

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

KAVO DENTAL TECHNOLOGIES, LLC,
Petitioner,

v.

OSSEO IMAGING, LLC,
Patent Owner.

IPR2020-00672
Patent 6,944,262 B2

Before GEORGIANNA W. BRADEN, NABEEL U. KHAN, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

KHAN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

I. INTRODUCTION

A. *Background and Summary*

Kavo Dental Technologies, LLC (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1, 2, 4, and 6 (“the challenged claims”) of U.S. Patent No. 6,944,262 B2 (Ex. 1003, “the ’262 Patent”). Osseo Imaging, LLC (“Patent Owner”) timely filed a Preliminary Response (Paper 6, “Prelim. Resp.”). Pursuant to our authorization (Paper 7), Petitioner filed a Reply to Patent Owner’s Preliminary Response (Paper 8, “Petitioner Preliminary Reply,” “Pet. Prelim. Reply”) and Patent Owner filed a Sur-Reply (Paper 9, “Patent Owner Preliminary Sur-reply,” “PO Prelim. Sur-reply”).

We have authority to institute an *inter partes* review only if the information presented in the Petition shows “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). Upon consideration of the aforementioned papers and evidence of record, we conclude that Petitioner has shown a reasonable likelihood of prevailing against the challenged claims. For the reasons explained below, we institute an *inter partes* review on the challenged claims of the ’262 Patent.

B. *Related Matters*

The parties identify the following matters as related to this case: *Osseo Imaging, LLC v. Kavo Dental Technologies, LLC*, 3-19-cv-00174 (W.D.N.C.) (“Kavo proceeding”); *Osseo Imaging, LLC v. Planmeca USA Inc.*, 1-17-cv-01386 (D. Del.) (“Planmeca proceeding”). Pet. 3; Paper 3, 2.

C. The '262 Patent

The '262 Patent, is directed to “[a] dental or orthopedic densitometry modeling system.” Ex. 1003, Abstract. The '262 Patent explains that early detection of dental pathologies, such as tooth decay, fractures, and abscesses is important to minimize damage. *Id.* at 1:29–30. Conventional dental pathology diagnosis procedures are generally performed using dental X-rays, according to Massie. *Id.* at 1:30–31. The '262 Patent explains that “[t]omography or sectional radiography techniques using scanning X-ray beams have previously been employed for dental applications” and that “[i]n the medical field, densitometry procedures are used for measuring bone morphology density (BMD) by utilizing scanning X-ray beam techniques.” *Id.* at 2:3–5, 2:10–12. The '262 Patent explains that the “availability of relatively fast computers with large memories at reasonable costs has led to the digitalization of X-ray images for mapping BMD models in various formats.” *Id.* at 2:18–20. Digitalization of X-ray images has allowed the use of color to identify varying bone densities, and also for allowing the comparison of patient models with standard models or with prior patient BMD histories. *Id.* at 2:21–24. The '262 Patent “utilizes such densitometry modeling and mapping techniques for dental applications” such as dental diagnostics and for monitoring osseointegration. *Id.* at 2:27–40.

The '262 Patent, therefore, discloses that its dental densitometry modeling system “includes a computer with a digital memory adapted for storing patient densitometry information, an input and an output.” Ex. 1001, Abstract. The input device includes an energy source and an energy sensor, such as X-ray sources and sensors, which can be external or intraoral to the patient. *Id.* at Abstract, 2:54–59. The sensor transfers densitometry signals to the computer which creates stores and compares digital densitometry

models. *Id.* at Abstract. A database may be created of dental or orthopedic information. *Id.* Current dental densitometry information from a patient may then be compared to the database, which can include the patient's prior densitometry models. *Id.*

D. Illustrative Claims

Of the challenged claims, claim 1 is independent. Claims 2, 4, and 6 depend from independent claim 1.

Claim 1, reproduced below with annotations, is illustrative.

1. A digital modeling system for creating dental or orthopedic models of patients, which system comprises:

[1.1] a computer including a digital memory storing patient densitometry information, an input and an output;

[1.2] a dental or orthopedic input device including an energy source and an energy sensor; said source and said sensor being placed with at least a portion of the patient's dental or orthopedic structure therebetween;

[1.3] said sensor transferring signals to the computer input;

[1.4] said signals representing densitometry of the patient's dental or orthopedic structure;

[1.5] said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure;

[1.6] an output device connected to said computer output and communicating densitometry model comparison information;

[1.7] imaging software associated with said computer; and

[1.8] a display associated with said output device and displaying information pertaining to said densitometry model.

Ex. 1003, 8:64–10:3.

E. Prior Art and Asserted Challenges

Petitioner asserts that claims 1, 2, 4, and 6 would have been unpatentable on the following challenges:

Claim(s) Challenged	35 U.S.C. §¹	Basis
1, 2, 4, 6	102	Massie ²
1, 2, 4, 6	103(a)	Massie, Xu ³ , Milestone ⁴
1, 2, 4, 6	103(a)	Arai ⁵ , Xu, Milestone, Cann ⁶
1, 2, 4, 6	103(a)	Pelc ⁷ , Xu, Milestone, Cann

In addition, Petitioner relies on the Declaration of Andrew Maidment (Ex. 1007) in support of the asserted challenges of unpatentability.

II. ANALYSIS

A. Discretionary Denial of Petition under § 314(a)

Patent Owner states that the '262 Patent is the subject of two pending district court litigations. Patent Owner asserted the '262 Patent against Planmeca USA Inc. in the first case ("the Planmeca proceeding"), while in the second case Patent Owner sued Petitioner for infringement of the '262

¹ 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 application from which the '262 Patent issued was filed before this date, the pre-AIA version of §§ 102, 103 applies.

² Ronald E. Massie, WO 01/39667, June 7, 2001 (Ex. 1017, "Massie")

³ Xin-Wei Xu, U.S. 6,363,163 B1, Mar. 26, 2002 (Ex. 1019, "Xu")

⁴ Barton N. Milestone, WO 98/36683, Aug. 27, 1998 (Ex. 1020, "Milestone")

⁵ Yoshinori Arai, US 6,118,842, Sept. 12, 2000 (Ex. 1013, "Arai").

⁶ Cann, Precise Measurement of Vertebral Mineral Content Using Computed Tomography, *Journal of Computer Assisted Tomographs*, Aug. 1980 (Ex. 1014, "Cann")

⁷ Norbert Pelc, WO 94/10908, May 26, 1994 (Ex. 1015, "Pelc")

Patent (“the Kavo proceeding”).⁸ Prelim. Resp. 3–5. Patent Owner argues we should exercise discretion under 35 U.S.C. § 314(a) and deny institution based on the trial scheduled for October 2020⁹ in the Planmeca proceeding, a proceeding to which Petitioner is not a party. Prelim. Resp. 1–12. Petitioner, however, is a party in the Kavo proceeding that is stayed currently.

Under § 314(a), the Director has discretion to deny institution of an *inter partes* review. *See* 37 C.F.R. § 42.4(a) (“The Board institutes the trial on behalf of the Director.”); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”); *SAS Inst. Inv. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

In *NHK*, the Board denied institution relying, in part, on § 314(a) because the parallel district court proceeding was scheduled to finish before the Board reached a final decision. *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential). “Thus, *NHK* applies to the situation where the district court has set a trial date to occur earlier than the Board’s deadline to issue a final written decision in an

⁸ Claims 1–6 of the ’262 Patent are at issue in both the Kavo and Planmeca proceedings. *Compare* Ex. 2001, *with* Ex. 2008. These claims include all of the claims challenged in this Petition.

⁹ The trial was originally set of May 18, 2020, but was postponed due to a court closure associated with Covid-19. *See* Ex. 2006, 2 (D.I. 18) (setting May 18, 2020 trial date); Ex. 2015 (resetting trial date for October 16, 2020).

instituted proceeding.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 3 (PTAB Mar. 20, 2020) (precedential) (Order). When determining whether to exercise discretion to deny institution under *NHK* due to an earlier trial date, we consider the following factors (“*Fintiv* factors”):

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;
5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
6. other circumstances that impact the Board’s exercise of discretion, including the merits.

