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Paper No. 11
Date: October 20, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ANATOMAGE, INC.,

Petitioner,

v.

SIRONA DENTAL SYSTEMS GMBH,

Patent Owner.

Case IPR2015-01057
Patent 6,319,006 B1

Before MEREDITH C. PETRAVICK, BENJAMIN D. M. WOOD, and BRIAN P. MURPHY, *Administrative Patent Judges.*

MURPHY, *Administrative Patent Judge*.

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

I. INTRODUCTION

Anatomage, Inc. ("Petitioner") filed a Petition requesting an *inter partes* review of claims 1–10 (all claims) of U.S. Patent No. 6,319,006 B1 (Ex. 1001, "the '006 patent"). Paper 1 ("Petition" or "Pet."). Sirona Dental Systems GmbH ("Patent Owner") filed a Preliminary Response to the Petition. Paper 9 ("Prelim. Resp."). We have statutory authority under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

Petitioner challenges claims 1–4 and 9–10 of the '006 patent as unpatentable under 35 U.S.C. §§ 102 and 103 and claims 5–8 under 35 U.S.C. § 103. Pet. 5. Based on the information presented in the Petition and Preliminary Response, we are persuaded there is a reasonable likelihood Petitioner would prevail with respect to at least one claim challenged in the Petition. Therefore, for the reasons given below, we institute *inter partes* review of claims 1–7 and 9–10 of the '006 patent.

A. Related Proceedings

The parties identify the following as related district court proceedings regarding the '006 patent: *Sirona Dental Systems GmbH v. Anatomage, Inc.*, No. 1:14-cv-00540-LPS (D. Del.), filed April 24, 2014; *Sirona Dental Systems GmbH v. Dental Wings Inc.*, No. 1:14-cv-00460-LPS (D. Del.), filed April 11, 2014; *Sirona Dental Systems GmbH v. Dentsply IH Inc*., No. 1:14-cv-00538-LPS (D. Del.), filed April 24, 2014; *Sirona Dental Systems GmbH v. OnDemand3D Technology Inc*., No. 1:14-cv-00539-LPS (D. Del.),

filed April 24, 2014; *Sirona Dental Systems GmbH v. 3Shape*, No. 1:15-cv-00278-LPS (D. Del.), filed March 30, 2015. Pet. 2–3; Paper 5, 2–3.

B. Proposed Grounds of Unpatentability

Petitioner advances multiple grounds of unpatentability under 35 U.S.C. §§ 102 and 103 in relation to all challenged claims in the '006 patent:

Reference[s]	Statutory Basis	Challenged Claims
Mushabac[1]	§ 102	1–4, 9–10
Fortin[2]	§ 102	1–4, 9–10
Bannuscher[3]	§ 102	1–3, 9–10
Fortin or Bannuscher, and Mushabac, Massen,[4] or Willer[5]	§ 103	1–4, 9–10
Mushabac and Poirier[6]	§ 103	5
Fortin and Poirier	§ 103	5
Bannuscher and Poirier	§ 103	4 and 5
Mushabac, Fortin, or Bannuscher and Weese[7]	§ 103	6 and 7

[1] Mushabac, U.S. Patent No. 5, 562,448, filed August 9, 1991, issued October 8, 1996. Ex. 1003 ("Mushabac").
[2] Fortin et al., *Computer-Assisted Dental Implant Surgery Using Computed Tomography*, 1 J. IMAGE GUIDED SURGERY 53 (1995). Ex. 1004 ("Fortin").
[3] Bannuscher, DE 19510294 A1, filed March 22, 1995, published October 2, 1996. Ex. 1005 ("Bannuscher").
[4] Massen, U.S. Patent No. 5,372,502, filed November 7, 1991, issued December 13, 1994. Ex. 1006 ("Massen").
[5] Willer et al., *Computer-assisted milling of dental restorations using a new CAD/CAM data acquisition system*, 80 (3) J. PROSTH. DENT. 346 (1998). Ex. 1007 ("Willer").
[6] Poirier, U.S. Patent No. 5,725,376, filed February 26, 1997, issued March 10, 1998. Ex. 1008 ("Poirier").
[7] Weese et al., *An Approach to 2D/3D Registration of a Vertebra in 2D X-ray Fluoroscopies with 3D CT Images*, CVR-Med-MRCAS'97, 1205 LECTURE NOTES IN COMPUTER SCIENCE 119 (1997). Ex. 1009 ("Weese").

