Filed on behalf of: AMO Development, LLC

Entered: January 4, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALCON INC., ALCON VISION, LLC, ALCON LABORATORIES, INC., AND ALCON RESEARCH, LLC,
Petitioner,

v.

AMO DEVELOPMENT, LLC,
Patent Owner.

Case IPR2021-00843
Patent 9,233,023

PATENT OWNER'S NOTICE OF APPEAL

Notice is hereby given, pursuant to 37 C.F.R. § 90.2(a), that Patent Owner AMO Development, LLC ("Patent Owner") appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision entered by the Patent Trial and Appeal Board (the "Board") on November 4, 2022 (Paper 54) (the "Final Written Decision," copy of which is attached hereto as Exhibit A).

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), Patent Owner further indicates that the issues on appeal may include, without limitation:

- Whether the Board erred in determining that Petitioner has shown by a preponderance of the evidence that any of the challenged claims of U.S. Patent No. 9,233,023 B2 are unpatentable as obvious, along with all reasons, findings, opinions, and orders leading thereto or underlying that decision.

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a), this Notice is being filed with the Director of the United States Patent and Trademark Office, and a copy of this Notice is being concurrently filed with PTAB. In addition, a copy of the Notice of Appeal, along with the required docketing fee, is being filed with the Clerk of Court for the United States Court of Appeals for the Federal Circuit.

Respectfully submitted,

Dated: January 4, 2023

By: / Michael A. Morin /

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. § 90.2(a)(1), on this 4th day of January, 2023, I electronically filed the foregoing **PATENT OWNER'S NOTICE OF APPEAL** with the Patent Trial and Appeal Board via P-TACTS, in accordance with 37 C.F.R. § 42.6(b)(1).

I also hereby certify that a true and correct paper copy of the foregoing **PATENT OWNER'S NOTICE OF APPEAL** is being filed by hand with the Director of the United States Patent and Trademark Office at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
Madison Building East, 10B20
600 Dulany Street
Alexandria, VA 22314-5793

I also hereby certify that, pursuant to Federal Circuit Rule 52(a)(2), on the 4th day of January, 2023, a true and correct copy of the foregoing **PATENT OWNER'S NOTICE OF APPEAL** and the filing fee, were filed with the Clerk's Office of the U.S. Court of Appeals for the Federal Circuit via CM/ECF.

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 4th day of January, 2023, a true and correct copy of the foregoing **PATENT OWNER'S NOTICE OF APPEAL** was served by electronic mail on Petitioner's lead and backup counsel at the following email addresses:

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EXHIBIT A

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571-272-7822

Paper 54
Date: November 4, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ALCON INC., ALCON VISION, LLC, ALCON LABORATORIES, INC., and ALCON RESEARCH, LLC.,
Petitioner,

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AMO DEVELOPMENT, LLC,
Patent Owner.

IPR2021-00843
Patent 9,233,023 B2

Before SHERIDAN K. SNEDDEN, JON B. TORNQUIST, and RYAN H. FLAX, *Administrative Patent Judges.*

TORNQUIST, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. Background and Summary

Alcon Inc., Alcon LenSx, Inc., Alcon Vision, LLC, Alcon Laboratories, Inc., and Alcon Research, LLC (collectively "Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–17 of U.S. Patent No. 9,233,023 B2 (Ex. 1004, "the '023 patent"). AMO Development, LLC ("Patent Owner") filed a Preliminary Response to the Petition. We authorized Petitioner to file a reply addressing the prior art status of a relied-upon reference (Paper 11, "Preliminary Reply"), to which Patent Owner filed a sur-reply (Paper 13). Upon review of the parties' arguments and supporting evidence, we instituted review. Paper 15 ("Decision" or "Dec.").

Patent Owner subsequently filed a Response (Paper 31, "PO Resp."), to which Petitioner filed a Reply (Paper 39, "Pet. Reply"), and Patent Owner filed a Sur-Reply (Paper 49, "Sur-Reply").

Petitioner relies, *inter alia*, upon the declaration and reply declaration of Holger Lubatschowski, Ph.D. (Exs. 1001, 1069) and the declaration of Richard Tipperman, M.D. (Ex. 1070). Patent Owner submits declarations from Jin U. Kang, Ph.D. (Exs. 2002, 2062) and Kathryn M. Hatch, M.D. (Ex. 2004, 2063).

An oral hearing was held on August 30, 2022, and a transcript of the hearing is included in the record (Paper 53, "Tr.").

For the reasons that follow, we conclude that Petitioner has proven by a preponderance of the evidence that claims 1–17 of the '023 patent are unpatentable.

B. Real Parties-in-Interest

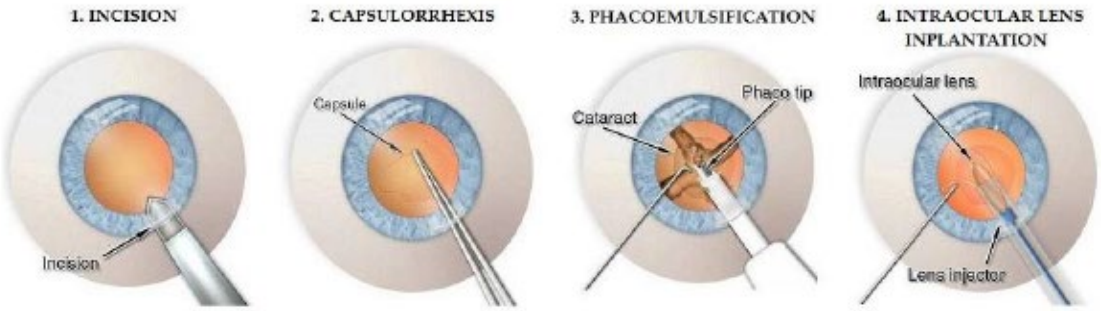
Petitioner identifies Alcon Inc., Alcon Vision, LLC, Alcon Laboratories, Inc., and Alcon Research, LLC as the real parties-in-interest, noting that after the Petition was filed "Alcon LenSx, Inc. merged into Alcon Research, LLC, with Alcon Research LLC the surviving entity." Paper 3, 1; Pet. 2. Patent Owner identifies itself and Johnson & Johnson Surgical Vision, Inc., AMO Manufacturing USA, LLC, and AMO Sales and Services, Inc., as the real parties-in-interest. Paper 5, 1.

C. Related Matters

The '023 patent is asserted in *AMO Development, LLC et al. v. Alcon LenSx, Inc. et al.*, No. 1:20-cv-00842-CFC (D. Del). Pet. 2; Paper 5, 1. *Inter partes* review petitions were also filed by Petitioner against related patents in IPR2021-00845, -00846, and -00849. Paper 3, 1; Pet. 2–3.

D. Background of Cataract Surgery

Each independent claim of the '023 patent is directed to a "cataract surgery scanning system for treating target tissue in one or more of a cornea, limbus, or sclera of a patient's eye." Ex. 1004, 14:5–7, 14:55–57, 15:38–40. Cataract surgery typically involves removal of the natural lens and replacing it with an intraocular lens (IOL). Ex. 1001 ¶ 23; Ex. 2063 ¶ 26. Petitioner's declarant, Dr. Lubatschowski, provides the following figures depicting these implantation steps (Ex. 1001 ¶ 23):



The figures above show the steps used in the process of implanting an IOL in a patient. *Id.* First, to access the lens and allow for insertion of medical instruments, an incision must be made in the cornea or nearby tissues. *Id.* ¶¶ 23, 59. Second, an optional step (not depicted above) to correct for astigmatism is performed. *Id.* ¶¶ 23–24. Third, in a process called capsulorhexis or anterior capsulotomy, an opening is made in the anterior lens capsule. *Id.* ¶ 23. Fourth, the eye's lens is broken apart and removed, usually by ultrasonic phacoemulsification. *Id.* Finally, an IOL is implanted in the lens capsule. *Id.*; Ex. 2063 ¶ 26.

E. The '023 Patent

The '023 patent is directed to a scanning system that implements patterned laser cutting to provide rapid and precise openings in the cornea and/or limbus of the eye. Ex. 1004, 1:62–64. The scanning system of the '023 patent includes a light source for generating a light beam, a scanner for deflecting the light beam to form first and second treatment patterns of the light beam under control of a controller, and a delivery system for delivering the treatment patterns to the target tissue of the eye. *Id.* at 1:66–2:6. The first treatment pattern forms a cataract incision that provides access to an eye chamber and the second treatment pattern forms a "relaxation incision along or near limbus tissue or along corneal tissue anterior to the limbus tissue of the patient's eye to reduce astigmatism thereof." *Id.* at 2:3–10.

The '023 patent explains that the "cataract incision" provided by the first treatment pattern "allow[s] access for the lens removal instrumentation" used during cataract surgery. *Id.* at 10:17–19. The '023 patent further explains that when in an unsterile environment, a complete cut may not be desirable because it may expose the eye to the environment and the risk of endophthalmitis. *Id.* at 10:27–30. Thus, the disclosed system allows for a

cataract incision that only partially penetrates the cornea, limbus, or sclera. *Id.* at 10:30–31.

The '023 notes that standard cataract incisions are known to induce from 0-1.0 D of astigmatism, on average. *Id.* at 10:64–67. To compensate for this effect, the second treatment pattern used in the system of the '023 patent may be in the form of a relaxation incision. *Id.* at 11:1–7. According to the '023 patent, although such corneal relaxation incisions (CRI) were known in the art, the present invention allows these incisions to "be planned and executed in conjunction with the cataract incision to achieve a better visual correction than otherwise possible." *Id.* at 11:10–19.

Figure 6 of the '023 patent is reproduced below:

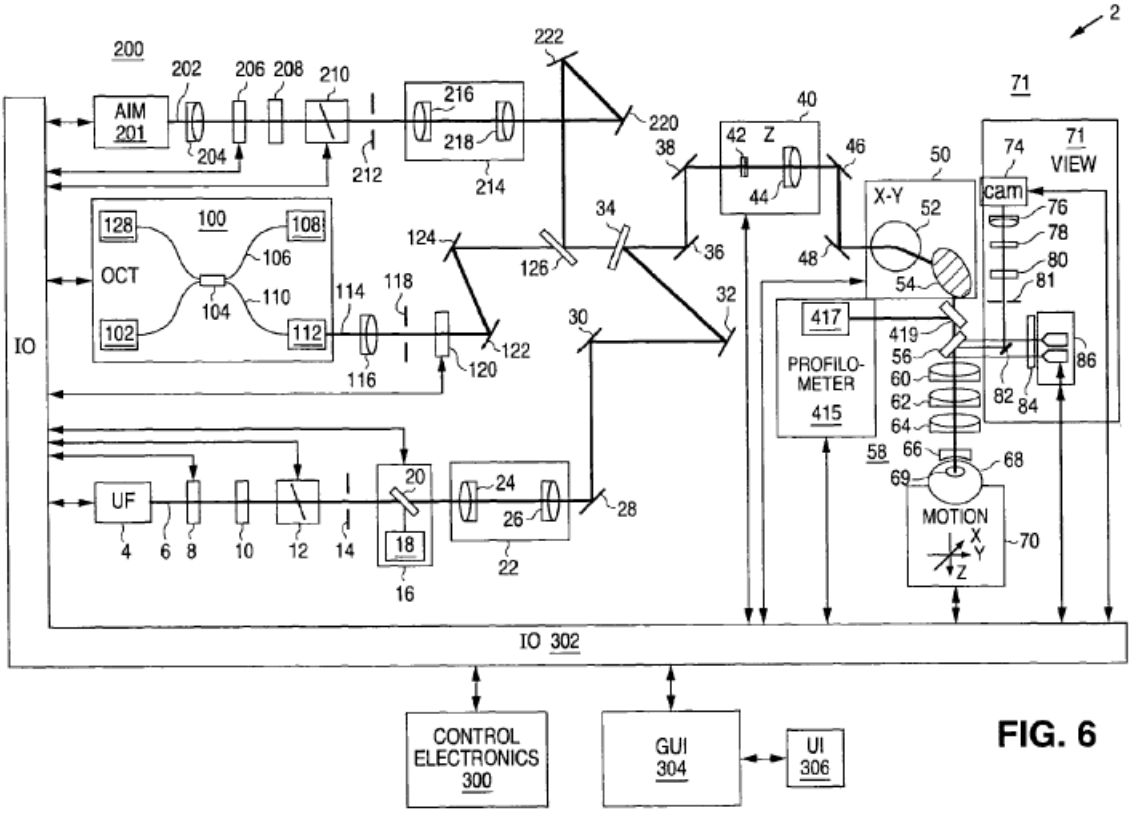


FIG. 6

Figure 6 is a schematic diagram of the optical beam scanning system with a profilometer subsystem. *Id.* at 2:38–39. In the system depicted in Figure 6, ultrafast light source 4 (e.g., a femtosecond laser) is scanned in patient's

eye 68 in three dimensions. *Id.* at 3:42–47. Laser 4 is controlled by control electronics 300, via an input and output device 302, to create optical beam 6. *Id.* at 3:65–66. "[G]raphical user interface GUI 304 may be used to set system operating parameters, process user input (UI) 306 on the GUI 304, and display gathered information such as images of ocular structures." *Id.* at 4:2–6.

UF light beam 6 proceeds towards the patient's eye 68, passing through various plates, mirrors, detectors, and control devices. *Id.* at 4:7–27. Beam combiner 34 transmits aim beam 202, OCT beam 114, and UF light beam 6. *Id.* at 28–55. UF light beam 6 proceeds through Z scan device 40 and then to x-y scan device 50. Scanner 50 can automatically generate "aiming and treatment scan patterns . . . under the control of controller 300." *Id.* at 5:32–34.

"An optional contact lens 66, which can be any suitable ophthalmic lens, can be used to help further focus the optical beam 6 into the patient's eye 68 while helping to stabilize eye position." *Id.* at 5:50–57. Profilometer 415 is distal to X-Y scanner 50 "to allow for a continuous unobstructed view of the cornea of patient's eye 68." *Id.* at 11:29–32. Profilometer 415 "may be a placido system, triangulation system, laser displacement sensor, interferometer, or other such device, which measures the corneal topography," and "may be used to prescribe an astigmatic keratotomy to correct the shape of a patient's cornea to diminish its astigmatism." *Id.* at 11:53–57.

