Trials@uspto.gov
571-272-7822

Paper No. 35
Date: August 8, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OSTEOMED LLC,
Petitioner,

v.

STRYKER EUROPEAN OPERATIONS HOLDINGS LLC,
Patent Owner.

IPR2022-00488
Patent 10,993,751 B1

Before HYUN J. JUNG, SUSAN L. C. MITCHELL, and MICHAEL A. VALEK, *Administrative Patent Judges.*

MITCHELL, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

OsteoMed LLC ("Petitioner") filed a Petition (Paper 1, "Pet."), seeking *inter partes* review of claims 1–3 and 6–18 of U.S. Patent No. 10,993,751 B1 (Ex. 1001, "the '751 patent"). We instituted trial on all grounds in the Petition. Paper 8, 37.

Following institution, Stryker European Operations Holdings LLC ("Patent Owner") filed a Response (Paper 16, "Resp."), Petitioner filed a Reply (Paper 25, "Reply"), and Patent Owner filed a Sur-reply (Paper 29, "Sur-reply"). We held a hearing on May 11, 2023, and a transcript is of record. Paper 34 ("Tr.").

After considering the parties' arguments and evidence, we find that Petitioner has shown by a preponderance of the evidence that the challenged claims of the '751 patent are unpatentable. *See* 35 U.S.C. § 316(e). Our reasoning is explained below.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies OsteoMed LLC, Acumed LLC, and Colson Medical, LLC as real parties in interest. *See* Pet. viii. Petitioner additionally identifies Marmon Holdings, Inc. and Berkshire Hathaway Inc. as "parties that may be relevant to the determinations." *Id.* Patent Owner identifies Stryker European Operations Holding LLC, Stryker Corporation, and Howmedica Osteonics Corp. *See* Paper 14, 2.

B. Related Matters

Petitioner and Patent Owner identify *OsteoMed LLC v. Stryker Corporation*, 1:20-cv-06821 (N.D. Ill.) as a related matter. Pet. ix; Paper 14,

2. Patent Owner additionally identifies *OsteoMed LLC v. Wright Medical Technology, Inc.*, 1:20-cv-01621 (D. Del.). Paper 14, 3.

Petitioner also identifies IPR2022-00486 and IPR2022-00487, which were filed concurrently with the Petition and involve the same parties. Pet. ix. We denied institution in IPR2022-00486. *See* IPR2022-00486, Papers 8, 12. IPR2022-00487 is currently pending.

C. The '751 Patent

The '751 patent issued on May 4, 2021, and is a continuation of an application that is part of a series of continuation applications, the earliest of which was filed on October 2, 2008. Ex. 1001, codes (30), (45), (63).

The '751 patent relates to "a plate fixed between two bone parts by way of screws engaged in holes formed in the thickness of said plate" that is configured to bring "the two bone parts into a compressive position." Ex. 1001, code (57). Figure 3 of the '751 patent provides a perspective view of this plate and is reproduced below. *See id.* at 2:1–4.

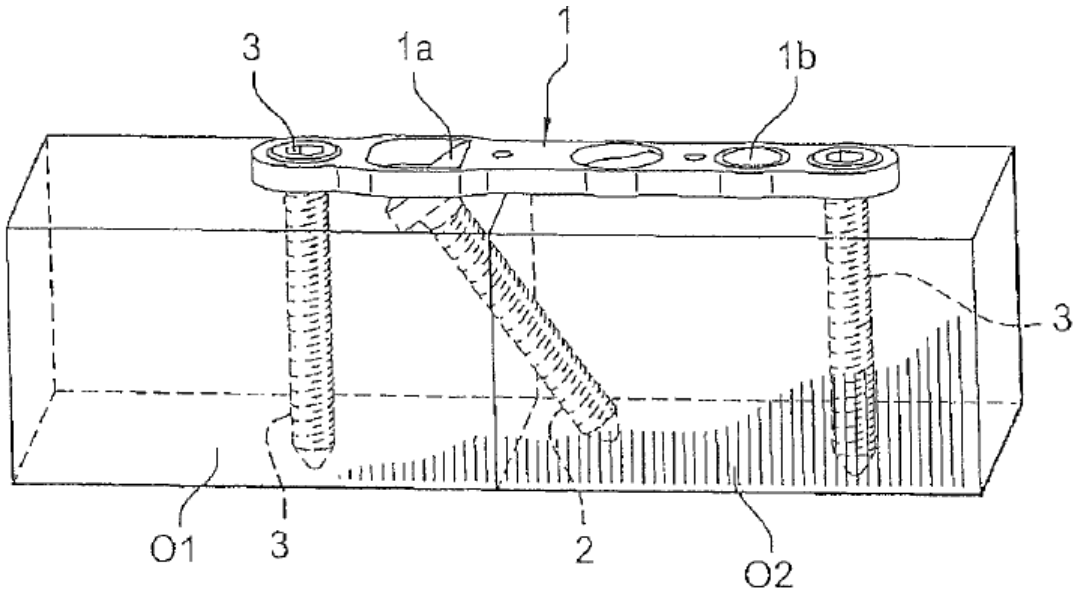


Fig. 3

Figure 3 depicts a plate 1 positioned between two bone parts O1 and O2. Ex. 1001, 2:28–29. Screws 3 are set through holes in the plate to attach it to bone parts O1 and O2. *Id.* at 2:45–47. A third screw 2 is positioned at an angle through a hole in tab 1a such that it extends through both parts O1 and O2. *Id.* at 2:8–11, 2:40–41. According to the Specification, engaging screw 2 in this manner "place[s] the fracture in compression." *Id.* at 2:40–41.

D. Challenged Claims

The Petition challenges claims 1–3 and 6–18. *See* Pet. 5. Challenged claims 1, 11, and 17 are independent. *See* Ex. 1001, 3:7–36 (claim 1), 3:61–4:29 (claim 11), 4:42–67 (claim 17). Claim 1 is illustrative of the challenged claims. Claim 1 is reproduced below with the same bracketed annotations used in the Petition to identify particular limitations.

> 1. [1pre] A system for fusing a first discrete bone and a second discrete bone separated by a joint, said system comprising:
>
> > [1a] a bone plate having a length sufficient to span the joint, said bone plate having a first end and a second end along said length, said length defining a longitudinal axis, said bone plate defining:
> >
> > [1b] a first hole at or adjacent the first end, said first hole configured to align with the first discrete bone on a first side of the joint;
> >
> > [1c] a second hole at or adjacent the second end, said second hole configured to align with the second discrete bone on a second side of the joint; and
> >
> > [1d] a third hole located between said first hole and said second hole, wherein said third hole is angled relative to the longitudinal axis of said bone plate;

> [1e] a first fixation member configured to be inserted through the first hole of the bone plate and into the first discrete bone of the joint;
>
> [1f] a second fixation member configured to [sic] inserted through said second hole of said bone plate and into the second discrete bone of said joint; and
>
> [1g] a third fixation member configured to be inserted through said third hole of said bone plate, into the first discrete bone, across said joint, and into the second discrete bone such that a free end of said third fixation member, not attached to any portion of the bone plate, resides in a second discrete bone,
>
> [1h] wherein said third fixation member is the only fixation member extending across said joint from the first side of the joint to the second side of the joint.

Ex. 1001, 3:7–36.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1, 2, 7, 8	103(a)	Slater[2]
1, 2, 7–18	103(a)	Slater, Zahiri[3]
6	103(a)	Slater, Zahiri, Myerson[4]

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), included revisions to 35 U.S.C. § 103 that became effective after the filing of the applications to which the '751 patent claims priority. Therefore, we apply the pre-AIA version of § 103.
[2] WO 2007/131287 A1, published November 22, 2007 (Ex. 1004) ("Slater").
[3] US 8,187,276 B1, filed September 26, 2006 and issued May 29, 2012 (Ex. 1007) ("Zahiri").
[4] US2006/0241592 A1, published October 26, 2006 (Ex. 1010) ("Myerson")

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–3, 7–18	103(a)	Arnould,[5] Zahiri
6	103(a)	Arnould, Zahiri, Myerson

Pet. 5.

In support of these grounds, Petitioner relies on the declaration of Michael Sherman (Ex. 1002) submitted with the Petition. Patent Owner relies on declarations from Karl R. Leinsing (Ex. 2005) and George B. Holmes (Ex. 2007) submitted with the Patent Owner Response.

Our analysis below focuses on Grounds 4 and 5, i.e., the two grounds relying on Arnould instead of Slater. Grounds 4 and 5 collectively reach all of the challenged claims.

III. ANALYSIS OF THE ASSERTED GROUNDS

A. Legal Standards

A claim is unpatentable for obviousness if, to one of ordinary skill in the pertinent art, "differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). 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

[5] EP 1,897,509 B1, published March 12, 2008 (Ex. 1005). Exhibit 1006 is a certified translation of EP 1,897,509 B1, which we cite and refer to herein as "Arnould."

of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Subsumed within the *Graham* factors is the requirement that the skilled artisan would have had a reasonable expectation of success in combining the prior art references to achieve the claimed invention. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007). "Obviousness does not require absolute predictability of success . . . . [A]ll that is required is a reasonable expectation of success." *In re O'Farrell*, 853 F.2d 894, 903–904 (Fed. Cir. 1988). Moreover, "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR*, 550 U.S. at 416.

On the other hand, a patent claim "is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. An obviousness determination requires finding "both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016) (citation omitted).

B. Level of Ordinary Skill in the Art

Relying on the testimony of its declarant, Mr. Sherman, Petitioner contends that a person of ordinary skill in the art (POSITA) of the '751 patent

> as of October of 2009, had at least a Bachelor's Degree in mechanical engineering, biomedical engineering, biomechanics or similar discipline and had approximately three years of

> experience with orthopedic implant design. Such a POSITA would have had knowledge of design considerations known in the industry and would have been familiar with then-existing products and solutions. A POSITA would have been familiar with orthopedic implants, bone plates, and intramedullary implants.

Pet. 4 (citing Ex. 1002 ¶¶ 50–52).

In its Response, Patent Owner argues:

> In pending IPRs involving Petitioner's own patents relating to the same bone plate technology, the parties and the Board agreed that "a POSITA at the time of the invention would be an individual having at least a bachelor's degree in engineering with at least two years of experience in the field, such as experience with the design of surgical implants, or a clinical practitioner with a medical degree and at least two years of experience as an orthopedic surgeon."

Resp. 7–8. Patent Owner urges that for consistency the same level of ordinary skill in the art should apply here. *Id.* at 8.

Patent Owner disagrees with Petitioner's proposal to the extent it "excludes 'clinical practitioners with a medical degree and at least two years of experience as an orthopedic surgeon.'" Resp. 8 (internal quotations omitted). Patent Owner argues that "Petitioner's omission of clinical practitioners from its definition of a POSITA appears to be an oversight because Petitioner's expert . . . agreed at his deposition that orthopedic surgeons should be included within the definition of a POSITA." *Id.* (citing Ex. 2009, 38:21–39:17).

Petitioner did not respond to Patent Owner's argument regarding the level of ordinary skill in the art in its Reply and confirmed at the hearing that it does not dispute Patent Owner's proposed description. *See* Tr. 62:3–16.

While both parties' descriptions are similar, we find that Patent

Owner's description is better supported by the record. As Patent Owner points out, the main distinction between the parties' proposals is that Patent Owner's description is broader because it includes orthopedic surgeons. The record supports the inclusion of such individuals in the description of a POSITA. *See* Ex. 2005 ¶¶ 37, 41; Ex. 2009, 38:21–39:7 (Petitioner's declarant testifying that he would "include an orthopedic surgeon that has some experience developing implants as a person of ordinary skill in the art"). Thus, we apply Patent Owner's description of a POSITA for our analysis.