Fortin and Weese	§ 103	8

Petitioner also supports its challenge with a Declaration by Dr. Richard A. Kraut, D.D.S. ("Kraut Decl.") (Ex. 1002).

C. The '006 Patent

The '006 patent, titled "Method for Producing a Drill Assistance Device for a Tooth Implant," issued November 20, 2001 from an application filed October 31, 2000.[8] Ex. 1001. The '006 patent is directed to a method for producing a drill assistance device for tooth implant surgery. *Id.* at Abstract. The method allows for optimal determination of a bore hole to be drilled into a person's jaw, by using a combination of X-ray and three-dimensional ("3-D") optical imaging to measure the person's jaw and teeth. *Id.* "Measured data records" are compiled for the X-ray and 3-D optical images and then "correlated" to define the optimal location, angle and depth of a bore hole. *Id.* at 2:16–28. A drill template based on the correlated X-ray and 3-D optical data contains a pilot hole that corresponds to the bore hole to be drilled in the person's jaw for fastening the tooth implant in position. *Id.* at 2:32–38.

Figure 5 of the '006 patent, showing an exemplary drill assistance device, is reproduced below.

[8] The '006 Patent claims foreign application priority to a German patent application, DE 19952962, filed November 3, 1999. Ex. 1001, 1 (30).

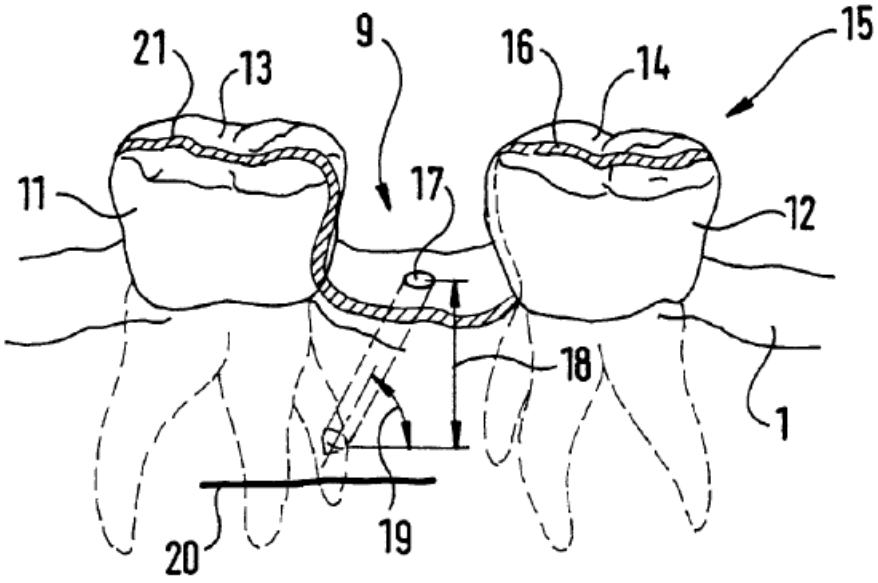

Figure 5, above, shows neighboring teeth 11 and 12 separated by implant space 9. *Id.* at 4:25–26. Drill assistance device 16 attaches to teeth 11 and 12 and includes pilot hole 17, which is positioned in the implant space and set at angle 19. *Id.* at 4:51–58. Depth 18 corresponds to the desired depth of the bore hole, defined to avoid nerve 20. *Id.* at 2:39–45, 4:58–62.

