

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PANDUIT CORP.,
Petitioner,

v.

CCS TECHNOLOGY, INC.,
Patent Owner.

Case IPR2017-01375
Patent 6,869,227 B2

Before JONI Y. CHANG, JENNIFER S. BISK, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

GALLIGAN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a)

I. INTRODUCTION

In this *inter partes* review, Panduit Corp. (“Petitioner”) challenges the patentability of claims 6, 7, and 11 of U.S. Patent No. 6,869,227 B2 (“the ’227 patent”), which was assigned to CCS Technology, Inc. (“Patent Owner”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* review. For the reasons discussed below, we determine that Petitioner has proven by a preponderance of the evidence that claims 6, 7, and 11 of the ’227 patent are unpatentable. *See* 35 U.S.C. § 316(e) (“In an *inter partes* review instituted under this chapter, the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence.”).

A. Procedural History

On May 5, 2017, Petitioner requested *inter partes* review of claims 6, 7, and 11 of the ’227 patent. Paper 2 (“Pet.”). Patent Owner filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). We instituted trial on all grounds of unpatentability, which are as follows:

1. Whether claim 6 is unpatentable under 35 U.S.C. § 103(a) as having been obvious over Toyooka,¹ Eichenberger,² and Giebel;³
2. Whether claim 7 is unpatentable under 35 U.S.C. § 103(a) as

¹ JP H11-160542, published June 18, 1999 (Ex. 1004). Petitioner also filed Toyooka as Exhibit 1007 with a declaration by the translator to address a deficiency noted in our Decisions on Institution. *See* Dec. on Inst. 6 n.1. Because the parties cite Toyooka as Exhibit 1004 in these matters, we also cite Toyooka as Exhibit 1004 for consistency in the record.

² US 7,021,837 B2, filed Feb. 20, 2001, issued Apr. 4, 2006 (Ex. 1005).

³ US 6,149,313, issued Nov. 21, 2000 (Ex. 1006).

having been obvious over Toyooka and Eichenberger; and

3. Whether claim 11 is unpatentable under 35 U.S.C. § 103(a) as having been obvious over Toyooka and Giebel.

Paper 8 (“Dec. on Inst.”), 38.

During the trial, Patent Owner filed a Response (Paper 14, “PO Resp.”), and Petitioner filed a Reply (Paper 16, “Pet. Reply”). An oral hearing was held on July 18, 2018, a transcript of which appears in the record. Paper 22 (“Tr.”).

B. Real Parties in Interest

Patent Owner indicates that Corning Optical Communications LLC (“Corning”) is a real party in interest by virtue of CCS’s assignment of “all substantial rights in the ’227 patent to Corning.” Paper 5, 1.

C. Related Matters

The parties indicate that the ’227 patent is at issue in *Corning Optical Communications LLC v. Panduit Corp.*, No. 1:16-cv-00268-GMS (D. Del.). Pet. 1; Paper 5, 1. In IPR2016-01648, the Board issued a Final Written Decision as to claims 1–3 and 8–10 of the ’227 patent. IPR2016-01648, Paper 27. In IPR2016-01647, the Board issued a Final Written Decision as to claims 1 and 2 of related Patent 6,758,600 B2 (“the ’600 patent”). IPR2016-01647, Paper 27. We are concurrently issuing a Final Written Decision in IPR2017-01323 addressing claims 3 and 4 of the ’600 patent.

D. The ’227 Patent

The ’227 patent generally relates to optical modules having a particular interconnection scheme. Ex. 1001, [57]. Figure 2 is reproduced below:

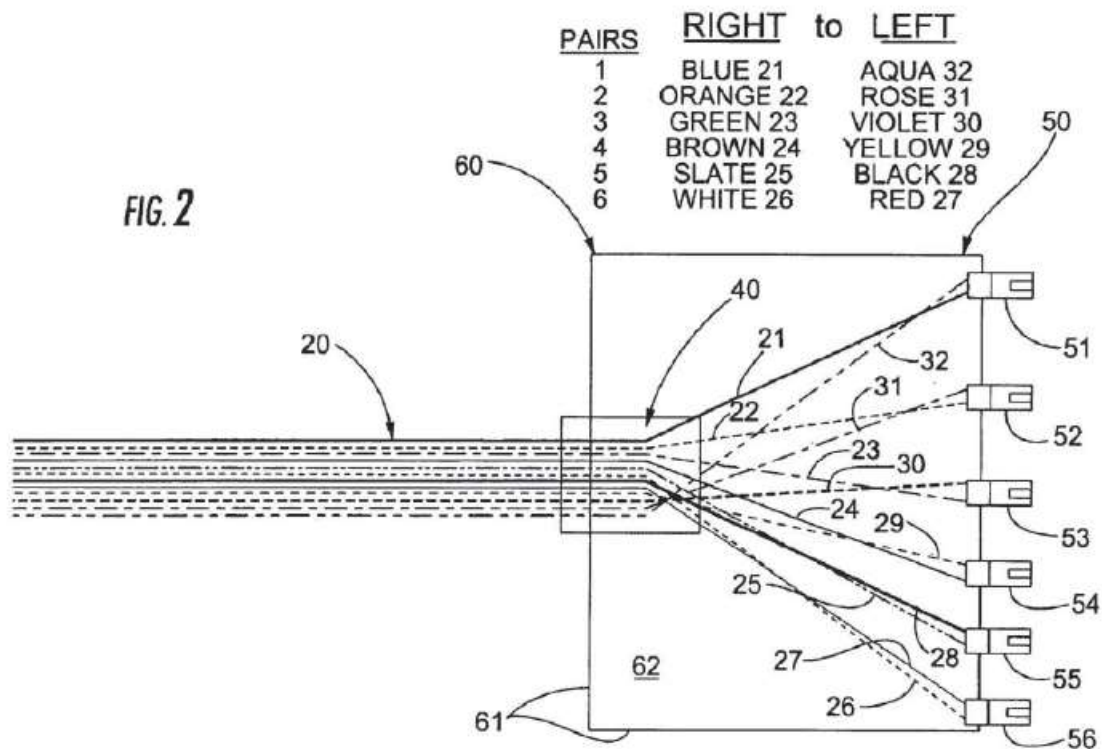


Figure 2 “illustrates an exemplary fiber wiring scheme for routing of optical fibers from connector 40 to single or multi-fiber connectors located at connector stations 51–56, defined at a break-out section 50 of module 60.” Ex. 1001, 3:14–17. The ’227 patent explains that “the optical paths of connector 40 and the optical connectors at stations 51–56 are optically interconnected by optical fibers disposed in cavity 62 of the module 60, the fiber pairs being formed by the optical fibers.” Ex. 1001, 3:30–34. As illustrated in Figure 2 and explained in the ’227 patent, fiber pairs are defined within the cavity of the module such that the fiber optically connected to the first fiber from ribbon 20 is paired with the fiber optically connected to the last fiber at connector station 51, and then the fiber optically connected to the next fiber in ribbon 20 is paired with the fiber optically connected to the next-to-last fiber in ribbon 20 at connector station

52, and so on. See Ex. 1001, 3:25–27 (“With reference to FIG. 2, the fiber pairs are defined as follows: 21–32; 22–31; 23–30; 24–29; 25–28; and 26–27.”).

The ’227 patent also describes particular optical assemblies, which are depicted in Figures 3 and 4. See Ex. 1001, 2:36–39, 3:55–4:23. Figure 3 is reproduced below.

