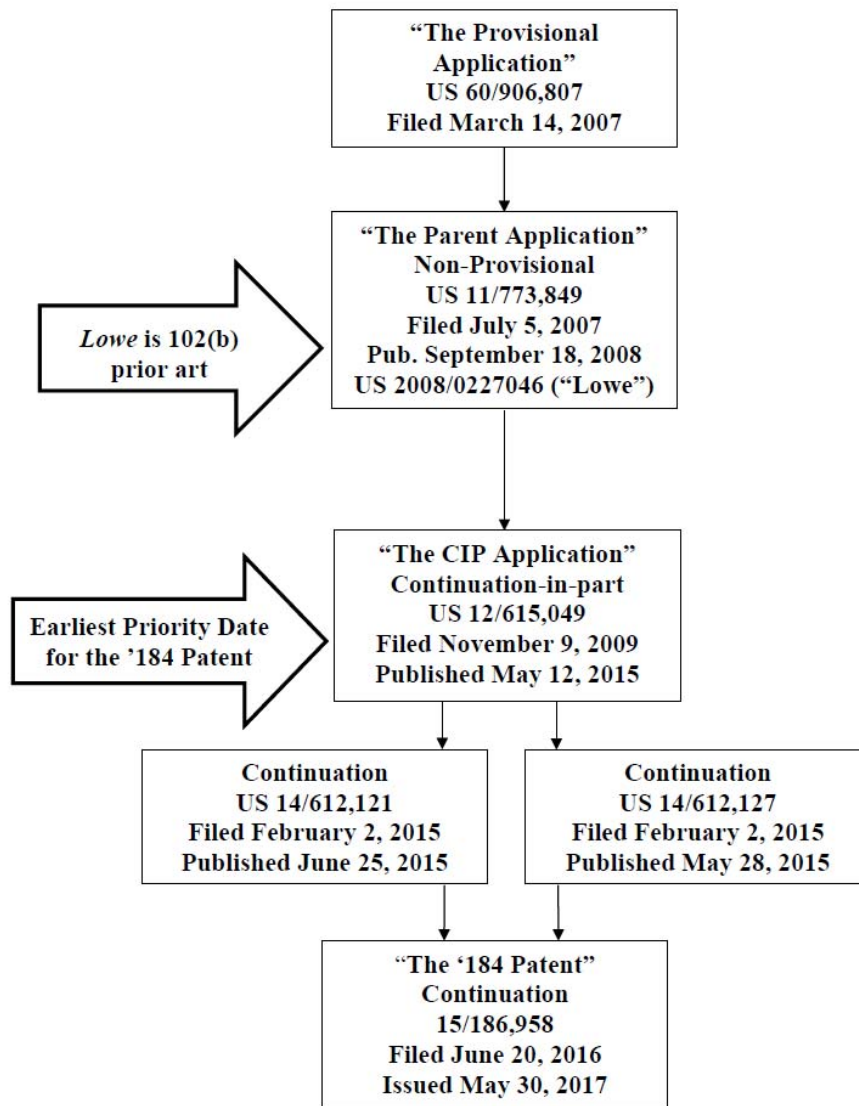
B. The Question of Priority under 35 U.S.C. § 120 – Whether the '184 Patent is Entitled to the Benefit of a Prior Parent Application's Filing Date

The '184 patent claims the benefit of, *inter alia*, Lowe's July 5, 2007, filing date, via a series of related continuation applications and a continuation-in-part application. *See* Ex. 1001, Related U.S. Application Data, *see also* Pet. 12, PO Resp. 2–3.

1. Related U.S. Applications

Petitioner's chart of related U.S. patent applications is reproduced below (including arrows added by Petitioner alleging that Lowe is prior art), and illustrates the '184 patent's benefit claims (Pet. 12).⁸

⁸ Michael K. Lowe is the sole inventor of the '184 patent, and the first named inventor of the Lowe reference (Ex. 1003), U.S. Appl'n No. 11/773,849.



On its face page, and as Patent Owner contends, the '184 patent claims the benefit of the July 5, 2007 filing date of Parent Patent Application U.S. 11/773,849 to Lowe, and also priority to U.S. Provisional Application No. 60/906,807 filed March 14, 2007 ("the '807 Provisional Application"). *See* Ex. 1001, 1. The arrows shown on the left of the chart, above, illustrate Petitioner's argument—alleging that the '184 patent is only entitled to the filing date of CIP Application No. 12/615,049, filed November 9, 2009 ("the '049 CIP Application").

2. *Brief Summary of the Parties Arguments*

Petitioner contends that “[t]he claims of the ’184 patent cannot claim priority before November 9, 2009 because there is no support for the claim limitation ‘1 to 20 minutes daily’ prior to that date.” Pet. 18. Thus, according to Petitioner, Lowe, which was filed more than one year before the CIP Application that became the ’184 patent, is § 102(b) prior art to the ’184 patent. *Id.*

Patent Owner argues that Lowe is not invalidating prior art because the claims of the ’184 patent are properly supported under 35 U.S.C. § 112 with sufficient written description by the parent application disclosure and thus “are entitled to a filing date as least as early as [Lowe,] July 5, 2007.” PO Resp. 3; *see* PO Sur-Reply 2–11.

3. *The Level of Ordinary Skill in the Art*

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–697 (Fed. Cir. 1983) (citing *Orthopedic Equip. Co. v. All Orthopedic Appliances, Inc.*, 707 F.2d 1376, 1381–82 (Fed. Cir. 1983)). Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *Id.* Moreover, these factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo Co. Ltd, Inc. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima v. Bourdeau*, 261

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F.3d 1350, 1355 (Fed. Cir. 2001). Additionally, the Supreme Court informs us that “[a] person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR Int’l v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

We determined in our Decision on Institution that the level of ordinary skill in the art includes a person with a degree in orthodontics and several years of experience as a working orthodontist, and also a person with an education and several years of experience in osteogenesis and bone remodeling, or an equivalent field, in the context of tooth movement. Inst. Dec. 8. On the complete record now before us we find this level of ordinary skill in the art to be consistent with our review of the evidence before us, including the prior art. Neither party proposes any further changes or objects to such a level of skill.⁹ *See generally* PO Resp.; Pet. Reply. Therefore, we determine that the level of ordinary skill in the art includes a person with a degree in orthodontics and several years of experience as a working orthodontist, and also a person with an education and several years of experience in osteogenesis and bone remodeling, or an equivalent field, in the context of tooth movement.