Claim 1 of the ’006 patent is illustrative and reproduced below.

1. Method for producing a drill assistance device for a tooth implant in a person’s jaw, comprising the following process steps:

taking an x-ray picture of the jaw and compiling a corresponding measured data record,

carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and of the teeth and compiling a corresponding measured data record,

correlating the measured data records from the x-ray picture and from the measured data records of the three-dimensional optical measuring,

determinating the optimal bore hole for the implant, based on the x-ray picture, and

determinating a pilot hole in a drill template relative to surfaces of the neighboring teeth based on the x-ray picture and optical measurement.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, we construe claim terms of an unexpired patent according to their broadest reasonable interpretation in light of the patent specification. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015). Under the broadest reasonable interpretation standard, we assign claim terms their ordinary and customary meaning, as understood by one of ordinary skill in the art, in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

1. "carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and of the teeth"

Petitioner proposes constructions for several claim limitations, but we determine there is no need to provide an express construction of these limitations beyond their ordinary and customary meaning, with one exception. Petitioner argues that the claim phrase "carrying out a three-dimensional optical measuring" should be construed to mean obtaining a visual representation of the actual physical proportions of the visible

surfaces of the jaw and teeth. Pet. 11–12. Petitioner argues that the '006 patent claims a "visual representation" because the 3-D image allows a dentist to see the visible proportions of a patient's mouth and the structures therein. *Id.* at 12 (citing Ex. 1001, 2:51–60). Patent Owner responds that Petitioner's proposed construction reads the words "three-dimensional optical measuring" out of the claim and fails to preserve the recited distinction between X-ray imaging and 3-D optical (light based[9]) imaging. Prelim. Resp. 10–11.

Claim 1 requires both "taking an x-ray picture of the jaw" and "carrying out a three-dimensional optical measuring" of the jaw and teeth. Ex. 1001, 5:5–8. The x-ray can be "a panoramic tomography picture, a tomosynthetic image or . . . [a] computer tomography[CT]" image. *Id.* at 2:46–48. Such x-ray techniques image the internal structures of the jaw. Ex. 1002 ¶¶ 25–26. The '006 patent distinguishes an x-ray from 3-D optical measuring and describes 3-D optical measuring as an "optical image" of the "visible surfaces . . . visible proportions . . . and visible structures" of the teeth and jaw. Ex. 1001, 2:49–62; Prelim. Resp. 11–12 (citing Ex. 1001, 2:57–3:11, 3:54–57, 4:23–34).[10] Petitioner's proposed construction is not consistent with the claim language or the specification of the '006 patent,

[9] "[I]nvolving the use of light-sensitive devices to acquire information for a computer." Ex. 2001, 5 (right column).

[10] Petitioner and Dr. Kraut criticize the sufficiency of the description of 3-D optical imaging in the '006 patent (Pet. 11–12; Ex. 1002 ¶ 44), but the question of whether the '006 patent satisfies the written description and enablement requirements of 35 U.S.C. § 112, first paragraph is not before us. *See* 35 U.S.C. § 311(b) ("A petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims of a patent *only* on a ground that could be raised under section 102 or 103 and *only* on the basis of prior art consisting of patents or printed publications." (emphasis added)).

because the proposed construction does not reflect the recited 3-D "optical measuring" of the visible surfaces of a patient's jaw and teeth. Therefore, we construe the phrase "carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and teeth" as "using light to measure the visible surfaces of the jaw and teeth in three dimensions."

