

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

OPTICIS CO., LTD

Petitioner,

v.

INNEOS LLC,

Patent Owner.

Case No. IPR2023-01256
U.S. Patent No. 7,198,416

PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION

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2005	<i>Radial</i> , CHAMBERS DICTIONARY OF SCIENCE AND TECHNOLOGY (rev. ed. 1974).
2006	<i>Ferrule</i> , NEWTON’S TELECOM DICTIONARY (21st ed. 2005).
2007	JOSEPH E. PALAIS, FIBER OPTIC COMMUNICATIONS 33–48 (2nd ed. 1988).
2008	<i>Fiber optic spot illumination</i> , FIBER OPTICS STANDARD DICTIONARY (2nd ed. 1989).
2009	Pages of Eric Grann Inventor Notebook.
2010	Curtis Ray Inventor Notebook.
2011	Declaration of Michael Liang.
2012	Wilfrid B. Veldkamp et al., <i>Coherent Summation of Laser Beams Using Binary Phase Gratings</i> , 11 OPTICS LETTERS, 303–05 (1986).
2013	J. W. Goodman et al., <i>Optical Interconnections for VLSI Systems</i> , 7 PROCEEDINGS OF THE IEEE, 850–66 (1984).
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I. INTRODUCTION

Patent Owner respectfully requests that the Board deny institution because Petitioner has failed to demonstrate a reasonable likelihood of success on the grounds submitted in its Petition. Pursuant to 37 C.F.R. §42.107(a), Patent Owner Inneos LLC submits this Preliminary Response to Petitioner Opticis Co. Ltd.'s Petition for *Inter Partes* Review of U.S. Patent No. 7,198,416 (“the ’416 Patent”).¹

Petitioner requested *Inter Partes* Review of claims 1, 2, 6, 7, and 9 of the ’416 Patent (collectively, the “Challenged Claims”) on five grounds.

Patent Owner submits that none of the five grounds warrants institution. Each of Petitioner’s proposed claim constructions is incorrect and unsupported. Under a proper construction of the ’416 Patent, the cited prior art is deficient in at least the following respects:

- Kurita, LaMarche and Lemoff do not disclose an optical combiner as claimed or a stopped single optical fiber;
- LaMarche is not analogous art;
- Kurita, LaMarche and Lemoff do not disclose the identical function or corresponding structure of the §112 ¶6 claim, “focusing means.”
- Kurita and Lemoff do not disclose a focusing means with n separate radial sectors on its surface;
- Lemoff does not disclose collimating lenses or n=4, where n represents the number of lasers and collimating lenses; and
- Bhandarkar is not prior art.

¹ Opticis USA LLC, a co-defendant in the underlying district court litigation, has not joined Opticis Co., Ltd. as a Petitioner here. If the IPR is instituted, Patent Owner intends to seek real-party-in-interest discovery as to Opticis USA.

Arendi S.A.R.L. v. Apple Inc., 832 F.3d 1355, 1366–67 (Fed. Cir. 2016) (reversing Board’s finding of obviousness where element missing from prior art).

Moreover, Petitioner has not met its burden in identifying the corresponding structure of the §112 ¶6 claim, “focusing means.” 37 C.F.R. § 42.104(b); *Facebook, Inc. v. Sound View Innovations, LLC*, IPR2017-01006 (P.T.A.B. Aug. 29, 2017).

Additionally, as established during prosecution and agreed by the Examiner, the ’416 Patent is entitled to a priority date of July 17, 2003, with the consequence that Bhandarkar is not prior art.

As discussed below, Petitioner has improperly attempted to frame the ’416 Patent as directed to an overly broad problem (“effective combination of light from a plurality of sources having different output wavelengths”). Petition p.4. Petitioner’s articulation of the problem to be solved is arguably even broader than the field of Wavelength Division Multiplexing (“WDM”), which Petitioner acknowledges (Petition p.7) was a known technological field at the time of the inventions claimed in the ’416 Patent.

The Declaration of Dr. Michael Lebby, Ph.D. (EX2003) is submitted herewith in support of this POPR.

II. OVERVIEW OF THE TECHNOLOGY, THE ’416 PATENT, AND THE PRIOR ART

A. The ’416 Patent

The ’416 Patent relates to advancements in WDM technology. Conventional WDM systems used expensive dielectric filters or waveguides requiring alignment. ’416 Patent, 1:43-41; 2:21-26; 4:64-65. Other attempts at WDM used discrete optical components in experimental settings that were bulky and not commercially

practical. Being able to accomplish WDM using an inexpensive multiplexer is a problem the inventors of the '416 Patent sought to solve. EX2003, §§V-VI.

The purpose of the '416 Patent is “to create a compact device capable of combining multiple optical signals into a single optical fiber.” EX1001, 1:43-51, 2:11-15 (“The 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.”); 2:21-26 (“One of the key objects of the present invention is to provide a compact and cost effective optical combiner”). The patent is entitled “Optical Combiner Device” and the specification explains, “this invention relates to an optical multiplexing device which spatially combines multi-wavelength light from a plurality of lasers into an optical fiber.” *Id.* 1:13-16.

The inventors of the '416 Patent developed an inexpensive, integrated device capable of combining, separately collimating and focusing the output of multiple lasers into a single optical fiber with a uniform, high coupling efficiency. *Id.* 1:13-16, 1:51-55, 2:11-26; 3:19-21. EX2003, §§V-VI.

B. The Cited Prior Art

1. Kurita (EX1004)

In contrast with the '416 Patent, Kurita discloses a “conceptual” optical arrangement for multiplexing that utilizes separately placed components. EX1004, ¶¶[0005]-[0006], [0015]. Unlike the '416 Patent, Kurita does not disclose an optical combiner with integrated components. While Kurita’s object was to reduce cost by reducing the number of individual optical components (EX1004, ¶¶[0005]-[0006]), Kurita still discloses discrete optical components. *Id.* Kurita does not disclose a compact optical combiner with integrated optical components. Kurita

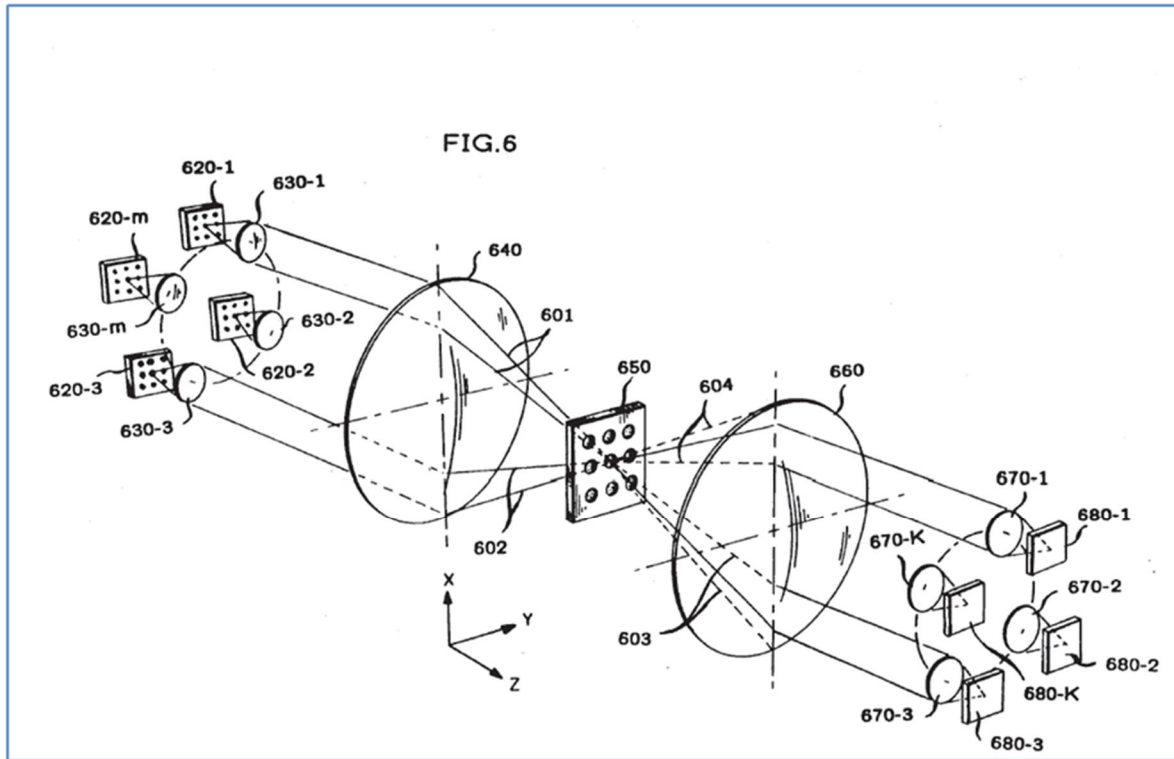
discloses an optical multiplexer consisting of a planar monochromatic light source array 10A, a lens array 20, and a lens 30 that must be manually aligned. *Id.* ¶[0017]; EX2003, §IX.A.1.

Because Kurita is a free-space optical arrangement of discrete parts, it fails to disclose numerous claim elements of the '416 Patent. Additionally, Kurita as a standalone §103 reference (including what Petitioner contends to be obvious variations thereof) also fails to disclose these missing elements. EX2003, §§IX.A.-B.

2. LaMarche (EX1005)

LaMarche does not disclose an optical combiner or teach a combiner for WDM. EX1005, FIG. 6. LaMarche is trying to solve the problem of improving signal integrity using “multipoint to multipoint” interconnections. EX1005, 1:11-2:17, 7:16-25. LaMarche provides an optical interconnection setup that links light emitters to corresponding light detecting devices using a simultaneous broadcasting technique. *Id.* 1:5-9, 2:13-27. LaMarche discloses that arranging the lenses radially, “affords the simultaneous broadcasting of optical signals to a plurality of light detective devices.” *Id.* 2:13-27; EX2003, §§IX.B.2.

In the optical arrangement of FIG. 6, each light emitting device (e.g., 620-1 through 620-M) communicates with each light detecting device (e.g., 680-1 through 680-K) on the other side of an array of ball lenses that fans out or broadcasts the light. EX1005, FIG. 6.



LaMarche is not analogous art to the '416 Patent. EX2003, §IX.B.2. LaMarche does not disclose a WDM method for combining multiple wavelengths onto a single fiber. LaMarche is related to “an optical arrangement for interconnecting, via free space, light emitting devices to light detecting devices.” EX1005, 1:5-8. LaMarche teaches a “fanout or broadcasting capability” to improve interconnectivity in such “multipoint-to-multipoint” systems. In this regard, LaMarche discloses using a *multitude of optical fibers* for an experimental test to collect light from the free space system and convey that light out of the system to remotely positioned photodetectors. EX2003, ¶188.

Nor is LaMarche pertinent to the problem solved by the '416 Patent. LaMarche's solution uses numerous discrete parts that must be aligned relative to each other for the light from one emitter to be received by the detector on the other side of an array of ball lenses. LaMarche's large system is costly to set up and

inconsistent with the low-cost, integrated, compact, pre-aligned solution of the '416 Patent. Further, the '416 Patent is not directed to multipoint-to-multipoint optical arrangements used for simultaneous broadcasting light to be received by multiple light detectors; it is focused on multiplexing light onto a single optical fiber using the claimed optical combiner. EX2003, §IX.B.2.

3. Lemoff (EX1006)

Lemoff discloses a multi-channel optical signal emitter for a WDM communication system that “eliminates the use of optical multiplexers or other devices external to the emitter.” EX1006, 1:52-56. Instead, Lemoff discloses multiple “emission apertures” to emit light toward the core of the optical fiber.

Lemoff discourages using optical wavelength multiplexers for short distances. EX1006, 1:42-48. Lemoff discloses that using WDM is “particularly problematic” in applications requiring “only relatively short distance lengths,” which are “more cost sensitive than other applications.” *Id.* Lemoff discloses that the complexity of WDM design “can dramatically increase production and maintenance costs.” *Id.* 1:34-41, 1:46-48.

To address the problems of short-distance WDM, Lemoff’s optical signal emitter *emulates* a WDM multiplexer “without using an optical multiplexer or other device external to the emitter.” *Id.* 1:52-56. Lemoff discloses multiple “emission apertures” located off center at aperture corners that point toward the center of the signal-emitting area. *Id.* 1:61-65. As shown in FIGS. 1A-1B, the fiber is abutted against the emitters at surface 110, allowing for “butt coupling.” *Id.* 3:29-33.

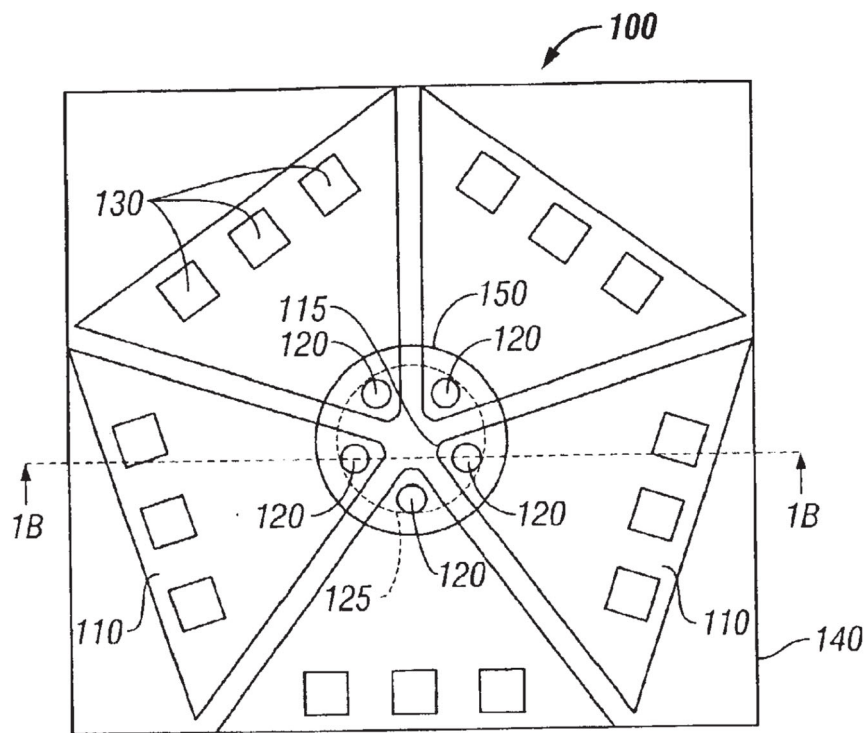


FIG. 1A

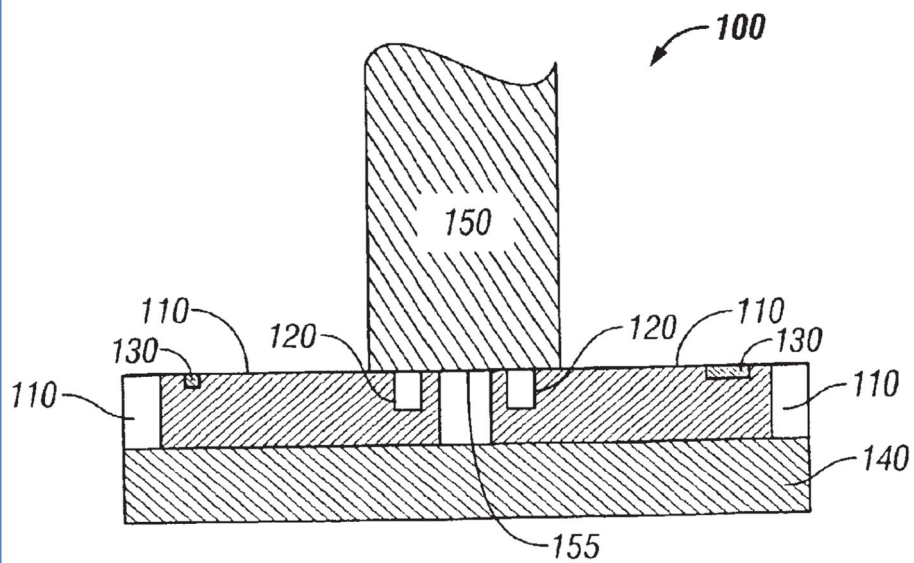
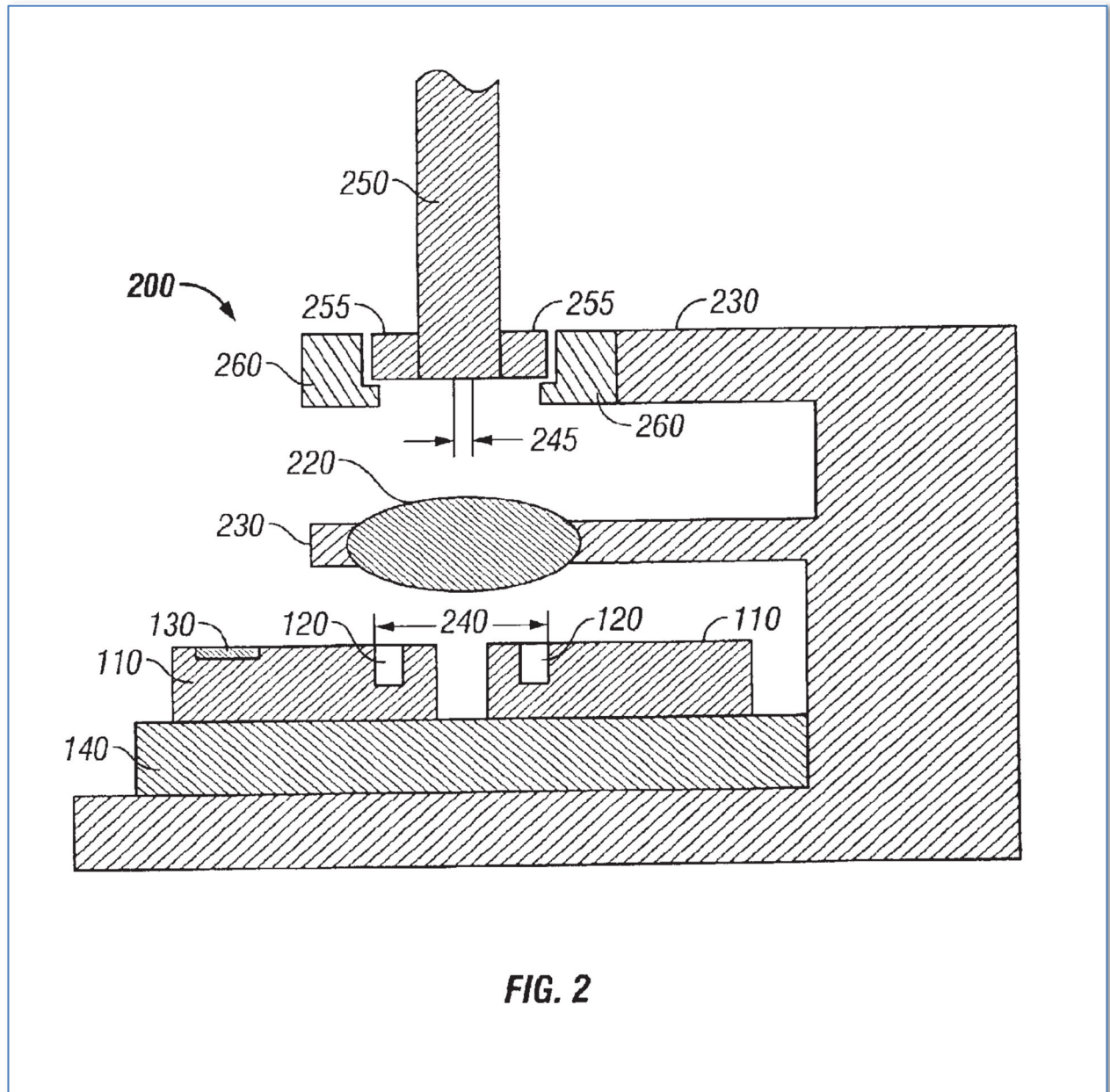


