

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JDS UNIPHASE CORPORATION,
Petitioner,

v.

FIBER, LLC,
Patent Owner.

Case IPR2013-00336
Patent 6,430,332 B1

Before HOWARD B. BLANKENSHIP, JACQUELINE WRIGHT BONILLA, and
JENNIFER S. BISK, *Administrative Patent Judges*.

BONILLA, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

JDS Uniphase Corporation (“Petitioner”) filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claims 101, 112, and 123–134 of U.S. Patent No. 6,430,332 B1 (Ex. 1001, “the ’332 patent”). Fiber, LLC (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”). We determined that the information presented in the Petition demonstrated that there was a reasonable likelihood that Petitioner would prevail in challenging claims 112 and 123–134, but not claim 101, as unpatentable under 35 U.S.C. § 103. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on December 6, 2013, on the basis that claims 112 and 123–134 are unpatentable on the following grounds.

Reference(s)	Basis	Claims challenged ¹
Chande (Ex. 1006) ² and Buchin (Ex. 1005) ³	§ 103	112, 123, 124, 127, and 129–134
Young (Ex. 1004) ⁴ and Hurst (Ex. 1007) ⁵	§ 103	112, 123–126, 129, and 131–134
Young and Kittrell (Ex. 1008) ⁶	§ 103	112, 123, 124, 127–129, and 131–134

Paper 9 (“Dec.”), 2–3, 29–30.

¹ We interpret Petitioner as challenging all claims that depend on the challenged independent claims, i.e., multiple dependencies, via a “[##]/[##]” designation in the Petition. Pet. 6, 9–10.

² U.S. Pat. No. 4,838,631 (Ex. 1006) (“Chande”).

³ U.S. Pat. No. 5,748,812 (Ex. 1005) (“Buchin”).

⁴ U.S. Pat. No. 5,903,687 (Ex. 1004) (“Young”).

⁵ U.S. Pat. No. 6,798,729 B1 (Ex. 1007) (“Hurst”).

⁶ U.S. Pat. No. 5,290,275 (Ex. 1008) (“Kittrell”).

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 24, “PO Resp.”), and filed a Contingent Motion to Amend (Paper 23, “Motion”). Petitioner subsequently filed a Reply to the Response (Paper 30, “Reply”) and an Opposition to Patent Owner’s Contingent Motion to Amend (Paper 31, “Opp.”). Patent Owner then filed a Reply in support of its Contingent Motion to Amend (Paper 33, “Reply to Opp.”). An oral hearing was held on September 9, 2014. A transcript of the hearing has been entered into the record. Paper 39.

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). Petitioner has shown by a preponderance of the evidence that claims 112, 123, 124, 127, 129, 131, 133, and 134 of the ’332 patent are unpatentable. Petitioner has failed to show that claims 125, 126, 128, 130, and 132 are unpatentable. Patent Owner’s Contingent Motion to Amend is denied.

B. Related Proceedings

Petitioner lists three cases in the U.S. District Court for the District of Colorado that may affect, or be affected by, the decision in this proceeding. Pet. 4. Those cases are *Fiber, LLC v. Ciena Corp.*, Docket No. 13-cv-0840 (D. Colo.) (stayed); *Fiber, LLC v. Ciena Corp.*, Docket No. 12-cv-01914 (D. Colo.) (dismissed November 2012); and *Fiber, LLC v. NEC Corp.*, Docket No. 12-cv-01346 (D. Colo.) (dismissed September 2012). In each of those cases, Patent Owner asserted the ’332 patent and U.S. Pat. No. 7,095,917 B2 (“the ’917 patent”) (a related patent, involved in IPR2013-00318) against a third party. *See id.*; Paper 4, 1. The district court ordered a stay of the first case pending resolution of this IPR proceeding. Docket No. 13-cv-00840, Doc. 33 (D. Colo. July 18, 2013).

C. The '332 Patent (Ex. 1001)

The '332 patent relates to an optical beam switching system. Ex. 1001, 1:29–49, claims 112, 123. Optical light signals are transmitted along optical fibers and switched from one fiber to another by an optical switch. *Id.* at 1:14–17. For example, as depicted in Figures 1 and 2 of the patent, an optical beam light source, such as cable/fiber 17, transmits light beam 13 toward mirror 25, which reflects the beam in a different direction toward movable mirror 29, which then reflects the light toward an optical receptor, such as another fiber (cable 7) (shown in Fig. 1). *See also id.* at 5:4–8, 20–28. The '332 patent states that the “light signal is optimized to minimize transmission losses by the optical units.” *Id.* at 5:20–21. Figures 2 and 7a of the '332 patent are reproduced below.

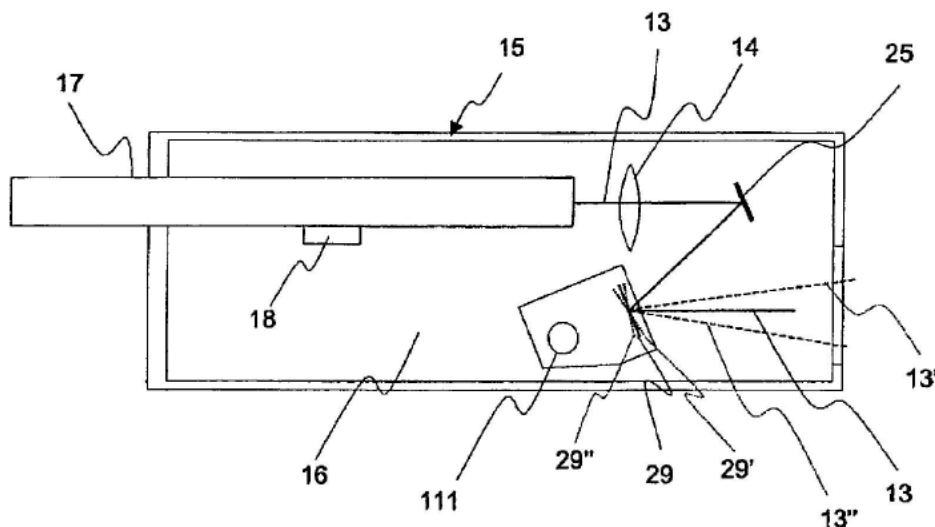


Fig. 2

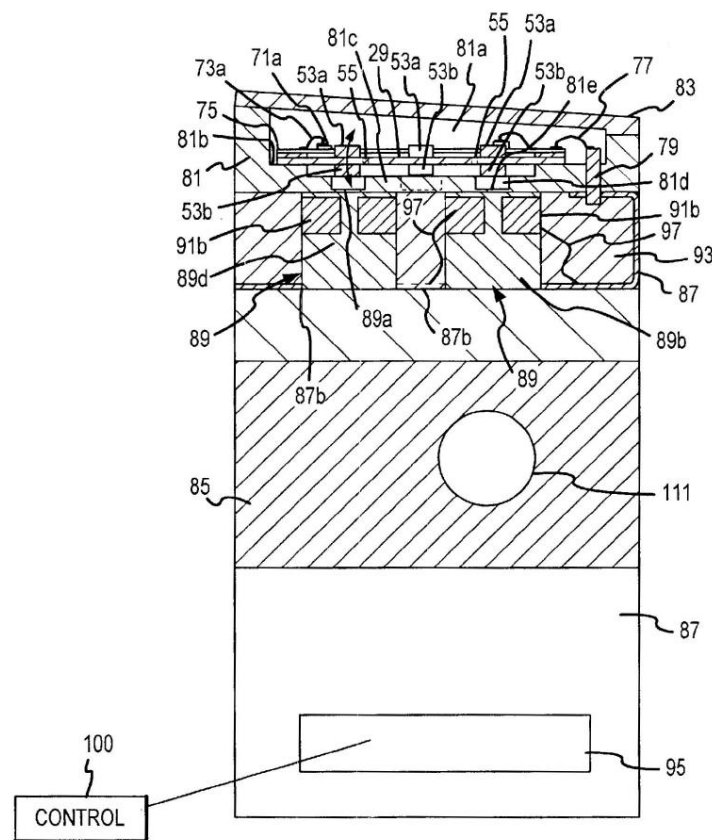


FIG. 7a

Figure 2 depicts a schematic view of a switching unit comprising movable mirror 29 that directs light beam 13. *Id.* at 4:11–14; 5:21–26. Figure 7a depicts a cross-section of an optical switch package including mirror 29, as well as LEDs 71a – 71d “positioned so that they can be used to direct the light beam 13 using the optic unit’s sensing control system 100.” *Id.* at 4:37–40; 8:1–3; *see also id.* at Fig. 7a (depicting LEDs 71a – 71d).

The ’332 patent further discloses:

[LEDs] mounted in an array adjacent a first movable mirror 29 . . . provide radiation which is detected by detector 16. Radiation from the [LEDs] in the array associated with the first movable mirror is received in a radiation guide of another, selected fiber and individually measured by control 100 (FIG. 7a). The position of the

associated movable mirror of the selected fiber is adjusted until radiation received from each LED from the first mirror is substantially equal

Id. 5:40–50.

Independent claim 123, reproduced below, is illustrative of the claimed subject matter:

123. An optical beam switching system for transmitting an optical beam from any one of a complete set of sources of said switching system to any one of a complete set of optical receptors of said switching system comprising:

a plurality of first movable mirrors mounted across a first area of free space from the sources and across a second area of free space from the optical receptors, for directing said optical beam from at least one source to a selected one of the optical receptors, said plurality of first movable mirrors mounted across a first area of free space from the sources such that *a plurality of first optical pathways are defined between the sources and the first movable mirrors*, said first movable mirrors comprising substantially a complete set of movable mirrors included in said switching system for directly interfacing with said sources free from any intervening movable mirrors and said first optical pathways comprising substantially a complete set of pathways included in said switching system between said sources and said first movable mirrors, said plurality of first movable mirrors further mounted across a second area of free space from the receptors such that *a plurality of second optical pathways are defined between the first movable mirrors and the receptors*, the second optical pathways comprising substantially a complete set of pathways included in said switching system between the first movable mirrors and the receptors;

said sources, first movable mirrors and receptors being configured such that there is a first three dimensional region that is traversed by at least most of said second pathways and at least most of said first pathways are located wholly outside said first region;

a control for transmission of the optical beam from the source to a selected optical receptor by means of controlling a controlled

mirror, by causing one of the first movable mirrors to direct the optical beam to a selected optical receptor; and

a data gathering and transmitting element for use in providing a feedback signal regarding the current orientation of the controlled mirror or the current location of the optical beam to the control, in either case for the purpose of adjusting the position of the relevant controlled mirror to minimize transmission loss of the optical beam to the optical receptor by fine tuning said orientation of said relevant controlled mirror based on said feedback signal.

Ex. 1001, 22:53–23:33 (indentation and emphases added). Independent claim 112 is similar to claim 123, but recites “a servo control element” instead of “a data gathering and transmitting element.” *Id.* at 21:39–22:16.

II. ANALYSIS

For the challenged claims, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). In patent law, “the name of the game is the claim.” *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998). Thus, we begin our analysis with claim construction.

A. Claim Construction

We construe claims in an unexpired patent by applying the broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). On the other hand, a “claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history.” *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

1. “*Optical Beam*”

Patent Owner contends that the claim term “optical beam” in the challenged claims should be construed as an “optical beam used in communications” or “communications optical beam.” PO Resp. 7–16. Patent Owner argues that the ’332 patent teaches one of ordinary skill in the art that claims 112 and 123 are directed to optical switches used in the field of communications, and not, for example, switches for YAG lasers used in industrial applications, as described in Chande (Ex. 1006). PO Resp. 8.

Patent Owner relies on a general purpose dictionary definition of the word “transmit” as relevant to the term “transmitting” in the claims, and states it “connotes the transmission of information: ‘1. To send or forward, as to a recipient or destination; dispatch; convey. 2. To communicate, as information or news.’” *Id.* (citing Ex. 2018, 6). Patent Owner also contends that the claim term “receptor” is “related to the term ‘receiver’ which has a definition in the electronics field as ‘a device or apparatus that receives electrical **signals**, waves, or the like, and renders them perceptible to the senses, as the part of a telephone held to the ear, a radio receiving set, or a television receiving set.’” *Id.* at 8–9 (citing Ex. 2018, 5), *see also id.* at 13–14 (citing Ex. 2017, 29–30, ¶ 73).