Id. at 6. “These factors relate to whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding.” *Id.* In evaluating these factors, we take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review.” *Id.* (citing Patent Trial and Appeal Board Consolidated Trial Practice Guide November 2019 (“CTPG”), 58.). We address the *Fintiv* factors *in seriatim* below.

1. Whether a Stay Exists or Is Likely to Be Granted if a Proceeding Is Instituted

The Kavo proceeding, in which Petitioner is a defendant, “is stayed pending the results of Kavo’s petitions based on a *joint request*.” Pet. Prelim. Reply 5 (citing Ex. 2013). This factor weighs against exercising discretion to deny institution. The stay of the Kavo proceeding allays

concerns about inefficiency and duplication of efforts as it relates to this proceeding. *See Fintiv*, Paper 11 at 6.

As to the Planmeca proceeding, the *Fintiv* Order explains, “Even when a petitioner is unrelated to a defendant, however, if the issues are the same as, or substantially similar to, those already or about to be litigated, or other circumstances weigh against redoing the work of another tribunal, the Board may, nonetheless, exercise the authority to deny institution.” *Fintiv*, Paper 11 at 14.

Petitioner argues that because it is not a party to the Planmeca proceeding, Petitioner has no way of knowing whether a stay will be granted in that case. Pet. Prelim. Reply 4. Patent Owner argues the Planmeca proceeding is not stayed and given its advanced stage and proximity to trial, “the Delaware court is not likely to stay the case even if the petitions were instituted and Planmeca made such a motion.” PO Prelim. Sur-reply 4.

Petitioner is in no position to offer evidence about a stay in the Planmeca proceeding because Petitioner is not a party to that proceeding. This proceeding may be a basis to deny institution if the issues are the same as, or substantially similar to, those already or about to be litigated, or other circumstances weigh against redoing the work of another tribunal. *See Fintiv*, Paper 11 at 14. In the event that there may be duplicative efforts, we inquire further as to whether the district court would render a decision before this proceeding as examined below under *Fintiv* factor 2, and the degree of overlap of the proceedings under *Fintiv* factor 4. *Fintiv* at 6 (explaining that there is some overlap among the factors).

2. *Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline*

As noted above, the Kavo proceeding is stayed pending this resolution of this proceeding, which weighs in against exercising our discretion to deny institution. Pet. Prelim. Reply 5. Both Petitioner and Patent Owner agree that the Planmeca proceeding is scheduled for a trial in October 2020. Pet. Prelim. Reply 6; PO Prelim Sur-reply 1, 5–6; *see also* Ex. 2015 (Order Rescheduling Trial). Because the Planmeca trial is scheduled approximately eight months before a Final Written Decision would be due in this case, this factor weighs in favor of exercising our discretion to deny institution. *See Fintiv*, Paper 11 at 9 (“If the court’s trial date is earlier than the projected statutory deadline, the Board generally has weighed this fact in favor of exercising authority to deny institution under *NHK*.”).

3. *Investment in the Parallel Proceeding by the Court and Parties*

Petitioner acknowledges that “[t]he Delaware court has clearly invested time and effort in the Planmeca [proceeding].” Pet. Prelim Reply 6. Petitioner argues, however, that “apart from *Markman* proceedings—the results of which Kavo adopted in its petitions—none of that effort bears on the distinct invalidity challenges raised in Kavo’s petitions.” *Id.*

Petitioner also argues that there was no delay in filing the Petition. Pet. Prelim. Reply 7. Specifically, Petitioner argues it filed the Petition approximately two months after Patent Owner filed its infringement contentions and Petitioner filed its invalidity contentions in the Kavo proceeding. *Id.*

Patent Owner argues that “[t]he court in the Planmeca [proceeding] has issued substantive rulings, including a claim construction order and orders denying motions to strike the expert reports relating to the same

patents at issue in these petitions.” PO Prelim. Sur-reply 6; *see* Prelim. Resp. 7–8 (noting the status of the Planmeca proceeding). Patent Owner further argues that summary judgment and *Daubert* motions have been fully briefed and argued. PO Prelim. Sur-reply 7. Patent Owner also argues that although the Kavo proceeding is not in an advanced stage, “Petitioner has benefited from [the Planmeca proceeding] as evidenced from Petitioner’s reliance on that court’s claim construction, [which] is significant and weighs heavily in favor of denial.” *Id.*

It is clear that the district court in the Planmeca proceeding has invested substantial resources into the case. With the exception of the *Markman* Order, however, Patent Owner has not sufficiently shown how the investment relates to the issue before us. That is, although summary judgment and *Daubert* motions have been briefed and argued, Patent Owner has not sufficiently shown that those issues are relevant here.

Accordingly, because the investment made by the court and the Patent Owner is in a proceeding in which Petitioner is not a party and Patent Owner has not demonstrated persuasively how this investment leads to an inefficient duplication of resources if this Petition is instituted, we find this factor weighs against exercising our discretion to deny.

4. Overlap between Issues Raised in the Petition and in the Parallel Proceeding

Petitioner states it has limited knowledge of the arguments in the Planmeca proceeding, but contends that based on Planmeca’s Section 282 statement, none of the lead prior art references of this Petition—Arai and Pelc—are asserted in the Planmeca proceeding. Pet. Prelim. Reply 8 (citing Ex. 1039). Petitioner argues that Planmeca’s expert’s invalidity reports and motion for summary judgment (Ex. 2004) support its contention that the

grounds, arguments, and/or evidence in the Petition are “materially different” “than those presented in the district court.” Pet. Prelim. Reply 8–9 (quoting *Fintiv*, Paper 11 at 12–13).

Patent Owner acknowledges that the Petition involves different primary references than the Planmeca proceeding, but argues that “the prior art that Petitioner presents requires consideration of issues . . . are cumulative to those presented in the Planmeca [proceeding].” PO Prelim. Sur-reply 7; *see also* PO Prelim. Resp. 9–10 (arguing that Petitioner’s arguments essentially duplicate those of the Planmeca proceeding).

Based on the record, we are not persuaded by Patent Owner’s argument that Arai and Pelc are cumulative to the references Planmeca is relying on in district court. Patent Owner simply offers a conclusory statement, without any support or analysis. Because the Petition “includes materially different grounds, arguments, and/or evidence than those presented in the district court,” this factor weighs against exercising discretion to deny institution. *Fintiv*, Paper 11 at 12–13 (citations omitted).

5. *Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party*

Petitioner argues it is not a party to the Planmeca proceeding. Pet. Prelim. Reply 9.

“Patent Owner acknowledges that Petitioner is not a party to the Planmeca [proceeding]” PO Prelim. Sur-reply 8. Patent Owner argues, however, that “this factor is not dispositive.” *Id.* Patent Owner further argues “the significant efficiencies of denial and consideration of other factors, viewed holistically, favor denial.” *Id.* at 8–9 (citing *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11 at 2 (PTAB Apr. 2, 2019) (precedential)); *see also* Prelim. Resp. 8–9 (“In other contexts, such as

a later-filed petition, the Board has found that identity of the parties is not dispositive and has exercised its discretion to deny institution.”).

“If a petitioner is unrelated to a defendant in an earlier court proceeding, the Board has weighed this fact against exercising discretion to deny institution under *NHK*.” *Fintiv*, Paper 11 at 13–14 (citations omitted). Because there is no dispute that Petitioner is unrelated to the defendant in the Planmeca proceeding and is not similarly situated as Planmeca, this factor weighs against us exercising discretion.

We do not find Patent Owner’s reliance on *Valve* persuasive. In *Valve*, Valve Corporation (“Valve”)—the petitioner—had a preexisting relationship with HTC Corporation and HTC America, Inc. (collectively, “HTC”), which had filed an earlier petition. *See Valve*, Paper 11 at 9–10. Specifically, both Valve and HTC were accused of patent infringement based on the same product, “namely HTC’s VIVE devices that incorporate technology licensed from Valve,” and that Valve employees provide HTC with technical assistance during the development of the accused devices. *Id.* (citations omitted). In contrast, in this case, Patent Owner has not alleged any relationship between Petitioner and Planmeca. Simply being accused of infringing the same patent is not a sufficient relationship. Accordingly, we find that this factor strongly weighs against us exercising discretion to deny institution.