FIG. 1B

Thus, the light signals are not entering the fiber at a single spot, but at different locations. *Id.*; EX2003, ¶223. FIG. 2 shows a second example of the invention, using an imaging lens.



By contrast, the '416 Patent is an optical multiplexer, *i.e.*, an optical combiner that multiplexes light of multiple wavelengths for short distance WDM.

Id. 1:13-16, 1:51-55, 2:11-26; 3:19-21. This contrasts with the '416 Patent's claimed optical combiner. Thus, Lemoff teaches that the very thing that inventors of the '416 Patent were trying to solve—using a cost-effective optical multiplexer/combiner for short distance WDM—was not attainable. EX2003, §IX.C.1.

4. Bhandarkar (EX1013)

Bhandarkar discloses a WDM multiplexer that includes a plurality of lasers and collimating lenses and a focusing lens. The collimating lenses collimate each laser's beam of light and the focusing lens is positioned to focus the collimated beams into a point of light. The WDM multiplexer includes a receptacle that houses each of these optical components. EX1013, Abstract. As discussed below, Bhandarkar is not prior art.

III. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner's proposed grounds fail under Petitioner's proposed level of skill in the art. 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.

IV. CLAIM CONSTRUCTION

Petitioner contends that the preambles of claims 1 and 7 are not limiting. Petition pp.11–14. Additionally, Petitioner identifies only two claim terms requiring construction: “focusing means” and “stopped.” Patent Owner disagrees with Petitioner's claim constructions.

A. The Preambles Are Limiting.

Because Petitioner contends that the preambles are not limiting, it ignores meaningful limitations in the preamble, including “optical combiner.”

The preamble to claim 1 states:

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:

cl. 1, 5:23-27. The preamble to claim 7 is similar. cl. 7, 6:19-23.

In one brief paragraph, Petitioner cites *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) for the proposition that when the body of a claim defines a structurally complete invention and the preamble only states a purpose or intended use, the preamble is not limiting. Petition p.13. In *Catalina Marketing*, the preamble phrase at issue was “located at predesignated sites such as consumer stores,” which was in the preamble of claim 1 and claim 25 and also in the body of claim 25. This phrase was not limiting because the body of the claim defines “a structurally complete invention.” *Id.* That is, the “location of the terminals in the stores merely gives an intended use for the claimed terminals.” *Id.* That is not the case here.

Petitioner mis-applies *Catalina Marketing* to the preambles of claims 1 and 7. As the Federal Circuit held, the determination whether the preamble is limiting is “resolved only on review of the entire[] ... patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” *Id.* (cleaned up). The Federal Circuit added, “[i]n general, a preamble limits the invention if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Id.* The Court continued, “when reciting

additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation.” *Id.*

Thus, *Catalina Marketing* is distinguishable, the preamble is limiting, and its component phrases must be construed, as established below.

1. “Optical combiner”

Petitioner does not offer a construction for “optical combiner.” The claimed optical combiner has physical attributes that are limitations beyond those stated in the body of the claims. Patent Owner proposes “optical combiner” to be construed as **“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.”** This construction is supported by the specification, as discussed below, and confirmed by Dr. Leiby. EX2003, §VII.A.1.; EX1001, 1:13-16; 1:35-42; 1:43-55; 2:34-41.

Corning Glass Works v. Sumitomo Elec. U.S.A., Inc., 868 F.2d 1251, 1256–57 (Fed. Cir. 1989), cited in *Catalina Marketing*, is particularly germane. The Federal Circuit found that “optical waveguide”² in the preamble was limiting because, as here, it was structurally defined in the specification in ways that were more limiting than the body of the claim. *Id.* at 1257; *see also Gen. Elec. Co. v. Nintendo Co.*, 179 F.3d 1350, 1361–62 (Fed. Cir. 1999) (limiting claim scope to “raster scanned display device,” rather than all display systems, in view of specification’s focus on prior art problem).

The ’416 Patent specification discloses that the claimed optical combiner is an integrated device either a single piece or one where the parts have been sub-

² The entire preamble in *Corning Glass Works* was “An optical waveguide comprising.”

assembled into a single device. “The 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.* 2:11-15; *see also id.* [Abstract]. “While 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.* 1:51-55 (emphasis added); *see also id.* 2:17-18.

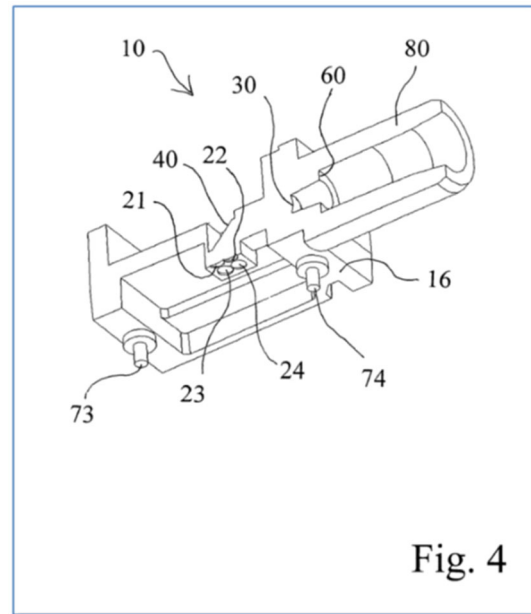
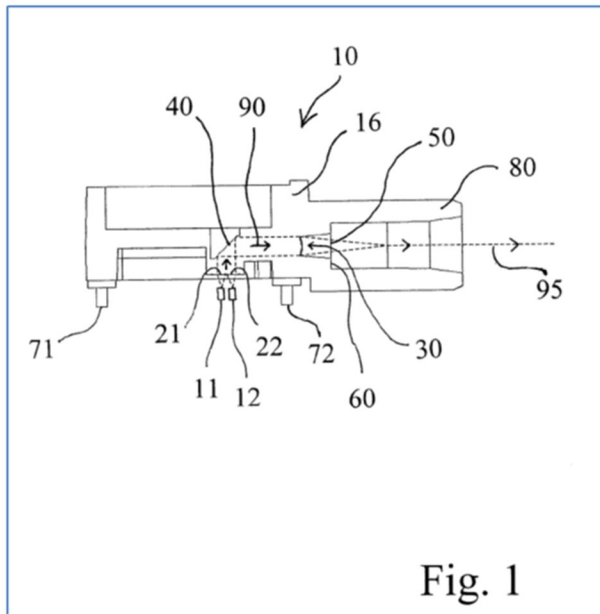
Further, the specification explains that the optical combiner is “formed” by integrating its parts. *See id.* 3:39-44 (“The plastic molded coupling module 16 is formed by integrating...[optical components]...all within a single part 16.”); *see also id.* 3:67-4:9, 4:10-13, 4:55-57, 4:61-63.

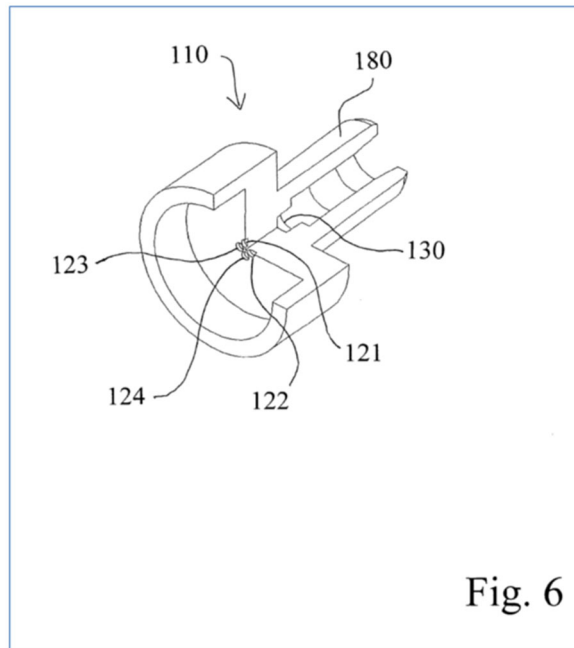
As Dr. Lebby explains, a POSITA would understand that an optical combiner is an integrated subassembly. EX2003, ¶¶60-63.

Second, the claimed optical combiner includes an integrated pre-aligned connector. “The integrated ferrule 80 enables one to place an output fiber optic cable into the pre-aligned connector.” *Id.* 3:17-18, [Abstract]. Each of the figures of the complete optical combiner and corresponding descriptions describe an integrated optical device with an integrated pre-aligned ferrule or connector. *Id.* 3:7-18 (“The **combiner 10** in this embodiment **includes** ...[an] **integrated ferrule**”); 3:39-44 (“The plastic molded coupling module 16 **is formed** by integrating ... **a fiber optic ferrule 80**... all within a single part 16.”); 3:54-60. EX2003, ¶¶64-66.

Third, the pre-aligned connector must contain a stop. Claims 1 and 7 recite that the optical combiner transmits laser outputs through “a stopped single fiber.” The specification describes the stop as being inside the integrated ferrule. *Id.* 3:11-15 (“a single optical fiber (not shown) **is stopped by fiber stop or seat 60 formed**

in ferrule 80.”); 3:23-24 (“the fiber (not shown) inserted into ferrule 80, **seated at the fiber stop 60...**”; FIGS. 1-6, 2:46-58. Consistent with these descriptions, as well as FIGS. 1, 4 and 6, the stop 60 is a physical structure that blocks the inserted optical fiber from being inserted further. *See infra* §IV.C. EX2003, ¶¶67-69.





The integrated, pre-aligned connector of the optical combiner provides the stop for the fiber so the fiber is passively aligned. *Id.* 2:38-41; 4:58-60 This passive alignment is possible because the fiber is stopped in the pre-aligned connector at a determinate location.

By contrast, the stop and ferrule are not shown in FIGS. 7-10, in which the optical combiner is only shown “generally,” and the disclosures describe the optical components within the optical combiner, without the fiber. *Id.* 2:59-3:2; 3:61-63; 4:35-39; 4:32-47 (“FIG. 9 shows a “single slice of optic 216 to more clearly illustrate the interaction with the module 216 with the circular array of lasers...”). Nevertheless, the specification explains that this embodiment of the optical combiner includes a stop. *See id.* 4:20-27. Thus, A POSITA would understand that the integrated connector for these embodiments is simply not shown in FIGS. 7-10 even though it is included. EX2003, ¶¶65-66.

Interpreting the claim indiscriminately to read out this limitation so that the claim would cover a mere optical arrangement generally “would be divorced from reality.” *Corning Glass*, 868 F.2d at 1257. EX2003, §VII.A.1.

2. “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”

This portion of the preamble makes clear the purpose and the context of the claimed optical combiner, which is also limiting. “Whether a preamble stating the purpose and context of the invention constitutes a limitation of the claimed process is determined on the facts of each case in light of the overall form of the claim, and the invention as described in the specification and illuminated in the prosecution history.” *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1572–73 (Fed. Cir. 1996); *Lemoine v. Mossberg Corp.*, No. 2020-2140, 2021 WL 4199934, at *2. (Fed. Cir. Sept. 15, 2021) (finding preamble limiting because it provides important context for nature and structure of invention being claimed). Further, the language “plurality of n lasers” and “each of said n outputs has a different output wavelength” is referenced in the body of the claim, thus providing antecedent basis for the claim body. *See* cls. 1, 7. *Catalina Mktg.*, 289 F.3d at 808 (antecedent basis may limit claim scope). Again, the specification makes clear that the inventors were working on a particular problem within the field of WDM devices. *See, e.g.*, 1:43-41; 2:21-26; 4:64-65; 1:51-55, 2:11-26; EX2003, §VII.A.2.

3. “For transmission into and through a stopped single optical fiber”

The importance of this limitation is underscored by the fact that the stopped single optical fiber is referred to three times throughout claims 1 and 7 – once in the preamble and twice in the body of the claims. This clause in the preamble

provides the antecedent basis for the “said” stopped single optical fiber in the body of the claim. *See* cls. 1, 7. *Catalina Mktg.*, 289 F.3d at 808. Accordingly, this phrase is limiting. EX2003, §VII.A.3.

B. “Focusing means for focusing said [n] collimated output beams onto a single spot at said stopped single optical fiber”

The parties agree that the “focusing means” limitation in claims 1 and 7 is a means-plus function limitation that should be construed under §112 ¶ 6, and the parties agree on the recited function: **“focusing said n collimated output beams onto a single spot at said stopped single optical fiber.”** EX2003, §VII.B.

The parties differ concerning the corresponding structure. Petitioner argues that the corresponding structure is, simply, “a focusing lens.” Petition p.11. This is insufficiently precise. There are known in the art many “focusing lenses” that cannot perform the function of “focusing n collimated output beams onto a single spot at said stopped single optical fiber.” EX2003, ¶¶80-81. Patent Owner’s proposed construction³ of the corresponding structure is **“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. *E.g.*, 3:32-36, 3:45-49. The functional requirement that the collimated beams be focused onto a single spot at said stopped single optical fiber further highlights the structural relationship between the optics of the focusing means and the structure of the optical combiner: both the distance from the focusing means to the “stop” and the size of the spot on

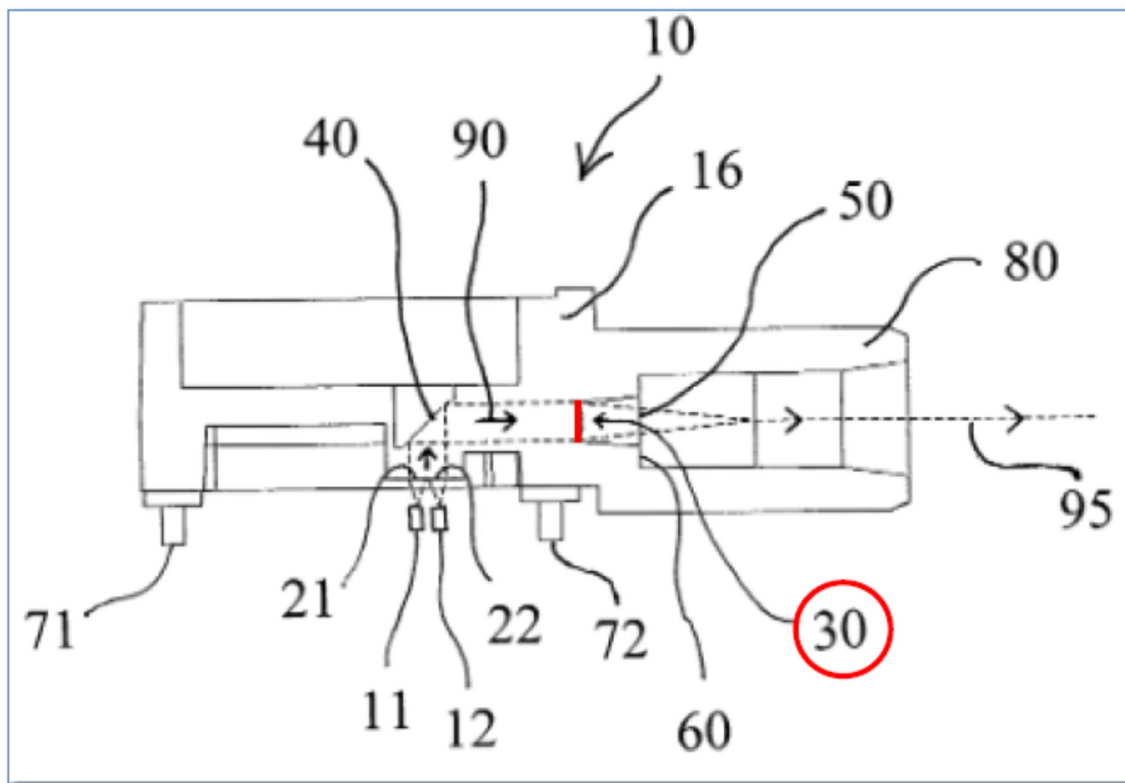
³ At Petition p.n.4, Petitioner states that Patent Owner agreed with its construction in its Complaint. Not at all. The statements in the Complaint were not claim construction positions, but rather a statement that, if the claim term is construed under § 112 ¶ 6, structure is disclosed.

the stopped optical fiber define the particular optical features of the focusing means. Each structural embodiment in the specification supports this construction:

- Embodiment 1: FIGS. 1-4 (focusing lens 30), Abstract (“focusing lens housed within a fiber optic connector ferrule”), 3:8-15, 3:17-18, 3:22-29, 3:32-36, 3:39-44, 3:45-49; cls. 1 & 7.
- Embodiment 2: FIGS. 5-6 (focusing lens 130), 3:50-51, 3:54-55, 3:58-60; 3:45-49; 3:22-29; Abstract; cls. 1 & 7; Embodiment 1.
- Embodiment 3: FIGS. 7-9 (focusing lens 250); Abstract; 3:67-4:2, 4:5-9, 4:10-14, 4:16-19, 4:20-23; cls. 1 & 7; Embodiment 1.
- Embodiment 4: FIGS. 10-11 (focusing lens 350), Abstract;, 4:36-39, 4:42-46, 4:49-51, cls. 1 & 7; Embodiment 1.

