

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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ZIMVIE, INC. AND ZIMMER BIOMET SPINE, INC.,  
Petitioner,

v.

ROGER P. JACKSON,  
Patent Owner.

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IPR2023-01433  
Patent 11,129,646 B2

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Before ULRIKE W. JENKS, SHERIDAN K. SNEDDEN, and  
ZHENYU YANG, *Administrative Patent Judges*.

YANG, *Administrative Patent Judge*.

DECISION  
Denying Institution of *Inter Partes* Review  
35 U.S.C. § 314

## I. INTRODUCTION

ZimVie, Inc. and Zimmer Biomet Spine, Inc. (collectively, “Petitioner”) filed a Petition (Paper 2, “Pet.”), seeking *inter partes* review of claims 1–20 of U.S. Patent No. 11,129,646 B2 (Ex. 1001, “the ’646 patent”). Dr. Roger P. Jackson (“Patent Owner”) filed a Patent Owner Preliminary Response. Paper 6 (“Prelim. Resp.”).

We have authority 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.” 35 U.S.C. § 314(a).

For the reasons provided below, we determine Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one claim challenged in the Petition. Accordingly, we deny institution of *inter partes* review.

### A. Related Matters

According to Petitioner, Patent Owner asserted the ’646 patent against Petitioner in *Jackson v. ZimVie Inc.*, Case No. 1:22-cv-00891 (D. Del.). Pet. 1. Petitioner also filed IPR2023-01430,<sup>1</sup> IPR2023-01431, and IPR2023-01432, seeking *inter partes* review of three other patents related to the ’646 patent. *Id.*

### B. The ’646 Patent and Related Background

The ’646 patent relates to a medical implant assembly including a receiver and a plug. Ex. 1001, Abstract; *see also id.* at 1:27–31 (“The present invention is directed to structure[s] for joining together parts of a medical

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<sup>1</sup> Patent Owner filed a statutory disclaimer disclaiming all claims of the patent challenged in IPR2023-01430.

implant, in particular to closure mechanisms for use with open bone anchors in spinal surgery, and in some embodiments thereof, for use with spinal bone anchors such as polyaxial screws.”).

The ’646 patent explains that bone anchors, such as bone screws, were used in many types of spinal surgery to secure implants to vertebrae along the spinal column to stabilize and/or adjust spinal alignment. *Id.* at 1:32–38. Both open-ended or closed-ended bone anchors were known. *Id.* at 1:39–40. According to the ’646 patent, open-ended bone screws typically “include a threaded shank with a head or receiver having a pair of parallel projecting branches or arms which form a yoke with a U-shaped slot or channel to receive a rod or other longitudinal connecting member.” *Id.* at 1:54–58. “The open-ended head or rod receiver portion of such implants typically includes a pair of spaced arms forming a channel closed by a closure member after the rod or other longitudinal connecting member is placed in the channel.” *Id.* at 1:61–65.

The ’646 patent states that

spinal misalignments, irregularities and the placement of other surgical tools make it difficult to place the rod or other connector between the arms of the implant while a closure structure is mated with the open implant as well as used to push the rod or other connector downwardly into the implant. For example, when the closure is a cylindrical plug having a single start helically wound guide and advancement structure, such structure must be aligned with mating structure on one of the implant arms and then rotated until a portion of the structure is captured by mating guide and advancement structure on both arms of the implant, all the while the closure is being pressed down on the rod while other forces are pushing and pulling the rod back out of the implant.

*Id.* at 2:14–27.

The '646 patent discloses a closure structure with one or more helically wound guide and advancement features, each feature having a start structure located at or near a bottom surface of the closure, "each start structure simultaneously engaging and being captured by each of the spaced arms of the open implant upon initial rotation of the closure structure with respect to the open implant arms." *Id.* at 2:39–47. Specifically, the '646 patent discloses a double-start closure "having two helically wound forms thereon, each form having a start structure for simultaneously engaging a mating helical form on a respective open implant arm." *Id.* at 2:48–51.

### *C. Illustrative Claims*

Among the challenged claims, claims 1 and 12 are independent. They are illustrative of the claimed subject matter and are reproduced below.

1. A medical implant assembly comprising:

a receiver having an upper portion with an inner surface at least partially configured as a helically wound thread extending up to a top surface of the receiver, and a channel formed in the upper portion of the receiver and configured to receive a rod; and

a plug being threaded and configured to be positioned within the upper portion, the plug having an axis of rotation, a continuously helically wound thread form, and a substantially flat bottom surface with an annular outer edge, the substantially flat bottom surface configured to engage the rod, the continuously helically wound thread form having a start structure with an upper surface extending between a root and a crest of the continuously helically wound thread form, the start structure having a leading face extending below the upper surface to a lower surface of the start structure, the leading face including a partial concave surface adjacent the root and a partial convex surface adjacent the crest, the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to each other, the lower surface of the start structure being spaced apart and above the annular outer edge of the substantially flat bottom

surface so as to not be connected with the annular outer edge thereof.

Ex. 1001, 25:12–37.

12. A medical implant assembly comprising:

a receiver having an upper portion with an inner surface, a top surface, and a channel, the inner surface having a helically wound thread extending up to the top surface, the channel configured to receive a rod; and

a plug configured for positioning within the upper portion of the receiver, the plug having an axis of rotation, a continuously helically wound thread form comprising a first thread and a second thread, a substantially flat bottom surface with an annular outer edge, and an outward facing surface encircling the substantially flat bottom surface, the first thread comprising a first start structure and a first upper surface extending between a first root and a first crest of the first thread, the first start structure including a first leading face extending below the first upper surface to a first lower surface, the second thread comprising a second start structure and a second upper surface extending between a second root and a second crest of the second thread, the second start structure including a second leading face extending below the second upper surface to a second lower surface, the first and second leading faces each including a partial concave surface adjacent the first and second root, respectively, and a partial convex surface adjacent the first and second crest, respectively, the partial concave and partial convex surfaces of the first and second leading faces each defined by a radius of curvature, the first lower surface of the first thread and from the second lower surface of the second thread are spaced above and apart from the annular outer edge of the substantially flat bottom surface of the plug.