2. "determinating a pilot hole in a drill template"

Claim 1 of the '006 patent recites "determinating a pilot hole in a drill template relative to surfaces of the neighboring teeth based on the x-ray picture and optical measurement." Ex. 1001, 5:16–18. Petitioner does not construe the quoted limitation, but Patent Owner construes the first clause of the limitation as referring to "a hole in a drill template through which the drill bit actually passes while drilling a bore hole into a patient's jaw during an implant procedure." Prelim. Resp. 13. The '006 patent describes and illustrates the drill template as a strip of material, adhesively secured onto the teeth adjacent the implant site, that contains a pilot hole. *Id.* at 4:43–54, Fig. 5. The position (location and angle) of the bore hole and corresponding pilot hole in the drill template "is predetermined on the surface of the drill assistance device" and the dental surgeon "determines the depth of the bore hole . . . and transfers the depth to the drill template as a stop." *Id.* at 4:55–62. The dentist can proceed to drill the bore hole "secure in the knowledge of having chosen the optimal pilot hole position." *Id.* at 63–66. In view of the claim language and description of the pilot hole in the '006 patent, we construe the claim phrase "determinating a pilot hole in a drill template" as

"defining a guide hole in a drill template for drilling a bore hole into the person's jaw."[11]

B. Anticipation of Claims 1–4 and 9–10 by Mushabac

Petitioner argues that Mushabac (Ex. 1003) discloses every limitation of claims 1–4 and 9–10 of the '606 patent and, therefore, anticipates the claims pursuant to 35 U.S.C. § 102. Pet. 14, 17–33. Mushabac issued more than one year before the November 3, 1999 foreign application priority date of the '006 patent and is prior art under 35 U.S.C. § 102(b). *Id.* at 14. Petitioner supports its argument with citations to Mushabac that correspond to each limitation of the claims and with Dr. Kraut's Declaration. *Id.* at 17–33 (citing Ex. 1003, Figs. 1, 25, 28; Ex. 1002 ¶¶ 70–108).

Patent Owner argues that Mushabac does not disclose the recited limitation of "determinating a pilot hole in a drill template" because Mushabac does not disclose use of a drill template for guiding a drill bit at the surgical site. Prelim. Resp. 17–18. Patent Owner argues, in particular, that although Mushabac discloses a block of acrylic material 606 in Figure 28 in which a hole is drilled during a practice (virtual) operation, the hole in the acrylic material does not act as a "pilot hole" during an actual drilling operation at the surgical site. *Id.* at 19. Petitioner points out, however, that Mushabac discloses "[t]he hole in block 606 can then be used as a template to guide, limit or control the motions of an implant drill during an actual operation on the patient's jaw bone 558." Ex. 1003, 26:62–27:11, Fig. 28; Ex. 1002 ¶¶ 94–95. On the present record, and recognizing that Patent Owner has not yet had an opportunity to submit new testimonial evidence in

[11] Antecedent basis for "the person's jaw" is provided in the preamble. Ex. 1001, 5:2–3.

support of its argument,[12] we are persuaded Petitioner has provided adequate evidence to show a reasonable likelihood of prevailing in its assertion that Mushabac anticipates claims 1–4 and 9–10 of the '006 patent.

C. Anticipation of Claims 1–4, 9–10 by Fortin

Petitioner argues that Fortin (Ex. 1004) discloses every limitation of claims 1–4 and 9–10 of the '606 patent and, therefore, anticipates the claims pursuant to 35 U.S.C. § 102. Pet. 14–15, 33–41. Fortin published in 1995, more than one year before the November 3, 1999 foreign application priority date of the '006 patent, and Fortin is prior art under 35 U.S.C. § 102(b). *Id.* at 15. Petitioner supports its argument with citations to Fortin that correspond to each limitation of the claims and with Dr. Kraut's Declaration. *Id.* at 33–41 (citing Ex. 1004, Figs. 2, 3, 8, 9; Ex. 1002 ¶¶ 112–140).

