

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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INSTRADENT USA, INC.,  
Petitioner

v.

NOBEL BIOCARE SERVICES AG,  
Patent Owner.

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Case IPR2015-01784  
Patent 8,764,443 B2

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Before WILLIAM V. SAINDON, TINA E. HULSE, and  
CHRISTOPHER G. PAULRAJ, *Administrative Patent Judges*.

PAULRAJ, *Administrative Patent Judge*.

DECISION  
Denying Institution of *Inter Partes* Review  
*37 C.F.R. § 42.108*

## I. INTRODUCTION

Instradent USA, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”), requesting institution of an *inter partes* review of claims 15, 17–19, 21, 25–27, and 30–32 of U.S. Patent No. 8,764,443 B2 (Ex. 1001, “the ’443 patent”). Nobel Biocare Services AG (“Patent Owner”) timely filed a Preliminary Response (Paper 6, “Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

Upon consideration of the Petition and the Preliminary Response, and for the reasons explained below, we determine that Petitioner has *not* shown that there is a reasonable likelihood that it would prevail with respect to any of the challenged claims of the ’443 patent. Accordingly, the Petition for an *inter partes* review is denied.

### A. *Related Proceedings*

The parties have identified concurrent proceedings related to the ’443 patent before the International Trade Commission (“ITC”) (*Certain Dental Implants*, Inv. No. 337-TA-934) and in the Central District of California (*Nobel Biocare Services AG and Nobel Biocare USA, LLC, v. Neodent USA, Inc.*, Civil Action No. 14-1322 DOC (DFMx) (C.D. Cal.), which is stayed pending resolution of the ITC investigation. Pet. 1–2, Prelim. Resp. 1–2, 9–11.

On October 27, 2015, the ITC issued an Initial Determination finding the ’443 patent to be infringed. Ex. 2001. The ITC’s Administrative Law Judge determined that Petitioner failed to prove invalidity of the ’443 patent,

and made specific findings that the '443 patent was not invalid for anticipation or obviousness over some of the prior art that has been raised in the Petition. *Id.* at 113–21.<sup>1</sup> Although we have taken the ITC's Initial Determination into account, we make an independent determination of patentability of the challenged claims based on the evidence before us and the standards applicable to an *inter partes* review.

*B. The '443 Patent (Ex. 1001)*

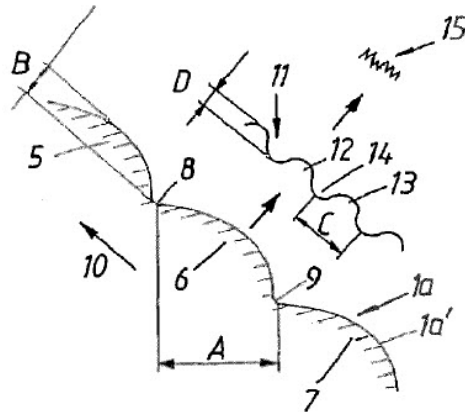
The '443 patent issued on July 1, 2014, and claims a priority filing date of December 21, 2001. *See* Ex. 1001, Title Page. It names Jan Hall as the sole inventor. *Id.*

The '443 patent relates generally to a surface structure produced on an outer surface of a dental implant or fixture for a range of implants related to different types and qualities of jaw bone. *See id.*, Abstract. Figure 2 of the '443 patent, illustrates the surface structure and is reproduced below:

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<sup>1</sup> The ITC has indicated that it will review in part the Initial Determination, but not with respect to any aspect of the '443 patent. Ex. 1029.

Fig. 2



Specifically, as depicted in Figure 2 of the '443 patent, the surface structure comprises a wave pattern (indicated by 5, 6, and 7) with at least one trough (indicated by 8 and 9) that substantially follows the spiral trajectory of a thread defining an outer surface. *See, e.g., id.* at 7:33–45 (claim 15). The trough depth (indicated by “B” in Fig. 2) ranges between approximately 25 to 250  $\mu\text{m}$ . *Id.* at 4:33–35. According to the specification, the outer surface structure is “designed so that effective growth of the surrounding bone onto the outer surface can take place and can be stabilized in a relatively short time.” *Id.* at 4:16–18. The specification also discloses that “[t]he present invention is based on the idea of achieving substantial stability of the implant incorporation in the bone in a short time, for example after just 1 to 5 days.” *Id.* at 2:35–37.

### C. Illustrative Claims

Petitioner challenges claims 15, 17–19, 21, 25–27, and 30–32 of the '443 patent. Independent claim 15 is illustrative, and reproduced below:

15. A dental implant comprising:

an implant body defining a longitudinal axis and an exterior surface; and

a thread extending about the implant body in a spiral trajectory, the thread defining an outer surface, wherein when seen in side view, the outer surface of the thread comprises a wave pattern with at least one trough, the wave pattern extending generally in the direction of the longitudinal axis of the implant body, the trough extending in a course that substantially follows the spiral trajectory of the thread, the wave pattern having a respective trough depth in the range of between approximately 25 to 200  $\mu\text{m}$ .

