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Paper 10
Entered: October 13, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZIMMER BIOMET HOLDINGS, INC. and
ZIMMER DENTAL INC.,
Petitioner,

v.

FOUR MILE BAY, LLC,
Patent Owner.

Case IPR2015-01058
Patent 8,684,734 B1

Before BENJAMIN D. M. WOOD, RICHARD E. RICE, and TIMOTHY J. GOODSON, *Administrative Patent Judges.*

RICE, *Administrative Patent Judge*.

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

I. INTRODUCTION

Zimmer Biomet Holdings, Inc. and Zimmer Dental Inc. (collectively, "Petitioner") filed a Petition (Paper 2, "Pet.") requesting an *inter partes* review of claims 1–3, 5–10, 12–15, and 17–27 ("the challenged claims") of U.S. Patent No. 8,684,734 B1 (Ex. 1001, "the '734 Patent"). Four Mile Bay, LLC ("Patent Owner") filed a Preliminary Response (Paper 8, "Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Petitioner has shown a reasonable likelihood that it would prevail with respect to all of the challenged claims, and, accordingly, we institute an *inter partes* review with respect to those claims.

A. Related Proceedings

We are informed that Petitioner is named in a federal district court case involving the '734 Patent (*Four Mile Bay LLC v. Zimmer Holdings, Inc. et al.*, No. 3:14-CV-1300 (N.D. Ind.) (JVB)-(JEM)). Pet. 1; Paper 5, 2. We also are informed that Petitioner has filed a second Petition seeking *inter partes* review with respect to the '734 Patent. Pet. 1; Paper 5, 2; *see* Case IPR2015-01059, Paper 1.

B. The '734 Patent

The '734 Patent, titled "Dental Implant with Porous Body," issued from U.S. Application No. 13/571,375, filed August 10, 2012. Ex. 1001, at [54], [21], [22]. The '734 Patent states that it is a continuation-in-part of U.S. Application No. 13/195,872, filed on August 2, 2011, now U.S. Patent No. 8,297,974 B1, which is a continuation of a number of earlier-filed

applications, including U.S. Application No. 10/375,343, filed on February 27, 2003, now U.S. Patent No. 7,291,012 ("the '012 Patent"). *Id.* at [63]. Petitioner's annotated version of Figure 2 of the '734 Patent is reproduced below.

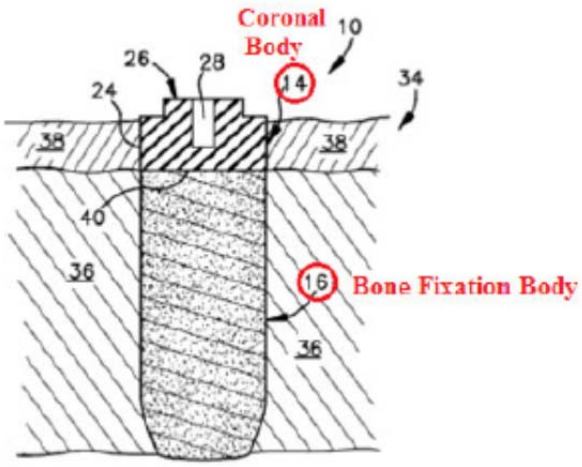


Fig. 2

Pet. 4.

As illustrated in Petitioner's annotated Figure 2, dental implant 10, which comprises coronal body 14 and bone fixation body 16, is embedded in jawbone 34 of a patient. Ex. 1001, 2:34–37, 62–63, Fig. 2. As described in the Specification, "bone fixation body 16 has a porous structure that extends from the outer surface and throughout the body." *Id.* at 3:1–2. The Specification further describes the porous structure as follows:

> Preferably, the average pore diameter of body 16 is about 40 μm to about 800 μm with a porosity from about 45% to 65%. Further, the interconnections between pores can have a diameter larger than 50–60 microns. In short, the geometric configuration of the porous structure should encourage natural bone to migrate and grow into and throughout the entire body 16.