Although contact lens 66 is shown in Figure 6, the '023 patent explains that contact lens 66 or its disposition relative to cornea 406 of eye 68 may have to be modified, compensated for, or removed to suit the profilometer's mode of operation. *Id.* at 11:35–46. "This is because

profilometer 415 requires the cornea to be in its natural state, not forced into contact with a surface and possibly conforming to its shape, to accurately measure cornea 406 and provide data to system 2 for calculation . . . ." *Id.* at 11:38–42.

F. Illustrative Claims

Petitioner challenges claims 1–17 of the '023 patent. Pet. 4. Of the challenged claims, claims 1, 8, and 12 are independent. Claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. A cataract surgery scanning system for treating target tissue in one or more of a cornea, limbus or sclera of a patient's eye, comprising:
>
> a treatment light source for generating a treatment light beam;
>
> a scanner for deflecting the light beam to form first and second treatment patterns of the treatment light beam under the control of a controller; and
>
> a delivery system comprising the controller operatively coupled to the treatment light source and the scanner, and programmed to: (i) deliver the first treatment pattern to a first target tissue selected from the group consisting of the cornea, limbus and sclera of the patient's eye to form a cataract incision therein that provides access to an eye chamber of the patient's eye, the incision to be formed by delivering the first treatment pattern only partially extending through the target tissue, and (ii) deliver the second treatment pattern to a second target tissue to form a relaxation incision along or near limbus tissue, or along corneal tissue-of the patient's eye.

Ex. 1004, 14:5–24.

G. Prior Art and Asserted Grounds

Petitioner contends claims 1–17 are unpatentable on the following grounds (Pet. 6):

Claims Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1–8, 10, 11, 17	103	Blumenkranz[2], Kurtz[3], Weikert[4]
4, 9, 12–16	103	Blumenkranz, Kurtz, Weikert, Benedikt[5]
1–3, 6, 17	103	Kurtz, Swinger [6], Weikert
4, 5, 7–16	103	Kurtz, Swinger, Weikert, Benedikt

II. ANALYSIS

A. Legal Standards

A patent claim is unpatentable under 35 U.S.C. § 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. *See 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;

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[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 and 103, effective March 16, 2013. Because the latest possible effective filing date of the challenged claims of the '023 patent is before this date (March 13, 2008), the pre-AIA version of these statutes apply. *See* 35 U.S.C. § 100(i)(2); Ex. 1004, code (22).

[2] US Patent Publication No. 2006/0195076 A1, published August 31, 2006. Ex. 1017 ("Blumenkranz").

[3] US Patent Publication No. 2008/0058777 A1. Ex. 1018 ("Kurtz").

[4] Mitchell P. Weikert and Douglas D. Koch, *Refractive Keratotomy: Does It Have a Future Role in Refractive Surgery?*, Cataract and Refractive Surgery (2005). Ex. 1019 ("Weikert"); *see* Ex. 1001 ¶ 73.

[5] US Patent Publication No. US 2004/0066489 A1, published April 8, 2004. Ex. 1020 ("Benedikt").

[6] US 6,325,792 B1, issued December 4, 2001. Ex. 1021 ("Swinger").

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

B. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner contends one of ordinary skill in the art "would have had a Ph.D. in Physics, Biomedical Engineering, or a related science, such as Optical Engineering, or at least five years of experience in research, manufacturing, or designing medical optics or medical lasers." Pet. 28. According to Petitioner, "[i]n either case, a [person of ordinary skill in the art] would have also had a moderate understanding of ophthalmology, and refractive and cataract surgery." *Id.*

Patent Owner contends the field of invention is "ophthalmic surgical procedures and systems" and that the team of inventors that developed the '023 patent included an ophthalmic surgeon. PO Resp. 8 (citing Ex. 1004, 1:12–14, 1:55–58; Ex. 2055). Thus, Patent Owner contends the correct level of skill in the art includes meaningful experience with ophthalmic surgery, such as an ophthalmic surgeon with experience with medical optics or lasers, or an engineer with a Bachelors degree in a laser-related engineering or optics field who worked with an ophthalmic surgeon. *Id.* at 8–9 (citing Ex. 2062 ¶¶ 80, 83). Patent Owner contends this definition of an ordinarily

skilled artisan stands in contrast to the experience of Dr. Lubatschowski, who lacks experience in ophthalmic surgery. *Id.* at 9.

In its Reply, Petitioner argues that Patent Owner's definition of the ordinarily skilled artisan includes an engineer who "worked with a clinician," and Dr. Lubatschowski has over 20 years of experience in laser applications for ophthalmology working with ophthalmic surgeons. Pet. Reply 4 (citing Ex. 2062 ¶ 80; Ex. 1002; Ex. 2041, 17:10–12) (emphasis omitted). Petitioner further notes that Patent Owner's own declarant, Dr. Kang, "is not a clinician and did not speak with any before rendering his opinions." *Id.* at 4–5 (citing Ex. 1073, 15:17–25, 17:7–21, 18:4–8).

Both parties present compelling evidence that those of skill in the art would include individuals with experience in ophthalmology, as well as in the research, manufacture, and design of medical optics or medical lasers. Pet. 28; PO Resp. 8. The evidence of record also demonstrates that few individuals actually had such experience. Rather, teams of individuals with different expertise and various academic degrees would work together to design laser surgery systems intended to make incisions in the lens of the eye.

Accordingly, we find that the person of ordinary skill in the art would have been an ophthalmic surgeon or someone with a Ph.D., M.S., or B.S. degree in physics, biomedical engineering, or a related science such as optical engineering, with experience in researching, manufacturing, or designing medical optics or medical lasers (e.g., Ph.D. or five or more years to compensate for lesser degrees). These individuals would have worked in collaboration with one another to fill any necessary gaps in knowledge (e.g., the engineer would consult the medical doctor on clinical issues or

physiology and the medical doctor would consult the engineer on technical issues). This definition marries the two proposed by the parties.

We note that although the level of ordinary skill in the art could include individuals with varying backgrounds and experience levels, where a declarant has knowledge of ophthalmic surgery but not medical optics, or of medical optics and engineering but not ophthalmic surgery, we will take this relative lack of direct experience or knowledge into account when weighing each declarant's testimony.

C. Claim Construction

In this proceeding, the claims of the '023 patent are construed "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b). Under that standard, the words of a claim are generally given their "ordinary and customary meaning," which is the meaning the term would have had to a person of ordinary skill at the time of the invention in the context of the entire patent including the specification. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

Petitioner provides constructions for the terms "[a] cataract surgery scanning system," "cataract incision therein that provides access to an eye chamber of the patient's eye, the incision . . . only partially extending through the target tissue," and "combine the first and second treatment patterns into a single treatment pattern." Pet. 6–12.

Patent Owner provides constructions for the terms "[a] cataract surgery scanning system" and "cataract incision . . . only partially extending through the target tissue." PO Resp. 10–13.

We address the constructions disputed by the parties below. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013,

1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.")).

1. "A cataract surgery scanning system"

a) Whether the Preamble is Limiting

The preamble of independent claims 1, 8, and 12 recites "[a] cataract surgery scanning system for treating target tissue in one or more of a cornea, limbus or sclera of a patient's eye." Ex. 1004, 14:5–7, 14:55–57, 15:38–40. Petitioner contends this preamble phrase is a non-limiting statement of intended use. Pet. 6 (citing *Arctic Cat Inc. v. GEP Power Prod., Inc.*, 919 F.3d 1320, 1328 (Fed. Cir. 2019)). Petitioner acknowledges that the Examiner amended the preamble from "scanning systems" to "a cataract surgery scanning system" during prosecution, but contends this still represents an intended use that "fails to impart any structure that would patentably distinguish the system from multifunctional, ophthalmic-surgery systems in the prior art." *Id.* at 6–7.

Patent Owner notes that an interview summary generated during prosecution states that the "Examiner suggested limiting the claimed apparatus (scanner) to a cataract surgery apparatus in order to exclude the other scanning systems." PO Resp. 10–11 (citing Ex. 1006, 18). Patent Owner contends this reliance on the preamble phrase in allowing the claims demonstrates that the preamble is limiting. *Id.*

In its Reply, Petitioner asserts that "a closer look indicates the Examiner did not rely" on the insertion of the phrase "cataract surgery scanning system" in the preamble when allowing the claims. Pet. Reply 5. Petitioner reasons that, although "the Examiner suggests the amendment was

'to exclude the other scanning systems,' . . . the Notice of Allowance instead focuses on the fact that the prior art did not teach partially penetrating cataract incisions." *Id.* (emphasis omitted) (citing Ex. 1006, 13, 15–16). Thus, according to Petitioner, the "basis for allowance was the Examiner's (incorrect) conclusion that a partially penetrating cataract incision was patentable, not that the prior art failed to teach a 'cataract surgery scanning system.'" *Id.*

"[C]lear reliance on the preamble during prosecution to distinguish the claimed invention from the prior art transforms the preamble into a claim limitation because such reliance indicates use of the preamble to define, in part, the claimed invention." *Catalina Mkt'g Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808–09 (Fed. Cir. 2002). Here, and as discussed in further detail below, the Examiner expressly allowed the claims, in part, due to an Examiner's Amendment changing "scanning system" to "cataract surgery scanning system." Ex. 1006, 13, 15, 18. This reliance on the preamble to help define the claimed invention transforms this portion of the preamble into a limitation. *See Catalina Mkt'g*, 289 F.3d. at 808.

b) Claim Construction Analysis

The determination that the preamble is limiting leads to the question of what a "cataract surgery scanning system" entails. Petitioner argues that the term "cataract surgery scanning system," if limiting, only requires "a system that can form a 'cataract incision' and 'relaxation incision.'" Pet. Reply 6.

Patent Owner contends this term requires that the system is designed to, or capable of, performing surgery on the lens. PO Resp. 42 ("[A] cataract surgery scanning system must be able to perform surgery on the lens.").

To construe a claim we must look at the claim language, the written description, and if in evidence the prosecution history. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). This intrinsic evidence is "the most significant source of the legally operative meaning of disputed claim language," and "[i]n most situations, an analysis of the intrinsic evidence alone will resolve any ambiguity in a disputed claim term." *Id.* at 1582–83.

(1) Claims

The preambles of independent claims 1, 8, and 12 require: "A cataract surgery scanning system for treating target tissue in one or more of a cornea, limbus, or sclera of a patient's eye." Ex. 1004, 14:5–7, 14:55–57, 15:38–40. As both parties agree, the term "cataract surgery" suggests that the system is intended for use in cataract surgery. Sur-Reply 22; Pet. Reply 6.

Cataract surgery involves incisions in the cornea, limbus, or sclera of a patient's eye, as well as incisions in the lens capsule and lens. Pet. 20–21; Ex. 2063 ¶ 26. Although the term "cataract surgery" could imply any of these incisions, claims 1, 8, and 12, make clear that the intended purpose of the claimed cataract surgery scanning system is to treat "one or more of a cornea, limbus, or sclera of a patient's eye," and in no claim is the lens recited or is surgery on the lens required.

Accordingly, the language of claims 1, 8, and 12, suggests that the claimed "cataract surgery" system is designed to treat, or capable of treating, tissue in the cornea, limbus, or sclera of a patient's eye for purposes of cataract surgery. The language of these claims does not require that the system be capable of making incisions in the lens capsule or lens (where a cataract would reside).

(2) Written Description

The term "cataract surgery scanning system" is not used in the written description of the '023 patent. A review of the written description, however, provides insight on how the patentees understood their invention. For example, in the Background of the Invention section the written description focuses on the need for "ophthalmic methods, techniques, and apparatus to advance the standard of care of *corneal shaping* that may be associated with invasive cataract and other ophthalmic pathologies." Ex. 1004, 1:55–58 (emphasis added). The Summary of the Invention section then focuses on the use of patterned laser cutting in the cornea and limbus to form cataract and relaxation incisions. *Id.* at 1:62–2:22. In neither of these sections is laser surgery on the lens discussed or required. This suggests that, consistent with the language of the claims, the disclosed apparatus is directed to making incisions in the cornea, limbus, or sclera, and not necessarily the lens or lens capsule.

In at least one embodiment of the '023 patent, it is noted that OCT data may be loaded into control electronics "and used to program and control the subsequent laser-assisted surgical procedure" on the lens and lens capsule. *Id.* at 6:5–19. This evidences that a *cataract surgery scanning system* might be used to form incisions in the cornea as well as the lens. We are directed to no disclosure in the written description, however, indicating that the disclosed device must be, or always is, capable of performing surgery on the lens or lens capsule.

Accordingly, we find that the written description supports a conclusion that the claimed "cataract surgery" system is intended for use on the cornea, limbus, or sclera of a patient's eye and may be, but is not required to be, capable of performing surgery on the lens or lens capsule.

(3) Prosecution History

In a Final Office Action during prosecution, the Examiner rejected the pending claims over the prior art combination of Blumenkranz (US Patent Publication No. 2006/0195076), Swinger (US Patent No. 6,325,792), and Bille (US Patent No. 4,907,586), as evidenced by Bille '586 (US Patent No. 4,907,586).[7] Ex. 1006, 66–72. In this rejection, the Examiner asserted that Blumenkranz discloses image guided laser surgery on the lens, as well as in other areas of the eye, such as the sclera and iris. *Id.* at 69. Given these capabilities, the Examiner asserted that Blumenkranz could be used to provide multiple focus beams to create multiple incisions in the crystalline lens, as well as other soft tissues of the eye. *Id.*

The Examiner then noted that Swinger discloses applying multiple laser incisions in a patient's eye, as well as the utility of the method in corneal operations, such as "correcting myopia, hyperopia, astigmatism, optical aberrations, etc." *Id.* at 70. The Examiner further noted that Swinger discloses making precise cuts in desired locations in a reproducible fashion, including "relaxation incisions," which "can be made in any predetermined length and depth, and in straight line or in curved patterns with high precision." *Id.*

The Examiner then asserted that Bille teaches a laser beam guidance system that can focus on cells in the cornea with "great accuracy" and with control of the depth of the incision in the corneal portion of the eye. *Id.* at 71–72.