6. *Other Circumstances that Impact the Board’s Exercise of Discretion, Including the Merits*

Petitioner argues Patent Owner’s arguments are not “frank and fair.” Pet. Prelim. Reply 10. Petitioner further argues that the Petition contains “a wealth of prior art [which] provides more than sufficient basis for this Board to institute *inter partes* review and hold the challenged claims

unpatentable,” while Patent Owner does not present any arguments directed to the merits. *Id.*

Patent Owner argues although Petitioner “repeats the [district] court’s construction [of densitometry/tomographic modeling and/or tomographic models] and adopts it as its own, Petitioner made no effort to explain how the prior art teaches this limitation.” PO Prelim. Sur-reply 9. Patent Owner further argues Petitioner waited “until just six weeks before the statutory deadline and several week after the summary judgment arguments in the Planmeca [proceeding]” to file the Petition. *Id.* at 10.

We are not persuaded by either parties’ arguments on this point. Although Petitioner waited until towards the end of the statutory period, Patent Owner waited eighteen months between filing complaints in the Planmeca proceeding and Kavo proceeding. That period of delay in filing the Kavo proceeding accounts for a large portion of the prejudice Patent Owner alleges.

Nor do we agree with the parties’ remaining arguments. Petitioner has not sufficiently shown that Patent Owner has not come forward with clean hands. And Patent Owner relies on conclusory attorney argument—which is not persuasive—to attack the sufficiency of the evidence in the Petition. Accordingly, we find this a neutral factor.

7. Conclusion

We have considered the circumstances and facts before us in view of the *Fintiv* factors. Because our analysis is fact driven, no single factor is determinative of whether we exercise our discretion to deny institution under § 314(a). Based on the facts of this case, the stay in the Kavo proceeding involving Petitioner allays concerns about inefficiency and duplication of

efforts as it relates to issues raised by the parties in that parallel proceeding. Further, the challenges raised in the Petition are not the same as, or substantially similar to, those about to be litigated in the Planmeca proceeding, which does not involve Petitioner as a party. Thus, the risk of duplicate work between the Planmeca proceeding and this *inter partes* review is *de minimis*. Even if the patents are found not to be invalid in the Planmeca proceeding, the patents will be subject to a second validity challenge by Petitioner. Patent Owner has not argued persuasively that it would be more efficient for that challenge to be held in the Kavo proceeding as opposed to before the Board.

Balancing all of the factors, on this record, we determine that the circumstances presented here weigh against exercising discretion under § 314(a) to deny institution of *inter partes* review.

B. Level of Ordinary Skill in the Art

Petitioner argues that a person of ordinary skill in the art at the time of the invention “would include a person with an advanced medical degree, such as an MD, DDS, or DMD, and/or an advanced degree in Medical Physics, Physics, or a related field, and at least three years of experience in using and/or designing medical imaging devices, including CT imaging systems and/or densitometric imaging systems.” Pet. 16–17 (citing Ex. 1007 ¶¶ 52–55). Patent Owner does not set forth a position on the level of ordinary skill in the art at this time.

Based on our review of the ’262 Patent, the types of problems and solutions described in the ’262 Patent and cited prior art, and the testimony of Dr. Maidment, for purposes of this Decision, we adopt and apply Petitioner’s proposed level of ordinary skill in the art, except that we delete

the qualifier “at least” to eliminate vagueness as to the amount of practical experience. The qualifier expands the range indefinitely without an upper bound, and thus, precludes a meaningful indication of the level of ordinary skill in the art.¹⁰ Specifically, we find that a person of ordinary skill in the art at the time of the claimed invention would have “include[d] a person with an advanced medical degree, such as an MD, DDS, or DMD, and/or an advanced degree in Medical Physics, Physics, or a related field, and three years of experience in using and/or designing medical imaging devices, including CT imaging systems and/or densitometric imaging systems.”

C. Claim Construction

In this case, we apply the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (now codified at 37 C.F.R. pt. 42 (2019)). Under the *Phillips* standard, claim terms must be given “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips*, 415 F.3d at 1313. Only claim terms in controversy require express construction, “and only to the extent necessary to resolve the controversy.” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner asserts that it adopts the constructions that the District Court in the Planmeca proceeding issued. Pet. 17. Patent Owner does not address

¹⁰ If Patent Owner proposes a different level of ordinary skill in the art in its Response, the parties are encouraged to address whether there are any material differences between the two proposals and what impact, if any, the different level has on the obviousness analysis.

Petitioner's proposed constructions. We determine that no claim terms require express construction for purposes of this Decision. A final determination as to claim construction will be made at the close of the proceeding, after any hearing, based on all the evidence of record. The parties are expected to assert all their claim construction arguments and evidence in the Petition, Patent Owner's Response, Petitioner's Reply, or otherwise during trial, as permitted by our rules.

D. Alleged Anticipation by Massie

Petitioner contends claims 1, 2, 4, and 6 are anticipated by Massie under 35 U.S.C. § 102. Pet. 4, 22–36. “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). To establish anticipation, “all of the elements and limitations of the claim must be shown in a single prior reference, arranged as in the claim.” *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001).

When evaluating a single prior art reference in the context of anticipation, the reference must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)). “[T]he dispositive question regarding anticipation[, therefore, i]s whether *one skilled in the art* would reasonably understand or infer from the [prior art reference's] teaching' that every claim element was disclosed in that single reference.” *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003) (alterations in original) (quoting *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991)).

I. Overview of Massie

Massie, International Publication No. WO 01/39667 A1, titled “Dental and Orthopedic Densitometry Modeling System and Method,” was published on June 7, 2001. Ex. 1017, code (43). Massie claims priority from U.S. Application No. 09/452,348. Ex. 1017 at code (30). The ’262 Patent is a continuation-in-part of US 09/452,348. As such, Massie, and the ’262 Patent have overlapping specifications.

Massie explains that early detection of dental pathologies, such as tooth decay, fractures, and abscesses is important to minimize damage. Ex. 1017 2:11–18. Conventional dental pathology diagnosis procedures are generally performed using dental X-rays, according to Massie. Ex. 1017, 2:17–18. Massie explains that “[t]omography or sectional radiography techniques using scanning X-ray beams have previously been employed for dental applications” and that “[i]n the medical field, densitometry procedures are used for measuring bone morphology density (BMD) by utilizing scanning X-ray beam techniques.” Ex. 1017, 2:20–21, 3:4–5. Massie explains that the “availability of relatively fast computers with large memories at reasonable costs has led to the digitalization of X-ray images for mapping BMD models in various formats.” Ex. 1017, 3:9–11. Digitalization of X-ray images has allowed the use of color to identify varying bone densities, and also for allowing the comparison of patient models with standard models or with prior patient BMD histories. Ex. 1017, 3:11–13. Massie “utilizes such densitometry modeling and mapping techniques for dental applications.” Ex. 1017, 3:15–16.

Massie, therefore, discloses “dental and orthopedic densitometry modeling system” that utilizes a controller, microprocessor, memory, and input devices, for providing a database of densitometry parameters for

comparison with a patient's densitometry model. Ex. 1017, 4:9–12. The controller controls the operation of X-ray equipment, which scans a patient's dental structures along preprogrammed paths. Ex. 1017, 4:13–15. The X-ray output is processed for creating a densitometry model which can be compared to predetermined parameters unique to the patient. Ex. 1017, 4:21–5:1. “The model can be output in various formats, including a visual image color-coded to depict varying dental and orthopedic structure densities.” Ex. 1017, 5:1–3.

