

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OPTICIS CO., LTD.,
Petitioner,

v.

INNEOS LLC,
Patent Owner.

IPR2023-01256
Patent 7,198,416 B2

Before TERRY J. OWENS, JON B. TORNQUIST, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Opticis Co., Ltd. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1, 2, 6, 7, and 9 of U.S. Patent No. 7,198,416 B2 (Ex. 1001, “the ’416 patent”). Inneos LLC (“Patent Owner”) filed a Preliminary Response (Paper 12, “Prelim. Resp.”). Petitioner filed a Preliminary Reply (Paper 13, “Prelim. Reply”), and Patent Owner filed a Preliminary Sur-Reply (Paper 14, “Prelim. Sur-Reply”).

We have authority to determine whether to institute an *inter partes* review. 37 C.F.R. § 42.4(a) (2023). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” A decision to institute under 35 U.S.C. § 314 may not institute on fewer than all claims challenged in the petition. 37 C.F.R. § 42.108(a) (implemented as a result of *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018)).

Upon consideration of the arguments and evidence presented by Petitioner and Patent Owner, we are persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one challenged claim. *See* 35 U.S.C. § 314(a). For the reasons explained below, we institute an *inter partes* review of all challenged claims.

II. BACKGROUND

A. *Related Proceedings*

The parties indicate that the ’416 patent is the subject of *Inneos LLC v. Opticis Co., Ltd. et al.*, No. 8-23-cv-00185-MCS-ADS (C.D. Cal. Jan. 30, 2023) (Pet. 1; Paper 4, 1).

B. *Real Party in Interest*

The parties identify themselves as the real parties in interest (Pet. 1; Paper 4, 1).

C. Level of Ordinary Skill in the Art

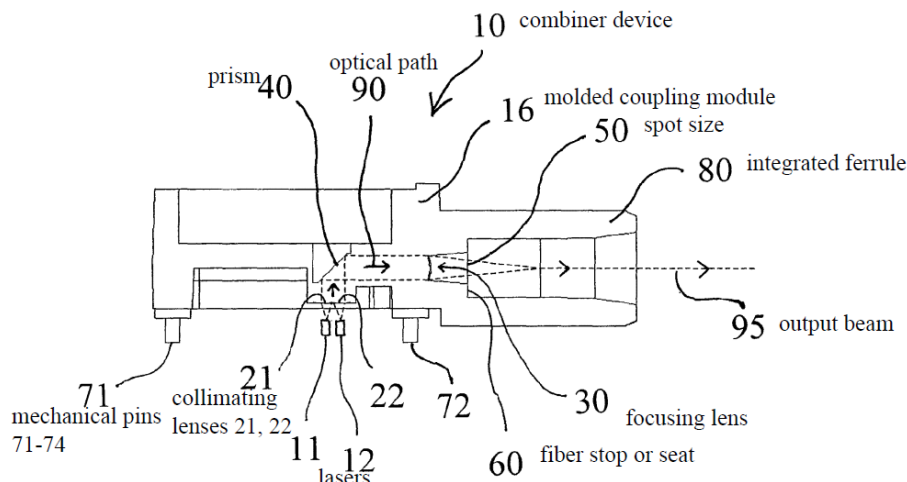
Petitioner states: “A POSITA would have had at least a bachelor’s degree in electrical engineering, physics, or a related field, and at least two years of practical experience in optical technologies. EX1003, §VII(D)(i). These descriptions are approximate and a higher level of education or skill might make up for less experience, and vice versa” (Pet. 10–11).

Patent Owner states: “For the purposes of this POPR only, Patent Owner employed Petitioner’s proposal; if review is instituted, Patent Owner will demonstrate that the proper level of skill is a PhD in a relevant field plus at least three years of industry experience in optoelectronics” (Prelim. Resp. 9).

For purposes of this Decision, we accept Petitioner’s stated level of ordinary skill in the art as it appears consistent with the prior art of record, except that we omit the open-ended language “at least.” During trial, the parties may address the appropriate level of ordinary skill in the art, to the extent it has an impact on the unpatentability analysis.

D. The ’416 Patent (Ex. 1001)

The ’416 patent “relates to an optical multiplexing device which spatially combines multi-wavelength light from a plurality of lasers into an optical fiber” (Ex. 1001, 1:14–16). The device (10) is illustrated as follows (Fig. 1 (annotated)):



The image shows the '416 patent's optical combiner.

“Lasers 11,12 are located at the focal points of the input lenses [(not shown)] and the light is collimated [(by collimating lenses 21 and 22)], reflected off a prism 40 and focused by the focusing lens 30 onto a spot at which a single optical fiber (not shown) is stopped by fiber stop or seat 60 formed in ferrule 80” (*id.* at 3:11–15).

E. Challenged Claims

The challenged claims are:

1. An optical combiner usable in data communication systems for multiplexing the outputs of a plurality of n lasers wherein each of said n outputs has a different output wavelength, for transmission into and through a stopped single optical fiber, comprising:
 - a plurality of n collimating lenses, said lenses being spaced apart and positioned to receive and collimate the output of said n laser output beams, said n laser output beams have n different output wavelengths, and
 - focusing means for focusing said n collimated output beams onto a single spot at said stopped single optical fiber, said focusing means having n separate radial sectors on its surface, and each of said n collimated beams passes through a separate one of said n sectors of said focusing means whereby said n output beams having n different wavelengths are coupled into said single fiber.
2. The optical combiner of claim 1 wherein $n=4$ and wherein said four lasers and four collimating lenses are each formed in a two-dimensional, two by two array, wherein said focusing means is a single focusing lens, and wherein each radial sector is a pie-shaped quadrant.
6. The optical combiner of claim 1 wherein said optical combiner does not require the use of dielectric filters or waveguides.
7. An optical combiner usable in data communication systems for multiplexing the outputs of a plurality of lasers wherein each of said outputs has a different wavelength, for transmission into and through a stopped single optical fiber, comprising:
 - an array of four lasers, formed in a two-dimensional, two by

two array, each of said lasers having an output beam with a different wavelength, an array of four collimating lenses, said lenses being formed in a two-dimensional, two by two array and positioned to receive and collimate the output of said laser output beams, and focusing means for focusing said collimated output beams onto a single spot at said stopped single optical fiber, aid focusing means having four separate quadrants on its surface, and each of said four collimated beams passes through a separate one of said quadrants of said focusing means whereby said output beams of said four lasers are coupled into said single fiber.