*Id.* at 26:26–57.

*D. Asserted Challenges to Patentability*

Petitioner asserts the following challenges to patentability:

| <b>Claim(s)<br/>Challenged</b> | <b>35 U.S.C. §<sup>2</sup></b> | <b>Reference(s)</b>                                                                                  |
|--------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------|
| 1, 2, 4–9                      | 102 or 103                     | The '477 publication <sup>3</sup>                                                                    |
| 1, 2, 4–9                      | 103                            | The '477 publication, Kirschman <sup>4</sup>                                                         |
| 10, 11                         | 103                            | The '477 publication, Johnson, <sup>5</sup> or<br>the '477 publication, Kirschman,<br>Johnson        |
| 3, 12–18, 20                   | 103                            | The '477 publication, Boschert <sup>6</sup>                                                          |
| 3, 12–18, 20                   | 103                            | The '477 publication, Boschert,<br>Kirschman                                                         |
| 19                             | 103                            | The '477 publication, Boschert,<br>Johnson, or the '477 publication,<br>Boschert, Kirschman, Johnson |

To support its Petition, Petitioner relies on the declaration of Carl McMillin, Ph.D. Ex. 1003.

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<sup>2</sup> The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103, effective March 16, 2013. Because the '646 patent has an effective filing date before March 16, 2013, we apply the pre-AIA version of §§ 102, 103.

<sup>3</sup> Jackson, US Patent Application Publication No. 2005/0267477 A1, published December 1, 2005 (Ex. 1005, “the '477 publication”).

<sup>4</sup> Kirschman, US Patent Application Publication No. 2011/0152947 A1, published June 23, 2011 (Ex. 1007, “Kirschman”).

<sup>5</sup> Johnson et al., US Patent Application Publication No. 2007/0088357 A1, published April 19, 2007 (Ex. 1008, “Johnson”).

<sup>6</sup> Boschert, US Patent No. 7,857,834 B2, issued December 28, 2010 (Ex. 1006, “Boschert”).

## II. ANALYSIS

### A. Claim Construction

In an *inter partes* review, we construe a claim term “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b). Under this standard, we construe the claim term “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*; *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (holding that the words of a claim “are generally given their ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application”).

Claim 1 recites “the start structure having a leading face . . . the leading face including a partial concave surface . . . and a partial convex surface.” Similarly, claim 12 recites “the first start structure including a first leading face,” “the second start structure including a second leading face,” and “the first and second leading faces each including a partial concave surface . . . and a partial convex surface.”

Petitioner argues that based on the disclosure of the ’646 patent, “and consistent with the plain meaning, a POSA would have understood that a ‘start structure’ is the beginning of a thread and the ‘leading face’ is the forward most surface of the thread in the direction the thread is to be rotated.” Pet. 15–16 (citing Ex. 1001, 9:38–42, Fig. 5; Ex. 1003 ¶¶ 158, 159). Petitioner further asserts that the concave portion is “inwardly curving,” and the convex portion is “outwardly curving.” *Id.* at 16 (citing Ex. 1003 ¶ 161).

Patent Owner does not propose any claim construction for these terms. *See* Prelim. Resp. 7. Instead, Patent Owner asserts that “there are no express constructions for the Board to consider or the Patent Owner to address.” *Id.* We disagree with Patent Owner’s allegation because Petitioner sufficiently explains the plain meaning of the terms “start structure,” “leading face,” “concave surface portion,” and “convex surface portion.” Pet. 15–16. On this record, and for purposes of this Decision, we adopt Petitioner’s proposed constructions of these terms.

Claim terms need only be construed to the extent necessary to resolve the controversy. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). On this record, and for purposes of this Decision, we see no need to address the construction of any other claim term.

*B. Alleged Unpatentability of Claims 1, 2, and 4–9  
over the ’477 Publication*

Petitioner asserts that the ’477 publication anticipates or renders obvious claims 1, 2, and 4–9 of the ’646 patent. Pet. 26–45. Based on this record, and for at least the following reasons, we determine Petitioner has not established a reasonable likelihood that it would prevail in this assertion.

1. The ’477 Publication

The ’477 publication relates to “[a] closure for use in conjunction with an open receiver of a medical implant for capturing and locking a rod member in the implant.” Ex. 1005, Abstract. The implant may be an open or closed element used in a spinal implant system, such as a bone screw.

*Id.* ¶ 7.

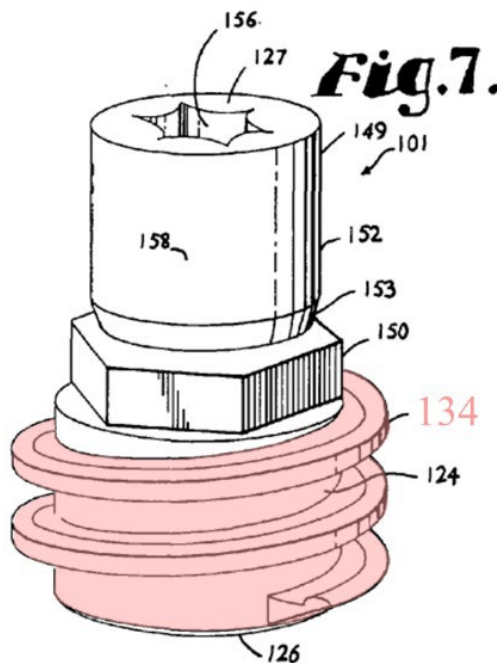
Specifically, the ’477 publication teaches that

[a] typical implant for use with a closure of the invention includes a receiver having a pair of spaced arms with an open channel located therebetween. The channel receives a rod or

other elongate structure. A closure of the invention is used to capture and fix the rod in the receiver subsequent to the receiver receiving the rod. In particular, internal surfaces of the arms of the receiver include a discontinuous guide and advancement structure, and the closure includes cooperating external guide and advancement structure so as to be rotated and driven into the receiver. Once the closure is matingly received in the receiver, the closure acts to capture the rod member.