2. Analysis of Claim 1

a) Preamble

The preamble of claim 1 recites “A digital modeling system for creating dental or orthopedic models of patients.” Petitioner argues the preamble of claim 1 is not limiting, but that to the extent that it is, Massie discloses the preamble because Massie discloses a digital modeling system for creating dental or orthopedic densitometry models of patients. Pet. 23–24 (citing Ex. 1017, 5:6–9). Petitioner further argues Massie “explicitly states that it generates a tomographical densitometry model.” Pet. 24 (citing Ex. 1017, 5:7–11, 9:2–6).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC, v. National Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

On the present record, regardless of whether the preamble is limiting, we are persuaded of a reasonable likelihood that Massie discloses the preamble of claim 1 by Petitioner's arguments and evidence. As Petitioner argues, Massie discloses “a method for modeling dental and orthopedic

structure using densitometry” (Ex. 1017, 5:7–9) and mentions tomographic densitometry being useful for dental applications (Ex. 1017, 9:2–6). This supports Petitioner’s contention that Massie discloses “[a] digital modeling system for creating dental or orthopedic models of patients” as claimed.

b) Limitations 1.1 and 1.2

Claim 1 recites “a computer including a digital memory storing patient densitometry information, an input and an output; a dental or orthopedic input device including an energy source and an energy sensor; said source and said sensor being placed with at least a portion of the patient’s dental or orthopedic structure therebetween.” With respect to these limitations, Petitioner argues Massie discloses “a computer in the form of ‘a controller 4 with a microprocessor 6 connected to a digital memory device 7’” that “‘is adapted to receive input from one or more input devices’” and that “further has ‘an output device or devices.’” Pet. 24 (quoting Ex. 1017, 7:6–17; 8:15–19). Petitioner argues Massie discloses that a patient’s densitometry information is stored in the computer’s memory. Pet. 25 (“Among the information that can be input and stored in the memory is ‘a patient’s dental and orthopedic records, including previous tomographical densitometry models.’” (quoting Ex. 1017, 7:17–19)). Petitioner argues Massie “discloses an X-ray source and detector.” Pet. 25 (citing Ex. 1017, 8:7–12 (“The source and the detector array 14, 16 are adapted for positioning on either side of a patient’s dental/orthopedic structure 18.”)).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

On the present record we are persuaded of a reasonable likelihood that Massie's teaching of a computer adapted to receive input from input devices and having output devices, having memory storing a patient's previous tomographical densitometry models, and an X-ray source and detector adapted for positioning on either side of a patient's dental structures, disclose limitations 1.1 and 1.2.

c) Limitations 1.3 and 1.4

Claim 1 recites "said sensor transferring signals to the computer input; said signals representing densitometry of the patient's dental or orthopedic structure." Petitioner relies on Massie's teaching that "Analog signals from the detector array 16 are output to an analog-to-digital (A/D) convertor 20, from which digitized signals are transmitted to a merger device 22 for merging into formats suitable for processing and analyzing by the microprocessor 6" as disclosing "said sensor transferring signals to the computer input." Pet. 25–26 (quoting Ex. 1017, 8:13–15. Petitioner argues Massie "teaches that the computer uses data from the signals to create a densitometric model." Pet. 26 (citing Ex. 1017, 8:15–17 ("The microprocessor 6, using data from the merger device 22, creates a tomographical densitometry model 24 which is transmitted to an output device or devices 26."))).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record we are persuaded of a reasonable likelihood that Massie's teaching of analog signals from a detector array being analyzed by

Massie's microprocessor to create a densitometric model discloses limitations 1.3 and 1.4.

d) Limitation 1.5

Claim 1 recites "said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure." Petitioner argues Massie discloses both the creation and storage of densitometry models. Pet. 26–27 (citing Ex. 1017, 5:6–9, 7:17–19, 9:13–14). Petitioner also argues that Massie discloses the comparison of densitometry models, pointing to claim 18 of Massie (Pet. 27) and to, what they argue, is Patent Owner's admission that the specification in the '262 Patent, and therefore also the common specification of Massie, describes the comparing limitation (Pet. 27 (citing Ex. 1012, 15:14–17:1)). As for the negative limitation of comparing the three-dimensional models "without the use of fiducial markers," Petitioner argues Massie does not discuss fiducial markers and that if the '262 Patent, which also does not discuss fiducial markers, discloses this limitation, then so does Massie. Pet. 31.

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record we are persuaded of a reasonable likelihood that Massie's computer creates and stores three-dimensional digital densitometry models (Ex. 1017, 5:6–9, 7:17–19, 9:13–14). We are also persuaded of a reasonable likelihood that these models are created without the use of fiducial markers because Massie, which has a common specification with the '262 Patent, makes no mention of fiducial markers. Finally we are

persuaded of a reasonable likelihood that Massie compares three-dimensional densitometry models. Massie teaches that the patient's densitometry model can be compared to stored densitometry parameters (Ex. 1017, 4:10–13, 4:20–5:1, 10:7–9; Ex. 1007 ¶ 534), which Massie explains can comprise the patient's prior tomographical densitometry models and standardized models (Ex. 1017, 9:13–14; Ex. 1007 ¶ 534). These descriptions from Massie's specification are consistent with Massie explicit statements in claim 18 that pre-existing tomographical densitometry models are input to the computer and compared to the patient's current densitometry model (Ex. 1017, 15 (claim 18)). Thus, at this stage of the proceeding, we agree with Petitioner that Massie discloses “comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure.”

e) Limitations 1.6–1.8

Claim 1 further requires “an output device connected to said computer output and communicating densitometry model comparison information; imaging software associated with said computer; and a display associated with said output device and displaying information pertaining to said densitometry model.” Petitioner argues Massie's teaching of densitometry model that is output to “a monitor and printer for converting the [densitometry] model to a visual image” discloses the claimed output device connected to the said computer output and communicating densitometry model comparison information. Pet. 32–33 (citing Ex. 1017, 7:12–14, 8:15–19, 10:9–12). Petitioner argues that the tomographical densitometry model that Massie discloses is transmitted to an output device, would include

densitometry comparison information. Pet. 33 (citing Ex. 1017, 3:17–18, 9:2–3, 10:9–12; Ex. 1007 ¶¶ 95–97, 542–43).

Patent Owner does not address specifically this limitation of independent claim 1, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Massie’s teaching of a monitor and printer for converting a densitometry model to a visual image discloses the claimed “output device connected to said computer” and that these output devices communicate densitometry model comparison information. As Petitioner explains, claim 18 of Massie teaches comparing a patient’s current densitometry model with pre-existing models. Pet. 27. Furthermore, Massie teaches “[t]he digitized detector array output is merged and compared to the diagnostic parameters” which comprise prior densitometry models and that the “dental/orthopedic densitometry is tomographically modeled and output, for example to a monitor or printer for converting the model to a visual image” (Ex. 1017, 10:7–11; *see* Ex. 1007 ¶ 534). At this stage of the proceeding, we agree with Petitioner that Massie discloses “an output device connected to said computer output and communicating densitometry model comparison information; imaging software associated with said computer; and a display associated with said output device and displaying information pertaining to said densitometry model.”

f) Conclusion

For the aforementioned reasons, on the present record, we find Petitioner has established a reasonable likelihood that Massie discloses the limitations of claim 1.

3. *Analysis of Claims 2 and 4*

Claim 2 depends from claim 1 and recites “said source is external.” Claim 4 depends from claim 1 and recites “said sensor is external.” Petitioner relies on Massie’s teaching of “positioning a patient and positioning the X-ray equipment relative to the patient, *i.e.* with the patient’s dental/orthopedic structure to be examined located between the X-ray source 14 and detector array 16,” along with Dr. Maidment’s testimony, in arguing that Massie discloses an external source and sensor. Pet. 33–34 (citing Ex. 1017, 9:10–12; Ex. 1007 ¶¶ 548, 551). Patent Owner does not address specifically these limitations of the challenged dependent claims, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record we are persuaded of a reasonable likelihood that Massie’s teaching of an X-ray equipment positioned relative to a patient’s dental structures teaches an external energy source and sensor.