[7] Neither Bille reference appears to have been submitted as an exhibit in this proceeding.

After summarizing the disclosures of Blumenkranz, Swinger, and Bille, the Examiner concluded that:

> it would have been obvious for one of ordinary skill in the art at the time of the instant invention was made to employ the system of Blumenkranz for not only making incisions in the lens but also for making incisions in the cornea by precisely controlling the location and depth of the incision such that the incision can penetrate epithelium, Bowman's membrane and only partially extend in to the stroma of cornea (col. 6, ll. 40–68), [as] suggested by Bille.

Id. at 72.

In response to the Final Office Action, the Applicants amended the preamble of claim 1 to "identify the target tissues (to be treated)," i.e., "one or more of a cornea, limbus or sclera." *Id.* at 43 (claim amendment), 62 (applicant-initiated interview summary). Responding to the rejection over Blumenkranz, Swinger, and Bille, the Applicants argued that although the prior art disclosed partially penetrating incisions "whose purpose is to **reshape the cornea**, it does not do so for partially penetrating cataract incisions, whose purpose is not to re-shape the cornea." *Id.* at 50–52. The Applicants further argued that one of ordinary skill in the art would not have been motivated to generate a partial cataract incision because a partial incision is "unsuitable for its intended purpose, *i.e.* to provide access to the lens." *Id.* at 53–55.

In response to the Applicants' amendments and arguments, the Examiner initiated an interview in which the Examiner suggested that "A scanning system" be amended to "A cataract surgery scanning system" in each independent claim. *Id.* at 15. The Examiner stated as the reasons for allowance, that the

> instant claimed cataract surgery scanning system is distinguishable from those taught by the prior art of record in that the prior art does not teach or suggest the suitability of a delivery system that deliver[s] a first treatment pattern to a target tissue selected from [the] cornea, sclera and limbus to form a cataract incision, which only partially extends through the target tissue, and provides access to the eye chamber of the patient's eye without causing refractive changes. On the other hand, prior art of record teaches fully penetrating incisions for cataract surgery, which do not avoid refractive changes in accessing the crystalline lens during cataract surgery.

Id. at 15–16.

Thus, the Examiner's reason for allowance was not based on the ability of the claimed system to perform surgery on both the lens and the cornea, but stems from the Examiner's conclusion that the prior art of record did not disclose partially penetrating cataract incisions that do not cause refractive changes. *Id.*

In the subsequent Examiner-Initiated Interview Summary, the Examiner stated that the "Applicants presented the arguments that the prior art does not teach cataract incisions that partially penetrate in a cataract surgery scanner. Examiner suggested limiting the claimed apparatus (scanner) to a cataract surgery apparatus in order to exclude the other scanning systems." *Id.* at 13. The claims then received a Notice of Allowance on September 24, 2015. *Id.* at 9.

Patent Owner argues that the Examiner's explanation of amending the claims to "A cataract surgery scanning system" in order to "exclude the other scanning systems" demonstrates that the claimed apparatus must be capable of making not only the claimed cataract and relaxing incisions, but also incisions in the lens. PO Resp. 11, 43–44.

The Examiner's reasons for allowance regarding a "cataract surgery scanning system" are ambiguous. For example, it is not clear how the addition of the term "cataract surgery scanning system" would exclude the systems of either Blumenkranz or Swinger, which both expressly disclose laser incisions in the lens or lens capsule for purposes of cataract surgery. Ex. 1017 ¶ 9; Ex. 1006, 76; Ex. 1021, 34:30–35:3. Bille does appear to be limited to laser incisions in the cornea, but the combination relied upon by the Examiner was for Blumenkranz to perform the claimed cataract and relaxation incisions. Thus, it is not clear how the Examiner's Amendment to include a "cataract surgery scanning system" would exclude any of the relied upon "scanning systems."

In their response to the Final Office Action, the Applicants stressed that Blumenkranz, Swinger, and Bille do not individually or in combination teach or suggest a cataract incision, "which is intended to provide **access** to the crystalline lens for the lens removal instruments during cataract surgery," that only partially penetrates the cornea of the patient's eye, and is not intended to "**reshape the cornea**." Ex. 1006, 55. We are directed to no argument in this prosecution response that Blumenkranz, Swinger, or Bille, or the combined system as a whole, must be capable of making incisions in both the lens and the cornea, limbus, or sclera.

Likewise, the Examiner's stated reasons for allowance focused on the Applicants' argument that the recited prior art references do not disclose a cataract incision in the cornea, limbus, or sclera of a patient's eye that only partially extends through target tissue and does not cause refractive changes to the eye. Ex. 1006, 15–16. Thus, although somewhat ambiguous, we understand that the addition of the term "cataract surgery scanning system" was intended to make clear that the system is designed to, or capable of,

making specific incisions related to cataract surgery, and not merely incisions "whose purpose is to **reshape the cornea**," as disclosed for example in Bille. Ex. 1006, 55. We do not find that the prosecution history suggests that a "cataract surgery scanning system" must be able to perform all steps of cataract surgery, including surgery on the lens or lens capsule.

(4) Analysis

As discussed above, the intrinsic record of the '023 patent, that is, the claims, written description, and prosecution history, suggests that a "cataract surgery scanning system" is one that is capable of performing at least one incision related to cataract surgery. This may include cataract and relaxation incisions in the cornea, limbus, or sclera, or incisions in the lens or lens capsule. Accordingly, we construe the claim term "cataract surgery scanning system" to require that the system be designed to, or capable of, performing at least one step of cataract surgery, such as creating an incision in the cornea or other exterior tissues to allow access for surgical instruments, correcting for astigmatism, creating an opening in the anterior lens capsule, or fragmenting the lens. *See* Pet. 20 (Petitioner describing the steps of a "typical cataract surgery").

2. "cataract incision therein that provides access to an eye chamber of the patient's eye, the incision . . . only partially extending through the target tissue"

Claim 1 requires a "cataract incision therein that provides access to an eye chamber of the patient's eye, the incision . . . only partially extending through the target tissue." Ex. 1004, 14:18–21. Petitioner contends this claim phrase is potentially subject to two different claim constructions. Pet. 8–10.

First, Petitioner argues that a "cataract incision" could be interpreted to mean "an incision that fully extends through the target tissue," which requires multiple passes of the laser along the treatment pattern to ultimately form a fully penetrating incision that "provides access to an eye chamber." *Id.* at 8–9. The problem with this construction, according to Petitioner, is that it reads limitations out of the claim. *Id.* at 10.

Second, Petitioner argues that the disputed language could merely recite the purpose of the partial incision, with ultimate access provided by a surgeon in another step. *Id.* at 9–10. Petitioner contends this construction is generally consistent with the disclosures of the '023 patent, but reads the term "provides access to an eye chamber" out of the claim. *Id.* at 10. Unable to definitively determine the correct interpretation of the claim, Petition adopts "both for purposes of [the] Petition," and seeks to show the claims would have been obvious under either interpretation. *Id.*

In the Institution Decision, after reviewing the claims, written description, and prosecution history, we construed the claim phrase "cataract incision therein that provides access to an eye chamber of the patient's eye, the incision . . . only partially extending through the target tissue" to require "a partially penetrating cataract incision that, when completed by the surgeon or another individual, allows access for lens removal instrumentation." Dec. 13–14. Patent Owner agrees with this construction (PO Resp. 13) and Petitioner does not expressly dispute the construction in its Reply. Accordingly, for the reasons set forth in the Institution Decision, we adopt this construction for purposes of this Final Written Decision.

D. Prior Art Status of Weikert

The Petition asserts that Weikert is an article, titled *Refractive Keratotomy: Does it Have a Future Role in Refractive Surgery?*, that was

published in 2005 "as Chapter 14 in CATARACT AND REFRACTIVE SURGERY" and is therefore prior art to the '023 patent under 35 U.S.C. § 102(b). Pet. 5, 30. In support of the Petition, Dr. Lubatschowski testifies that the identified chapter of Weikert was part of "the 2005 edition" of "CATARACT AND REFRACTIVE SURGERY." Ex. 1001 ¶ 73.

In its authorized Preliminary Reply to the Preliminary Response, Petitioner provides a copy of the front cover of Weikert, as well as pages identifying the ISBN number, ISSN number, Library of Congress Control Number, and a 2005 copyright date for the reference. Reply 1; Ex. 1060, 1–5.[8] Petitioner also argues that a simple internet search of the citation provided in the Petition would provide the same information. Reply 3.

Patent Owner contends that the Petition failed to provide evidence establishing Weikert is prior art to the '023 patent and, therefore, "the Petition fails at the threshold." PO Resp. 13–14. Patent Owner acknowledges that Petitioner submitted Supplemental Evidence and Reply arguments to support its assertion that Weikert is prior art to the '023 patent, but contends the Petition must establish a reference as prior art, and failure to do so in this case is fatal. *Id*.

A petition must "identify *with particularity* the grounds for institution and evidence supporting such grounds," including "the prior art relied upon and evidence that it qualifies as such." *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential) (citing 35 U.S.C. § 312(a)). The Petition identifies the grounds for institution and the evidence supporting such grounds, and

[8] Here we reference the page numbers in the bottom-right corner of the reference that were added by Petitioner.

presents evidence that Weikert qualifies as prior art under 35 U.S.C. § 102(b). Pet. 5, 30. For example, Petitioner and Dr. Lubatschowski assert that CATARACT AND REFRACTIVE SURGERY "is a quarterly review series comprising chapters written by well-known specialists," and that Weikert was included in the 2005 edition of CATARACT AND REFRACTIVE SURGERY as Chapter 14: *Refractive Keratotomy: Does it Have a Future Role in Refractive Surgery?* Ex. 1001 ¶ 73.

In addition, *Hulu* contemplates additional evidence being admitted in a reply to a patent owner preliminary response, as long as that evidence is responsive to the prior briefing. *Hulu*, Paper 29 at 14. In this case, Petitioner's evidence submitted in its Reply is responsive to arguments made in prior briefs (i.e., Patent Owner's Preliminary Response and Response), and simply confirms what was asserted in the Petition and Dr. Lubatschowski's declaration, i.e., that Weikert is Chapter 14 of CATARACT AND REFRACTIVE SURGERY and the document bears a copyright date of 2005 (or, as asserted by Dr. Lubatschowski, is a "2005 edition"). Ex. 1060, 5, 12; Pet. 5, 30; Ex. 1001 ¶ 73. In addition, this evidence indicates that CATARACT AND REFRACTIVE SURGERY was published by "Springer," which is a well-known publishing company, and is the type of document that would be expected to be made publicly accessible. *See* Ex. 1001 ¶ 73 (asserting that CATARACT AND REFRACTIVE SURGERY "is a quarterly review series comprising chapters written by well-known specialists"); Ex. 1019, 220, 224, 227, 228, 230, 232 (providing a "Summary for the Clinician" at the end of several sub-chapters); Ex. 1060, 4–5.

The information presented in the Petition, as confirmed by the Reply evidence submitted by Petitioner, sufficiently demonstrates that Weikert is prior art to the '023 patent.

E. Claims 1–3, 6, and 17 over Kurtz, Swinger, and Weikert

Petitioner contends the subject matter of claims 1–3, 6, and 17 would have been obvious over the combined disclosures of Kurtz, Swinger, and Weikert. Pet. 51–58.

1. Kurtz

Kurtz discloses a system and method for resecting corneal tissue using a surgical laser. Ex. 1018, code (57). Although Kurtz focuses on systems and techniques for transplanting corneas, it notes that "[o]ther applications are also possible." *Id.* ¶¶ 2, 22.

Kurtz explains that traditional techniques used for performing penetrating keratoplasty involved using a full-thickness cylindrical cut in both the recipient and donor corneas to resect corneal tissue. *Id.* ¶ 4. The resected donor tissue is then grafted into the recipient cornea in the same operating room and within minutes of the resection. *Id.*

Kurtz explains that femtosecond surgical lasers were previously used to create full thickness corneal incisions, but such systems have the drawback of taking up "valuable space within the operating room." *Id.* ¶ 5. Given this drawback, Kurtz discloses that "[a]s an alternative, the femtosecond surgical laser could be placed in a surgical preparation room." *Id.* In that scenario, extreme care must be taken not to expose the internal tissues of the cornea to contaminants "during the process of transferring the recipient and the donor tissue to the operating room for completion of the procedure." *Id.*

To overcome these limitations, Kurtz discloses having the pulsed laser beam skip portions of the resection pattern, thereby leaving uncut gaps in the to-be-resected cornea. *Id.* ¶ 7. Kurtz explains that by leaving uncut gaps in the resection pattern, tissue along the incision and the internal chambers of

the eye remain protected and unexposed to environmental contaminants, allowing the patient to be moved between the preparation room and the operating room without exposing the patient to contamination risks. *Id.* ¶ 14. Once in the operating room, the uncut gaps may be incised by the surgeon using an alternate surgical instrument, preferably a bladed instrument. *Id.* ¶¶ 8, 15.