In addition, Patent Owner points us to where the Specification of the ’332 patent states that “[t]his invention relates generally to optical switching and **more particularly** to non-electrical switching of laser **communication signals**.” *Id.* at 10 (citing Ex. 1001, 1:9–11). Patent Owner provides a definition of “particular,” and contends that “more particularly” means that the ’332 patent “pertains *particularly* to non-electrical switching of laser communication signals, rather than to all types of optical switching in general.” *Id.* at 11 (citing Ex. 2018, 3–4). Patent Owner also refers us to an article in *PC Magazine*, which Patent Owner contends defines

“optical switching” as “[a]n all-optical fiber-optic switching device that maintains the signal as light from input to output.” *Id.* at 10 (citing Ex. 2019). Patent Owner points us to where the Specification uses the phrase “optical signal” or “light signal,” arguing that such language conveys a light beam consisting of communications information, as reflected in a dictionary definition of the word “signal.” *Id.* at 12–13 (citing Ex. 2005, 3). Patent Owner also contends that during prosecution of the ’332 patent, the Examiner “only sought and reviewed art in the field of fiber optic switching devices used in the communications field,” which “suggests” that the Examiner thought the claims “related to optical devices in the communications field, not every conceivable switch involving light beams.” *Id.* at 14–15.

As discussed on our Decision to Institute (Dec. 6), we conclude that Patent Owner’s proposed definition of “optical beam” imports improperly a limitation into the claims. The claims themselves do not recite “communications.” Likewise, the ’332 patent Specification does not indicate that “optical beam” is limited to a communications beam, such that it would exclude a YAG laser beam, for example. As noted by Patent Owner, the Specification states that the “invention relates generally to optical switching and more particularly to non-electrical switching of laser communication signals.” Ex. 1001, 1:9–11. In other words, the Specification indicates that communication signals may be a preferred embodiment of the recited “optical beam,” but the claim phrase is not limited to that particular embodiment. *See also* Ex. 1011, 95:23–96:4 (testimony of Patent Owner’s witness, Dr. David A. Smith, stating that the Specification describes a system that “could switch [a] non-communication beam”); Reply 4.

Patent Owner’s proposed dictionary meanings of the terms “transmit,” as relevant to “transmitting” in the claims, as well as “receptor,” do not persuade us

otherwise. For example, a dictionary definition of the term “transmit” indicates that it means, more generally, to “send or forward, as to a recipient or destination” or “convey,” even if “[t]o communicate” is another alternative definition. Ex. 2018, 6. Patent Owner does not persuade us that switches for YAG lasers, for example, do not “send or forward” a laser beam. In fact, Patent Owner’s own proposed definition of “transmit” is not limited to sending or forwarding information used in the field of communications, where communications, according to Patent Owner, excludes YAG laser beams.

Likewise, as Patent Owner acknowledges (PO Resp. 8–9), the term “optical receptor” is not limited to an element that receives electronic signals, and the Specification, which does not mention the term “receptor” except in the claims, likewise does not limit this term as such. *See also* Dec. 7 (discussing “receptor”); *see also* *infra*. Moreover, use of the phrases “optical signal” and “light signal” in a similar context as “optical beam” in the Specification does not mean that “optical beam” is limited to “a light beam consisting of communications information.” PO Resp. 12–13. Similarly, even assuming the Examiner relied exclusively on prior art relating to communications during prosecution of the ’332 patent, that fact would not dictate how we apply our claim construction standard, i.e., the broadest reasonable interpretation in light of the Specification.

2. “Sources” and “source”

The terms “sources” and “source” are recited in the challenged claims, but are not used in the Specification of the ’332 patent. We construe “sources” and “source” in the context of the claims, consistent with the Specification, however, to refer to sources or a source of an optical beam that is transmitted by the optical beam switching system. *See* Ex. 1001, claims 112 and 123 (reciting “system for transmitting an optical beam from any one of a complete set of sources” in the

preamble). “Sources” or a “source” may be fibers or a fiber, respectively, such as fiber 17, as shown in Figures 1 and 2 of the Specification. *See also* Ex. 1001, 1:14–18 (stating that “optical signals are transmitted along such fibers and are switched from one fiber to another by means of an optical switch”); 2:9–13 (describing “a housing in which an optical fiber is received and in which another mirror is disposed in alignment with the fiber for reflecting an optical signal from the fiber to the movable mirror”); 4:62–5:8 (discussing Figure 1).

3. *“First optical pathways are defined between the sources and the first movable mirrors” and “second optical pathways are defined between the first movable mirrors and the receptors”*

Independent claims 112 and 123 also recite that “a plurality of first optical pathways are defined between the sources and the first movable mirrors,” and “a plurality of second optical pathways are defined between the first movable mirrors and the receptors.” While the term “optical pathways” is not defined in the Specification of the ’332 patent, we construe an “optical pathway,” consistent with the use of the term in the claims and with descriptions in the Specification, to refer to a path taken by an optical beam between a source (e.g., a fiber) and a mirror, or between a mirror and receptor (e.g., a fiber or other mirror that receives an optical beam from a mirror) (*see discussion infra*). *See, e.g.*, Ex. 1001, 5:29–30 (describing that “first movable mirror 29 selects the target position for creating an optical path”).

4. *Other Claim Terms Construed in the Decision to Institute*

In our Decision to Institute, we construed other terms in the challenged claims, including “control for transmission of the optical beam,” “receptor,” “servo control element,” and “data gathering and transmission element,” as recited in independent claims 112 and 123, as well as “adjacent,” as recited in dependent

claims 127 and 128. Dec. 6–9. Patent Owner does not propose alternative claim constructions for those claim phrases in its Patent Owner Response, nor did Petitioner challenge our constructions in its Reply. We discern no reason to alter our claim constructions for this Final Written Decision. For convenience, our claim constructions are reproduced in the table below.

Claim(s)	Claim Phrase	Claim Construction
112 and 123	“control for transmission of the optical beam”	“an element that controls and adjusts a movable mirror, which in turn controls transmission of the optical beam from the beam source to a receptor”
112 and 123	“receptor”	“an element that receives an optical beam after it has been directed by the movable mirror,” such as “another optic fiber (cable 7) or optical switch (optical switch 5), as depicted in Figure 1” of the Specification
112	“servo control element”	“an element that provides a ‘feedback signal’ to the control regarding the orientation of the mirror or location of the beam, which leads to a ‘fine tuning’ adjustment of the mirror ‘to minimize transmission loss’ of the beam to the receptor.” Examples include “LEDs, a ‘detector,’ and ‘radiation guide of another, selected fiber’ that provides a feedback signal to the control”

Claim(s)	Claim Phrase	Claim Construction
123	“data gathering and transmission element”	an element that “provides a ‘feedback signal’ to the control regarding the orientation of the mirror or location of the beam, which leads to a ‘fine tuning’ adjustment of the mirror ‘to minimize transmission loss’ of the beam to the receptor,” and also “gathers ‘data,’ such as information or measurements regarding orientation of the mirror or location of the beam, and transmits a feedback signal, for example to the control.” Examples include “LEDs, a ‘detector,’ and ‘radiation guide of another, selected fiber’ that receives data (e.g., radiation from the LEDs) and transmits a feedback signal to the control”
127 and 128	“adjacent”	“to lie close or near”

Dec. 6–9. In relation to a “receptor,” we further elaborate that this term encompasses an element that receives an optical beam after it has been directed by a movable mirror (e.g., mirror 25), such another mirror (mirror 29), as depicted in Figure 2 of the Specification. Ex. 1001, 5:20–28.

B. Prior Art Status

1. Priority Date for the '332 Patent Claims

Claims are entitled to the benefit of the filing date of an earlier filed application only if the disclosure of the earlier application provides written support for those claims, as required by 35 U.S.C. § 112. *In re Chu*, 66 F.3d 292, 297 (Fed. Cir. 1995). To satisfy the written description requirement, the prior application must convey with reasonable clarity to those skilled in the art that, as of the earlier filing date, the inventor was in possession of the invention. *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1563–64 (Fed. Cir. 1991). In addition, “[e]ntitlement to a filing date does not extend to subject matter which is not

disclosed, but would be obvious over what is expressly disclosed.” *In re Huston*, 308 F.3d 1267, 1277 (Fed. Cir. 2002) (quoting *Lockwood v. Am. Airlines Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997)).

Petitioner argues that the effective filing date of the challenged claims of the ’332 patent should be no earlier than May 12, 1999, the filing date of the non-provisional application that matured into the ’332 patent. Pet. 7–8. Petitioner submits that, contrary to Patent Owner’s contentions, the challenged claims of the ’332 patent are not entitled to a priority date based on an earlier filed provisional patent application, App. No. 60/088,239 (Ex. 1003, Ex. 2006) (“the provisional application”), which was filed on June 5, 1998. Pet. 6–8. Petitioner asserts that the provisional application fails to describe sufficiently the “servo control element” recited in claim 112, or the “data gathering and transmission element” recited in claim 123, where each element is “for use in providing a feedback signal regarding the current orientation of the controlled mirror or the current location of the optical beam to the control.” *Id.* at 7–8; Ex. 1001, 22:8–16; 23:24–33.

Patent Owner, on the other hand, argues that the provisional application discloses those elements when it describes the use of a “servo control.” PO Resp. 16–25. Patent Owner notes that the “servo control and data gathering and transmission limitations in claims 112 and 123 include the following concepts: (1) a feedback system regarding the current location of the controlled mirror or the optical beam, (2) for the purpose of adjusting the position of the mirror for better accuracy.” PO Resp. 17. Patent Owner contends that the provisional application discloses movable mirrors coupled with the use of a “servo control.” *Id.* at 17–18 (citing Ex. 2006, 5, 7–9). Patent Owner relies on a Declaration by its expert witness, Dr. David A. Smith, to support its contention that such disclosure indicates the described device includes an element providing “an indication

concerning the current orientation of the controlled mirror or current location of the optical beam for adjusting the device and ensuring that the device is aligned properly—in other words, a closed-loop, feedback system.” PO Resp. 17–18, 19–20 (citing Ex. 2017, 40–45).

In further support of its contention that the provisional application provides adequate support for this limitation, Patent Owner refers to Figure 16 in the provisional application, and what occurs at time t_0 (mirror rotates via push and pull), time t_1 (mirror reaches maximum and position angle is zero), and time t_2 (currents are reversed to stop mirror). *Id.* at 18 (citing Ex 2006, 7). Patent Owner highlights that the provisional application then states, “[a]t that point the currents are adjusted to hold it in place.” *Id.*; Ex 2006, 7. Patent Owner contends that “Dr. Smith concludes that this inherently communicates use of feedback as to mirror or beam position for purposes of controlling the beam directing device.” PO Resp. 19. Patent Owner quotes Dr. Smith as testifying that “[h]olding the mirror in place means stabilizing its position by using current variations responsive to mirror movements that would otherwise change the mirror alignment,” and therefore, “an error signal must be present which is used in order to correct the angular changes so as to reduce that error signal.” *Id.* at 19–20 (quoting Ex. 2017, 44).

Based on our reading of the provisional application, we conclude that its use of the phrase “servo control” refers to a “control” element, as opposed to a “servo control” or “data gathering and transmission” element, as recited in challenged claims, where the “servo control” in the provisional application controls movement of a mirror using a “push+pull magnetic force,” for example. Ex. 2006, 7. Consistently, the provisional application states that “[i]t may be desirable to add damping mechanism for better servo control,” i.e., to control movement of the mirrors, and that “resulting push+pull magnetic force is more linear and also larger

than the pull only design, and allows for better servo control,” i.e., control of the position of the mirrors. *Id.* at 5, 7; *see also* PO Resp. 18.