Patent Owner argues that Fortin does not disclose the recited limitation of "carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and of the teeth." Prelim. Resp. 20–23. Patent Owner argues that, although Fortin discloses optical (laser) imaging of the external surface of a "splint" (resin mouthpiece) that covers a plaster model of the upper jaw of a patient, the external surface of the splint is smooth and does not permit measurement of the visible surface of the patient's teeth and jaw. *Id.* at 21–22 (citing Ex. 1004, 3–5 (Figs. 7–9)). Patent Owner argues that the internal surface of the splint and the supporting plaster model of the patient's jaw and teeth "are neither visible to the cameras nor accessible to the 'sharp tip' of the 'second rigid body' [probe] in Fig. 7." *Id.* at 22.

[12] 37 C.F.R. § 42.107(c) ("The preliminary response shall not present new testimony evidence beyond that already of record, except as authorized by the Board.").

We agree with Patent Owner. Fortin describes a "splint" made of "autopolymerized clear acrylic resin" that covers the entire upper jaw and serves as a "radiographic template." Ex. 1004, 1 (right column ¶ 1). Fortin illustrates the imaged "external surface" of the splint as a smooth surface, shown in Figures 7 and 8 reproduced below.

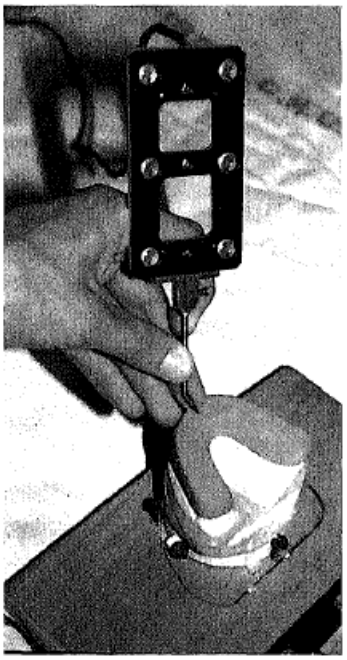

Fig. 7. The splint and a rigid body are firmly attached to define the splint reference coordinate system. A second rigid body equipped with a sharp tip is used to collect points on the splint surface.

Fig. 8. Registration of the 3D points acquired by the pointer with the splint surface segmented on CT images. (a) Initial position. (b) Final position.

Figures 7 and 8, above, show the smooth external surface of the splint covering the plaster mold of the patient's jaw and teeth (Fig. 7) and the optical 3-D points of the external surface are registered with a CT scan (Fig. 8). By implication, the internal surface of the splint and supporting plaster model contain the cast or impression of the visible surfaces of the patient's upper teeth and jaw, not the smooth external surface of the splint that is optically imaged. Petitioner does not address the issue, relying instead on a

claim construction that we have rejected. Pet. 35 (citing Kraut Dec. Ex. 1002 ¶¶ 123–25). Therefore, we determine Petitioner has not provided adequate evidence to show a reasonable likelihood of prevailing in its assertion that Fortin anticipates claims 1–4 and 9–10 of the '006 patent.

D. Anticipation of Claims 1–3 and 9–10 by Bannuscher

Petitioner argues that Bannuscher (Ex. 1005) discloses every limitation of claims 1–3 and 9–10 of the '606 patent and, therefore, anticipates the claims pursuant to 35 U.S.C. § 102. Pet. 15, 41–48. Bannuscher published on October 2, 1996, more than one year before the November 3, 1999 foreign application priority date of the '006 patent, and Bannuscher is prior art under 35 U.S.C. § 102(b). *Id.* at 15. Petitioner supports its argument with citations to Bannuscher that correspond to each limitation of the claims and with Dr. Kraut's Declaration. *Id.* at 41–48 (citing Ex. 1005; Ex. 1002 ¶¶ 144–168).

Patent Owner argues that Bannuscher does not disclose the recited limitation of "carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and of the teeth." Prelim. Resp. 23–24. Patent Owner argues that Bannuscher discloses use of plaster molds of the patient's jaw and teeth, but not an "optical measuring" of the patient's jaw and teeth. *Id.* Patent Owner is correct.