In each of the structures described in the '416 Patent, the focusing means is integrated into the optical combiner such that it is aligned with the collimating lenses and lasers in a way to carry out the claimed function—to focus the laser outputs onto a single spot at the fiber that is placed in a pre-aligned connector.

The first corresponding structure described in the specification for performing the focusing function is identified in FIGS. 1–4. *See* Figs. 1–4, 3:7-8. As shown in FIG. 1, the structural integration and the positioning of the focusing means inside the optical combiner allows it to perform the function of focusing the light from the collimated output beams onto a single spot at said stopped single optical fiber. The arrows in FIG. 1 show the optical path 90 and collimated output beam 95 as the light is being directed onto a stopped single fiber.



Thus, the focusing means is an integrated part of the optical combiner. *Id.* 3:32-38, [Abstract]. The specification describes the integrated focusing lens of the first embodiment: “The **plastic molded coupling module 16 is formed by integrating ... a focusing lens 30.**” *Id.* 3:39-44. It explains how the lens focuses the light: “[l]asers 11,12 are located at the focal points of the input lenses and the light is collimated, 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.* 3:11-15. The specification explains that the collimating lenses are **of a size small enough to fit inside the diameter of the focusing lens 30.** *Id.* 3:26-31.

The second corresponding is identified in FIGS. 5–6 and further described in the text. *Id.* 3:50-51. As shown in FIG. 6, the focusing means is integrated into the

optical combiner and properly aligned with the collimating lenses. *Id.* 3:54-60, FIGS. 5-6. . The collimating lenses are small enough to fit inside the diameter of the focusing lens 130. *Id.*

The third corresponding structure is identified in FIGS. 7–9. *See* FIGS. 7–9 (focusing lens 250). In describing these figures, the specification states that **“The focusing lens 250 is formed on the top surface of the module 216.”** *Id.* 4:5-6. The specification describes the **“surface of focusing lens 250 [as] smooth”** and that it **“includes four pie-shaped radial quadrants 251–254”** having **“separate pie-shaped quadrants 252 and 254...”** *Id.* 4:6-8, 4:16-19.

The fourth corresponding structure is identified in FIGS. 10–11. FIGS. 10-11 (focusing lens 250). This optical combiner includes a **“two-piece” molded module that contains “a separately molded output lens 350”** and **“separately molded collimating lenses 321–324.”** *Id.* 4:35-43. The specification states, **“[t]he focusing lens 350 is supported in its position shown in FIG. 10 by means known to those skilled in the art”** *Id.* 4:43-46. Like each of the other embodiments, the focusing means is integrated into the optical combiner to focus the laser outputs onto a single spot of the stopped optical fiber.

Based on these disclosures, a POSITA would understand that the focusing means must be a **lens integrated into the optical combiner that is in alignment with the collimating lenses and the core of the stopped optical fiber to perform the claimed function.** EX2003, ¶¶82-93. A POSITA would understand the lensing properties that are necessary for the integrated focusing lens that will cause the light to focus the collimated beams onto a single spot on the fiber. EX2003, ¶84. And a POSITA would understand that not every “focusing lens” is capable of doing this. EX2003, ¶¶80-81.

As discussed in detail below, under a proper construction of the corresponding structure, Petitioner’s cited prior art does not read onto the claims of

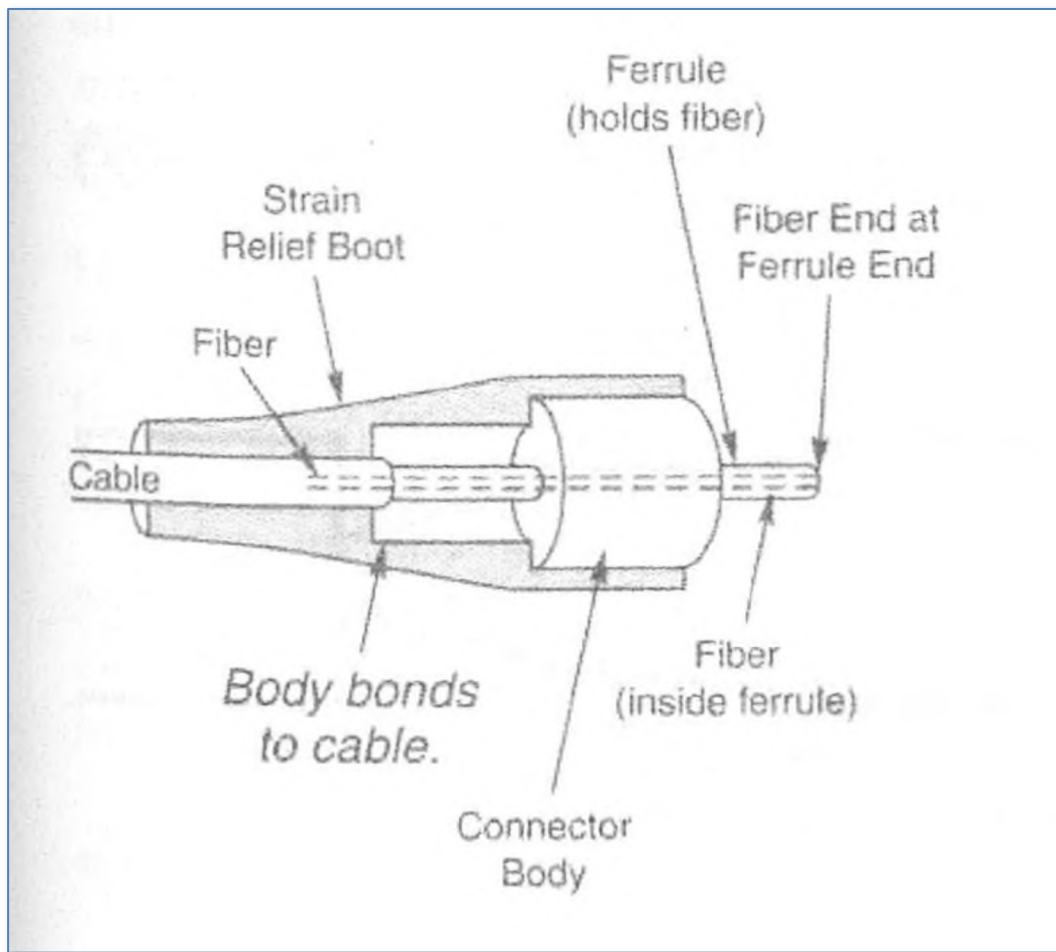
the '416 Patent. Without reliance on Petitioner's overly broad, generic structure, Grounds 1-5 fail.

C. "Stopped single optical fiber"

Petitioner proposes to construe only the word "stopped," and proposes defining it as "'fixed,' such that movement would be substantially limited." Petition pp.13–14. The proper term to construe is "stopped single optical fiber." Every time the word "stopped" is used in the claims, it modifies "single optical fiber." The term "stopped single optical fiber" appears in the preamble and the body of independent claims 1 and 7.

Patent Owner proposes to construe "stopped single optical fiber" as **"a single optical fiber that has been inserted into the optical combiner until it comes abuts a physical structure that prevents the fiber from being inserted further into the optical combiner."** Petitioner's proposed construction confuses the stop or seat, as described in the specification, with the ferrule of which the stop or seat forms a part. EX2003, §VII.C.

A "ferrule" is a "component of a fiber optic connection that holds a fiber in place and aids in its alignment." EX2016, p.336. Not all ferrules are structurally the same. Below is a ferrule that does not have a stop, where the fiber passes all the way through the ferrule. EX2017, p.317 ("The fiber end may be pushed slightly past the end of the ferrule and then polished to a smooth face.").



EX2017; *see also* EX2021.

However, unlike the example shown above (which does not include a stop or seat), the ferrule disclosed in the '416 Patent is not “pushed slightly past the end of the ferrule,” but rather includes a stop or seat to block the fiber optic cable’s further insertion into the ferrule. FIG. 1 of the '416 Patent shows the stop 60 is inside ferrule 80; *see also* 3:24 (fiber is “seated at the fiber stop 60”).

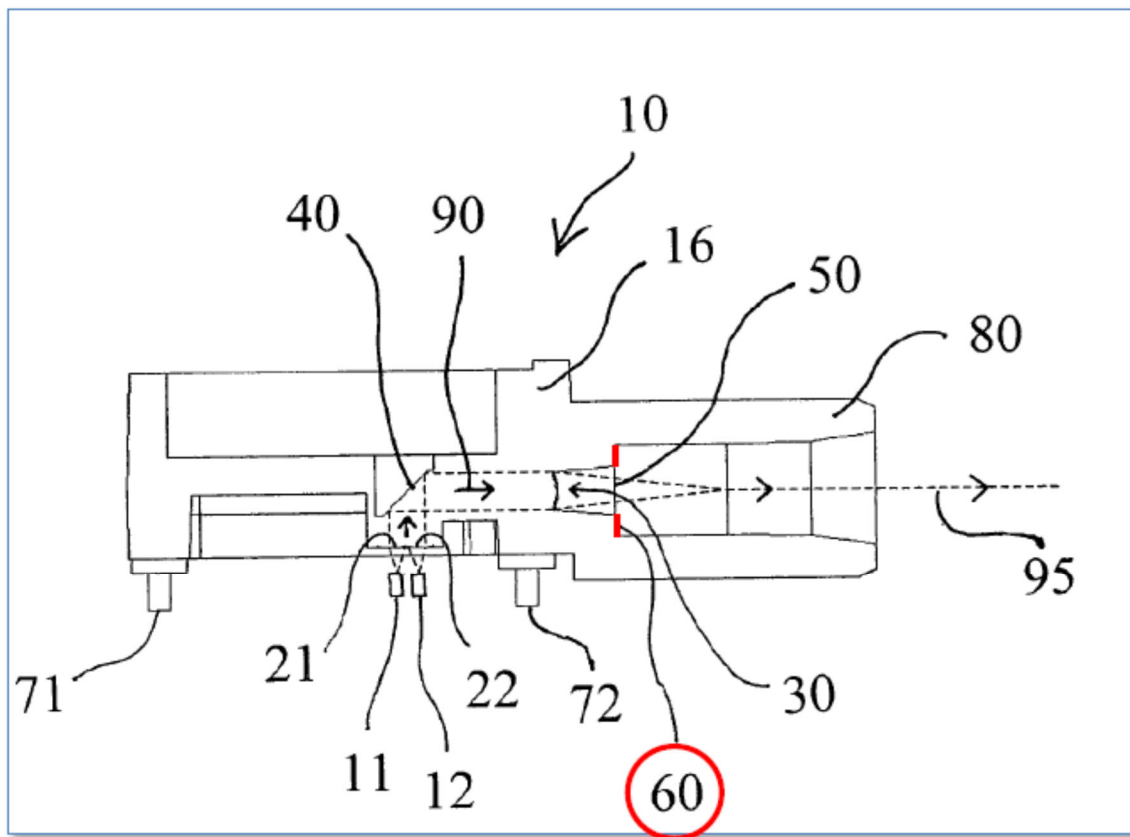


FIG. 1; FIG. 4, stop 60.

Patent Owner's construction is correct because the specification explains that the "stop" of the optical combiner's pre-aligned connector prevents the fiber from going further into the optical combiner, allowing the fiber to be pre-aligned with the optical components of the optical combiner. *See* 3:11-15. "The integrated ferrule 80 enables one to place an output fiber optic cable into the pre-aligned connector." *Id.* 3:17-18; 3:39-44; 3:54-60. "Another 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.* 4:27-31. "Passive Alignment[:]" All of the optical components within the multiplexer could utilize passive alignment mechanisms." *Id.* 4:58-60.

Dictionary definitions also support Patent Owner’s construction. “Stopped” means “[t]o arrest the progress or motion of; cause to halt.” EX2004, p.1161. The word “seat” means “a part (as a socket) or surface on or in which another part or surface rests.” EX2004, p.1059.

Petitioner’s construction, which simply means that the fiber is fixed somewhere in space, does not capture the meaning of this term. The fiber must be seated within the optical combiner’s integrated connector for it to be considered a “stopped single optical fiber.” EX2003, §VII.C.

V. THE BOARD SHOULD NOT INSTITUTE REVIEW

A. Ground 1: Petitioner Fails to Show that the Challenged Claims Are Obvious Over Kurita

Kurita does not include each of the claimed elements, as described below. EX2003, §IX.A.2.

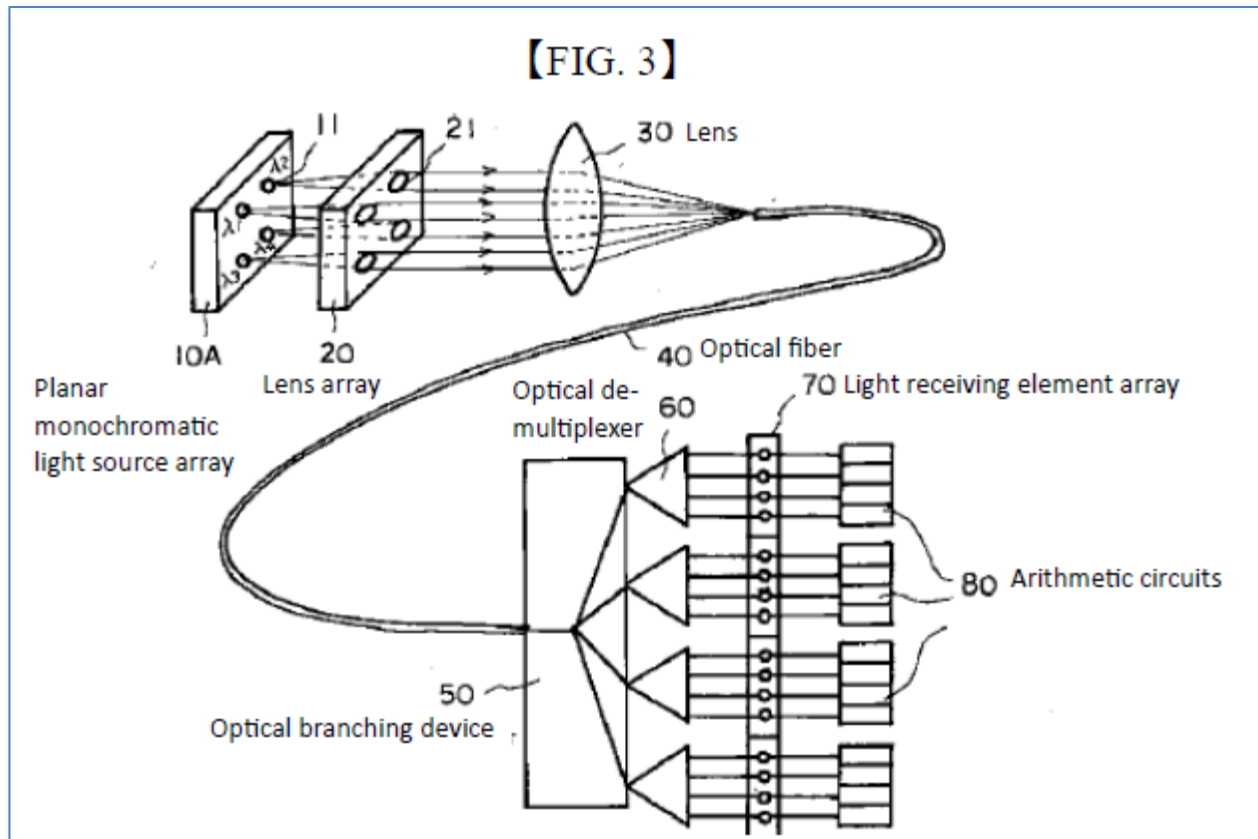
1. Claim 1: Kurita does not disclose elements [1.0]-[1.2]

Petitioner contends Kurita’s “light connection device” is an optical combiner. Petitioner cites only Kurita ¶[0001], which states in its entirety: “The present invention relates to light connection elements and light connection devices for inputting laser lights into and outputting them out of optical fibers that are used with multistage switching networks inside optical computers and switchboards, and with optical communications, laser processing, etc.” This is not an “optical combiner,” as that term is used in the ’416 Patent. EX2003, §IX.A.2.a.