4. The Written Description Requirement

Under 35 U.S.C. § 120, a patent claim is entitled to the benefit of the filing date of a prior-filed application only if the original disclosure of the prior-filed application provides written description support for the patent claim as required by 35 U.S.C. § 112, first paragraph. *In re NTP, Inc.*, 654 F.3d 1268, 1276–77 (Fed. Cir. 2011); *see also Augustine Med., Inc. v. Gaymar Indus., Inc.*, 181 F.3d 1291, 1302–03 (Fed. Cir. 1999) (noting that

⁹ There is no dispute in this proceeding that both parties’ declarants, Dr. Ricupito for Patent Owner and Dr. Yadav for Petitioner, are at least persons of ordinary skill in the art.

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different claims of a continuation-in-part application may receive different effective filing dates because subject matter that arises for the first time in a continuation-in-part application does not receive the benefit of the filing date of the parent application).

To be clear, this threshold written description issue is a question of fact—whether a person of ordinary skill in the art would have understood from the disclosure in *Lowe* that the inventor had possession of the invention at the time of the filing of the earlier application. *See PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008) (“[T]he disclosure of the prior application must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [the inventor] was in possession of the invention.” (internal citation omitted)); *see also Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (“This inquiry, as we have long held, is a question of fact. Thus, we have recognized that determining whether a patent complies with the written description requirement will necessarily vary depending on the context.” (internal citation omitted)).

In addition, the parent application need not state the exact same language, or limitation, that is recited and claimed in the later filed application. *See Union Oil Co. of California v. Atl. Richfield Co.*, 208 F.3d 989, 997 (Fed. Cir. 2000) (“The written description requirement does not require the applicant to describe exactly the subject matter claimed.” (internal citation omitted)). It must be shown, however, that “the disclosure of the application relied upon ‘reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter.’” *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 772 F.2d 1570, 1575 (Fed. Cir. 1985) (internal citation omitted). The question of “possession” by the

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inventor is not whether the range was precisely expressed in the earlier application, but whether “one skilled in the art could derive the claim limitations from the parent.” *Id.*

The issue of possession however, should not be conflated with obviousness. *See Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997) (“Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed. It extends only to that which is disclosed.”). In other words, just because a later claimed invention may be obvious in view of certain prior disclosure, the earlier disclosure does not automatically satisfy the written description requirement under 35 U.S.C. § 112. It is not enough that the later claimed invention would have been obvious; there must be some express or intrinsic disclosure showing the inventor’s possession at the earlier date of the claimed limitation. *See id.* at 1572 (“While the meaning of terms, phrases, or diagrams in a disclosure is to be explained or interpreted from the vantage point of one skilled in the art, all the limitations must appear in the specification . . . a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.”).

5. *The Burden of Proof*

It is settled law that after coming forward with a challenge and evidence that a patent is *not* entitled to the priority it claims, the burden of production is on the Patent Owner to show that the challenged patent is entitled to the benefit of the priority date it claims. *See PowerOasis*, 522 F.3d at 1305 (describing the requisite burdens to establish priority, the Federal Circuit explained that “[o]nce T–Mobile established by clear and

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convincing evidence that the MobileStar Network was § 102(b) prior art to the asserted claims of the '658 and '400 patents, the burden was on PowerOasis to come forward with evidence to the contrary”); *see also Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1327 (Fed. Cir. 2008) (explaining that the patentee’s burden of production for showing an asserted reference is not prior art includes “not only the existence of the earlier application, but why the written description in the earlier application supports the claim”); *see also Research Corp. Techs., Inc. v. Microsoft Corp.*, 627 F.3d 859, 870–71 (Fed. Cir. 2010) (holding that the patentee carries the burden to show entitlement to a priority date when the patentee relies on that priority date to overcome an anticipation or obviousness argument).

In *inter partes* review proceedings, the Petitioner has the burden of persuasion to prove unpatentability by a preponderance of the evidence and also has the initial burden of production. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1380 (Fed. Cir. 2015). Once Petitioner has met its initial burden of production by presenting sufficient explanation and evidence, the Board has consistently required Patent Owner to support its claim to priority and produce evidence “that the challenged claims are entitled to the benefit of an earlier effective filing date that is before the relevant date of [the asserted prior art].” *United States Auto. Ass’n v. Nader Ashghari*, CBM2016-00064, slip op. at 34 (PTAB Aug. 15, 2017) (Paper 42).

6. Analysis

Petitioner argues that neither the '807 Provisional Application, nor the '849 Parent Application, disclose the limitation recited in each of the challenged independent claims of “activating said orthodontic remodeling

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device *for 1 to 20 minutes daily.*” Pet. 10–27 (emphasis added). Petitioner points out that the ’807 Provisional Application states that “[t]he proposed invention would be worn for *approximately twenty minutes daily*, but could be worn for longer or shorter periods of time both more or less frequently.” Pet. 13 (citing Ex. 1004, 7:25–8:1) (emphasis added). Similarly, Petitioner contends that the ’849 Parent Application discloses that “[t]he system can be worn for a predetermined period such as *approximately twenty minutes daily* or any other suitable duration of time.” *Id.* (citing Ex. 1006, 7:6–8) (emphasis added). The first time that the range of “1 to 20 minutes daily” is disclosed, Petitioner argues, is in the ’049 CIP Application:

Thus, the invention also includes a method for movement of one or more teeth by applying differential vibration to selected areas of a bite plate at frequencies between 1 to 1000 Hz (preferably 10-100 Hz and most preferred 20-40 Hz) and a force of 0.01-2 Newtons (or 0.1-0.5 or 0.2 Newtons) for a period of 1-60 minutes, preferably about 1-30 or 1-10 minutes or 20 minutes.

Id. at 14 (citing Ex. 1005 ¶ 39).