Figure 2 of Kurtz is reproduced below:

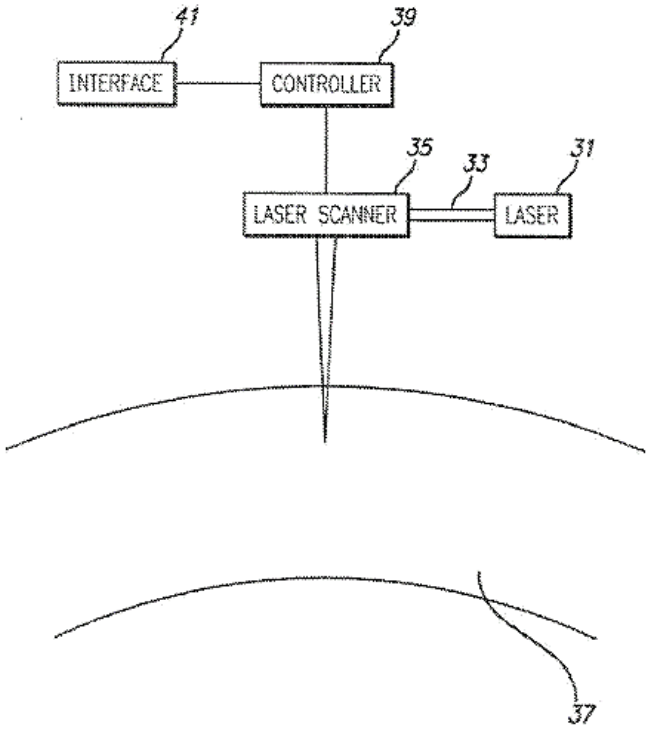

FIG. 2

Figure 2 of Kurtz is a schematic illustration of a system for resecting corneal tissue using a resection pattern having an uncut gap. *Id.* ¶ 12. In the embodiment shown in Figure 2, interface 41 "presents the surgeon with several incision patterns from which the desired resection pattern is selected." *Id.* ¶ 19. Femtosecond surgical laser 31 generates a pulsed laser beam 33 and directs that beam into focusing assembly 35, "which in turn

focuses the pulsed beam 33 into the cornea 37." *Id.* Controller 39 "is a programmable computer which precisely controls the location of the beam focal point within the cornea 37 according to parameters received from the surgeon interface 41." *Id.*

2. Swinger

Swinger discloses the use of low energy, ultra-short (femtosecond) pulsed laser radiation to ablate ocular tissue in a controlled fashion. Ex. 1021, code (57). Swinger explains that the disclosed photodisruption process is gentle enough that it may be used for surgical procedures that were previously impossible using laser radiation, including "radial and arcuate keratotomy," "capsulectomy, capsulorhexis, and phacoablation." *Id.*

Figure 6 of Swinger is reproduced below:

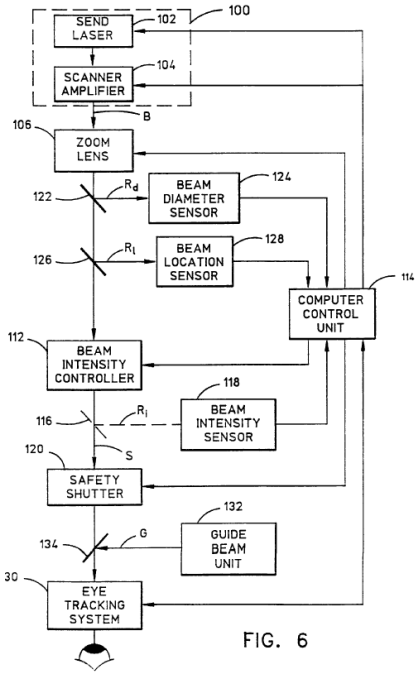

Figure 6 is a block diagram of a preferred embodiment of the laser and control system of Swinger. *Id.* at 10:61–62, 17:1–30. As shown in Figure 6, laser unit 100 generates laser beam B. *Id.* at 17:1–2. Swinger explains that the preferred laser system includes a broad gain bandwidth laser using lasing

ions such as titanium, chromium or neodymium and emitting at a preferred wavelength of 400 nm to 1900 nm, "which is generally transmissive in eye tissue." *Id.* at 8:43–48.

Zoom lens 106 provides control over the diameter of laser beam B. *Id.* at 17:21–24. Beam-splitting mirrors 122 and 126 reflect part of the beam energy to beam diameter sensor 124 and beam location sensor 128, respectively. *Id.* at 18:43–45, 19:30–33. Beam intensity controller 112 is coupled to computer control unit 114, which is programmed to vary the intensity of surgical laser beam S, as necessary for a particular surgical procedure. *Id.* at 17:50–54. Safety shutter 120 is coupled to computer control unit 114 and is used to prevent unwanted or accidental laser radiation exposure of eye tissue. *Id.* at 18:10–24, 19:24–29. Guide beam unit 132 includes a low-power laser that provides a guide beam appropriate for direct viewing that is aligned with surgical laser beam S and acts as an indicator of the location of the treatment beam. *Id.* at 20:22–34.

Swinger discloses that its system "can easily create straight line and curved-line excisions, of any predetermined length and depth, at any location determined by a surgeon." *Id.* at 20:49–51. One use of this system is "for performing radial keratotomies or making T-cuts or arcuate cuts, to correct myopia, hyperopia, or astigmatism (regular or irregular)." *Id.* at 21:12–19. Swinger explains that these cuts may be made using various laser scanning patterns and that these cuts may completely penetrate the cornea or may be made within the cornea. *Id.* at 33:7–17.

Swinger also explains that the disclosed system may perform capsulorhexis surgery, as follows. *Id.* at 34:30–51. First, the focus of the laser beam spot is localized to the anterior lens capsule "by direct visualization using a visual HeNe laser beam focused to the same focal point

as the ablating laser." *Id.* at 34:52–55. "Then the surgeon displaces the HeNe positioning beam just posteriorly to" the lens capsule and "photodisruption begins." *Id.* at 34:58–61. According to Swinger, "[t]he cutting process can be totally computerized once the reference point on the capsule has been fixed, or the surgeon can terminate the process when the capsule has been visibly cut for 360 degrees." *Id.* at 34:64–67.

3. Weikert

Weikert reviews the history, use, and potential future of refractive keratotomy, which involves making incisions into the cornea of the eye, often to correct astigmatism. Ex. 1019, 217.[9] Weikert explains that the first clinical use of keratotomy to correct refractive error occurred in 1885, where a penetrating limbal incision was used to decrease astigmatism following cataract surgery. *Id.* (section 14.2). Although by the late 1990s laser-based systems "had replaced refractive keratotomy as the dominant technique for the surgical correction of refraction error," Weikert notes that "incisional corneal surgery remains a useful tool in the surgeon's repertoire of refractive procedures." *Id.* at 218.

Weikert notes that clear corneal incisions (CCIs) "made during cataract surgery have been known to induce astigmatism by flattening the meridian on which the incision is centered." *Id.* at 227 (section 14.7.1). "The amount of this surgically induced astigmatism (SIA) varies with incision length and placement." *Id.* Weikert reports that one study comparing incision sizes of 3.2 mm, 4.0 mm, and 5.2 mm, found that the mean SIA was 0.09 D, 0.26 D, and 0.54 D, respectively. *Id.* In view of the

[9] Our citations are to the original page numbers of the document.

various studies on the subject, Weikert reports that "0.0–0.5 D of SIA can be expected from temporal CCIs less than or equal to 3.2 mm." *Id.* at 228.

Weikert notes that one method of correcting the astigmatism caused by corneal incisions for cataract surgery was to provide "a similar incision placed opposite to the temporal CCI," with cataract surgery being performed only through one wound. *Id.* (section 14.7.2). Although such a procedure can reduce astigmatism, its "range is limited" and "carries [the] additional risk associated with the extra penetrating corneal wound." *Id.* To correct higher levels of astigmatism, Weikert reports that "[p]artial thickness, arcuate or transverse corneal incisions" may be used and that "[a]rcuate incision have been combined with cataract surgery to reduce pre-existing astigmatism." *Id.* at 228–229 (section 14.7.3).

In its conclusion, Weikert reports that "[a]s advances continue in the areas of intraocular lens design, crystalline lens removal and excimer laser refractive surgery, we are likely to see further decline in the use of refractive keratotomy." *Id.* at 232.

4. Analysis: Claim 1

Addressing the limitations of claim 1, Petitioner contends that Kurtz's system includes (1) a treatment light source for generating a treatment light beam; (2) a scanner for deflecting the light beam to form treatment patterns under the control of a controller; and (3) a delivery system comprising a controller operatively coupled to the treatment light source and the scanner and programmed to a deliver treatment pattern to a patient's eye. Pet. 53–54. Although Kurtz does not expressly disclose making a cataract incision or relaxation incisions, Petitioner contends both types of incisions are disclosed in Weikert and that Swinger demonstrates that an ophthalmic laser surgery system could be adapted to make both types of incisions. *Id.* at 54–

55 (citing Ex. 1021, 21:12–24, 33:7–22, Figs. 8B, 15W; Ex. 1019, 1; Ex. 1001 ¶ 240).

With respect to the reason to combine Kurtz, Swinger, and Weikert, Petitioner argues that Kurtz discloses a multifunctional ophthalmic-surgery system that can be used for corneal transplants or "[o]ther applications," and that Weikert discloses that "the combined delivery of cataract and relaxation incisions have been known for approximately 150 years." Pet. 51. Petitioner further argues that Swinger discloses a multifunctional ophthalmic-surgery system "intended for various surgical procedures, including to reshape the cornea, perform corneal transplants, and 'excise or photoablate regions within the cornea, capsule, lens, vitroretinal membrane, and other structures within the eye.'" *Id.* at 51–52 (citing Ex. 1021, 8:34–36, 55–67; Ex. 1019, 1–2). Given the disclosures of Weikert, Kurtz, and Swinger, Petitioner contends one of ordinary skill in the art would have found it obvious to use the multifunctional ophthalmic-surgery system disclosed by Kurtz to deliver both cataract incisions and relaxation incisions in the eye of a patient. *Id.* at 52 (citing Ex. 1001 ¶¶ 163–165).

In support of the Petition, Dr. Lubatschowski testifies that one of ordinary skill in the art would have understood that Kurtz's system is capable of making both a cataract incision and relaxation incisions in the cornea, and would have sought to do so in view of Swinger's demonstration that such incisions could be made with beneficial results. Ex. 1001 ¶ 162 (noting that Swinger's laser surgery system allows incisions with predictable dimensions and allows for "safer" procedures), ¶ 163 (Dr. Lubatschowski testifying that the system of Kurtz is not limited to corneal transplants and is "well suited" for cataract incisions to access the eye chamber).

Patent Owner contends that Petitioner's grounds based on Kurtz are not persuasive because Kurtz is not a cataract surgery scanning system, but rather a corneal surgery system. PO Resp. 42. Patent Owner reasons that a "cataract surgery scanning system" "must be able to perform surgery on the lens," whereas Kurtz is focused on one type of corneal procedure—"corneal transplants"—which leaves a large, 360-degree circular hole in the center of the cornea. *Id.* at 43 (citing Ex. 1001 ¶ 134; Ex. 2063 ¶¶ 53, 59–60). According to Patent Owner, no skilled artisan would remove most of the cornea (as is done in Kurtz) to perform cataract surgery, "particularly given the known risks of such a large incision." *Id.* at 43–44 (citing Ex. 2062 ¶ 249; Ex. 2063 ¶¶ 52–57; Ex. 2041, 88:3–16).

Patent Owner also argues that one of ordinary skill in the art would not have modified Kurtz to perform surgery on the lens. PO Resp. 44. Patent Owner reasons that although Kurtz indicates that "many more modifications are possible without departing from the inventive concepts herein" (Ex. 1018 ¶ 22), the examples of such modifications all "involve corneal transplants." *Id.* (citing Ex. 1018 ¶ 22). Patent Owner also argues that Kurtz's mention of "[o]ther applications" fails to disclose "a cataract surgery scanning system," i.e., a scanning system capable of performing surgery on the lens under Patent Owner's construction of that term, "with sufficient precision and detail to establish that the subject matter existed in the prior art." *Id.* at 42–44 (quoting *Wasica Fin. GmbH v. Cont'l Auto. Syst., Inc.*, 853 F.3d 1272, 1284–85 (Fed. Cir. 2017), and citing Ex. 2062 ¶¶ 248, 103; Ex. 2063 ¶¶ 52–57, 59; Ex. 1018 ¶¶ 2, 13).

On this record, Petitioner persuasively demonstrates that: Weikert discloses that it was well known in the art to make cataract incisions and relaxing incisions as part of cataract surgery; Kurtz was designed to make

partially penetrating corneal incisions, which could easily include cataract and relaxing incisions; and Swinger discloses using a laser to make multiple incision types in the cornea and the benefits of such laser-created incisions. Ex. 1001 ¶¶ 160–165. In view of such disclosures, and in view of the general understanding that laser-created incisions are precise and accurate, we find that Petitioner persuasively explains why one of ordinary skill in the art would have sought to combine Kurtz, Swinger, and Weikert to arrive at the subject matter of claim 1 with a reasonable expectation of success.[10]

Patent Owner's arguments are not persuasive because the claims of the '023 patent do not require a system that is capable of performing surgery on the lens. Rather, as noted above, the claims require only that the system be capable of, or designed to, perform at least one step of cataract surgery, such as a cataract incision or relaxation incision. On this record, Petitioner persuasively demonstrates that the system of Kurtz, Swinger, and Weikert would be capable of forming both cataract and relaxation incisions.

Patent Owner's argument regarding the size of Kurtz's corneal transplant incisions is likewise not persuasive because Petitioner does not argue that one of ordinary skill in the art would have made a 360-degree corneal transplant incision for use as a cataract incision. Pet. 52; Ex. 1001 ¶ 163. Petitioner asserts instead that Kurtz would be used to form the cataract incisions typically used during cataract surgery. Pet. 52 (asserting that "Kurtz is not limited to corneal transplants" and could also be used to provide "cataract incisions to the cornea to access the eye chamber");

[10] We note that Patent Owner does not expressly dispute that one of ordinary skill in the art would have modified Kurtz to perform cataract incisions and relaxation incisions. Patent Owner only appears to dispute whether Kurtz would be used for incisions in the lens or lens capsule. PO Resp. 44–47.

Ex. 1001 ¶ 165 (Dr. Lubatschowski testifying that cataract incisions are "generally much smaller" than corneal transplant incisions, "as the incision need only provide access to an inner chamber of the patient's eye for surgical tools").

In view of the foregoing, we find that Petitioner sufficiently demonstrates that Kurtz, Swinger, and Weikert teach or suggest every limitation of independent claim 1, and that Petitioner explains sufficiently why one of ordinary skill in the art would have combined these references to arrive at the subject matter of claim 1 with a reasonable expectation of success. Thus, Petitioner demonstrates by a preponderance of the evidence that the subject matter of independent claim 1 would have been obvious over the combined disclosures of Kurtz, Swinger, and Weikert.