Id. at 3:11–17. The Specification describes various materials and processes for forming the porous structure. *Id.* at 12:45–13:11. In one example, the porous structure is formed by coating a solid or hollow skeleton with a polymer, a metal, and/or a metal alloy, for example, coating a carbon skeleton with tantalum using a vapor deposition process. *Id.* at 13:1–4. The Specification additionally describes that "the porosity of the porous structure can be constant throughout the porous structure or change within the porous structure." *Id.* at 13:16–18.

C. Illustrative Claim

Claims 1, 8, 14, 20, 25, and 27 are independent. Claims 2, 3, and 5–7 depend directly from claim 1; claims 9, 10, 12, and 13 depend directly from claim 8; claims 15 and 17–19 depend directly from claim 14; claims 21–24 depend directly from claim 20; and claim 26 depends directly from claim 25. Claim 1 is illustrative of the claimed subject matter, and is reproduced below:

> 1. A dental implant, comprising:
>
> a coronal body having a proximal end with a connection shaped as a polygon to receive a dental component, having a distal end surface with an elongated protrusion that extends outwardly therefrom, and being formed of solid metal; and
>
> an elongated cylindrical porous body formed as a porous metal structure that is uniform and that includes a proximal end that engages the distal end surface of the coronal body at an interface,
>
> wherein the distal end surface of the coronal body has a circular shape, the proximal end of the porous body has a circular shape, and the solid metal of the circular shape of the coronal body interfaces with the porous metal structure of the

> circular shape of the porous body at the interface, and
>
> wherein the elongated protrusion of the coronal body includes a polygonal shape that extends into an opening of the porous body such that the porous metal structure completely surrounds and engages an exterior surface of the elongated protrusion that extends into the porous body.

Id. at 13:49–14:3.

D. The Asserted References

Petitioner relies upon the following references (Pet. 3):

Reference	Publication No.	Date	Exhibit No.
Lomicka	US 2011/0123951 A1	May 26, 2011	Ex. 1006
Bhaduri	US 2002/0106611 A1	Aug. 8, 2002	Ex. 1007

E. The Asserted Grounds

Petitioner challenges claims 1–3, 5–10, 12–15, and 17–27 of the '734 Patent on the following grounds (Pet. 3):

Reference(s)	Basis	Claims Challenged
Lomicka	§ 102(b)	1–3, 5–10, 12–15, 17–21, 23, 24, and 27
Lomicka	§ 103(a)	22
Lomicka and Bhaduri	§ 103(a)	25 and 26

II. ANALYSIS

We turn now to Petitioner's asserted grounds of unpatentability to determine whether Petitioner has met the threshold standard of 35 U.S.C. § 314(a) for instituting review.

A. Claim Construction

As a first step in our analysis, we determine the meaning of the claims. In an *inter partes* review, the Board gives claim terms in an unexpired patent their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278, 1279 (Fed. Cir. 2015) ("We conclude that Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA" and "the standard was properly adopted by PTO regulation."). Under the broadest reasonable interpretation standard, and absent any special definition, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire 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 with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

> Petitioner contends that a person of ordinary skill in the art
>
> would have had an undergraduate degree in a relevant engineering field (e.g., Mechanical Engineering, Materials Science Engineering, Biomedical Engineering) with 3–5 years of experience with dental implants or similar implants or a graduate degree in a relevant field with 1–3 years of experience with dental implants or similar implants.

Pet. 12–13 n.2 (citing Ex. 1002 ¶ 10). Patent Owner agrees. Prelim. Resp. 5 n.2. For purposes of this Decision, we adopt Petitioner's definition.

1. "porous" and "porosity"

The Specification provides the following lexicographical definition of "porous": "By 'porous,' it is meant that the material at and under the surface

is permeated with interconnected interstitial pores that communicate with the surface." Ex. 1001, 3:3–5. For purposes of this Decision, we regard this definition as the broadest reasonable interpretation of the term "porous."

The Specification uses the term "porosity" in accordance with its ordinary meaning as the ratio or percentage of the volume of interstices of a material relative to the volume of its mass. *See id.* at 3:11–13 (stating that the "porosity" of the porous structure of body 16 is preferably "from about 45% to 65%"); EX. 3001(MERRIAM WEBSTER'S COLLEGIATE DICTIONARY (10th ed. 1993)), 907 (porosity: "the ratio of the volume of interstices of a material to the volume of its mass").