C. Claim Construction

Petitioner asserts that no term needs to be construed, *see* Pet. 5, but Patent Owner argues that we should construe the term "bone plate," which it asserts is a missing limitation in the asserted art, *see* Resp. 9–11. More specifically, Patent Owner argues that "[b]ecause Petitioner fails to define certain claim terms, its obviousness analysis glosses over claim limitations that are not met by the prior art." *Id.* at 9.

Patent Owner alleges that the '751 patent "defines the claim term 'bone plate' as 'a plate for arthrodesis or osteosynthesis adapted to be fixed between two bone parts.'" *Id.* at 9 (quoting Ex. 1001, 1:29–31). Patent Owner further describes the "bone plate" by referring to the ordinary meaning of the claim terms "first end," "second end," and "between." *Id.* at 10–11. Patent Owner asserts that "a POSITA would have understood the claimed 'first end' to refer to one end of the bone plate and the 'second end' to include the opposite extreme end of the bone plate." *Id.* at 10 (citing Ex. 2005 ¶¶ 29–35). Patent Owner further asserts that a POSITA would

understand the claimed "third hole" located "between" a first and second hole to refer to "a 'third hole' located in the space separating the first hole and the second hole." *Id.* at 10–11 (citing Ex. 2005 ¶¶ 29–33, 36). We address the construction of these terms in turn below.

i. "Bone Plate"

Patent Owner contrasts its definition of "bone plate" with the device disclosed in Zahiri, which "is designed to be positioned on only one side of a fracture – [such that] it does not span any fracture, let alone a joint." *See id.* at 26 (urging that Zahiri "does ***not*** disclose a 'bone plate,' as properly defined") (citing Ex. 2005 ¶ 124). According to Patent Owner, we can "resolve the controversy regarding the meaning of 'bone plate'" by "determin[ing] that the claim term 'bone plate' refers to a 'a plate adapted to be fixed ***between two bone parts*** to immobilize a fracture or joint.'" *Id.* at 10.

Petitioner generally disputes Patent Owner's position, urging that the Specification does not define the term differently than its plain and ordinary meaning. Reply 3. According to Petitioner, none of the "dictionary definitions [Patent Owner cites] require that the plate itself cross the fracture or joint to be fixed." *Id.* at 4 (citing Ex. 2012, 5; Ex. 2013, 4). Moreover, Petitioner points to Mr. Sherman's testimony and other evidence that bone plates for fracture fixation are "not always" placed across the fracture. *Id.* (citing Ex. 2009, 52:9–53:1; Ex. 1019). Accordingly, Petitioner contends that "[t]o the extent 'bone plate' requires construction, it must include plates that are positioned on one side of a joint or fracture consistent with the term's plain and ordinary meaning." *Id.* at 5.

We begin by observing that Patent Owner does not dispute that both Arnould and Slater disclose a "bone plate" regardless of how the term is construed. *See* Tr. 41:1–6. Rather, Patent Owner seeks to construe "bone plate" to further its attempt to show that Zahiri is not analogous art, and therefore, cannot be combined with the other references. As explained below, we find that Zahiri is analogous art even if we were to adopt Patent Owner's proposal limiting "bone plate" to a plate "adapted to be fixed between two parts to immobilize a fracture or joint" because it is in the same field of endeavor, i.e., orthopedic implants, as the '751 patent. *Infra* § III.E.i.

That said, we do not agree with Patent Owner that the Specification defines "bone plate" as it contends. In the background of the invention, the Specification states that "[t]he invention relates to the technical field of orthopedic implants. More particularly, the invention relates to a plate for arthrodesis or osteosynthesis adapted to be fixed between two bone parts." Ex. 1001, 1:27–31. Contrary to Patent Owner's argument, this passage does not "define" the term "bone plate" nor otherwise suggest that the patentee acted as its own lexicographer. *See* Resp. 9.

Moreover, nothing in the record suggests that the ordinary meaning of "bone plate" requires the plate to be fixed between two bone parts. The medical dictionaries Patent Owner cites do not include such a requirement in their definitions. *See* Ex. 2012, 1478 (defining "bone plate" as "a metal bar with perforations for the insertion of screws, used to immobilize fractured segments"); Ex. 2013, 241 (defining "bone plate" as "a metal plate used to reconstruct a bone that has been fractured" and "designed to hold the bone fragments in apposition"). Both of these definitions are consistent with Mr. Sherman's testimony that a bone plate is "not always" placed across the

fracture. *See* Ex. 2009, 52:9–53:1 (identifying particular instances in which a plate is not placed across the fracture). We credit that testimony over the competing testimony of Patent Owner's declarant, Mr. Leinsing. Ex. 2005 ¶ 34 (referring to the statements from the Specification and dictionary definitions discussed above).

For these reasons, we agree with Petitioner that the term "bone plate" as recited in the challenged claims has its ordinary meaning and that meaning does not exclude plates located on only one side of a joint or fracture.

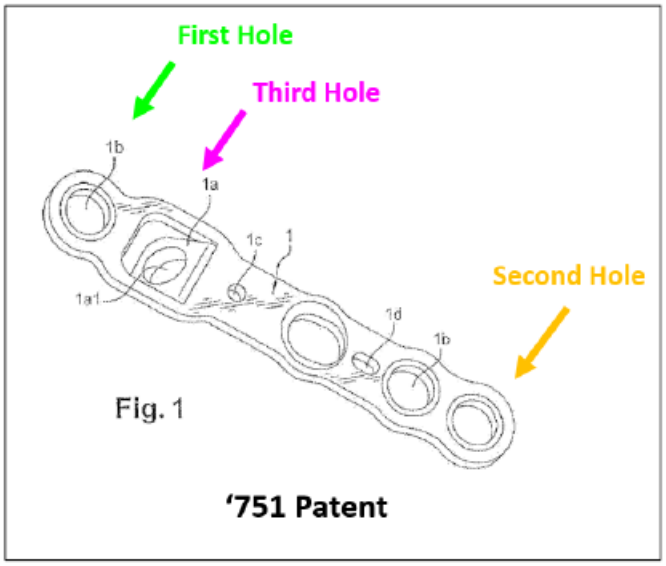
ii. "First End" and "Second End"

Patent Owner asks for a construction of the terms "first end" as referring to "one end of the bone plate" and "'second end' to include the opposite extreme end of the bone plate." Resp. 10. Petitioner asserts that such an interpretation "is at odds with the intrinsic evidence and with [Patent Owner's] interpretation of 'end' in other proceedings." Reply 5. Petitioner offers "[t]o the extent 'end' requires construction, it must include more than just the tip of a bone plate, i.e., a portion of the plate." *Id*. at 7.

In its Sur-Reply, Patent Owner indicates that the construction of these two terms "is necessary because the Board identified the mid-portion of the Slater plate as the 'second end.'" Sur-reply 8. Because we do not reach the Slater grounds in this decision, it is not necessary for us to resolve the parties' dispute regarding these terms and therefore we do not provide an express construction of the claim terms "first end" and "second end."

iii. "Between"

Patent Owner asserts that the ordinary meaning of the term "between" as used in the claim phrase "a third hole located between said first hole and said second hole" would be understood by a POSITA to mean "a 'third hole' located in the space separating the first hole and the second hole." Resp. 10–11 (citing Ex. 2005 ¶¶ 29–33, 36). Patent Owner asserts that such a construction is consistent with Figure 1 of the '751 patent as shown below.



Resp. 11. Figure 1 of the '751 patent, as annotated by Patent Owner, shows a first hole and a second hole on opposite ends of the bone plate with a third hole located along the bone plate between those two holes.

Petitioner disagrees. During Mr. Leinsing's deposition, Petitioner states:

> [I]t became clear PO's interpretation of "between" is extraordinarily narrow, excluding from the definition of between anything that is in a "different plane" or "offset." Ex. 1015, 151:8–20. Under PO's proposed definition, he explained, a person's hand is not "between" their head and their feet. *Id.*, 153:1–12.

Reply 7–8.

Petitioner relies on Figure 2 of the '751 patent to show that Patent Owner's definition is too narrow. Figure 2 of the '751 patent as annotated by Petitioner is depicted below.

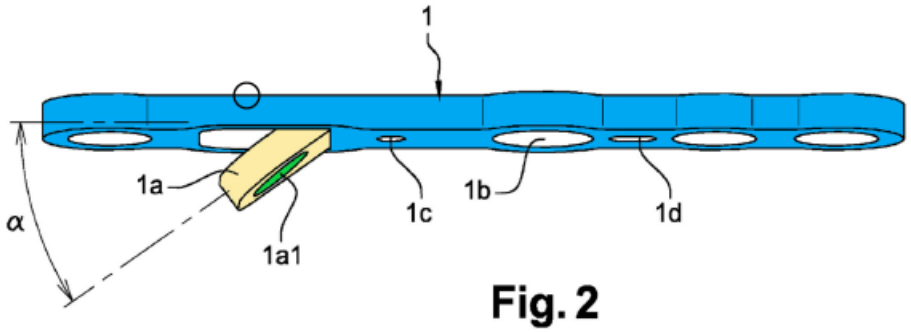


Fig. 2

Reply 8. Petitioner explains how the third hole 1a1 lies between the first and second ends of the bone plate even though it does not lie in the same plane as the other holes and is offset from the axis of the bone plate. Petitioner states:

> While PO purports to rely upon the figures in the '751 Patent to support this construction (*id.*), the figures actually illustrate a plate that would not satisfy PO's proposal because, like a person's hand, the '751 Patent's cross-joint hole (green) is actually *below* the planar space between the first and second holes (blue).

Reply 8.

Mr. Leinsing's deposition testimony discussed above relates to a discussion of Figures 1 and 2 in Arnould. *See* Ex. 1015, 149:19–153:12. Figure 2 of Arnould is set forth below.

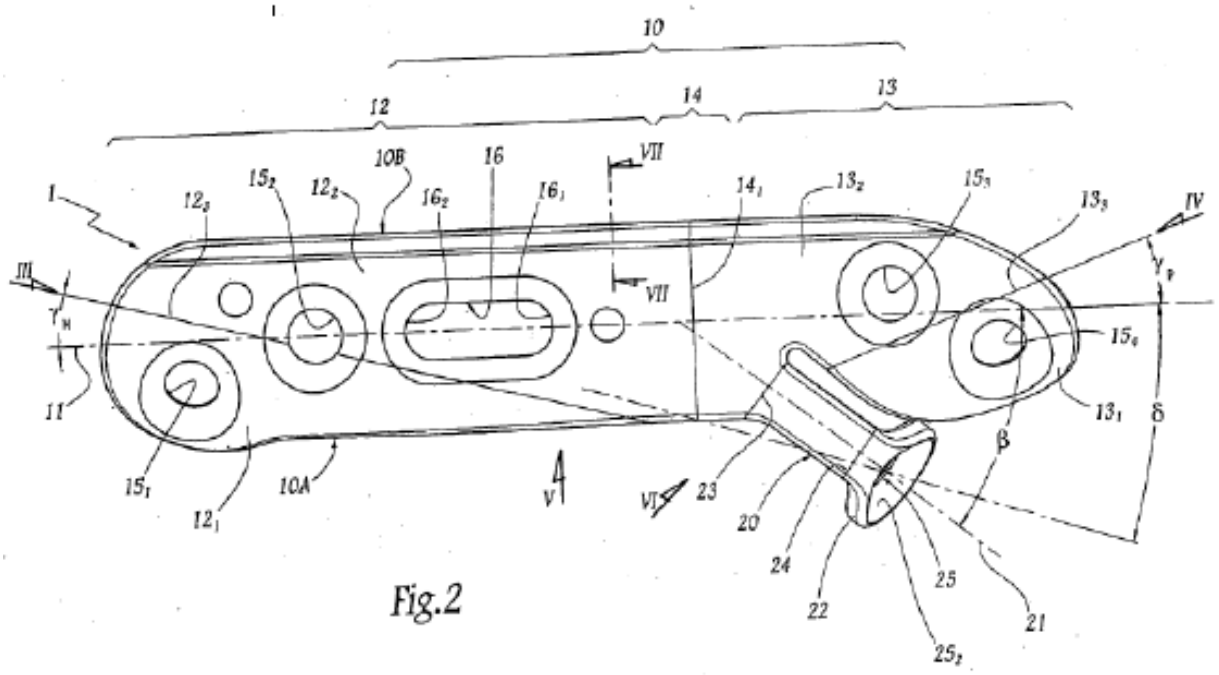


Fig.2

Ex. 1006, Fig. 2.