5. Analysis: Claims 2, 3, 6, and 17

Petitioner also presents evidence that the subject matter of claims 2, 3, 6, and 17 is taught or suggested in Kurtz, Swinger, and Weikert. Pet. 55–58. In particular, Petitioner demonstrates that it was known in the art, such as in Kurtz, to form two treatment patterns into a single treatment pattern for forming desired incisions (claim 2) (*id.* at 55–56); it was known in the art to make partially-penetrating relaxation incisions, such as in Swinger and Weikert (claim 3) (*id.* at 56); and it was known in the art to use an aiming beam that is configured to form an aiming pattern that visually indicates a position of at least one of the first and second treatment patterns on the patient's eye, as in Swinger (claim 6) (*id.* at 56–57).

With respect to claim 17, Petitioner argues that Kurtz discloses a controller that is programmed to deliver multiple incision patterns in a patient's eye, and that it was known in the art to use two cataract incisions "to allow multiple instruments to have access to the eye chamber via

different incisions." *Id.* at 57–58 (citing Ex. 1001 ¶ 246). Supporting the Petition, Dr. Lubatschowski notes that Weikert discloses providing multiple cataract incisions to correct for astigmatism, and testifies that cataract surgeries often involve multiple incisions in order to provide access for surgical tools and instruments to the interior of a patient's eye. Ex. 1001 ¶¶ 223, 246.

Patent Owner does not address Petitioner's arguments with respect to claims 2, 3, and 6 beyond its arguments set forth above with respect to independent claim 1, but does contest whether Kurtz discloses first and third treatment patterns, as recited in claim 17. PO Resp. 52–55. Patent Owner reasons that claim 17 requires that the third treatment pattern is "an additional incision," and Kurtz's single corneal transplant incision cannot meet both limitations. *Id.* at 52–53. Patent Owner further argues that Kurtz's use of multiple incisions to form its cataract transplant incision are part of a single treatment pattern, and not additional treatment patterns to complete a single incision.

With respect to Petitioner's argument that one of ordinary skill in the art would have sought to use two cataract incisions, Patent Owner argues that the Petition is silent as to why multiple cataract incisions would have been made, "as opposed to just a single cataract incision." *Id.* at 55–56. Patent Owner further argues that Petitioner cannot rely on the testimony of Dr. Lubatschowski to fill any gaps, because these arguments were not set forth in the Petition and would improperly incorporate-by-reference arguments into the Petition from Dr. Lubatschowski's declaration. *Id.* at 55.

The Petition asserts that Kurtz would be used to form the standard cataract incisions used during cataract surgery and that one of ordinary skill in the art would have sought to administer more than one cataract incision

"to allow multiple instruments to have access to the eye chamber via different incisions." Pet. 55, 58 (citing Ex. 1001 ¶ 246). This rationale is not disputed, only the level of supporting documentation or reasoning. On this point, Weikert expressly discloses making multiple cataract incisions (Ex. 1019, 228), and Dr. Lubatschowski provides a clear explanation as to why multiple incisions are beneficial. Ex. 1001 ¶¶ 223, 246. Consistent with Dr. Lubatschowski's testimony, both of Patent Owner's own declarants testified that multiple cataract incisions are beneficial for precisely the same reason asserted in the Petition, i.e., to allow multiple instruments to have access to the eye chamber via different incisions. Pet. 58; Ex. 1073, 89:3–92:15 (Dr. Kang testifying that "[s]o you typically do need, I believe, secondary access for additional tool access"); Ex. 1074, 159:2–18 (Dr. Hatch testifying that it is her general practice to "always make two cataract incisions for instrument access," and "sometimes three").

Given the clear support for the rationale expressly set forth in the Petition, we determine that Petitioner demonstrates by a preponderance of the evidence that the subject matter of claim 17 is taught or suggested by Kurtz, Swinger, and Weikert, when considered in light of the knowledge of one of ordinary skill in the art.

In view of the foregoing, Petitioner demonstrates by a preponderance of the evidence that claims 2, 3, 6, and 17 would have been obvious over the combined disclosures of Kurtz, Swinger, and Weikert.

6. Conclusion with Respect to the Combination of Kurtz, Swinger, and Weikert

For the reasons set forth above, Petitioner demonstrates by a preponderance of the evidence that claims 1–3, 6, and 17 would have been obvious over the combination of Kurtz, Swinger, and Weikert.

F. Claims 4, 5, and 7–16 over Kurtz, Swinger, Weikert, and Benedikt

Petitioner contends that the subject matter of claims 4, 5, and 7–16 would have been obvious over the combined disclosures of Kurtz, Swinger, Weikert, and Benedikt. Pet. 58–67.

1. Benedikt

Benedikt discloses an apparatus for detecting the surface topography of a cornea of an eye. Ex. 1020, code (57). The apparatus of Benedikt includes a Placido Topometer and a CCD array. *Id.* ¶ 29. In use, light in a known pattern is projected on a cornea and the reflected light is captured as an image by the CCD array. *Id.* ¶ 31. This "allows measurement [of] the surface of the cornea 24 within a few milliseconds by recording usually more than 8,000 measuring points." *Id.* ¶ 32. Because the recorded information "does not supply any information from deeper sections of the eye," however, Benedikt discloses combining the Topometer with either a wave front analyzer or coherence tomography. *Id.* ¶¶ 15, 32.

Figure 3 of Benedikt is reproduced below:

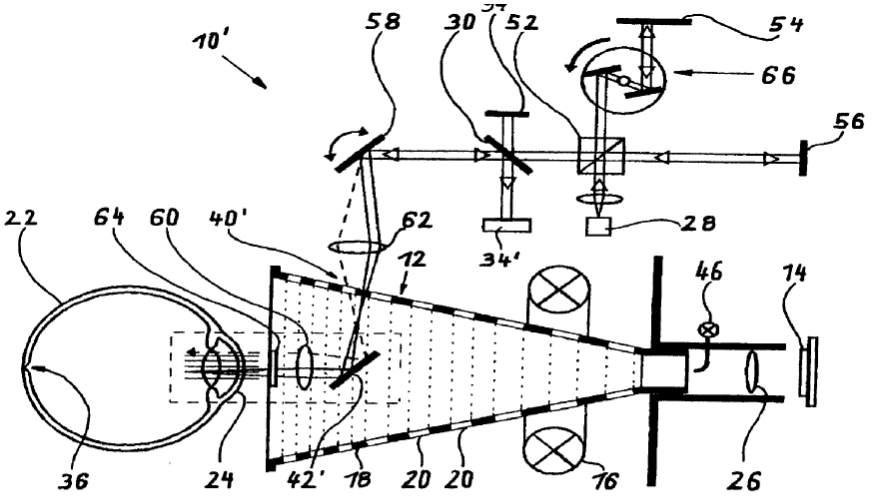

Figure 3

Figure 3 is a schematic representation "of an apparatus with a Placido Topometer and optical coherence tomography (OCT), with the optical coherence tomography being set up for acquiring tomographs from the anterior section of the eye." *Id.* ¶ 25. In Figure 3, apparatus 10' consists of "a Placido Topometer with a Placido cone 12, a cone lamp 16 and a CCD array 14, as well as an optical coherence tomography." *Id.* ¶ 41. Aperture 40' is provided on Placido cone 12, "through which the laser beam from the coherence tomography can be guided." *Id.* The OCT device detects individual boundary surfaces of the eye, including the anterior and posterior surface of the cornea, anterior and posterior surface of the lens, and fundus of the eye. *Id.* ¶ 43.

In the disclosed design, "the measurements with the Placido Topometer and the coherence tomography can be performed either simultaneously or sequentially." *Id.* ¶ 46. According to Benedikt, "the combination of Placido Topometery and coherence tomography leads to a qualitatively novel and previously unachievable quantitative description of the eye in respect of diagnostics and therapeutics." *Id.* ¶¶ 39, 46.

With respect to the use of a dual imaging system, Benedikt explains that the data record may be used "to introduce the individually optimal ablation pattern for the front surface of the cornea with photo-ablative lasers," thereby detaching "the ablation process from the surgeon's manual dexterity" and providing "a data record for the automated ablation of tissue in the laser per se." *Id.* ¶ 39.

2. Analysis: Claim 4

Claim 4 depends from independent claim 1 and further requires a profilometer for measuring the surface profile of a patient's cornea and a

controller that "controls the formation of the second treatment pattern by the scanner in response to the measured surface profile." Ex. 1004, 14:33–37.

Petitioner contends that Kurtz, Swinger, and Weikert "collectively teach a surgery scanning system for treating target tissue, including cataracts, in a patient's eye," but "do not expressly disclose a system with multiple detecting, imaging, and profiling subsystems." Pet. 58. Petitioner asserts, however, that Benedikt recognizes that "an accurate understanding of the target anatomy is essential to ophthalmic surgery systems," and provides this accurate illustration of the cornea and other structures of the eye by combining a topometer and OCT device. *Id.* at 58–59. Petitioner argues that one of ordinary skill in the art would have sought to integrate Benedikt's imaging assembly into a laser treatment system, such as the system of Kurtz and Swinger, "in order to plan and effect laser surgery with improved accuracy." *Id.* at 59 (citing Ex. 1001 ¶¶ 167–170). And, when Benedikt's topometer/OCT imaging device is used in combination with Kurtz, Swinger, and Weikert, Petitioner contends that every limitation of claim 4 is taught or suggested in the prior art. *Id.* at 60–61.

Patent Owner contends Petitioner's combination arguments fail because (1) Benedikt's dual topometer/OCT imaging system is not more accurate than Swinger's direct visualization method; and (2) one of ordinary skill in the art would not have sought to use Benedikt's imaging system with prior art laser systems due to technical and design issues. PO Resp. 49–51. We address these arguments in turn.

3. Accuracy of Benedikt's Imaging System

Patent Owner argues that Swinger uses a HeNe beam to accurately create treatment patterns and that there is "no evidence that Benedikt's diagnostic imaging system would improve Swinger's accuracy or precision."

PO Resp. 49 (citing Ex. 2062 ¶ 269). Petitioner further argues that the fact that Benedikt provides a "previously unattainable" illustration of the cornea would not have motivated a skilled artisan to use such a system because the claimed "cataract surgery scanning system" "must be able to perform surgery on the *lens*." *Id.*

Petitioner persuasively demonstrates that HeNe beams are limited to visualizing the surface of eye tissue at a single point. Pet. Reply 26; Ex. 1070 ¶¶ 32–34. In contrast, Benedikt describes its combined topometer/OCT imaging device as providing a "previously unattainable comprehensive topometerical/topographical illustration of the cornea." Pet. 59; PO Resp. 49. As Kurtz uses its laser source to make incisions in the cornea, we find persuasive Petitioner's argument that one of ordinary skill in the art would have found it beneficial to implement Benedikt's imaging device to aid the corneal surgery procedures of Kurtz, Swinger, and Weikert.

Patent Owner's counter-arguments are not persuasive because Swinger's method of direct visualization using a HeNe laser, although acceptable for surgery on the lens, does not provide the same level of topographical or topometrical data regarding the cornea and underlying structures as Benedikt's dual topometer/OCT imaging system. Pet. 58; Ex. 1070 ¶¶ 32–34; Ex. 1001 ¶¶ 167–170. In addition, we have found that the term "cataract surgery scanning system" does not require that the apparatus be capable of treating the lens, as asserted by Patent Owner.

a) Use of Benedikt's Imaging System in Kurtz and Swinger

Patent Owner contends that Kurtz and Swinger both use an eye fixation device that is incompatible with Benedikt's diagnostic imaging system. PO Resp. 50. Patent Owner further contends that implementing a dual topometer/OCT device as part of a cataract surgery scanning system

"has never been done" and "would have posed the difficult task of redesigning Kurtz's optical system to combine multiple imaging beams into a common beam path." *Id.* at 50–51 (citing Ex. 2062 ¶ 274).

Petitioner argues in response that neither Kurtz nor Swinger requires eye fixation, and also that prior-art laser surgical systems with integrated imaging were known in the art, and that a person of ordinary skill in the art would have known how to adjust the delivery system's optics —"including a calibration and registration between the treatment beam and imaging beams"—and reprogram the controller to provide additional incision types in the cornea. Pet. Reply 27. In support of this position, Petitioner notes that the '023 patent "offers no details on how to program a controller, calibrate or register beams, or address chromatic aberrations," strongly suggesting that these steps were within the skill of an ordinarily skilled artisan. *Id.*

In its Sur-Reply, Patent Owner argues that there is simply no reason to move away from Swinger's HeNe aiming beam and implement Benedikt's topometer/OCT imaging device. Sur-Reply 24. Patent Owner further argues that Kurtz's and Swinger's eye fixation devices are incompatible with a topometer, and that the topometer's measurements "would be rendered redundant by the subsequent OCT measurement." *Id.* at 26. And, given the minimal purported advantages over Swinger's HeNe aiming beam, Patent Owner contends one of ordinary skill in the art would not have sought to overcome the considerable design challenges required to align the imaging and treatment beams. *Id.*

For surgery on the cornea, Benedikt explains that a topographic scanner is particularly useful, as is a second scanner for detecting optical properties of layers of the eye disposed below the front surface of the cornea. Ex. 1020 ¶¶ 3–8, 32. Consistent with this disclosure, and with

Petitioner's arguments in general, Dr. Hatch testifies that even when OCT data is available, she finds that topometer data very useful. Ex. 1074, 246:6–248:16 (Dr. Hatch explaining that despite having OCT images, there is "a huge benefit to topography"). As such, we find persuasive Petitioner's argument that one of ordinary skill in the art seeking to form a cataract incision and relaxing incisions in the cornea would have sought to implement a topometer/OCT imaging system, as disclosed in Benedikt.