2. "a porous . . . structure that is uniform," "a uniform porosity," and "a uniform porous . . . structure"

Claim 1 recites "a porous . . . structure that is uniform" (Ex. 1001, 13:55–56); claims 8 and 14 each recite "a uniform porosity" (*id.* at 14:46–47, 15:9–10); and claims 20, 25, and 27 each recite "a uniform porous . . . structure" (*id.* at 16:5, 32, 58–59). Petitioner refers collectively to these claim terms as the "uniform porosity features," and contends that they "should be construed together to have the same meaning," i.e., to require "a porous body or structure having a constant porosity throughout the body or structure." Pet. 13–14.

In support of its proposed claim construction, Petitioner argues that "[t]he plain and ordinary meaning of 'uniform' is 'not varying or changing' or 'constant.'" Pet. 14 (citing Ex. 1010, 1368; Ex. 1014, 1561). Although the term "uniform" is not used in the Specification outside of the claims, Petitioner argues that the Specification supports its construction where it "contrasts the porous structure having 'constant' porosity with a porous

structure in which the porosity 'change[s] within the porous structure.'" *Id.* at 15 (quoting Ex. 1001, 13:16–18).

Petitioner acknowledges that the Board reached a different interpretation of the term "uniform" during prosecution of the '012 Patent Application (to which the '734 Patent Application claims priority as a continuation-in-part, as noted above), but argues that the Board's decision in the previous case is inapplicable here because the disclosure of the '734 Patent Application is different from the disclosure of the '012 Patent Specification:

> The Board previously determined that a "completely uniform porous structure" simply refers to a structure in which no part is non-porous. Though the construed phrase has similarities to the uniform porosity features of the '734 patent claims, the Board's finding was made in view of the different disclosure of the original patent and thus does not apply here.

Id. at 18 n.4 (citing Ex. 1003, 39–40). Petitioner asserts that the Board, in the previous case, found no support in the '012 Patent Application for the appellant's argument that the claim term "completely uniform porous structure" required constant porosity and pore size throughout the porous structure. *Id.* at 9. Petitioner argues that the disclosure of the '734 Patent Specification, in contrast, fully supports Petitioner's proposed construction requiring a porous structure having a *constant* porosity throughout the structure. *Id.* at 15 (quoting Ex. 1001, 13:16–18).

Further, Petitioner argues that the doctrine of prosecution history disclaimer supports its proposed claim construction. *Id.* at 15–17. According to Petitioner, the applicant amended the claims of the '734 Patent Application during prosecution to recite the uniform porosity features, and

relied on those features to overcome the Examiner's rejection based on the Otani prior art reference. *Id.* at 16–17. Petitioner particularly relies on the following statement in the applicant's Response to the Examiner's Office Action mailed June 19, 2013:

> Independent claim 21 recites a porous metal structure that is uniform. Independent claim 28 recites a porous body with a uniform porosity. Independent claim 34 recites a porous body with a uniform porosity. Independent claim 40 recites a bone fixation body with a uniform porous metal structure. *By contrast, Otani teaches* a dental implant with a porous coating that has a "pore distribution such that the interior of the fiber material i.e. the core material side, is most dense and *the porosity gradually increases* toward the external surface" (col. 3, lines 35–38).

Id. at 16 (quoting Ex. 1004, 38–39).[1] Petitioner additionally relies on an Applicant-Initiated Interview Summary memorializing the Examiner's agreement that "requiring the porous structure to be 'uniform'" would overcome the rejections based on Otani because "the porosity of the porous layer [of Otani] changes." Ex. 1004, 51, *cited in* Pet. 16; *see* Ex. 1008, 3:35–39 (disclosing "a pore distribution such that the interior of the fiber material i.e. the core material side, is most dense and the porosity gradually increases towards the external surface layer"). Petitioner argues that "the Applicant clearly and unmistakably distinguished Otani's changing porosity within the porous body from the claimed 'uniform' porous body of the claims." Pet. 17 (italics omitted).

[1] We have corrected the quotation to conform with Exhibit 1004, while maintaining Petitioner's emphasis (shown in italics).