4. *Analysis of Claim 6*

Claim 6 depends from claim 1 and recites “said energy being collimated.” Petitioner relies on Massie’s teaching that the “X-ray beam can suitably [be] collimated to assume any suitable configuration, such as fan, pencil, cone, etc.” as teaching claim 6. Pet. 36 (citing Ex. 1017, 8:8–9; Ex. 1007 ¶¶ 554–55). Patent Owner does not address specifically this limitation of challenged dependent claim 6, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Massie’s

teaching of an X-ray beam that can be collimated as teaching “said energy being collimated.”

E. Alleged Obviousness over Massie, Xu, and Milestone

Petitioner contends claims 1, 2, 4, and 6 are obvious over Massie, Xu, and Milestone under 35 U.S.C. § 103. Pet. 4, 22–36. A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *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 of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

1. Analysis of Claim 1

With a few noted differences, Petitioner relies on largely the same arguments and evidence for its obviousness challenge over Massie, Xu, and

Milestone as Petitioner did for its anticipation challenge over Massie alone. *See* Pet. 23–33. For the reasons stated above, at this stage of the proceeding we find these common arguments persuasive in establishing a reasonable likelihood that the combination of Massie, Xu, and Milestone teach the limitations of claim 1 to which they pertain. Below, we analyze the distinct arguments pertaining only to this obviousness challenge.

a) Comparing three-dimensional digital densitometry models without the use of fiducial markers

Petitioner contends Massie combined with Xu and Milestone renders obvious the comparing limitation. Pet. 27–29. Petitioner argues that “[t]he ’262 Patent admits that means for comparing tomographic models were known in the prior art.” *Id.* at 27 (citing Ex. 1003, 2:23–25). Petitioner further argues Patent Owner admitted during litigation that one of ordinary skill in the art would know how to compare two sets of data in a computer and that commercially available software capable of the comparison was known. Pet. 27 (citing Ex. 1012, 17:23–18:21). In addition to these purported admissions by the ’262 Patent and by Patent Owner, Petitioner relies on Xu arguing that it teaches comparing two sets of three dimensional medical scans to each other. *Id.* at 28 (citing Ex. 1019 2:19–32, 16:43–18:52). Petitioner also relies on Milestone as teaching the use of software to compare volumetric or three-dimensional rendering of internal structures. *Id.* at 28–29 (citing Ex. 1020, 5:15–26). Petitioner argues one of ordinary skill would have combined Massie with either Xu or Milestone to “help medical professionals identify small changes or abnormalities that they might otherwise miss as well as save them time.” *Id.* at 29. Petitioner supports its contention with testimony from Dr. Maidment. *Id.* at 29 (citing Ex. 1007 ¶¶ 534–36).

Petitioner further argues that it would be obvious to compare densitometric models without fiducial markers. Pet. 31. Petitioner argues that “[w]hile fiducial markers can help to align individual slices in a 3D tomographic model . . . a POSA¹¹ would recognize that they are not necessary for the creation, storage, or comparison of tomographic models with the system disclosed in the Massie Publication.” *Id.* (citing Ex. 1007 ¶¶ 91, 540–541). One of skill in the art, according to Petitioner, “would be motivated not to use fiducial markers to reduce the complexity and cost associated with the scan in using such markers.” *Id.* (citing Ex. 1007 ¶¶ 91, 540–541).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record we are persuaded of a reasonable likelihood that Massie, Xu, and Milestone teach comparing three-dimensional digital densitometry models without the use of fiducial markers. At this stage of the proceeding, we find Petitioner has articulated a rational reason for combining Massie with Xu and Milestone, supported by the testimony of Dr. Maidment. *See* Ex. 1007 ¶¶ 91, 540–41). We agree the ’262 Patent itself states that bone morphology density models “are also used for comparison purposes with standard models with patients’ own prior BMD histories.” Ex. 1003, 2:23–25. We agree with Petitioner that Xu and Milestone each teach comparing three-dimensional scans and renderings of medical structures to each other. Pet. 28–29 (citing Ex. 1019, 2:19–32, 2:36–44, 16:43–18:52; Ex. 1020, 5:15–26). Therefore, we are persuaded for purposes of institution that the combination

¹¹ Person of Ordinary Skill in the Art (“POSA”).

of these teachings would suggest to one of ordinary skill in the art that Massie's densitometry models may be compared with other models such as previous patient models or standard models, without the use of fiducial markers, for diagnostic purposes.

b) An output device communicating densitometry model comparison information

Petitioner argues, that even if Massie does not disclose an output device that communicates densitometry model comparison information, "a POSA would find it obvious to use the Massie Publication's system to display comparison model information developed by that system." Pet. 33 (citing Ex. 1007 ¶¶ 542–43). Petitioner argues that "[a] POSA would reasonably expect to be able to successfully display the comparison model . . . in the same manner as displaying a present patient model."

Patent Owner does not respond to the Petitioner's aforementioned arguments. On the present record we are persuaded of a reasonable likelihood that Massie, Xu, and Milestone teach an output device, such as Massie's monitor or printer, that outputs densitometry model comparison information. Petitioner has established that Massie creates densitometry model comparison information (Pet. 27 (citing Ex. 1017, 15 (claim 18))), and also that Massie includes output devices for displaying densitometry models (*id.* at 32 (citing Ex. 1017, 10:9–12)). We agree based on the current record that these output models would also display the model comparison information just as they display the models themselves.

c) Conclusion

For the aforementioned reasons, on the present record and for purposes of institution, we find Petitioner has established a reasonable

likelihood that the combination of Massie, Xu, and Milestone teach the limitations of claim 1.

2. Analysis of Claims 2 and 4

Petitioner relies on the same contentions discussed above with respect to the anticipation challenge over Massie alone, for claims 2 and 4 but adds that person of ordinary skill would understand that an external source and external sensor is one of a finite number of known and predictable solutions regarding the placement of the source and sensor and that an external placement was the most common and accepted placement. Pet. 34–36 (citing Ex. 1007 ¶¶ 549, 552).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Massie, Xu, and Milestone teach the external placement of sources and sensors.

3. Analysis of Claim 6

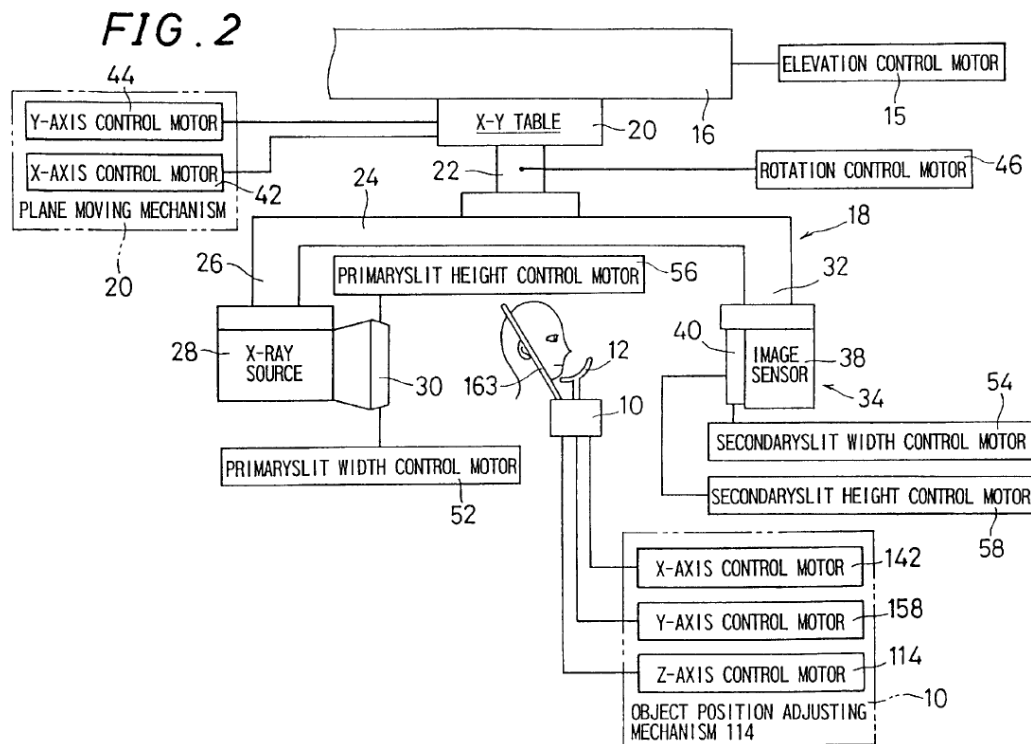
Petitioner relies on the same arguments for its obviousness challenge of claim 6 over Massie, Xu, and Milestone, as it did for its anticipation challenge of claim 6 over Massie alone. For the same reasons as those explained in our analysis of the anticipation challenge of claim 6 over Massie, we find Petitioner has established a reasonable likelihood that Massie, Xu, and Milestone teach the limitations of claim 6.