Patent Owner’s position relies on an inherency argument in relation to one sentence in the provisional application, as discussed above, which indicates that after velocity of the mirror is “zeroed,” “currents are adjusted to hold it in place.” Ex. 2006, 7. We are not persuaded that this one sentence describing the adjustment of currents to hold a mirror in place necessarily describes a closed-loop, feedback system, or “an error signal” that is “used in order to correct the angular changes so as to reduce that error signal,” as stated by Dr. Smith. PO Resp. 19–12 (citing Ex. 2017, 44). We do not see how this sentence, expressly or inherently, describes a separate “servo control element” or “data gathering and transmission element” as recited in claims 112 and 123, respectively (i.e., something different from the “control” element of each of those claims, which corresponds to the “servo control” in the provisional application), where each element provides a feedback signal regarding current orientation of the mirror or current location of the optical beam.

As discussed in our Decision to Institute (Dec. 10), two references cited by Patent Owner, i.e., *Servomechanism Fundamentals* (Ex. 2007)⁷ and the *Scientific American* article (Ex. 2008),⁸ at best indicate it might have been obvious to an ordinary artisan to include an element providing a feedback signal as a component of a servo control system. Even assuming that to be the case, the doctrine of obviousness does not dictate that the provisional application describes a “servo control” that inherently, i.e., necessarily, includes a “differential error detecting

⁷ Henri Lauer, et al., *SERVOMECHANISM FUNDAMENTALS*, 13–16 (2d ed. 1960).

⁸ Jearl Walker, *The Amateur Scientist*, 248(1) *SCIENTIFIC AMERICAN* 130–137 (1983).

device,” or involves a particular type of “servomechanism,” as described in those references, as argued by Patent Owner. PO Resp. 20–23. *See Tronzo v. Biomet, Inc.*, 156 F.3d 1154, 1159 (Fed. Cir. 1998) (stating that “[i]n order for a disclosure to be inherent, [] the missing descriptive matter must necessarily be present in the parent application’s specification”).

Patent Owner also points us to a reference, MALMSTADT & ENKE, ELECTRONICS FOR SCIENTISTS 291 (W. A. Benjamin, 1962), not of record in this proceeding, but quoted by Dr. Smith in his Declaration (Ex. 2017, ¶ 115). Patent Owner relies on Dr. Smith’s testimony in this regard to support its contention that one would have understood the phrase “servo control” to refer necessarily to “feedback control.” PO Resp. 23–24. Again, such teachings, at best, indicate that it might have been obvious to include an element providing a feedback signal as a component of a servo control system, but the provisional application itself does not disclose, expressly or inherently, that element.

Thus, we are persuaded that the challenged claims of the ’332 patent are not entitled to the June 5, 1998, filing date of the provisional application, and have an effective filing date of no earlier than May 12, 1999.

2. *Antedating Young and Hurst*

Regardless of the priority date of the ’332 patent, Patent Owner also contends that it can show the invention predates certain patent references at issue in grounds upon which we instituted *inter partes* review. PO Resp. 25–30. Patent Owner contends that it establishes a conception date as early as June 18, 1996, and reasonable diligence from that date through the filings of the provisional and non-provisional applications. *Id.* at 25. In support, Patent Owner relies on a Declaration by Mr. Aron Katz (Ex. 2016), evidence attached to his Declaration

(Ex. 2016, Exs. A–T), as well as Dr. Smith’s Declaration (Ex. 2017). *Id.* at 25–30 (citing Exs. 2016, 2017).

The following table presents a summary of the five references at issue in instituted grounds. The table indicates the prior art status, under 35 U.S.C. § 102(b) or § 102(e), of each reference, depending on whether the Declarations and cited evidence establish conception by June 18, 1996, and reasonable diligence through a constructive or actual reduction to practice (“RTP”).

Reference	If Patent Owner cannot antedate reference	If conception by June 18, 1996, diligence, and RTP
Young (Ex. 1004) ⁹	§ 102(e) art	<i>Not prior art</i>
Buchin (Ex. 1005) ¹⁰	§ 102(b) art	§ 102 (b) art
Chande (Ex. 1006) ¹¹	§ 102(b) art	§ 102(b) art
Hurst (Ex. 1007) ¹²	§ 102(e) art	<i>Not prior art</i>
Kittrell (Ex. 1008) ¹³	§ 102(b) art	§ 102(b) art

See PO Resp. 30–32; Dec. 12–13.

Patent Owner contends that it can show that inventors of the ’332 patent invented the claimed subject matter before the filing dates of two patent references at issue, i.e., Young and Hurst. PO Resp. 25–30. Patent Owner states that because

⁹ Young (Ex. 1004), which issued on May 11, 1999, was filed on May 2, 1997.

¹⁰ Buchin (Ex. 1005) issued on May 5, 1998, i.e., more than one year before the filing date of the ’332 patent on May 12, 1999 (Ex. 1001).

¹¹ Chande (Ex. 1006) issued on Jun. 13, 1989.

¹² Hurst (Ex. 1007), which issued on Sept. 28, 2004, has a priority filing date of Mar. 24, 1997, based on a divisional application, and also a priority filing date of Jul. 30, 1996, based on a provisional application.

¹³ Kittrell (Ex. 1008) issued on Mar. 1, 1994.

it can establish a priority and invention date of the '332 patent as early as June 18, 1996, those two references do not qualify as prior art under 35 U.S.C. § 102(e). *Id.* at 30–32.

When arguing conception, Patent Owner relies on the Declaration by Mr. Katz, the founder, principal investor, and Chairman of the Board of Astarte Fibre Networks, Inc. (“Astarte”), a predecessor company to Fiber, LLC (“Fiber”), as well as the founder in 2002 and now president of Patent Owner, Fiber. PO Resp. 26; Ex. 2016 ¶¶ 1, 3–6. Mr. Katz testifies that, as a result of his role as Chairman of the Board of Astarte from 1990 through 2000, he has had “ongoing access to and custody over Astarte’s business records,” as well as “first-hand knowledge of Astarte’s product development efforts,” and is “familiar with its joint efforts with industry partners.” Ex. 2016 ¶¶ 8, 3. Mr. Katz also testifies that in 2000, Astarte merged with Tellium, Inc. (“Tellium”) and signed an agreement with Corning Inc. for a license and an option to purchase Astarte’s intellectual property. *Id.* ¶ 5. In addition, “AFN, LLC became the primary custodian of the documents and records of Astarte,” as well as assignee of the application that became the '332 patent. *Id.* Thereafter, in 2002, Fiber became the successor of AFN, LLC, and custodian of its documents and records. *Id.* ¶ 6.

Mr. Katz states that “[b]ecause of the merger with Tellium in 2000, a vast majority of Astarte’s employees departed to unknown locations and occupations,” and therefore, it was “not possible to produce a declaration from the three inventors of the '332 Patent.” *Id.* ¶ 7. Mr. Katz testifies that since 2000, he has had little to no contact with any of the three inventors, and is not aware of their current location or contact information. *Id.* Thus, instead of relying on a declaration by an inventor to establish conception, Patent Owner relies on

testimony by Mr. Katz based on his knowledge of Astarte's business records, product development efforts, and joint efforts with industry partners. *Id.* ¶ 8.

As an initial matter, we note that the record does not reflect that Patent Owner made any diligent attempt to contact or obtain a declaration from an inventor with personal knowledge of conception of the subject matter of the challenged claims. That Mr. Katz has had no contact with an inventor since 2002, and may not know their current location or contact information, does not lead to a conclusion that the inventors are unreachable. To the contrary, as remarked by Patent Owner's counsel during the oral hearing, Patent Owner did not engage in any effort to find or reach out to the inventors, but rather assumed "it would be impossible to get them to submit to a deposition because they no longer have an interest in what is going on." Paper 39, 43:13–44:19. This lack of diligence in obtaining evidence raises questions about how much weight we should accord Mr. Katz's testimony in relation to conception and reasonable diligence by the named inventors.

Even if we assume that Mr. Katz's Declaration is the best evidence that could be obtained, however, we conclude that the Declaration, and evidence cited therein, fail to establish adequately conception or reasonable diligence. First, as case law clarifies, conception is the "formation in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice." *Dawson v. Dawson*, 710 F.3d 1347, 1352 (Fed. Cir. 2013) (quoting *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1376 (Fed. Cir. 1986)). Here, we must consider what happened in the mind of an inventor, but without testimony from any inventor himself. *See Dawson*, 710 F.3d at 1352–53. Instead, Patent Owner relies on what normally would serve as corroborating evidence, i.e., testimony by a non-inventor witness (Mr. Katz),

regarding what he understood to be in the minds of inventors, and contemporaneous disclosure documents in Mr. Katz's possession to support his testimony.

In this regard, Mr. Katz discusses Exhibits A–T attached to his Declaration. Ex. 2016 ¶¶ 9–37. In particular, Mr. Katz and Patent Owner rely on Exhibits A–E to establish conception as early as June 18, 1996, and Exhibits F–T to establish a reasonably diligent reduction to practice through 1999. PO Resp. 26–30; Ex. 2016 ¶¶ 15–22.

Mr. Katz testifies that Exhibit A is a copy of a November 28, 1995, Memorandum he sent to Mr. Laor (a co-inventor), attaching an article about a Texas Instruments Inc. (“TI”) micromirror chip. Ex. 2016 ¶ 15. In the Memorandum, Mr. Katz asked whether TI's micromirrors had “any ramifications for the next generation” of Astarte's optical switching technology (“*STAR*SWITCH*”).¹⁴ *Id.*; Ex. A.

According to Patent Owner, the “genesis of the invention actually began” thereafter, during a meeting between Mr. Katz and Mr. Laor on December 8, 1995. PO Resp. 27. Patent Owner contends that, at the time of that meeting, Mr. Laor had invented the fiber optic communications switches of U.S. Patent No. 5,177,348 (Ex. 2009) and U.S. Patent No. 5,524,153 (Ex. 2020), which, according to Patent Owner, taught “the need for servo control to ensure precise movement of an optical switch using piezoelectric mechanisms for fiber bending and alignment.” *Id.* (citing *generally* Ex. 2016, 5–7).

¹⁴ Patent Owner does not point us to evidence explaining or defining “*STAR*SWITCH*,” but during the oral hearing, counsel for Patent Owner indicated the term refers to the “piezoelectric switch that Astarte had been working on.” Paper 39, 68:9–19.

Mr. Katz testifies that Exhibit B is a copy of a December 8, 1995, Memorandum that he drafted, documenting the meeting he had with Mr. Laor “to discuss in person the concept of using movable mirrors in an optical switch for transmitting communications signals.” Ex. 2016 ¶ 16. That Memorandum refers to “the substitution of [the TI] mirrors for pizeo-electric [sic] elements, with the mirrors controlled by a chip identical or similar to the TI chip, with the chip controlled by the microprocessor, and with the microprocessor controlled by the sensor.” *Id.* (quoting Ex. B).

Mr. Katz also discusses a joint venture between Astarte and TI that began in early 1996. *Id.* ¶ 17. According to Mr. Katz, as part of that joint venture, a team of engineers, including Mr. Laor and his co-inventors, Mr. Krozier and Mr. Plouffe, conducted in-person meetings to advance the project. *Id.* ¶ 18. Mr. Katz points to Exhibit C as a copy of correspondence from Mr. Krozier, dated March 25, 1996, documenting the first of such meetings on March 19, 1996. *Id.*; Ex. C (referring to “the first official program meeting” on March 19, 1996, of a group of people including all three inventors).

Mr. Katz also relies on Exhibit D, a copy of correspondence from Mr. Krozier dated July 1, 1996, documenting another meeting that took place on June 18, 1996, “regarding development of the new optical switch.” Ex. 2016 ¶ 19. In addition, Mr. Katz refers to Exhibit E as a document prepared thereafter by Mr. Krozier “summarizing the historical conception and development of the technology at issue.” *Id.* ¶ 21. Mr. Katz and Patent Owner contend that Exhibits D and E, in particular, provide evidence that the inventors conceived of the invention disclosed in the ’332 patent at least as early as the date of that meeting on June 18, 1996. *Id.* ¶¶ 20–21; PO Resp. 28–30.

In relation to Exhibit D, Mr. Katz testifies that Mr. Laor disclosed to the engineering team “his concept of using an array of micromirrors to replace the piezoelectric devices in Astarte’s existing fiber optics switch technology.”

Ex. 2016 ¶ 19. According to Mr. Katz, “the Astarte/TI team resolved to fabricate micromirror ‘test wafers’ to provide data to assess application of the concept of ‘position feedback’ to micromirrors.” *Id.* (citing Ex. D, C 012118).