Kurita discloses a “light connection device” that is a wavelength multiplex switch. As part of the switch system, Kurita discloses an optical arrangement of individual, separate components that operate to multiplex the light from multiple fibers onto a single optical fiber. Kurita FIG. 3 is an example of such switch system. [EX1004], ¶¶[0008], [0017], ¶[0015] (“FIG. 3 being a conceptual

configuration diagram” of “a light connection device” that is “a 4x4 wavelength multiplexing switch”). Kurita discloses the portion of the switch system that multiplexes the optical signals is comprised of individual parts. EX1004, ¶[0017] (“switch composed of a planar monochromatic light source array 10A, a lens array 20, and a lens 30, each being singular”). These discrete, individual component parts are not integrated and do not disclose an integrated optical combiner. EX2003, ¶¶123-124.

Each of the individual, singular components (10A, 20, 30, 40) disclosed in Kurita must be manually positioned and aligned. Kurita does not disclose an *integrated* subassembly of optical components for multiplexing light of different wavelengths. This is apparent from the drawing of the “conceptual” Kurita system shown in FIG. 3. EX2003, ¶¶126-129.



Additionally, as can be seen from FIG. 3 above, Kurita does not disclose an optical combiner that includes an integrated, pre-aligned connector with a stop to hold the single fiber optic cable. Petitioner fails to address this issue because it has argued “optical combiner” is non-limiting.

Moreover, Kurita does not disclose a “stopped single optical fiber.” Petitioner fails to specifically address this term in its Petition, and cites to its expert’s report. However, Dr. Willner applies the wrong claim construction. EX2003, ¶¶130-131.

Finally, the disclosures in Kurita do not enable an integrated optical combiner with integrated optical components with a ferrule and a stop. *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1381 (Fed. Cir. 2021) (“a

standalone §103 reference must enable the portions of its disclosure being relied upon”). EX2003, ¶132.

Because Kurita does not disclose an integrated optical combiner as claimed, it does not disclose elements [1.0] through [1.2].

2. Claim 1: Kurita does not disclose elements [1.3]-[1.4]

Because Kurita does not disclose an optical combiner (§V.A.1, claim [1.0], above), it does not disclose a “an optical combiner... comprising: a plurality of n collimating lenses...” Thus, Kurita does not meet these elements. EX2003, §IX.A.2.b.

Petitioner relies on “the individual lens portions 21, of the lens array 20,” as “plurality of n collimating lenses,” but ignores the fact that the lens array is not integrated into an optical combiner as required by the claim. The lens array is one individual component of the switch disclosed in Kurita. EX1004, ¶[0017]. At best, Kurita only discloses lenses as part of a lens array, but this array is not integrated into an optical combiner. EX2003, ¶¶136-138.

To the extent that Petitioner claims Kurita “suggests” claim elements [1.3]-[1.4] as implied by its argument heading, Petitioner and its expert have made no such showing. *Synopsys*, IPR2012-0041, Paper 16 at 14 (“Petitioner does not clearly provide analysis to support the assertion of obviousness.”).

Accordingly, Kurita does not disclose or teach claims [1.3] or [1.4]. EX2003, §IX.A.2.b.

3. Claim 1: Kurita does not disclose elements [1.5]-[1.6]

Petitioner has not shown that Kurita meets these elements. Kurita does not disclose either a focusing means that performs the identical function or the particular corresponding structure, or an equivalent thereof. EX2003, §IX.A.2.c.

Petitioner relies on the free-floating lens 30 from Kurita FIG. 3 as the “focusing means.” Petition p.22.

To show disclosure of a means-plus-function limitation in a prior art reference, a functional analysis alone will not suffice; the invalidity proponent must prove that the prior art discloses both the identical function and the particular corresponding structure that performs the function, or an equivalent thereof. *Fresenius USA, Inc. v. Baxter Int’l., Inc.*, 582 F.3d 1288, 1299 (Fed. Cir. 2009); *see, e.g., CytoLogix Corp. v. Ventana Med. Sys.*, 424 F.3d 1168, 1178 (Fed. Cir. 2005) (“To establish infringement under §112, ¶6, it is insufficient for the patent holder to present testimony ‘based only on a functional, not a structural, analysis.’” (quoting *Alpex Computer Corp. v. Nintendo Co.*, 102 F.3d 1214, 1222 (Fed. Cir. 1996))).

Because Kurita does not disclose an optical combiner (*see* §V.A.1, Claim [1.0], above), Kurita does not disclose an optical combiner comprising a “focusing means.” EX2003, ¶¶141-157.

Kurita does not disclose the claimed function of “focusing the collimated output beams onto a single spot *at said stopped single optical fiber....*” because there is no stop that is part of Kurita’s system. *See* §V.A.1, claim [1.1]. Petitioner’s obviousness argument is limited to modifying the fiber disclosed in Kurita to be “fixed.” Because a stopped optical fiber must be physically inserted into the optical combiner until it reaches a stop or seat, Kurita does not disclose the identical function. Nor is there any teaching, suggestion or motivation to modify Kurita to add a “stopped single optical fiber.” EX2003, ¶¶143-145.

Concerning the structure, Petitioner’s cursory structural analysis fails because its construction of “focusing means” does not incorporate the corresponding structure from the specification. Petition p.23.

Petitioner's expert, Dr. Willner, fares no better. He simply states "compare" FIG. 3 of Kurita showing lens 30 with FIGS. 7 and 10 of the '416 Patent showing lenses 250 and 350. EX1003, ¶181. Dr. Willner, does not contend the lenses are the same structure; from a simple comparison of the figures, it's apparent they are not. Without any analysis, he simply declares them "equivalent." *See id.* He, too, ignores the corresponding description from the specification that describes FIGS. 7 and 10.

Structurally, Kurita's lens 30 is not the same structure as any one of the embodiments in the '416 Patent. In the '416 Patent, each embodiment of the focusing means is integrated into an optical combiner to accomplish the claimed function. *See* §IV.B, above. Kurita's lens 30 is not integrated into an optical combiner. EX2003, ¶149. Tellingly, Dr. Willner has not asserted that Kurita's lens is the same as or equivalent to the lenses in FIGS. 1-6 of the '416 Patent. He only argues that Kurita corresponds to FIGS. 7 and 10. The '416 Patent states that the focusing means in FIG. 7 is "formed on the top surface of the module 216," which is a single monolithic optical block coupling block." Further, "[t]he surface of focusing lens 250 is smooth and includes four pie-shaped radial quadrants 251–254." In relation to the fourth embodiment shown in FIG. 10, the '416 Patent states "The focusing lens 350 is supported in its position shown in FIG. 10 by means known to those skilled in the art which are deleted in the interest of brevity." The '416 Patent focusing means, thus, is integrated into the optical combiner, whereas lens 30 of Kurita is a free-floating lens component. EX2003, ¶¶150-153.

Further, Kurita's lens 30 does not disclose n separate radial sectors on its surface that each of said n collimated beams passes through. EX2003, ¶¶155-156.

In sum, Kurita does not disclose elements [1.5] or [1.6]. EX2003, §IX.A.2.c.

4. Claim 2: Kurita does not disclose claim 2

Because Kurita does not disclose the optical combiner of claim 1 (*see* §V.A.1-3), Kurita does not disclose an optical combiner with the limitation of claim 2. EX2003, §IX.A.3.

Further, Kurita does not disclose pie-shaped radial sectors on lens 30 of FIG 3:

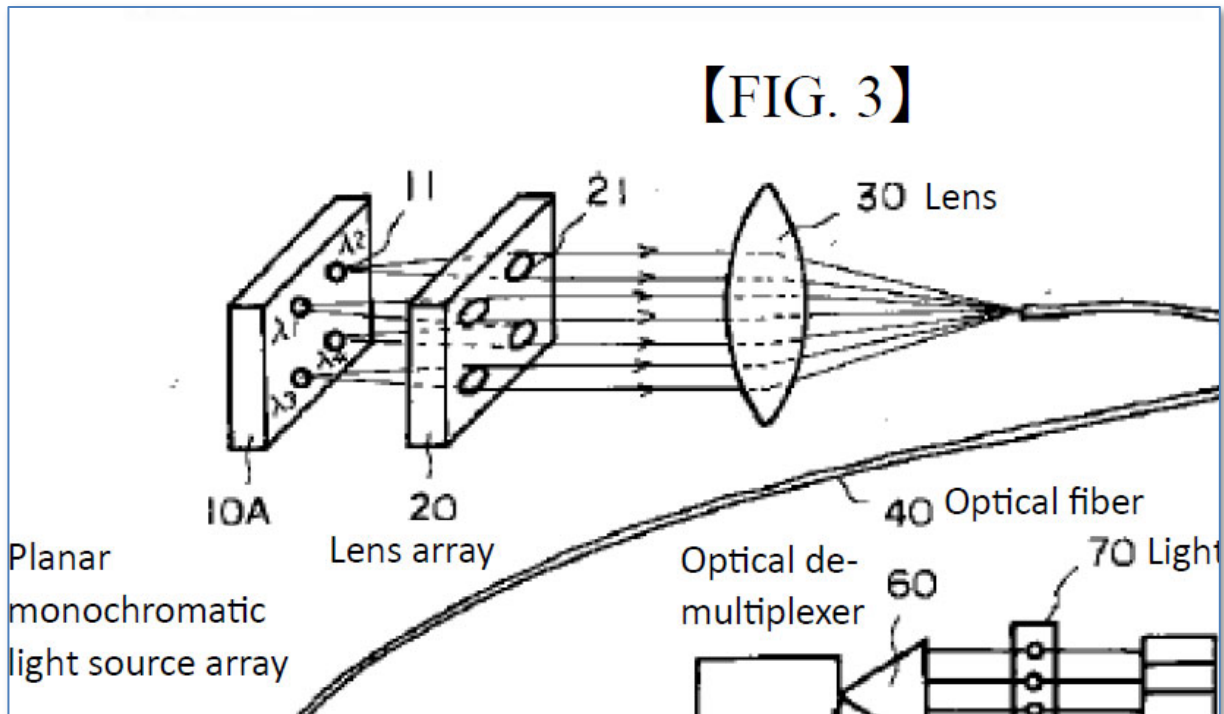
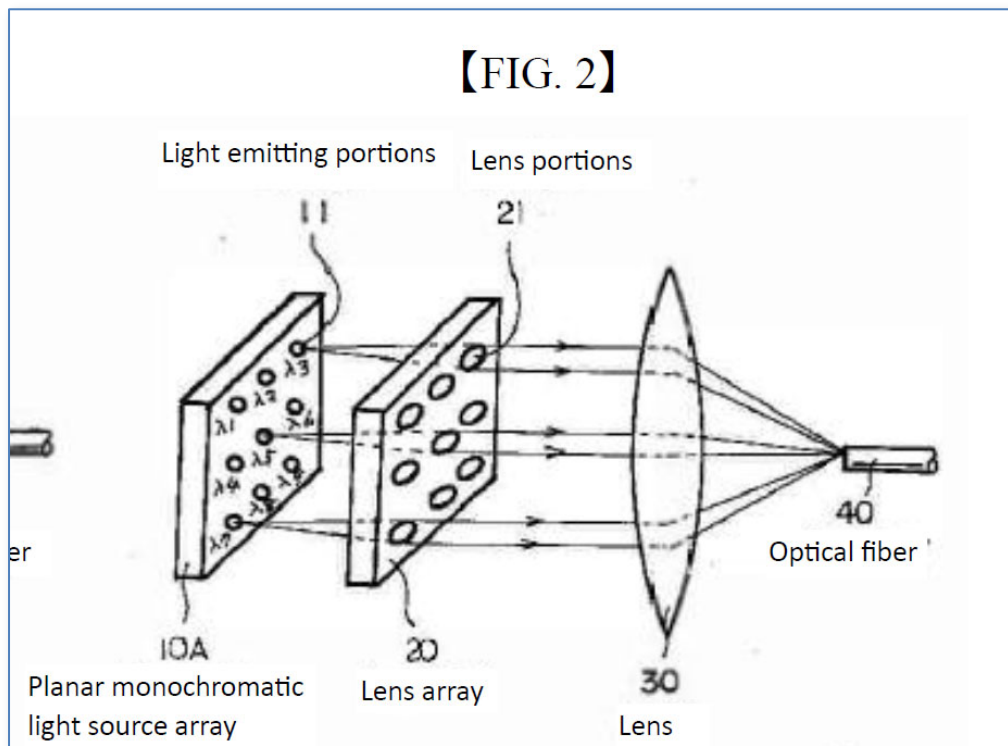


FIG. 2 also does not disclose pie-shaped radial sectors:



See also EX2003, ¶¶159-161. To the extent that Petitioner claims Kurita “suggests” claim 2, as implied by the heading of its argument, Petitioner and its expert have made no such showing. EX2003, ¶162.

5. **Claim 6: Kurita does not disclose claim 6**

Because Kurita does not disclose the optical combiner of claim 1 (*see* §V.A.1-3), Kurita does not disclose an optical combiner that does not require the use of dielectric filters or waveguides. EX2003, §IX.A.4.

6. **Claim 7: Kurita does not disclose claim 7**

Petitioner contends that claim 7 is substantially the same in scope as claim 2 and incorporates by reference its analysis for claims 1-2. Petition p.25. Because Kurita does not satisfy the claim elements of claims 1-2, the same analysis for claims 1-2 applies equally here. *See* §V.A.1-4; EX2003, §IX.A.5.

7. Claim 9: Kurita does not disclose claim 9

Petitioner contends that claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Petition p.25. Because Kurita does not satisfy claims 1-2 or 6, the same analysis for claims 1-2 and 6 applies equally here. *See* §V.A.1-5; EX2003, §IX.A.6.

B. Ground 2: Petitioner Fails to Show that the Challenged Claims Are Obvious Over Kurita in View of LaMarche and/or Lemoff

1. Ground 2 Lacks Particularity

Petitioner's Ground 2 (*see* Petition pp.3, 26) lacks the particularity and specificity required by 35 U.S.C § 312(a)(3), 37 C.F.R. §§ 42.22(a), 42.104(b)(2), and 42.104(b)(4). In Ground 2, Petitioner appears to rely on LaMarche solely for the “radial arrangement of collimating lenses” to disclose that the collimated light passes through separate radial sectors of the focusing means. Petition pp.31–32. Further, Petitioner appears to rely on Lemoff for the sole element of “receptacle and ferrule arrangement for securing an optical fiber” to disclose a “stopped optical fiber.” (Petition p.33). Where limitations are not literally disclosed by the cited art, Petitioner also fails to explain any basis for its obvious-to-modify arguments.

These combinations do not overcome the shortcomings of Kurita as discussed above in Ground 1. EX2003, §IX.B.

2. Kurita, LaMarche, and/or Lemoff Are Not Combinable

To combine references to show obviousness, it is not enough merely to “check all the boxes” of the claim elements. There must be a reason, suggestion or motivation to combine, and a reasonable likelihood of success. *Forest Labs., LLC v. Sigmapharm Labs., LLC*, 918 F.3d 928, 934 (Fed. Cir. 2019) (cleaned up); *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1357 (Fed. Cir. 2019) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007)). In suggesting

combinations, “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421; MPEP §2143.01.

Petitioner’s proposed combination of Kurita, LaMarche and/or Lemoff fail to meet this standard.

a. Kurita and LaMarche Are Not Combinable

A POSITA would not look to LaMarche to improve Kurita for several reasons. EX2003, §IX.B.3. As a threshold matter, LaMarche is not analogous art and should not be considered for obviousness. *See* §II.B.2, above; EX2003, §IX.B.2 and ¶198.

First, because LaMarche would drastically increase the number of components in the optical arrangement, a POSITA would not look to LaMarche to improve Kurita. EX2003, ¶¶199-202. Kurita teaches that increasing the number of optical components reduces coupling efficiency and increases costs, because of how expensive such systems are in terms of person hours needed to align. EX1004, ¶[0004]. Kurita discloses a system that uses a smaller number of discrete components to reduce costs and the amount of losses thereby improving efficiency. EX1004, ¶[0017]. By contrast, 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. There is inherently a large loss of light in simultaneous broadcasting,

which LaMarche acknowledges. EX1005, 7:35-41 (“Only a fraction of the total energy impinging on pupil lens, 408 or 660, is received by probe lenses, 409 and 410, or, 670-1 through 670-K, respectively.”). A POSITA would understand this is a very inefficient design to maintain a certain data rate. EX2003, ¶¶202-204.

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. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (“The mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification”); *see also In re Giannelli*, 739 F.3d 1375, 1380 (Fed. Cir. 2014). 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.