Addressing the disclosure in the ’807 Provisional Application and the ’849 Parent Application to Lowe, Petitioner’s declarant, Dr. Yadav, testifies that “one skilled in the art would not interpret ‘about 20 minutes’ to include anything but slight variations from 20 minutes, at most a range from 19–21 minutes.” Ex. 1002 ¶ 37. Dr. Yadav explains that orthodontists “are generally a conservative group, and that the use of vibration was an unproven technology back in July of 2007.” *Id.* ¶ 38. Because of these considerations and the nature of such orthodocny procedures, Dr. Yadav testifies that one of ordinary skill in the art would not discern from catch-all phrases such as “any other suitable duration of time” as stated in Lowe, “that other durations are being disclosed, let alone [that] a duration of 1 to 20

minutes is possessed by the inventor.” *Id.* During his deposition, Dr. Yadav was consistent, maintaining that while some nominal variation from 20 minutes would have been foreseeable, one of ordinary skill in the art would not have recognized a range of 1 to 20 minutes.

Q. And therefore it’s your view that only a range of 19 to 21 minutes is disclosed in the parent application, correct?

....

A. So in the parent application or the provisional application only discloses about 20 minutes. One [of] ordinary skill like me as an orthodontist, if you tell us about 20 minutes, we will think probably approximately one or two standard deviation above or below 20 minutes, which is written here in my declaration, 19 to 21 minutes.

Ex. 2009, 17:10–21. In sum, it is Petitioner’s position that recognition in Lowe of the range “1 to 20 minutes daily” is not supported by the evidence of broad disclosure language, nor the recitation in the parent application of “approximately 20 minutes.”

Patent Owner argues that the ’807 Provisional Application and the ’849 Parent Application to Lowe in fact do disclose to one of ordinary skill in the art the later claimed range of “activating said orthodontic remodeling device for 1 to 20 minutes daily,” as recited in the claims of the ’184 patent. PO Resp. 4–32. Acknowledging that the ’807 Provisional Application and the ’849 Parent Application to Lowe do not expressly disclose wearing the orthodontic device for “1 to 20 minutes daily,” Patent Owner argues that “[t]he disclosure as originally filed does not, however, have to provide *in haec verba* support for the claimed subject matter at issue.” *Id.* at 4 (citing *Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1364 (Fed. Cir. 2003)).

To support its position that the '807 Provisional Application inherently discloses the range of "1 to 20 minutes" recited in the '184 patent, Patent Owner argues that the '807 Provisional Application explains that besides using the orthodontic device for "20 minutes daily," it "**could be worn for longer or shorter periods of time.**" PO Resp. 5 (citing Ex. 1004, 7–8). Likewise, Patent Owner argues that the '849 Parent Application to Lowe states to use the device for "approximately twenty minutes daily **or any other suitable duration of time.**" *Id.* (citing Ex. 2002, 3:67–4:2). Also, Patent Owner points to the passage in the '849 Parent Application describing that "**the prescribed clinical application of forces can be over any duration, frequency, and time of day combination pattern.**" *Id.* at 6 (citing Ex. 2002, 6:29–34). Patent Owner argues that, "[b]oth Applications include express statements that the device could be worn for periods other than twenty minutes" and that "the inventors had possession of an invention that would work over a range of minutes — not just exactly or even nearly twenty minutes." *Id.* at 6–7.

Taking aim at Petitioner's declarant, Patent Owner argues that Dr. Yadav's testimony should garner no weight, and that his "dogmatic goal-focused approach ignores the *entirety* of the duration disclosure of the priority Applications." *Id.* at 12. Dr. Yadav's testimony, Patent Owner argues, "seeks to improperly interpret the Provisional and Parent Applications by *removing* text," thereby essentially ignoring the broad nature of the disclosure and that the orthodontic device "could be worn for longer or shorter periods of time both more or less frequently" for example, as stated in the Provisional Application. *Id.* at 12–13 (citing Ex. 1004, 7–8).

Patent Owner advances the testimony of its declarant, Dr. Ricupito, to explain why one of ordinary skill in the art would have recognized the range

of 1–20 minutes to be disclosed in the '807 Provisional Application and the '849 Parent Application to Lowe. *Id.* at 23 (citing Ex. 2010 ¶¶ 42–43; Ex. 1022 ¶¶ 26–35). Dr. Ricupito testifies that “[o]ne of ordinary skill would read this disclosure as including the claimed range of 1–20 minutes” because “it was not unusual in orthodontics and dentistry to use devices for very short periods like 1 to 2 minutes. For example, the amount of time recommended for tooth brushing is about two minutes.” Ex. 2010 ¶ 28. Dr. Ricupito testifies also that by increasing the frequency of vibration of the device, the orthopedic device could be used for less time because “one of ordinary skill would have been well-aware of the principle that there is a generally inverse relationship between frequency and time.” *Id.* ¶ 29.

We agree with both parties that there is no express disclosure of using the orthodontic device for the range 1 to 20 minutes daily in either the '807 Provisional Application or the '849 Parent Application to Lowe. *Compare* Ex. 1004, 7, *with* Ex. 1006, 7. Consequently, the question is whether one of ordinary skill in the art would have derived, i.e., recognized, the claimed range of “1 to 20 minutes” from the context of the disclosure in these prior applications. *See Lockwood*, at 1572 (“[A] prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.”). As discussed below, we determine that one of ordinary skill in the art would not have concluded that the inventor was in possession of the claimed “1 to 20 minute daily” range based on the disclosure in the prior provisional and parent applications.

Patent Owner relies on the broad description in the prior applications that states, for example in the '849 Parent Application to Lowe, that the orthodontic device can be used for “any duration.” *See* Ex. 1006, 12 (the

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'849 Patent Application states that “the prescribed clinical application of forces can be over any duration, frequency, and time of day combination pattern”). What neither Patent Owner nor Dr. Ricupito have persuasively explained is why a person of ordinary skill in the art would have recognized the specific range of “1 to 20 minutes” from the boundless description of “any duration.” *See* Ex. 2010 ¶¶ 28–43.