*D. The Asserted Grounds of Unpatentability*

Petitioner challenges the patentability of the claims of the '443 patent on the following grounds:

<b>References</b>	<b>Basis</b>	<b>Claims challenged</b>
Bono <sup>2</sup> and Dinkelacker <sup>3</sup>	§ 103(a)	15, 17–19, 21, 25–27, and 30–32
Libbey <sup>4</sup> and Dinkelacker	§ 103(a)	15, 17–19, 21, 25–27, and 30–32
Papafotiou <sup>5</sup> and Dinkelacker	§ 103(a)	15, 17–19, 21, 25–27, and 30–32
Weiss <sup>6</sup>	§ 102(b)	15, 17, 30, and 32

<sup>2</sup> Bono et al., U.S. Patent No. 6,129,730 (iss. Oct. 10, 2000) (Ex. 1004).

<sup>3</sup> Dinkelacker, U.S. Patent No. 6,364,663 B1 (iss. Apr. 2, 2002) (Ex. 1003).

<sup>4</sup> Libbey, U.S. Patent No. 422,307 (iss. Feb. 25, 1890) (Ex. 1010).

<sup>5</sup> Papafotiou et al., U.S. Patent No. 6,371,709 B1 (iss. Apr. 16, 2002) (Ex. 1012).

<sup>6</sup> Weiss et al., U.S. Patent No. 4,103,422 (iss. Aug. 1, 1978) (Ex. 1013).

References	Basis	Claims challenged
Weiss and Dinkelacker	§ 103(a)	18, 19, 21, 25, and 26

## II. DISCUSSION

### A. Claim Construction

We interpret claims using the “broadest reasonable construction in light of the specification of the patent in which [they] appear[.]” 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015) (“Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA,”<sup>7</sup> and “the standard was properly adopted by PTO regulation.”), *cert. granted, Cuozzo Speed Techs. LLC v. Lee*, 84 U.S.L.W. 3218 (U.S. Jan. 15, 2016) (No. 15-446). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). “Absent claim language carrying a narrow meaning, the PTO should only limit the claim based on the specification . . . when [it] expressly disclaim[s] the broader definition.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed Cir. 2004). “Although an inventor is indeed free to define the specific terms used to describe his or her invention, this must be done with reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

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<sup>7</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”).

We determine that no explicit construction of any claim term is necessary to determine whether to institute a trial in this case. *See, e.g., Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

### *B. Principles of Law*

We analyze the proposed grounds of unpatentability in accordance with the following stated principles.

An *inter partes* review may be instituted only if “the information presented in the [Petition and Preliminary Response] shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

#### *1. Law of Anticipation*

The Court of Appeals for the Federal Circuit summarized the analytical framework for determining whether prior art anticipates a claim as follows:

To anticipate a claim, a single prior art reference must expressly or inherently disclose each claim limitation. *Celeritas Techs., Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir. 1998). But disclosure of each element is not quite enough—this court has long held that “[a]nticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.” *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) (citing *Soundscriber Corp. v.*

*United States*, 175 Ct. Cl. 644, 360 F.2d 954, 960 (1966)  
(emphasis added)).

*Finisar Corp. v. DirectTV Grp., Inc.*, 523 F.3d 1323, 1334–35 (Fed. Cir. 2008). “Thus, it is not enough that the prior art reference discloses part of the claimed invention, which an ordinary artisan might supplement to make the whole, or that it includes multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention.” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 n.5, 1371 (Fed. Cir. 2008). “The requirement that the prior art elements themselves be ‘arranged as in the claim’ means that claims cannot be ‘treated . . . as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.’” *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (quoting *Lindemann Maschinenfabrik GMBH v. Am. Hoist & Derrick Co.*, 730 F.2d 1452, 1459 (Fed.Cir.1984)).

In assessing the prior art, “[i]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005) (quoting *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l. Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000)); *see also* MPEP § 2125 (“When the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value.”).



## 2. *Law of Obviousness*

A patent may not be obtained if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. 35 U.S.C. § 103(a). The legal 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 skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In *KSR Int’l Co. v. Teleflex Inc.*, the Supreme Court stated:

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

550 U.S. 398, 421 (2007). In this regard, “[o]bviousness does not require absolute predictability of success . . . all that is required is a reasonable expectation of success.” *In re Kubin*, 561 F.3d 1351, 1360 (Fed. Cir. 2009) (citing *In re O’Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988)).