As noted by Patent Owner, use of Benedikt's topometer would require modification or removal of Kurtz's eye fixation device. Petitioner persuasively demonstrates, however, that neither Kurtz nor Swinger require an eye fixation device, and that topographical data would be advantageous, "whether or not eye fixation is used during surgery." Pet. Reply 27 (citing Ex. 1018 ¶ 21; Ex. 1021, 23:35–56). In addition, although the '023 patent recognizes the difficulty in using a profilometer with an eye fixation device, to overcome such difficulties the '023 patent merely states that "contact lens 66 or its disposition relative to cornea 406 of eye 68 may have to be modified, or compensated for, to suit the profilometer's mode of operation," without providing any particular guidance on how to do so. Ex. 1004, 11:35–38. This suggests the inventors of the '023 patent did not consider the necessary modifications for integrating a topometer to be particularly difficult, including modifying or removing the eye fixation device.

With respect to co-registration of the OCT and treatment laser beam, it appears undisputed that integrating Benedikt's imaging system with a treatment laser would present technical design challenges. The evidence of record, however, suggests that surgical systems with integrated imaging were known and that any necessary modifications were within the ordinary skill in the art. *Id.*; Ex. 1072, 76:21:77–3 (Dr. Kang testifying that in 2005 a

person of ordinary skill in the art knew how to develop a system that could co-register the OCT and the laser beam). In any event, even if design challenges existed in implementing a dual topometer/OCT imaging system in Kurtz, Swinger, and Weikert, given the advantages of Benedikt's imaging system for incisions in the cornea, we find that one of ordinary skill in the art would not have avoided the use of Benedikt's imaging system in light of design challenges.

In view of the foregoing, we find that Petitioner persuasively demonstrates that Kurtz, Swinger, Weikert, and Benedikt teach or suggest every limitation of dependent claim 4. Petitioner also provides a sufficient explanation as to how and why one of ordinary skill in the art would have implemented Benedikt's dual imaging system in Kurtz, Swinger, and Weikert with a reasonable expectation of success. Accordingly, Petitioner demonstrates by a preponderance of the evidence that claim 4 would have been obvious over Kurtz, Swinger, Weikert, and Benedikt.

4. Analysis: Claims 5, 8–10, and 12–15

Petitioner identifies where Kurtz, Swinger, Weikert, and Benedikt disclose every limitation of claims 5, 8–10, and 12–15. Pet. 61–67. In particular, Petitioner demonstrates that Benedikt includes a detector for measuring a surface profile of a surface of the cornea of a patient's eye, and suggests providing this information to a controller that controls the formation of a treatment pattern (claim 5) (*id.* at 61 (citing Ex. 1020 ¶¶ 39, 42, Figs. 3, 4)); Swinger discloses an aiming light source that generates a beam that visually indicates the position of the surgical beam (and thereby the position of a treatment pattern before initiating treatment) on the patient's eye (claims 10 and 15) (*id.* at 56–57, 62 (citing Ex. 1021, 33:58–62, 34:27–28, 34:52–35:3, 35:50–57, 36:20–31, Fig. 15Y)); Benedikt

discloses measuring scattering properties by a detector and suggests automating surgery using topometric data obtained from the detector (claim 9) (*id.* at 65 (citing Ex. 1020 ¶¶ 6, 13, 15, 16, 29–32, 39; Ex. 1001 ¶¶ 261–262)); Kurtz discloses making a plurality of incisions at the same time, which one of ordinary skill in the art would have applied to the cataract and relaxing incisions of Weikert and Swinger (claim 13) (*id.* at 66–67 (citing Ex. 1018 ¶ 8; Ex. 1019, 12; Ex. 1001 ¶ 270)); and Kurtz discloses a treatment light source, scanner, and controller that are configured such that incisions in the cornea only partially extend through the target tissue (claim 14) (*id.* at 67 (citing Ex. 1018 ¶ 14, Figs. 1A–H)).

With respect to independent claims 8 and 12, Petitioner provides a detailed explanation as to where each limitation of these claims is taught or suggested in Kurtz, Swinger, Weikert, and Benedikt. Pet. 62–64, 65–66.

Patent Owner does not specifically address Petitioner's arguments and supporting evidence with respect to claims 5, 8–10, and 12–15, beyond its arguments discussed above with respect to dependent claim 4.

Upon review of the evidence and arguments of record, we determine that Petitioner demonstrates by a preponderance of the evidence that claims 5, 8–10, and 12–15 would have been obvious over Kurtz, Swinger, Weikert, and Benedikt.

5. Analysis: Claims 7, 11, and 16

Claims 7, 11, and 16 depend from independent claims 1, 8, and 12, respectively, and further require a camera for capturing an image of target tissue, a display device for displaying the image, and a graphic user interface "for modifying a composition and location of at least one of the first and second treatment patterns on a patient's eye." Ex. 1004, 14:49–54, 15:32–37, 16:40–45.

Petitioner contends that Kurtz discloses the use of a programmable computer with an interface that is used "to present[] the surgeon with several incision patterns from which the desired resection pattern is selected," with the system then applying the selected incisions. Pet. 61 (citing Ex. 1018 ¶ 19). Although not explicitly disclosed in Kurtz, Petitioner contends a person of ordinary skill in the art would have understood that interface 41 of Kurtz includes a "display device" and a "graphical user interface" that would allow the surgeon to make the desired pattern selection and modify the composition and location of at least one treatment pattern on the patient's eye. *Id.* at 61–62 (citing Ex. 1001 ¶ 252). Petitioner also contends that Benedikt discloses a video camera and that one of ordinary skill in the art would have understood that when Benedikt's imaging system is used in Kurtz, the image data would have been provided to interface 41 "so that a surgeon could see the treatment pattern as it would be applied to the eye upon delivery." *Id.* at 62 (citing Ex. 1020 ¶¶ 4, 31, 39, Figs 3, 4; Ex. 1001 ¶ 253).

Patent Owner contends Petitioner's arguments with respect to claims 7, 11, and 16 fail because Petitioner's evidence "suggests modifying the shape of Kurtz's treatment pattern, ***not its location***." PO Resp. 59 (citing Ex. 2062 ¶ 291) (Dr. Kang testifying that for all incision patterns presented in Kurtz, "the location of the incision pattern is the same, and the only thing that changes is the desired shape and gap placement").

In response, Petitioner asserts that selection of a treatment pattern "necessarily selects and modifies the treatment pattern location," and in any event Kurtz's controller already "precisely controls the ***location*** of the beam focal point . . . ***according to parameters received from the surgeon interface 41***." Pet. Reply 30.

In its Sur-Reply, Patent Owner contends that Petitioner is incorrect that selecting a treatment pattern necessarily selects and modifies the treatment pattern location, as "[a]ll of Kurtz's incisions target a 360-degree incision in the central cornea." Sur-Reply 28 (citing Ex. 2063 ¶ 60; Ex. 1073, 207:19–210:23).

Upon review of the parties' arguments and supporting evidence, we credit the testimony of Dr. Lubatschowski that interface 41 of Kurtz would be used by a surgeon to alter both the shape and location of the claimed cataract and relaxation incisions. Ex. 1001 ¶¶ 252–253. And, although the differences in location may be minor between selected incision shapes (as asserted by Dr. Kang), the claims do not require any particular amount of change in the location of the treatment pattern. Pet. Reply 30 (citing Ex. 1018 ¶ 22, Figs 1A–1H).

In view of the foregoing, Petitioner demonstrates by a preponderance of the evidence that claims 7, 11, and 16 would have been obvious over Kurtz, Swinger, Weikert, and Benedikt.

6. Conclusion with Respect to the Combination of Kurtz, Swinger, Weikert, and Benedikt

For the reasons set forth above, Petitioner demonstrates by a preponderance of the evidence that claims 4, 5, and 7–16 would have been obvious over Kurtz, Swinger, Weikert, and Benedikt.

G. Claims 1–8, 10, 11, and 17 as Obvious over Blumenkranz, Kurtz, and Weikert

Petitioner contends the subject matter of claims 1–8, 10, 11, and 17 would have been obvious over the combined disclosures of Blumenkranz, Kurtz, and Weikert. Pet. 31–45.

1. Blumenkranz

Blumenkranz is directed to a system and method for making incisions in eye tissue at different depths. Ex. 1017, code (57). The primary disclosed use of the system of Blumenkranz is for cataract surgery, with the disclosed system providing "rapid and precise openings in the lens capsule and fragmentation of the lens nucleus and cortex . . . using 3-dimensional patterned laser cutting." *Id.* ¶¶ 3–11, 57, 69.

Figure 11 of Blumenkranz is reproduced below:

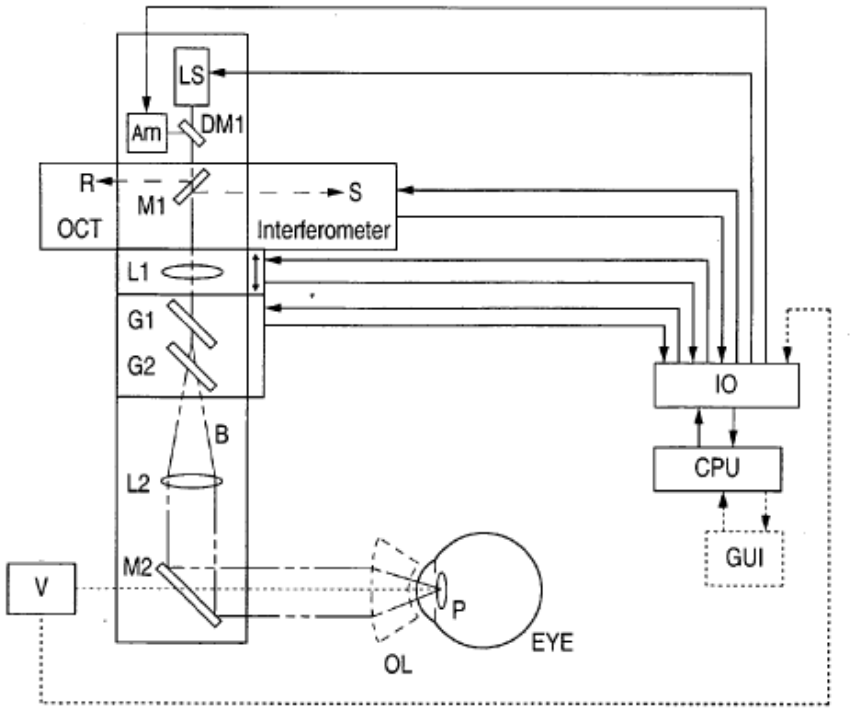

FIG. 11

Figure 11 is a plan diagram of one embodiment of Blumenkranz wherein the system projects or scans an optical beam into a patient's eye. *Id.* ¶ 34. Figure 11 shows laser source LS and aiming beam source AIM having outputs that are combined using mirror DM1. *Id.* ¶ 75. In this configuration, laser source LS may be used for both therapeutics and diagnostics. *Id.* Mirror M1 serves to provide both reference input R and

sample input S to an OCT Interferometer, which provides images to graphical user interface GUI. *Id.* ¶¶ 75, 77. For proper alignment of the treatment beam pattern, an alignment beam may be projected onto the target tissue with visible light. *Id.* ¶ 73. "This allows the surgeon to adjust the size, location, and shape of the treatment pattern." *Id.* Cutting of ocular tissue is determined by scanning patterns that can be circular and spiral, with a vertical step similar to the length of the rupture zone. *Id.* ¶ 68.

Blumenkranz explains that although the primary discussion is of using the described system for capsulotomy and fragmenting the lens of the eye, the techniques described in the patent application "may be used to perform new ophthalmic procedures or improve existing procedures, including anterior and posterior capsulotomy, lens fragmentation and softening, dissection of tissue in the posterior pole (floaters, membranes, retina), as well as incisions in other areas of the eye such as, but not limited to, the sclera and iris." *Id.* ¶ 71.

2. Analysis: Claim 1

Petitioner contends that Blumenkranz discloses a scanning system for cataract surgery that can "treat target tissue in one or more of the cornea, limbus, or sclera of a patient's eye." Pet. 33 (citing Ex. 1017 ¶¶ 8, 11, 21, 45, 71, 74). Petitioner further contends that the system of Blumenkranz has a treatment light source for generating a treatment light beam, as well as a scanner for deflecting the light beam to form treatment patterns under the control of a controller, with the scanner programmed to deliver multiple treatment patterns to target tissue, including the sclera of the patient's eye. *Id.* at 34–35, 37 (citing Ex. 1017 ¶¶ 45, 57, 68, 71, 73). Petitioner concedes that Blumenkranz does not disclose delivering either a cataract incision that only partially penetrates the target tissue or a relaxation incision, but

contends that such incisions are taught in Kurtz (cataract incision) and Weikert (cataract and relaxation incisions). *Id.* at 36–37.

Petitioner contends that one of ordinary skill in the art would have sought to make cataract and relaxing incisions using Blumenkranz's system because "those in the art had already recognized that laser systems delivered more accurate and precise incisions to ocular tissue, without the risk of tearing." *Id.* at 32. Petitioner further contends that one of ordinary skill in the art would have sought to use partially penetrating cataract incisions in Blumenkranz in view of Kurtz's disclosure that such incisions protect the eye from environmental contaminants and infection when made in less-than-sterile environments. *Id.* at 31 (citing Ex. 1018 ¶ 14).

Patent Owner contends Petitioner's arguments are not persuasive because (1) Blumenkranz does not teach or suggest the claimed incisions, and (2) one of ordinary skill in the art would not have modified Blumenkranz's laser system to make the cataract incisions disclosed in Kurtz and Weikert for multiple reasons. PO Resp. 18–19. We address Patent Owner's arguments below.

a) Whether Blumenkranz Teaches or Suggests a Cataract Laser Designed to Cut the Claimed Tissue Types

Patent Owner argues that Petitioner's grounds based on Blumenkranz rely upon using the disclosed system to form incisions in the cornea of a patient's eye, yet Blumenkranz does not disclose making incisions in corneal tissue. PO Resp. 19–20 (citing Pet. 31–32; Ex. 1001 ¶¶ 105–106, 108; Ex. 2062 ¶¶ 137–142). And, although Blumenkranz mentions different tissue types, such as the sclera and iris, Patent Owner asserts that these tissue types are all "well behind the cornea." PO Resp. 20–23.