Petitioner claims it is merely “combining prior art elements” (EX1003, ¶208); however, the physically integrated radially aligned lenses, which Petitioner contends would have been obvious, are not disclosed in Kurita or LaMarche. Petitioner has taken an impermissible piecemeal, hindsight-driven approach to try to match individual claim terms to the disclosures in Kurita and LaMarche. *KSR*, 550 U.S. at 421. EX2003, ¶215.

Further, Dr. Willner’s contention that LaMarche, which predates Kurita by nearly a decade, would improve coupling efficiency, reduce physical complexity, and be able to achieve high-bandwidth connection, is misconstruing the disclosures in LaMarche, which are actually a comparison of LaMarche to prior art systems that pre-date LaMarche and use a single high bandwidth channel being broadcast over multiple points and have nothing to do with Kurita’s multiplexer. EX2003, ¶¶205-219. Thus, a POSITA would have no reason to combine Kurita with LaMarche’s optical arrangement.

b. Kurita and Lemoff Are Not Combinable

As discussed above, 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.

Concerning functionality, Lemoff is not physically combinable with Kurita due to Lemoff’s small size. EX2003, ¶¶230-233. Moreover, 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.

3. Claim 1: Kurita does not disclose elements [1.0]-[1.5]

For Ground 2, Petitioner relies on Kurita alone to disclose elements [1.0]-[1.5]. *See* Petition p.31. Kurita does not disclose elements [1.0]-[1.5]. *See* §V.A.1-3. EX2003, §IX.B.3, §IX.B.5.

4. Claim 1: Kurita in view of LaMarche and/or Lemoff does not disclose element [1.6]

For Ground 2, Petitioner relies on LaMarche and/or Lemoff to disclose only element [1.6] in combination with Kurita. Petition p.31 (“With respect to Ground 2, LaMarche and/or Lemoff are ... relied on to further teach aspects of claim

element [1.6].”). Kurita in view of LaMarche and/or Lemoff do not disclose element [1.6].

Petitioner relies on LaMarche to teach a radial arrangement of collimating lenses. As explained above, a POSITA would not have combined Kurita with LaMarche. *See* §V.B.2.a; EX2003, §IX.B.3. Nevertheless, rearranging the collimating beams and laser emitters in Kurita to be radial, would not disclose the claimed optical combiner comprising a focusing means. *See* §V.A.3; EX2003, ¶¶238-241.

Petitioner relies on Lemoff to satisfy the “stopped single optical fiber” element. Petition p.33. However, a fiber inserted into Lemoff’s ferrule and receptacle does not satisfy the “stopped optical fiber” limitation. During the assembly, the end of the fiber is inserted into the ferrule; this “fiber and ferrule assembly is then inserted into receptacle 260, which surrounds and secures the fiber and ferrule assembly.” EX1006, 5:58-60. The receptacle and ferrule allow the fiber to be “plugged into or removed from the optical signal emitter 200.” *Id.* 5:65-6:2. As shown in FIG. 2, the ferrule surrounds the fiber and is flush with the end of the fiber such that there is not a stop that is part of the ferrule. *Id.* FIG. 2. EX2003, ¶¶242-243.

Additionally, Lemoff does not disclose an integrated ferrule with a stop as required by claim 1’s optical combiner limitation. The ferrule in Lemoff is removable. *Id.* 5:65-6:2. EX2003, ¶244.

In Ground 2, Petitioner does not rely on LaMarche or Lemoff to cure any other shortcomings of Kurita. Because Kurita is missing claim elements beyond the ones Petitioner depends upon Lemoff and LaMarche to fulfill, this combination does not satisfy all claim limitations for claim 1. *See* Ground 1, claim [1.0]-[1.6]. *supra* §V.A.1-5.

5. Claim 2: Kurita in view of LaMarche and/or Lemoff does not disclose claim 2

Because Kurita, LaMarche, and/or Lemoff do not disclose all elements of claim 1 (§V.B.3-4), this combination does not disclose dependent claim 2. *See also* §V.B.5.

Petitioner further relies on LaMarche (and only LaMarche) to disclose a two by two array. However, LaMarche discloses discretely placed optical elements and not collimating lenses formed in a two-dimensional, two by two array; input probe lenses 630-1 through 630-M that Petitioner refers to are not integrated into an optical combiner. Combining Kurita and LaMarche also does not cure this shortcoming. EX2003, §IX.B.7.

6. Claim 6: Kurita in view of LaMarche and/or Lemoff does not disclose claim 6

Because Kurita, LaMarche, and/or Lemoff do not disclose all elements of claim 1 (§V.B.3-4), this combination does not disclose dependent claim 6. EX2003, §IX.B.8.

7. Claim 7: Kurita in view of LaMarche and/or Lemoff does not disclose claim 7

Petitioner contends that claim 7 is substantially the same in scope as claim 2. Petition p.34. Because Kurita, LaMarche, and/or Lemoff do not satisfy the claim elements of claims 1-2, these references do not disclose or render obvious claim 7. §V.B.3-5; EX2003, §IX.B.9.

8. Claim 9: Kurita in view of LaMarche and/or Lemoff does not disclose claim 9

Petitioner contends that claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Petition p.35. Because Kurita, LaMarche, and/or

Lemoff do not satisfy claims 1, 2, or 6, these references do not disclose or render obvious claim 9. §V.B.3-6; EX2003, §IX.B.10.

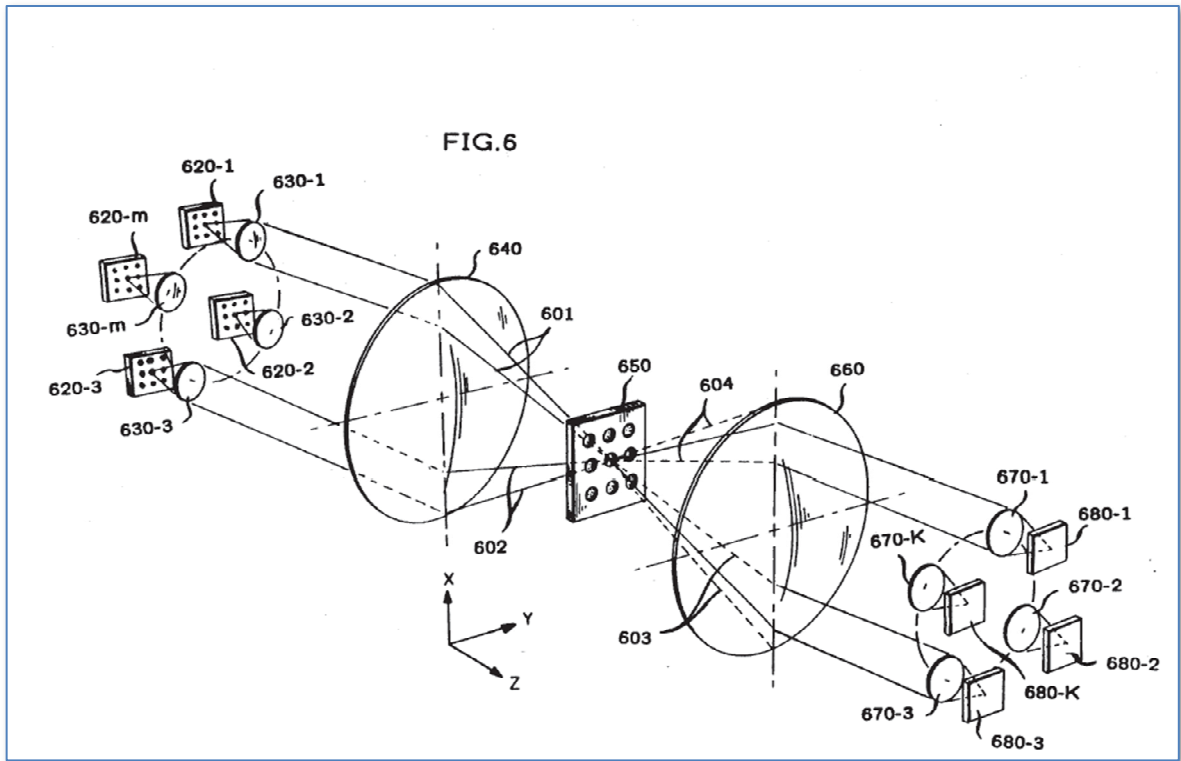
C. Grounds 3 and 4: Petitioner Fails to Show that the Challenged Claims Are Obvious Over Lemoff Alone and/or in View of LaMarche

For Ground 3, Petitioner relies on Lemoff as a standalone §103 reference and for Ground 4 relies on Lemoff in view of LaMarche.

1. Lemoff and LaMarche Are Not Combinable

Petitioner argues that a POSITA would combine the collimating lenses from LaMarche, placed in a radial alignment, with Lemoff's optical signal emitter. Petition p.37. However, there are several reasons why a POSITA would not turn to LaMarche to modify Lemoff. EX2003, §IX.C.3. As an initial matter, LaMarche is not analogous art with the '416 Patent or Lemoff. EX2003, §IX.C.2 and ¶¶289-290.

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. EX2003, ¶¶268-275. *See Depuy Spine Inc. v. Medtronic Sofamor Danek*, 567 F.3d 1314, 1326 (Fed. Cir 2009) (the "predictable result" discussed in *KSR* refers to the expectation that prior art elements are capable of being physically combined); *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007) ("[A] reference teaches away from a combination when using it in that combination would produce an inoperative result."). 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.



By contrast, Lemoff is in the order of 1-2 centimeters. Lemoff discloses embodiments where the entire signal-emitting area **240** is $100\mu\text{m}$ - $2,000\mu\text{m}$ (up to 2mm), around 2x the size of the core of a fiber. EX1006, 3:34-43, 5:15-49. The entire signal-emitting area **240** (area of the emitter that encompasses all emission apertures **120**) corresponds to the outer circle **325** in FIG. 3. EX1006, 6:3-6.

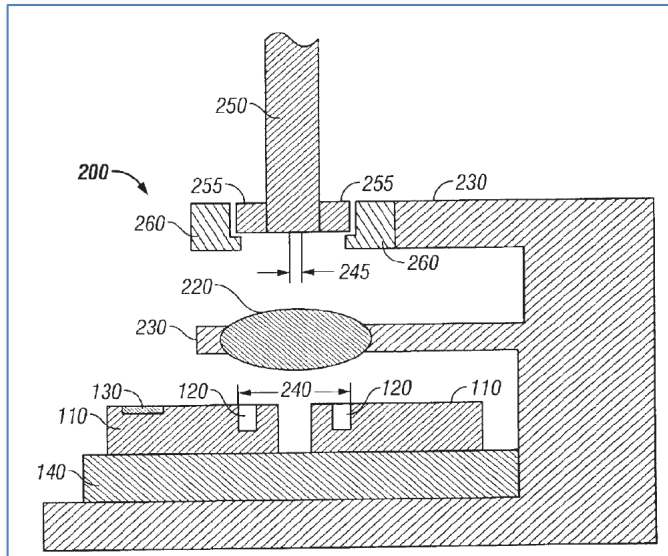


FIG. 2

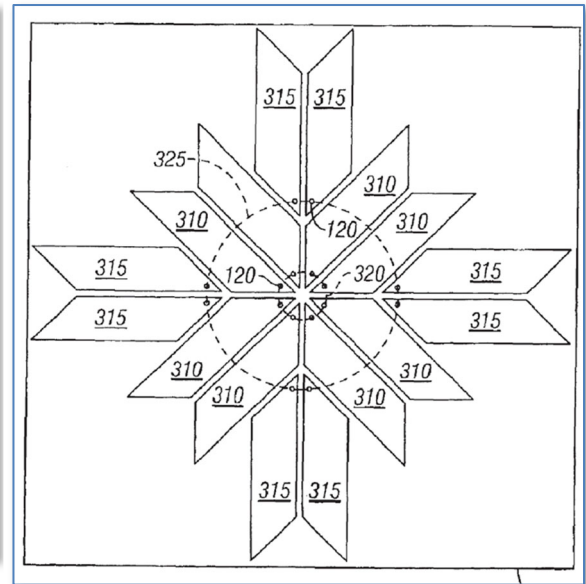


FIG. 3

This means that LaMarche's optical arrangement is more than 100x larger than the signal-emitting area disclosed in Lemoff. The combination would not have resulted in a functional device. EX2003, ¶¶268-275.

As discussed above, Lemoff discourages using complex optical wavelength multiplexers to accomplish WDM for short distances. EX1006, 1:42-48. Instead, Lemoff *emulates* WDM for short distances by shaping the emitting apertures to point toward the signal-emitting area “without using an optical multiplexer or other device external to the emitter.” EX1006, 1:52-56. By contrast, LaMarche is a large optical arrangement with numerous separate, discrete components that are highly dependent on placement, requiring a high degree of precision and man-hours to align. Given the overall size of Lemoff compared to the complexity of the system in LaMarche, a POSITA would have no reason to combine LaMarche’s discrete, individually placed input probe lenses with Lemoff. EX2003, ¶¶276-282. Lemoff repeatedly reinforces that its optical signal emitter is usable for small distances—the antithesis of LaMarche. EX1006, 3:62-65, 7:13-18, 7:47-55. EX2003, ¶¶284.

Further, there is no evidence that adding collimating lenses to Lemoff would improve its coupling efficiency or maximize efficiency. EX2003, ¶¶312-319. EX1006, Further, LaMarche’s disclosure of radial arrangement of collimating lenses to improve coupling efficiency in “simultaneous broadcasting” using multipoint to multipoint optical arrangements is not pertinent to improving coupling efficiency for Lemoff’s signal emitter. EX2003, ¶¶285-287. LaMarche also recognizes the losses inherent in its design. EX1005, 7:35-46. When conducting his optical arrangement experiment, LaMarche himself used only two input probe lenses. EX1005, 7:16-34. Thus, Petitioner’s reasoning lacks the required factual underpinnings for claiming obviousness. *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Additionally, LaMarche would lead to *greater* physical complexity than Lemoff—requiring additional optical components, further discouraging a POSITA from modifying Lemoff. EX2003, ¶¶285-287.

Moreover, 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.”).

LaMarche and Lemoff do not disclose collimated lenses that are integrated into an optical combiner, as required by the claims. Petitioner has provided no evidentiary support as to why a POSITA would have taken LaMarche’s discretely placed, radially aligned collimated lenses and integrated them into Lemoff’s optical signal emitter. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) (reversing Board’s finding of unpatentability when prior art is missing claim

limitation because “common sense” “cannot be used as a wholesale substitute for reasoned analysis and evidentiary support, especially when dealing with a limitation missing from the prior art references specified”). Neither Lemoff nor LaMarche disclose an optical combiner with integrated collimated lenses. EX2003, ¶¶291.

Finally, as more fully explained below, even if Lemoff and LaMarche were combinable in the way Petitioner argues, the references fail to disclose claimed features of the challenged claim.

2. Claim 1: Lemoff (and LaMarche) fail to disclose elements [1.0]-[1.2]

Petitioner does not indicate whether it relies on Ground 3 or Ground 4 to satisfy these elements. Petition pp.39-40. Petitioner only cites to Lemoff for these elements. *Id.* The Board and Patent Owner should not have to guess which Ground Petitioner is relying on to satisfy this limitation. Neither Lemoff nor Lemoff plus LaMarche disclose elements [1.0]-[1.2]. EX2003, §IX.C.4.a.

Ground 3 - Lemoff

Lemoff does not disclose the claimed optical combiner—“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.”

First, Lemoff teaches away from using an optical multiplexer for short distances because of the cost associated with typical optical multiplexers used in WDM. Instead, Lemoff geometrically positions the spots (emission apertures) so that different wavelengths can enter the fiber and create a WDM fiber. EX2003, §IX.C.1. Petitioner cites EX1006, 1:52-56, but this confirms that Lemoff does not teach that the light is combined—the entire quote states that Lemoff can be used to

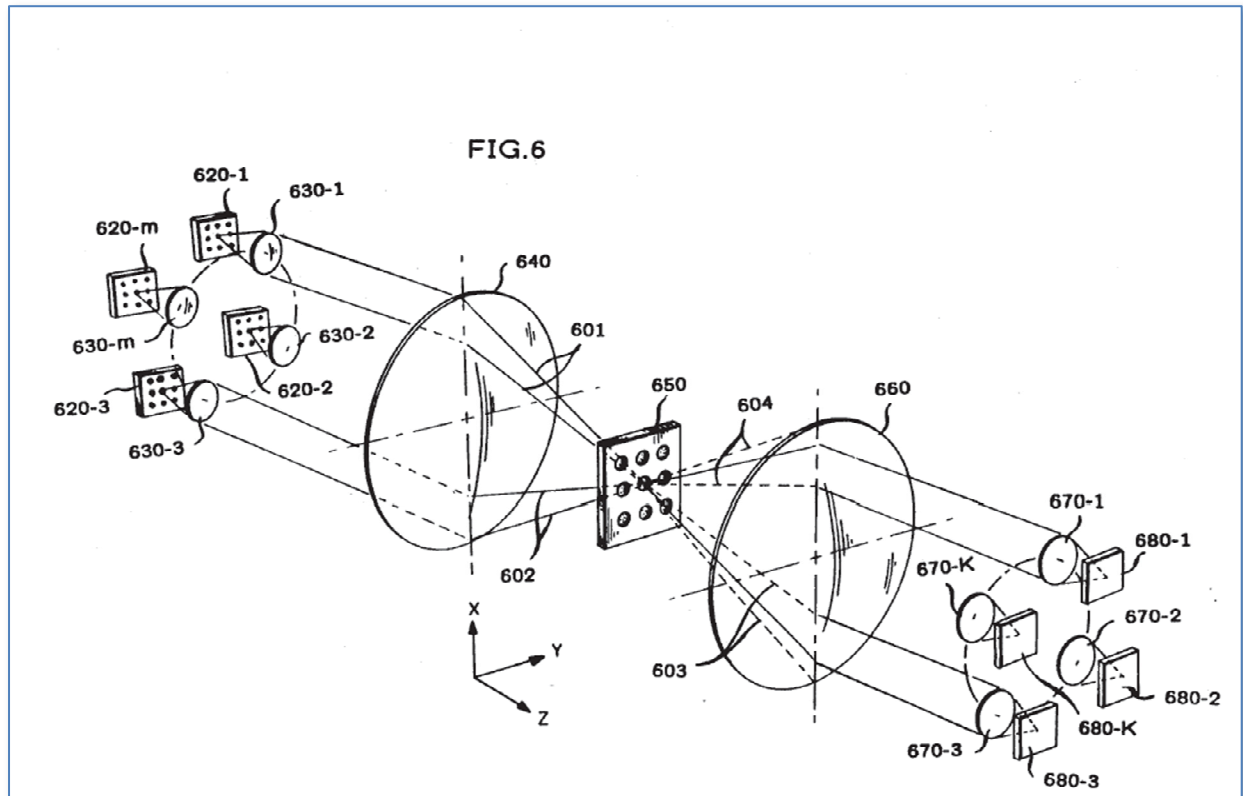
emulate WDM because it can be used in a WDM communication system “without using an optical multiplexer or other device external to the emitter.” EX1006, 1:52-56. EX2003, ¶¶295-298.