*Id.*

The '477 publication depicts an embodiment of the disclosed closure in Figure 7, reproduced below.



Reproduced above is Figure 7 of the '477 publication, as annotated by Petitioner. Pet. 32. It is an enlarged and perspective view of a bone screw closure, showing the closure 101 having a cylindrical closure body 124 with a guide and advancement structure 134. Ex. 1005 ¶¶ 20, 41. The closure 101 also includes a break-off head 149 and a removal head 150 that are coaxially attached to the body 124. *Id.* ¶ 42.

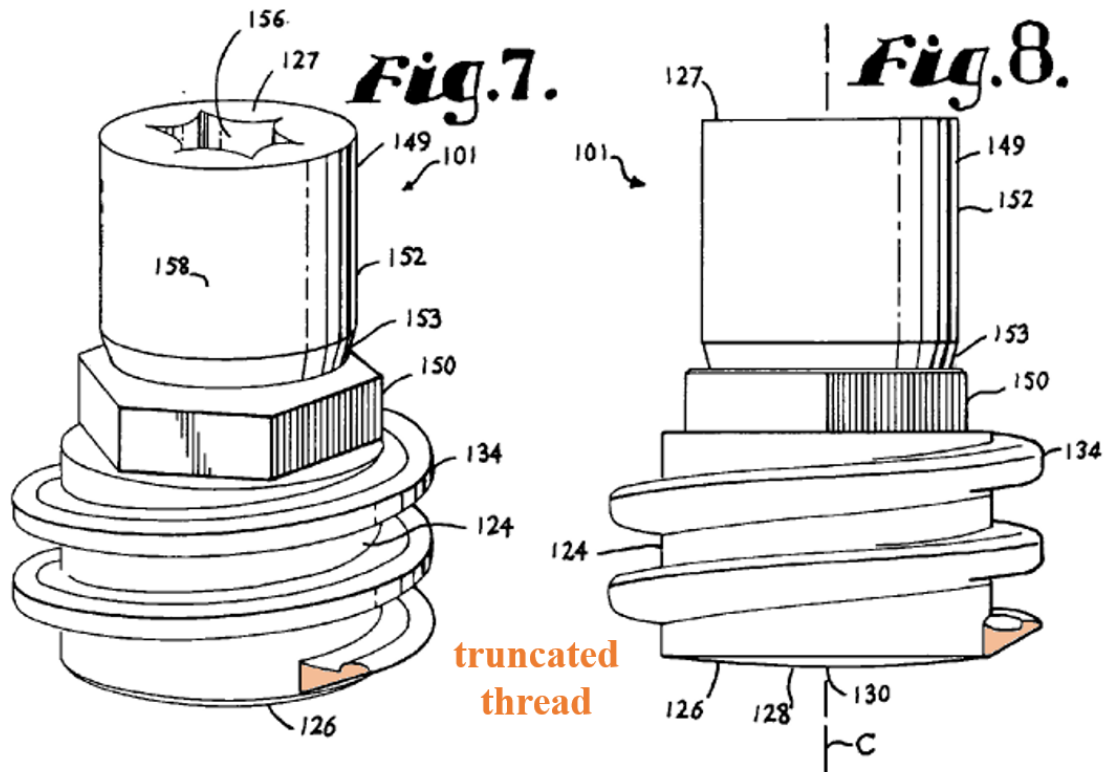
## 2. Analysis

We focus our analysis on claim 1. Petitioner contends that the '477 publication discloses or suggest each limitation of claim 1. Pet. 26–38.

Patent Owner counters that Petitioner fails to show the '477 publication teaches (1) “a substantially flat bottom surface with an annular outer edge . . . the lower surface of the start structure being spaced apart and above the annular outer edge of the substantially flat bottom surface so as to not be connected with the annular outer edge thereof” (Prelim. Resp. 12–16); (2) “the leading face including a partial concave surface adjacent the root and a partial convex surface adjacent the crest” (*id.* at 20–34); and (3) “the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to each other” (*id.* at 35–41). We focus our analysis on Patent Owner’s latter two arguments. Based on this record, and as explained below, we find them persuasive.

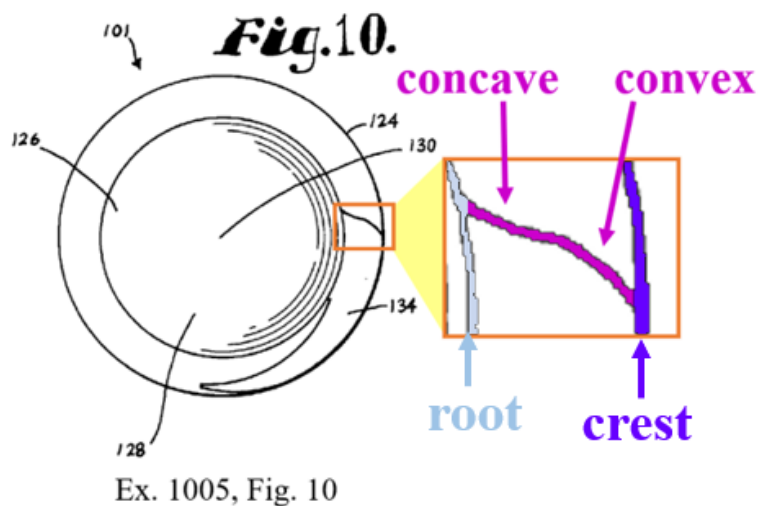
### *a. Leading Face*

Petitioner argues that the '477 publication discloses “a truncated thread start” with a leading face. Pet. 27–28 (citing Ex. 1003 ¶ 186; Ex. 1005, Figs. 7, 8), 35 (citing Ex. 1003 ¶ 233; Ex. 1005, Figs. 7, 8). Petitioner annotates Figures 7 and 8 as follows:



The figures above are reproductions of Petitioner's annotated Figures 7 and 8 of the '477 publication. Pet. 28. We find these figures sufficiently supports Petitioner's assertion that the '477 publication discloses a start structure having a leading face. Patent Owner does not disagree.

Petitioner next refers to an annotated Figure 10, reproduced below:



The figure above is a reproduction of Petitioner's annotated Figure 10 of the '477 publication. Pet. 29, 36. Petitioner asserts that this figure shows "the leading face of the start structure is formed in an s-curve, with both concave and convex curves." *Id.* at 35 (citing Ex. 1003 ¶ 234); *see also id.* at 28 (citing Ex. 1003 ¶ 186; Ex. 1005, Fig. 10) ("The leading face is curvate and formed in an s-curve, with a partial concave surface adjacent the root and a partial convex surface adjacent the crest."). We are not persuaded.

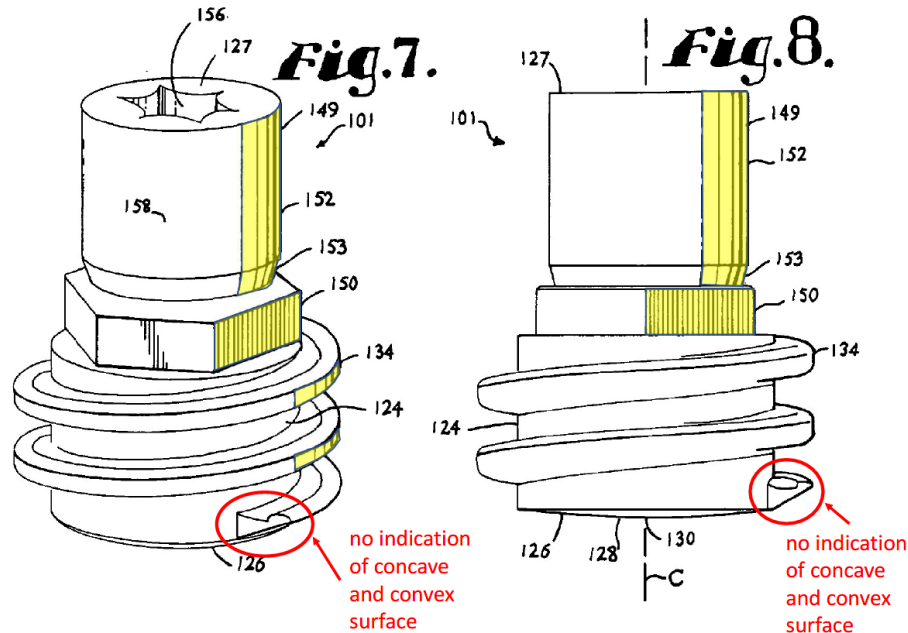
As Patent Owner correctly points out, the '477 publication does not describe, or even identify, the line in Figure 10 that Petitioner relies on as the leading face. Prelim. Resp. 20. Thus, the only evidence purportedly supports Petitioner's argument that the unidentified and undescribed line is the leading surface is Dr. McMillin's testimony. *See* Ex. 1003 ¶¶ 186, 234. In paragraph 186, Dr. McMillin's testimony merely repeats, nearly verbatim, Petitioner's argument, without any explanation or other evidentiary support. *See id.* ¶ 186. As a result, we accord limited weight to this testimony. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential).

In paragraph 234, Dr. McMillin testifies that an ordinarily skilled artisan would have recognized the unidentified and undescribed line of Figure 10 "as the leading face of the thread, at least because it is the only feature shown that matches with leading face shown in Fig. 8." Ex. 1003 ¶ 234. We find this testimony inconsistent with the disclosures in Figures 7 and 8.

Figures 7, 8, and 10 show the same bone screw closure from different viewpoints. Ex. 1005 ¶¶ 20, 21, 23 (stating Figure 7 shows the "perspective view," Figure 8 shows the "front elevational view of the closure of FIG. 7,"

and Figure 10 shows the “bottom plan view of the closure of FIG. 7”).