Petitioner argues in response that "the claims do not require corneal incisions, but [rather] incisions in 'sclera' tissue and 'along or near limbus tissue.'" Pet. Reply 7 (citing Ex. 1004, 14:15–24 (claim 1)). And, because "Blumenkranz expressly teaches treating the ***sclera*** and ***iris***," Petitioner contends that "every claimed region is within the limits of Blumenkranz's system." *Id.* (citing Ex. 1017 ¶ 71; Ex. 2063 ¶¶ 14–15; Ex. 1074, 108:7–23, 104:4–15; Ex. 1070 ¶¶ 21–24).

Patent Owner argues in its Sur-Reply that the Petition consistently asserts that the cataract incision and relaxation incisions would have been made in the cornea of a patient's eye and now, in Reply, Petitioner has impermissibly shifted course to assert that the identified incisions could be made in limbal or scleral tissue. Sur-Reply 5–6 (citing Pet. 36–37). Patent Owner further argues that relaxation incisions are typically formed in the "peripheral to mid peripheral cornea," and by 2008 "sclera [cataract] incisions were not used at all." *Id.* at 6 (citing Ex. 2065, 82:12–17, 225:12–18, 223:14–225:11; Ex. 1019, 14).

The evidence of record demonstrates that cataract incisions and relaxation incisions were well known in the art. Ex. 1001 ¶ 23; Ex. 2063 ¶¶ 30, 33; Ex. 1019, 227; Ex. 1004, 12:19–24. For example, Weikert expressly discloses that corneal incisions are made during cataract surgery and that these incisions can "induce astigmatism by flattening the meridian on which the incision is centered." Ex. 1019, 227. To treat this induced astigmatism, Weikert also expressly discloses using relaxing incisions. *Id.* at 228.

The evidence of record also demonstrates that it was understood in the art that cataract incisions and relaxing incisions could be made in any of the cornea, limbus, or sclera of a patient's eye. Ex. 1001 ¶ 22

(Dr. Lubatschowski testifying that cataract incisions may be made in the cornea, limbus, or sclera of a patient's eye); Ex. 2004 ¶ 18 (Dr. Hatch testifying that "[d]uring cataract surgery, the surgeon makes a cataract incision in the overlying cornea, limbus, or sclera" of a patient's eye); Ex. 2063 ¶ 33 (Dr. Hatch noting that cataract incisions in the sclera were known, but are a "less common" form of incision); Ex. 1004, 12:22–24 (the '023 patent expressly disclosing that "as is known in the art," "relaxing incisions may be made in the limbus 408, or sclera 410"); *see Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1339 (Fed. Cir. 2020) (noting that it is appropriate to consider admission in a patent's specification "when assessing whether [the] patent's claims would have been obvious").

Finally, we find that Petitioner sufficiently argued in its briefing that one of ordinary skill in the art would have used Blumenkranz's system to make cataract and relaxing incisions in any of the cornea, limbus, or sclera of a patient's eye. For example, the Petition expressly states that Blumenkranz discloses a delivery system that could be used to deliver a cataract incision in the sclera of a patient's eye. Pet. 34–35 (citing Ex. 1001 ¶¶ 68, 71, 200). Dr. Lubatschowski also testifies in support of the Petition that a person of ordinary skill in the art "would have used Blumenkranz's system to deliver a first treatment pattern to the cornea, limbus, or sclera to form a cataract incision." Ex. 1001 ¶ 200.

With respect to relaxing incisions, Dr. Lubatschowski testifies that the relaxation incision could be made "along or near limbus tissue" or in "other target tissue," as opposed to "along corneal tissue." Ex. 1001 ¶ 201; Pet. 36–37. The sclera is a tissue type that is not corneal tissue and is "near limbus tissue." *See, e.g.*, Ex. 2062 ¶ 21 (Dr. Kang describing the tissues of the eye and their relative locations); Ex. 2063 ¶ 14 (Dr. Hatch describing the

basic anatomy of the eye). Moreover, the '023 patent concedes that it was known in the art to make relaxing incisions in either the cornea, limbus, or sclera of a patient's eye. Ex. 1004, 12:22–24.

As noted by Patent Owner, after discussing the various disclosures of Blumenkranz and Swinger, the Petition asserts that "[b]ased on these teachings, it would have been obvious [for a person of ordinary skill in the art] to use Blumenkranz's system to create a corneal incision that provides access for lens removal instrumentation." Pet. 36 (citing Ex. 1001 ¶ 200); Sur-Reply 5. Patent Owner contends this assertion led it to address only the question of whether Blumenkranz could be used for corneal incisions, not whether the system of Blumenkranz would have been used to form cataract incisions in the limbus or sclera. Tr. 113:20–115:6.

We agree that the Petition could have been clearer on this point. However, at the beginning of the section cited by Patent Owner, Petitioner expressly asserts that Blumenkranz could be used to target the sclera of a patient's eye to form a cataract incision. Pet. 34–35 ("Additionally, these treatment patterns can be delivered to the sclera, which is 'near limbus tissue' (as claimed)"). Consistent with this disclosure, and in the section identified by Patent Owner, Petitioner cites repeatedly to Dr. Lubatschowski's testimony that a person of ordinary skill in the art would have used Blumenkranz's system to deliver a cataract incision in any of the cornea, limbus, or sclera. Ex. 1001 ¶ 200. These arguments in the Petition reasonably put Patent Owner on notice that Petitioner was relying on the ability of Blumenkranz's system to perform cataract incisions in any of the cornea, limbus, or sclera of a patient's eye. *See* Ex. 1001 ¶ 107 (Dr. Lubatschowski testifying that "another well-known aspect of cataract

surgery involves incisions to the cornea, sclera, or limbus to provide a surgeon access to the inner eye chamber").

As the sclera is a claimed tissue type for both types of incisions, and it is undisputed that Blumenkranz is capable of forming incisions in the sclera, we find that Petitioner persuasively demonstrates that the system of Blumenkranz is capable of performing the claimed cataract and relaxing incisions in the sclera, a claimed tissue type.

b) Whether a Person of Ordinary Skill in the Art Would have Modified Blumenkranz's Laser System

Patent Owner argues that one of ordinary skill in the art would not have modified Blumenkranz to perform incisions in the cornea because Blumenkranz's laser would have been unacceptable for such incisions. PO Resp. 23. Patent Owner reasons that "Blumenkranz uses low focusing precision and high laser energy, while corneal incisions require high focusing precision and low laser energy." *Id.* at 23–24 (citing Ex. 2062 ¶¶ 90–95, 149–183).

This argument is not persuasive in this case because Petitioner is not relying only on incisions in the cornea. Rather, for the reasons set forth above, Petitioner contends cataract incisions and relaxation incisions could have and would have be made in any of the claimed tissue types, i.e., the cornea, limbus, and sclera.

3. Forming Weikert's Manual Incisions with Blumenkranz's Laser

Patent Owner contends that Petitioner's argument that one of ordinary skill in the art would have formed Weikert's manual incisions using Blumenkranz's laser in view of improved accuracy and precision falls apart upon closer examination. PO Resp. 32 (citing Pet. 31–32). Patent Owner contends Dr. Lubatschowski could not identify "the advantages and

disadvantages, from a clinical perspective, of using a blade versus a laser for a surface cut," and testified on cross-examination that the precision of lasers compared to manual blade methods "depends on the situation," and as a "non-ophthalmologist," he did not want to "make any judgement calls." *Id.* at 32–33 (citing Ex. 2041, 107:8–22, 108:3–7 and quoting Ex. 2041, 109:9–15).

Patent Owner also contends that Weikert's manual incisions provide "predictable and reproducible incision profiles," and are "effective," "low-cost and low-risk." *Id.* at 32. And, given Dr. Lubatschowski's inability to identify specific advantage of laser incisions over manual incisions, Patent Owner argues that "[a] skilled artisan would have had no motivation to undertake the expensive task of redesigning Blumenkranz's laser delivery optics." *Id.*

Petitioner argues in its Reply that because lasers were known to perform some aspects of cataract surgery, a person of ordinary skill in the art "would have been motivated to improve all aspects of cataract surgery, including Weikert's relaxing incisions." Pet. Reply 14. According to Petitioner, there was a consistent, acknowledged progression in the art from manual to more precise laser methods, and there was "general excitement and optimism over how manual procedures could be improved by replacing them with lasers." *Id.* at 15.

In its Sur-Reply, Patent Owner argues that the idea that skilled artisans would have used lasers for "all aspects" of cataract surgery is "[n]onsense," as "[e]ven today, ophthalmologists perform the claimed incisions manually, even while performing other aspects of cataract surgery with a laser." Sur-Reply 17 (citing Ex. 2065, 85:3–8; Ex. 1074, 50:17–55:4). And, given the "effective," "low-cost," "reproducible," and "low-

risk" manual blade methods discussed in Weikert, Petitioner contends there was simply no need or desire to implement laser based surgical systems for these incisions. *Id.* at 17–18.

On this record, we find that there was a consistent progression in the art towards performing all aspects of eye surgery using lasers. For example, Weikert discloses that "the advent of excimer laser surgery has led to a tremendous decrease" in manual corneal incisions to correct refractive error. Ex. 1019, 217. Indeed, "[a]s technological advances continue" in various laser surgery techniques, including "crystalline lens removal," Weikert asks: "Is there a future role for refractive keratotomy in modern refractive surgery?" *Id.*

We further find that the consistent push to perform various incisions in the eye using a laser was based on the view that such incisions are more precise and accurate than manual incisions performed by a surgeon. Consistent with this conclusion, Blumenkranz discloses a laser surgery system that allows "rapid and precise openings in the lens capsule and fragmentation of the lens nucleus and cortex" using "3-dimensional patterned laser cutting." Ex. 1017 ¶ 9. Similarly, Swinger discloses a femtosecond laser system that can perform corneal and lens procedures, and states that prior art mechanical and manual incisions in the cornea were unable to "precisely and reproducibly cut living corneal tissue with a minimum of trauma to the cornea." Ex. 1021, 6:59–64, 8:55–57, 34:30–67, Fig. 15A1 (comparing the smooth contoured incision of the invention to the irregular opening created using manual techniques). In contrast to those manual techniques, Swinger discloses that its laser surgery system allows for "accurate control of tissue removal." *Id.* at 9:1–6.

Consistent with the disclosures of the prior art, Dr. Lubatschowski testifies that laser-surgical incisions are "accurate and precise." Ex. 1001 ¶¶ 91, 130, 177. Likewise, Dr. Hatch and Dr. Kang testify that femtosecond laser surgery allows for incisions to be performed in an accurate and "precise way." Ex. 2063 ¶¶ 27, 60 (noting that Kurtz's laser creates "a precise incision in the cornea"); Ex. 2062 ¶ 33 (Dr. Kang testifying that nanosecond laser pulses can provide "accurate, nonthermal ablation"). Thus, we find persuasive Petitioner's argument that one of ordinary skill in the art would have sought to use Blumenkranz's laser system to create cataract and relaxation incisions.

Often, cataract incisions and relaxation incisions are made in the cornea of the eye. Dr. Lubatschowski testifies, however, that it was understood in the art that access to the anterior chamber can be accomplished through incisions in any of the cornea, limbus, or sclera of the eye. Ex. 1001 ¶¶ 22, 117, 200. Likewise, Dr. Hatch testifies that cataract incisions in the sclera were known in the art. Ex. 2063 ¶¶ 30, 33 (noting that cataract incisions in the sclera were known, but "less common"). As such, we find that one of ordinary skill in the art would have understood that Blumenkranz's system was capable of making the corneal and relaxation incisions generally discussed in Weikert in the sclera of a patient's eye, and would have sought to do so as this is a known tissue type in which to place cataract and relaxing incisions. *See* Ex. 1004, 12:22–24 ("Likewise, as is known in the art, such relaxing incisions may be made in the limbus 408, or sclera 410.").

4. Conclusion with Respect to Independent Claim 1

In view of the foregoing, and upon review of the parties' arguments and evidence as a whole, we find that Blumenkranz, Weikert, and Kurtz,

when considered in light of the knowledge of one of ordinary skill in the art, teach or suggest every limitation of claim 1 of the '023 patent. Petitioner also persuasively explains why one of ordinary skill in the art would have sought to combine the disclosures of these references to arrive at the subject matter of claim 1 with a reasonable expectation of success. Thus, Petitioner demonstrates by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Blumenkranz, Kurtz, and Weikert.

5. Analysis: Claims 2–6, 8, and 10

Petitioner presents evidence that Blumenkranz, Kurtz, and Weikert teach or suggest every limitation of claims 2–6, 8, and 10. In particular, Petitioner presents evidence that: Blumenkranz is capable of delivering two treatment patterns simultaneously, such as the identified cataract and relaxing incisions (claim 2) (*id.* at 37–38 (citing Ex. 1017 ¶ 101; Ex. 1019, 12; Ex. 1001 ¶¶ 204–205)); Weikert discloses relaxing incisions that only partially extend through the target tissue (claim 3) (*id.* at 38–39 (citing Ex. 1019, 217–218, 228)); Blumenkranz discloses a profilometer, in the form of an OCT device,[11] that could be used to control the formation of the relaxation incisions (claim 4) (*id.* at 39–40 (citing Ex. 1017 ¶¶ 56, 68, 74, 78, 85)); Blumenkranz discloses a detector for measuring scattering properties from different locations of a patient's eye (claim 5) (*id.* at 40 (citing Ex. 1017 ¶¶ 74, 78, 85)); Blumenkranz discloses an aiming light beam that may be deflected to form an aiming pattern that is delivered to target tissue and visually indicates the position of a treatment pattern on the

[11] Petitioner argues that the "profilometer" of the '023 patent may take many forms, including an interferometer, which encompasses an OCT device. Pet. 39 n.7 (citing Ex. 1004, 11:55–60); Ex. 1051, 4 (Patent Owner alleging in its infringement allegations that an OCT device is a "profilometer").

patient's eye (claim 6 and 10) (*id.* at 40–41 (citing Ex. 1017 ¶¶ 45, 75, 77, 84, 85, Figs. 11–12)); and Blumenkranz, Kurtz, and Weikert teach or suggest every limitation of independent claim 8 (*id.* at 42–45).

Patent Owner does not directly address these claims, beyond its arguments with respect to independent claim 1.