Our review of Exhibit D, however, uncovers that it states, under the heading “Matrix Switch Concepts (Discussion)”:

Herzel [Laor] brought up the idea of using a large array of micromirrors to replace the piezo devices in his current design with a much faster device. Our goal however is still to take advantage of an array of mirrors to build an optical matrix switch. *Unfortunately, we still do not have a reasonable concept for this.*

Ex. 2016, Ex. D, C 012117–18 (emphasis added). Similarly, in relation to “Action Items,” the document states: “Fabricate test wafers. Provide data on parametric measur[e]ments on wafers. Characterize micro-mirror capacitance. *This will provide data to determine if position feedback is realistic.*” *Id.* at C 012118 (emphasis added).

Thus, although Exhibit D may provide evidence of a research plan to substitute piezoelectric devices with an array of micromirrors in a “current design,” the document itself clarifies that the inventors, at that time, did not have “a reasonable concept” of how to do it or how to prepare an optical switching system as recited in the challenged claims. *Id.* at C 012117–18. Exhibit D may indicate that the inventors had a general idea on June 18, 1996, of how to proceed with their research plan, but the exhibit does not show sufficiently a formation, in the mind of the inventors, a definite and permanent idea of the complete and operative invention, as to be applied in practice.

In relation to Exhibit E, we note that we cannot tell from that exhibit the date of the document, who prepared it, or who provided the handwritten notes of “David Write-Up” and “19980000 History Write-Up by David Krozier” on the document. Ex. 2016, Ex. E; *see also, e.g.*, Ex. 1012, 111:21–112:8 (testimony by Mr. Katz stating he cannot tell the date of the document); 116:18–23 (agreeing that Exhibit E “was probably drafted sometime after March 31st, 1997”). Moreover, Mr. Katz’s Declaration does not clarify if he has any personal knowledge in this regard, or if he has seen the document before recently. Ex. 2016 ¶ 21. Instead, he testifies that each exhibit attached to his Declaration is “a record of regularly conducted business activity of Astarte,” he has had “ongoing access to and custody over Astarte’s business records,” and he has “first-hand knowledge of Astarte’s product development efforts” generally. *Id.* ¶¶ 9, 8. Such testimony does not persuade us that Exhibit E, or Mr. Katz’s discussion of that exhibit, provides reliable evidence regarding inventor conception by June 18, 1996, or conception or efforts toward a reduction to practice by inventors on any other date.

Thus, we are not persuaded that Exhibits A–E, or Mr. Katz’s testimony regarding those exhibits, sufficiently establish conception by the inventors of the subject matter of the challenged claims at least as early as June 18, 1996, as asserted by Patent Owner. PO Resp. 25–30; Reply 6–11.

We likewise are not persuaded that evidence of record establishes that “Astarte exercised reasonable diligence in reducing this complex invention to practice from 1996 through late 1999.” *Id.* While some of Exhibits F–T are dated or refer to dates during that time frame, Patent Owner and Mr. Katz’s discussion of those exhibits do not establish sufficiently that the inventors were reasonably diligent for the entire three-year period. *See Creative Compounds, LLC v. Starmark Labs.*, 651 F.3d 1303, 1312–13 (Fed. Cir. 2011) (stating that to establish

diligence, “a party must ‘account for the entire period during which diligence is required’”) (quoting *Gould v. Schawlow*, 363 F.2d 908, 919 (CCPA 1966)).

For example, Mr. Katz refers to notes and diagrams from a meeting on December 5, 1996 (Exhibit F), and then describes evidence of activity starting in mid-March 1997, such as allegedly presented in Mr. Laor’s laboratory notebook dating from March 14, 1997, to early September 1997 (Exhibit G), and correspondence from Mr. Krozier dated March 17, 1997, documenting a meeting held on March 13 and 14, 1997 (Exhibit H). Ex. 2016 ¶¶ 24–26. Thus, evidence of record fails to show adequately relevant activity for over three months in the December 1996–March 1997 time frame. *See Crane v. Carlson*, 125 F.2d 709, 714 (CCPA 1942) (stating that an “unexplained period of time” of two months, “in which, so far as the record shows, nothing was done toward reducing the invention to practice, evidences lack of diligence”).

For the reasons discussed above, evidence of record does not establish, sufficiently, conception of the subject matter of the challenged claims, diligence after conception, or that inventors of the ’332 patent invented the claimed subject matter before the filing dates of Young and Hurst patent references. Thus, those two references qualify as prior art under 35 U.S.C. § 102(e).

C. Obviousness over Chande and Buchin

Petitioner argues that claims 112, 123, 124, 127, and 129–134 of the ’332 patent would have been obvious over Chande in view of Buchin. Pet. 19–22, 35–43; Dec. 17–20. As discussed above, Chande and Buchin both constitute § 102(b) prior art.

1. Chande (Ex. 1006)

Chande describes a system that directs successive beam pulses of a laser into different optical fibers. Ex. 1006, Abstract. The system comprises a lens, optical

fibers, and galvanometer-driven mirrors for directing a laser beam through the lens for focusing onto different fiber tips. *Id.*

Chande presents Figure 5, reproduced below:

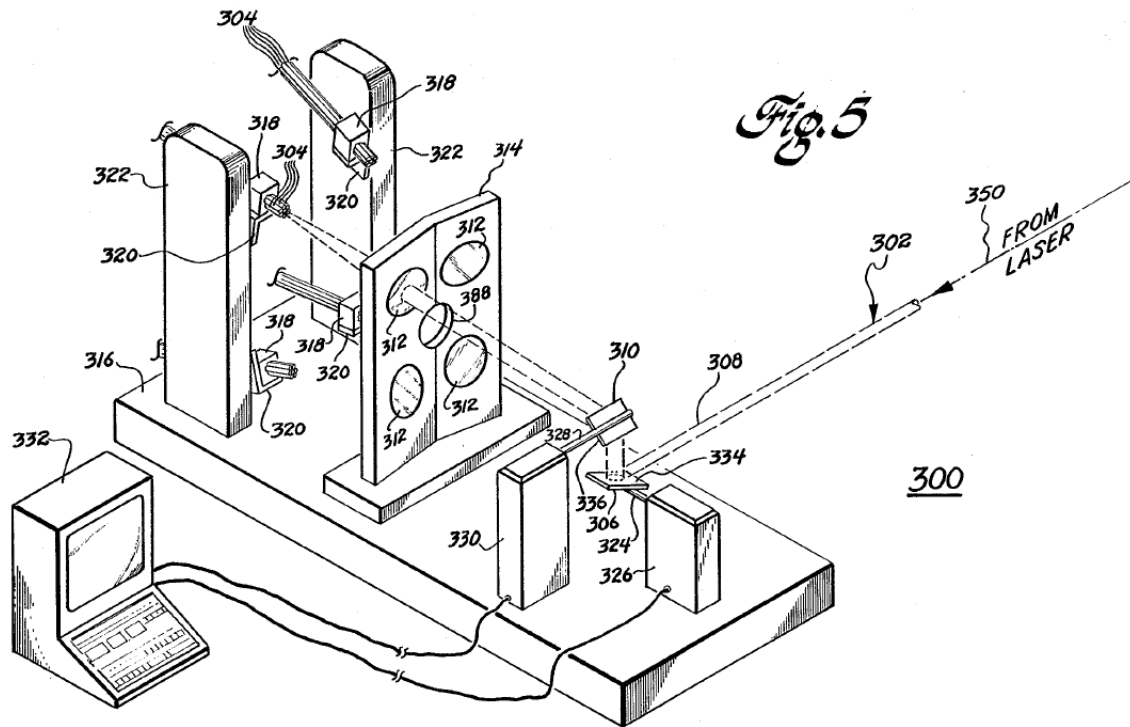


Figure 5 depicts laser beam directing system 300, which directs laser beam 302 into one of a plurality of optical fibers 304. The system comprises mirror 306, which reflects the beam onto second mirror 310. The beam reflects off mirror 310 onto one of four focusing lenses 312, which focuses the beam onto one of the optical fibers 304. *Id.* at 8:39–48. Computer 332 controls galvanometers 326 and 330, and, therefore, galvanometer shafts 324 and 328, which control mirrors 306 and 310, respectively. *Id.* at 8:64–9:5.

As described in Chande and depicted in Figure 9 (not shown here), galvanometer 326 provides an output 640 of an analog signal proportional to the angular position of shaft 324, and, therefore, mirror 306. *Id.* at Fig. 9; 3:57–60; 14:21–29. Output 640 is applied to first input of comparator 644, which “provides

an error signal representative of the difference between the actual and desired galvanometer positions, the error signal being amplified by an amplifier 648 and applied to drive galvanometer 326.” *Id.* at 14:21–35. Galvanometer 330, which controls mirror 310, similarly creates output 650 applied to comparator 654, which generates an error signal sent to galvanometer 330. *Id.* at 14:36–52.

2. Buchin (Ex. 1005)

Buchin describes an optical switch comprising a first light port, a second light port, a focusing system, a mirror, and a motor. Ex. 1005, 1:7–15; 3:31–38. The motor rotates the mirror, and the mirror reflects light from the first light port to a location outside the second light port. *Id.* at 3:38–46. Buchin teaches that “the preferred embodiment uses a galvanometer motor with a closed-loop, servo-controlled analog drive, which gives a higher speed and accuracy than a galvanometer motor with an open-loop analog drive.” *Id.* at 6:38–52.

Buchin presents Figure 6, reproduced below.

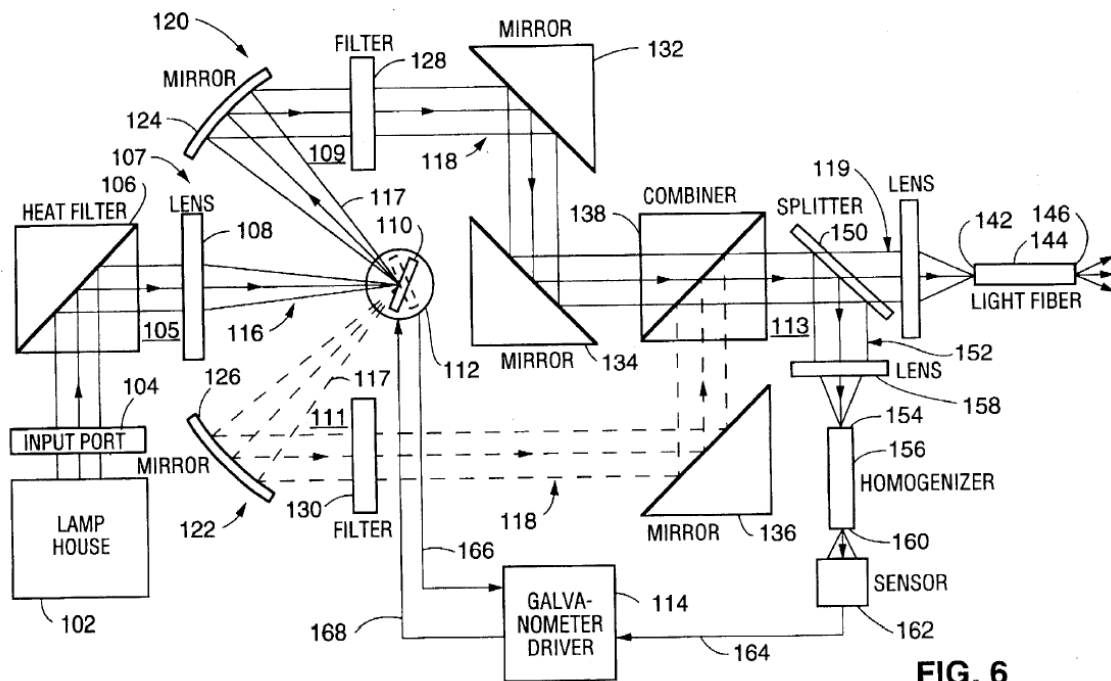


Figure 6 depicts an optical switch and “feedback arrangement to vary the angle of rotation of the mirror to control the relative intensity of the spectral bands of, and to reduce noise due to intensity fluctuations in, the combined light beam.” *Id.* at 5:31–37. Figure 6 depicts movable mirror 110, as well as mirrors 124 and 126 that reflect light reflecting from mirror 110. *Id.* at 9:39–48.