Patent Owner contends that Figures 7 and 8 do not show any curved surface in the leading face. Prelim. Resp. 21–24. Patent Owner annotates Figures 7 and 8 as follows:



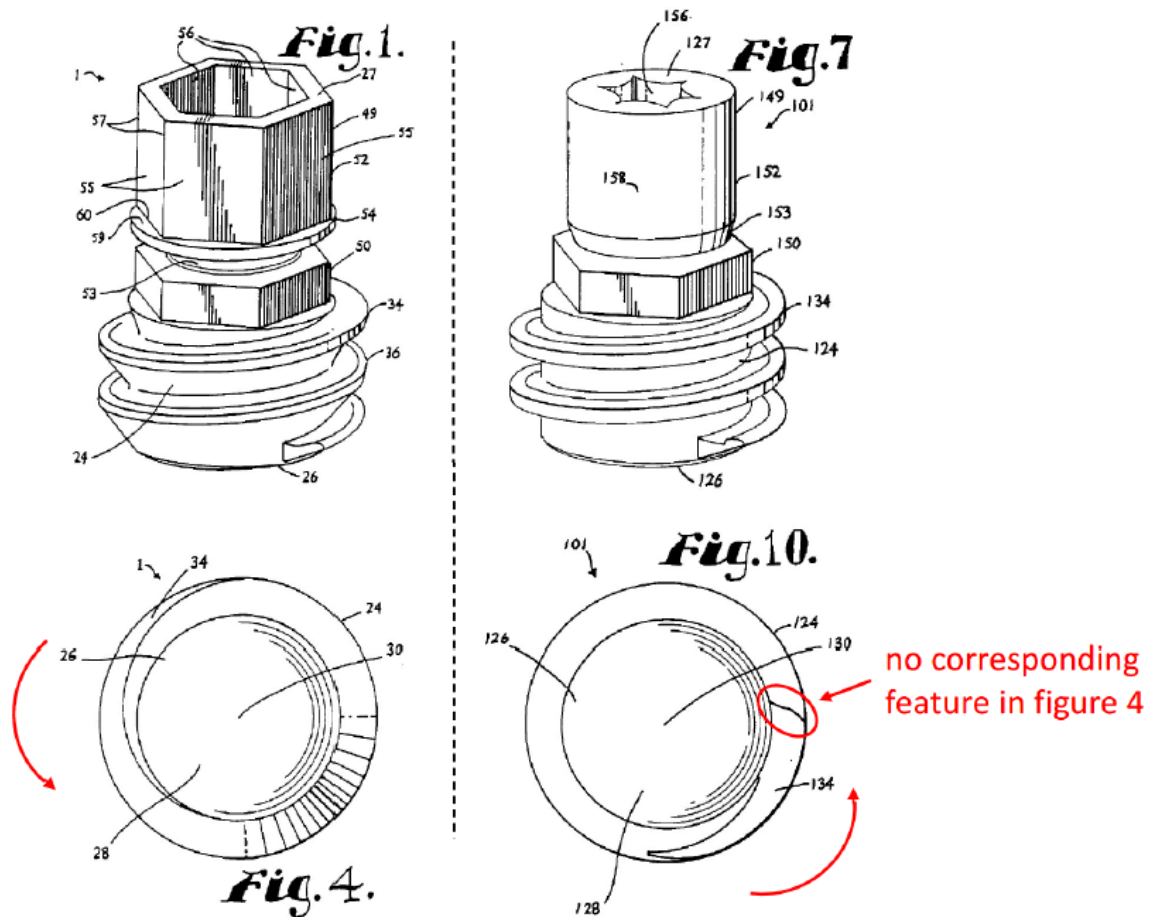
The figures above are the reproduction of Patent Owner’s annotated Figures 7 and 8 of the ’477 publication. Prelim. Resp. 23. We agree with Patent Owner that Figures 7 and 8 appear to depict a flat surface for the leading face, rather than a partially concave surface and a partially convex surface, as required in claim 1. *Id.* at 22–23.

We are also persuaded by Patent Owner’s showing that, in the challenged ’646 patent, the partially concave and partially convex surface is “visible across all views.” *Id.* at 23–24 (citing Ex. 1001, Figs. 1, 2, 5); *see also* Ex. 1001, 3:42–45 (explaining each of Figures 1 and 2 is a perspective view of the same closure), 3:55–56 (explaining Figure 5 is a bottom plan view of the closure of Figure 1). In other words, if the ’477 publication taught the curved leading face, the partially concave and partially convex

surface would have been visible not only in Figure 10 (the bottom plan view), but also in Figures 7 and 8 (the perspective view). Yet, the leading faces shown in Figures 7 and 8 appear flat. This contradicts Dr. McMillin's testimony that the leading face represented by the unidentified and undescribed line of Figure 10 "matches with leading face shown in Fig. 8." *See* Ex. 1003 ¶ 234. As a result, we find Dr. McMillin's testimony insufficient to support Petitioner's argument on this point.

Petitioner's argument that the unidentified and undescribed line in Figure 10 shows a leading face is also inconsistent with the disclosure for another embodiment in the '477 publication. The '477 publication teaches two embodiments of bone screw closure, one shown in Figures 1–4, the other in Figures 7–10. Ex. 1005 ¶¶ 14–17, 20–23; *see also* Pet. 27 ("The '477 Publication discloses two embodiments of the closure."). Petitioner acknowledges that "[t]he primary difference between the embodiments is the shape of the break-off head." Pet. 27 (citing Ex. 1005 ¶¶ 33, 43, Figs. 1, 7). Thus, we agree with Patent Owner that an ordinarily skilled artisan "would understand the leading face between the two embodiments is substantially the same." Prelim. Resp. 28.

Patent Owner annotates Figures 1, 4, 7 and 10, which we reproduce below:



The figures above are the reproduction of Patent Owner's annotated Figures 1, 4, 7, and 10 of the '477 publication. Prelim. Resp. 28. Figures 1 and 4 depict the same first embodiment of a closure from the perspective view and bottom plan view, respectively. Ex. 1005 ¶¶ 14, 17. Similarly, Figures 7 and 10 depict the same second embodiment of a closure from the perspective view and bottom plan view, respectively. Ex. 1005 ¶¶ 20, 23.

Patent Owner argues that

Given the similarity in their leading faces, one would expect the same depiction of the leading faces across all embodiments. However, the bottom view of Figure 1 (as shown in Figure 4) does not contain the same line depicted in the bottom view of Figure 7 (as shown in Figure 10) that Petitioner relies on[.]