Obviousness does not require an explicit teaching, suggestion, or motivation in the prior art. *KSR*, 550 U.S. at 402. Nonetheless, “there must be some articulated reasoning with some rational underpinning to support

the legal conclusion of obviousness.” *Id.* at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

For a prior art reference to be considered in an obviousness challenge, it must be analogous to the claimed invention. *Bigio*, 381 F.3d at 1325. A reference is analogous art vis-à-vis the claimed invention if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). *Id.* In order for a reference to be “reasonably pertinent” to the problem, it must “logically . . . have commended itself to an inventor's attention in considering his problem.” *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379–80 (Fed. Cir. 2007) (quoting *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992)).

### *C. Prior Art Relied Upon*

Petitioner relies upon the following prior art in its challenges.

#### *1. Dinkelacker (Ex. 1003).*

Dinkelacker is directed to a cylindrical, conical or stepped tooth implant comprising numerous “groove-shaped recesses” along its lengthwise axis or at a sharp angle to it. Ex. 1003, Abstract, Fig. 1 (element 20); *see also id.* at Fig. 12 (element 63) Fig. 13 (element 66). Figure 1 of Dinkelacker is reproduced below:

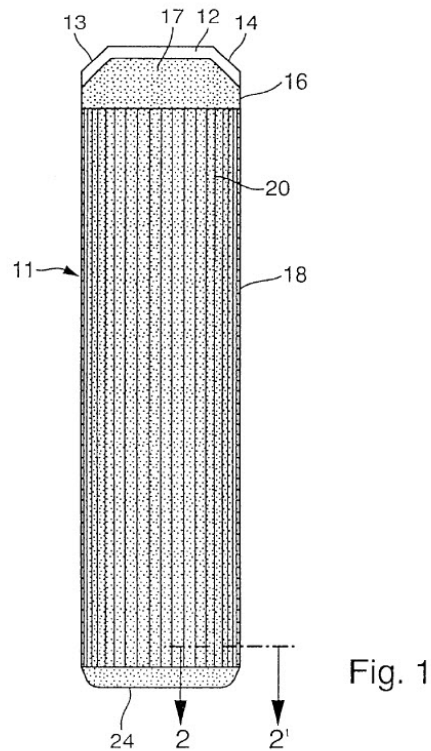


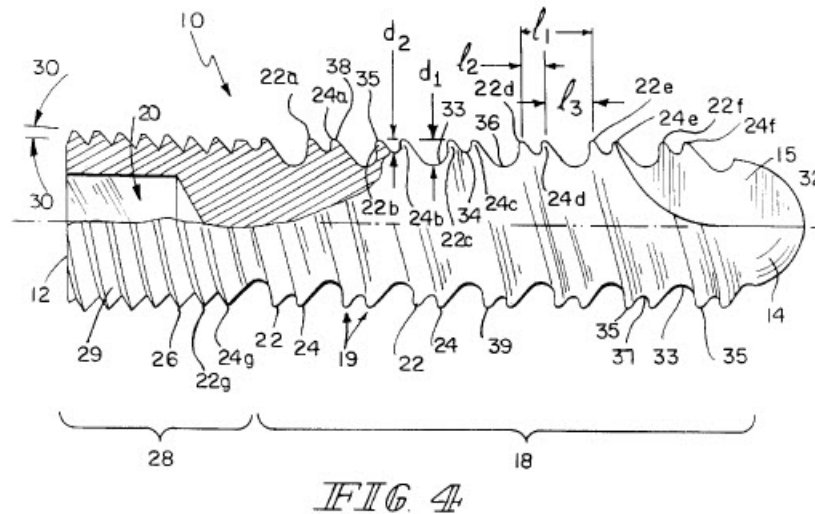
Figure 1 illustrates a cylindrical tooth implant with axial groove-shaped recesses (indicated by 20). *Id.* at 2:58. The groove-shaped recesses “offer[] favorable conditions for osteons to collect during the healing phase and additionally secure against axial shifting and rotation of the implant after healing.” *Id.* at 2:16–19. Dinkelacker teaches that “[t]he groove-shaped recesses are 20–300  $\mu\text{m}$  wide and 10–150  $\mu\text{m}$  deep.” *Id.* at 3:41:43.

According to Dinkelacker, the entire surface of the implant body is also provided with numerous small troughs or lagoons whose average diameter is around 3  $\mu\text{m}$  and whose depth is advantageously around 1  $\mu\text{m}$ . *Id.* at 3:46–49; Fig. 6. Dinkelacker teaches that “[t]he troughs or lagoons 23 assist the anchoring of the implant in the jawbone by allowing a large

number of osteocytes to collect on the surface of the body area.” *Id.* at 4:27–29.