Concerning Figure 2 shown above, Mr. Leinsing testifies that hole 25 would not be "between" the holes at the two opposite ends of the bone plate as shown above, which are delineated in Figure 2 as $15_{1\text{-}4}$, and in Figure 1 as 3 and 4. Ex. 1015, 151:8–13; Ex. 1006 ¶ 21, Fig. 1. Mr. Leinsing testifies that hole 25 is "in a different plane, and it's offset and its axis to the hole is not in any relation to the main part of the Arnould plate." Ex. 1015, 151:18–20. When asked whether, if leg 20 were bent to be in the same plane as the bone plate, that would make hole 25 between holes 3 and 4, Mr. Leinsing answered no. *Id*. at 151:21–152:2. Mr. Leinsing explained "[b]ecause it wouldn't be between those holes. It wouldn't lie in the space between the holes or the screws shown in 4 and 3" as he defines "between" as "at, into, or across the space separating two objects, places, or points." *Id*. at 151:21–152:17. To be "between" as he defines it, Mr. Leinsing testifies that hole 25 "would need to be on that main body of the Arnould plate and then have the

other requirements as required by the claims." *Id*. at 152:18–25.

We do not agree that the ordinary meaning of "between" is as restrictive as Patent Owner contends. First, Patent Owner's definition of "between" does not require an object that is "between" two others to lie along the same axis defined by the two other objects. A "space separating two objects" is not so restrictive. Instead, a more expansive ordinary meaning of "between" is evidenced by the intrinsic evidence of the '751 patent as Petitioner explained with reference to Figure 2 of the '751 patent, which shows a third hole 1a1 between the other holes even though it is "offset" and in a different plane from the longitudinal axis of the bone plate.

Patent Owner attempts to draw a distinction between Arnould's Figure 2 and Figure 2 of the '751 patent, by asserting "like Arnould, a hand is in a different plane *and* offset *and* its axis is not in relation to the body. In contrast, the angled tab shown in Figure 2 of the '751 patent is *not* in a different plane *and* offset from the plate, and the hole axis forms an angle with the plate." Sur-reply 8. Patent Owner's distinction here appears to be whether the third hole lies at an angle below or above the bone plate as shown in Figure 2 of the '751 patent (which would be "between" according to Patent Owner) versus also being positioned to either side of the bone plate as shown in Figure 2 of Arnould (which in Patent Owner's view would mean that hole is no longer "between" the others). We see no basis for drawing such a fine distinction regarding the meaning of "between," especially when the narrower definition Patent Owner seeks is not made explicit in the Specification of the '751 patent.

To the extent any further claim construction is necessary to resolve the issues presented in this proceeding, we consider such in our analysis below.

D. Overview of Arnould, Zahiri, and Myerson

i. Arnould (Ex. 1006)

Arnould is a European patent filed September 10, 2007 and published on March 12, 2008. Ex. 1006, codes (22), (43). Petitioner asserts, and Patent Owner does not dispute, that Arnould qualifies as prior art under 35 U.S.C. § 102(b). Pet. 8.

Arnould describes "an arthrodesis plate for a metatarsal-phalangeal joint, particularly for the joint between the first metatarsal and the first phalanx of the big toe" and "a surgical method for placing such an arthrodesis plate." Ex. 1006 ¶ 1.

Figure 1 of Arnould, reproduced below, "depicts an arthrodesis plate 1 for a joint between the first metatarsal M and the first phalanx P of the big toe of a left foot." Ex. 1006 ¶ 11.

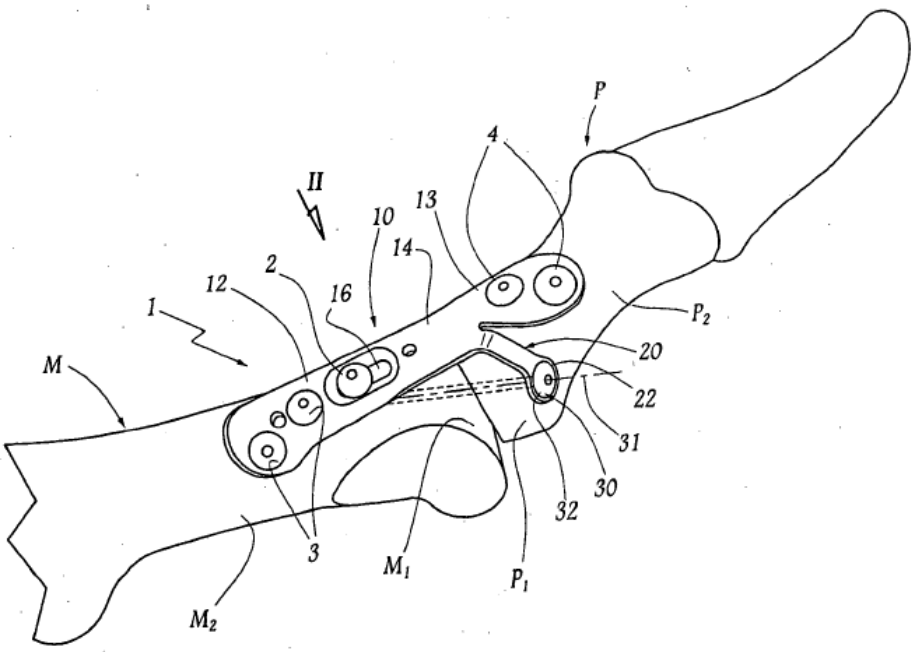


Fig.1

Figure 1 above shows screws 2 and 3 extending through holes 15_1 and 15_2 in plate 1 to "secure the plate body 10 to the metatarsal M."[6] *Id.*¶ 33. "Before or after securing the plate body 10 in relation to the metatarsal M, additional screws 4 are inserted into the holes 15_3 and 15_4 in order to secure the phalangeal portion 13 to the phalanx P." *Id.* ¶ 34. Screw 30 is inserted through hole 25 "following a direction of insertion inclined in relation to the plate body 10 at an angle . . . chosen by the surgeon so that this screw, during its screwing, successively passes through the phalangeal epiphysis P_1 and the metatarsal epiphysis M_1" to join those bones. *Id.* ¶ 32; *see also id.* ¶ 6 (explaining that this screw "will extend both through the bone material of the phalanx and into the bone material of the metatarsal").

[6] The labels for holes 15_1, 15_2, 15_3, 15_4, and 25 do not appear in Figure 1 of Arnould, but are shown in other figures depicting Arnould's plate. *See, e.g.*, Ex. 1006, Figs. 2, 4.

Arnould also teaches that "in order to allow the screw 30 to be screwed in and locked with its axis 31 inclined in relation to the central axis" of hole 25, that hole has "a concave surface which is substantially complementary to an associated surface delimited by this screw head." Ex. 1006 ¶ 27. Figure 4 of Arnould is reproduced below and provides an elevation view of plate 1 from another angle.

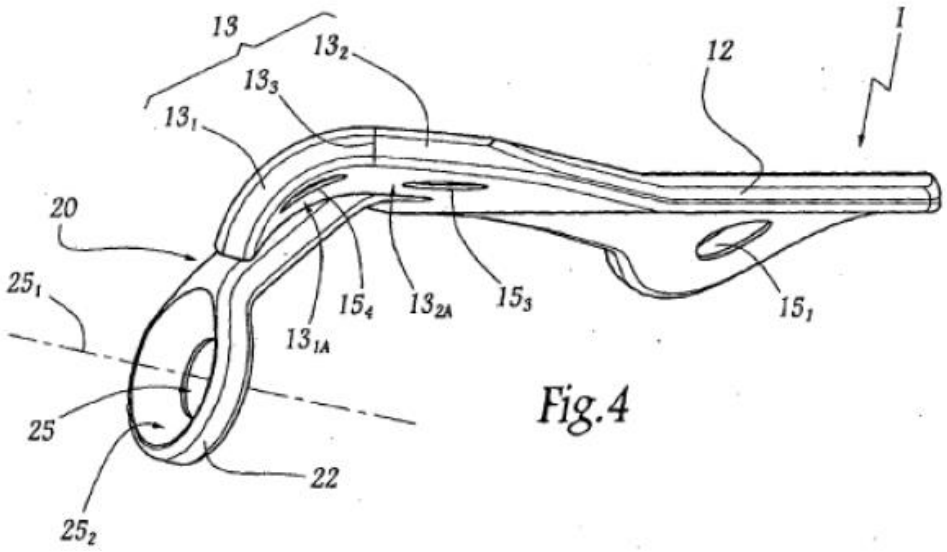


Fig.4

Figure 4 above shows hole 25 with a concave edge 25_2. *Id.* ¶ 27. According to Arnould, "when screw 31 is fully inserted into the hole 25, its head 32 comes to rest and wedge[s] against at least a portion of the edge 25_2." *Id.*

ii. Zahiri (Ex. 1007)

Zahiri is a United States patent filed on September 26, 2006, and issued May 29, 2012. Ex. 1007, codes (22), (45). Petitioner asserts, and Patent Owner does not dispute, that Zahiri qualifies as prior art under 35 U.S.C. § 102(e). Pet. 9.

Zahiri describes "fixation devices for compressing bone fractures of a human being." Ex. 1007, 1:9–11. Figure 1 of Zahiri, reproduced below from

the version on page 11 of the Petition, depicts an embodiment of Zahiri's fixation device.

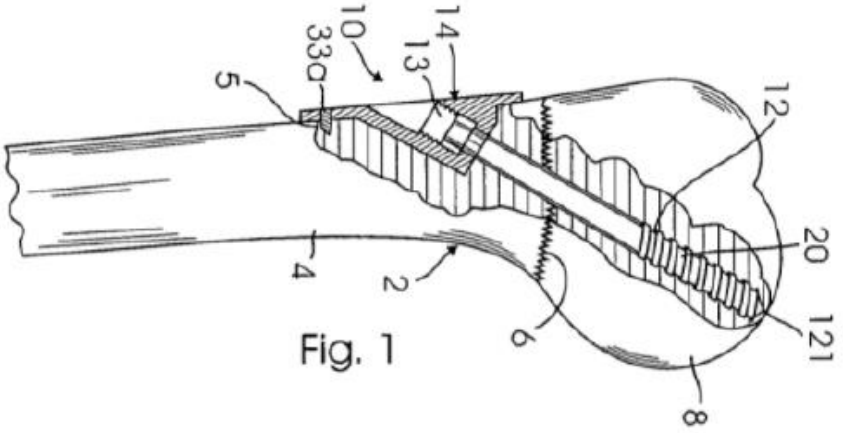


Fig. 1

Figure 1 of Zahiri shows the insertion of lag screw 12 through guide plate 14 such that it extends through fracture line 6 in the bone at "an angle of 150 degrees or 170 degrees." *See id.* at 4:58–67. According to Zahiri, the inclined angle of the "short barrel portion" of the guide plate can vary in "the range of from 90 to 170 degrees." *Id.* at 3:59–67.

Zahiri also teaches that the plate may include holes for pins "designed to temporarily lock" the plate in position "so that it creates a user friendly condition for a surgeon to place the disclosed device at a desired location." Ex. 1007, 3:11–18; *see also id.*, Fig. 8 (holes 235a-d).

iii. Myerson (Ex. 1010)

Myerson is a United States patent application published on October 26, 2006. Ex. 1010, code (43). Petitioner asserts, and Patent Owner does not dispute, that Myerson qualifies as prior art under 35 U.S.C. § 102(b). Pet. 10.