The "three-dimensional model geometry of the mouth and jaw area" disclosed in Bannuscher refers to a three-dimensional plaster model. Ex. 1005, 2 (right column ¶ 3), 5 (right column ¶¶ 1–2 ("[I]mpressions of the oral situation . . . are once poured and molded by the dental technician. . . . The three-dimensional plaster models and the X-ray image are now entered . . . into a computer by digital transmission.")). Petitioner does not argue that

Bannuscher discloses a 3-D optical measuring of the visible surfaces of the teeth and jaw. Ex. 1005, 5. Petitioner argues only that "Bannuscher discloses obtaining *a 3-D measuring* of the physical characteristics of a patient's jaw and teeth" (emphasis added), and relies on a proposed claim construction that we have rejected. Pet. 42–43 (citing Kraut Dec. Ex. 1002 ¶¶ 147–49). Therefore, we determine Petitioner has not provided adequate evidence to show a reasonable likelihood of prevailing in its assertion that Bannuscher anticipates claims 1–3 and 9–10 of the '006 patent.

E. Obviousness of Claims 1–4 and 9–10 Over Fortin or Bannuscher, and Mushabac, Massen, or Willer

Petitioner, focusing on the 3-D "optical measuring" limitation, argues in the alternative that claims 1–4 and 9–10 would have been obvious over either Fortin or Bannuscher when combined with either Mushabac, Massen, or Willer. Pet. 49 (citing Ex. 1002 ¶¶ 170–188). Petitioner argues that a person of ordinary skill in the art would have selected any of the optical imaging techniques disclosed in Mushabac, Massen, or Willer as a substitute for use in the methods of Fortin or Bannuscher, with a reasonable expectation of success. *Id.* at 50–52 (citing Ex. 1002 ¶¶ 177–79). Massen and Mushabac discuss the use of optical scanning to obtain images of the teeth that are adjacent to areas in which implants are to be placed. Ex. 1002 ¶ 177. Willer utilizes optical scanning in the context of dental crowns and bridges that can be fabricated from optical scans of a patient's teeth and jaw. *Id.* Petitioner argues that a person of ordinary skill would have been motivated to use the optical scanning methods of Mushabac, Massen, or Willer in either Fortin or Bannuscher "for possibly providing greater realism or clarity" of the patient's jaw and teeth. Pet. 50 (citing Ex. 1002 ¶ 179).

We agree with Patent Owner that Petitioner's evidence of obviousness lacks sufficient detail and persuasiveness regarding how any of the asserted combinations would operate and why one of ordinary skill would have made the posited "simple substitution" (Ex. 1002 ¶ 178) with a reasonable expectation of success. Prelim. Resp. 25–28. Petitioner and Dr. Kraut do not provide a technical explanation and detailed analysis to support their conclusions that (i) different methods of obtaining three-dimensional images of a patient's teeth and were known to be "interchangeable" with 3-D optical imaging, and (ii) it would have been obvious for one of ordinary skill to try the 3-D optical measuring techniques of Mushabac, Massen, and Willer in Fortin or Bannuscher with a reasonable expectation of success. Pet. 50 (citing Ex. 1002 ¶¶ 177–78). For example, as explained in section II.C., above, Fortin already discloses use of optical (laser-guided) imaging to scan the smooth external surface of the splint, but Fortin does not scan any visible surfaces of the teeth and jaw, which are inside the splint and not "visible" for optical scanning according to the Fortin method. Petitioner and Dr. Kraut do not address this fundamentally different aspect of the Fortin method or explain how combining Fortin with Mushabac, Massen, or Willer would yield a different result.

Petitioner's proposed combinations involving Bannuscher fare no better. Petitioner and Dr. Kraut do not explain how and why the proposed substitution of an optical imaging technique would be used in place of Bannuscher's plaster cast method by a person of ordinary skill with a reasonable expectation of success. Would the person of ordinary skill optically image the 3-D plaster casts of the patient's jaw and enter the data digitally into the computer or would they omit making casts altogether and

directly image the patient's jaw and teeth? Why and how would a person of ordinary skill do such a thing? Why would there be a reasonable expectation of success if they had done so? Petitioner and Dr. Kraut do not answer these questions other than with generalities, rather than specifics.