2. *Bono (Ex. 1004).*

Bono is directed to a bone screw with a “dual lead thread.” Ex. 1004, Abstract. Figure 4 of Bono is reproduced below:



Bono explains:

[R]eferring to FIG. 4, bone screw 10 has a large groove 36 and a small groove 37. Large groove 36 of bone screw 10 has a thread depth  $d_1$ . Thread depth  $d_1$  is the radial distance from a peak position 35 to a position at a trough 33 of lead 1<sub>3</sub>. Small groove 37 has a thread depth  $d_2$ , which is the radial distance from peak position 35 to a position at a trough 34 of lead 1<sub>2</sub>. In the illustrative embodiment, thread depth  $d_1$  is at least twice thread depth  $d_2$ .

*Id.* at 3:39–46. The dual lead thread (22, 24) of Bono’s bone screw is described as providing enhanced pullout resistance by overcoming machining limitations to produce a bone screw with increased thread depth while maintaining or decreasing thread pitch. *Id.* at 3:47-60.

3. *Libbey (Ex. 1010).*

Libbey is directed to a wood screw, as depicted in Figure 2, which is reproduced below:

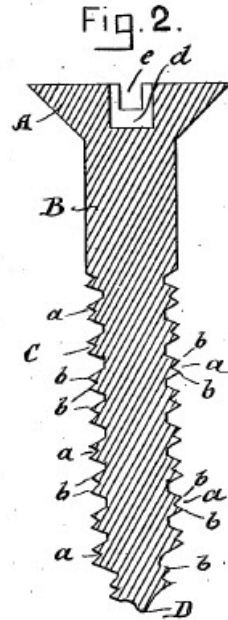


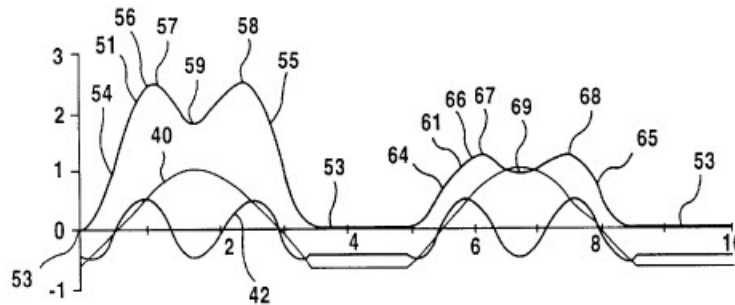
Figure 2 depicts a thread that is slightly thicker and divided at its periphery by a V-shaped groove (a), so as to present two cutting edges (b) on each thread (C). Ex. 1010 at 1:13–15. The specification discloses that “[t]he object of [the] invention is to produce a wood-screw that can be inserted with less liability of splitting the material than screws now in use.” *Id.* at 1:9–12.

4. *Papafotiou (Ex. 1012).*

Papafotiou is directed generally to wood screws, with particular application to fasteners for attaching railway track to timber sleepers. Ex.

1012 1:7–10. Figure 9 of Papafotiou illustrates the screw thread and is reproduced below:

**Fig.9**



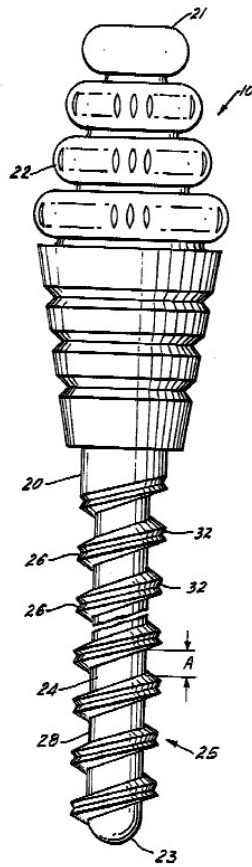
As depicted in Figure 9, the screw thread comprises two peaks 57 and 55 with trough 59 between them. *Id.* at 4:35–46. Papafotiou discloses that:

[t]he higher ridge 51 rises 2.5 mm from the root while the lower ridge 61 rises 1.25 mm. The higher trough 59 is 0.7 mm deep while the lower trough 69 is 0.25 mm deep. The lower ridge is thus 50% of the height of the higher ridge, and thus within the preferred range of 30% to 70%. Also, the higher trough is 28% of the height of the higher ridge, while the lower trough is 20% of the height of the lower ridge, thus within the more preferred range of 15% to 35%.

*Id.* at 4:48–56. By reducing the degree to which wood fibers are cut, Papafotiou explains that the threadform penetrates into the timber more by way of compression, strengthening the timber and leaving the wood fiber intact, which causes less weakening of the timber's structure. *Id.* at 6:7–21.