Overall, the basic premise of Patent Owner’s argument, that the specific claimed range is found in context based on the ambiguous breadth of the disclosure statements, is not persuasive. *See* PO Resp. 6–15 (Patent Owner argues, for example, that “[t]he broad understanding of the disclosure related to daily duration of use is consistent with the broad disclosure of other aspects of the invention”). This “breadth of the disclosure” argument basically asserts that *any* time periods shorter (or longer) than 20 minutes are encompassed, and would have been recognized by one of ordinary skill in the art, within the broad specification language, e.g., “any other suitable duration of time,” as written in the written descriptions of the prior applications. PO Resp. (citing Ex. 2002, 3:67–4:2)). Patent Owner’s examples of broad specification language, including arguably “boilerplate” specification language, do not persuasively tie the later claimed limitation of “1 to 20 minutes” in the ’184 patent to any express or inherent disclosure in the earlier applications, any more than they would express some other time range, for instance, “20 to 40 minutes.” *See e.g.*, Ex. 1004, 7–8 (the ’807 Provisional Application states that the orthodontic device “could be worn for longer or shorter periods of time”), *see also id.* at 20 (the ’807 Provisional Application explains the disclosure “is intended to cover any modifications that are within the scope and spirit of the invention”). Patent Owner offers no constructive boundaries to this argument. Taken at face value, Patent

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Owner's position is that such broad specification language means that essentially any range of time, later claimed, would have been clearly conveyed to a person of ordinary skill in the art by the prior applications. We cannot accept this premise. *See In re Ruschig*, 379 F.2d 990, 995 (C.C.P.A. 1967) (“It is no help in finding a trail or in finding one's way through the woods where the trails have disappeared—or have not yet been made, which is more like the case here—to be confronted simply by a large number of unmarked trees. Appellants are pointing to trees. We are looking for blaze marks which single out particular trees. We see none.”).

Turning to the specific disclosure of “approximately 20 minutes daily” as stated in the '807 Provisional Application, Patent Owner makes several specific arguments as to *why* one of ordinary skill in the art would find the claimed range disclosed in the earlier applications. PO Resp. 23–32. First, Patent Owner argues that other orthodontic and dental devices were known to be used for short periods of time. *Id.* at 23. Patent Owner contends “[f]or example, the amount of time recommended for tooth brushing is about two minutes and a waterpik, which is a pressurized water flosser commonly used by patients with braces, is typically used for anywhere from thirty seconds to one minute.” *Id.* (citing Ex. 2010 ¶ 28). Second, Patent Owner argues there is an inverse relationship between frequency and time, and thus “one of ordinary skill in the art would expect this increase in force to translate to faster tooth movement and a shorter course of treatment.” *Id.* at 25 (citing Ex. 2010 ¶ 30). Third, Patent Owner argues that Dr. Yadav considered only the embodiment in the '849 Parent Application that disclosed a range of frequencies, i.e. using the device “for about twenty minutes a day at a frequency of between 0.1 to 400 Hz.” *Id.* at 26–27 (citing Ex. 2002, 6:17–32; Claim 22). Patent Owner argues that

“nothing in this example implies that a shorter duration is excluded merely because a range of 0.1 to 400 Hz could be used for twenty minutes.” *Id.* at 27 (citing Ex. 2010 ¶ 36). We address these specific arguments below.

Patent Owner’s first argument that other dental devices and procedures, such as for teeth cleaning, are used for periods of time shorter than 20 minutes is not persuasive because no evidence or explanation is provided of any functional or temporal relationship between the objectives of teeth cleaning and teeth realignment through bone remodeling. PO Resp. 23–24 (citing Ex. 2010 ¶ 28). Dr. Ricupito testifies that because the recommended time for tooth brushing is 2 minutes, “one of ordinary skill would have read the disclosure of a range of times for use of a vibratory device to include times similar to those for other devices in the field at the time (e.g., 30 seconds to 2 minutes).”¹⁰ Ex. 2010 ¶ 28. Dr. Ricupito, however, does not support this comparison with any evidence that a person of ordinary skill in the art would have understood a causal relationship between teeth cleaning and teeth realignment from the orthodontic and dental fields. *See id.* Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight. 37 C.F.R. § 42.65(a). Dr. Ricupito’s testimony does not provide any facts, data, or analysis to support the opinion stated. Merely repeating an argument from the Petition in the declaration of a proposed expert does not

¹⁰ If we were to give Dr. Ricupito’s statement weight, then we would also have to consider giving weight to evidence of other times; for instance, there are certainly orthodontic devices, such as conventional braces, that require significantly more than 20 minutes of application. Ex. 1001, 1:41–43 (the ’184 patent explains that “this widely accepted approach takes about twenty four months on average to achieve success”).

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give that argument enhanced probative value. Accordingly, we give the cited evidence on this point in Dr. Ricupito's declaration little, if any, probative weight.

Patent Owner's second argument, which notes the inverse relationship between force and time, appears to be simply a re-casting of Patent Owner's "breadth of the disclosure" argument. It may be that there is an inverse relationship between force and time; for example, we know from fundamental physics principles that $f = m \times a$, and that a unit of force is a Newton ("N") derived as $\text{kg} \times \text{m/s}^2$. The mathematical likelihood (or obviousness) of this relationship does not, however, explain persuasively that a person of ordinary skill in the art would have recognized that a time of 1 minute, i.e., 5%, of 20 minutes, was clearly within a range of, e.g., "approximately 20 minutes daily" as stated in the '807 Provisional Application. Ex. 1004, 7. To the extent that a range of time including 1 minute at higher frequencies would have been obvious to a person of ordinary skill in the art, this limitation is not disclosed in the prior applications, and it is inappropriate to consider written description in terms of obviousness. *See Lockwood*, 107 F.3d at 1572. ("One shows that one is 'in possession' of *the invention* by describing *the invention*, with all its claimed limitations, not that which makes it obvious.")

For its third argument, Patent Owner has pointed us to no persuasive case law with respect to written description, or to any relevant scientific principle or persuasive evidence, that states or implies that from a specific frequency-time parameter relationship, i.e., 0.1 to 400 Hz for about 20 minutes, one of ordinary skill in the art would clearly have recognized other unstated time range parameters. PO Resp. 26–27 (citing Ex. 2010 ¶¶ 7, 34–35; Ex. 1022 ¶¶ 12, 26). Dr. Ricupito testifies that nothing in the disclosure

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of the prior applications “implies that a shorter duration is excluded merely because a range of 0.1 to 400 Hz could be used for twenty minutes.”