9. The optical combiner of claim 7 wherein said optical combiner does not require the use of dielectric filters or waveguides.

F. Prior Art and Other Evidence

Petitioner relies on the following references:

Name	Reference	Publication/Issue Date	Exhibit No.
Kurita	JP 2848279 B2	Jan 20, 1999	1004 (as translated)
LaMarche	US 5,058,499	Jan. 7, 1992	1005
Lemoff	US 6,870,195 B2	Mar. 22, 2005	1006

Petitioner relies also upon a Declaration of Alan E. Willner, Ph.D. (Ex. 1003, “Willner Decl.”). Patent Owner submits a Declaration of Michael Lebby, Ph.D. (Ex. 2003, “Lebby Decl.”).

G. Asserted Grounds of Unpatentability

Petitioner contends that claims 1, 2, 6, 7, and 9 of the '416 patent are unpatentable based on the following grounds (Pet. 3):

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)/Basis
1, 2, 6, 7, 9	103(a)	Kurita
1, 2, 6, 7, 9	103(a)	Kurita, LaMarche, Lemoff
1, 2, 6, 7, 9	103(a)	Lemoff
1, 2, 6, 7, 9	103(a)	Lemoff, LaMarche
1, 2, 6, 7, 9	103(a)	Bhandarkar

III. ANALYSIS

A. Claim Construction

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1325 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water, Inc. v Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). “Claim construction requires determining how a skilled artisan would understand a claim term ‘in the context of the entire patent, including the specification.’” *Grace Instrument Indus., LLC v. Chandler Instruments Co., LLC*, 57 F.4th 1001, 1008 (Fed. Cir. 2023) (quoting *Phillips*, 415 F.3d at 1313). However, although claim terms are interpreted in the context of the entire patent, it is improper to import limitations from the specification into the claims. *See Phillips*, 415 F.3d at 1323. As stated by the Federal Circuit in *Markman v Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995), “[t]he written description part of the specification itself does not delimit the right to exclude. That is the function and purpose of claims.”

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the '416 patent issued has an effective filing date prior to March 16, 2013, the pre-AIA version of § 103 applies.

Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). In the present case, the claim terms having disputed meanings are “optical combiner,” “focusing means,” and “stopped single optical fiber” (Pet. 11–14; Prelim. Resp. 9–23; Prelim. Reply 2–9; Prelim. Sur-Reply 1–8).

1. Optical Combiner

Petitioner argues that the term “optical combiner” is found only in the preamble of claim 1 as part of a statement of purpose or intended use and is therefore not limiting (Prelim. Reply 2). To the extent this term is found to be limiting, however, Petitioner contends it “should be given its plain meaning – *a device that combines multiple optical inputs into an output*” (*id.*).

Patent Owner argues that the preamble is limiting because it “provides important context to the claims, including antecedent basis for several elements in the body of the claims” (Prelim. Sur-Reply 3). Patent Owner further argues, in reliance upon the Lebbby Declaration, that “optical combiner” means “**an integrated subassembly of optical components for multiplexing light of different wavelengths, which includes an integrated, pre-aligned connector with a stop to hold the single fiber optic cable**” (Prelim. Resp. 11; Ex. 2003 ¶¶ 59–67).

The ’416 patent’s specification states that “[t]he combiner/WDM device described herein utilizes plastic mold injection to create a compact device capable of combining multiple optical signals into a single optical fiber, and which avoids the use of dielectric filters and the use of expensive waveguides” (Ex. 1001, 1:46–51), “[t]he present invention provides, for the first time, an inexpensive, injection molded, one piece optical combiner capable of

combining, separately collimating and focusing the output of multiple lasers into a single optical fiber with a uniform, high coupling efficiency” (*id.* at 2:11–15), and “[a]nother object of the present invention is to integrate a fiber optic connector within the optical module, to passively align an optical fiber to the coupling optic” (*id.* at 2:38–40). The optical combiner (10) in the ’416 patent’s Figure 1 shown above is illustrated as an integrated, molded structure.

The ’416 patent’s specification, however, also states that “[w]hile a single molded device can be constructed to create one embodiment of the present invention, two or more parts can be combined to accomplish the same function, and may be necessary to achieve certain environmental conditions” (*id.* at 1:51–55), “[a]n optional two piece combiner is also provided for use in certain environments” (*id.* at 2:17–18), “[a]ll of the optical components within the multiplexer could utilize passive alignment mechanisms” (*id.* at 4:59–60), and “[e]ach optical coupling and redirection component is integrated within a single monolithic plastic-molded device in most embodiments” (*id.* at 4:61–63). Moreover, claims 3 and 8 which depend, respectively, from claims 2 and 7, recite that “said collimating lenses, said prism and said focusing lens are formed as a single, monolithic molded block.” Those claims, therefore, indicate, under the doctrine of claim differentiation, that claim 2, its independent claim 1, and claim 7 do not require the collimating lenses, prism, and focusing lens to be formed as a single, monolithic molded block. *See Karlin Tech. Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971–72 (Fed. Cir. 1999) (The doctrine of claim differentiation “normally means that limitations stated in dependent claims are not to be read into the independent claim from which they depend.”).

Thus, the ’416 patent’s specification discloses an integrated, monolithic molded optical combiner, but also indicates that the optical combiner claimed in the challenged claims is not limited to such a structure but, rather, includes

an optical combiner comprised of components that are integrated sufficiently to combine multiple optical inputs into an optical output focused onto a spot on an optical fiber but are not integrated in a pre-aligned unit. We give weight to the preamble claim term “optical combiner” because it is needed to specify the type of device being claimed. The parties disagree on the meaning of “optical combiner,” i.e., whether it is a device that combines multiple optical inputs into an output as argued by Petitioner, or is limited to light-multiplexing devices that comprise an integrated subassembly of optical components including an integrated, pre-aligned connector with a stop to hold a single fiber optic cable as argued by Patent Owner. During trial, the parties can address what the ordinary and customary meaning of the claim term “optical combiner” would be to one of ordinary skill in the art in view of “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Phillips*, 415 F.3d at 1327 (quoting *Innova*, 381 F.3d at 1116).

2. *Focusing Means*

The parties agree that the term “focusing means” is a means-plus-function limitation subject to construction under 35 U.S.C. ¶ 6 (Pet. 11; Prelim. Resp. 16). Construing a means-plus-function limitation includes two steps: 1) identifying the claimed function, and 2) identifying the corresponding structure in the specification of the patent that performs the function. *See IPCom GmbH & Co. v. HTC Corp.*, 861 F.3d 1362, 1370 (Fed. Cir. 2017).