In response, Patent Owner argues that "the 'uniform porosity' limitations of the bone fixation body" should be construed to mean "a porous structure having a porosity that extends throughout the body or structure and that does not gradually increase or decrease from the interior of the body or structure to the external surface." Prelim. Resp. 10. Patent Owner relies on the disclosure in the Specification of "a completely porous structure that extends throughout the entire body from the proximal to distal ends" and an "average pore diameter of . . . about 40 μm to about 800 μm with a porosity from about 45% to 65%." *Id.* at 2–3 (citing Ex. 1001, 2:56–58, 3:9–17). Patent Owner also argues that, "based on the prosecution file history, uniform porosity (and equivalent terms) means the entire structure is porous, the porosity of the porous layer does not change, but there is no requirement that porosity or pore size be identical throughout the body." *Id.* at 7.

Upon consideration of the competing arguments, we determine at this stage of the proceeding that the broadest reasonable interpretation consistent with the Specification of "a uniform porosity" is a porosity that is constant throughout a porous structure. We similarly determine that the broadest reasonable construction consistent with the Specification of both "a porous . . . structure that is uniform" and "a uniform porous . . . structure" is a porous structure having a constant porosity throughout the structure. As Petitioner argues, the Specification contrasts a porous structure having constant or uniform porosity with a porous structure in which the porosity changes. Ex. 1001, 13:16–18; *see* Pet. 15.

3. Other claim terms

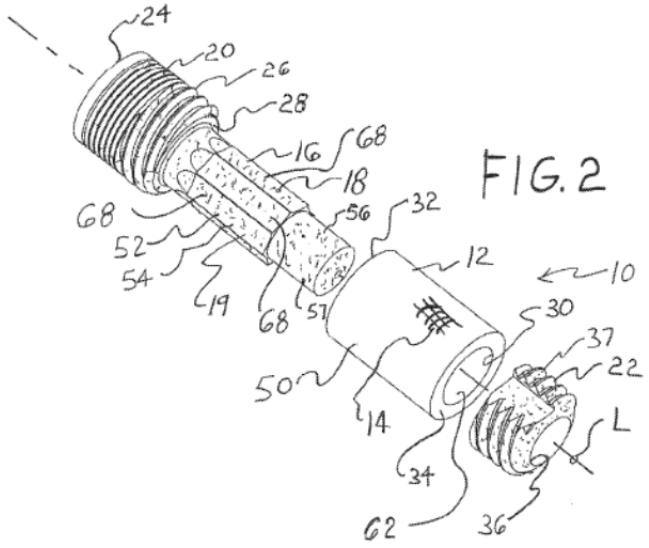
At this stage of the proceeding, none of our determinations regarding Petitioner's proposed grounds of unpatentability requires us to interpret expressly any other claim term.

B. Asserted Anticipation by Lomicka

Anticipation requires all features of a claim to be disclosed within a single reference. *Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008) (holding that, for anticipation, "a single prior art reference must expressly or inherently disclose each claim limitation"). Here, Petitioner contends that claims 1–3, 5–10, 12–15, 17–21, 23, 24, and 27 are unpatentable as anticipated by Lomicka. *See* Pet. 3, 23–48.

1. Overview of Lomicka

Lomicka discloses dental implant 10, which includes head 20, exterior portion 12 made of porous material 14, core 16, and apical portion 22. Ex. 1006 ¶¶ 16, 17. Figure 2 of Lomicka is reproduced below.



Id. at Fig. 2. As shown in Figure 2, exterior portion 12 is placed on or around core 16, and apical portion 22 engages core 16 such that exterior

portion 12 is retained between head 20 and apical portion 22. *Id.* ¶¶ 16, 17. The porous material forming the exterior portion may be a porous tantalum structure fabricated to a uniform porosity. *Id.* ¶¶ 23, 29. Lomicka states:

> [T]he porous tantalum may be fabricated to virtually any desired porosity and pore size, whether uniform or varying, and can thus be matched with the surrounding natural bone in order to provide an improved matrix for bone in-growth and mineralization.

Id. ¶ 29.