F. Alleged Obviousness over Arai, Xu, and Milestone

1. Overview of Arai

Arai is titled “X-ray Imaging Apparatus” and is directed to “an X-ray imaging apparatus which takes an image of an object such as a head of a human body along a desired tomographic plane.” Ex. 1013, code (54), 1:5–7). “An object of the invention is to provide a dual-purpose X-ray imaging apparatus capable of partial CT imaging in addition to panoramic tomographic imaging. Another object of the invention is to provide a dedicated partial X-ray CT imaging apparatus.” *Id.* at code (57).

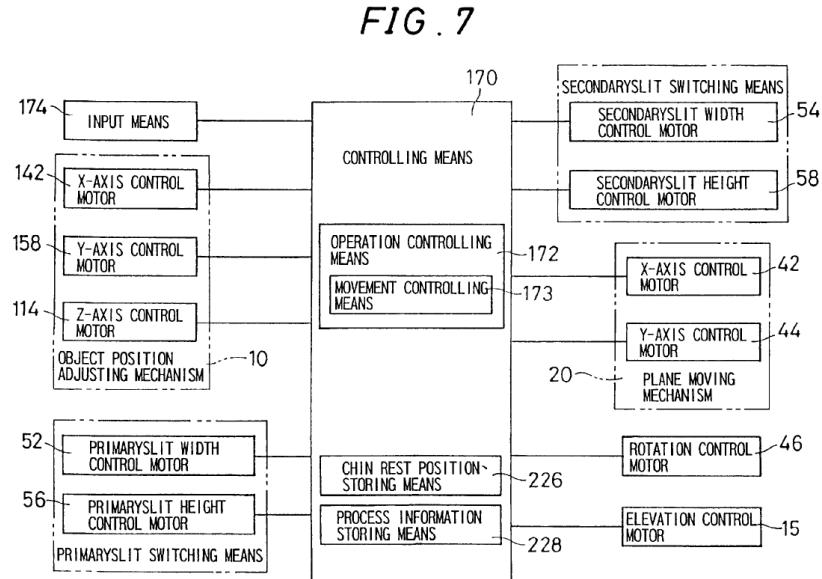
Aria’s Figure 2 is reproduced below.



Aria’s Figure 2 “is a block diagram showing an outline of the X-ray imaging apparatus.” Ex. 1013, 8:32–33. Figure 2 depicts, *inter alia*, the patient, the X-ray source, an image sensor, and object position adjusting mechanism “for

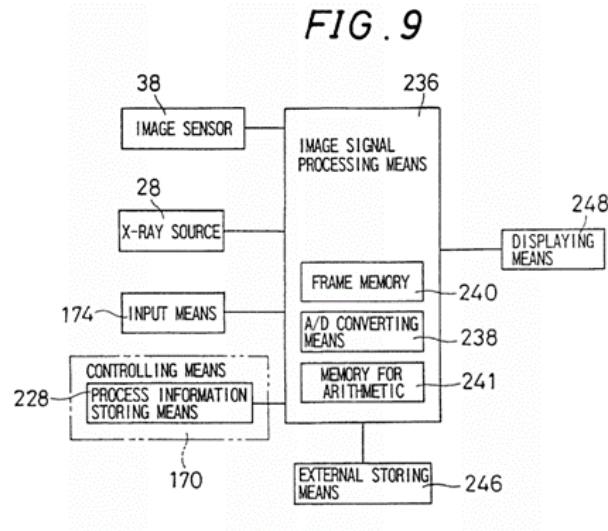
positioning the chin rest 12 at a predetermined position.” *Id.* at Fig. 2, 12:42–45.

Aria’s Figure 7 is reproduced below.



Arai’s Figure 7 “is a block diagram showing a control system for various motors in the X-ray imaging apparatus.” Ex. 1013, 8:43–44. Aria’s Figure 7 depicts, *inter alia*, controlling means 170, which controls the operation of various motors, and process information storing means 228, which “stores CT process information for obtaining a partial CT image.” *Id.* at Fig. 7, 15:62–16:3, 16:41–43.

Aria’s Figure 9 is reproduced below.



Arai's Figure 9 "is a block diagram showing an image signal processing system in the X-ray imaging apparatus." Ex. 1013, 8:48–49. According to Aria,

the image signal output from the image sensor 38 is supplied to image signal processing means 236. The image signal processing means 236 may be configured by, for example, a microprocessor for image processing. The image signal processing means 236 in the embodiment comprises A/D converting means 238 for converting an analog signal into a digital signal, a frame memory 240 which stores image information, and a memory for arithmetic 241. The image signal supplied from the image sensor 38 to the image signal processing means 236 is converted into a digital signal by the A/D converting means 238, and digital-converted image information is stored in the frame memory 240. Plural sets of image information stored in the frame memory 240 are stored in the image memory for arithmetic 241. A predetermined arithmetic process corresponding to the selected imaging mode is conducted on image information read out from the image memory for arithmetic 241, thereby generating a tomographic image of the selected mode.

Id. at 17:30–48

2. *Analysis of Claim 1*

a) *Preamble*

The preamble of claim 1 recites “A digital modeling system for creating dental or orthopedic models of patients.” Petitioner argues the preamble of claim 1 is not limiting, but that to the extent that it is, Arai teaches the preamble because Arai “discloses a system for creating a dental model of a patient.” Pet. 46. Petitioner further argues Arai discloses a CT system that generates tomographic models of dental structures. Pet. 46–47 (citing Ex. 1013, 2:3–5, 17:42–48, 23:8–11, Figs. 1–27; Ex. 1007 ¶ 559–560).

Petitioner also argues that if the preamble requires quantitative modeling, “Arai’s CT system is quantitative because . . . CT scanners use information from multiple scans to calculate a CT number, represented by Hounsfield units, which provides information regarding bone density.” Pet. 47 (citing Ex. 1007 ¶ 561). Alternatively, Petitioner argues Cann teaches use of CT for measuring bone mineral content through the use of quantitative CT imaging, and that the combination of Arai with Cann would therefore teach quantitative CT imaging. Pet. 47–48 (citing Ex. 1014, 493–95; Ex. 1007 ¶¶ 181–85, 562–63).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, regardless of whether the preamble is limiting, we are persuaded of a reasonable likelihood that Arai teaches the preamble of claim 1 by Petitioner’s arguments and evidence. As Petitioner argues, Arai “provide[s] an X-ray imaging apparatus which can conduct a partial CT imaging in addition to a panoramic tomographic imaging.” Ex.

1013, 2:3–5. The CT images can be used for “an implant operation in [a] dental treatment.” Ex. 1-13, 23:8–11. This appears to support Petitioner’s contention that Arai discloses “[a] digital modeling system for creating dental or orthopedic models of patients” as claimed.

b) Limitations 1.1–1.4

For limitations 1.1–1.4, Petitioner argues Arai discloses “a computer comprising ‘controlling means’ and ‘image signal processing means,’” that have memory devices such as the “frame image,” “image memory for arithmetic,” and “external storing means,” for storing tomographic images. Pet. 49–52 (citing Ex. 1013, 14:48–54, 15:62–16:10, 16:41–44, 17:29–48, 18:11–15, Fig. 7; Ex. 1007 ¶¶ 567–569). Petitioner relies on Arai’s “input means” and “operation panel” as teaching the claimed input and Arai’s “displaying means” and “external storing means” as teaching the claimed output. Pet. 52–53 (citing Ex. 1013, 14:51–56, 18:3–8, 18:11–15, Figs. 7–9; Ex. 1007 ¶¶ 570–571).