Myerson describes "[a] fixation plate for use in fusion of the metatarsal-phalangeal joint" with a number of screw holes. Ex. 1010, code

(57). Myerson discloses an embodiment in which at least some of these "screw holes are designed to receive locking screws, such as by the incorporation of locking screws . . . within the screw hole." *Id.* ¶ 22. According to Myerson, "[t]he locking threads can be of a variety of known configurations as dictated by the particular cortical locking screw." *Id.*

E. Ground 4: Obviousness over Arnould and Zahiri

Petitioner contends claims 1–3 and 7–18 would have been obvious over Arnould and Zahiri. *See* Pet. 62–89. As explained below, Petitioner has shown by a preponderance of the evidence that these claims would have been obvious over Arnould and Zahiri.

i. Independent Claims 1, 11, and 17

1. Claim 1

Petitioner contends that Arnould teaches or reasonably suggests the elements of the recited combination, including a bone plate with first and second ends and with a length that defines a longitudinal axis, and that spans a first and second bone separated by a joint (i.e., plate body 10 that includes metatarsal portion 12 and phalangeal portion 13 along its longitudinal direction 11), a first hole at or adjacent a first end of the bone plate to align with the first bone (i.e., plate 1 having holes 15_3 and 15_4 aligned with the phalanx), a second hole at or adjacent a second end of the bone plate to align with the second bone (i.e., plate 1 having holes 15_1 and 15_2 aligned with the metatarsal), a third hole between the first and second hole that is angled relative to the longitudinal axis of the bone plate (i.e., hole 26 into which screw 30 is configured to be inserted at an angle δ selected by the surgeon), a first fixation member for insertion through the first hole and into the first

bone (i.e., screws 4 that are inserted in holes 15_3 and 15_4), a second fixation member for insertion through the second hole and into the second bone (i.e., screws 3 that are inserted in holes 15_1 and 15_2), and a third fixation member for insertion through the third hole into the first bone and into the second bone such that the free end of the third fixation member is not attached to any portion of the bone plate and resides in the second bone and the third fixation member is the only fixation member extending across the joint (i.e., screw 30 that is configured to pass through the phalangeal epiphysis and anchor to the metatarsal epiphysis). Pet. 67–77 (citing evidence). Petitioner relies on Zahiri as additional evidence for elements [1d] and [1h] and, based on the full trial record, has articulated a sufficient rationale for combining Zahiri's teachings regarding those limitations with Arnould to the extent they are not already taught in Arnould itself. Pet. 62–66, 70–72, 76–77 (citing evidence).

We find Petitioner's arguments and evidence persuasive. Arnould teaches a bone plate depicted in Arnould's figures for fusing a joint, e.g., the "metatarsal-phalangeal joint particularly . . . the joint between the first metatarsal and the first phalanx of the big toe" (limitation [1pre]). Ex. 1006 ¶ 1. As shown in Arnould Figure 1, reproduced below, bone plate 10 is positioned to span a joint between a first and second bone, specifically the phalanx P on the right and the metatarsal M, and has holes aligned with each of those bones adjacent to the ends of the bone plate (limitations [1a], [1b], and 1[c]).

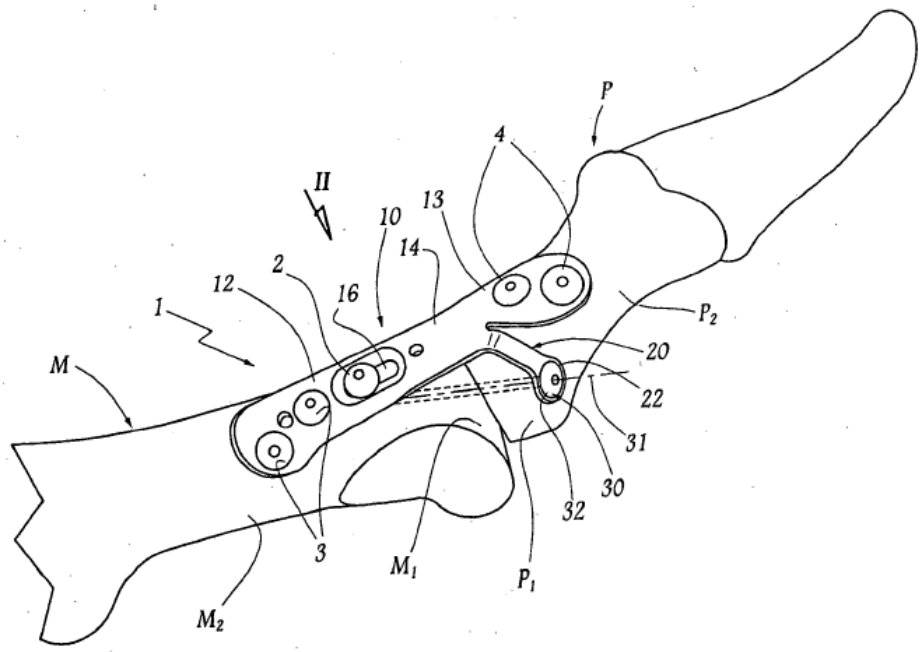


Fig. 1

As shown in the figure, screws 4 (i.e., "fixation member[s]" as recited in claims 1, 11, and 17) are inserted through holes in the plate 10 into the first bone P (limitation [1e]) and screws 3 are inserted through holes in the plate 10 into the second bone M (limitation [1f]). *Id.* ¶¶ 33–34. Screw 30 is inserted through a hole in plate 10 into the first and second bone such that the free end resides in the second bone and the head 32 of screw 30 resides in the hole (limitation [1g]). *Id.* ¶ 32. Moreover, as shown in Figure 1, screw 30 is the only fixation member that extends across the joint (limitation [1h]).

Arnould also teaches that the hole through which screw 30 extends is configured as recited in limitation [1d]. Figure 2 of Arnould, reproduced below, shows hole 25, which Petitioner maps to the "third hole" in claims 1, 11, and 17.

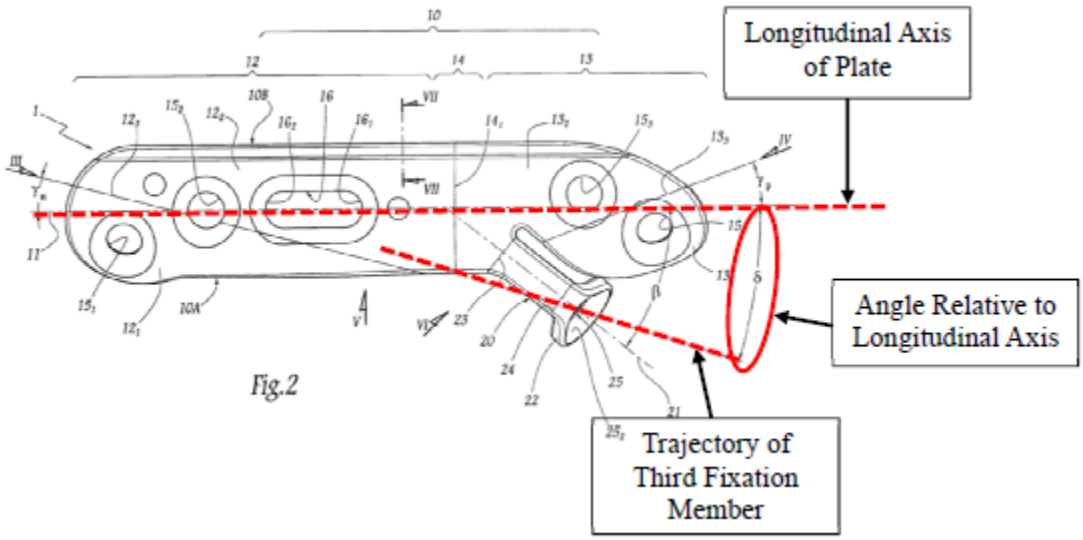


Fig.2

Pet. 70.

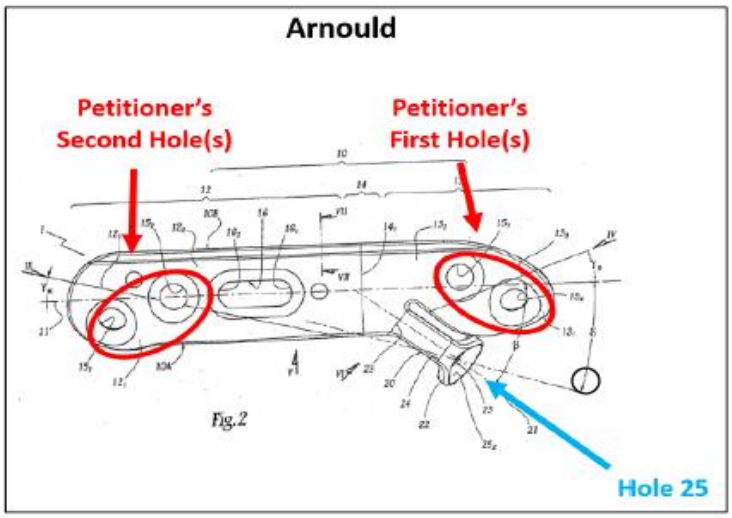
Petitioner adds red dotted lines demonstrating that the trajectory of the third fixation member (i.e., screw 30) through hole 25 is angled relative to the longitudinal axis of the plate (limitation [1d]). More specifically, as shown in Figure 2:

> The hole 25 is provided to receive the screw 30 so that, depending on the direction of observation corresponding to arrow II, the longitudinal axis 31 of this screw can be inclined in relation to the longitudinal direction 11 of the plate body 10, forming a non-zero angle δ with this direction 11. It can be understood that the smaller this angle δ is, the more the axis 31 of the screw 30 tends to align with an anteroposterior direction, guaranteeing a greater depth of penetration of the screw into the metatarsal for any given length of screw.

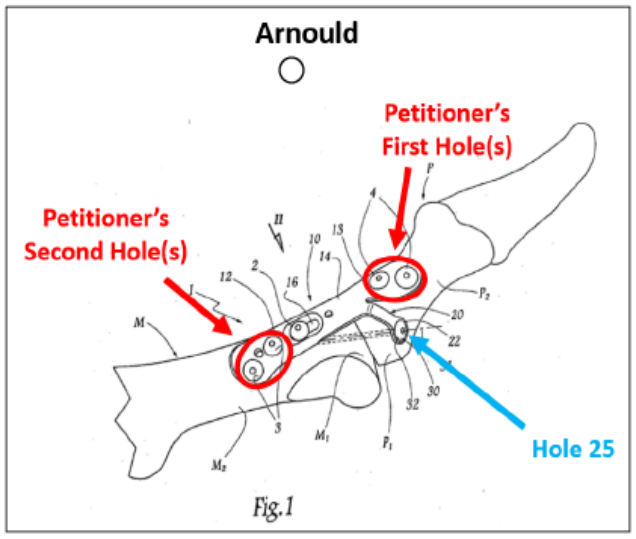
Ex. 1006 ¶ 27.

Patent Owner asserts that Petitioner does not explain sufficiently how Arnould discloses "a third hole located between said first hole and said second hole." Resp. 70–73. Patent Owner points to its definition of "between," as supported by Figure 1 of the '751 patent, as the third hole "located in the space separating the first hole and the second hole." *Id.* at

70–73. Patent Owner further illustrates why Arnould's plate would not satisfy its definition of "between." *Id*. Patent Owner's annotated Figures 1 and 2 of Arnould is set forth below.



Resp. 72.