2. Dispute over Effective Filing Date

Petitioner contends that the uniform porosity features of the challenged claims were first introduced in the '734 Patent Application and, therefore, the earliest-possible effective filing date of the challenged claims is August 10, 2012, which is the actual filing date of the '734 Patent Application. Pet. 20 (citing Ex. 1004, 122:7–8; Ex. 1003, 160–174); *see* 35 U.S.C. § 120; *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571 (Fed. Cir. 1997) (holding that "to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier application must comply with the written description requirement"). Petitioner argues:

> The '734 patent explicitly states that "the porosity of the porous structure can be constant throughout the porous structure." Ex. 1001 at 13:16–18. By contrast, the earlier-filed applications describe a bone fixation body that is "completely porous," but with varying pore diameter and porosity throughout. *See e.g.*, Ex. 1003 at 165 ("Preferably, the average pore diameter of body 16 is about 40μm to about 800μm with a porosity from about 45% to 65%."). The earlier applications do not describe or show a bone fixation body with the "uniform porosity" features.

> *See generally* Ex. 1003 at 160–174, Ex. 1011 at 94–107, Ex. 1012 at 238–252; *see also* Ex. 1002 at ¶ 28.

Pet. 20. At this stage of the proceeding, we are persuaded by Petitioner's arguments that the earliest-possible effective filing date of the challenged claims is August 10, 2012.

Patent Owner has not persuaded us that the '012 Patent Application, to which the '734 Patent claims priority (*see supra* Section I.B), describes the uniform porosity features, as construed above. Prelim. Resp. 14–16; *see supra* Section II.A.2. Patent Owner's argument that the '012 Patent Application "describ[es] the size and shape of the porous structure as emulating the size and shape of the porous structure of natural bone" is insufficient to show that the porous structure has a constant porosity throughout the structure as required by the claims. Prelim. Resp. 15. Further, Patent Owner's argument that Figures 1 and 2 of the '012 Patent Application show the uniform porosity features also is unpersuasive. *See id.*; *see also Hockerson-Halberstadt, Inc. v. Avia Group Int'l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000) (holding that "patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue").

3. Anticipation Analysis

Petitioner contends that Lomicka, which was published on May 26, 2011, is prior art to the challenged claims under 35 U.S.C. § 102(b). Pet. 21. On the record at this stage of the proceeding, we agree. As discussed above, Patent Owner has not persuaded us that the challenged claims are entitled to the benefit of the earlier filing date of the '012 Patent Application. *See supra* Section II.B.2; Prelim. Resp. 8.

Petitioner argues that Lomicka discloses the limitations of each of claims 1–3, 5–10, 12–15, 17–21, 23, 24, and 27. Pet. 23–48. As to claim 1, for example, Petitioner argues that Lomicka's implant 10 has a "coronal body" comprising head 20 and core 16 and "an elongated cylindrical porous body" comprising exterior portion 12 and porous tantalum portion 40 fabricated to a uniform porosity. *Id.* at 24–26. With respect to the first "wherein" clause of claim 1, Petitioner argues that apical end surface 28 of head 20 has a "circular shape," coronal end 32 of exterior portion 12 has a "circular shape," and the solid metal of the circular shape of head 20 "interfaces" with the porous metal structure 40 of the circular shape of exterior portion 12. *Id.* at 26–27. With respect to the second "wherein" clause of claim 1, Petitioner argues that core 16 may have a "polygon shape" that "extends into" bore 30 of exterior portion 12 such that interior wall 62 of exterior portion 12 "engages" core 16. *Id.* at 28–29.

Having considered the Petition, the Preliminary Response, and the evidence of record, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to its challenge to claims 1–3, 5–10, 12–15, 17–21, 23, 24, and 27 as anticipated by Lomicka.

C. Asserted Obviousness

A claim is unpatentable for obviousness "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject

matter pertains." 35 U.S.C. § 103(a).[2] A patent claim composed of several elements, however, is not proved obvious merely by demonstrating that each of its elements was known, independently, in the prior art. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). In analyzing the obviousness of a combination of prior art elements, it can be important to identify a reason that would have prompted one of skill in the art to combine the elements in the way the claimed invention does. *Id.* A precise teaching directed to the specific subject matter of a challenged claim is not necessary to establish obviousness. *Id.* Rather, "any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id.* at 420. 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, when in evidence. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In the present case, Petitioner contends that claim 22 is unpatentable as obvious over Lomicka and that claims 25 and 26 are unpatentable as obvious over Lomicka and Bhaduri. *See* Pet. 3.