The parties agree that the claimed function is “focusing said n collimated output beams onto a single spot at said stopped single optical fiber” (Pet. 11; Prelim. Resp. 16).

As to the structure, Petitioner argues, in reliance upon the Willner Declaration, that “[i]n the ’416 Patent, the corresponding structure described in the specification for performing the function of ‘focusing said n collimated

output beams onto a single spot at said stopped single optical fiber’ is a focusing lens” (Pet. 11 (emphasis omitted); Ex. 1003 ¶ 113).

Patent Owner argues, in reliance upon the Lebby Declaration, that “the corresponding structure is a **“lens integrated into the optical combiner that is in alignment with the collimating lenses and the core of the stopped optical fiber”** and “equivalent structures” (Prelim. Resp. 16; Ex. 2003 ¶¶ 80–94).

As indicated above by our discussion of the “optical combiner” recitation, the ’416 patent’s specification does not appear to require that the structure corresponding to the claim term “focusing means” includes, in addition to the focusing lens (30), the other components of a single, monolithic block with which it can be integrated. Moreover, claim 2’s requirement that the “focusing means is a single focusing lens” and claim 7’s requirement of a “focusing means having four separate quadrants on its surface” appear to indicate that the focusing means is the focusing lens (30). Thus, the structure corresponding to the “focusing means” in claim 1 appears to be the focusing lens (30). During trial, the parties further can address the focusing means’ corresponding structure.

3. Stopped Single Optical Fiber

Petitioner argues, in reliance upon the Willner Declaration, that “the term ‘*stopped*’ would have been understood by a POSITA to mean ‘fixed,’ such that movement would be substantially limited” (Pet. 13; Ex. 1003 ¶ 118).

Patent Owner argues, in reliance upon the Lebby Declaration, that “stopped single optical fiber” means **“a single optical fiber that has been inserted into the optical combiner until it comes abuts [sic] a physical structure that prevents the fiber from being inserted further into the optical combiner”** (Prelim. Resp. 20; Ex. 2003 ¶¶ 67–69).

The ’416 patent’s specification discloses that the focusing lens (30)

focuses light “onto a spot at which a single optical fiber (not shown) is stopped by fiber stop or seat 60 formed in ferrule 80” (Ex. 1001, 3:11–15), and “[t]he integrated ferrule 80 enables one to place an output fiber optic cable into the pre-aligned connector” (*id.* at 3:17–18). The ’416 patent’s Figure 1 appears to indicate that the fiber optic cable’s connector can be inserted into the integrated ferrule (80) until it reaches the fiber stop or seat (60). The ’416 patent’s specification, however, does not appear to limit the claim term “stopped single optical fiber” to a fiber having a connector that abuts against a fiber stop or seat but, rather, appears to include a fiber that is fixed in other ways that enable the collimated output beam to be focused onto a single spot on the optical fiber. In our analysis of Grounds 1–4 we construe the term “stopped single optical fiber” as having the broader of the above two meanings. Regarding Ground 5, even if we give the term “stopped single optical fiber” the narrower meaning argued by Patent Owner, such a structure (SC connector) appears to be disclosed by Bhandarkar (Ex. 1013 ¶ 41).

During trial the parties can further address the meaning of “stopped single optical fiber” and address methods for stopping an optical fiber.

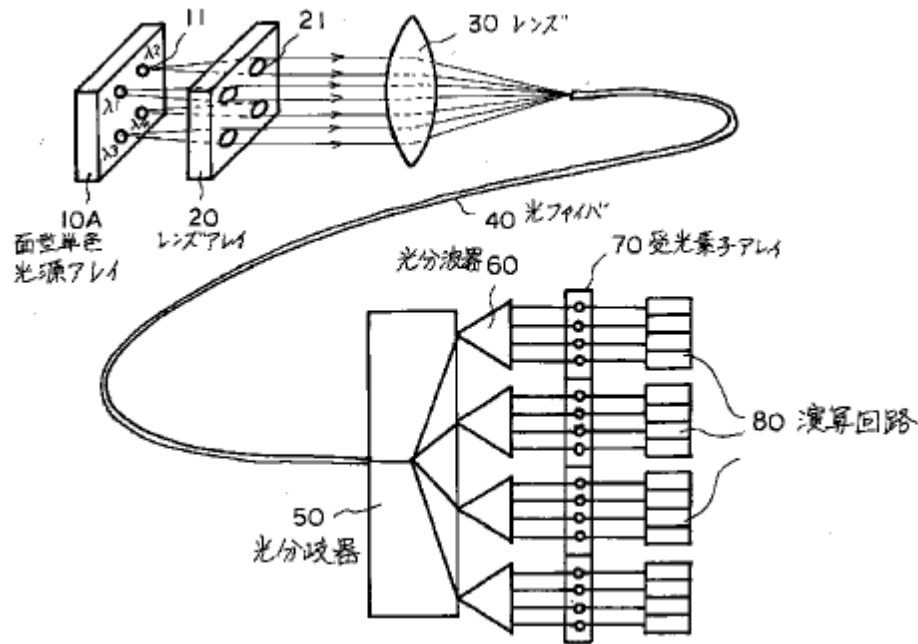
B. Grounds

Ground 1: § 103 – Kurita

Petitioner asserts that claims 1, 2, 6, 7, and 9 are unpatentable as obvious over Kurita (Pet. 17–25).

1. Kurita

Kurita discloses a light connection device illustrated as follows (Ex. 1004, Fig. 3):



The image is Kurita's Figure 3 showing
Kurita's light connection device.

The light connection device comprises: 1) a planar monochromatic light source array (10A) of integrally array-formed surface emitting lasers (11) each emitting light having a different wavelength; 2) a collimating lens array (20) each lens (21) of which corresponds to a different one of the lasers (11); and 3) a lens (30) that receives in different sectors the light emitted from each of the lasers (11) and converges the light from each sector onto one point to be entered into one end portion of a single optical fiber (40) (*id.* ¶¶ 1, 6, 8–11).

2. Arguments

Petitioner contends: 1) Kurita's light connection device (Figure 3) is an "optical combiner"; 2) planar monochromatic light source array 10A is in a 2x2 array and corresponds to claim 1's "plurality of n lasers"; 3) collimating lens array 20 corresponds to claim 1's "plurality of n collimating lenses"; and 4) lens 30 corresponds to claim 1's "focusing means" (Pet. 19–23).