As described in Buchin, “[i]n response to the drive signal 168 from the galvanometer driver 114, the galvanometer 112, and hence the mirror 110, rotate about the axis to deflect the reflected light beam 117 at different angles.” *Id.* at 8:52–60. Buchin teaches that “feedback signal 166 provides information on the angle of rotation of the galvanometer motor 112, and hence of the mirror 110, to the galvanometer driver 114.” *Id.* at 8:61–65. In addition, feedback signal 166 “is fed to the galvanometer motor drive servo (not shown) in the galvanometer driver 114, which generates the galvanometer motor drive signal 168 to drive the galvanometer motor 112.” *Id.* at 12:64–13:3.

Buchin also describes “sensor 162 [that] delivers the electrical signal 164 to the galvanometer driver 114.” *Id.* at 12:51–53. Buchin teaches “[b]y comparing the electrical signal 164 from the sensor 162 with a reference voltage representing the desired intensity of the combined light beam, an intensity error signal can be generated.” *Id.* at 13:4–8. The intensity error signal is “used to modify the positional feedback signal 166 from the galvanometer motor 112,” thereby changing “operation of the galvanometer motor drive servo,” which leads to a change in the rotation of the mirror. *Id.* at 13:10–16. This system “enables the intensities of the spectral bands in the output light beam [] to be matched . . . and noise due to fluctuations in the light intensity of the light generated by the lamp house to be reduced.” *Id.* at 14:55–67; 13:16–25.

3. *Obviousness Based on Chande and Buchin*

Petitioner argues that Chande and Buchin are analogous art because they relate to the same field of endeavor (i.e., optical switching) and both are directed to coupling laser light to receptors with rotational reflective elements (e.g., mirrors). Pet. 22. Petitioner also points us to where Chande discloses every limitation recited in claims 112, 123, 124, 127, 129, 131, 133, and 134 of the '332 patent. *Id.* at 35–43. In relation to independent claims 112 and 123, Petitioner contends that “[t]o the extent that Chande does not disclose multiple sources in a single system,” it would have been obvious to an ordinary artisan to include “a plurality of sources as taught by Buchin into Chande to provide the capability of providing more than one type of laser to any of the workstations of Chande.” *Id.* at 21–22, 35–36, 38–39. In addition, Petitioner relies on Buchin as teaching the limitations recited in claims 130 and 132, which both ultimately depend from claim 123. *Id.* at 41–42.

Patent Owner responds that Chande and Buchin are “non-analogous art” to subject matter of the challenged claims, and those references are “not reasonably pertinent to the problem addressed” in the '332 patent. PO Resp. 37–42. In this regard, Patent Owner contends that Chande does not involve fiber optic switches used in the communications field, but rather “describes a switch used in manufacturing operations involving high powered neodymium:yttrium aluminum garnet (‘YAG’) lasers.” *Id.* at 37. Patent Owner argues that Chande “relates to ‘high power gas and solid state lasers’ used for energy intensive and destructive manufacturing operations such as ‘welding,’ ‘scribing information’ and ‘drilling.’” *Id.* Patent Owner contends that, by contrast, the '332 patent relates to the switching of laser communication signals that travel substantial distances, where “[d]elicate and minute MEMS mirror assemblies that direct the path of the optical communications beam accomplish the switching.” *Id.*

Patent Owner further argues that the Chande system differs from the system recited in the challenged claims because Chande discloses (1) a “single, locally located laser beam,” not fiber sources carrying communication signals; (2) “an individual source [] directed by a mirror or two mirrors to a plurality of output fibers or fiber bundles,” and not “a plurality of first moveable mirrors”; (3) a distribution system for delivering the optical power of a single laser to a plurality of locally located workstations, not a fiber-to-fiber switch; (4) a high power pulsed YAG laser light source operating at 1064 nm, not a communications laser operating at 1550 nm, such that “Chande’s switch will be different in material and design”; (5) a system that uses a laser power that is “approximately 400 Watts average power or 50 J/pulse, thousands of times more intense than the power of communication signals”; (6) output fibers that are fused silica fibers or fiber bundles, which are not used in the communications field; (7) “dielectric coated mirrors that provide high reflectivity without damage to the underlying substrate,” which are “not operable with MEMS mirrors which are fabricated by a monolithic silicon process”; (8) mirrors “positioned on galvanometer shafts, not fabricated by silicon micromachining”; and (9) a galvanometer control loop that receives no feedback regarding the current location of the optical beam. *Id.* at 38–39 (citing Ex. 2017, 53–57).

Regarding Buchin, Patent Owner argues that it relates to fluorescence microscopy, which “not from the same field of endeavor as the switching of optical communications beams.” *Id.* at 39–41. Patent Owner contends that the Buchin system differs from the system recited in the challenged claims because Buchin relates to: (1) “fluorescence microscopy and fluorescence excitation in other biomedical and industrial applications,” not optical communication; (2) providing a light source “unrelated to communication signals;” (3) an output coupling “to a

single receptor,” and not a plurality of first movable mirrors; (4) a “servo mechanism” directed to compensating intensity, and not alignment fluctuations; and (5) “low intensity per unit spectrum,” such that “the optical alignment requirements are much less stringent than those in the instant fiber communication applications.” *Id.* at 41–42 (citing Ex. 2017, 58–65).

Claims 112, 123, 124, 127, 129, 131, 133, and 134

As discussed above, we do not define “optical beam” to be limited to “optical beam used in communications,” as Patent Owner proposes. *Id.* at 7–15. The claims themselves do not recite “communications,” and the ’332 patent Specification does not indicate that “optical beam” is limited to the “communications” signal described by Patent Owner. Based on our claim construction, and upon review of the record before us, we are persuaded that Petitioner has shown by a preponderance of the evidence that Chande discloses every element recited in claims 112, 123, 124, 127, 129, 131, 133, and 134. For example, Petitioner points us to where Chande discloses “a plurality of first movable mirrors” “for directing said optical beam from at least one source to a selected one of the optical receptors” as recited in the independent claims, i.e., mirrors 306 and 310. Pet. 35–36, 38 (citing Ex. 1006, 8:39–41, 45–63, Fig. 5).

Petitioner also points us to where Chande discloses or at least suggests mounting mirrors “such that a plurality of first optical pathways are defined between the sources and the first movable mirrors,” as recited in the independent claims. Pet. 35–37, 38–39 (citing Ex. 1006, 8:39–63, Fig. 5). Specifically, in Figure 5 in Chande, movable mirrors 310 and 306 are mounted such that “optical pathways” exist, i.e., “are defined,” between “at least one source” of beam 302 and mirrors 306 and 310 (first movable mirrors). As shown in Figure 5, at least one optical pathway exists between the source of beam 302 and mirror 306, and at least

another optical pathway exists between mirror 306 and mirror 310. In addition, Petitioner points to where Chande discloses or at least suggests mounting mirrors “such that a plurality of second optical pathways are defined between the first movable mirrors and the receptors,” as also recited in the independent claims. Specifically, as also depicted in Figure 5 in Chande, movable mirrors 310 and 306 are mounted such that “optical pathways” exist between the mirrors and receptors, i.e., fibers 304, as beam 302 runs through focusing lenses 312. Ex. 1006, 8: 39–48; *see also id.* at Figure 1, 3:62–4:10 (describing mirror 106 reflecting incident portion 108 of beam 102 toward a different one of optical fibers 104).

We are not persuaded by Patent Owner’s contentions that Chande describes only “an individual source,” and does not describe “a plurality of first moveable mirrors.” PO Resp. 38. While claims 112 and 123 refer to a “system for transmitting an optical beam from any one of a complete set of sources” in the preamble, the body of each claim first mention “source” when it recites “at least one source to a selected one of the optical receptors,” and thereafter refers to “sources.” Thus, we do not construe the systems recited in the challenged claims to require more than one beam source. *See also* Pet. 21 (addressing “[t]o the extent that Chande does not disclose multiple sources in a single system”). In addition, as discussed above, Petitioner persuades us that Chande describes “a plurality of first moveable mirrors,” i.e., mirrors 310 and 306.

In addition, Petitioner explains where Chande discloses a “control for transmission of the optical beam from the source to a selected optical receptor,” as recited in the independent claims, i.e., digital computer 332, which controls the positions of galvanometer shafts 324 and 328, and mirrors 306 and 310. *Id.* at 37, 40 (citing Ex. 1006, 9:2–9).

Petitioner also points to where Chande discloses the “servo control” or “data gathering and transmission” element, as recited in independent claims 112 and 123, respectively. Pet. 37–38, 40. We are persuaded that galvanometers 326 and 330 provide a feedback signal regarding the current orientation of a controlled mirror (mirror 306 and 310) to the control (computer 332) for adjusting the position of the mirror “to minimize transmission loss of the optical beam to the optical receptor by fine tuning said orientation of said relevant controlled mirror based on said feedback signal,” as shown in Figures 5–7 and 9 of Chande, for example. *See also* Ex. 1006, 12:3–59 (describing that “[g]alvanometers 326 and 330 each feed back an analog position signal, on their respective outputs 420 and 422, to the galvanometer driver [408],” and that “[s]ignal conditioner 402 is coupled to receive the position acknowledge signal generated by the galvanometer driver,” and “condition signals being provided to computer 332,” which itself generates a signal that directs the galvanometer driver to cause the galvanometer to orient a mirror). We are not persuaded by Patent Owner’s contention that “the galvanometer control loop [in Chande] receives no feedback regarding the current location of the optical beam.” PO Resp. 39. Instead, we are persuaded that the “the galvanometer control loop” in Chande receives “feedback” (*id.*) regarding the current orientation of the controlled mirror.

Moreover, nearly all differences that Patent Owner asserts between the claimed subject matter and the subject matter of Chande, as discussed above, appear to rely on elements not recited in the claims, such as communication signals, and certain types of fibers, light sources, and power strength used in field of fiber optic communication. As noted above, the challenged claims are not limited to switching system of optical communications beams, or require specific components or beams relevant to fiber communication applications, as asserted by

Patent Owner. Thus, Patent Owner does not persuade us that Chande fails to describe the elements of claims 112 and 123 as properly construed.

Petitioner also explains where Chande describes other elements recited in dependent claims 124, 127, 129, 131, 133, and 134. Pet. 40–43. For example, regarding claim 127, Petitioner has shown by a preponderance of the evidence that Chande discloses a data gathering and transmission element, i.e., galvanometers 326 and/or 330 (as shown in Fig. 9), that are adjacent, i.e., near to, mirrors 306 and 310, respectively (as shown in Fig. 5). *Id.* at 59. Based on our review of the evidence and arguments in the Petition, we are persuaded that Petitioner shows by a preponderance of the evidence that claims 112, 123, 124, 127, 129, 131, 133, and 134 would have been obvious over Chande alone.

Claims 130 and 132

Claim 130, which depends from independent claim 123, requires “a stationary mirror for folding the path of the optical beam.” In addition, claim 132, which depends from claim 131, and ultimately from claim 123, requires a “focusing lens [] disposed between a source and one of the first movable mirrors.” Petitioner relies on Buchin as disclosing the elements of those claims. Pet. 41–42.

We are not persuaded that Chande and Buchin are non-analogous art to each other because, as Petitioner points out, both references are directed to optical switching and coupling of laser light to receptors with rotational reflective elements. *Id.* at 22. We still address, however, whether one of ordinary skill in the art would have had reason to combine the elements disclosed in Chande and Buchin when making the optical switch of claims 130 and 132.

In relation to a reason to combine elements disclosed in the two references, Petitioner only contends that a “person having ordinary skill in the art would have been motivated to include switching of multiple sources as taught by Buchin into

Chande” because “inclusion of additional sources would have been use of a known technique to improve a similar device, the combination would have been predictable, and the combination could be accomplished using known methods to yield predictable results.” *Id.*

As an initial matter, we note that Petitioner cites no evidence, such as a declaration from an expert witness, in support of those contentions. *Id.* In any event, Petitioner does not explain sufficiently how, or show by a preponderance of the evidence why, one would have added a stationary mirror or focusing lens “disposed between a source and one of the first movable mirrors,” as Petitioner contends is disclosed in Buchin, to the system described in Chande. Petitioner’s assertion that “inclusion of additional sources” would have been predictable or accomplished does not explain, nor provide evidence, as to why one would have included an additional stationary mirror or a focusing lens in a different location, i.e., elements that differ from “additional sources,” in the optical switch of Chande. *Id.*; see also Reply 12 (stating only that Chande and Buchin are both in the field of optical switching, and Patent Owner’s “attempts to read limitations from the specification into the claims is improper”).