Second, Lemoff does not disclose that its optical signal emitter multiplexes the light onto a single spot of a fiber as required by the claims. Instead, Lemoff discloses that the light is butt coupled into the fiber, which means the light enters the fiber at multiple distinct locations. EX1006, 3:26-33. Even when an imaging lens is used, Lemoff does not teach “combining” the light signals onto a single spot. EX2003, ¶¶299-300, 305.

Nor does Lemoff disclose an integrated, pre-aligned connector with a stop. Lemoff’s ferrule is pluggable and removable. EX1006, 5:65-6:2. Lemoff’s ferrule also does not include a stop; the fiber is flush with the end of the ferrule and does not come into contact with a surface. *Id.* FIG. 2. Further, because Lemoff’s ferrule does not disclose a stop, the light is not transmitted into and through a stopped single optical fiber, as required by the claims. EX2003, ¶¶301-307.

Ground 4 – Lemoff and LaMarche

To the extent Petitioner relies on LaMarche, LaMarche does not disclose an optical combiner. This is obvious from a review of FIG. 6. There is absolutely no physical integration of the components and no optical combiner. EX2003, ¶¶308-310.



EX1005, FIG. 6.

3. Claim 1: Lemoff (and LaMarche) fail to teach elements [1.3] and [1.4]

Ground 3 Lemoff

Lemoff does not disclose “a plurality of n collimating lenses.” Lemoff discloses a single lens system. Lemoff discloses the light that is emitted from the aperture into and toward the center of the signal-emitting area (area of the emitter

that encompasses all emission apertures), then either into the fiber or through an imaging lens. Because Lemoff does not disclose collimating lenses, it does not disclose “n” collimating lenses that are “spaced apart and positioned to receive and collimate the output of said n laser output beams.”

A POSITA would not have modified Lemoff to include collimating lenses. EX2003, ¶¶311-319. Petitioner cites to various types of imaging lenses disclosed in Lemoff that may be used to image the optical signals to the fiber (EX1006, 6:16-23), but none of these are collimating lenses. EX2003, ¶¶313-314. *In re Warner*, 379 F.2d at 1017 (cannot resort to hindsight reconstruction to supply deficiencies in the factual basis). Further, as a standalone reference, Lemoff does not enable using collimating lenses with its claimed optical signal emitter. *Raytheon Techs. Corp.*, 993 F.3d at 1381. EX2003, ¶¶315. Further, 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. EX2003, ¶¶315. Petitioner is simply once again using a hindsight-driven approach to try to augment Lemoff to include claim elements that Lemoff simply does not disclose, nor would it have been obvious to include. *In re Warner*, 379 F.2d at 1017.

Rather than collimating light to be multiplexed onto the fiber, Lemoff discloses that the aperture corners 115 of die 110 all point toward the center of signal-emitting area 125, causing the signals to point to different parts of the core fiber. Modifying Lemoff to collimate and multiplex or combine the light onto a single spot of the fiber, defeats the intended purpose of Lemoff’s aperture arrangement. *See Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999) (where the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, the proposed modification would not have been obvious). EX2003, ¶316.

Further, there is no evidence that adding collimating lenses to Lemoff would lead to an improvement of coupling efficiency, and maximize efficiency. EX2003, ¶¶317-319.

In sum, a POSITA would not have modified Lemoff's optical signal emitter to incorporate a plurality of *n* collimating lenses being spaced apart and positioned to receive and collimate the output of said *n* laser output beams. EX2003 ¶¶311-319.

Ground 4 Lemoff and LaMarche

Petitioner further compounds its impermissible hindsight-driven approach in Ground 4. As discussed above, a POSITA would not have combined a modified Lemoff with LaMarche. *See* §V.C.1, above. Combining Lemoff and LaMarche would have not led to a predictable result because the resulting device would have been inoperable. EX2003, ¶¶ 269-275. Further because the degree of modification necessary to modify Lemoff with collimating lenses from LaMarche is significant, the proposed modification would not have been a “mere substitution of one element for another known in the field.” *KSR*, 550 U.S. at 416; EX2003, ¶¶ 269-280-.

There is no evidence that adding collimating lenses to Lemoff would improve the coupling efficiency, and maximize efficiency. EX2003, ¶¶282, 285-291. Collimating lenses would not only modify the principal operation of Lemoff, it would render Lemoff unsatisfactory for its intended purpose. *In re Gordon*, 733 F.2d at 902; *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959); EX2003, ¶276-285.

Additionally, LaMarche's radially aligned collimating lenses is not equal to an *n* number of lasers as Petitioner contends LaMarche teaches. Instead, LaMarche discloses one radially aligned collimating lens *per array* of laser emitters—there are nine lasers per collimating lens. EX1005, 4:43-49, 5:27-38. EX2003, ¶321.

Finally, neither reference discloses a plurality of n collimating lenses that are integrated into an integrated optical combiner. Petitioner has provided no evidentiary support as to why a POSITA would have taken LaMarche's discretely placed, radially aligned collimated lenses and integrated them into Lemoff's optical signal emitter. *Arendi*, 832 F.3d at 1362. Neither Lemoff nor LaMarche disclose an optical combiner with integrated collimated lenses. EX2003, ¶324.

4. Claim 1: Lemoff (and LaMarche) fail to teach elements [1.5] and [1.6]

Grounds 3 & 4

Because Petitioner has not incorporated the corresponding structure into its construction of “focusing means” (*see* §IV.B.1), Petitioner has not met its burden under 37 C.F.R. §42.104(b)(3).

Petitioner attempts to modify Lemoff's structure to perform the claimed function, but this is improper. Unless an element performs the *identical function* specified in the claim, it cannot be an equivalent for the purposes of §112 ¶6. *See* MPEP §2183 (prior art must perform the “specified function in the claim” and equivalent structures must perform “the identical function specific in the claim...”); *Abiomed, Inc. v. Maquet Cardiovascular LLC*, No. CV 16-10914-FDS, 2023 WL 4034268, at *17 (D. Mass. June 15, 2023) (a means plus function term “is obvious if the prior art discloses a function identical to the function at issue, and a structure corresponding to that function or an equivalent thereof.”); *cf. Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1320–21 (Fed. Cir. 1999) (under §112, ¶6, accused device must perform identical function as recited in claim element while DOE may be satisfied when function performed by accused device is only substantially same.). Only after the structure performing the identical function is

identified, can a §103 obviousness determination be made relating to the structure. MPEP §2183.

In Lemoff, the light that enters into the imaging lens *has not been collimated by collimating lenses*. Further, Lemoff does not disclose that the imaging lens causes the light to focus “onto a single spot at said stopped single optical fiber.” Because the claimed function is not performed or disclosed in Lemoff, Petitioner has not met its burden under Grounds 3 and 4. EX2003, ¶¶325-330.

Ground 3

Further, Petitioner’s reliance on modifying Lemoff’s imaging element 220 to include collimating lenses based on FIG. 1A (EX1003, ¶¶268-269), is misguided because Lemoff teaches away from using any imaging element 220 with this arrangement and is structurally not capable of housing an imaging element with or without collimating lenses. EX1006, 3:26-34; FIGS. 1A & 1B; EX2003, ¶¶328-338.

Ground 4

Because a POSITA would not have modified Lemoff to include collimating lenses, Lemoff and LaMarche do not disclose a “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” See §§V.C.1 and V.C.3, EX2003, §IX.C.3.

Further 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.

Finally, because the signals in Lemoff are emitted to enter directly into the fiber at different locations, the signals would not enter the fiber in a single spot as required by claim [1.5]. EX2003, ¶330.

5. Claim 2: Lemoff (and LaMarche) fail to teach claim 2

Because Lemoff and/or LaMarche do not disclose all elements of claim 1 from which claim 2 depends (*see* Ground 3, §V.C.2-4, claims [1.0]-[1.6], this combination does not disclose claim 2. *See also* §V.B.2-5.

Petitioner does not state whether it relies on Ground 3 in addition to Ground 4 for this claim. Petitioner relies on both Lemoff and LaMarche for this claim. EX2003, §IX.C.5.

Ground 3

Lemoff does not disclose collimating lenses, nor would a POSITA have found it obvious to incorporate Lemoff. *See* §§V.C.1, V.C.3. Lemoff does not disclose an optical combiner of claim 1 with the additional limitation of claim 2. EX2003, ¶¶349-352.

Ground 4

Petitioner further relies on LaMarche for certain aspects of claim 2; however, because LaMarche does not disclose an optical combiner; it does not disclose an optical combiner of claim 1 with the additional limitation of claim 2. LaMarche discloses discrete optical elements; the input probe lenses 630-1 through 630-M that Petitioner refers to are not integrated into an optical combiner. *See* §V.C.2; EX2003, ¶¶353-354.

Further, a POSITA would not have combined Lemoff and LaMarche. *See* §V.C.1; EX2003, §IX.C.3. Even so, combining Lemoff and LaMarche does not cure these deficiencies. *See* §V.C.2-4; EX2003, ¶355.

6. Claim 6: Lemoff (and LaMarche) fail to teach claim 6

Because Lemoff or Lemoff and LaMarche do not satisfy all elements of claim 1, these references do not disclose or render obvious claim 6. *See* §§V.C.2, V.C.5; EX2003, §IX.C.6.

7. Claim 7: Lemoff (and LaMarche) fail to teach claim 7

Petitioner contends that claim 7 is substantially the same in scope as claim 2. Petition p.50. Because Lemoff or Lemoff and LaMarche do not satisfy the claim elements of claims 1-2, these references do not disclose or render obvious claim 7. *See* §V.C.2-5; EX2003, §IX.C.7.

8. Claim 9: Lemoff (and LaMarche) fail to teach claim 2

Petitioner contends that claim 9 differs from claim 6 only in that it depends from claim 7 instead of claim 1. Petition p.50. Because Lemoff or Lemoff and LaMarche does not satisfy claim 1 or claim 6, these references do not disclose or render obvious claim 9. *See* §§V.C.2-4, V.C.6; EX2003, §IX.C.8.

D. Ground 5: Bhandarkar Is Not Prior Art

Because Petitioner fails to establish Bhandarkar as prior art, Ground 5 must be denied.

Each of the Challenged Claims has a priority date of July 17, 2003. *See infra* §V.D.3. Bhandarkar is not prior art as it has a priority date no earlier than September 29, 2003. Petition p.52. Because the priority of the Challenged Claims predates the earliest priority date Petitioner has asserted for Bhandarkar, Petitioner has failed to establish that Bhandarkar is prior art. *See, e.g., Globus Med., Inc. v.*

Depuy Synthes Prods., LLC, IPR2015-00099, Paper 15 (PTAB May 1, 2015) (PTAB denied institution where Petitioner failed to establish its primary reference was prior art with respect to the challenged claims).

1. The '416 Patent Is Entitled to a Priority Date of July 17, 2003

The provisional application leading to the '416 Patent was filed on February 4, 2004. During prosecution, applicants established entitlement to a priority date of July 17, 2003. *See* EX1002 p.22 (1/25/05 NOA).

Petitioner argues that the '416 Patent should not have a July 17, 2003, priority date, because (1) conception and diligence in reducing to practice are not sufficiently corroborated; and (2) the provisional application does not provide adequate written description for some of the claims. Each of these arguments fails.

a. Conception and Diligent Reduction to Practice

During prosecution, Patent Owner's predecessor successfully swore behind Bhandarkar. The inventors submitted several declarations to establish that the inventors conceived of the '416 Patent by July 17, 2003 followed by a diligent efforts to reduce to practice, with constructive reduction to practice occurring upon the filing of the provisional application on February 4, 2004. Consequently, the Examiner issued a Notice of Allowance for the '416 Patent, finding they had sworn behind Bhandarkar. EX1002, p.22.

i. Inventor Notebooks Establish Conception as of July 17, 2003.

Patent Owner's documentary evidence—namely inventor notebooks—establish conception as of July 17, 2003. Petitioner incorrectly contends that Patent Owner is relying solely on inventor *declarations* to establish conception, and further incorrectly contends that Patent Owner cannot rely on inventor notebooks

to corroborate that testimony. Petition p.54. But Petitioner’s argument is backwards. Patent Owner is relying on documentary evidence that does not require corroboration.

Inventor notebooks—witnessed or not—can establish conception. In *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1577–78 (Fed. Cir. 1996), the Federal Circuit held, “[t]his court does not require corroboration where a party seeks to prove conception through the use of physical exhibits. The trier of fact can conclude for itself what documents show, aided by testimony as to what the exhibit would mean to one skilled in the art.”); *Price v. Symsek*, 988 F.2d 1187, 1195–96 (Fed. Cir. 1993).

Accordingly, Petitioner’s reliance on the quoted portion of *Brown v. Barbacid*, 276 F.3d 1327, 1335 (Fed. Cir. 2002) is misplaced. Petition p.53. In *Brown*, the Federal Circuit drew a distinction between inventor testimony and documentary evidence: “This court does not require corroboration where a party seeks to prove conception through the use of physical exhibits.” *Id.* (quoting *Mahurkar*, 79 F.3d at 1577). Specifically, the Federal Circuit held that “Dr. Reiss’ notebooks and autoradiographs, do not require corroboration...” *Id.* The problem in *Brown* was that the notebooks (and photographs) did not “encompass all limitations of the claimed invention,” which was necessary to establish conception. *Id.* at 1336. The only evidence of the missing claim element being conceived as of September 20 was the inventor’s *oral testimony*, which *did* require corroboration. *Id.* at 1334-335. That is, the Federal Circuit relied on the unwitnessed notebooks for the elements that were disclosed, but that was insufficient to establish conception of all elements as of September 20.

To be sure, the *Brown* court further found that the Board erred in not relying on the inventor’s notebook to establish conception as of a later date, September 25,

when the later notebook pages and other physical evidence supported all claim elements. *Brown*, 276 F.3d at 1337.

Petitioner relies on several other cases concerning *inventor's testimony* to argue that *inventor notebooks* corroborating such testimony are not sufficient corroboration, but these cases are likewise off-point because Patent Owner does not rely on inventor *testimony* for conception. Petition p.54; *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 999 (Fed. Cir. 2009) (proving conception through *oral testimony* cannot be corroborated by unwitnessed lab notebook); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1170 (Fed. Cir. 2006) (issue on appeal is “whether Medichem provided adequate corroboration of the *inventors' testimony* regarding the alleged actual reduction to practice,” and clarifying that “no similar condition of ‘corroboration’ is imposed on an inventor’s notebook, or indeed on any documentary or physical evidence...”); *see also Curt Mfg., LLC v. Horizon Global Ams. Inc.*, IPR2019-00625, Paper 31, 13–18 (PTAB Aug. 11, 2020) (determining whether inventor testimony sufficiently corroborated).

Concerning conception, Petitioner only takes issue with corroboration of the “dates of the notebooks.” Petition p.38. The inventor notebooks themselves do not require further independent corroboration, including the dates in the notebook. *Brown*, 276 F.3d at 1335, 1337 (“Dr. Reiss’ notebooks and autoradiographs, do not require corroboration to demonstrate the content of the physical evidence itself, namely that FT assay experiments took place on September 20 and 25”).