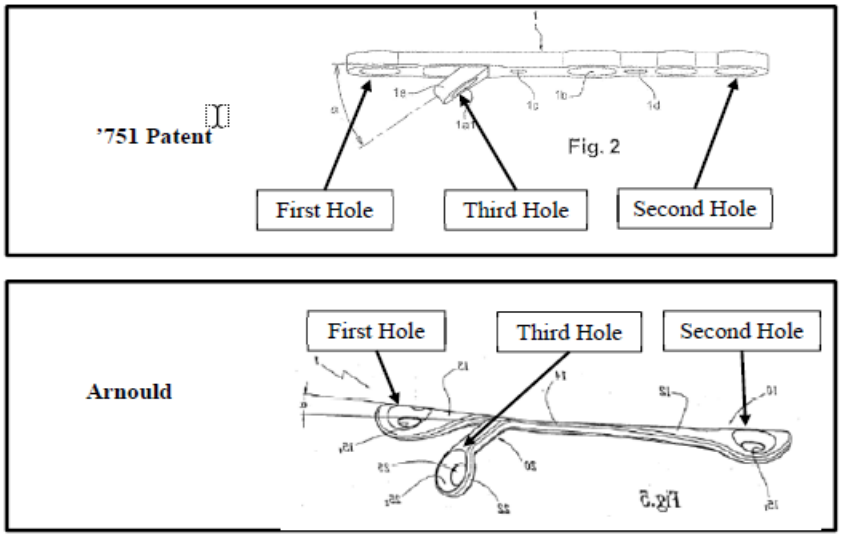
Resp. 73. Patent Owner annotated Figures 1 and 2 set forth above to show what Petitioner has asserted is the claimed first and second holes on Arnould's plate as well as hole 25 of Arnould's plate that Petitioner asserts is the claimed "third hole." Patent Owner argues:

> Hole 25 is located on leg 20, which "extends lengthwise from

> the phalangeal portion 13" and "gives the impression of *plunging downward* in relation to the plate body 10, so that its end 22, which is located *vertically below* this plate body in the configuration of implantation of the plate 1, is pressed against the inner lateral surface of the phalangeal epiphysis P1.

Resp. 71 (quoting Ex. 1006 ¶¶ 23, 26 (emphasis added by Patent Owner). Patent Owner concludes that "[a]s shown in annotated Figures 1 and 2, hole 25 of Arnould is not located in the space separating the 'first hole' and 'second hole' but is rather located below, off to the side of, and on a different plane as compared with the first and second holes." Resp. 73 (citing Ex. 2005 ¶¶ 266–269).

As we stated in our claim construction section, we do not agree that "between" is so limited. There is nothing in the ordinary meaning of "between" that would require the third hole to lie on the same axis between the first and second holes. Petitioner provides an apt illustration that the orientation of Arnould's "third hole" 25 is very similar to an embodiment in the '751 patent. Petitioner's annotated comparative figures are set forth below.



Reply 29 (annotated by Petitioner; Figure 5 of Arnould is reversed). Figure 2 from the '751 patent and Figure 5 from Arnould shown above depict bone plates with first, second, and third holes.

Petitioner concludes that "[i]n both figures, the third hole is between the first and second holes, even though both are below the main body of the plate." Reply 30. We agree. We determine that both the third holes shown in Figure 2 of the '751 patent and in Arnould's Figure 5 shown above are "between" the first and second holes.[7]

Patent Owner also contends that Arnould does not teach or suggest limitation [1d] because "while the trajectory of screw 30 may be angled, it does not follow that hole 25 is necessarily angled." Resp. 74. With reference to Figures 2, 4, and 6 of Arnould, Patent Owner states:

> [H]ole 25 is not an "angled hole" as claimed. Rather, hole 25 appears to have the same shape and geometry of holes 15_1, 15_2, 15_3, and 15_4, none of which are angled through the bone plate. Hole 25 includes "a concave surface which is substantially complementary to an associated surface delimited by this screw head." Arnould does not say that hole 25 is itself angled relative to the longitudinal axis of the plate.

Resp. 74 (citing Ex. 1006, Figs. 2, 4, 6, ¶ 27; Ex. 2005 ¶¶ 272–273).

We disagree with Patent Owner. The claim does not require that the third hole be at any particular angle, nor does it require that the hole limit the

[7] Patent Owner asserts that the Petition does not sufficiently address limitation [1d] of the challenged claims, and cannot do so on reply. Sur-reply 30 n.8, 31. We do not agree. In the Petition, Petitioner identifies hole 25 as the claimed "third hole" and provides annotated Figure 2 of Arnould showing hole 25 is between the claimed first and second holes. *See* Pet. 69–70. Petitioner's argument in its Reply responds to Patent Owner's questioning of the ordinary meaning of "between," and is appropriate rebuttal argument.

trajectory of the third fixation member to a particular angle relative to the longitudinal axis. All that is required is that the third hole be "angled relative to the longitudinal axis of said bone plate." Ex. 1001, 3:20–21. Such a configuration is unequivocally shown in Arnould's figures. Figure 2 of Arnould shows that hole 25 is disposed at an angle to the longitudinal axis 11 of the plate.[8] Arnould explains that angle δ in Figure 2 is the angle of axis 31 (labeled in Figure 1) of screw 30 relative to the longitudinal axis 11 of the plate. Ex. 1006 ¶ 27. Arnould teaches that the concave surface of hole 25 "is substantially complementary to an associated surface delimited by" the head of screw 30 such that when the screw "is fully inserted into the hole 25, its head 32 comes to rest and wedge[s] against at least a portion of the edge 25_2, even if its axis 31 is inclined in relation to the axis 25_1 of the hole." Ex. 1006 ¶ 27. Thus, Arnould teaches that the axis 25_1 of hole 25 (labeled in Figure 4) may be "inclined in relation" to the axis of the screw or it may not be—in which case the axis of screw 30 and the axis of hole 25 would be at the same angle, i.e., angle δ, to the longitudinal axis 11 of the plate. *Id.* In either event, the axis of Arnould's third hole is angled relative to the longitudinal axis of the bone plate, as recited in limitation [1d].

Arnould additionally discloses this limitation because the inner surface of hole 25 is angled relative to the longitudinal axis of the plate. As shown in Figure 4 of Arnould, the diameter of hole 25 on the outer surface of the plate is larger than the dimeter of the hole on the inner surface,

[8] Figure 2 depicts angle β, which is described as the angle of the leg 20 relative to the longitudinal direction of the plate body, and angle δ, which is described as the angle of the longitudinal axis of screw 30 to the plate body. Ex. 1006 ¶¶ 25, 27.

resulting in a "concave surface" on the interior of hole 25. *See*, *e.g.*, Ex. 1006, Fig. 4, ¶ 27. As shown in Figure 4, this concave surface is "angled relative to a longitudinal axis of said bone plate" as recited in limitation [1d].

The testimony Patent Owner cites from Mr. Leinsing does not show otherwise. Mr. Leinsing's testimony appears to be premised on limitations not recited in the claim itself. *See* Ex. 2005 ¶¶ 188–89 (asserting that "[a]ngle β [in Arnould Fig. 2] is formed by the longitudinal direction 11 and longitudinal direction 21 of leg 20, not hole 25" and that "hole 25 is not an 'angled hole' as claimed"). Neither Patent Owner nor Mr. Leinsing squarely addresses the fact that Arnould's figures show that both hole 25 and the concave inner surface of that hole are disposed at an angle to the longitudinal axis of the plate. *Id.* In contrast, Mr. Sherman's testimony is consistent with the figures and written description in Arnould. Ex. 1002 ¶¶ 263–64. Accordingly, we find Mr. Sherman's testimony on this point to be more credible than the competing testimony from Mr. Leinsing.

For these reasons, Petitioner has demonstrated that Arnould teaches or suggests all of the limitations of claim 1. Accordingly, Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious over Arnould alone.

We also address Petitioner's alternative theory that claim 1 would have been obvious over the combination of Arnould and Zahiri.[9] For this

[9] The Petition explains that the proposed combination of Arnould with Zahiri is an alternative basis for the unpatentability of claim 1, i.e., "[i]t may be argued that Arnould does not expressly disclose the angle of the third hole positioned relative to the longitudinal axis of the bone plate." Pet. 63; *see also* Reply 25 (explaining that Arnould meets the requirements of claim 1

theory, Petitioner relies on Zahiri as additional evidence that a third hole configured as recited in limitations [1d] and [1h] would have been obvious. *See* Pet. 63–64, 70–71, 76–77. Petitioner illustrates its contentions with Figures 4 and 8 of Zahiri. We begin with Figure 4 as annotated by Petitioner that is reproduced below.

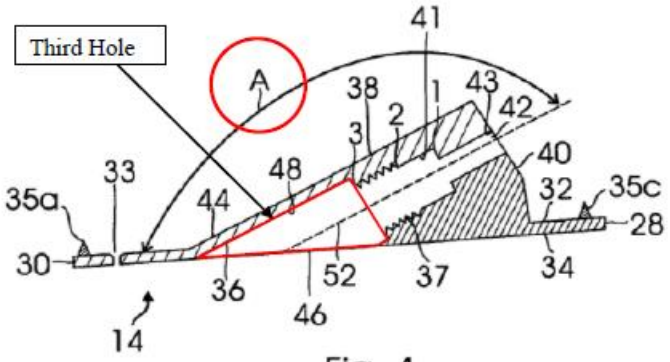


Fig. 4

Pet. 71. Petitioner annotates Figure 4 above to identify what it calls Zahiri's "third hole," the configuration of which in Zahiri's plate teaches limitation [1d]. Petitioner states: "Zahiri's bone plate comprises a barrel portion 38 with a third hole defined by an inner side wall 48 that extends from an opening 46 and a third point 3. The third hole is angle[d] at an incline "'A' relative to the central longitudinal line of the plate." *id*. (citing Ex. 1007, Fig. 4 (annotated); 6:12–35, 6:50–56.

Petitioner annotates Figure 8 of Zahiri set forth below.

"without turning to the disclosure of Zahiri, rendering [Patent Owner's] combination challenges irrelevant").

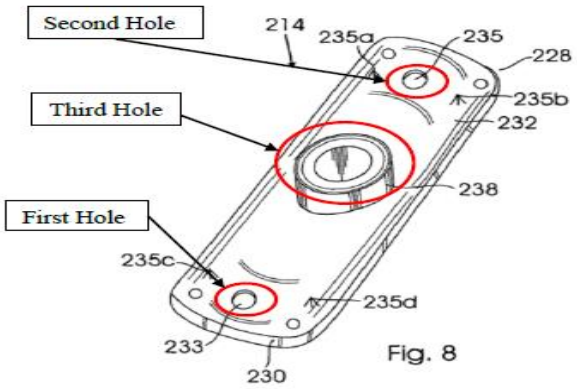


Fig. 8

Petitioner offers Figure 8 above as showing that "Zahiri further shows the barrel portion 238 (third hole) located between the first hole 233 and the second hole 235." Pet. 71. Petitioner also urges that "a POSITA would have looked to Zahiri for a way to improve the integrity of the angled fixation screw." Pet. 76 (citing Ex. 1002 ¶ 280). Petitioner points to Figure 1 of Zahiri depicted below to illustrate this point.

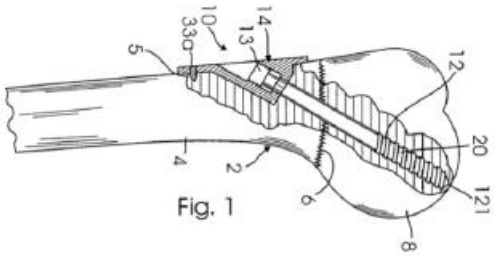


Fig. 1

Pet. 77. With reference to Figure 1, Petitioner asserts that "Zahiri depicts a bone plate comprising a guide hole through a barrel portion configured to angle a lag screw through a first bone and into a second bone. (Ex. 1007, 2:23–36). Zahiri shows that the bone plate is configured for only one lag screw 12 to pass through fracture line between the first bone and the second bone (Ex. 1007, Fig. 1; 2:23–36)," which teaches limitation [1h]. Pet. 76–77.