Petitioner relies on Arai’s disclosure of “an ‘X-ray source’ and image sensor” as teaching the claimed energy source and sensor. Pet. 53 (citing Ex. 1013, 2:15–18, Fig. 2). Petitioner relies on Arai’s Figure 2 as depicting a patient’s dental or orthopedic structure placed between an X-ray source and image sensor. Pet. 53–54 (citing Ex. 1013, Fig. 2). Petitioner argues Arai’s image sensor receives X-rays and transfers these signals to the imaging signal processing means. Pet. 54–55 (citing Ex. 1013, 17:30–42). Petitioner also relies on Dr. Maidment’s testimony that X-ray attenuation is dependent of density. Pet. 54–55 (citing Ex. 1007 ¶¶ 574–575).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate

unpatentability. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Arai's teaches limitations 1.1–14.

c) Limitation 1.5

Claim 1 recites “said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure.” Petitioner argues Arai discloses creating and storing three-dimensional digital densitometry models. Pet. 55 (citing Ex. 1013, 2:3–5, 17:42–48, 18:11–15). Petitioner further argues that Arai combined with Xu and Milestone also teaches comparing these densitometry models. Petitioner argues that “[t]he ’262 Patent admits that means for comparing tomographic models were known in the prior art.” *Id.* at 56 (citing Ex. 1003, 2:23–25). Petitioner further argues Patent Owner admitted during litigation that one of ordinary skill in the art would know how to compare two sets of data in a computer and that commercially available software capable of the comparison was known. *Id.* (citing Ex. 1012, 17:23–18:21). In addition to these purported admissions by the ’262 Patent and by Patent Owner, Petitioner relies on Xu arguing that it teaches comparing two sets of three dimensional medical scans to each other. Pet. 56–57 (citing Ex. 1019 2:19–32, 16:43–18:52). Petitioner also relies on Milestone as teaching the use of software to compare volumetric or three-dimensional rendering of internal structures. *Id.* at 56–57 (citing Ex. 1020, 5:15–26). Petitioner argues “Arai discloses the use of cone beam scanning technology” which Petitioner argues creates a three-dimensional dataset. *Id.* at 57 (Ex. 1007 ¶¶ 79–81, 582–83).

Petitioner argues that Arai does not use fiducial markers because, just like the ’262 Patent, Arai does not discuss fiducial markers. Pet. 58.

Petitioner argues that “[w]hile fiducial markers can help to align individual slices in a 3D tomographic model . . . a POSA would recognize that they are not necessary for the creation, storage, or comparison of tomographic models with the system disclosed in Arai.” *Id.* at 58–59 (citing Ex. 1007 ¶¶ 584–85). Petitioner argues that a later issued Arai patent on a similar CT scanning apparatus explicitly discloses the use of position markers to improve accuracy, thus creating the presumption that the absence of such a disclosure in Arai indicates that fiducial markers are not used. *Id.* at 59 (citing Ex. 1027, 2:5–10, 2:29–32).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Arai, Xu, and Milestone teach “said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure” for the reasons stated by Petitioner.

d) Limitations 1.6–1.8

Claim 1 further requires “an output device connected to said computer output and communicating densitometry model comparison information; imaging software associated with said computer; and a display associated with said output device and displaying information pertaining to said densitometry model.” Petitioner relies on Arai’s disclosure of an image sensor supplying data to an image signal processing means which generates a tomographical model that is supplied to Arai’s displaying means (that

includes a display device) for the aforementioned limitation. Pet. 60 (Ex. 1013, 17:29–61, 18:3–9; Ex. 1007 ¶ 588).

With respect to “communicating densitometry model comparison information,” Petitioner argues “it would be obvious to communicate such comparison information with the Arai system.” Pet. 60. Petitioner contends that “performing comparisons between two or more models is commonplace in medicine for purposes of diagnosis” and that for a physician to use such information, “it needs to be transmitted to them.” *Id.* at 61 (citing Ex. 1007 ¶ 95–97). Petitioner argues a person of ordinary skill would find it obvious to use Arai’s displaying means to display comparison model information. *Id.* (Ex. 1007 ¶¶ 586–87).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Arai’s disclosure of a display means that displays tomographic models teaches the aforementioned claim limitations.

e) Conclusion

For the aforementioned reasons, on the present record and for purposes of institution, we find Petitioner has established a reasonable likelihood that the combination of Arai, Xu, Milestone, and Cann teaches the limitations of claim 1.

3. Analysis of Claims 2 and 4

Claim 2 depends from claim 1 and recites “said source is external.” Claim 4 depends from claim 1 and recites “said sensor is external.”

Petitioner relies on Arai's X-ray source and image sensor as being external. Pet. 61–62 (citing Ex. 1013, Figs. 1, 2, 26; Ex. 1007 ¶¶ 591–95).

Patent Owner does not respond to the Petitioner's aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Arai, Xu, Milestone, and Cann teach the external placement of sources and sensors.

4. *Analysis of Claim 6*

Claim 6 depends from claim 1 and recites “said energy being collimated.” Petitioner relies on Arai's disclosure of a “primary slit means” restricting the “width and height of X-rays emitted from the X-ray source” as teaching “energy being collimated.” Pet. 61–62 (citing Ex. 1013, 10:44–47; Ex. 1007 ¶¶ 596–99). Petitioner further argues the FDA “required all X-ray imaging devices to use restricted beams well before the priority date.” *Id.* at 62 (citing Ex. 1007 ¶¶ 596–99; Ex. 1025, 566).

Patent Owner does not respond to the Petitioner's aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record we are persuaded of a reasonable likelihood that Arai, Xu, Milestone, and Cann teach “said energy being collimated.”

G. *Alleged Obviousness over Pelc, Xu, Milestone, and Cann*

1. *Overview of Pelc*

Pelc, is titled “Compact C-Arm Tomographic Bone Scanning System,” and relates to “a versatile instrument for either radiographic scanning or tomographic scanning of a patient for evaluation of bone density

and bone morphology.” Ex. 1015, 1:13-17. Pelc discloses a “compact and cost-effective C-arm gantry and a small detector array which is capable of practical use as a tomography machine.” *Id.* at 5:11–13. Pelc’s apparatus includes a track for moving a pallet with respect to a patient. *Id.* at 5:22–24. A collar is attached to the pallet and holds a C-arm which may slide through the collar so that its ends rotate around the patient. *Id.* at 5:24–27. “A radiation source and detector are affixed to the ends of the C-arm to provide energy attenuation measurements along an axis between those ends at the plurality of angles, such measurements being received by an electronic computer.” *Id.* at 5:27–31. The computer controls the C-arm, the radiation source and detector and stores attenuation measurements which it uses to reconstruct a tomographic image. *Id.* at 5:31–6:1.

Figure 15, depicting one embodiment of Pelc’s C-arm apparatus is reproduced below:

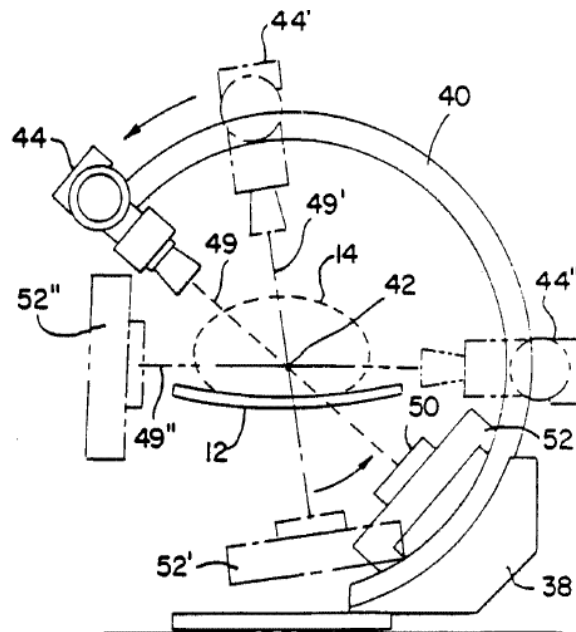


Figure 15 is a schematic representation of motion of the C-arm. Ex. 1015, 11:23–26. Figure 15 shows radiation source 44 and detector array 50

positioned with respect to collar 38 so that beam axis 49 is horizontal to obtain a lateral scan of patient 14 when the patient is lying on table 12. *Id.* at 17:3–7.