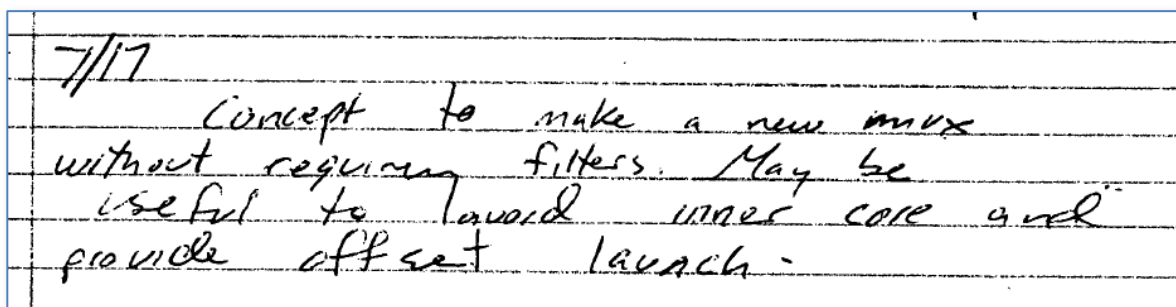
During prosecution, the Examiner found that the laboratory notebooks established conception of all elements. When the Examiner initially found that the notebooks did not disclose different wavelengths, the applicant submitted documentary evidence that “ λ_1 , λ_2 , λ_3 , λ_4 ” in the lab notebooks was standard notation for different wavelengths, which was confirmed by the inventor. Indeed, a

POSITA would understand that this is a typical notation for different wavelengths. EX1002, p.35-37; EX2018; EX2003, ¶¶363-364. Thus, while inventor testimony is not necessary for this particular claim element, the inventor testimony is fully corroborated and not contested by Petitioner. Further, in connection with this IPR, Patent Owner has submitted inventor notebooks which show dated, chronological entries from the notebook to further establish when the inventor conception occurred. EX2009; EX2010.

In a further attack on Patent Owner's evidence of priority date, Petitioner misconstrues the laboratory books as "unwitnessed." In fact, each of the notebooks is signed and dated by multiple co-inventors. *Id.* Petitioner does not otherwise dispute that the notebooks provide all limitations of the claimed invention.

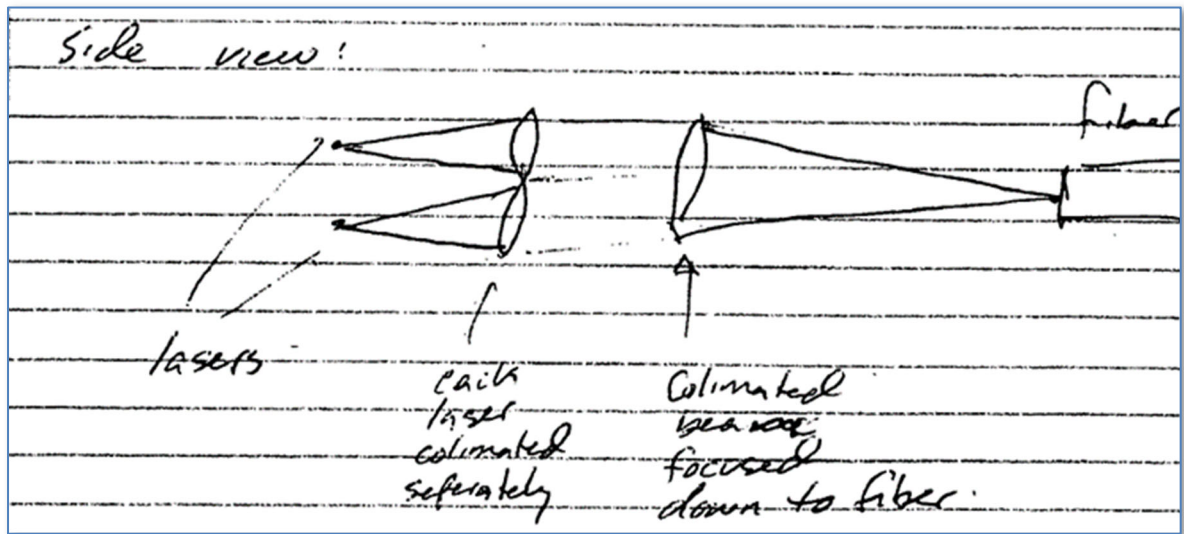
As discussed in the file history (EX1002 pp.21-141), and charted below, the laboratory notebooks submitted during prosecution establish conception as of July 17, 2003, as summarized below. EX2003, ¶¶365.

1. Limitations [1.0]-[1.2]



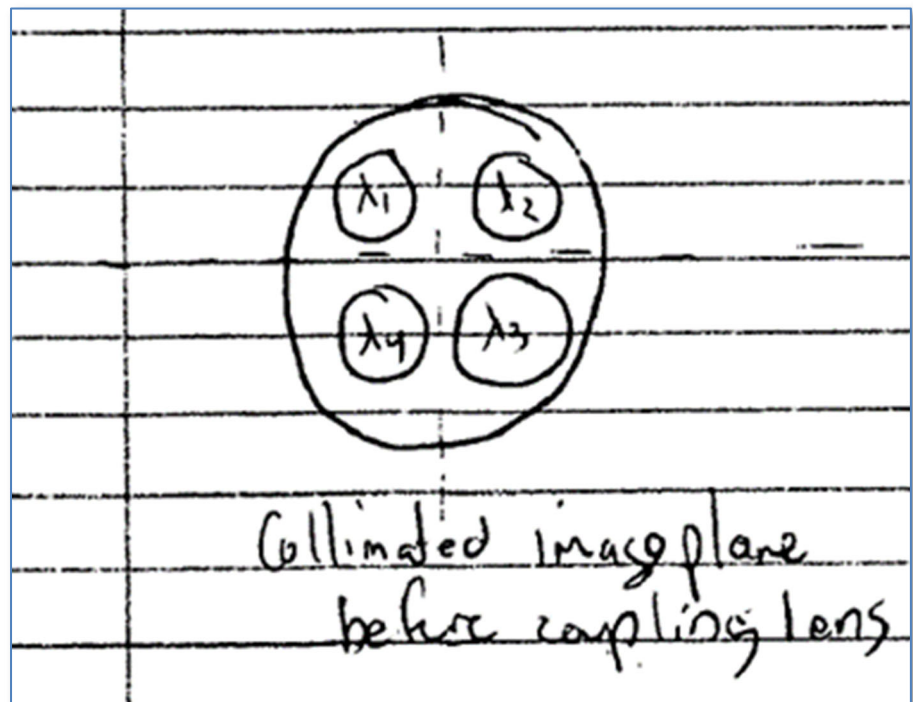
7/17
Concept to make a new mux
without requiring filters. May be
useful to launch inner core and
provide offset launch.

EX1002, 79

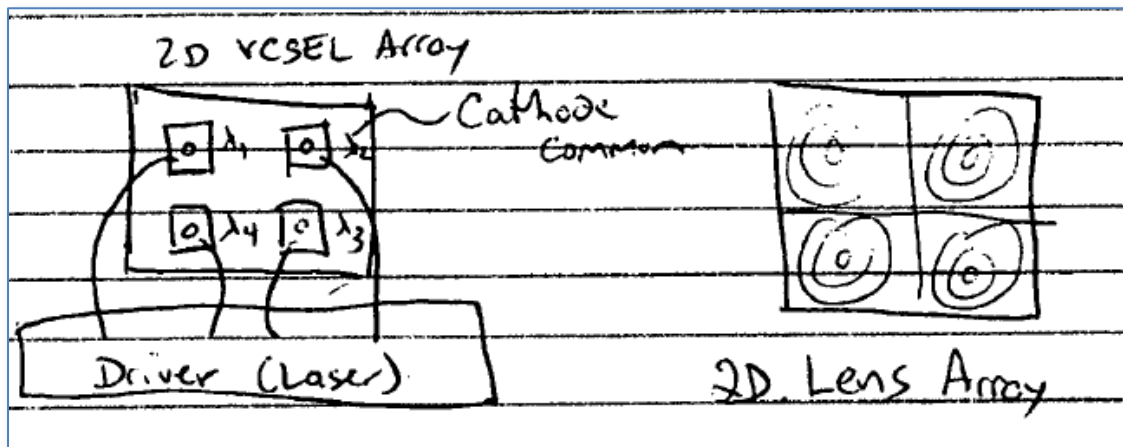


EX1002, 79

Limitations [1.3]-[1.4]

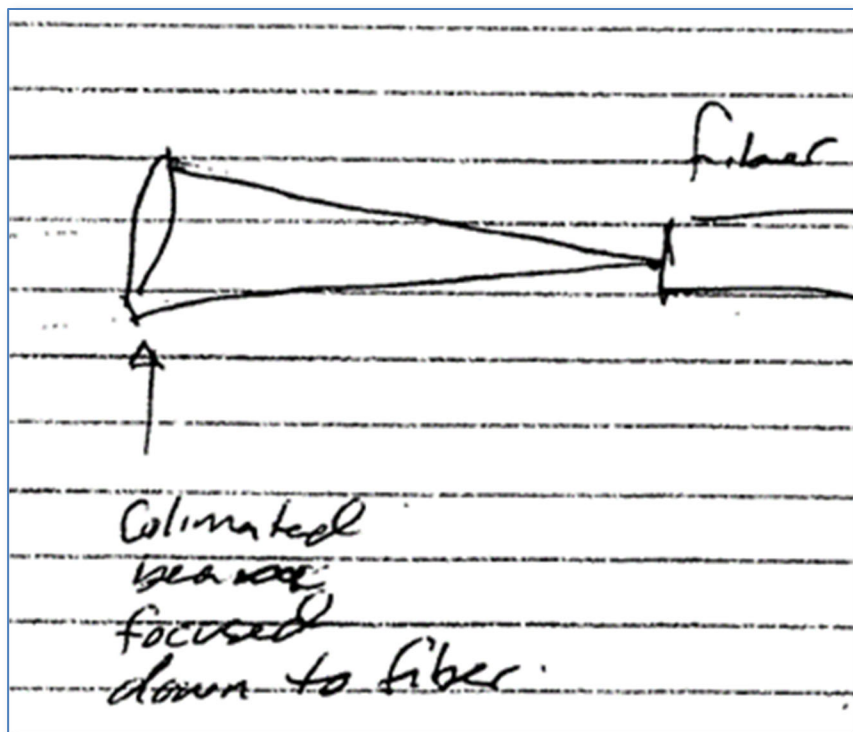


EX1002, p.126

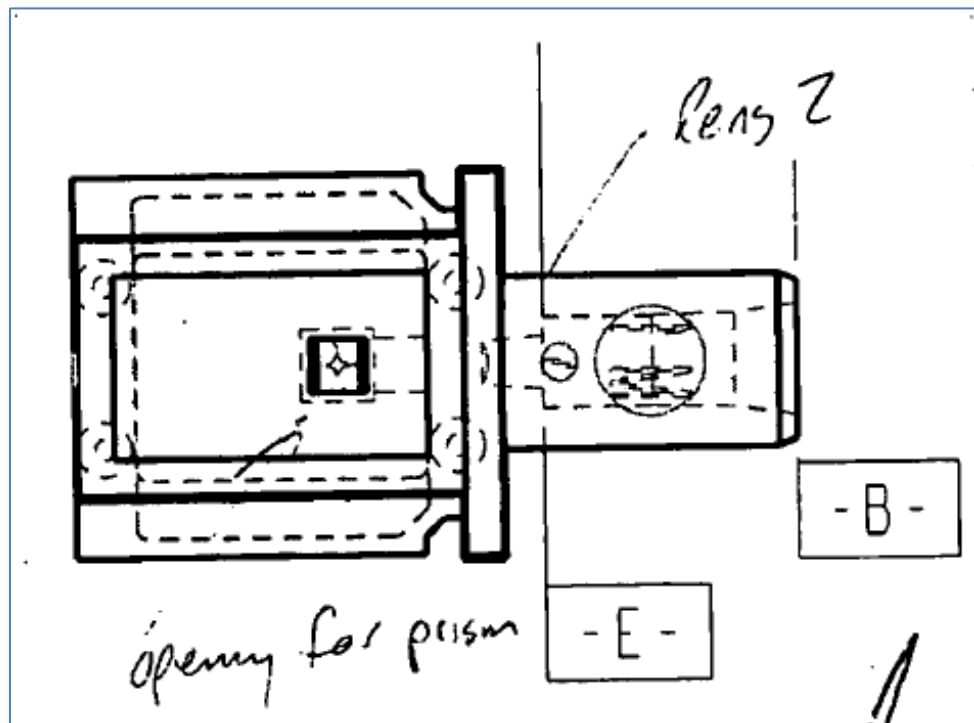


EX1002, p.126

Limitations [1.5]-[1.6]

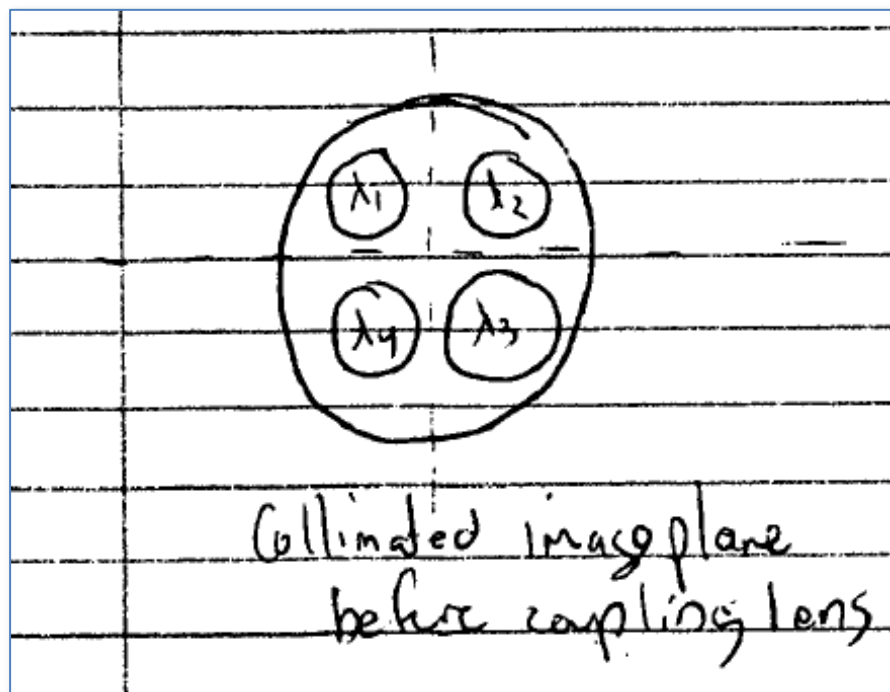


EX1002, p.126

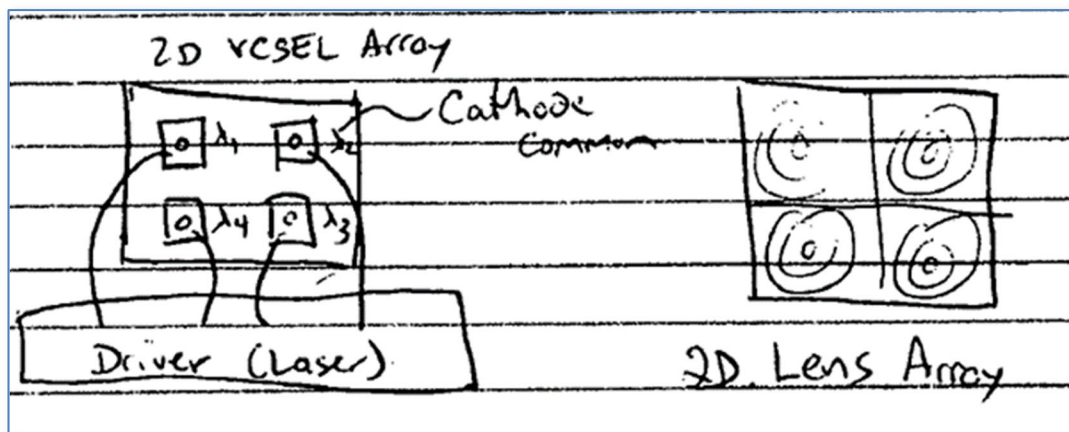


EX1002, p.80

2. Claim 2



EX1002, p.126



EX1002, p.126

Claims 6 and 9 (claimed invention does not use dielectric filters or waveguides).
See EX1002, pp.74-128.

Claim 7 (see Claims 1 and 2, above)

ii. Reasonable Diligence for Reduction to Practice

To establish diligence in reduction to practice, the inventor must show diligence throughout the entire critical period, here, from September 29, 2003 (Bhandarkar Provisional Application filing date), to February 4, 2004 ('416 Patent provisional application filing date). *Mahurkar*, 79 F.3d at 1578. Petitioner ignores the corroborating evidence of diligence during this period.

In establishing reasonable diligence, “[a] patent owner need not prove the inventor continuously exercised reasonable diligence throughout the critical period; it must show there was reasonably continuous diligence. Under this standard, an inventor is not required to work on reducing his invention to practice every day during the critical period. And periods of inactivity within the critical period do not automatically vanquish a patent owner’s claim of reasonable diligence.” *Perfect Surgical Techniques, Inc. v. Olympus Am., Inc.*, 841 F.3d 1004, 1009, 1010 (Fed. Cir. 2016) (cleaned up).

The “point of the diligence analysis is not to scour the patent owner’s corroborating evidence in search of intervals of time where the patent owner has failed to substantiate some sort of activity. It is to assure that, in light of the evidence as a whole, the invention was not abandoned or unreasonably delayed.” *Id.* at 1009; *see, e.g., Monsanto Co. v. Mycogen Plant Sci., Inc.*, 261 F.3d 1356, 1369–70 (Fed. Cir. 2001) (reasonable diligence where no corroborating evidence of activity for a series of months); *Brown v. Barbacid*, 436 F.3d 1376, 1380–83 (Fed. Cir. 2006).