Petitioner contends that "[a] POSITA would have looked to Zahiri when making improvements to the plate disclosed in Arnould" because "Arnould's disclosure at least guides a POSITA to incorporate the teachings

of Zahiri, and position the third hole at an angle relative to the longitudinal thickness of the bone plate." Pet. 63–64 (citing Ex. 1002 ¶¶ 248–249). In other words, Petitioner proposes modifying hole 25 in Arnould's plate to incorporate the angled hole with a seated screw head configuration depicted in in Figure 1 of Zahiri (referred to hereinafter as "Zahiri's angled hole configuration"). *See id.* at 70–71, 76–77. According to Petitioner, a POSITA would have been motivated to make this combination because Zahiri teaches that this arrangement "allows a sufficient amount of force to be applied between two bone while dissipating the force along the plate so it does not damage the bones," and a POSITA would have known that "bone plates configured for arthrodesis [like those taught in Arnould] and bone plates configured to fuse bone fractures [like those taught in Zahiri] have been used interchangeably for decades." *Id.* at 63–64 (citing Ex. 1007, 5:65–6:11; Ex. 1002 ¶ 249).

We again find Petitioner's arguments and evidence persuasive. Figure 1 of Zahiri shows "plate 14" having an angled hole extending through the thickness of the device with a screw inserted to join two bone parts wherein the free end of the single screw resides in the second part and is not attached to the plate. Ex. 1007, Fig. 1, 4:58–67. The hole for the screw is between the first and second holes, 233 and 235, as shown in Figure 8 and recited in limitation [1d], the third hole is disposed at an angle relative to the longitudinal axis of the device as recited in limitation [1d], and Zahiri's bone plate is configured for only a single lag screw to be extend from one side of the joint to the other as shown in Figure 1 and as recited in limitation [1h]. Zahiri teaches that this configuration is desirable because it dissipates compression forces, which avoids "failure by loosening of the device" and

keeps the bone cortex "healthy and intact." *Id.* at 5:65–6:7. Moreover, Mr. Sherman provides testimony, which we credit, explaining that "bone plates configured for arthrodesis and bone plates configured to fuse bone fractures [like Zahiri's plate] have been used interchangeably for decades." Ex. 1002 ¶ 249. Thus, even if Arnould did not itself teach or suggest a third hole configured as recited in limitations [1d] and [1h], Petitioner has shown that its proposed combination of Arnould and Zahiri does and articulated reasoning with rationale underpinning demonstrating that a POSITA would have been motivated to make that combination with a reasonable expectation of success.

Patent Owner contends that Zahiri is not analogous art to the '751 patent and therefore cannot be combined with Arnould because Zahiri "discloses only a 'guide plate'" and not "a 'bone plate,' as properly defined." Resp. 25, 60–61. According to Patent Owner, Zahiri's plate is not a "bone plate" because it "is designed to be positioned on only one side of a fracture – it does not span any fracture, let alone a joint." *Id.* at 25; *see also* Sur-reply 17 (arguing that "under the proper construction of 'bone plate' . . . Zahiri is *not* a 'bone plate'"). Moreover, Patent Owner contends that "[t]he Zahiri device does not itself serve as structural support to immobilize the bone segments" and is designed for a "specific procedure." *See id.* at 26.

We disagree with Patent Owner for several reasons. First, the narrow construction of "bone plate" that Patent Owner proposes to distinguish Zahiri is not supported by the record. *See supra* § III.C.i. We agree with Petitioner that the ordinary meaning of "bone plate" includes plates like those described in Zahiri. *Id.* Second, even if Patent Owner's construction were correct, the scope of analogous art is broader than Patent Owner

contends. A reference is considered to be analogous art if it is in the "same field of endeavor" as the patent at issue. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). Here, the Specification states that "[t]he invention relates to the technical field of orthopedic implants." Ex. 1001, 1:27–28. Zahiri falls squarely within this field, describing "fixation devices for compressing bone fractures of a human being." Ex. 1007, 1:9–11; *see also, e.g.*, *id.* at Fig. 1 (depicting the use of Zahiri's plate as an orthopedic implant to fix two bone parts). The differences Patent Owner identifies in Zahiri's device do not show otherwise.

In this regard, we find the testimony of Mr. Sherman (Ex. 1002 ¶ 245) on this point to be more credible than the competing testimony offered by Mr. Leinsing (*see* Ex. 2005 ¶¶ 121–29, 238). Mr. Sherman persuasively testifies that "Arnould and Zahiri disclose bone plates with diagonal fixation members configured to compress the intersection of a first and second bone," demonstrating Arnould and Zahiri "are therefore in analogous fields of invention" to the '751 patent. Ex. 1002 ¶ 245. Mr. Leinsing, on the other hand, continues to assert that Zahiri discloses only "a guide that directs a lag screw at a precise angle into a humeral head, not a bone plate" because it is located on only one side of the joint or fracture. Ex. 2005 ¶ 238. Therefore, Mr. Leinsing concludes that the "Zahiri device is directed to a completely different function than Arnould," and is non-analogous art. *Id*. Because we find Zahiri discloses a "bone plate" according to the ordinary meaning of that term, Mr. Leinsing's testimony is unconvincing. *See supra* § III.C.i (explaining that the ordinary meaning of "bone plate" does not exclude plates located on only one side of a joint or fracture). But even if we agreed with Patent Owner's and Mr. Leinsing's interpretation of bone plate,

Zahiri's plate is still an orthopedic implant and therefore analogous art because it is within the same field of endeavor as the '751 patent.

Patent Owner's argument that Zahiri teaches away from a combination with Arnould is also unavailing. *See* Resp. 61–67. Patent Owner asserts that unlike Arnould's plate, Zahiri's "is specifically designed to prevent a surgeon from having the flexibility to select a different screw trajectory than that dictated by the shape of the barrel," *see* Resp. 65 (citing Ex. 2005 ¶ 247), and thus, if combined with Arnould, "a surgeon would not be able to choose from among the multiple screw trajectories afforded by hole 25, defeating one of the main advantages of the Arnould plate," *see id*. (citing Ex. 2009, 904–91:9); *see also* Resp. 65 (stating "structural features that confine the head of Zahiri's lag screw . . . are incompatible with the Arnould plate" with the concave surface for the edge of third hole 25). But those distinctions do not rise to the level of a teaching away. *See Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009)) ("A reference does not teach away . . . if it . . . does not criticize, discredit, or otherwise discourage investigation into the invention claimed."). Moreover, Petitioner's combination is premised on modifying hole 25 in Arnould's plate to have Zahiri's angled holed configuration. That combination would retain Arnould's flexible plate, while fixing or at least limiting the angle of screw 30 through the hole. However, Petitioner explains that "Zahiri discloses providing plates with a variety of angles in a kit so the surgeon can choose the plate that will maximize fixation based on the particular needs of the patient." Reply 22; *see also* Ex. 1007, 3:59–64, 9:1–4 (teaching that the hole may configured in a range of angles to

accommodate the device's use "for a variety of fractures, fusion procedures and osteotomies"). Thus, a POSITA could compensate for the fixed angle and, in any event, the fact that one embodiment may be preferable in some instances does not teach away from the proposed combination. *See UCB, Inc. v. Actavis Labs. UT, Inc.*, 65 F.4th 679, 692 (Fed. Cir. 2023) (explaining that a teaching that one composition is "optimal or standard" or that expresses a "preference" for something does not teach away from other options) (internal quotations omitted).

Patent Owner's remaining arguments against the combination of Arnould and Zahiri are also unavailing. Patent Owner contends that there would have been no reasonable expectation of success because "fusing an MTP joint with Arnould's bone plate is fundamentally different than using Zahiri's device to guide the position of a lag screw across a proximal humeral fracture at a fixed angle." Resp. 69 (citing Ex. 2005 ¶¶ 256–258); *see also* Resp. 66–67 (stating "Petitioner fails to discuss how the dimensions of Zahiri's odd angle internal fixation device 'for use in a transverse fracture of a humerus' would be modified for a plate that is placed 'on the upper surfaces of the metatarsal and phalanx connected by the joint."). The problem with Patent Owner's argument is that it assumes the bodily incorporation of the barrel portion of Zahiri's plate with Arnould's without consideration of a POSITA's exercise of ordinary skill to apply Zahiri's teachings to Arnould's bone plate. It is well-established, however, that a POSITA is understood to exercise "ordinary creativity" and is "not an automaton." *See KSR*, 550 U.S. at 421. Indeed, as our reviewing court recently observed, "a skilled artisan may be motivated to combine particular features of different references, e.g., to secure some benefits at the expense

of others, even when bodily incorporation would be impossible or inadvisable." *Axonics, Inc. v. Medtronic, Inc.*, 73 F.4th 950, 957 (Fed. Cir. 2023).

This is the case here where Petitioner is proposing a relatively minor change to Arnould's plate, i.e., modifying the existing hole 25 in Arnould's plate to incorporate Zahiri's angled hole configuration.[10] There is no indication this configuration would not work if adapted to and sized for the dimensions of Arnould's plate and the anatomy of the metatarsal-phalangeal joint through the exercise of a POSITA's ordinary creativity. Indeed, Mr. Sherman offers testimony, which we credit, demonstrating that plates for fusing fractures and joints were known to be interchangeable. *See* Ex. 1002 ¶ 134. We find that evidence sufficient under the facts of this case

[10] Patent Owner also asserts that Petitioner improperly relies on different embodiments of Zahiri set forth in Figures 4 and 8 to teach "said third hole is angled," without providing a motivation to combine these different embodiments with a reasonable expectation of success. *See* Resp. 76. We disagree and find that Petitioner is relying on the principles taught by Zahiri, including the configuration of the third hole, as applied to the Arnould plate. Zahiri itself provides this reasoning for applying the principles taught by the various embodiments of Zahiri. Although depicted in separate figures, Zahiri does not describe the principles illustrated in these figures as separate embodiments. To the contrary, Zahiri explains that the principles illustrated in its figures can be applied in many possible embodiments. *See* Ex. 1007, 4:48–53 ("Although specific embodiments of the present invention will now be described with reference to the drawings, it should be understood that such embodiments are by way of example only and merely illustrative of but a small number of the many possible specific embodiments which can represent application of the principles of the present invention."). Therefore, we determine that Mr. Sherman appropriately looks to different figures in Zahiri to glean principles related to Zahiri's angled third hole that may be applied to Arnould's plate.

to demonstrate that a POSITA would have had a reasonable expectation of success. Accordingly, Petitioner has shown by a preponderance of the evidence that claim 1 also would have been obvious over the combination of Arnould and Zahiri.

2. Claim 11

For ease of reference in discussing the limitations of claim 11, we set forth the full text of the claim below with bracketed annotations used in the Petition to identify particular limitations.

11. [11Pre] A system for fusing first and second bone parts, said system comprising:

[11a] a bone plate having a length sufficient to span a fracture or joint of a patient such that said bone plate is positionable alongside first and second bone parts straddling the fracture or joint, said bone plate having:

[11b] a first hole configured to align with the first bone part,

[11c] a second hole configured to align with the second bone part,

[11d] a third hole and a fourth located between the first hole and the second hole, said third and fourth hole having an axis that is configured to cross the fracture or joint during use, the *third hole defining a first area and the fourth hole defining a second area, the second area being smaller than the first area*, and

[11e] *a fifth hole located adjacent either the first hole or the second hole, said fifth hole being smaller in area than said first hole or said second hole*;

[11f] a first fixation member configured to be inserted through the first hole of said bone plate and into the first bone part;

[11g] a second fixation member configured to be inserted through the second hole of said bone plate and into the second bone

part;

[11h] a third fixation member configured to be inserted through the third and fourth hole in the bone plate, into the first bone part, across the fracture or joint, and into the second bone part, [11i] wherein a free end of said third fixation member does not attach to any portion of the bone plate and [11j] wherein the third fixation member is the only fixation member extending across the fracture or joint, *the third fixation member having a fixation head defining a head area, the head area being greater than the second area and less than the first area*; and

[11k] *a temporary fixation member configured to be inserted through the fifth hole in the bone plate*.

Ex. 1001, 3:61–4:29.