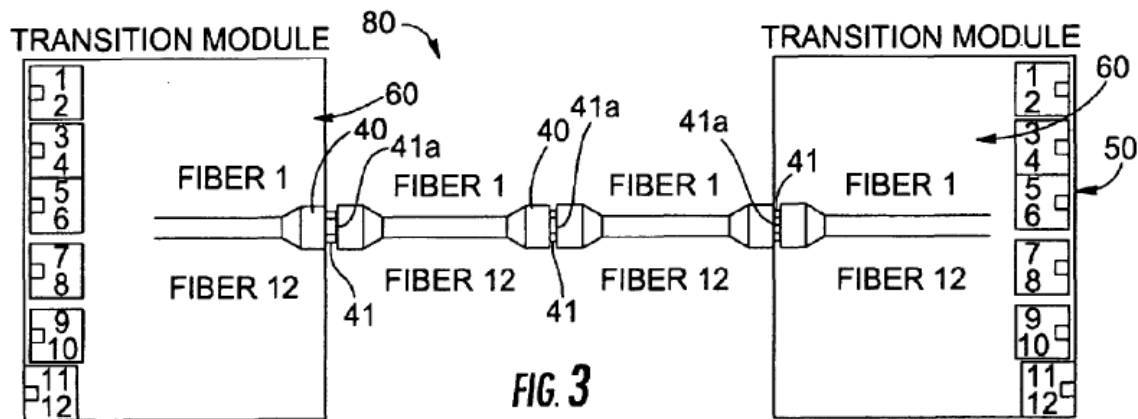


Figure 3 depicts “a schematic view of a first optical assembly according to the present invention.” Ex. 1001, 2:36–37. The ’227 patent explains:

In system[] 80, . . . the polarity is not reversed, fibers one through twelve are not flipped between the modules. In other words, the optical paths are not flipped at the adapters or other position between the modules. For example, the optical path remains with its color, blue stays with blue (1—1), orange with orange (2—2), green with green (3—3), and so on, from one module to another including the connectors 40 externally of the modules 60.

Ex. 1001, 3:62–4:2.

E. Claims at Issue

Claim 6 depends from claim 3, and claim 11 depends from claim 1. Claim 7 is independent. Claims 1 and 11, claims 3 and 6, and claim 7 are reproduced below.

1. A universal breakout harness for reversing the polarity of optical fibers, comprising:

a multi-fiber connector with multiple optical paths formed therein, the optical paths being arranged in a generally planar array with each optical path being immediately adjacent to at least one other optical path;

a plurality of optical fibers of an optical ribbon disposed in the optical paths formed in the multi-fiber connector; and

a plurality of optical fiber connectors disposed opposite the multi-fiber connector, the plurality of optical fiber connectors defining a plurality of pairs of optical paths for receiving the optical fibers of the optical ribbon;

wherein the optical fibers of the optical ribbon are separated and routed between the optical paths formed in the multi-fiber connector and the pairs of optical paths defined by the plurality of optical fiber connectors; and

wherein the optical fibers in at least one of the pairs of optical paths defined by the plurality of optical fiber connectors are selected from optical fibers disposed in optical paths formed in the multi-fiber connector that are not immediately adjacent to each other.

11. The universal breakout harness of claim 1, wherein the optical fiber connectors include at least one multi-fiber connector.

3. A method of implementing reverse-ribbon positioning in a cabling system, comprising:

assigning a sequential number to each of the optical fibers of an optical ribbon;

installing one end of the optical ribbon into a multi-fiber connector with the optical fibers of the optical ribbon arranged in sequential number from left to right; and

installing the other end of the optical ribbon into a plurality of optical fiber connectors with the optical fibers of the optical ribbon arranged in reverse sequential number from left to right.

6. The method of claim 3, wherein the multi-fiber connector has a key oriented in a predetermined direction and

wherein each of the plurality of optical fiber connectors has a key oriented in the same predetermined direction.

7. A method of transitioning ribbon cabling into multiple duplex systems, comprising providing a first transition module and a second transition module by:

assigning a sequential number to each of the optical fibers of a first optical ribbon;

installing one end of the first optical ribbon into a first multi-fiber connector having a key with the optical fibers of the first optical ribbon arranged in sequential number from left to right and the key oriented in a predetermined direction; and

installing the other end of the first optical ribbon into a plurality of optical fiber connectors with the optical fibers of the first optical ribbon arranged in reverse sequential number from left to right; and

connecting the first multi-fiber connector of the first transition module to a second multi-fiber connector installed on one end of a second optical ribbon having a plurality of optical fibers arranged in a sequential number from left to right, the second multi-fiber connector having a key oriented in the predetermined direction; and

connecting the first multi-fiber connector of the second transition module to a third multi-fiber connector installed on the other end of the second optical ribbon, the third multi-fiber connector having a key oriented in the predetermined direction.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Citing the testimony of its declarant, Dr. Casimer DeCusatis, Petitioner argues that the level of ordinary skill in the art is “(a) a Bachelor’s degree in Electrical Engineering or similar, with at least 5 years of experience designing fiber optic cassettes or harnesses; or (b) a Master’s degree in Electrical Engineering or similar, with at least 3-5 years of

experience designing fiber optic cassettes or harnesses.” Pet. 12 (citing Ex. 1003 ¶¶ 10–19).