Ex. 2010 ¶ 36. In the ’807 Provisional Application, the disclosed species of time is “approximately 20 minutes.” Ex. 1004, 7. That the provisional application does not expressly *exclude* other time ranges is not a convincing argument that a person of skill in the art would have understood that certain specific time ranges *were* therefore clearly possessed and within the inventor’s grasp. We are not persuaded that we should accept the genus of “any duration of time” as inherently or contextually disclosing the further species of “1 to 20 minutes daily,” which includes a 95% deviation from the single example in the prior applications. Patent Owner’s arguments here are inconsistent with established case law. *See Ralston Purina Co.*, 772 F.2d at 1580 (“Certainly, genera and subgenera ranges which substantially deviate from the two species disclosed in the grandparent are not sufficiently described when there is no suggestion to those skilled in the art that such ranges . . . are embraced by the original invention.”).

Patent Owner also argues that its claim to priority is consistent with the Examiner’s priority determination and allowance of the application that became the ’184 patent. PO Resp. 32–34. Patent Owner argues that the Examiner’s “refusal to reject the claims as anticipated or to reject the priority claim evidences that the Parent Application adequately disclosed the independent claims.” *Id.* at 33. Patent Owner argues specifically that the Examiner’s suggestion to include the limitation “for 1 to 20 minutes” in the claims of the ’184 patent demonstrates that “the Examiner understood that the [’849] Patent Application supported this limitation.” *Id.* (citing Ex. 1007, 234–237).

Our review of the prosecution history, and the Examiner's Amendment in the Notice of Allowability ("NOA"), mailed April 20, 2017, does not reveal that the Examiner substantively reviewed or considered, in the NOA, the relevant content of the prior applications to which priority is claimed in the '184 patent. *See* Ex. 1007, 234–237. It is most likely that the Examiner's amendment indicates that the Examiner found support in the relevant disclosure of the continuation application that became the '184 patent for the range of 1 to 20 minutes per day. *See* Ex. 1007, 235; *see also* Ex. 1001, 7:32–47.

More interesting is that the Examiner, in a subsequent related patent application, stated in an office action that the "[a]mendment of the duration to 'from 1 to 20 minutes' was confirmed with TQAS (Technical Quality Assurance Specialists) to be supported by the 'any duration' language in the parent cases." Ex. 2003. The Examiner, however, in the *ex parte* prosecution of the application, did not have the benefit of the record we have in this adversarial proceeding, including the declarations and deposition testimonial evidence of Dr. Yadav and Dr. Ricupito. Particularly, the Examiner did not have Dr. Yadav's testimony that a person of ordinary skill in the art would *not* recognize the phrases "approximately 20 minutes daily" and "or any other suitable duration of time" as including the range of "1 to 20 minutes daily." Ex. 2009, 33:6–20. Dr. Yadav testifies consistently that a person of ordinary skill in the art would consider "that probably [the range] would be plus or minus one or two standard deviation." *Id.* at 34:2–3. The Examiner did not have any expert testimony before her, even an expert in sync with Patent Owner's assertions. This is telling because even Dr. Ricupito during his deposition struggled to confirm Patent Owner's assertion that a person of ordinary skill in the art would understand a range of "1 to 20

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minutes daily” from the original disclosure of “approximately twenty minutes daily.”

Q. What does “approximately twenty” mean to you, just in this context?

A. Plus or minus, either way.

Q. Plus or minus how much?

A. Approximately -- five minutes to a half-hour, approximately.

Q. So you think “approximately 20” means -- can mean 5 minutes?

A. Well, I think that “approximately 20” means around 20 minutes, but the --

Q. That’s all I’m asking about, is just – I understand your testimony is that there is other language that -- like the next sentence that expands that, but just the phrase “approximately 20 minutes,” to one skilled in the art, how much leeway away from 20 minutes would you understand that to mean?

A. Plus or minus five to seven minutes either way.

Ex. 1024, 53:9–25.

As discussed above, we give little to no evidentiary weight to the breadth of disclosure, i.e. “any duration,” argument asserted by Patent Owner and Dr. Ricupito. Indeed, as shown by his testimony above, not even Patent Owner’s declarant, Dr. Ricupito, was willing to confirm consistently that a person of ordinary skill in the art would have recognized a range of time down to 1 minute from the statement “approximately 20 minutes.”

Ex. 1024, 53:9–25. Therefore, we do not find persuasive Patent Owner’s reliance on the Examiner’s findings in the prosecution of the related patent applications to the ’184 patent.

We are persuaded that Petitioner has shown, and Patent Owner has failed to rebut, the more compelling evidence that one of ordinary skill in the art *would not* have clearly recognized that the inventor had possession of the invention in the earlier parent and provisional applications to the '184 patent, namely—the range of using the claimed orthodontic device for “1 to 20 minutes daily” as recited in each of the independent claims challenged in this proceeding. Accordingly, we determine that the '184 patent cannot claim priority to either the '807 Provisional Application, or the '849 Parent Application to Lowe, and thus, at least Lowe is § 102(b) prior art to the challenged claims of the '184 patent.

We turn now to Petitioner's asserted grounds of unpatentability and Patent Owner's arguments to determine whether Petitioner has met its burden under 35 U.S.C. § 316(e).

C. Claims 1–8, 10–16, and 19–26—Anticipation by Lowe

Petitioner asserts that claims 1–8, 10–16, and 19–26 are anticipated by Lowe. Pet. 28–53. Petitioner has established by a preponderance of the evidence that claims 1–8, 10–16, and 19–26 are anticipated for the reasons explained below.

1. Lowe

Lowe is titled, “Systems, Methods, and Adjunctive Procedures for Correcting Malocclusion.” Ex. 1003, 1. Lowe describes an apparatus and method for “inducing tooth movement and treating malocclusion, craniofacial anomalies, bony defects, and dentofacial deformities through accelerated bone remodeling.” *Id.*, Abstract. Lowe's Figure 1, reproduced below, illustrates one embodiment of orthopedic treatment system 10.