2. *Analysis of Claim 1*

a) *Preamble*

The preamble of claim 1 recites “[a] digital modeling system for creating dental or orthopedic models of patients.” Petitioner argues the preamble of claim 1 is not limiting, but that to the extent that it is, Pelc teaches the preamble because Pelc “discloses a system for creating an orthopedic model of a patient.” Pet. 62 (citing Ex. 1007 ¶¶ 601–04). Petitioner argues Pelc’s “‘tomographic bone scanning system’ discloses ‘[a]n X-ray imaging system’ that ‘provides both scanning radiography and computed tomography’” *Id.* (citing Ex. 1015, Title, Abstract, 1:13–17).

Petitioner argues that if the preamble requires quantitative modeling, “Pelc teaches quantitative densitometric modeling.” Pet. 62–63 (citing Ex. 1015 1:13–17; Ex. 1007 ¶ 603). Alternatively, Petitioner argues, Cann teaches quantitative densitometry, and the combination of Pelc and Cann would therefore teach quantitative CT imaging. Pet. 64 (citing Ex. 1007 ¶ 604).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, regardless of whether the preamble is limiting,, we are persuaded of a reasonable likelihood that Pelc and Cann teach the preamble of claim 1 by Petitioner’s argument that Pelc teaches a

tomographic bone scanning system that discloses an X-ray imaging system that provides scanning radiography and computed tomography.

b) Limitations 1.1–1.4

For limitations 1.1–1.4, Petitioner argues Pelc discloses an ‘electronic computer’ that ‘controls the C-arm, the radiation source, and the detector,’” and that the computer has memory for storing image data, which a person of ordinary skill would understand teaches densitometry. Pet. 64 (citing Ex. 1015 5:31–35, 9:34–10:2, 16:18–22, 18:10–11, 18:22–24, 35:17–21, 36:1–3; Ex. 1007 ¶¶ 605–608). Petitioner relies upon Pelc’s disclosure of a keyboard as an input device, and Pelc’s disclosure of “‘a CRT display . . . to display the reconstructed image and other information’” as the claimed output. *Id.* at 65 (citing Ex. 1015, 4:17–20, 35:31–36; Ex. 1007 ¶ 609). Petitioner relies on Pelc’s “‘radiation source and a detector’” that are ‘affixed to the ends of the C-arm to provide energy attenuation measurements.’” Pet. 65–66 (citing Ex. 1015, 5:27–31, 16:23–36, Figs. 1, 6, 18; Ex. 1007 ¶ 610). Petitioner relies on Pelc’s disclosure of “[a] radiation source and a detector . . . [that] provide energy attenuation measurements . . . received by an electronic computer.” *Id.* at 66 (citing Ex. 1015, 5:27–31, 35:3–8; Ex. 1007 ¶ 611). Petitioner argues that “[b]ecause X-ray attenuation is dependent on density, among other things, these signals represent densitometry of the patient’s orthopedic structure.” *Id.* (citing Ex. 1007 ¶ 612–13).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable

likelihood that Pelc's electronic computer with memory for storing image data, keyboard, CRT display, radiation source, detector affixed to a C-arm that provide energy attenuation measurements to a computer teach claim limitations 1.1–1.4.

c) Limitation 1.5

Claim 1 recites “said computer creating, storing and comparing three-dimensional digital densitometry models without the use of fiducial markers of patient dental or orthopedic structure.” Petitioner argues that Pelc creates and stores densitometry models as explained above with respect to the other limitations of the claim. Pet. 67 (citing Ex. 1015, 5:22–6:1, 36:1–3). Petitioner further argues that Pelc combined with Xu and Milestone teaches comparing three-dimensional digital densitometry models without the use of fiducial markers for the same reasons explained above with respect to the obviousness challenge over Arai, Xu, and Milestone. See Pet. 67–71; *supra* § II.H.2.e.

Patent Owner does not respond to the Petitioner's aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. See *Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that the combination of Pelc, Xu, Milestone, and Cann teach limitation 1.5 for the reasons stated with respect to the obviousness challenge over Arai, Xu, and Milestone of the same limitation. See *supra* § II.H.2.e.

d) Limitation 1.6

Claim 1 further requires “an output device connected to said computer output and communicating densitometry model comparison information;

imaging software associated with said computer; and a display associated with said output device and displaying information pertaining to said densitometry model.” Petitioner relies on Pelc’s disclosure of ““a CRT display . . . to display the reconstructed image and other information”” as teaching the claimed output device, imaging software, and display. Pet. 71 (citing Ex. 1015, 35:31–36, 4:17–20, Fig. 19; Ex. 1007 ¶¶ 625–28).

With respect to “communicating densitometry model comparison information,” Petitioner relies on the same arguments as those presented above with respect to the challenge over Arai, Xu, and Milestone.

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Pelc’s CRT display teaches the claimed output device, imaging software, and display. We are also persuaded that the output device communicates densitometry comparison information for the reasons stated with respect to the obviousness challenge over Arai, Xu, and Milestone of the same limitation. *See supra* § II.H.2.f.

e) Conclusion

For the aforementioned reasons, on the present record and for purposes of institution only, we find Petitioner has established a reasonable likelihood that the combination of Pelc, Xu, Milestone, and Cann teaches the limitations of claim 1.

3. Analysis of Claims 2, 4, and 6

Claim 2 depends from claim 1 and recites “said source is external.” Claim 4 depends from claim 1 and recites “said sensor is external.” Claim 6

depends from claim 1 and recites “said energy being collimated.” Petitioner relies on Figures 1, 6, 15, and 18 of Pelc as depicting an external energy source and sensor. Pet. 72 (citing Ex. 1015, Figs 1, 6, 15, and 18; Ex. 1007 ¶¶ 630–31). .” Petitioner argues “Pelc discloses the radiation source ‘includes an x-ray tube together with filter and collimator’” *Id.* (citing Ex. 1015, 14:24–25, 22:10–11). Petitioner further argues “the FDA required all X-ray imaging devices to use restricted beams well before the priority date.” *Id.* (citing Ex. 1007 ¶¶ 636–37; Ex. 1025, 566).

Patent Owner does not respond to the Petitioner’s aforementioned arguments, but nonetheless the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378. On the present record and for purposes of institution, we are persuaded of a reasonable likelihood that Pelc, Xu, Milestone, and Cann teach the external placement of sources and sensors and that the energy is collimated.

III. CONCLUSION

For the foregoing reasons and on the present record, we determine that the information presented in the Petition is sufficient to demonstrate a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of claims 1, 2, 4, and 6 of the ’262 Patent.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the ’262 Patent is hereby instituted commencing on the entry date of this Decision, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; and

FURTHER ORDERED that the *inter partes* review is instituted on all challenged claims on all challenges of unpatentability asserted in the Petition.

IPR2020-00672
Patent 6,944,262 B2

FOR PETITIONER:

Aaron Maurer
Andrew Trask
WILLIAMS & CONOLLY LLP
amaurer@wc.com
atrask@wc.com

FOR PATENT OWNER:

Seth H. Ostrow
Antonio Papageorgiou
Sarah Pfeiffer
MEISTER SEELIG & FEIN LLP
sho@msf-law.com
ap@msf-law.com
sap@msf-law.com