5. Weiss (Ex. 1013).

Weiss is directed to a self-tapping endodontic stabilizer to stabilize the tooth. Ex. 1013, Abstract. Figure 1 of Weiss illustrates the stabilizer and is reproduced below:



**FIG. 1**

As depicted in Figure 1, the stabilizer comprises a threaded shaft defining a plurality of shallow recesses (32) along the peripheral edge of the threads and grooves (28) between threads. *Id.* at 3:40–46, 6:7–21. The groove has a longitudinal height (designated by label “A” in Fig. 1) of least 0.20

millimeters, and preferably about 0.2 to 0.38 millimeters. *Id.* at 3:40–46. The recesses and grooves “exercise[] and work[]” the ligament, which promote generation of the ligament. *Id.* at 2:37–48, 4:46–55.

*D. Analysis of Petitioner’s Patentability Challenges*

*1. Obviousness of Claims 15, 17–19, 21, 25–27, and 30–32  
Based on Bono and Dinkelacker*

Petitioner contends that claims 15, 17–19, 21, 25–27, and 30–32 are obvious based on the combination of Bono and Dinkelacker. Pet. 12–23. In addition to the teachings of the references, Petitioner relies upon the Declaration of Michael M. Dard, DDS, MS, Ph.D. Ex. 1002. Petitioner also includes claim charts for claims 15, 17–19, 26, 27, and 30–32. Pet. 16–22.

Petitioner asserts that “Bono discloses a threaded bone screw having a groove disposed in the outer edge of the thread.” *Id.* at 12. Petitioner points to the testimony of Patent Owner’s expert in the related ITC action as an admission that the grooves taught by Bono have a “wave pattern” as recited in independent claim 15. *Id.* (citing Ex. 1005, Figure 4 (as annotated); Ex. 1006, Dep. Tr. of Dr. Sinan Müftü, 66:24–67:11).<sup>8</sup> Petitioner acknowledges that Bono does not explicitly teach that the threads of its bone screw have a groove depth of 25–200  $\mu\text{m}$  as claimed, and therefore relies upon Dinkelacker’s teachings of grooves on the surface of a dental implant,

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<sup>8</sup> On this record, we do not consider the deposition testimony of Patent Owner’s expert, Sinan Müftü, Ph.D., to be an admission that Bono discloses a “wave pattern” that includes a “trough” in the manner claimed. Pet. 11–12 (citing Ex. 1006, 66:24–67:11). The quoted testimony relates only to an annotated version of Bono’s Figure 4, and we are not persuaded that Dr. Müftü would have come to the same conclusion based on the figure as it appears in the reference itself. *Id.*



“which grooves are sized to correspond with the osteons in the bone to promote the bone to grow directly into the implant.” *Id.* (citing Ex. 1003, 3:42–45).

Petitioner asserts that the trough depth limitation is suggested by Dinkelacker’s teaching of grooves with a depth of between 10–150  $\mu\text{m}$ , which overlaps the claimed range. *Id.* at 9. Further, Petitioner argues that Dinkelacker’s grooves facilitate bone growth and enhance dental implant stability. *Id.* at 9–10. Petitioner contends that “the osteons of the bone are ‘agnostic’ as to the location of the groove, and Dinkelacker’s teachings to provide a specific groove depth are readily applicable to Bono.” Pet. 14 (citing Ex. 1003, 6:23–27). Accordingly, Petitioner contends that the skilled artisan would have found that the grooves disclosed by Dinkelacker could be applied to other portions of an implant, such as to the outer surface of the thread of Bono’s bone screw. *Id.* at 16.

Patent Owner argues that this obviousness ground fails because Bono does not disclose the claimed “dental implant” and “wave pattern.” Prelim. Resp. 30–34.<sup>9</sup> More particularly, Patent Owner contends that “Bono does not teach that its thread design was to promote osseointegration<sup>[10]</sup> or bone growth,” and “[t]hus, Bono’s bone screw addresses a fundamentally

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<sup>9</sup> Petitioner contends that the preamble of claim 15 is not a limitation. Pet. 6–7. We need not address this issue because even assuming *arguendo* that the claims are not limited to a “dental implant,” Petitioner has not demonstrated a reasonable likelihood of establishing obviousness for the reasons discussed herein.

<sup>10</sup> Patent Owner contends that “osseointegration” is the process by which an implant will “integrate into the surrounding bone tissue.” Prelim. Resp. 5. This appears to be consistent with Petitioner’s use of that term. *See* Pet. 46–47.

different problem than the '443 Patent, and skilled artisans would not have looked to Bono devise [sic] the invention of the '443 Patent.” *Id.* at 32.

Patent Owner also argues that the grooves in Dinkelacker’s unthreaded implant would not have been applied by skilled artisans to threads. *Id.* at 34–38. According to Patent Owner, the purpose of Dinkelacker’s grooves, unlike the structure taught by the '443 patent, is to prevent “micromotion” in unthreaded dental implants. *Id.* at 35–37. Further, because Dinkelacker later filed a separate patent application that included grooves on threads, Patent Owner contends that skilled artisans “did not consider placing grooves on a dental implant thread to be obvious at the time of the invention of the '443 Patent.” *Id.* at 37.