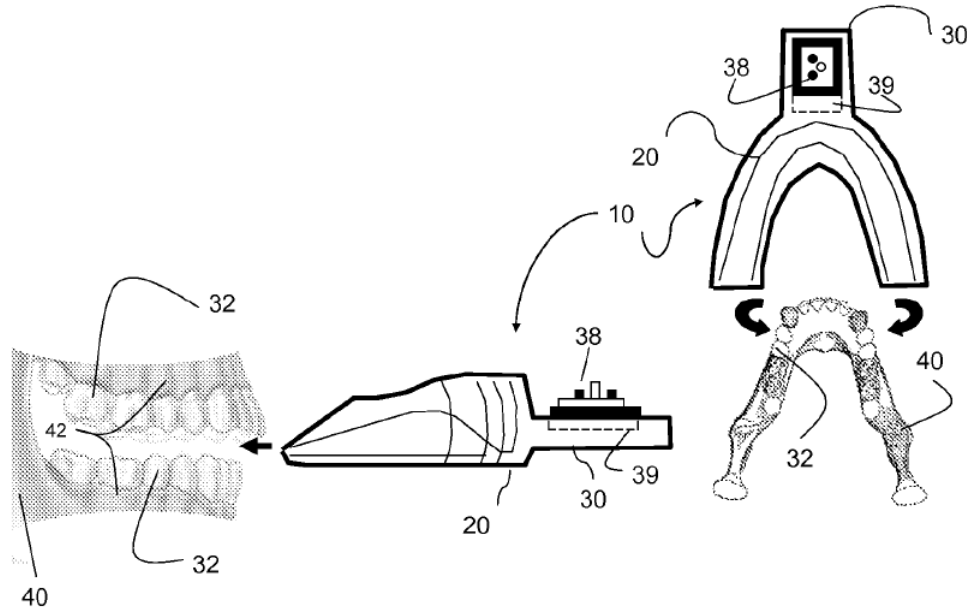


FIG. 1

Figure 1 of Lowe, above, depicts orthopedic treatment system 10 including bite plate 20 having vibration source 30 for positioning intraorally and interfacing with the dentition 32 of a patient and applying non-static forces to dental arches 42. Lowe explains that the “non-static forces are used to accelerate the remodeling of craniofacial bones in conjunction with orthodontic treatment.” *Id.* ¶ 32. Lowe describes further that “[i]n one embodiment, the interface with the dentition 32 can transmit a force of about five Newtons (5N) for about twenty minutes a day at a frequency of between 0.1 to 400 Hz.” *Id.* ¶ 39.

2. Anticipation

To anticipate a patent claim under 35 U.S.C. § 102, “a single prior art reference must expressly or inherently disclose each claim limitation.” *Finisar Corp. v. DirectTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). Under the principles of inherency, if the prior art necessarily functions in

accordance with, or includes, the claim limitations, it anticipates, even though artisans of ordinary skill may not have recognized the inherent characteristics or functioning of the prior art. *MEHL/Biophile Int'l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999) (citation omitted); *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349–50 (Fed. Cir. 2002).

3. Independent Claims 1, 10, and 19

Petitioner argues that Lowe discloses each limitation of, and therefore anticipates, each of independent claims 1, 10, and 19. Pet. 37–51. We discuss the independent claims together as they contain mostly the same limitations, except that claims 10 and 19 lack the “upper and lower vertical rims” limitation, and claim 19 includes the additional limitation that the processor “captures and communicates device usage data.” Ex. 1001, 13:28–14:59.

According to Petitioner, Lowe teaches a “faster method of orthodontic remodeling” that includes “a patient . . . biting an orthodontic remodeling device,” and that the orthodontic device includes “an extraoral housing containing a power source,” an “actuator,” and “a processor that controls said actuator.” *Id.* at 38–43 (citing Ex. 1002 ¶¶ 63, 65, 66; Ex. 1003 ¶¶ 33, 36, 44, Figs. 1, 3). Petitioner argues that “Lowe’s extraoral housing is connected to an intraoral U-shaped bite plate,” as shown in Figure 1, and that the bite plate has “upper and lower vertical rims on a facial edge thereof.” *Id.* at 44–48 (Ex. 1002 ¶¶ 68–73; Ex. 1003 ¶¶ 7, 8, 33, 37, 68; Figs. 1, 11).

Petitioner argues further that Lowe discloses that the orthodontic device is “held in place only by teeth clamping” and that the “device vibrates at a frequency from 0.1 to 400 Hz.” *Id.* at 48–49 (citing Ex. 1002 ¶¶ 74, 75; Ex. 1003 ¶¶ 33, 37, 44). In addition, Petitioner argues that Lowe discloses

its device “can transmit a force of about five Newtons (5N) **for about twenty minutes a day** at a frequency of between 0.1 to 400 Hz,” and where 20 minutes a day is within the claimed range of “1 to 20 minutes daily,” Petitioner contends that the range is thus anticipated. *Id.* at 49 (citing *Ineos USA LLC v. Berry Plastics Corp*, 783 F.3d 865, 869 (Fed. Cir. 2015)).

Petitioner argues that the final limitation of each independent claim, that the method “provides accelerated tooth movement as compared to without using said orthodontic remodeling device,” is merely an intended use. *Id.* at 50. To the extent this limitation is deserving of any patentable weight, Petitioner argues that Lowe also discloses a method and device “used to accelerate the remodeling of craniofacial bones in conjunction with orthodontic treatment.” *Id.* at 50–51 (citing 1002 ¶¶ 77–78; Ex. 1003 ¶¶ 16, 42).

Claim 19 includes the additional limitation that the processor “captures and communicates device usage data including duration of use and frequency of use.” Ex. 1001, 14:46–48. Petitioner argues that Lowe specifically discloses a processor performing this function where it states “[d]ata capture related to usage frequency and duration updates real time.” *Id.* at 44 (citing Ex. 1003 ¶ 40).

Patent Owner’s only substantive argument against the asserted anticipation ground is that “Petitioner’s first Ground (anticipation by Lowe) relies solely on Lowe. However, Lowe cannot invalidate claims 1–8, 10–16, and 19–25, because it is not prior art to those claims.” PO Resp. 35. As discussed above we find that Lowe is § 102(b) prior art to the claims.

As set forth above, Petitioner relies on Lowe to disclose the preamble and each of the above discussed limitations of independent claims 1, 10 and 19. Pet. 27–39. Patent Owner does not substantively dispute Petitioner’s

mapping of Lowe’s disclosure to the limitations of claims 1, 10 and 19. We have reviewed Petitioner’s analysis, evidence, and citations, and determine that Lowe accounts for the preamble and each of the limitations and elements recited in independent claims 1, 10 and 19.

4. Dependent Claims 2–8, 11–16, and 20–26

We address below the anticipation challenges to the sub-groups of claims 2–8, 11–16, and 20–26, as they respectively depend from independent claims 1, 10, and 19.