Thus, we are not persuaded that Petitioner shows by a preponderance of the evidence that an ordinary artisan would have included a stationary mirror, or focusing lens “disposed between a source and one of the first movable mirrors,” as recited in challenged claims 130 and 132 and Petitioner contends are disclosed in Buchin, in the optical switch disclosed in Chande.

Summary—Chande and Buchin

For the reasons given above, and in light of the record before us, Petitioner has shown by a preponderance of the evidence that claims 112, 123, 124, 127, 129, 131, 133, and 134 of the ’332 patent would have been obvious over Chande.

Petitioner has not shown by a preponderance of the evidence, however, that claims 130 or 132 would have been obvious over Chande alone, or in view of Buchin.

D. Obviousness over Young and Hurst

Petitioner argues that claims 112, 123–126, 129, and 131–134 of the '332 patent would have been obvious over Young in view of Hurst. Pet. 22–24, 43–52; Dec 24–25. As discussed above, Young and Hurst both constitute § 102(e) prior art.

1. Young (Ex. 1004)

Young describes an optical switching system with a plurality of optical input ports. Ex. 1004, Abstract, Figs. 1, 7, and 10. The disclosed optical switch directs a light beam traveling along an input beam path into an optical output port. *Id.* at 3:60–67; 6:18–36. A reproduction of Figure 10 of Young is presented below.

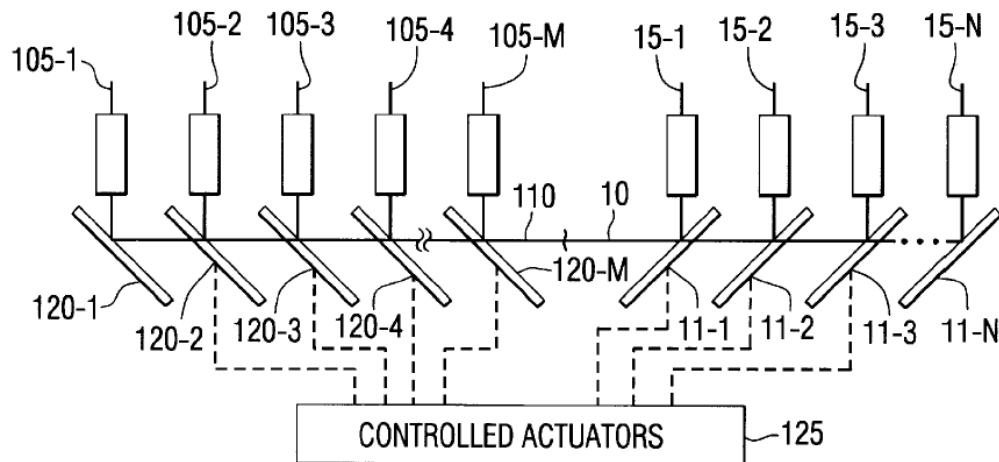


FIG. 10

Figure 10 illustrates diagrammatically an embodiment of an optical switch. In this system, a “set of controlled actuators 125 selectively displaces the mirrors 120 of the Mx1 front end and the mirrors 11 of the 1xN rear end to provide the input/output beam port connectivity.” *Id.* at 7:54–64; *see also* Abstract.

2. Hurst (Ex. 1007)

Hurst describes directing light transmitted from an optical fiber to a respective optical head using a “micro-machined” optical switch that uses a steerable mirror. Ex. 1007, 3:2–18. Embodiments depicted in Figures 7 and 8 of Hurst disclose “a linearly polarized diode laser source 231 operating in a visible or near ultraviolet frequency region” that directs outgoing laser beam 191 to optical switch 104. *Id.* at 9:52–58; 9:67–10:3. Figure 8 in Hurst is reproduced below.

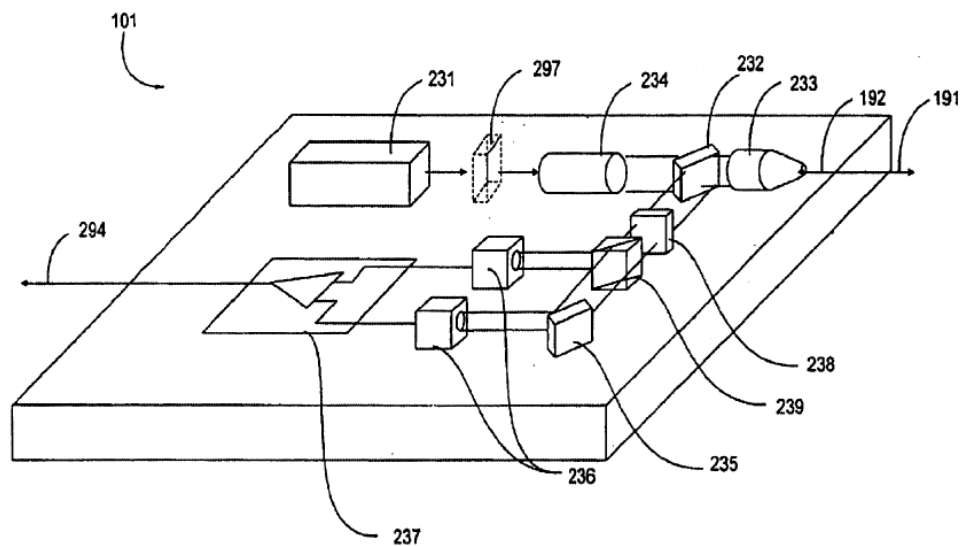


FIG. 8

Figure 8 shows laser optic assembly 101, which provides outgoing laser beam 191 to, and receives reflected laser beam 192 from, optical switch 104 (shown in Figure 7). In relation to both Figures 7 and 8, Hurst describes that reflected laser beam 192 is directed by optical switch 104 to lens 233 and routed by beam splitter 232 to a “differential detector” (not shown in the figures), which “measures the optical power in two orthogonal polarization components of the reflected laser beam 192.” *Id.* at 10:5–17. Based on this measurement, the detector creates “a differential signal” that “is processed by the differential amplifier 237 and is output as signal 294,” as depicted in Figure 8. *Id.* at 10:12–21.

Hurst also presents Figure 16, which is reproduced below.

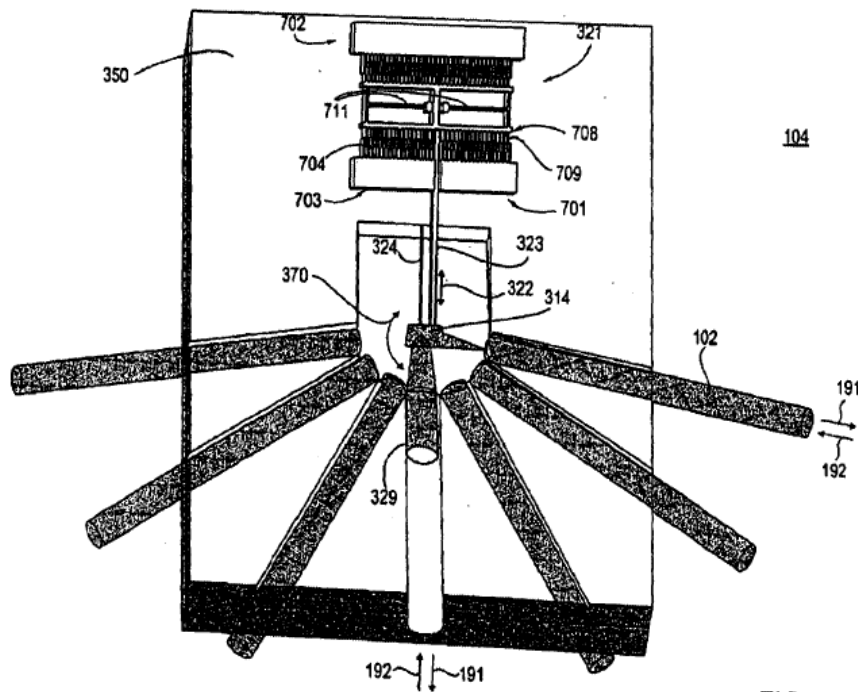


FIG. 16

Figure 16 depicts details of optical switch 104 (of Figure 7), which provides a switch between laser-optics assembly 101 and optical fibers 102. *Id.* at 18:9–16. Optical switch 104 comprises micro-motor 321, micro-mirror 314, and GRIN lens 329. *Id.* at 18:15–18, 34–38. As explained in Hurst, outgoing laser beam 191 is directed through GRIN lens 329, and reflected by mirror 314. *Id.* at 18:33–41. The angular position of micro-mirror 314 is controlled by micro-motor 321, and outgoing laser beam 191 is focused by GRIN lens 329 to one end of fiber 102 through mirror 314. *Id.* at 18:42–65.

Hurst further describes that “[coarse] and/or fine alignment signals representative of misalignment of outgoing laser beam 191 to the PM optical fiber 102 may be applied to move the micro-motor 321 and the micro-mirror 314 relative to the support portion so as to maintain fine alignment of the outgoing laser beam 191.” *Id.* at 19:63–20:1. Hurst states that “fine alignment signals may

be obtained by measuring an amplitude of the reflected laser beam 192,” and such signals may be “applied as a closed loop feedback signal so as to maintain fine alignment.” *Id.* at 20:1–7.

3. Obviousness Based on Young and Hurst

Petitioner argues that Young and Hurst are analogous art because they relate to the same field of endeavor (i.e., optical switching) and are directed to coupling laser light to one of a plurality of receptors. Pet. 23. Petitioner further argues that Young discloses every element recited in claims 112, 123–126, 129, and 131–134, except that the reference does not disclose the “servo control” or “data gathering and transmitting” element of independent claims 112 and 123, respectively. *Id.* at 47, 49–50. Petitioner relies on Hurst for the teaching of those elements.

Regarding the “servo control” and “data gathering and transmission” elements recited in the independent claims, Petitioner contends that “Hurst discloses determining the angular position of mirror 314 by electric potential applied to motor 321 and obtaining alignment signals by using a look-up table of pre-calibrated values by measuring an amplitude of beam 192, the alignment signals applied as a feedback loop.” Pet. 47, 49–50 (citing Ex. 1007, 10:3–17; 18:52–58; 20:1–8). In its citation to Hurst, Petitioner points to Hurst’s disclosure of using beam splitter 232 to route laser beam 192 to a differential detector, which creates a “differential signal,” which “is processed by the differential amplifier 237 and is output as signal 294.” Ex. 1007, 10:3–21. As discussed in our Decision to Institute (Dec. 25), we are persuaded that the differential detector in Hurst acts as the recited servo control and data gathering and transmission elements by:

- (1) receiving reflected laser beam 192 from optical switch 104;
- (2) “measur[ing] the optical power in . . . components of the reflected laser beam 192” (Ex. 1007, 10:5–17); and
- (3) generating signal 294, which corresponds to “*alignment signals*

representative of misalignment of outgoing laser beam 191” (*id.* at 19:63–65; 10:13–21) (emphasis added). Hurst also describes that such alignment signals may be applied to move mirrors “so as to maintain fine alignment of the outgoing laser beam 191 to the core of the PM optical fibers 102.” Ex. 1007, 19:63–20:1.

In response, Patent Owner does not dispute what Young or Hurst discloses, but argues that neither of those references qualify as prior art. PO Resp. 31–32. As discussed above, we conclude that Young and Hurst both qualify as prior art under 35 U.S.C. § 102(e).

Patent Owner further contends, however, that Hurst and Young are not analogous art. Patent Owner contends that, unlike Young, Hurst does not “involve switching in the fiber optic communications field of endeavor,” but instead “relates to the use of micro-machined elements to deliver read/write signals to and from a local optical data storage systems.” *Id.* at 46. Citing Dr. Smith’s Declaration in support, Patent Owner contends that the Hurst’s embodiments differ in a number of ways from the fiber optic communications switch described in Young. *Id.* at 46–47 (citing Ex. 2017, 76).