Prelim. Resp. 28.

We find Patent Owner’s argument persuasive. Indeed, from the perspective view, closure 1 shown in Figure 1 and closure 101 shown in Figure 7 appear to have substantially the same leading faces. Yet, from the bottom plan view, Figure 4 (closure 1) does not appear to have a curved line similar to the one shown in Figure 10 (closure 101), which Petitioner alleges as representing a leading face with a partially concave surface and a partially convex surface. *See* Pet. 28–29, 35–36. Petitioner does not explain this discrepancy.

For the foregoing reasons, Petitioner does not persuade us that the unidentified and undescribed line in Figure 10 of the ’477 publication represents a leading surface having a partially concave surface and a partially convex surface as required in claim 1.<sup>7</sup> For this reason alone, on this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claim 1 based on the ’477 publication.

Each of claims 2 and 4–9 depends from claim 1. For the same reasons as explained above, Petitioner has not established a reasonable likelihood that it would prevail in its obviousness challenge of these claims either.

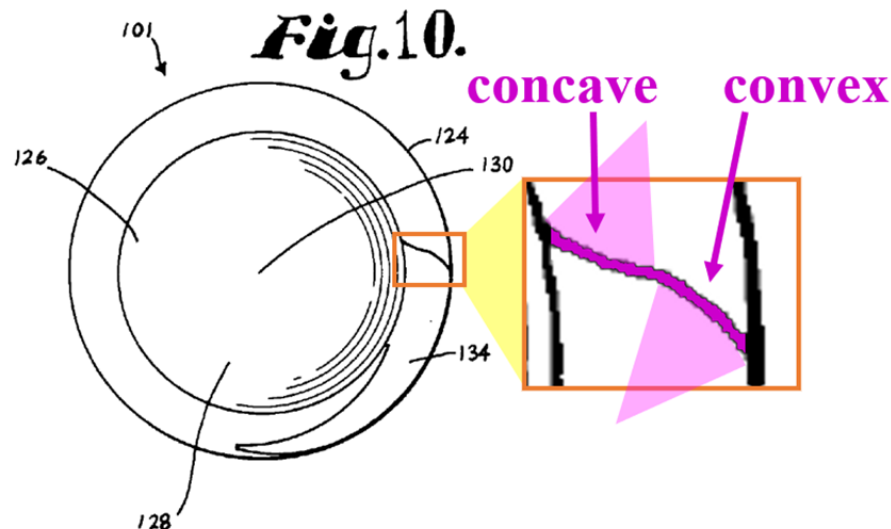
*b. Substantially Equal Radius of Curvature*

Claim 1 requires “the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to

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<sup>7</sup> We also express doubt on whether Petitioner adequately shows the line in Figure 10 is partially concave and partially convex, as required in the disputed limitation. Petitioner’s argument on this point is predicated on an enlarged section of a small drawing, showing a single unidentified and undescribed line that was not apparently intended to demonstrate the direction of any curvature. Ultimately, we do not need to address this issue, because Petitioner does not sufficiently persuade us that the line depicts the leading face recited in the disputed limitation.

each other.” For this limitation, Petitioner, again, relies on Figure 10 of the ’477 publication. Pet. 36. Petitioner’s annotated Figure 10 is reproduced below:



The figure above is a reproduction of Petitioner’s annotated Figure 10 of the ’477 publication. *Id.* Petitioner’s argument relating to this limitation, in its entirety, reads:

The ’477 Publication discloses this limitation. EX1003, ¶235. Annotated and enlarged Figure 10 shows that the partial concave surface adjacent the root and the partial convex surface adjacent the crest, *see supra* §VI.B.1.f, are each defined by a radius of curvature that is substantially equal with respect to each other. EX1003, ¶235.

*Id.*

Petitioner’s argument runs afoul of the Federal Circuit law. Indeed, the court instructed 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.”

*Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000); *see also Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed.

Cir. 2005) (“[S]peculative modeling premised on unstated assumptions in prior art patent drawings cannot be the basis for challenging the validity of claims reciting specific dimensions not disclosed directly in such prior art.”).

Here, the line Petitioner relies on is unidentified and undescribed in the ’477 publication. Even assuming it depicts the leading face, and further assuming it shows a partially concave and partially convex surface, the ’477 publication is completely silent on the radii of the curves. Thus, we reject Petitioner’s argument that its annotated Figure 10 shows that the partial concave surface and the partial convex surface are each defined by a radius of curvature that is substantially equal with respect to each other. *See In re Wright*, 569 F.2d 1124, 1127 (CCPA 1977) (“Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value.”).

In sum, Petitioner does not persuade us that the unidentified and undescribed line in Figure 10 of the ’477 publication discloses “the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to each other,” as required in claim 1. For this additional reason, on this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claim 1, as well as its dependent claims 2 and 4–9, based on the ’477 publication.

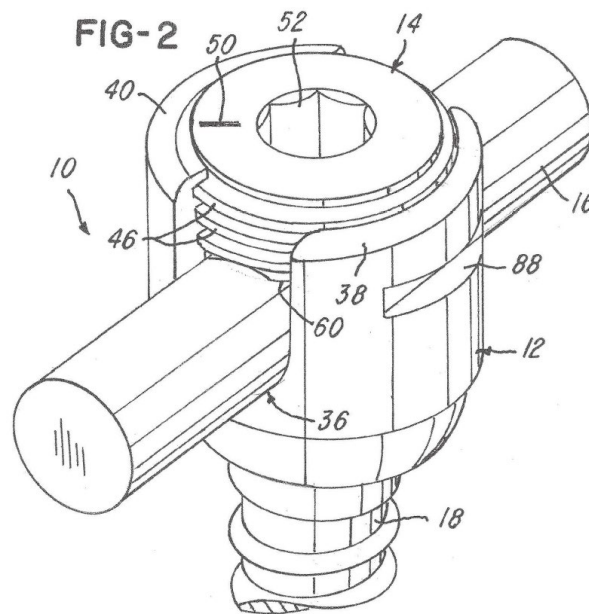
*C. Alleged Obviousness of Claims 1, 2, and 4–9  
over the ’477 Publication and Kirschman*

Petitioner asserts that claims 1, 2, and 4–9 would have been obvious over the combination of the ’477 publication and Kirschman. Pet. 46–54. Based on this record, and for at least the following reasons, we determine Petitioner has not established a reasonable likelihood that it would prevail in this assertion.