Claims 2, 3, 4, 11, 12, 13, 20, 21, and 22

Petitioner argues these claims as a group because they all relate to the electrical power system for the orthodontic device. Pet. 51–52.

Petitioner argues that Lowe discloses “a battery” (claims 2, 11, and 20), that the battery can be “rechargeable” (claims 3, 12, and 21), and that the battery may be recharged via a “USB port” (claims 4, 13, and 22). *Id.* (citing Ex. 1002 ¶¶ 79–81; Ex. 1003 ¶¶ 8, 36, Fig. 3).

Claim 5, 6, 14, 15, 23, and 24

Petitioner argues that Lowe discloses that the orthodontic device can be “braces” (claims 5, 14, and 23), or “an alignor” (claims 6, 15, and 24). *Id.* at 52–53 (citing 1002 ¶¶ 79–81; Ex. 1003 ¶¶ 8, 36, Fig. 3).

Claim 7

Petitioner argues that Figures 1 and 11 of Lowe disclose upper and lower vertical rims on “a lingual edge” of the bite plate and that Lowe teaches that “the interface [in the form of a bite plate] can contact the teeth at any point and at one or more points.” *Id.* at 54–55 (citing Ex. 1002 ¶¶ 84–86; Ex. 1003 ¶¶ 7, 8, 37, Figs. 1, 11).

Claims 8, 16, and 25

Petitioner points out that Lowe expressly discloses that “[u]pon completion of one (1) twenty-minute duration of activation, the device automatically shuts off.” *Id.* at 55–56 (citing Ex. 1003 ¶ 39).

Claim 26

Petitioner argues that the limitation in claim 26, “accelerated tooth movement is about 0.5 mm per week,” is simply an intended result and is not entitled to any patentable weight. *Id.* at 56. Even if this limitation is entitled to some weight, Petitioner argues that Lowe “discloses the same operational features taught by the ’184 patent that result in the claimed movement. *Id.* (citing *Toro Co. v. Deere & Co.*, 355 F.3d 1313, 1321 (Fed. Cir. 2004)). Dr. Yadav testifies that “in my opinion *Lowe* discloses accelerated tooth movement of about 0.5 mm per week, because it discloses the operational features taught by the ’184 patent that result in the claimed movement.” Ex. 1002 ¶ 89.

As discussed above in our claim construction, we determined that “about 0.5 mm per week” is a requirement of the claims reciting this limitation. We agree with Petitioner that because at least part of the claimed range of 1 to 20 minutes, i.e. “approximately 20 minutes,” is disclosed in Lowe, along with the frequency range of 0.1 to 400 Hz, these are the operational aspects of the method claims that inherently determine the resulting teeth movement of “about 0.5 mm per week” described and claimed in the ’184 patent. *See Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) ([A] prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference.”).

As noted above, Patent Owner does not substantively dispute Petitioner’s mapping of Lowe’s express and inherent disclosure to the limitations of any of claims 2–8, 11–16, and 20–26. We have reviewed Petitioner’s analysis, evidence, and citations, and determine that Lowe expressly and inherently accounts for all of the method steps, limitations, and outcomes recited in dependent claims 2–8, 11–16, and 20–26.

On the complete record of this proceeding, we determine that Petitioner has proved by a preponderance of the evidence that claims 1–8, 10–16, and 19–26 are anticipated by Lowe.

D. Claims 9, 17, 18, 26, and 27— Obviousness over Lowe and Ting

Petitioner argues that claims 9, 17, 18, 26, and 27 are obvious in view of Lowe and Ting. Pet. 57–59. Patent Owner contends, again, that “[g]rounds Two and Three fail because they rely on Lowe as prior art.” PO Resp. 36. As we discuss below, Petitioner has established by a preponderance of the evidence that claims 9, 17, 18, 26, and 27 are obvious over Lowe and Ting.

1. The Law of Obviousness

Section 103(a) precludes issuance of a patent when “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.” *KSR*, 550 U.S. at 406.

The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long-felt but unsolved needs, and failure of

others. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *see KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” *Graham*, 383 U.S. at 18.

The Supreme Court has made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To allow us to reach this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F. 2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a *whole* in deciding the question of obviousness.”) (citation omitted); *see also Stratoflex, Inc. v. Aeroquip Corp.*,

713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences *themselves* would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention *as a whole would have been obvious*.”) (citation omitted).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Against this general background, we consider the references, the level of ordinary skill in the art, other evidence, and arguments on which the parties rely.

2. *Ting*

Noting “[t]he ability of living tissues to remodel in response to cyclic loads,” *Ting* discloses an orthodontic device and method that “generates a cyclic force, thereby providing a stimulation that facilitates tooth movement.” *Ex. 1012*, 1:1–2, 3:30.¹¹ In particular, *Ting* discloses “providing a cyclic force having a magnitude in the range between about 0.001 Newton to about 20 Newton.” *Id.* at 9:3–4. *Ting* expressly states an embodiment using a cyclic force of “about 0.2 Newton.” *Id.* at 9:7–8. *Ting* teaches using an orthodontic device and applying the cyclic force in the range of “about 20 Hz to about 40 Hz.” *Id.* at 8:33. *Ting* also teaches using such cyclic forces to move teeth a certain desired distance “typically less than 2 mm, preferably less than 1 mm, and more preferably less than 0.5 mm.” *Id.* at 12:13–16. *Ting* teaches that this movement is not immediate,

¹¹ We reference the original page numbers of *Ting*, not Petitioner’s added page numbers.

but occurs over a period of days or even weeks; for example, Ting describes the appliance as “typically being replaced at an interval in the range from 2 days to 20 days, usually at an interval in the range from 5 days to 10 days.” *Id.* at 23:20–24.