Patent Owner argues that Kurita's light connection device and

focusing lens do not correspond, respectively, to the recited “optical combiner” and “focusing means” because Kurita’s focusing lens is free floating and not integrated into a subassembly with the light connection device (Prelim. Resp. 22–28).

On this record, we disagree with Patent Owner’s arguments. Kurita explains that Figure 3 is “a conceptual configuration diagram for the element in the third example according to the present invention,” the “element” being a “light connection element” (Ex. 1004 ¶¶ 10, 15). On this record, we do not view the components of the light connection device in Figure 3 as free floating; rather, it appears that Kurita’s lens (30) cannot be free floating because it must be fixed relative to the collimating lens array (20) and the optical fiber (40) to enable the light from the surface-emitting lasers (11) to become multiplexed and integrated to be transmitted through the optical fiber (40) (Ex. 1004 ¶¶ 10, 11, 15). Thus, the light source array (10A), the collimating lens array (20), the focusing lens (30), and the optical fiber (40) appear to be integrated as needed to enable the light connection device to function properly.

Petitioner contends that one of ordinary skill in the art would have understood that Kurita’s fiber is “stopped,” or would have found it obvious to design it as a “stopped” fiber, because Kurita’s beams are focused “at one point” and stopping the fiber would ensure the focused beams enter into the fiber and would improve coupling efficiency (Pet. 22–23).

Patent Owner argues that Kurita does not disclose that the single optical fiber (40) must be inserted until it reaches a stop or seat and, therefore, does not disclose a stopped single optical fiber (Prelim. Resp. 25, 27).

Ground 1 is based upon obviousness, not anticipation. Patent Owner’s argument is not well taken because it does not address what

Kurita would have suggested to one of ordinary skill in the art regarding fixing Kurita's single optical fiber (40) in place.

Patent Owner argues, in reliance upon the Lebby Declaration, that Kurita's lens (30) does not have n separate radial pie-shaped sectors on its surface that each of the n collimated beams passes through (Prelim. Resp. 28–29; Ex. 2003 ¶¶ 155–56, 159).

Kurita discloses that planar monochromatic light source array 10A has integrally-formed surface emitting lasers (11) in a 2x2 array (Ex. 1004, Fig. 3). Dr. Willner testifies that Kurita's two-by-two array of plural lens portions 21 “results in radially arranged lenses that will each pass their respective collimated light to a separate radial portion (or sector) of the lens 30” (Ex. 1003 ¶ 182). On this record, we are persuaded by Petitioner's contention that Kurita teaches light passing through a 2x2 array of collimating lenses (21) “to a separate radial portion (or sector) of the lens 30” (Pet. 23; Ex. 1003 ¶ 182). On this record, we also find persuasive Petitioner's contention that it would have been obvious that “the lens portions 21 are aligned with the center axis of the focusing lens 30 in such a way that the collimated light passes through separate radial sectors because doing so would have resulted in better coupling efficiency” (Pet. 23 (citing Ex. 1003 ¶¶ 183–184)).

Based upon the above-discussed evidence and arguments, we conclude that Petitioner establishes a reasonable likelihood that the optical combiner claimed in claims 1, 2, 6, 7, and 9 would have been obvious to one of ordinary skill in the art over Kurita.

Grounds 2, 3, and 4: § 103 - Kurita in view of LaMarche and/or Lemoff; § 103 - Lemoff; and § 103 - Lemoff in view of LaMarche.

Petitioner contends that claims 1, 2, 6, 7, and 9 would have been obvious over the combined disclosures of Kurita, LaMarche, and/or

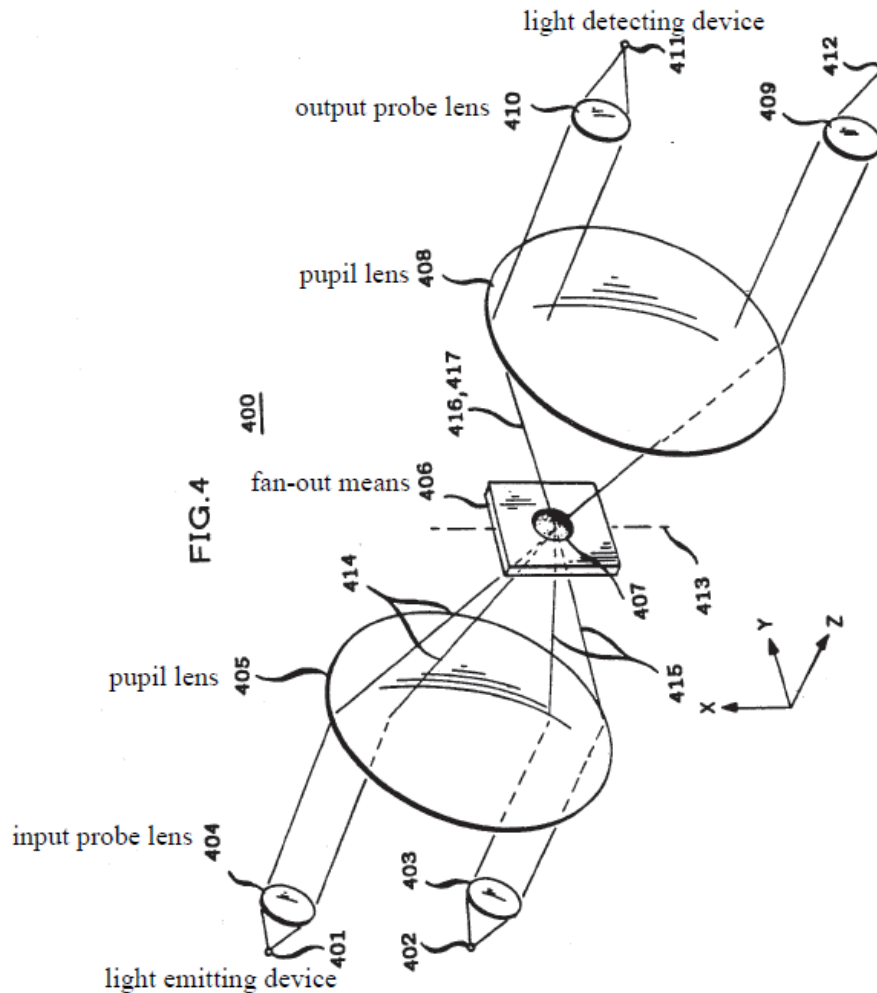
Lemoff (Ground 2); Lemoff (Ground 3); and Lemoff and LaMarche (Ground 4) (Pet. 6–50).