Claim 11 is similar to claim 1, and we have italicized claim language that is materially different from claim 1 requiring further analysis. We rely on our analysis for claim 1 above for the teachings in Arnould and/or Zahiri for a bone plate that spans or straddles a fracture or joint with a first hole for a first fixation member to be inserted into a first bone part, a second hole for a second fixation member to be inserted into a second bone part, and a third hole between the first and second holes for a single third fixation member to be inserted into the first bone part, across the fracture or joint into the second bone part with a free end not attached to the bone plate. *See supra* Section III.E.i.2. We discuss the remaining limitations of independent claim 11 below.

Concerning claim 11's requirement of a "third hole defining a first area and the fourth hole defining a second area, the second area being smaller than the first area," Petitioner asserts that while "Arnould is silent regarding the dimensions of hole 25 . . . a POSITA would find that Zahiri discloses this element." Pet. 78 (citing Ex. 1007, Figs. 4, 8, 6:12–35,

8:34-44; Ex. 1002 ¶ 287). Petitioner provides an annotated Figure 4 from Zahiri to illustrate its point.

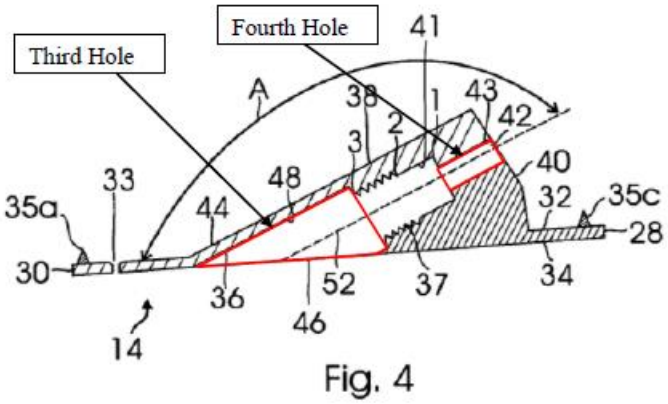


Fig. 4

Pet. 37. Petitioner describes annotated Figure 4 of Zahiri as follows.

> Zahiri's bone plate comprises a barrel portion 38 with a third hole defined by an inner side wall 48 extending from an opening 46 and a third point 3 and a fourth hole that is defined by an opening side wall 43 that extends from a first point 1 to an opening 42. The inner side wall 48 of the third hole has a larger diameter than opening side wall 43 of the fourth hole. A POSITA would understand that the area defined by the third hole is larger than the area defined by the fourth hole, as shown by annotated Figure 4. Looking to improve the integrity of the angled fixation screw of [Arnould], a POSITA would have readily looked to the disclosure of Zahiri.
>
> Additionally, the barrel portion of Zahiri's bone plate further discloses an axis, as shown by the dotted line in Figure 4. A POSITA would understand that the lag screw passes through the third hole and then through the fourth hole along the axis, as shown by Figure 4 above.

Pet. 36–37 (citing Ex. 1007, Fig. 4 (annotated); 6:12–35; Ex. 1002 ¶¶ 155–157).

We find Petitioner's arguments and evidence persuasive. Zahiri's Figure 4 set forth above as annotated by Petitioner shows a third and fourth hole outlined in red where the area defined by the fourth hole is smaller than

the area defined by the first hole as required by limitation [11d].

Patent Owner does not dispute that Zahiri teaches limitation [11d], but asserts that "a POSITA would not have been motivated to combine the alleged 'third hole and fourth hole' of Zahiri with Arnould." Resp. 77–78. We have addressed and rejected Patent Owner's argument that a POSITA would not be motivated to modify the existing hole 25 in Arnould's plate to incorporate Zahiri's angled hole configuration. *See supra* Section III.E.i.1.

Concerning claim 11's requirements of a "fifth hole" and a temporary fixation member to be inserted in the fifth hole reflected in limitations [11e] and [11k], Petitioner relies on the teachings of Zahiri. *See* Pet. 78–79. Specifically, Petitioner asserts that "Zahiri discloses four small holes 31a-d in the respective corners of the bone plate, located adjacent to medium size holes," which are used with temporary guide pins to hold the bone plate in place while a surgeon inserts the lag screw. Pet. 39 (citing Ex. 1007, Figs. 2, 8; 5:47–64); *see also id*. (annotating Figure 8 of Zahiri to identify "pin holes" in Zahiri's plate).[11]

We find Petitioner's arguments and evidence presented here persuasive. Zahiri's Figure 8 shows four holes that are smaller than the claimed first and second holes for use with temporary guide pins or temporary fixation members as required by limitations [11e] and [11k]. We also find persuasive Mr. Sherman's testimony that a POSITA would utilize the known technique of Zahiri for improving Arnould's plate "to guide the

[11] Patent Owner asserts that Petitioner improperly combines different embodiments of Zahiri in Figures 2 and 8 without providing any reason why a POSITA would make such a combination. *See* Resp. 80. We have addressed this argument previously with respect to claim 1 as discussed above. *See supra* Section III.E.i.1. n.10.

plate alignment during implantation." Pet. 79 (citing Ex. 1002 ¶ 290).

Regarding Petitioner's argument that it would have been obvious to incorporate Zahiri's temporary guide pins and holes, Patent Owner argues that combination is "based on impermissible hindsight." Resp. 67–68. According to Patent Owner, "Arnould's plate is not at risk for unwanted torqueing or spinning like Zahiri's guide plate because Arnould's plate is (1) contoured to the metatarsal and phalanx, with a leg designed to wrap around the phalangeal epiphysis, and (2) 'partially immobilized' by inserting screw 2 into oblong hole 16 without tightening the screw head against the edge of the hole, allowing displacement only in the direction 11 relative to the metatarsal M." Resp. 68 (citing Ex. 1006 ¶ 31; Ex. 2007 ¶¶ 65, 44–45). For these reasons, Patent Owner contends that "proper alignment and temporary fixation is obtained in Arnould ***without*** the need for 'temporary guide pins used with pin holes' of Zahiri." *Id.* at 68 (citing Ex. 2007 ¶¶ 44–45, 63–66; Ex. 2005 ¶¶ 253–255).

In Reply, Petitioner points out that Patent Owner does not dispute that Arnould itself discloses pin holes as recited in claim 11. Reply 31 (citing Pet. 64). Petitioner urges that "[f]or additional details regarding these pin holes, a POSITA would be directed to Zahiri." *Id.*

In its Sur-reply, Patent Owner asserts that to the extent Petitioner is attempting to shift to a new argument that Arnould alone teaches these limitations, Petitioner has conceded that Arnould does not. Sur-reply 33 (citing Pet. 78–82, 75).

We find Petitioner's arguments and evidence persuasive. We find that it would have been obvious to incorporate Zahiri's temporary fixation pins for use with Arnould's plate especially in light of Arnould's depiction in

Figure 2 of temporary guide holes that may be used to temporarily secure the plate. *See* Ex. 1002 ¶ 251. Zahiri discloses the use of pins inserted through holes in the plate to temporarily fix the plate to the bone before the permanent screws are inserted. Ex. 1007, 3:10–18. Zahiri also teaches that those pins are removed after the screws are inserted. *Id.* at 7:63–66. We agree with Mr. Sherman's testimony that a POSITA would be motivated to combine the teachings of Arnould and Zahiri, to utilize a known technique for improving the implantation of a bone plate (similar device), and obtain an improvement to Arnould's bone plate to guide the plate alignment during implantation." *See* Ex. 1002 ¶ 290.

Patent Owner's argument that there would have been no need for this combination because Arnould obtains proper placement via other mechanisms is unavailing. *See* Resp. 79–80. As an initial matter, Patent Owner's argument ignores the fact that Arnould's figures depict pin holes in the plate. *See* Ex. 1002 ¶¶ 251–252 (annotating Figure 2 of Arnould to identify the "pin holes"). If it were true, as Patent Owner asserts, that there is no need for temporary fixation pins given the configuration of Arnould's plate, then there would be no reason for those pin holes. Yet, those holes are clearly depicted in Arnould's figures, and Patent Owner offers no alternative explanation for their purpose. Moreover, the other mechanisms Patent Owner points to only provide for partial immobilization of the plate. *See* Ex. 1006 ¶ 31 (explaining that the plate is "partially immobilized using the oblong hole 16" and screw 2 "without tightening the screw head against the edge of the hole" so that the "plate body 10 remains displaceable in the direction 11 relative to the metatarsal M"); Ex. 2005 ¶¶ 253–255 (annotating hole 16 and screw 2 in Figure 1 of Arnould and explaining how this

mechanism "partially immobilize[s]" the plate body during surgery while allowing the plate to remain displaceable in direction 11); *see also* Ex. 2007 ¶¶ 45 (same). The fact that Arnould teaches that its plate is partially immobilized using hole 16 and screw 2 does not obviate the motivation to incorporate Zahiri's temporary fixation pins to further immobilize the plate, either before or after the insertion of screw 2, to ensure correct alignment. For these reasons, we find Mr. Sherman's testimony (Ex. 1002 ¶¶ 64–65 (describing pin holes in Zahiri), 251–256 (describing combination of Arnould and Zahiri as teaching the fifth hole limitations [11e] and [11k]) to be more credible then the competing testimony Patent Owner cites from Mr. Leinsing and Dr. Holmes (Ex. 2005 ¶ 285–287; Ex. 2007 ¶¶ 44–45, 63–66) as discussed above.

Lastly, Petitioner asserts that Zahiri teaches the italicized portion of limitation [11j]—the third fixation member having a fixation head defining a head area, the head area being greater than the second area and less than the first area. Resp. 81. Specifically, Petitioner relies on Zahiri's teaching of a such a fixation member as shown in Figure 1 of Zahiri. Pet 44–45 (citing Ex. 1002 ¶¶ 179–182), 81.

We agree with Petitioner that Zahiri discloses such a fixation member with a fixation head area of the lag screw that meets this part of limitation [11j]. Patent Owner does not respond to Petitioner's showing here.

Accordingly, Petitioner has shown by a preponderance of the evidence that claim 11 is unpatentable as obvious over Arnould and Zahiri.

3. Claim 17

For ease of reference in discussing the limitations of claim 17, we set forth the full text of the claim below.

> 17. An orthopedic implant comprising:
>
> a bone plate having a proximal surface and an opposite distal bone contacting surface, said bone plate having length sufficient to span a fracture or joint of a patient such that said bone plate is positionable alongside first and second bone parts straddling the fracture or joint,
>
> said bone plate having a first hole configured to align with the first bone part, the first hole sized to accept a first bone screw,
>
> a second hole configured to align with the second bone part, the second hole sized to accept a second bone screw,
>
> a third hole located between said first hole and said second hole, said third hole sized to accept a third bone screw having a screw head, said third hole being angled relative to said bone plate such that, during use, said third bone screw is positioned to extend through said third hole and cross the fracture or joint, said third hole being configured to allow the entire screw head to be seated below the proximal surface of said bone plate, and
>
> a pin hole located adjacent either said first hole or said second hole, said pin hole being smaller in area than said first hole or said second hole, said pin hole extending from said proximal surface of said bone plate to said distal surface, said pin hole being configured to accept a temporary fixation member.

Ex. 1001, 4:42–67.

Petitioner relies on Arnould's plate that comprises an outer longitudinal side 10B that faces outward and an inner longitudinal side 10B that presses against the surface of the bones as disclosing the claimed bone plate with a first, second, and third hole configured as claimed. Pet. 82–83.

Petitioner, relying an annotated version of Figure 1 of Arnould shown below, asserts Arnould discloses the third bone screw as claimed.