[2] Pub. L. No. 112-29, effective March 16, 2013, changed § 103. Because the '077 Patent has an effective filing date before March 16, 2013, we have quoted the unchanged version of § 103.

1. Claim 22 as Obvious over Lomicka

Petitioner asserts that claim 22 of the '734 Patent would have been obvious over Lomicka. Pet. 48–49. Claim 22 recites: "The dental implant of claim 20, wherein the coronal body is fabricated independently from the bone fixation body and is subsequently fused to the bone fixation body." Ex. 1001, 16:13–15.

Petitioner acknowledges that Lomicka does not disclose fusing exterior portion 12 to head 20, but argues that one skilled in the art would have been motivated to weld or fuse apical end surface 28 of head 20 to coronal end 32 of exterior portion 12 in order "to prevent rotation of exterior portion 12 relative to head 20." Pet. 48 (citing Ex. 1002 ¶ 80). In support of that rationale, Petitioner's declarant, James Earthman, Ph.D., testifies that preventing relative rotation "minimizes wear damage and fatigue at the interface between the exterior portion 12 and head 20, prolonging the life of the implant." Ex. 1002 ¶ 80. Dr. Earthman also testifies that "[w]elding or fusing two components was well-known and within the skill of [the] art at the time of the alleged invention." *Id.*

Having considered the Petition, the Preliminary Response, and the evidence of record, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to its challenge to claim 22 as obvious over Lomicka.

2. Claims 25 and 26 as Obvious over Lomicka and Bhaduri

Petitioner asserts that claims 25 and 26 of the '734 Patent would have been obvious over Lomicka and Bhaduri. Pet. 49–52. For essentially the same reasons as discussed above regarding Lomicka, we are persuaded at this stage of the proceeding that Bhaduri (which was published on August 8,

2002) is prior art to the challenged claims under 35 U.S.C. § 102(b). *See supra* Sections II.B.2 and II.B.3; Pet. 21.

Claim 25 recites, *inter alia*, "machining a coronal body of a dental implant that is formed of solid metal to include a proximal end with a connection shaped to receive a dental component and a distal end surface with an elongated protrusion that extends outwardly therefrom." Ex. 1001, 16:25–29. Claim 26 depends from claim 25 and recites "fusing the porous body to the coronal body after the porous body is separately fabricated from the coronal body." *Id.* at 48–50.

Petitioner argues that Lomicka discloses all limitations of claim 25 except "machining" head 20, and that Bhaduri remedies that deficiency. Pet. 49–50. Bhaduri teaches machining dental implants out of titanium and titanium alloys. Ex. 1007 ¶ 6. Petitioner's declarant, Dr. Earthman, testifies that "machining head 20 would have amounted to nothing more than applying known techniques to a known method to yield predictable results." Ex. 1002 ¶ 83. Petitioner argues that Lomicka and Bhaduri also teach the limitations of claim 26, for the reasons discussed above in connection with claims 22 and 25. Pet. 52.

Having reviewed the Petition, the Preliminary Response, and the evidence of record, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to its challenges to claims 25 and 26 as obvious over Lomicka and Bhaduri.

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has established a reasonable likelihood of prevailing on its challenges to: claims 1–3, 5–10, 12–15, 17–21, 23, 24, and 27 as anticipated by Lomicka; claim

22 as obvious over Lomicka; and claims 25 and 26 as obvious over Lomicka and Bhaduri. The Board has not made a final determination concerning patentability of any of the challenged claims.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review of claims 1–3, 5–10, 12–15, and 17–27 of the '734 Patent is granted;

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '734 Patent is hereby instituted commencing 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 following grounds: claims 1–3, 5–10, 12–15, 17–21, 23, 24, and 27 as anticipated by Lomicka; claim 22 as obvious over Lomicka; and claims 25 and 26 as obvious over Lomicka and Bhaduri.

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