Based on the current record, we determine that Petitioner has not demonstrated a reasonable likelihood of establishing that it would have been obvious to combine Dinkelacker’s teaching of groove-shaped recesses to the threads of the bone implant screw taught by Bono in order to arrive at the claimed “wave pattern having a respective trough depth in the range of between approximately 25 to 200  $\mu\text{m}$ .”

We recognize that the grooves of Dinkelacker are designed to promote bone growth and thereby enhance “osseointegration.” Ex. 1003, 1:39–41, 2:16–19 (“Such a surface structure [e.g., grooves] offers favorable conditions for osteons to collect during the healing phase . . .”). As such, contrary to Patent Owner’s arguments, the grooves taught by Dinkelacker and troughs taught by the '443 patent serve essentially the same purpose. *Cf.* Ex. 1001, 4:15–18 (noting that “[t]he outer surface structure must be designed so that effective growth of the surrounding bone onto the outer surface can take place and can be stabilized in a relatively short time”). On

the other hand, the dual lead thread design of Bono's screws are designed to increase mechanical "pullout resistance." Ex. 1004, 1:25–29, 3:47–60. In order to provide greater pullout resistance, Bono teaches a dual lead thread that *maximizes* average thread depth while maintaining or even decreasing thread pitch. *Id.* at 3:47-60. The average thread depth that Bono seeks to maximize is the average of depths  $d_1$  and  $d_2$ , as depicted in Fig. 4 of Bono. *Id.* at 3:50.

Petitioner relies upon Dr. Dard's Declaration to support the desirability of minimizing Bono's thread depth in order to promote osseointegration. Pet. 14 (citing Ex. 1002 ¶ 27). In particular, Dr. Dard asserts that the skilled artisan "would have been motivated to modify the grooves formed in the outer surface of the threads of the Bono bone screw to have a similar depth as that taught by Dinkelacker." Ex. 1002 ¶ 27. However, in view of Bono's stated desirability to maximize thread depth in the bone screw, Petitioner has failed to demonstrate how or why the skilled artisan would have applied Dinkelacker's teaching regarding groove depths that correspond to the dimensions of osteons, i.e., on the order of microns. There is no teaching in Bono regarding a need for enhanced osseointegration. But even assuming that the skilled artisan would have considered osseointegration to be relevant for Bono's screw, Petitioner has not identified any criteria from the references or elsewhere that would guide the skilled artisan to optimize the thread depth to within the claimed range of 25–200  $\mu\text{m}$ , while still achieving a desirable level of pullout resistance. Because Petitioner does not account for Bono's contrary goal of maximizing thread depth, we determine that Petitioner's stated reasons for incorporating the groove depths taught by Dinkelacker are conclusory and insufficient.

*See KSR*, 550 U.S. at 418 (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements.”) (quoting *Kahn*, 441 F.3d at 988).

We are also unpersuaded by Petitioner’s reliance on the Board’s Decision on Appeal in *In re Jorneus*, Appeal No. 2012-005116 (PTAB Nov. 15, 2013) (non-precedential), in which the Board affirmed the Examiner’s rejection of claims in an unrelated application over the combination of Dinkelacker with another reference (Ricci). Pet. 14–16. In *Jorneus*, the Board concluded that the skilled artisan “would have found it obvious to combine the teachings of Ricci and Dinkelacker such that the lower portion 152 of the implant of Ricci (which is in contact with bone and which bear a pattern of grooves) is modified with the grooves of Dinkelacker.” Ex. 1007, 6–7. That decision, however, is distinguishable insofar as the Board did not address the obviousness of applying Dinkelacker’s grooves to a bone screw with thread depths that are to be maximized.

We, therefore, determine that Petitioner has failed to demonstrate a reasonable likelihood of prevailing with respect to this obviousness challenge.

2. *Obviousness of Claims 15, 17–19, 21, 25–27, and 30–32  
Based on Libbey and Dinkelacker*

Petitioner contends that claims 15, 17–19, 21, 25–27, and 30–32 are obvious based on the combination of Libbey and Dinkelacker. Pet. 23–33. In addition to the teachings of the references, Petitioner also relies upon Dr. Dard’s Declaration in support of this challenge. Ex. 1002. Petitioner provides claim charts for claims 15, 17–19, 26, 27, and 30–32. Pet. 27–32.