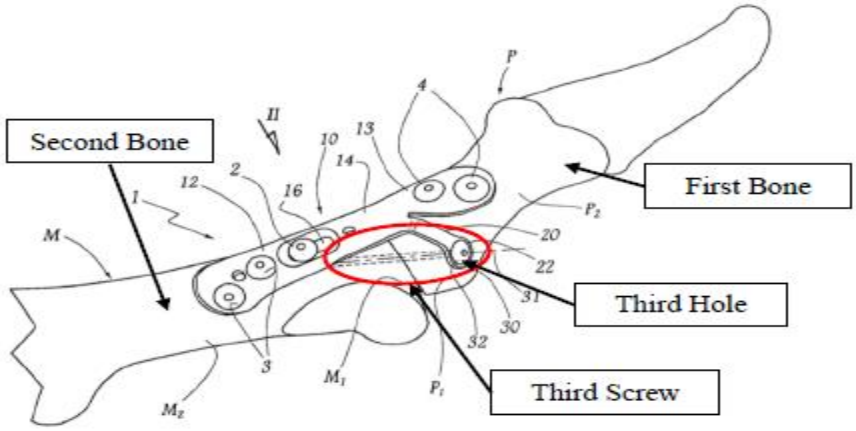


Fig.1

Pet. 84. Petitioner asserts that annotated Figure 1 shows:

> a screw hole 25 (third hole) configured such that the screw 30 (third bone screw) forms a non-zero angle in relation to the longitudinal direction of the plate body, and screw 30 passes through hole 25 and enters the phalanx and metatarsal bone. A POSITA would understand that screw 30 passes through the joint between the phalanx and the metatarsal.

Pet. 84–85.

Petitioner also asserts that while Arnould is silent regarding the dimensions of hole 25, a POSITA would look to Zahiri for the known dimensions of such openings to utilize "the seated head of the lag screw from Zahiri to ensure the third fixation member is seated securely in the third hole." *See* Pet. 85. Such teaching, Petitioner asserts, discloses the limitation "said third hole being configured to allow the entire screw head to be seated below the proximal surface of said bone plate." *Id*. Petitioner also relies on the combination of Zahiri and Arnould to teach the pin hole limitation of claim 17. *See* Pet. 85–86.

We have discussed above with reference to claims 1 and 11 how we

find Petitioner's arguments and evidence persuasive that the combination of the teachings of Arnould and Zahiri teach the claimed bone plate configuration with a first hole/first bone screw, second hole/second bone screw, third hole/third bone screw, and a pin hole as claimed in claim 17. *See* Sections III.E.i.1. and 2. Patent Owner does not present any additional arguments than those raised for claims 1 and 11 as to why the combination of the teachings of Arnould and Zahiri do not disclose the limitations of claim 17. We rely on our previous discussion of these arguments for claims 1 and 11.

Accordingly, Petitioner has shown by a preponderance of the evidence that claim 17 is unpatentable as obvious over Arnould and Zahiri.

ii. Dependent Claims 2, 3, 7–10, 12–16, and 18

Petitioner provides how the additional limitations of dependent claims 2, 3, 7–10, 12–16, and 18 are met by Arnould and/or Zahiri. *See* Pet. 86–89. We agree with Petitioner's assessment of how each of these additional limitations are met by the Arnould and Zahiri. *See id.*; Ex. 1002 ¶¶ 323–340.

Patent Owner responds with two arguments that we have previously addressed and rejected in the previous discussions above—namely, that a POSITA would not be motivated to combine Zahiri's temporary fixation features with Arnould's plate, and Petitioner has not sufficiently explained why a POSITA would be motivated to combine different embodiments of Zahiri. *See* Resp. 83.

Accordingly, Petitioner has shown by a preponderance of the evidence that claims 2, 3, 7–10, 12–16, and 18 are unpatentable as obvious over Arnould and Zahiri.

F. Ground 5: Obviousness over Arnould, Zahiri, and Myerson

Petitioner contends claim 6 would have been obvious over Arnould, Zahiri, and Myerson. *See* Pet. 90–91. Claim 6 depends from claim 1 and additionally recites "wherein said joint is a tarsometatarsal joint." Ex. 1001, 3:45–46. Petitioner relies on Myerson as it illustrates a bone plate fixed across the tarsometatasal joint as shown in Figure 1 of Myerson depicted below as annotated by Petitioner. Pet. 90–91.

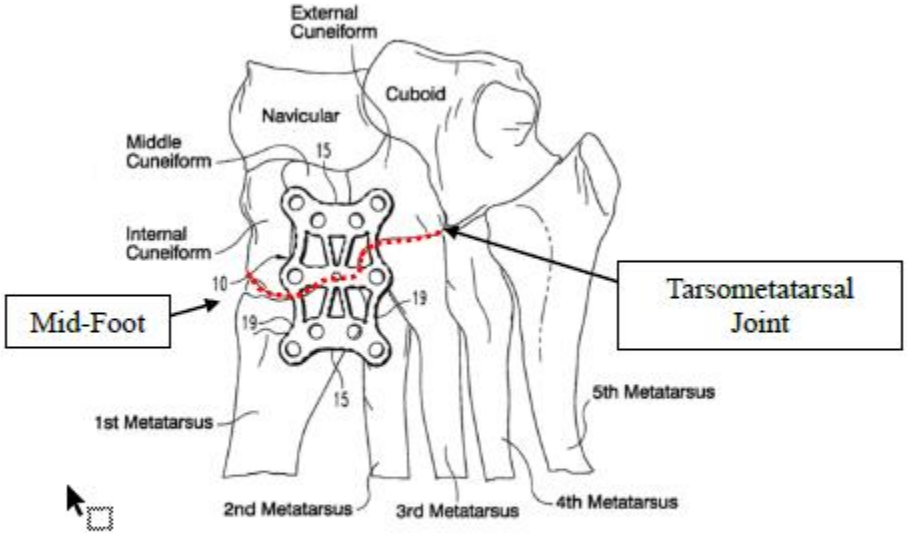


Fig. 1

Pet. 91. Petitioner asserts that "Myerson discloses a bone plate comprising contours configured to secure the bone plate to various bones 'anywhere along the mid-foot,' 'especially across the metatarsal joints,'" and Figure 1 above shows Myerson's bone plate fixed across the tarsometatarsal joint. *Id.* at 90; Ex. 1002 ¶ 345 (citing Ex. 1010 ¶¶ 21–22).

Mr. Sherman testifies that "a POSITA would understand that Myerson's bone plate is configured to fuse the tarsometatarsal joint," and "that Arnould's bone plate would easily be configured to contour to the

bones in the mid-foot and fuse the tarsometatarsal joint." Ex. 1002 ¶ 346. Mr. Sherman concludes that "[b]ased on Figure 1 of Myerson, and the specification cited above, Arnould in view of Zahiri and Myerson clearly discloses a system wherein said joint is a tarsometatarsal joint." *Id.* ¶ 347.

We find Petitioner's arguments and evidence persuasive. Myerson describes a bone plate for fusion of the "metatarso-phalangeal (MTP) joint," i.e., the same joint on which Arnould teaches its plate is used. Ex. 1010, code (57), Fig. 1, ¶¶ 1–2; Ex. 1002 ¶ 343 (stating "[i]n analogous art, Myerson discloses a bone plate for fusion of the MTP joint"). Myerson also teaches in the embodiment shown in Figure 1 above a bone plate for fusing the tarsometatarsal joint. Thus, Myerson teaches that similar bone plates can be used for both the MTP joint and the tarsometatarsal joint, which supports Mr. Sherman's testimony that a POSITA could easily configure Arnould's bone plant for the tarsometatarsal joint (Ex. 1002 ¶ 345) and evidences a motivation for doing so. For instance, Mr. Sherman testifies that "Myerson discloses a bone plate comprising contours configured to secure the bone plate to various bones 'anywhere along the mid-foot,' 'especially across the metatarsal joints,'" and Figure 1 shows Myerson's bone plate fixed across the tarsometatarsal joint." Ex. 1002 ¶ 345. Accordingly, Myerson teaches the additional limitations recited in claim 6 and Petitioner has articulated sufficient reasoning for combining those teachings with Arnould's plate.

Patent Owner attacks the combination of the teachings of Arnould, Zahiri, and Myerson by attacking each of the references separately. *See* Resp. 84–86. For instance, Patent Owner states that "the principles described in Arnould are specific to MTP joints and teach away from the modification of the plate for use with the TMT joint." Resp. 86 (citing Ex. 2005 ¶¶ 323–

329, 83–85). The test for obviousness, however, "is what the combined teachings of the references would have suggested to a person of ordinary skill in the art." *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012).

Mr. Leinsing testifies that "[a] POSITA would understand that Arnould is configured solely for the metatarsophalangeal joint, and could not be used or configured to fuse the tarsometatarsal joint," and details the teachings of Arnould specific to the metatarsophalangeal joint. Ex. 2005 ¶¶ 327–328. Mr. Leinsing asserts that this amounts to a teaching away. *Id.* ¶ 328. Mr. Leinsing attempts to draw a negative inference for this teaching away in Arnould because the Specification of Arnould is directed to "an arthrodesis plate for a metatarsal-phalangeal joint, *particularly* for the joint between the first metatarsal and the first [proximal] phalanx of the big toe." *Id.* ¶ 327. Such a negative inference, however, does not rise to the level of a teaching away. *See Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013) (quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009)) ("A reference does not teach away . . . if it . . . does not criticize, discredit, or otherwise discourage investigation into the invention claimed.").

As explained above, Petitioner has articulated sufficient reasoning with rationale underpinning for combining both Zahiri's angled hole configuration and Myerson's teaching of fusing the tarsometatarsal joint with Arnould's plate.

G. Grounds 1–3

Having determined that all of the challenged claims are unpatentable as obvious over the references in Grounds 4 and 5, we need not reach

Petitioner's argument that those same claims are also unpatentable as obvious over the references in the Grounds 1–3. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner "is entitled to a final written decision addressing all of the claims it has challenged"); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App'x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the "Board need not address issues that are not necessary to the resolution of the proceeding" and, thus, agreeing that the Board has "discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims"). Accordingly, we do not reach those grounds.

H. Patent Owner's Objections to Demonstratives

Patent Owner filed objections to certain demonstrative slides that Petitioner served for the oral hearing. *See* Paper 33, 1–2. Most, if not all, of Patent Owner's objections are moot because they relate to slides for grounds we do not reach in this decision. In any event, Petitioner's demonstratives are not evidence and we do not rely on them herein. *See* PTAB Consolidated Trial Practice Guide (Nov. 2019), 84 (explaining that demonstratives are merely "aids to oral argument and not evidence" and therefore "the Board has not found that such objections are helpful in many cases"). Thus, we do not sustain Patent Owner's objections.

IV. CONCLUSION[12]

Petitioner has shown, by a preponderance of the evidence, that claims

[12] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or*

1–3 and 6–18 of the '751 patent are unpatentable.

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 2, 7, 8[13]	103	Slater		
1, 2, 7–18[14]	103	Slater, Zahiri		
6[15]	103	Slater, Zahiri, Myerson		
1–3, 7–18	103	Arnould, Zahiri	1–3, 7–18	
6	103	Arnould, Zahiri, Myerson	6	
Overall Outcome			1–3, 6–18	

V. ORDER

Accordingly, it is:

ORDERED that Petitioner has shown that claims 1–3 and 6–18 of U.S. Patent 10,993,751 B1 are unpatentable;

FURTHER ORDERED that Patent Owner's objections to Petitioner's

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Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), 42.8(b)(2).

[13] As explained above, we do not reach this ground. *See supra* § III.G.
[14] As explained above, we do not reach this ground. *See supra* § III.G.
[15] As explained above, we do not reach this ground. *See supra* § III.G.

Demonstrative Slides (Paper 33) are overruled; and

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

For PETITIONER:

Jason Engel
Katherine Allor
K&L GATES LLP
jason.engel.ptab@klgates.com
katy.allor@klgates.com

For PATENT OWNER:

Sharon Hwang
Robert Surrette
Scott McBirde
MCANDREWS, HELD & MALLOY, LTD.
shwang@mcandrews-ip.com
bsurrette@mcandrews-ip.com
smcbride@mcandrews-ip.com