Evidence supports the inventors’ diligence.

First, during prosecution, the inventors submitted declarations identifying various date ranges during which the inventors were preparing and revising invention disclosure forms, from October 2003 through January 2004, which ultimately formed the basis of the provisional application for the ’416 Patent. Each of the three drafts of the invention disclosure form was attached to the Ray declaration. EX1009, p.74-116. Patent Owner additionally submits metadata for the electronic Word files, which verify the last-saved dates of the invention disclosure forms and their contents. EX2011.

Second, the inventors’ declarations indicate they were conducting prior art searches during the relevant time period. EX1002, p.118-122. These prior art searches are corroborated in the invention disclosure forms because the prior art search results are listed in these documents. EX1002, p.74-76, 84-116. Metadata for the Word files verifies the dates of the invention disclosure forms that show the prior art search results. EX2011, ¶¶1-11. Prior art searching is sufficient activity for diligence. *See, e.g., Correge v. Murphy*, 705 F.2d 1326, 1330 (Fed. Cir. 1983) (inventor’s two-month response to prior art search results did not result in abandonment); *cf. In re Enhanced Sec. Rsch., LLC*, 739 F.3d 1347, 1358–59 (Fed. Cir. 2014) (counting attorney’s prior art searches toward diligence analysis).

Further, inventors presented corroborating evidence of computer-generated models that correspond to FIGS. 2 and 3 of the patent application. EX1002 p.74-76, 80-83. Each notebook page is signed by the other inventors. *Adenta GmbH v. OrthoArm, Inc.*, 501 F.3d 1364, 1372–73 (Fed. Cir. 2007) (oral testimony of another interested party can help to corroborate along with other evidence.). In Ray’s declaration, he submitted a Windows Explorer Screenshot showing file name showing the last computer model generated on January 9, 2004. EX1002 p.74-76, 82-83.

Finally, the assignee’s prosecuting attorney submitted a declaration swearing that he received the latest version of the invention disclosure form on January 27, 2004, and worked diligently on preparing the provisional application, which was filed on February 4, 2004. EX1002, p.129-130.

This evidence of diligence is summarized below:

Dates	Evidence
August and September 2003	Conducted prior art searches. EX1002 p.118-122.
October 7-16, 2003	Inventors prepared first draft of “Report of Possible Subject Invention.” EX1002 p.74-76, 84-94. Inventor Ray’s declaration states he performed prior art searches during this time. <i>Id.</i> During this time, the inventors also performed computer modeling of the optical combiner. <i>Id.</i>

Dates	Evidence
	The metadata shows Rev 0 document was last saved on October 16, 2003. Prior art references are identified on page 3. Computer models of the combiner are inserted into the Word document. EX2011, ¶¶6-7.
October 24 through November 10, 2003	Inventors prepared a second draft of the invention disclosure. EX1002 p.74-76, 95-105. Inventor Ray's declaration states that he performed prior art searches during this time. <i>Id.</i> Rev 1's metadata shows it was last saved on November 10, 2003 and contains redlines showing efforts to edit the document. EX2011, ¶¶8-9. Additional or different prior art references are identified in the second draft. Computer models of the combiner are inserted into the Word document. EX2011, ¶¶10-11.
November 10, 2003 to on or around January 15, 2004	Inventors updated prior art searches. EX1002 p.118-122.
January 9, 2004	In Ray's Declaration, he submitted a Windows Explorer Screenshot showing file name of the last computer model generated on January 9, 2004. EX1002 p.74-76, 106-116.
January 27, 2004	Ray's Declaration states they finalized the invention disclosure and forwarded to counsel. Rev 2's metadata

Dates	Evidence
	shows it was last saved on January 27, 2004, and Rev 2 identifies different prior art references from Rev 1. EX2011, ¶¶8-11. ⁴
January 27, 2004	Applicant's attorney's declaration confirms he received Rev 2 on January 27, 2004.
January 28 through February 4, 2024	Applicant's attorney reviewed the final disclosure and filed the provisional application. EX1002 p.129-130.

In sum, under the rule of reason, in considering all pertinent evidence, the Patent Owner has established conception followed by diligent reduction to practice for the relevant four-month period. “[O]ur case law does not require that evidence have a source independent of the inventors on every aspect of conception and reduction to practice Here, the law requires only that the corroborative evidence, including circumstantial evidence, support the credibility of the inventors’ story.” *E.I. du Pont De Nemours & Co. v. Unifrax I LLC*, 921 F.3d 1060, 1077 (Fed. Cir. 2019) (cleaned up).

Because Patent Owner has shown conception followed by diligent reduction to practice, to the Challenged Claims have a priority date of July 17, 2003.

⁴ Petitioner claims the corroborating metadata is “admittedly” unavailable and cites to the Ray and Grann declarations. Petition pp.54–55. The cited passages refer to the modeling software only and not the invention disclosure Word documents. The metadata for the Word documents is available and is submitted with this POPR. EX2011.

b. The '416 Provisional Application Provides Adequate Written Description and Enables the Full Scope the Invention.

Petitioner further argues that the '416 Patent's priority date should not be based on the filing date of the underlying provisional application because: (i) the provisional application does not meet the written description requirement for not mentioning "radial sectors" or the requirement that each of the n collimated beams pass through a "separate radial sector"; and (ii) because the provisional application only discloses a device with four lasers and collimating lenses, it does not enable the full scope of " n " lasers and collimating lenses.

i. Petitioner Fails to Show that Any Challenged Claim Lacks Written Description in the Provisional Application

A provisional application satisfies the written description requirement when "the description clearly allows persons of ordinary skill in the art to recognize that the inventor invented what is claimed." *See Bd. of Trs. of Leland Stanford Junior Univ. v. Chinese Univ. of Hong Kong*, 860 F.3d 1367, 1375 (Fed. Cir. 2017) (cleaned up) (noting it is a fact intensive inquiry). Possession of the invention is conveyed "by such descriptive means as words, structures, figures, diagrams, formulas, etc., that fully set forth the claimed invention[,] [a]lthough the exact terms need not be used *in haec verba*." *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997).

Concerning a focusing means having "separate radial sectors on its surface" and the collimated beams passing "through a separate one of said n sectors," the provisional application specifically states that the invention comprises an optical combiner that includes "one lens for focusing several *geometrically placed* collimated beams onto the fiber and one or more lenses for collimating light from

lasers or fibers and a means for *geometrically arranging* the plurality of collimated beams for maximum coupling efficiency into the fiber.” EX1009, at 2 (emphasis added). The provisional application discloses that one such embodiment utilizes “a two-dimensional array of lenses 9a, 9b, 9c, 9d for collimating the input light signals...” EX1009, 3 (e.g., “arranging four (in this embodiment) collimating lenses 2a, 2b, 2c, 2d”), followed by the focusing lens 10. This is shown in several figures of the provisional application, including FIGS. 3 and 6, shown below:

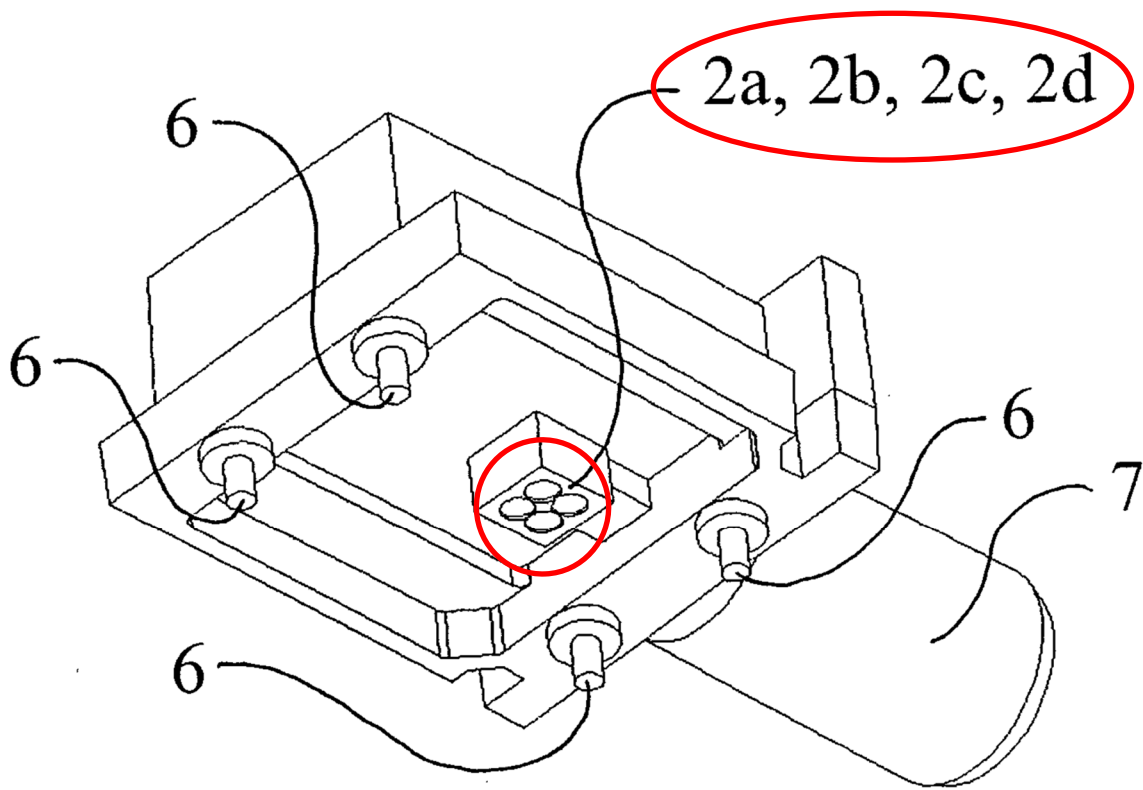
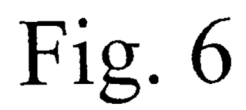
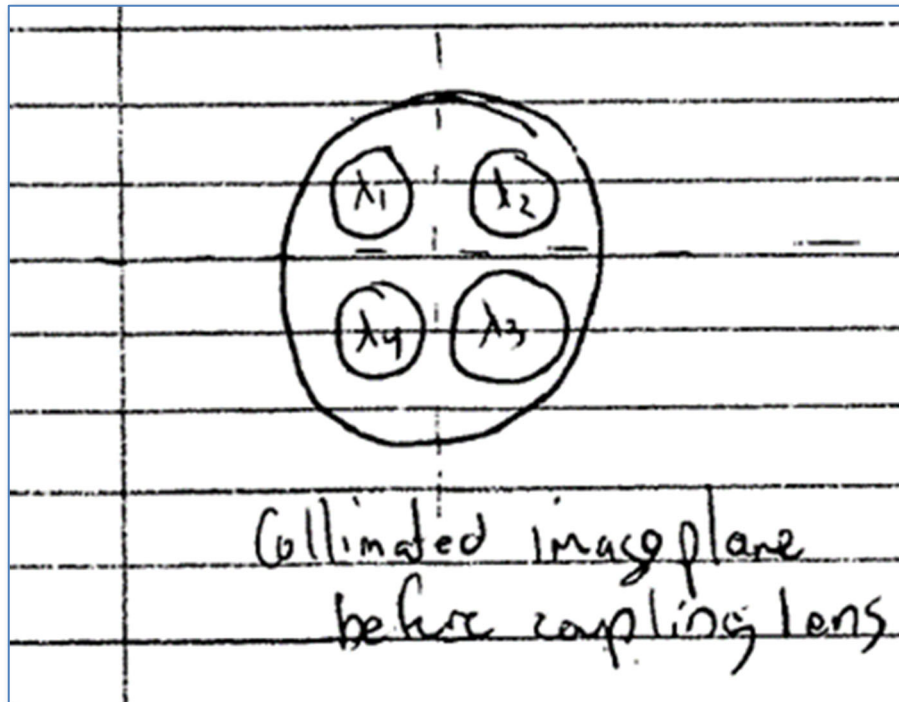


Fig. 3



EX1009 at 4, 7.

Based on the Figures and corresponding descriptions, a POSITA would recognize that the outputs of the two-dimensional array of collimating lenses will intersect with the integrated focusing means (such as focusing lens 10 in FIG. 6) in four pie-shaped segments, or radial rectors. EX2003, ¶¶368-372. This is illustrated in the inventor's notebook.



EX1002 p.126. Thus, the inventors clearly had possession of the claimed invention at the time of the provisional application. EX2003, ¶¶367-374.

ii. Petitioner Fails to Show that Any Challenged Claim Lacks Enablement by the Provisional Application

The Petition fails to establish that it's more likely than not that the provisional application does not enable any Challenged Claim, because the provisional discloses four lasers and collimating lenses, but does not expressly generalize to n . To establish non-enablement, a challenger must show that a skilled artisan would be unable to practice the claimed invention without "undue

experimentation.” *Alcon Rsch. Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1188 (Fed. Cir. 2014).

Concerning enabling the full scope of claim 1’s n lasers and collimating lenses, the specification does not have to “describe with particularity how to make and use every single embodiment within a claimed class.” *Amgen Inc. v. Sanofi*, 143 S. Ct. 1243, 1254 (2023). A claim can satisfy the enablement requirement of §112 if one skilled in the art, after reading the specification, could practice the claimed invention without undue experimentation. *In re Wands*, 858 F.2d 731, 736–37 (Fed. Cir. 1988). As the Federal Circuit explained, “the artisan’s knowledge of the prior art and routine experimentation can often fill gaps, interpolate between embodiments, and perhaps even extrapolate beyond the disclosed embodiments, depending on the predictability of the art.” *AK Steel Corp. v. Sollac & Ugine*, 344 F.3d 1234, 1244 (Fed. Cir. 2003).⁵

Petitioner contends that even if the provisional application provides support for the “separate radial sector” limitation, that a POSITA would not be capable of understanding n radial sectors based on the disclosures. Petition pp.56-57. Petitioner is incorrect because the ’416 Patent fully enables using collimating lenses in a radial alignment. EX2003, ¶¶375-380. A POSITA would understand that n collimating beams, when geometrically arranged in a circle, such as the 2x2

⁵ To the extent Petitioner intended to argue that “ n ” violates §112 because it does not specify an upper limit, that argument fails. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1376–77 (Fed. Cir. 2007) (cleaned up) (“Open-ended claims are not inherently improper ... They may be supported if there is an inherent, albeit not precisely known, upper limit and the specification enables one of skill in the art to approach that limit.”). In any event, Petitioner does not make this argument explicitly or by clear implication. EX2003, ¶379.

arrangement of collimated lenses, would also result in in pie-shaped segments, or radial rectors, on the integrated focusing means. *Id.* How many radial sectors simply depends on the number of collimated lenses placed radially around the center axis. *Id.* Moreover, Petitioner itself argues that the POSITA would recognize a four lens radial arrangement can be extrapolated to n lenses based on what was known in the art at the time of the invention. Petition p.32 (“LaMarche teaches this radial arrangement for an arbitrary number of M input probe lenses 630-1 thorough 630- M ”). Specifically, LaMarche illustrates four lenses in such an arrangement: 630-1, 630-2, 630-3, and 630- m . EX1005, FIG. 6. Petitioner cannot have it both ways. The full scope of the Challenged Claims is enabled by the provisional application.⁶

VI. DISCRETIONARY FACTORS DISFAVOR INSTITUTION

Further, although Petitioner filed a *Sotera* stipulation on November 8, 2023, the Board should deny institution under § 314(a) because trial would be an inefficient use of the Board’s resources in light of parallel district court litigation (C.D. Cal. 8:23-cv-00185-MCS-ADS), originally filed ten months ago, on January 30, 2023. The district court has entered a scheduling order; trial is set to commence in December 2024, before the Board would be due to enter a final decision. The district court will hold a claim construction hearing and fact discovery will be

⁶ Opticis does not contend that any other limitations of the Challenged Claims are missing from the provisional, effectively conceding that they are present. In fact, including the two disputed limitations, all limitations are supported by the provisional. *Compare* Claim [1.0]-[1.2] *with* EX1009, FIGS. 1-6, 8:5-9; claim [1.3]-[1.4] *with* EX1009, p.10:11-12, claim [1.5]-[1.6] *with* EX1009, p.9:18-22. EX2003, ¶381.

nearly complete before the Board is even due to make an institution decision. EX2019. The district court denied Petitioner's stay motion. EX2020. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 2 (Mar. 20, 2020) (precedential). The Board should exercise its discretion and deny institution under §314(a). Petitioner's *Sotera* stipulation is of only limited value because Opticis USA, a co-defendant in the district court action and not a co-petitioner here, has not made a similar undertaking. *Cf.* EX2022.

VII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny institution.

Date: November 13, 2023

Respectfully submitted,

/s/ Barry J. Herman

Barry J. Herman (Reg. No. 51,254)
Christian E. Mammen (*pro hac vice*)
Carrie Richey (*pro hac vice*)

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24(d), the undersigned certifies that this Preliminary Response complies with the type-volume limitation of 37 C.F.R. § 42.24(b). The word count application of the word processing program used to prepare this Preliminary Response indicates that the Preliminary Response contains 13,996 words.

Dated: November 13, 2023

/s/ Barry J. Herman
Barry J. Herman (Reg. No. 51,254)

CERTIFICATE OF SERVICE

The undersigned certifies that on November 13, 2023, that a true and correct copy of the foregoing was served on Counsel for Petitioner via filing through the P-TACTS, as well as by delivering a copy via electronic mail to the following email address(es):

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