Ground 2: § 103 - Kurita in view of LaMarche and/or Lemoff

Petitioner contends that claims 1, 2, 6, 7, and 9 would have been obvious over the combined disclosures of 1) Kurita and LaMarche, or 2) Kurita, LaMarche and Lemoff.

1. LaMarche

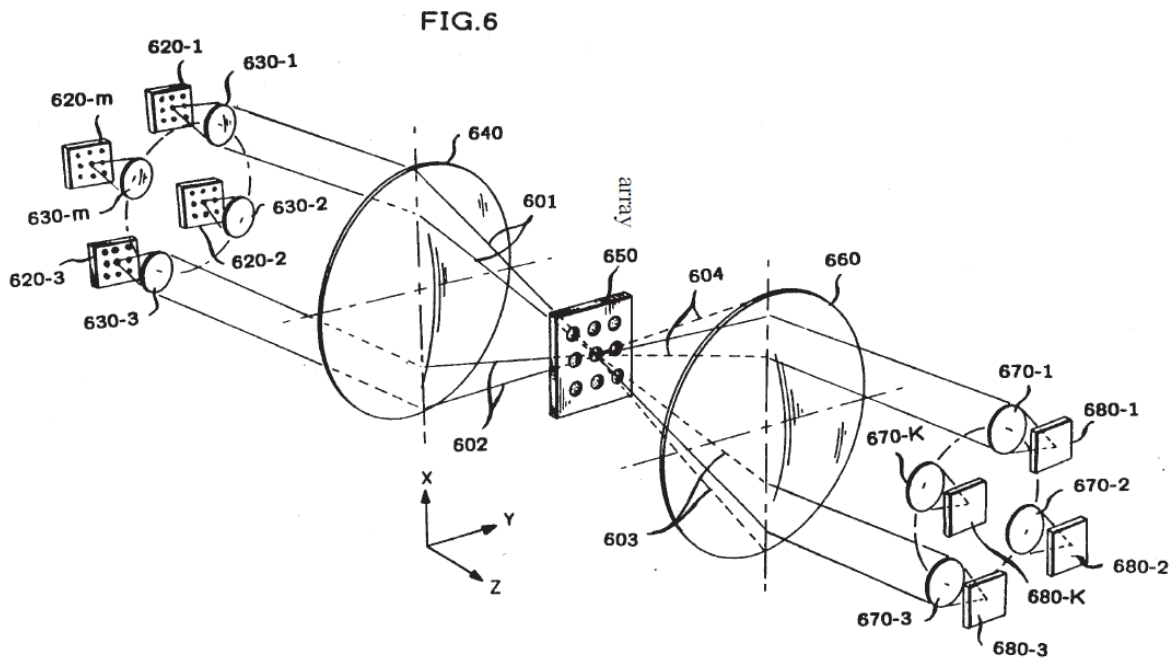
LaMarche discloses “an optical arrangement for interconnecting, via free space, light emitting devices to light detecting devices” (Ex. 1005, 1:6–8). The optical arrangement permits “multipoint to multipoint interconnections by utilizing the concept of pupil division in conjunction with a non-collinear arrangement of lenses” (*id.* at 3:5–8), and “overcomes the drawbacks of the prior art methods of interconnections by using in a new manner a non-collinear arrangement of lenses, i.e., the optical axes of two or more lenses are parallel, but offset in the radial direction” (*id.* at 2:13–17). “As a result of utilizing different portions of the same lens in a technique called pupil division, the non-collinear lens arrangement affords the simultaneous broadcasting of optical signals to a plurality of light detecting devices” (*id.* at 2:23–27). The optical arrangement is illustrated as follows (Fig. 4 (annotated)):



The image is LaMarche's Figure 4 showing La Marche's optical arrangement for interconnecting, via free space, light emitting devices to light detecting devices.

“[P]upil lenses 405 and 408 form an afocal system. That is, collimated beamlets incident on pupil lens 405 exit pupil lens 408 substantially collimated” (*id.* at 4:9–11). “Fan-out means 406 increases the divergence angles of beamlets incident thereon, such as beamlets 414 and 415 (*id.* at 4:7–8). “The fanning-out of beamlets, 414 and 415, into beams, 416 and 417, also ensures that light rays from both beamlets, 414 and 415, each substantially fills the aperture of pupil lens 408” (*id.* at 4:19–22).

Another embodiment the optical arrangement is shown in LaMarche's Figure 6 is as follows:



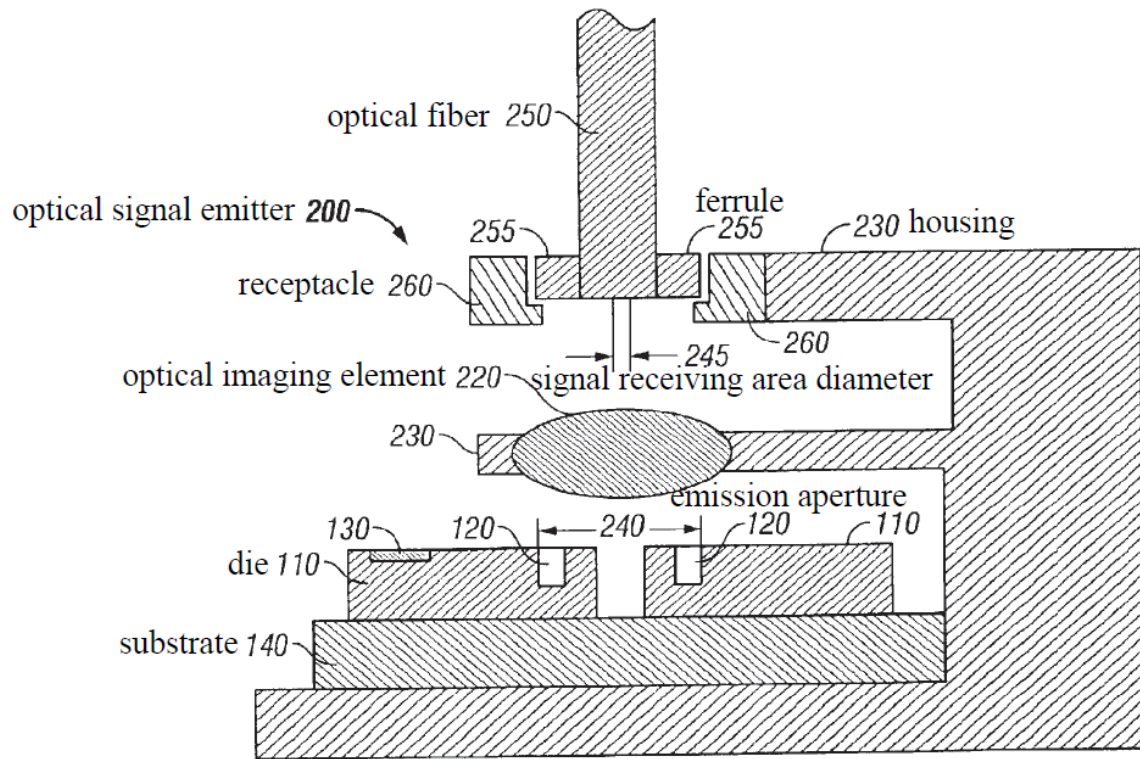
The image is LaMarche's Figure 6 showing
LaMarche's optical arrangement.