In sum, Petitioner relies on conclusory statements and does not provide a detailed technical explanation based on the specific disclosures of the references to explain precisely how and why the proposed combinations would work in practice. Pet. 50–52 (citing Ex. 1002 ¶¶ 176–79). In the absence of a more persuasive analysis to explain how and why the proposed combinations would satisfy the independent claim limitation of "carrying out a three-dimensional optical measuring of the visible surfaces of the jaw and of the teeth," we determine Petitioner has not shown a reasonable likelihood of prevailing in its argument for the asserted obviousness of claims 1–4 and 9–10.

F. Obviousness of Claim 5 Over Mushabac and Poirier

Claim 5 of the '006 patent depends from claim 4, which depends from claim 1, and claim 5 recites a "ball shaped body" that is attached to a patient's teeth and used as a reference marker for correlating the X-ray and 3-D optical images. Ex. 1001, 6:3–4. Petitioner points out that Mushabac discloses the use of "T-shaped" radio-opaque markers attached to a patient's teeth for implementing such a correlation, and Mushabac also recognizes other shapes may be used. Pet. 53 (citing Ex. 1003, 27:58 ("Although FIG. 29 shows T-shaped reference elements, it is to be understood that numerous other shapes may be used.")). Poirier discloses use of "spherical" radio-opaque reference markers for correlating different dental images. *Id.* at 52–53 (citing Ex. 1008, 5:46–62). Petitioner argues that it would have been

obvious in view of Mushabac for one of ordinary skill to use reference markers of other shapes, including the spherical reference marker of Poirier, to permit correlation of X-ray and 3-D optical images. *Id.* at 53 (citing Ex. 1002 ¶¶ 189–196).

Patent Owner repeats its argument that Mushabac does not anticipate claim 1. Based on the present record, we are persuaded Petitioner has provided sufficient evidence to show a reasonable likelihood of prevailing in its assertion that claim 5 of the '006 patent would have been obvious to a person of ordinary skill in the art over Mushabac and Poirier as of the November 3, 1999 priority date of the '006 patent.

G. Obviousness of Claim 5 over Fortin and Poirier

Petitioner argues that claim 5 also is obvious over the combination of Fortin and Poirier. Pet. 53–54 (citing Ex. 1002 ¶¶ 189–196). Petitioner relies on Poirier for its disclosure of a "ball shaped marker," but does not argue that Poirier cures the deficiency of Fortin explained in section II.C, above, with respect to the limitation of a 3-D "optical measuring" step. *Id.* Therefore, we determine Petitioner has not shown a reasonable likelihood of prevailing in its assertion of the obviousness of claim 5 over Fortin and Poirier.

H. Obviousness of Claims 4 and 5 Over Bannuscher and Poirier

Petitioner argues that claims 4 and 5 are obvious over the combination of Bannuscher and Poirier. Pet. 54–55 (citing Ex. 1002 ¶¶ 197–201). Petitioner relies on Poirier for its disclosure of a "ball shaped marker," but does not argue that Poirier cures the deficiency of Bannuscher explained in section II.D, above, with respect to the limitation of a 3-D "optical

measuring" step. *Id.* Therefore, we determine Petitioner has not shown a reasonable likelihood of prevailing in its assertion of the obviousness of claims 4 and 5 over Bannuscher and Poirier.