For instance, Patent Owner contends that the “optics in Hurst has polarization-maintaining fibers and uses shorter wavelengths that change substantially the optical design and the components, such as optical coatings.” *Id.* at 46. Patent Owner contends, citing Dr. Smith’s testimony, that because “Hurst does not teach a communications-grade fiber switch, how to monitor intensity of the transmitted signal or how to close a fine alignment loop, adding Hurst to Young (which does not disclose stabilization at all) leaves the combination lacking enablement.” *Id.* (citing Ex. 2017, 76, ¶¶ 196–197). Thus, Patent Owner indicates that, in view of differences in design and component in the systems of Young and Hurst, an ordinary artisan would not have known how to add the feedback element

(differential detector) of Hurst to the Young switch system and get it to work, i.e., it would have left “the combination lacking enablement.” *Id.*

We are not persuaded that Young and Hurst are non-analogous art because, as Petitioner points out, both references describe optical switching and are directed to coupling laser light to one of a plurality of receptors. Pet. 23. Patent Owner’s contentions still are relevant, however, to the issue of whether one of ordinary skill in the art would have had reason to combine the elements disclosed in Young and Hurst when making an optical switch.

In this regard, Petitioner argues that a “person having ordinary skill in the art would have been motivated to combine Young and Hurst for the benefit of ensuring that an output laser is optimally aligned to prevent signal-to-noise degradation.” *Id.* Petitioner also contends that “including alignment of a laser as taught by Hurst into Young would be a use of a known technique to improve a similar device in the same way, and the combination would have been predictable and accomplished using known methods to yield predictable results.” *Id.* at 23–24. Petitioner also asserts that the combination of elements would have been obvious “to finely position output light within the output path.” *Id.* at 47, 49–50.

Petitioner cites no evidence, such as a declaration from an expert witness, in support of those contentions, however, especially in relation to the differential detector (servo control or data gathering and transmission element) in Hurst. *Id.* Moreover, Petitioner does not explain sufficiently how, or why, an ordinary artisan would have added that element of Hurst to the optical switch of Young, or would have been using a “known technique to improve a similar device in the same way,” or it “would have been predictable and accomplished using known methods to yield predictable results.” *Id.* at 23–24. By contrast, as discussed above, Patent Owner explains, citing evidence in support, i.e., Dr. Smith’s Declaration, that one

reading the two references would have understood that the two disclosed systems differed enough, such that it would not have been straightforward or “predictable” to combine elements.

We conclude that Petitioner does not address adequately in its Petition, nor respond sufficiently in its Reply to Patent Owner’s Response, contentions raised by Patent Owner in this regard, or in cited testimony by Dr. Smith. At most, Petitioner contends in its Reply that independent claims 112 and 123 of the ’332 patent do not recite elements identified by Patent Owner as deficient in Hurst, and that Patent Owner’s “attempts to read limitations from the specification into the claims is improper.” Reply 13–14. We are not persuaded that Petitioner shows by a preponderance of the evidence that an ordinary artisan would have included the “servo control” or “data gathering and transmission” element recited in independent claims 112 and 123, respectively, in the optical switch disclosed in Young based on the teachings in Hurst or Young.

For the reasons given above, and in light of the record before us, Petitioner has not shown by a preponderance of the evidence that claims 112, 123–126, 129, and 131–134 of the ’332 patent would have been obvious over Young in view of Hurst.

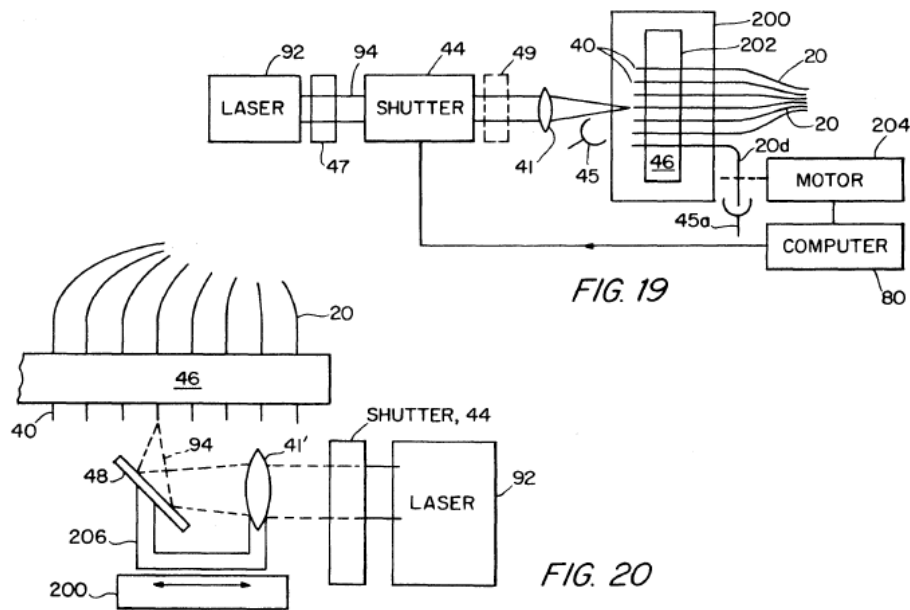
E. Obviousness over Young and Kittrell

Petitioner contends that claims 112, 123, 124, 127–129, and 131–134 of the ’332 patent would have been obvious over Young in view of Kittrell. Pet. 24–25, 54–61; Dec. 27–29. Young constitutes § 102(e) prior art, while Kittrell constitutes § 102(b) prior art. We discuss Young above.

1. Kittrell (Ex. 1008)

Kittrell describes a system “in which optical fibers are provided within a catheter and laser radiation is directed through the fibers.” Ex. 1008, 1:13–15.

Figures 19 and 20 in Kittrell are reproduced below.



Figures 19 and 20 depict different embodiments of a “linear array fiber selector system.” *Id.* at 7:16–19.

Figure 19 shows a system comprising laser 92, lens 41, photodiode 45, computer 80, and motor 204, which moves fiber array 46 to a position in front of the laser. *Id.* at 17:10–31, 60–67. As taught in Kittrell, “photodiode 45 mounted near the input ends 40 of the optical fibers 20 can detect scattered light,” where “[m]inimum scattered light indicates the best alignment.” *Id.* at 17:60–63. Kittrell discloses that a signal from photodiode 45 can be coupled to computer 80 to impact motors 204 to move fibers to “optimize the coupling of laser light 94 into the input ends 40” and “provid[e] feedback to computer 80 for small corrections in optical fiber array 46 position.” *Id.* at 17:63–18:2.

In Figure 20, “the light beam is moved by the translator 200, rather than the fibers 20.” *Id.* at 18:35–38. Fibers are “selected by moving a mirror 48 which is mechanically fixed in holder [206] in spaced relation to lens 41’.” *Id.* at 18:38–41. Movement of the holder, and therefore mirror, is controlled by a computer driven motorized system. *Id.* at 18:42–44.

2. Obviousness Based on Young and Kittrell

Petitioner argues that Young and Kittrell are analogous art because they both discuss fiber selection and routing, and are directed to coupling laser light to one of a plurality of receptors. Pet. 25. Petitioner further argues that Young discloses every element recited in the challenged claims, except that the reference does not disclose the “servo control” or “data gathering and transmitting” element recited in independent claims 112 and 123, respectively. *Id.* at 24–25, 56–57, 59. Petitioner relies on Kittrell for these elements, noting that Kittrell discloses photodiode 45 mounted near input ends of fibers, which receives and provides signals that are coupled to computer 80 to control motor operation. *Id.* (citing Ex. 1008, 17:60–18:9).

Petitioner contends it would have been obvious “to combine Young and Kittrell as claimed for the benefit of ensuring that an output laser is optimally aligned with the output fibers for maximum power transmission.” *Id.* at 25. Petitioner also contends that “the addition of alignment of a laser as taught by Kittrell into Young would be a use of a known technique to improve a similar device in the same way operation of the combination of known devices would have been predictable,” and thus, “combining the prior art elements could be accomplished using known methods to yield predictable results.” *Id.*

Patent Owner responds by stating that Young does not qualify as prior art. PO Resp. 31–32. In addition, Patent Owner contends that Young and Kittrell are

non-analogous art because “[w]hile Young does involve switching in the fiber optic communications field of endeavor, Kittrell does not.” *Id.* at 47, 44–45. In this regard, Patent Owner contends that in Kittrell involves: (1) moving fibers, not the mirror, in response to feedback provided to computer 80; (2) different wavelengths of operation, a local laser source, and use of a single mirror; and (3) a mirror that is “mechanically fixed” in its holder, where the “holder moves along a linear rail, [and] the mirror only moves in accordance with the holder.” *Id.* at 44–45.

Patent Owner also contends that “Kittrell discloses devices in which optical fibers are placed within a catheter, and laser radiation is directed through the fibers for medical applications, including diagnosis and removal of arterial or vascular obstructions,” and therefore, it would not be obvious to combine the teachings of Young and Kittrell. *Id.* at 47 (citing Ex. 2017, 82). In addition, Patent Owner contends “Kittrell does not disclose feedback for mirror position control to optimize mirror or beam alignment,” but instead “discloses a fixed optical mirror system and movement of the output fibers to fine-tune alignment using scattered light as an indicator of alignment.” *Id.* at 48.

In its Reply, Petitioner responds that Patent Owner relies on limitations in the claims that “are not required or recited in claims 112 and 123 of the ’332 patent.” Reply 13.

We disagree. Independent claims 112 and 123 each require a “servo control” or “data gathering and transmitting” element, respectively “for use in providing a feedback signal regarding the current orientation of the controlled mirror or the current location of the optical beam to the control, in either case *for the purpose of adjusting the position of the relevant controlled mirror . . . by fine tuning said orientation of said relevant controlled mirror* based on said feedback

signal.” Ex. 1001, 22:8–16, 23:24–33 (emphasis added). We are persuaded by Patent Owner’s contentions that Kittrell teaches moving fibers, not a mirror, in response to the feedback signal provided to computer 80.

At most, Petitioner points us to “Kittrell at Col. 17:60-18:9.” Pet. 56–57, 59. As disclosed therein in Kittrell, the “signal from the photodiode 45 can be coupled to the computer 80 to cause the computer to overload the motors 204 *to reposition the fibers* to optimize the coupling of laser light 94 into the input ends 40,” and can provide “feedback to computer 80 for *small corrections in optical fiber array 46 position*.” Ex. 1008, 17:60–18:2 (emphasis added). Thus, Petitioner does not point us to where Kittrell teaches, nor explain how that reference (or Young) suggests, a feedback signal provided to a control “for the purpose of adjusting the position of the relevant controlled mirror . . . by fine tuning” the orientation of the mirror, as required in independent claims 112 and 123.

Thus, we are not persuaded that Petitioner shows by a preponderance of the evidence that an ordinary artisan would have included the “servo control” or “data gathering and transmission” element, as recited in independent claims 112 and 123, respectively, in the optical switch disclosed in Young based on the teachings in Kittrell or Young.

For the reasons given above, and in light of the record before us, Petitioner does not present sufficient evidence to support a conclusion that claims 112, 123, 124, 127–129, and 131–134 of the ’332 patent would have been obvious over Young in view of Kittrell.

F. Patent Owner’s Motion to Amend

Patent Owner moves to substitute claims 135 and 136 for challenged independent claims 112 and 123, respectively, assuming we find claims those unpatentable. Motion 1. As stated above, we determine that Petitioner has

demonstrated by a preponderance of the evidence that challenged claims 112 and 123 are unpatentable. Thus, Patent Owner's Motion to Amend is before us for consideration. For the reasons set forth below, Patent Owner's Motion to Amend is denied.

Proposed substitute claims 135 and 136 are each independent claims.