“Rectangular areas, 620-1 through 620-M, represent arrays of lighting emitting devices” (*id.* at 4:44–45). “Similarly, rectangular areas, 680-1 through 680-K, represent arrays of light detecting devices” (*id.* at 4:49–51). “[T]he light detecting devices within each array are positioned in a substantially identical pattern as that of the light emitting devices” (*id.* at 4:54–57). “Each of the $M \times N \times N$ arrays of light emitting devices, 620-1 through 620-M, is placed at the focal plane of input probe lenses, 630-1 through 630-M, respectively. Input probe lenses, 630-1 through 630-M, have a focal 30 length of f_p . Thus, light that is emitted from a light emitting device is collimated by its respective input probe lens” (*id.* at 5:27–33).

2. Lemoff

Lemoff discloses “a multi-channel optical signal emitter for a wavelength division multiplexed (WDM) communication system that combines multiple signal components into a multi-channel optical signal without using an optical multiplexer or other device external to the emitter” (Ex. 1006, 1:52–56). The optical signal emitter (200) is illustrated as

follows (Fig. 2 (annotated)):



The image is Lemoff's Figure 2 showing
Lemoff's optical signal emitter.

The optical signal emitter (200) includes a housing (230) which secures and holds in alignment a receptacle (260), an optical imaging element (220), and a substrate (140) (*id.* at 6:12–15). The optical imaging element (220) is a simple bi-convex lens configured to image optical signal components emitted from a die (110)'s emission apertures (120) into an optical fiber (250)'s core portion's signal receiving area (245) (*id.* at 6:3–11). A ferrule (255) surrounds and secures the end of the optical fiber (250) (*id.* at 5:58–60).

3. Arguments

Petitioner argues, in reliance upon the Willner Declaration (Pet. 29; Ex. 1003 ¶ 203):

The embodiment shown in FIG. 3 of Kurita includes a two-by-two array of four radially arranged collimating lens portions 21, and it

would be a natural extension to apply LaMarche's teaching of a radial arrangement for an arbitrary number M of collimating lenses. LaMarche further teaches that the radial (or non-collinear) arrangement it describes results in improved coupling efficiency, reduced physical complexity, and has other advantages such as being able to achieve high-bandwidth connections. *See* EX1005, 1:11-2:20 (Background of the Invention), 2:17-23 (Summary of the Invention); EX1003, §VIII(C)(i).

Petitioner further argues that one of ordinary skill in the art would have applied to Kurita's light connection element: 1) LaMarche's radial arrangement of collimating lenses, such that the collimated light from each of the collimating lenses passes through a separate radial sector of a focusing lens; and/or 2) Lemoff's receptacle and ferrule arrangement for securing an optical fiber (Pet. 30). The reason for the combination is that they would be combined with a known device (Kurita's light connection element) ready for improvement, according to a known method (arranging elements of an optical device) to yield predictable results (e.g., a functioning optical device) (*id.*). Petitioner further argues: "LaMarche expressly teaches a radial arrangement of collimating lenses. This is similar to the radial, two-by-two arrangement of FIG. 3 of Kurita" (Pet. 31).

Further regarding Lemoff, Petitioner argues that "the embodiment shown in FIG. 3 of Kurita includes an optical fiber 40, and it would be a natural extension to apply Lemoff's teaching of a receptacle and ferrule arrangement for securing an optical fiber" (Pet. 29; Ex. 1003 ¶ 212).

Patent Owner argues that one of ordinary skill in the art would not have combined Kurita and LaMarche for three reasons (Prelim. Resp. 32–33):

First, because LaMarche would drastically increase the number of components in the optical arrangement, a POSITA would not look to LaMarche to improve Kurita. . . . LaMarche would require *six additional discrete parts* for the same number of lenses and emitters disclosed in Kurita—the same number that Kurita FIG. 4 discloses and Kurita describes as "unnecessary."

EX1004, ¶¶0002]; EX2003, ¶201.

Second, a POSITA would understand that the optical arrangement in LaMarche using “simultaneous broadcasting,” even when properly aligned after spending increased man hours and expenditures, results in losses of light and would not have necessarily improved coupling efficiency or achieved greater bandwidths. . . .

Third, the degree of modification necessary for Kurita is not a simple substitution—it would require a significant modification. *See KSR*, 550 U.S. at 416. Kurita’s entire system would need to be overhauled, against the teachings of Kurita Not only would Kurita’s lenses need to be arranged radially, the lenses would also need to be aligned relative to each other. EX2003, ¶¶201, 218-219.

Regarding the combinability of Kurita and Lemoff, Patent Owner argues (Prelim Resp. 34):

Lemoff discourages using optical wavelength multiplexers for short distances because the complexity of the design is often cost prohibitive, particularly because optical wavelength multiplexers require high precision. EX1006, 1:42-48, 1:52-56. Conversely, Kurita discloses an expensive multiplexer comprised of separate, discrete components, that requires costly manual alignment and high precision. EX2003, §IX.B.1. By contrast, Lemoff discloses that its signal emitter can be used in a WDM communication system “without using an optical multiplexer or other device external to the emitter,” (*id.* 1:52-56) *i.e.*, without using a system such as Kurita or any external device. Thus, taking the references as a whole, a POSITA would not have a reason to combine Lemoff with a large, costly WDM system disclosed in Kurita. EX2003, §IX.B.5.

Patent Owner further argues that “a POSITA would have no reason to combine Lemoff’s receptacle and ferrule with discrete, free-floating components in Kurita because the ferrule would serve no purpose—the fiber would need to be manually aligned with or without a ferrule. EX2003, ¶¶234-236” (*id.*).