I. Obviousness of Claims 6 and 7 Over Mushabac, Fortin, or Bannuscher, and Weese

Claim 6 of the '006 patent depends from claim 1 and recites "wherein the measured data records of the three-dimensional measurement are converted to a pseudo-x-ray picture." Ex. 1001, 6:5–7. Claim 7 depends from claim 6 and recites "wherein the x-ray picture and the pseudo-x-ray picture are superimposed from several directions." *Id.* at 6:10–12. The '006 patent describes conversion of measured data records of the 3-D optical image to a pseudo-x-ray "assuming standard x-ray absorption values." *Id.* at 3:1–3. Petitioner argues that either Mushabac, Fortin, or Bannuscher, in combination with Weese, would have rendered claims 6 and 7 obvious to one of ordinary skill in the art. Pet. 56–59 (citing Ex. 1002 ¶¶ 202–216). Patent Owner repeats the arguments that neither Mushabac, Fortin, nor Bannuscher anticipate claim 1. Prelim. Resp. 38.

Weese discloses the correlation of x-ray pictures with three-dimensional CT images in order to improve "the placement of pedicle screws in spine surgery." Ex. 1009, 1. The pedicle screws "must accurately be drilled into the vertebra to avoid damage, especially to the spinal cord." *Id*. Weese discloses a method "based on the computation of pseudo projections [pseudo x-rays] from the CT image which are correlated to the x-ray projection." *Id.* at 2; Ex. 1002 ¶ 209. Weese further teaches that the computation of the pseudo x-rays from the 3-D CT image factors-in standard x-ray absorption values: "[t]he absorption coefficients depend on the energy

of the x-ray beam. . . . [therefore] the gray-values in the pseudo projection are scaled with a proper factor." Ex. 1009, 4.

We are persuaded by Petitioner's argument and evidence with respect to the combination of Mushabac and Weese. Dr. Kraut opines that a person of ordinary skill would find the use of pseudo x-rays desirable to correlate with x-ray images because "it would have eliminated the need to use radiopaque markers, which are more prone to human error in the correlation process." Ex. 1002 ¶ 207. Dr. Kraut also explains that Weese's conversion technique is completely applicable to the 3-D imagery disclosed in Mushabac. *Id.* ¶ 211. On the other hand, Weese does not cure the deficiencies in Fortin and Bannuscher explained above.

Therefore, based on the present record, we determine Petitioner has provided adequate evidence to show a reasonable likelihood of prevailing in its assertion that claims 6 and 7 of the '006 patent would have been obvious to one of ordinary skill in the art over Mushabac and Weese.

J. Obviousness of Claim 8 over Fortin and Weese

Claim 8 depends from claim 7 and recites "wherein the x-ray picture comprises at least two individual panoramic images showing longitudinal and transverse sections of the jaw." Ex. 1001, 6:13–15. Petitioner argues that claim 8 is obvious over Fortin and Weese. Pet. 59–60 (citing Ex. 1002 ¶¶ 217–220). Petitioner relies on Weese for its disclosure of a "pseudo-x-ray," but does not argue that Weese cures the deficiency of Fortin explained in section II.C, above, with respect to the limitation of a 3-D "optical measuring" step. *Id.* Therefore, we determine Petitioner has not shown a reasonable likelihood of prevailing in its assertion of the obviousness of claim 8 over Fortin and Weese.

III. CONCLUSION

Petitioner has demonstrated a reasonable likelihood of prevailing with respect to claims 1–7 and 9–10 challenged in this Petition, based on certain grounds asserted and discussed above. At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claims.

IV. ORDER

ORDERED that pursuant to 35 U.S.C. § 314, *inter partes* review is instituted as to claims 1–7 and 9–10 of the '006 patent on the following grounds of unpatentability:

Claims 1–4 and 9–10 of the '006 patent as anticipated by Mushabac pursuant to 35 U.S.C. § 102(b);

Claim 5 of the '006 patent as obvious over Mushabac and Poirier pursuant to 35 U.S.C. § 103; and

Claims 6 and 7 of the '006 patent as obvious over Mushabac and Weese pursuant to 35 U.S.C. § 103.

FURTHER ORDERED that *inter partes* review is commenced on the entry date of this Order, 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 trial is limited to the grounds of unpatentability listed above, and no other grounds of unpatentability are authorized for *inter partes* review.

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