3. Claims 9, 17, and 27

Each of claims 9, 17, and 27 recites “said orthodontic remodeling device vibrates at about 30 Hz and about 0.2 N and said accelerated tooth movement is about 0.5 mm per week.” *See, e.g.*, Ex. 1001, 13:64–67. Petitioner argues that a person of ordinary skill in the art using Lowe’s method would have looked to Ting for specific forces, frequencies, and time, i.e., parameters that facilitate achieving a desired rate of tooth movement with an orthodontic device, such as 0.5 mm per week.¹² Pet. 58. Petitioner argues that one of ordinary skill in the art would have understood that Ting teaches orthodontic appliances “configured to move individual teeth in small increments, typically less than 2 mm, preferably less than 1 mm, and more preferably less than 0.5 mm.” *Id.* (citing Ex. 1002 ¶¶ 90–92; Ex. 1012, 12:13–16). Petitioner’s declarant, Dr. Yadav, testifies that a person of ordinary skill in the art would have looked to Ting for the specific parameters for attaining a desired rate of tooth movement, e.g., “less than 0.5 mm” over 5 to 10 days. Ex. 1002 ¶ 93. Dr. Yadav testifies that by “[a]pplying the known operating parameters—30 Hz and 0.2 N—disclosed

¹² Although Petitioner argues the resulting teeth movement (acceleration) parameter is not a limitation, Petitioner nevertheless also argues that Ting discloses this parameter. Pet. 57. We have determined it is a requirement of the claims, and thus we address the accelerated tooth movement recitation of “0.5 mm per week” for each of dependent claims 9, 17, 18, 26, and 27.

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by *Ting* to the *Lowe* method [this] would have yielded predictable results and the known advantages.” *Id.*

Patent Owner does not address specifically these dependent claims.

For claims 9, 17, and 27, Petitioner provides a detailed analysis as to where each of the claimed elements is disclosed in the *Ting* reference, and that these specific parameters would have been obvious to use with *Lowe*’s method because applying these known parameters simply achieved the predictable result of tooth movement—the desired result in both *Lowe* and *Ting*. Pet. 57–58. Throughout its analysis of these claims, Petitioner relies on the testimony of Dr. Yadav (Ex. 1002) that one of ordinary skill in the art would have been familiar with the various ranges and “would have been motivated to utilize the parameters disclosed by *Ting* for the *Lowe* method given the accelerated movement values disclosed by *Ting*.” Ex. 1002 ¶ 93. There is no specific contrary evidence asserted by Patent Owner for these dependent claims.

As for a reason to combine *Lowe* and *Ting*, Petitioner contends “both *Ting* and *Lowe* disclose devices and systems for accelerating tooth movement using the application of cyclical forces,” and that one skilled in the art would have been motivated to combine the references to employ the further benefits of the specific ranges of force and frequency disclosed in *Ting* in the system of *Lowe*. Pet 58. Petitioner argues that “[a]pplying the known operating parameters—30 Hz and 0.2 N—disclosed by *Ting* to the *Lowe* method would have yielded predictable results and the known advantages.” *Id.* (citing Ex. 1002 ¶ 93). Based on the complete record now before us, we determine that Petitioner has shown that the limitations of claims 9, 17, and 27 are taught or suggested by the combination of *Lowe* and *Ting*, and has further shown that the proposed modification is nothing more

than the predictable use of prior art elements according to their established functions.

We find that a preponderance of the evidence and the arguments asserted by Petitioner establishes that claims 9, 17, and 27 would have been obvious based on Lowe and Ting.

4. Claims 18 and 26

Dependent claims 18 and 26 both recite that said “tooth movement is about 0.5 mm per week.” Ex. 1001, 14:37–38, 15:5–6. As discussed in our claim construction above, we determined that “0.5 mm per week,” is a requirement of claims 18 and 26.

Petitioner argues that Ting teaches orthodontic appliances “configured to move individual teeth in small increments, typically less than 2 mm, preferably less than 1 mm, and more preferably less than 0.5 mm.” *Id.* (citing Ex. 1002 ¶¶ 90–92; Ex. 1012, 12:13–16). Petitioner points out that Ting describes achieving this movement by use of an orthodontic appliance “from 2 days to 20 days, usually at an interval in the range from 5 days to 10 days.” Ex. 1012, 24:20–24. Based on this evidence, Dr. Yadav testifies that “a person skilled in the art would reasonably understand or infer this disclosure to be that *Ting* discloses a range of tooth movement that includes movement of 0.5 mm per 5 to 10 days, which is an overlapping range to the claimed 0.5 mm per week.” Ex. 1002 ¶ 92.

Based on the complete record now before us, we determine that Petitioner has shown that the limitations of claims 18 and 26 are taught or suggested by the combination of Lowe and Ting because Ting discloses an embodiment that teaches teeth movement “preferably less than 0.5 mm” over a period of 5 to 10 days, and we agree that using Ting’s parameter in

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Lowe is nothing more than the predictable use of prior art elements according to their established functions.

We find that a preponderance of the evidence and the arguments asserted by Petitioner establishes that claims 18 and 26 would have been obvious based on Lowe and Ting.

E. Claims 9, 17, 18, 26, and 27— Obviousness over Lowe and Mao

In this alternative ground, for the same claims as discussed above relative to Ting, Mao is relied upon by Petitioner as disclosing an orthodontic remodeling device having an overlapping, and narrower, frequency range compared to Lowe, of “up to about 40 Hz,” and a force range of “about 0.1 to about 5 Newtons.” Ex. 1013, 3:35–45. We have already determined that claims 9, 17, 18, 26, and 27 are obvious in view of Lowe and Ting, and Petitioner does not identify any deficiency in Ting that is purportedly remedied by Mao. As we have already determined above that these same claims are obvious over Lowe and Ting, we see no need to analyze these claims on this additional ground.

IV. SUMMARY

Petitioner has proved by a preponderance of the evidence that claims 1–8, 10–16, and 19–26 of the ’184 patent are anticipated by Lowe.

Petitioner has proved by a preponderance of the evidence that claims 9, 17, 18, 26, and 27 would have been obvious over Lowe and Ting.

V. ORDER

For the reasons given, it is

ORDERED, based on a preponderance of the evidence that claims 1–27 are unpatentable;

FURTHER ORDERED, that Petitioner’s Motion to Exclude is *denied*; and

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FURTHER ORDERED that, because this is a Final Written Decision, any party to the proceeding seeking judicial review of this Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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For PETITIONER:

Christopher S. Schultz
Cory C. Bell
David R. Lefebvre
Eric P. Raciti
FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, LLP
christopher.schultz@finnegan.com
cory.bell@finnegan.com
david.lefebvre@finnegan.com
eric.raciti@finnegan.com

For PATENT OWNER:

Paul V. Storm
John J. May
Michael Dubner
FOLEY GARDERE
pvstorm@foley.com
jmay@foley.com
mdubner@foley.com