Patent Owner’s above-stated arguments against the combinability of Kurita with LaMarche and/or Lemoff raise some questions as to whether

Petitioner has adequately explained why one of ordinary skill would have combined Kurita with LaMarche and/or Lemoff to arrive at the optical combiner claimed in the '416 patent's challenged claims. The parties may further address during trial whether claims 1, 2, 6, 7, and 9 would have been obvious to one of ordinary skill in the art over Kurita combined with Lemoff and/or La Marche.

Ground 3: § 103 – Lemoff

Petitioner argues (Pet. 41):

The use of collimating lenses in conjunction with a focusing lens was well known to a POSITA, and in particular, was known to be advantageous, e.g., in terms of coupling efficiency. EX1003, ¶257; *see also id.*, Section VI(C) (describing background technology) and above, Section IV(C) (same). A POSITA therefore would have been motivated, at least in order to improve coupling efficiency, to have the optical imaging element 220 of Lemoff include “*a plurality of n collimating lenses*” (i.e., one for each of the light emitting apertures 120), which work in conjunction with a focusing lens to image the optical signal components into the fiber 250. See EX1003, §VIII(D)(iii).

In making this design choice, a POSITA would make the collimating lenses spaced apart and positioned to receive and collimate light so that they would be aligned appropriately with the light emitting apertures 120. This would improve the coupling efficiency, and maximize efficiency as specifically noted in Lemoff as being desirable. See EX1006, 6:23-25, 5:15-59; *see also* EX1003, ¶¶257-259.

Patent Owner argues (Prelim. Resp. 40):

Lemoff does not teach or suggest using collimating lenses. Petitioner cites to Lemoff's disclosure of various types of imaging lenses that may be used to image the optical signals to the fiber (EX1006, 6:16-23), but none of these are disclosed to be collimating lenses, much less collimating lenses corresponding to each emission aperture. EX2003, ¶¶266-267. *See, e.g., In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967) (the Board cannot “resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis.”).

Patent Owner also argues that “there is no evidence that adding collimating lenses to Lemoff would improve its coupling efficiency or maximize

efficiency. EX2003, ¶¶312-319” (*id.*).

Because Petitioner relies solely upon Dr. Willner’s opinion evidence as support for the argument that Lemoff would have suggested, to one of ordinary skill in the art, use of a collimating lens with each of the light emitting apertures (120), and Patent Owner challenges that argument with citation to declarant testimony that disputes the factual basis for Dr. Willner’s conclusions, we determine that we are presented with a material issue of fact as to whether one of ordinary skill in the art would have arrived at the subject matter of claims 1, 2, 6, 7, and 9 in view of the disclosures of Lemoff, and that this issue can be best resolved on a complete trial record.

Ground 4: § 103 – Lemoff in view of LaMarche

Petitioner argues (Pet. 43–44):

[A] POSITA would have been motivated to modify the optical combiner taught by Lemoff to include a collimating lens [in LaMarche’s Fig. 6] above for each of the emission apertures 120 in FIG. 2 of Lemoff, in order to achieve the predictable result of ensuring that the light from the emission apertures 120 reach the optical imaging element 220 in the same direction such that the optical imaging element 220 focuses the light at the same point. *See, e.g.*, EX1005, 5:60-62 (“All collimated beamlets propagating through pupil lens 640 having the same propagation direction are focused to the same spatial coordinates.”); *see also* EX1003, ¶263.

In making this modification, a POSITA would make the collimating lenses spaced apart and positioned to receive and collimate light (as they are in LaMarche, e.g., as shown in FIG. 6) so that they would be aligned appropriately with the light emitting apertures 120. This would improve the coupling efficiency, and maximize efficiency as specifically noted in Lemoff as being desirable. *See* EX1006, 6:23-25, 5:15-59; *see also* EX1003, ¶¶263; EX1003, §VIII(D)(iii).

Patent Owner argues (Prelim. Resp. 37):

Combining Lemoff and LaMarche would not have led to a predictable result because they are not capable of being physically combined due to the size differences, and any such system would

lead to inoperable results. . . . Because Lemoff is a micro-package signal emitter, combining it with LaMarche would have led to inoperable results. LaMarche discloses a system that spans over 160mm. EX1005, 7:16-25.

Patent Owner argues that “[b]y contrast, Lemoff is in the order of 1-2 centimeters” (*id.* at 38).

Patent Owner further argues (Prelim. Resp. 40):

Lemoff does not teach or suggest using collimating lenses. Petitioner cites to Lemoff’s disclosure of various types of imaging lenses that may be used to image the optical signals to the fiber (EX1006, 6:16-23), but none of these are disclosed to be collimating lenses, much less collimating lenses corresponding to each emission aperture. EX2003, ¶¶266-267. *See, e.g., In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967) (the Board cannot “resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis.”).

Patent Owner also argues that “there is no evidence that adding collimating lenses to Lemoff would improve its coupling efficiency or maximize efficiency” (*id.* at 40) and that “there is no suggestion that even if collimating lenses were used in some capacity that they would be arranged over each aperture of each laser such that there is a collimating lens corresponding to each laser, as required by the claims (*id.* at 44). Patent Owner further argues (Prelim. Resp. 47–48):

Lemoff does not disclose “separate radial sectors” *on the surface of the imaging lens*. For this limitation, Petitioner relies on FIG. 1A, but this embodiment of Lemoff does not include an imaging lens. EX1006, at 3:26-34; FIGS. 1A & 1B. Lemoff teaches away from using an imaging lens in this embodiment. EX1006, 3:26-34, 3:54-65; EX2003, ¶¶340-341. To the extent Petitioner relies on FIG. 2 of Lemoff, the emitting apertures form an inner and outer circle. This means that the light hitting the imaging lens would not form pie shaped sectors, even if the light was collimated. EX2003, ¶338. To the extent Petitioner relies on LaMarche, the pupil lens focuses the light from the collimating lenses to an array of ball lenses—that means that the individual

laser beams are not focused onto a single spot, but are focused onto nine different ball lens. *E.g.*, EX1005, FIG. 6; EX2003, ¶¶344-347.