Petitioner relies upon Libbey’s teaching of a wood screw with a “V-shaped groove” on the threads, but acknowledges that “Libbey does not

explicitly teach that its thread groove has a depth within the range of 25 to 200  $\mu\text{m}$  claimed.” *Id.* at 26, 29. To make up for this deficiency, Petitioner relies upon Dinkelacker, in the same manner as discussed above with regard to the obviousness challenge based on Bono, and asserts that Dinkelacker’s teachings regarding groove depth “are equally applicable to the threaded structure disclosed in Libbey.” *Id.* at 26–27. Relying on Dr. Dard’s testimony, Petitioner argues that the skilled artisan would recognize that the behavior of dental implants can be modelled using wood. *Id.* at 25 (citing Ex. 1002 ¶ 67). Petitioner also asserts that, during oral arguments before the Board in the appeal that led to issuance of the ’443 patent, Patent Owner’s counsel acknowledged that the claims would cover Libbey’s improved screw, stating, “I’m just claiming a thread and then a groove on top of the thread that is spiral.” *Id.* at 24–25 (citing Ex. 1011, 12).

Patent Owner argues that Libbey is not analogous art. Prelim. Resp. 38–40. According to Patent Owner, Libbey is not reasonably pertinent to the problem of implant stability or osseointegration that the inventor of the ’443 patent was trying to solve and, instead, Libbey is directed to a different problem of preventing wood splitting. *Id.* at 40–41 (citing Ex. 1001, 2:35–37; Ex. 1010, 1:9–12). Further, according to Patent Owner, the Dard Declaration simply parrots the Petition and provides no independent evidence that skilled artisans would have considered wood screws for solving problems relating to integrating implants in living tissue. *Id.* at 41.

We are not persuaded that Petitioner has demonstrated a reasonable likelihood that it would have been obvious for the skilled artisan to apply Dinkelacker’s grooves to Libbey’s threads. Petitioner has not explained sufficiently why a skilled artisan would have either a) applied the

dimensions of Dinkelacker's grooves, which are optimized to promote osseointegration, to a wood screw, or b) use the thread structure taught by Libbey, which is designed to prevent wood from splitting, for a dental implant. Petitioner's only rationale is that skilled artisans would recognize that dental implant behavior can be modeled using wood. Pet. 25; Ex. 1002 ¶ 67. Other than the conclusory testimony of Dr. Dard, Petitioner offers no evidence to support this rationale. Even so, the fact that dental implant behavior can be modeled using wood does not suggest that the specific thread structure taught for a wood screw would have been considered relevant when designing a dental implant; nor does it suggest that groove dimensions taught for a dental implant would have been considered relevant for a wood screw. Therefore, Petitioner's arguments lack the requisite articulated reasoning with rational underpinning to support a conclusion of obviousness. We are also unpersuaded by Petitioner's assertion that Patent Owner previously admitted before the Board that the claims at issue are directed precisely to Libbey's improved wood screw. Pet. 24–25. The quoted portions of the oral hearing transcript are, at best, ambiguous in this regard; indeed, they do not mention wood screws at all. Ex. 1011, 12. Regardless, Libbey does not teach a groove depth between 25–200  $\mu\text{m}$ , and there is an insufficient basis on this record to apply Dinkelacker's teachings regarding groove dimensions for a tooth implant to Libbey's wood screw.

Accordingly, based on the current record, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to this obviousness challenge.

*3. Obviousness of Claims 15, 17–19, 21, 25–27, and 30–32  
Based on Papafotiou and Dinkelacker*

Petitioner contends that claims 15, 17–19, 21, 25–27, and 30–32 are obvious based on the combination of Papafotiou and Dinkelacker. Pet. 33–42. In addition to the teachings of the references, Petitioner also relies upon Dr. Dard’s testimony in support of this challenge. Ex. 1002. Petitioner provides claim charts for claims 15, 17–19, 26, 27, and 30–32. Pet. 35–41.

Petitioner’s arguments for this obviousness challenge are similar to those presented with respect to the challenge based on the Libbey/Dinkelacker combination. In particular, Petitioner contends that “[s]imilar to Libbey, Papafotiou discloses a fastener that is a particularly useful for fastening to wood or timber,” and asserts that the skilled artisan “would seek to combine Papafotiou with Dinkelacker for the same reasons provided for the combination of Libbey with Dinkelacker.” *Id.* at 35. Using a “well-known range of dental implant diameters” (3.5 mm to 5.0 mm), Petitioner calculates that the skilled artisan “could readily [modify] the groove depths of Papafotiou to arrive at the ranges of 49 – 136 microns when scaling to a 3.5mm implant, and 69 – 194 microns when scaling to a 5.0mm implant.” *Id.* (citing Ex. 1002 ¶¶ 104–106).