Proposed substitute claims 135 and 136 are reproduced as follows:

135. (substitute for claim 112) A ~~an~~ fiber optical beam communications switching system for transmitting an optical communications beam from any one of a complete set of fiber sources of said switching system to any one of a complete set of fiber optical receptors of said switching system comprising:

a plurality of first movable mirrors for directing said optical communications beam from at least one fiber source to a selected one of the fiber optical receptors, said plurality of first movable mirrors mounted across a first area of free space from the fiber sources such that a plurality of first optical pathways are defined between the fiber sources and the first movable mirrors, said first movable mirrors comprising substantially a complete set of movable mirrors included in said switching system for directly interfacing with said sources free from any intervening movable mirrors and said first optical pathways comprising substantially a complete set of pathways included in said switching system between said sources and said first movable mirrors, said plurality of first movable mirrors further mounted across a second area of free space from the fiber optical receptors such that a plurality of second optical pathways are defined between the first movable mirrors and the fiber optical receptors, the second optical pathways comprising substantially a complete set of pathways included in said switching system between the first movable mirrors and the fiber optical receptors;

said sources, first movable mirrors and fiber optical receptors being configured such that there is a first three dimensional region that is traversed by at least most of said second pathways and at least most of said first pathways are located wholly outside said first region;

a control for transmission of the optical communications beam from the fiber source to a selected fiber optical receptor by means of controlling a controlled mirror, by causing one of the first movable mirrors to direct the optical communications beam to a selected fiber optical receptor; and

a servo control element for use in providing a feedback signal regarding ~~the current orientation of the controlled mirror~~ or the current location of the optical communications beam to the control, in either case for the purpose of adjusting the position of the relevant controlled mirror to minimize transmission loss of the optical communications beam to the fiber optical receptor by fine tuning said orientation of said relevant controlled mirror based on said feedback signal[.]

136. (substitute for claim 123) A fiber optical beam communications switching system for transmitting an optical communications beam from any one of a complete set of fiber sources of said switching system to any one of a complete set of fiber optical receptors of said switching system comprising:

a plurality of first movable mirrors mounted across a first area of free space from the fiber sources and across a second area of free space from the fiber optical receptors, for directing said optical communications beam from at least one fiber source to a selected one of the fiber optical receptors, said plurality of first movable mirrors mounted across a first area of free space from the fiber sources such that a plurality of first optical pathways are defined between the fiber sources and the first movable mirrors, said first movable mirrors comprising substantially a complete set of movable mirrors included in said switching system for directly interfacing with said sources free from any intervening movable mirrors and said first optical pathways comprising substantially a complete set of pathways included in said switching system between said sources and said first movable mirrors, said plurality of first movable mirrors further mounted across a second area of free space from the fiber optical receptors such that a plurality of second optical pathways are defined between the first movable mirrors and the fiber optical receptors, the second optical pathways comprising substantially a complete set of pathways included in said

switching system between the first movable mirrors and the fiber optical receptors;

said sources, first movable mirrors and fiber optical receptors being configured such that there is a first three dimensional region that is traversed by at least most of said second pathways and at least most of said first pathways are located wholly outside said first region;

a control for transmission of the optical communications beam from the fiber source to a selected fiber optical receptor by means of controlling a controlled mirror, by causing one of the first movable mirrors to direct the optical communications beam to a selected fiber optical receptor; and

a data gathering and transmitting element for use in providing a feedback signal regarding ~~the current orientation of the controlled mirror or~~ the current location of the optical communications beam to the control, in either case for the purpose of adjusting the position of the relevant controlled mirror to minimize transmission loss of the optical communications beam to the fiber optical receptor by fine tuning said orientation of said relevant controlled mirror based on said feedback signal.

Motion 1–4 (underlining added by Patent Owner to show added features, and strike-through added to show deleted features).

A motion to amend claims in an *inter partes* review is not, itself, an amendment. As the moving party, Patent Owner bears the burden of proof to establish that it is entitled to the relief requested. 37 C.F.R. § 42.20(c). Thus, Patent Owner’s proposed substitute claims are not entered automatically, but only upon Patent Owner having demonstrated by a preponderance of the evidence the patentability of those substitute claims. *See, e.g.*, 37 C.F.R. § 42.1(d) (noting that the “default evidentiary standard [in proceedings before the Board] is a preponderance of the evidence”).

1. Claim Construction

Claim construction is an important step in a patentability determination. *Oakley, Inc. v. Sunglass Hut Int'l*, 316 F.3d 1331, 1339 (Fed. Cir. 2003). Thus, a motion to amend claims must identify how the proposed substitute claims are to be construed, especially when the proposed substitute claims introduce new claim terms. *See Idle Free Sys., Inc. v. Bergstrom, Inc.*, Case IPR2012-00027, slip op. at 7 (PTAB June 11, 2013) (Paper 26).

In its Motion to Amend, Patent Owner introduces three new claim terms—i.e., “communications,” “fiber,” and “fiber optical”—in its proposed substitute claims. Patent Owner argues that those claim features distinguish the proposed substitute claims from the prior art. *See, e.g.*, Motion 11–14. Patent Owner does not provide, however, adequate claim constructions or explanations for how the new claim terms should be construed. For example, in relation to the term “communications,” Patent Owner offers, at most, that the addition of this term means that the recited subject matter “involve[s] switches only in the fiber optic communications field of endeavor,” and that the term identifies claimed components as “related to a fiber optic switching device that switches optical beams containing communications signals.” *Id.* at 5, 11–12.

Simply referring to the terms “communications,” “fiber,” and “fiber optic” in the Motion to Amend does not define adequately an ordinary and customary meaning of “communications,” as would be understood by one of ordinary skill in the art in the context of the Specification (which itself does not define “communications”). Ex. 1001, 1:11–14 (presenting the one time the term “communication” is used in the ’332 patent Specification). During the oral hearing, Patent Owner’s counsel, upon questioning, proposed that “communication” means “a beam of light, with a frequency around approximately

1500 nanometers.” Paper 39, 47:4–13. The Motion to Amend, however, does not suggest such a claim construction, nor refer to any evidence, e.g., a dictionary or scientific definition, in support. Moreover, as discussed during the oral hearing, it is not clear from the record if “communication” might mean simply “transmission of information,” a definition not limited to a beam of light at 1500 nm. *Id.* at 53:14–55:18.

Without a reasonable construction of the new claim features added by the proposed substitute claims, Patent Owner’s Motion does not provide adequate information for us to determine whether its proposed substitute claims are patentable over the prior art generally. Thus, we are not persuaded that Patent Owner has met its burden to demonstrate patentability of the proposed substitute claims under 37 C.F.R. § 42.20(c).

2. *Written Description Support*

A motion to amend claims must identify clearly the written description support for each proposed substitute claim. 37 C.F.R. § 42.121(b). The written description test is whether the original disclosure of the application relied upon reasonably conveys to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter as of the filing date. *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). Thus, the motion should account for the claimed subject matter as a whole, i.e., the entire proposed substitute claim, when showing where there is sufficient written description support for each claim feature. *See Nichia Corp. v. Emcore Corp.*, Case IPR2012-00005, slip op. at 4 (PTAB June 3, 2013) (Paper 27).

In both substitute claims, Patent Owner proposes to delete “the current orientation of the controlled mirror” so that the claim requires that the “servo control” or “data gathering and transmission” element provides “a feedback signal

regarding the current location of the optical communications beam to the control . . . for the purpose of adjusting the position of the relevant controlled mirror to minimize transmission loss of the optical communications beam to the fiber optical receptor by fine tuning” the orientation of the mirror based on the feedback signal. In written description support, Patent Owner cites the ’332 patent, as issued (Ex. 1001), at column 1, line 58–column 2, line 13, and column 5, lines 40–50. Motion 8.

As an initial matter, we note that Patent Owner does not direct us to support in the original disclosure of the application as-filed, as required under 37 C.F.R. § 42.121(b)(1) (stating that a motion to amend claims must include a claim listing setting forth “support in the original disclosure of the patent”). Even considering the ’332 patent as issued, however, the disclosure identified by Patent Owner does not point us to adequate written description support for an element that provides “a feedback signal regarding the current location of the optical communications beam to the control.” Instead, the disclosure identified by Patent Owner provides written description support for an element providing a feedback signal regarding the current orientation of the controlled mirror. See Opp. 3–4, 5–6.

For example, column 1, line 58–column 2, line 13, of the ’332 patent describes that “LED’s provide signals for controlling the position of the movable mirror,” and that the LEDs “accurately locate the mirror relative to one another for proper control of mirror movement.” Ex. 1001, 1:62–2:17. That passage in the ’332 patent does not describe LEDs identifying the current location of the light beam. In addition, the sentence at column 2, lines 9–13, describes how a “mirror is disposed in alignment with the fiber for reflecting an optical signal from the fiber to the movable mirror,” but again does not describe identifying the current location of the optical signal. *Id.* at 2:13–17. Likewise, column 5, lines 40–50, describes

how LEDs provide radiation “associated with the first movable mirror,” but does not mention identifying the current location of the optical signal/light beam. *Id.* at 5:40–50.

We note that in its Reply in support of its Contingent Motion to Amend, Patent Owner points out for the first time that the ’332 patent teaches that “[t]he control system [of the ’332 Patent] can be similar to that described in U.S. Pat. No. 5,177,348,” (“the ’348 patent”) (Ex. 2009). Reply to Opp. 2 (citing Ex. 1001, 1:25–31; 5:40–50; 7:65–8:5). Patent Owner then argues that the ’348 patent describes the use of “Radiation Emitting Devices (‘RED’s’) to detect the location of the optical communications beam and provide feedback to a servo controlled, piezoelectric fiber bender.” *Id.* (citing Ex. 2009).

In making what is essentially an incorporation by reference argument regarding REDs disclosed in the ’348 patent, Patent Owner only cites to “Exhibit 2009,” i.e., the ’348 patent generally, without providing any specific citations to the reference, or where it might disclose REDs that detect a location of an optical beam and provide a feedback signal. *Id.*

Similarly, the ’332 patent itself, in the passages cited by Patent Owner, only refers to the ’348 patent generally, without providing any specific citations. Reply to Opp. 2 (citing Ex. 1001, 1:25–31; 5:40–50; 7:65–8:5). *See Zenon Environmental, Inc. v. U.S. Filter Corp.*, 506 F.3d 1370, 1378 (Fed. Cir. 2007) (stating that to “incorporate material by reference, the host document must identify with detailed particularity what specific material it incorporates and clearly indicate where that material is found in the various documents”) (quoting *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000)). We cannot tell, for example, if the cited passages in the ’332 patent Specification, citing the ’348 patent, might refer to “control system 100,” i.e., the

“control” limitation recited in the challenged claims. *See, e.g.*, 1001, 1:25–31 (referring to a “controlling the fiber positioning means”); 5:40–50 (describing “control 100” and that the “position of the associated movable mirror of the selected fiber is adjusted”); 7:65–8:5 (stating that the “control system can be similar to that described in U.S. Pat. No. 5,177,348, as discussed above”).

Thus, we are not persuaded that Patent Owner has demonstrated by a preponderance of the evidence that its Motion to Amend sets forth adequate written description support for each proposed substitute claim as required by 37 C.F.R. § 42.121(b)(1) and § 42.121(b)(2).

III. CONCLUSION

For the foregoing reasons, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 112, 123, 124, 127, 129, 131, 133, and 134 of the ’332 patent would have been obvious over Chande. We are not persuaded, however, that Petitioner has demonstrated by a preponderance of the evidence that: (1) claims 130 and 132 of the ’332 patent would have been obvious over Chande in view of Buchin; (2) claims 112, 123–126, 129, and 131–134 would have been obvious over Young in view of Hurst; or (3) claims 112, 123, 124, 127–129, and 131–134 would have been obvious over Young in view of Kittrell. Petitioner has not demonstrated by a preponderance of the evidence that challenged claims 125, 126, 128, 130, or 132 of the ’332 patent are unpatentable based on the grounds before us.

In addition, for the reasons discussed above, Patent Owner has not, in its Motion to Amend, satisfied its burden of proof.

IV. ORDER

Accordingly, it is

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 112, 123, 124, 127, 129, 131, 133, and 134 of the '332 patent are *unpatentable*; and

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied*; and

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

For PETITIONER:

Kimberly Nobles
John Teresinski
Jan Weir
Sara Kerrane
kim.nobles@klgates.com
john.teresinski@klgates.com
jan.weir@klgates.com
sara.kerrane@klgates.com

For PATENT OWNER:

A. Justin Poplin
jpoplin@lathropgage.com