1. Kirschman

Kirschman “relates to a spinal implant system and method and, more particularly, to an implant having . . . a lock aid that provides at least one of improved guidance, tactile or visual feedback or enhanced fixation and locking of a cap in a receiver of the implant.” Ex. 1007 ¶ 2.

Figure 2, reproduced below, shows an embodiment of Kirschman’s implant and polyaxial screw system.



The figure above is an assembled view of an embodiment of an implant and polyaxial screw system. *Id.* ¶¶ 24, 25, 34, 35. The system 10 includes a cap 14 which is threadably mounted to a receiver 12 containing a rod 16 and a polyaxial screw 18. *Id.* The receiver 12 has a first arcuate wall 38 with threads and a generally opposing second arcuate wall 40 with threads that lay between first and second rod receiving openings 36. *Id.* ¶¶ 35, 36. The threads of the first arcuate wall 38 and the second arcuate wall 40 receive male threads 46 on the cap 14 to allow the cap 14 to be screwed onto the receiver 12 to lock the rod 16 in the receiver 12. *Id.* The cap 14 includes a tool-receiving opening 52 that receives a tool (e.g., hex

wrench) for rotatably driving the cap 14. *Id.* ¶¶ 44, 56. The receiver 12 includes notched out areas 88 to enable the user to position or hold the receiver 12 using a fork tool. *Id.*

The system 10 includes lock aids associated with the receiver 12 and/or the cap 14 to provide the user with tactile or visual feedback (e.g., indicia 50) indicating that the cap 14 is properly aligned and mounted on the receiver 12. *Id.* ¶¶ 36, 38. The lock aid may include a deformable area 60 on the cap 14 that deforms around the rod 16 as the cap 14 is screwed into the receiver 12. *Id.* ¶ 45.

## 2. Analysis

Petitioner contends that the '477 publication “already anticipates or renders obvious every limitation of Claims 1–2 and 4–9.” Pet. 48. According to Petitioner, “Kirschman further reinforces the obviousness of certain limitations.” *Id.* at 48–49. The “certain limitations” discussed under this ground do not include (1) the “leading surface including a partially concave surface . . . and a partially convex surface;” or (2) “the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to each other.” *See id.* at 49–54. In other words, here, Petitioner relies solely on the '477 publication for teaching these two limitations. For the same reasons explained above, we are not persuaded by Petitioner’s arguments. *See supra* Section II.B.2. Thus, on this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claims 1, 2, and 4–9, based on the combination of the '477 publication and Kirschman.

### *D. Alleged Obviousness of Claims 10 and 11*

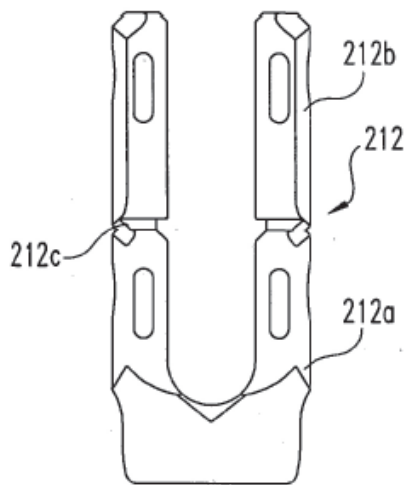
Petitioner contends that claims 10 and 11 would have been obvious over the combination of the '477 publication and Johnson, or further in view

of Kirschman. Pet. 54–60. Based on this record, and for at least the following reasons, we determine Petitioner has not established a reasonable likelihood that it would prevail in this assertion.

1. Johnson

Johnson “relates to devices and methods useful in surgery, such as orthopedic surgery. In particular, it relates to anchors and other implants for use in tissue, to be placed during orthopedic surgery.” Ex. 1008 ¶ 1.

Specifically, Johnson teaches an adjustable bone anchor assembly that includes a receiver. *Id.* ¶ 31. An embodiment of the assembly is illustrated in Figure 10, the receiver portion of which is reproduced below.



The figure above is a portion of Johnson’s Figure 10, showing the receiver 212 of an adjustable bone anchor assembly. Ex. 1008 ¶¶ 22–23, 50. Receiver 212 has a lower portion 212a and an upper portion 212b separated by a thinned section 212c. *Id.* ¶ 51. According to Johnson, after the receiver receives an elongated member, a compression member is inserted to force the elongated member through the upper portion 212b to the bottom of the lower portion 212a. *Id.* ¶ 55. Once the assembly is locked, upper portion

212*b* may be cut or sheared off or otherwise removed from lower portion  
212*a*. *Id.* ¶ 56.

## 2. Analysis

Claim 10, through its dependency from claim 9, which in turn, depends from claim 1, requires “the upper portion of the receiver includes a first arm and a second arm,” and the first and second arm each has a “breakoff extension.” Claim 11 depends from claim 10, and recites further limitations.