Patent Owner argues that Papafotiou is also not analogous art. Prelim. Resp. 39–40. As with Libbey, Patent Owner contends that skilled artisans would not have looked to Papafotiou’s wood screw to solve problems relating to osseointegration and dental implant stability. *Id.* at 41. Rather, Patent Owner points out that Papafotiou designed his screw to achieve “significant advantages during installation and in [railroad] track operation performance.” *Id.* (citing Ex. 1012 1:19–21).

For reasons similar to our conclusion regarding the challenge based on the Libbey–Dinkelacker combination, we determine that Petitioner has not demonstrated a reasonable likelihood that it would have been obvious for the skilled artisan to combine Dinkelacker’s groove dimensions with Papafotiou’s thread design to arrive at the claimed invention. In particular, Petitioner has not articulated a sufficient rationale as to why a skilled artisan would look to Papafotiou’s teachings regarding a wood screw designed for railroad track installation in order to improve Dinkelacker’s dental implant, or vice versa. Moreover, Petitioner’s assertion that the dimensions of Papafotiou’s groove depths could simply be scaled to fall within the claimed range of 25 to 200  $\mu\text{m}$  based on “well-known” diameters of dental implants is conclusory and unpersuasive. Although mere changes in size may not render a claim patentable, that is only true where “the dimensional limitations did not specify a device *which performed and operated any differently from the prior art.*” *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 1349 (Fed. Cir. 1984) (emphasis added). That is not the case here.

Accordingly, based on the current record, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to this obviousness challenge.

#### 4. Anticipation of Claims 15, 17, 30, and 32 Based on Weiss

Petitioner contends that claims 15, 17, 30, and 32 are anticipated by Weiss (as evidenced by the *Implant Dentistry* text (Ex. 1014), Christensen (Ex. 1015), or Tosti (Ex. 1016)). Pet. 42–54. In addition to the teachings of the references, Petitioner also relies upon Dr. Dard’s testimony in support of this challenge. Ex. 1002.



Petitioner argues that Weiss's endodontic stabilizer is a "dental implant" with recesses or grooves (Fig. 1 (element 32)) that promote osseointegration. Pet. 44–47. Additionally, based on certain measurements taken by Dr. Dard, Petitioner contends that Figure 1 of Weiss reliably discloses a trough with a depth of between 25 to 200  $\mu\text{m}$ . *Id.* at 48 (citing Ex. 1002 ¶¶ 149, 159–163). Specifically, relying upon Weiss's disclosure that the dimension "A" (i.e., the longitudinal height between threads) is at least 0.2 mm, and preferably about 0.25–0.38 mm (Ex. 1013, 3:41–44), Dr. Dard calculated the range of the depth of the recess/groove illustrated in Figure 1 as between 28–53 microns. Ex. 1002 ¶ 162.

Patent Owner argues, *inter alia*, that Petitioner has improperly relied upon patent figure measurements from Weiss. Prelim. Resp. 48–50. We agree. "[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue." *Nystrom v. TREX Co.*, 424 F.3d at 1149 (citations omitted). Petitioner does not present any evidence that the drawings of the Weiss patent are to scale, such that a reliable measurement of groove depth can be made based on the figure itself. To the contrary, Patent Owner has pointed to testimony from one of Weiss's co-inventors indicating that he did not know if Figure 1 of Weiss is drawn to scale. Prelim. Resp. 49–50 (citing Ex. 2025 (Judy Depo.), 126:14–16).

Therefore, based on the current record, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to this anticipation challenge.

5. *Obviousness of Claims 18, 19, 21, 25, and 26 Based on Weiss and Dinkelacker*

Petitioner contends that claims 18, 19, 21, 25, and 26 are obvious based on Weiss and Dinkelacker. Pet. 55–59. In addition to the teachings of the references, Petitioner also relies upon Dr. Dard’s testimony in support of this challenge. Ex. 1002. Petitioner provides claim charts for claims 18, 19 and 26. Pet. 57–58.

With respect to the dependent claims challenged on this ground, Petitioner argues that it would have been obvious for the skilled artisan to combine Weiss with Dinkelacker because Dinkelacker teaches advantages of providing varying grooved structures. *Id.* at 56–57. Petitioner, however, does not rely upon Dinkelacker’s teachings regarding groove depths of between 10–150  $\mu\text{m}$ . Rather, Petitioner only refers back to the anticipation analysis based on measurements taken of Weiss’s Figure 1. *Id.* at 57. As noted above, Petitioner’s reliance on patent figure measurements cannot establish that the claimed dimensional limitation was known in the prior art.

Accordingly, based on the current record, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to this obviousness challenge.

### III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has not demonstrated that the information presented in the Petition and in the Preliminary Response shows that there is a reasonable likelihood that it would prevail in proving the unpatentability of claims 15, 17–19, 21, 25–27, or 30–32 of the ’443 patent.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), the Petition for *inter partes* review is denied as to all challenged claims of the '443 patent.

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