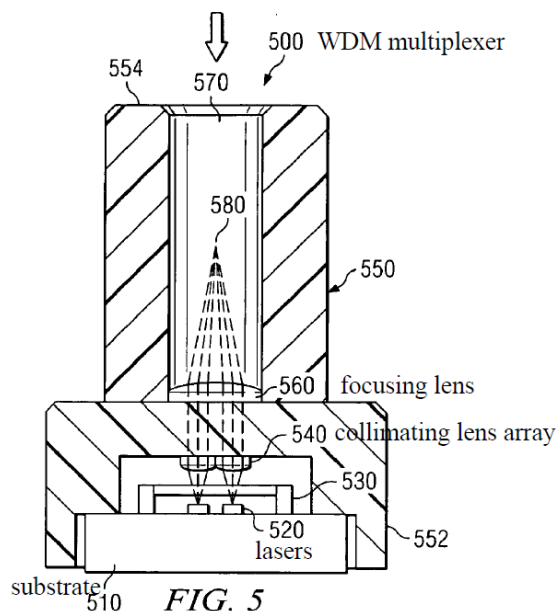
In view of Patent Owner's above-stated challenges to the evidence and arguments relied upon by Petitioner, we determine that Patent Owner raises questions as to whether a person of ordinary skill in the art would have combined the disclosures of Lemoff and LaMarche to arrive at the subject matter of claims 1, 2, 6, 7, and 9. The parties may further address this issue during trial.

Ground 5: § 103 – Bhandarkar

Petitioner contends that claims 1, 2, 6, 7, and 9 would have been obvious over Bhandarkar (Pet. 50–69).

1. Bhandarkar

Bhandarkar discloses a wavelength division multiplexing (WDM) multiplexer illustrated as follows (Ex. 1013, Fig. 5 (annotated)):



The image is Bhandarkar's Figure 5 showing
Bhandarkar's WDM multiplexer.

The WDM multiplexer comprises a collimating lens array (540) and a single focusing lens (560). The collimating lens array (540), single focusing

lens (560) and receptacle (550) can be integrated as a single molded unit and can be coupled to an optical fiber by a plug-in SC fiber-optic connector (*id.* ¶¶ 5, 41).

2. *Arguments*

Petitioner contends that Bhandarkar is prior art and discloses all elements of the challenged claims (Pet. 50–69).

Patent Owner argues only that Bhandarkar is not prior art to the '416 patent (Prelim. Resp. 49–66). Patent Owner's reasoning is that although Bhandarkar's September 29, 2003 provisional application's filing date is before the '416 patent's February 4, 2004 provisional application's filing date, Patent Owner has shown conception of the '416 patent's claimed optical combiner on June 17, 2003 and diligence in reducing it to practice from before September 29, 2003 to the '416 patent's provisional application's February 4, 2004 filing date (Prelim. Resp. 50–61; Prelim. Sur-Reply 8–10).

Petitioner argues that Patent Owner has not shown diligence in reducing the invention to practice from November 10, 2003 to January 15, 2004 (Pet. 55; Reply 9–10). Petitioner's reasoning is (Pet. 55):

[F]rom November 10, 2003 until January 15, 2004, the only evidence of diligence is inventor testimony of the inventors performing a *second* prior art search for over two months, after a *first* prior art search also taking two months. EX1002, 121 (paras. 8 and 10 of Grann declaration). Even if an inventor's prior art searching could count toward diligence—which Petitioner does not acquiesce—it is not reasonably continuous diligence for inventors to spend this amount of time on prior art searching, particularly where there is no corroborating evidence of the search, the results (if any) do not appear in the provisional application (the asserted constructive reduction to practice), and no technical development was being done at the time.

Patent Owner provides two types of evidence of diligence from November 10, 2003 to January 15, 2004 (Prelim. Resp. 60): 1) computer

modeling by Curtis Ray reported on January 9, 2004 (Ex. 1002, 83); and 2) a prior art search update by Curtis Ray and Eric Grann “during the period from November 10, 2003 through approximately January 15, 2004” (Ex 1002, 121) reported on January 27, 2004 (Ex. 2011, 2, 35). Patent Owner points out that those reported results differ from search results reported on November 10, 2003 (*id.* at 22).

“The purpose of requiring reasonable diligence by the first to conceive the invention but second to reduce to practice is to assure that the invention was not abandoned or unreasonably delayed by the first inventor during the period after the second inventor entered the field.” *Brown v. Barbacid*, 436 F.3d 1376, 1379 (Fed. Cir. 2006). “A patent owner need not prove the inventor *continuously* exercised reasonable diligence throughout the critical period; it must show there was *reasonably continuous* diligence.” *Perfect Surgical Techniques, Inc. v. Olympus Am., Inc.*, 841 F.3d 1004, 1009 (Fed. Cir. 2016). “[T]here need not necessarily be evidence of activity on every single day if a satisfactory explanation is evidenced.” *Monsanto Co. v. Mycogen Plant Sci., Inc.*, 261 F.3d 1356, 1369 (Fed. Cir. 2001). Thus, Patent Owner must provide an explanation that is satisfactory to indicate that the relied-upon computer modeling and prior art search update show reasonably continuous diligence from November 10, 2003 to January 15, 2004.

Patent Owner has provided some evidence to show diligence from November 10, 2003 to January 15, 2004, but Patent Owner has not explained why, under the facts of this case, the evidence is sufficient to establish reasonably continuous diligence for the period before Bhandarkar’s effective filing date to the date of constructive reduction to practice.

We have reviewed Petitioner’s contentions as to how Bhandarkar teaches the subject matter of the claims, and we find them sufficiently persuasive at this stage. Based upon the above-discussed evidence and

arguments, we conclude that Petitioner establishes a reasonable likelihood that the optical combiner claimed in claims 1, 2, 6, 7, and 9 would have been obvious to one of ordinary skill in the art over Bhandarkar.

C. Discretionary Factors

Patent Owner argues that we should exercise discretion to deny institution under 35 U.S.C. § 314(a) because the factors identified in *Apple, Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”), weigh in favor of denying institution in view of the district court litigation (Prelim. Resp. 68–69).

A Memorandum from Director Vidal titled Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“Interim Procedure”)² provides that “the PTAB will not deny institution of an IPR or PGR under *Fintiv* . . . where a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition” (Interim Procedure 9). Petitioner has submitted such a stipulation (Paper 11). Thus, we do not exercise discretion to deny institution under 35 U.S.C. § 314(a).

III. CONCLUSION

Upon consideration of the Petition, Preliminary Response, Reply, Sur-Reply, and accompanying evidence, we grant institution of an *inter partes* review of claims 1, 2, 6, 7, and 9 of U.S. Patent No. 7,198,416 B2.

² Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

IV. ORDER

It is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 2, 6, 7, and 9 of U.S. Patent No. 7,198,416 B2 is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of U.S. Patent No. 7,198,416 B2 shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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