Upon review of the evidence and arguments presented by the parties, we determine that Petitioner demonstrates by a preponderance of the evidence that claims 2–6, 8, and 10 would have been obvious over the combined disclosures of Blumenkranz, Kurtz, and Weikert.

6. Analysis: Claims 7 and 11

Claims 7 and 11 depend from independent claims 1 and 8, respectively, and further require a camera for capturing an image of the target tissue, a display device for displaying the captured image, and a graphic user interface "for modifying a composition and location of at least one of the first and second treatment patterns on the patient's eye." Ex. 1004, 14:49–54, 15:32–37.

Petitioner argues that Blumenkranz's system has a camera for capturing an image of the target tissue, a display device, and a graphic user interface for modifying the composition and location of a treatment pattern(s). Pet. 41–42 (citing Ex. 1017 ¶¶ 77, 88, Figs. 11, 12, 14).

Patent Owner argues in response that the GUI disclosed in paragraph 77 of Blumenkranz is a system for generically processing user input, and not a GUI that allows a user to modify a compostion and location of a treatment pattern. PO Resp. 58–59. Patent Owner further argues that Figures 11, 12, and 14 of Blumenkranz merely depict the GUI generically, with no disclosure of the capabilities of the GUI. *Id.* at 58. Patent Owner acknowledges that Dr. Lubatschowski also cites to Kurtz and Weikert for

this claim limitation, but contends theories set forth in an expert declaration that are not incorporated or made in the Petition must be disregarded. *Id.* at 58–59.

Petitioner argues in its Reply that there is no dispute that Blumenkranz discloses a GUI with the claimed functionality, as is expressly set forth in paragraph 77 of Blumenkranz, and that paragraph 73 of Blumenkranz confirms this by unambiguously disclosing that the GUI of Blumenkranz allows a surgeon to modify the composition and location of a treatment pattern. Pet. Reply 29–30 (citing Ex. 1073, 198:13–199:14; Ex. 1017 ¶¶ 73, 88, Fig. 15; Ex. 1001 ¶ 212). And, although paragraph 73 of Blumenkranz is cited only in Dr. Lubatschowski's declaration, Petitioner contends it is acceptable to cite additional paragraphs of a reference in a Reply to respond to arguments raised in the Patent Owner Response. *Id.* at 29 n.13.

In its Sur-Reply, Patent Owner asserts that the new paragraph of Blumenkranz (paragraph 73) may not be relied upon in the Reply but, in any event, it does not cure the deficiencies in the Petition because it only discusses an alignment beam/pattern, which Patent Owner contends is not a description of the GUI. Sur-Reply 28 (citing Ex. 1073, 291:20–25, 280:4–281:3).

Blumenkranz discloses a camera, a display device, and a GUI. Ex. 1017 ¶ 77, Fig. 11, 12, 14. In Blumenkranz, an aiming beam may be directed to the patient's eye and displayed on a screen, "such as a graphical user interface." *Id.* ¶ 77. Blumenkranz also discloses that the alignment beam allows "the surgeon to adjust the size, location and shape of the treatment pattern[s]." *Id.* ¶ 73. When considered in combination, we agree with Petitioner that paragraphs 73 and 77 would indicate to one of ordinary

skill in the art that the GUI of Blumenkranz allows a surgeon to "adjust the size, location and shape of the treatment pattern[s]." *Id.* ¶¶ 73, 77. Thus, we find that Blumenkranz discloses the subject matter of claims 7 and 11.

We further find that Petitioner did not shift its argument in Reply and that it was not improper to point out, in responding to Patent Owner's arguments, further disclosures of Blumenkranz—discussing the same general embodiment identified in the Petition—that confirm the assertion in the Petition that Blumenkranz teaches or suggests a camera, a display device, and a GUI that allows a surgeon to adjust the size and location of a treatment pattern. *See Apple Inc. v. Andrea Elects. Corp.*, 949 F.3d 697, 706–707 (Fed. Cir. 2020) (explaining that a petitioner may introduce new evidence in reply, as long as petition does not raise a new legal argument and is a legitimate reply to evidence introduced by the patent owner).

Accordingly, Petitioner demonstrates by a preponderance of the evidence that Blumenkranz, Kurtz, and Weikert teach or suggest every limitation of claims 7 and 11.

7. Analysis: Claim 17

Claim 17 depends from claim 1 and further requires a third incision pattern that is formed in "corneal tissue that provides access to the eye chamber of the patient's eye." Ex. 1004, 16:45–48. The parties contest whether one of skill in the art would have used Blumenkranz's laser surgery system to form incisions in the cornea of a patient's eye. PO Resp. 20–32; Pet. Reply 7–9, 27–28.

Given our determination that claim 17 would have been obvious over the combination of Kurtz, Swinger, and Weikert, we do not address this additional ground directed towards claim 17.

8. Conclusion with Respect to Claims 1–8, 10, and 11

For the reasons set forth above, we determine that Petitioner demonstrates by a preponderance of the evidence that claims 1–8, 10, and 11 would have been obvious over Blumenkranz, Kurtz, and Weikert. We do not address Petitioner's further assertion that claim 17 would have been obvious over this combination of references.

H. Claims 4, 9 and 12–16 over Blumenkranz, Kurtz, Weikert, and Benedikt

Petitioner contends the subject matter of claims 4, 9, and 12–16 would have been obvious over the combined disclosures of Blumenkranz, Kurtz, Weikert, and Benedikt. Pet. 45–51.

1. Reason to Combine

Petitioner argues that "Benedikt recognized that single-measurement systems have inherent deficiencies," and that "an accurate understanding of the target anatomy is essential to ophthalmic surgery systems." Pet. 46 (citing Ex. 1020 ¶ 39). Petitioner contends that one of ordinary skill in the art would have been motivated to modify the system of Blumenkranz to have multiple independent imaging and profiling subsystems (as taught by Benedikt), "in order to better produce 'both the entire substantial surface topography of the cornea and also at least one optical property of the layers of the eye disposed under the cornea.'" *Id.* at 46–47. Petitioner contends this combination would provide "the surgeon or practitioner a more accurate representation of the patient's eye tissues and layers, before, during, and after surgery." *Id.* at 47 (citing Ex. 1001 ¶¶ 142–147).

Patent Owner contends that the benefits of a dual topometer/OCT imaging system that are reported in Benedikt are to help compensate for any OCT measurement errors caused by accidental eye movement, which is not

applicable to Blumenkranz's laser system. PO Resp. 36 (citing Ex. 1020 ¶¶ 15, 17; Ex. 2062 ¶¶ 113, 218–219). This is because, according to Patent Owner, cataract surgery requires eye fixation. *Id.* at 36–37 (citing Ex. 2041, 115:15–22; Ex. 2009, 5; Ex. 2023, 4).

Patent Owner further contends that Petitioner fails to show that Benedikt's profilometer would improve over Blumenkranz's OCT imaging system, which was a precise and accurate way to image a patient's eye for laser cataract surgery. Ex. 1017 ¶ 57.

Petitioner argues in Reply that the only embodiment disclosed in the '023 patent with a profilometer also includes an eye fixation device. Pet. Reply 16 (citing Ex. 2062 ¶ 230). Petitioner contends "[t]his indicates a [person of ordinary skill in the art] would have known how to use a profilometer with a laser cataract surgery system and whether or not to use eye fixation." *Id.* With respect to Patent Owner's arguments regarding the lack of additional benefit over Benedikt's OCT system, Petitioner argues that Benedikt's topometer is still beneficial when the eye is not fixated, or for use in pre- and post-surgery analysis, which was confirmed by Dr. Hatch who testifies that there is a "huge benefit to topography" because it provides "so much clinical information." *Id.* at 17–18 (citing Ex. 1074, 246:8–249:18, 234:20–235:21, 237:25–238:10, 248:17–249:9).

It is undisputed that Benedikt's topometer/OCT would provide "previously unattainable comprehensive topometrical/topographical illustration of the cornea," which can be used for planning incisions in the eye. Ex. 1020 ¶¶ 39, 46. Although Benedikt discusses the use of topographical data with OCT to compensate for eye movement (Ex. 1020 ¶¶ 15, 17), the benefits discussed in Benedikt are not limited to this use, nor does Petitioner rely on this benefit for its reasons to combine. Ex. 1020

¶¶ 43–44. Nor does Petitioner limit its reliance on Benedikt to the use of the topometer during surgery. Pet. 46–47 (Petitioner arguing that the system of Benedikt would be valuable to a practitioner "before, during, and after surgery"); Pet. Reply 17–18. Finally, Dr. Hatch confirms the value of topometric data for eye surgery, even when OCT data is available. Ex. 1074, 246:8–249:18 (Dr. Hatch testifying that "there's a huge benefit to topography," even when OCT data is available).

Given the known advantages of a topometer/OCT for eye surgery, we credit the testimony of Dr. Lubatschowski that one of ordinary skill in the art would have sought to implement Benedikt's dual topometer/OCT imaging in the system of Blumenkranz, Kurtz, and Weikert. Ex. 1001 ¶¶ 142–149; Ex. 1069 ¶¶ 49, 52–55. We also credit the testimony of Dr. Lubatschowski that one of ordinary skill in the art would have had a reasonable expectation of success in combining Benedikt in the system of Blumenkranz, Kurtz, and Weikert, especially in view of the lack of any specific disclosure in the '023 patent as to how the claimed system would successfully incorporate a profilometer in combination with eye fixation. Ex. 1001 ¶ 149; Ex. 1069 ¶¶ 53–55.

2. Analysis: Claim 4

Claim 4 depends from claim 1 and further requires a profilometer for measuring a surface profile of a surface of the cornea of a patient's eye, "wherein the controller controls the formation of the second treatment pattern by the scanner in response to the measured surface profile." Ex. 1004, 14:33–37. Petitioner contends that Benedikt discloses a profilometer for measuring the surface profile of the cornea of a patient's eye. Pet. 48 (citing Ex. 1020 ¶¶ 29–31). And, because topometers measure astigmatism, Petitioner contends that one of ordinary skill in the art would

have sought "to program the controller" of Blumenkranz "to control the formation of the second treatment pattern," which is a relaxing incision intended to treat astigmatism. *Id.* at 48–49.

Patent Owner does not directly address Petitioner's arguments with respect to claim 4, apart from its arguments addressed above regarding the motivation to combine Blumenkranz, Kurtz, Weikert, and Benedikt.

Upon review of Petitioner's arguments and supporting evidence, we determine that Petitioner demonstrates by a preponderance of the evidence that claim 4 would have been obvious over Blumenkranz, Kurtz, Weikert, and Benedikt.

3. Analysis: Claim 9

Claim 9 depends from claim 8 and further requires a profilometer for measuring a surface profile of a surface of the cornea, a detector for measuring scattering properties from different locations on the patient's eye, and using the acquired data when forming the first and second treatment patterns. Ex. 1004, 15:15–25.

Petitioner contends that Benedikt discloses a dual topometer/OCT imaging system with a profilometer for measuring the surface profile of the cornea, a detector for measuring scattering properties of a patient's eye, and then using the acquired data for automated corneal surgery. Pet. 49. Petitioner further contends that given the detail provided by Benedikt's imaging system, one of ordinary skill in the art would have found it obvious, "when utilizing a detector ***and*** profilometer in the system disclosed by Blumenkranz, to program the controller to control the formation of the first and second treatment patterns in response to the measured profiles and scattering properties." *Id.* (citing Ex. 1001 ¶¶ 228–229).

Patent Owner does not directly address Petitioner's arguments regarding claim 9.

Upon review of Petitioner's arguments and supporting evidence, we determine that Petitioner demonstrates by a preponderance of the evidence that claim 9 would have been obvious over Blumenkranz, Kurtz, Weikert, and Benedikt.

4. Analysis—Claims 12–16

Independent claim 12 is similar to independent claim 1, but requires a profilometer that measures a surface profile of a surface of the cornea of a patient's eye and then uses this information to control the formation of the second treatment pattern. Ex. 1004, 15:46–50. Claims 13–16 depend from claim 12 and add various limitations relating to how the first and second treatment patterns are formed (claims 13 and 14), the use of an aiming beam (claim 15), and the use of a camera, display, and graphic user interface for modifying a composition and location of at least one of the first and second treatment patterns (claim 16). *Id.* at 16:25–45.

Petitioner contends the combination of Blumenkranz, Kurtz, Weikert, and Benedikt teaches or suggests the limitations of claims 12–16. Pet. 49–51. With respect to the limitations of claim 16, Petitioner relies on its arguments set forth above with respect to the combination of Blumenkranz, Kurtz, and Weikert. *Id.* at 41–42, 51.

Patent Owner does not address Petitioner's arguments for claims 12–15, but contends Petitioner's arguments with respect to claim 16 fail for the same reasons addressed above with respect to the combination of Blumenkranz, Kurtz, and Weikert (addressed with respect to claims 7 and 11 above). PO Resp. 59.

With respect to claims 12–15, upon review of parties' arguments and supporting evidence, we determine that Petitioner demonstrates by a preponderance of the evidence that these claims would have been obvious over Blumenkranz, Kurtz, Weikert, and Benedikt. With respect to claim 16, for the reasons discussed above with respect to the combination of Blumenkranz, Kurtz, and Weikert (claims 7 and 11), we determine that Petitioner demonstrates by a preponderance of the evidence that this claim also would have been obvious over Blumenkranz, Kurtz, Weikert, and Benedikt.

III. CONCLUSION[12]

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–8, 10, 11, 17[13]	103(a)	Blumenkranz, Kurtz, Weikert	1–8, 10, 11	
4, 9, 12–16	103(a)	Blumenkranz, Kurtz, Weikert, Benedikt	4, 9, 12–16	
1–3, 6, 17	103(a)	Kurtz, Swinger, Weikert	1–3, 6, 17	

[12] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

[13] For the reasons set forth above, we do not address Petitioner's argument that claim 17 would have been obvious over Blumenkranz, Kurtz, and Weikert.

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
4, 5, 7–16	103(a)	Kurtz, Swinger, Weikert, Benedikt	4, 5, 7–16	
Overall Outcome			1–17	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–17 of the '023 patent are unpatentable;

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

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