Petitioner contends that an ordinarily skilled artisan “would have been motivated to apply Johnson’s teachings of breakoff extension arms to the closure and receiver system taught by the ’477 Publication (with or without modifications in view of Kirschman).” Pet. 56. In other words, Petitioner relies on Johnson only for teaching the additional limitations recited in claims 10 and 11, and on the ’477 publication, with or without Kirschman, for teaching the limitations recited in claim 1. *Id.* at 57–60.

As explained above, Petitioner does not show the ’477 publication, either alone or in combination with Kirschman, teaches or suggests (1) the “leading surface including a partially concave surface . . . and a partially convex surface;” or (2) “the partial concave and partial convex surfaces each defined by a radius of curvature that is substantially equal with respect to each other.” *See supra* Sections II.B.2, II.C.2. Thus, on this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claims 10 and 11, based on the ’477 publication and Johnson, or further in view of Kirschman.

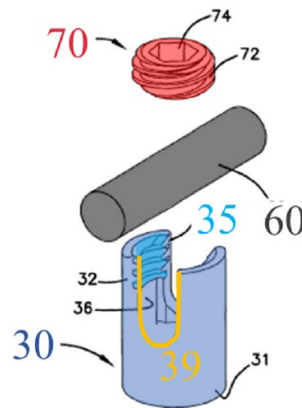
### *E. Alleged Obviousness of Claims 3, 12–18, and 20*

Petitioner argues that claims 3, 12–18, and 20 would have been obvious over the combination of the ’477 publication and Boschert

(Pet. 61–77), or further in view of Kirschman (*id.* at 78–81). Based on this record, and for at least the following reasons, we determine Petitioner has not established a reasonable likelihood that it would prevail in either of these assertions.

1. Boschert

Boschert describes an orthopedic fixation device for securing a rod to a bone, and specifically, an intervertebral connection system suited for stabilization of the spine. Ex. 1006, Abstract, 1:5–7. It depicts an embodiment of the disclosed device in Figure 1, the relevant portion of which is reproduced below.



Reproduced above is a portion of Figure 1 of Boschert, as annotated by Petitioner. Pet. 61. It is an exploded perspective view of an orthopedic fixation device, including a receiver 30 having a top portion 32 defining a saddle 39 (i.e., a pocket) for receiving a rod 60. Ex. 1006, 2:58–61, 4:16–18. The fixation device also includes a setscrew 70 for clamping the rod 60 within the saddle 39 of the receiver 30. *Id.* at 4:26–38.

Boschert teaches that the threads 72 of the setscrew 70 can “be designed with a double lead to allow the setscrew 70 to start more easily than with a single lead.” *Id.* at 7:21–23.

## 2. Analysis

Claim 3 depends from claim 1, and further recites “the start structure is a first start structure disposed at a diametrically opposite location on the plug from a second start structure.” Claim 12 is independent. Relevant to our analysis, it recites “a first start structure . . . including a first leading face,” “a second start structure . . . including a second leading face,” “the first and second leading faces each including a partial concave surface . . . and a partial convex surface.” Each of claims 13–18 and 20 depends from claim 12.

Petitioner contends that an ordinarily skilled artisan would have had a reason “to combine the closure of the ’477 Publication and the double lead thread of Boschert.” Pet. 62. In other words, Petitioner relies on Boschert only for teaching two start structures, and on the ’477 publication, with or without Kirschman, for teaching the other limitations. *Id.* at 62–77.

Indeed, when analyzing independent 12, Petitioner repeatedly refers back to its analysis of claim 1. *Id.* at 67–72. Specifically, Petitioner relies on the ’477 publication for teaching “the curvate leading face.” *Id.* at 71. According to Petitioner, an ordinarily skilled artisan would have used “the curvate leading face of the ’477 Publication as the start structure on each of the two start threads taught by Boschert.” *Id.* at 71–72.

As explained above, Petitioner does not show the ’477 publication, either alone or in combination with Kirschman, teaches or suggests the “leading surface including a partially concave surface . . . and a partially convex surface.” *See supra* Sections II.B.2.a, II.C.2. For the same reasons, Petitioner does not show the asserted prior art references teach or suggest “the first and second leading faces each including a partial concave surface . . . and a partial convex surface,” as recited in claim 12. Thus, on

this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claims 3, 12–18, and 20, based on the combination of the '477 publication and Boschert, or further in view of Kirschman.

*F. Alleged Obviousness of Claim 19*

Petitioner asserts that claim 19 would have been obvious over the combination of the '477 publication, Boschert, and Johnson, or further in view of Kirschman. Pet. 81–83. Based on this record, and for at least the following reasons, we determine Petitioner has not established a reasonable likelihood that it would prevail in either of these assertions.

Claim 19 depends from claim 18, which in turn, depends from claim 12. For this challenge, Petitioner does not discuss the leading faces recited in claim 12. *See id.* at 82. Instead, Petitioner cites to Johnson solely for its teaching that “[t]hreads 256 may [be] configured so that they are essentially continuous from upper portion 212 b to lower portion 212 a’ so that a compression member ‘can be inserted into upper portion 212 b and moved down to lower portion 212 a.’” *Id.* (quoting Ex. 1008 ¶ 53). In other words, Petitioner relies on the '477 publication, Boschert, with or without Kirschman, for teaching the limitations recited in claim 12, including the leading faces.

As explained above, Petitioner does not show the asserted prior art references teach or suggest “the first and second leading faces each including a partial concave surface . . . and a partial convex surface,” as recited in claim 12. *See supra* Sections II.E.2. Thus, on this record, Petitioner has not established a reasonable likelihood that it would prevail in its challenge of claim 19.

### III. CONCLUSION

Based on the current record, and for the reasons explained above, we find Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one claim challenged in the Petition. Thus, we decline to institute *inter partes* review.

### IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is denied, and no trial is instituted.

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