Patent Owner, citing the testimony of its declarant, Mr. Eric Pearson, argues that “[a] person of ordinary skill in the art of the ’227 patent would have a bachelor’s degree in mechanical engineering, materials science, or a related field; and 2 years of experience in fiber optic equipment design.” PO Resp. 1 (citing Ex. 2002 ¶ 14).

Although there are differences between the proposed levels of ordinary skill in the art, the parties and their declarants agree that an ordinarily skilled artisan would have had a four-year technical degree and some amount of professional experience with fiber optic equipment. Based on the evidence of record, including the testimony of the parties’ declarants, the subject matter at issue, and the prior art of record, we determine that the skill level of a person of ordinary skill in the art would have been that of a person having a four year technical degree with a minimum of two years of professional technical experience in fiber optic equipment design. We apply this level of ordinary skill in the art in our analysis below. However, we note that our analysis would be the same if we adopted either party’s proposed level of ordinary skill.

B. Claim Interpretation

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). In applying a broadest reasonable construction, claim terms generally 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. *See In re*

Translogic Tech., Inc., 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. “*Optical Ribbon*”

The parties disagree as to what subject matter is encompassed within the term “optical ribbon,” which appears in the challenged claims or in claims from which they depend. The parties’ arguments and evidence on this issue are largely the same as the arguments and evidence presented on this issue in IPR2016-01648.⁴ In that case, we fully evaluated the issue and determined that the broadest reasonable interpretation of the term “optical ribbon” in view of the specification of the ’227 patent “encompasses optical fibers that are bonded together in a generally planar array or optical fibers that are grouped and aligned in a generally planar array.” IPR2016-01648, Paper 27, 10–19.

In addition to its previous arguments, Patent Owner presents three illustrations allegedly showing optical ribbons in which fibers are separated at the ends. PO Resp. 18–19. Patent Owner argues:

It does not follow from the fact that the ribbon common layer is ultimately broken out at the end to install the individual fibers into connectors that no ribbon ever existed in the first place. Similarly, claim 3 recites installing one end of a ribbon into a multi-fiber connector and the other end into a plurality of separate connectors, which a person of ordinary skill in the art would understand to require a breakout of the individual fibers from the ribbon common layer at the point of installation. That person would not, however, conclude from this that no ribbon common layer ever existed, especially in light of the specification’s clear statement that one does.

⁴ Patent Owner submits the same evidence in this case that it submitted in IPR2016-01648. In particular, Exhibits 2001, 2002, and 2003 in this case are the same as Exhibits 2004, 2001, and 2003, respectively, in IPR2016-01648.

PO Resp. 19 (citing Ex. 2002 ¶¶ 22–32). This argument appears directed to our discussion in the Final Written Decision in IPR2016-01648 explaining that claim 3 of the '227 patent, read in light of the specification, shows that the term “optical ribbon” encompasses optical fibers that are bonded together in a generally planar array or optical fibers that are grouped and aligned in a generally planar array but not necessarily bound in a ribbon common layer. IPR2016-01648, Paper 27, 16–19. In particular, we stated the following:

[I]ndependent claim 3 of the '227 patent, when read in light of the specification, claims “an optical ribbon” as individual fibers or, at least, encompasses such subject matter. In particular, claim 3 recites “installing one end of the optical ribbon into a multi-fiber connector with the optical fibers of the optical ribbon arranged in sequential number from left to right” and then “installing *the other end of the optical ribbon into a plurality of optical fiber connectors* with the optical fibers of the optical ribbon arranged in reverse sequential number from left to right.” (Emphasis added). The claim requires installing “one end” and “the other end” of the ribbon, which corresponds to the fibers between connector 40 (“multi-fiber connector”) and connector stations 51–56 (“plurality of optical fiber connectors”) in figures 2 and 5. The '600 and '227 patents describe that “the optical paths of connector 40 and the optical connectors at stations 51–56 are optically interconnected by optical fibers disposed in cavity 62 of the module 60.” Ex. 1001, 3:30–33. The '600 and '227 patents do not describe interconnecting a multi-fiber connector and connector stations using anything other than individual fibers, such as those depicted in figure 2 of the '600 and '227 patents and figure 5 of the '227 patent. Thus, claim 3, read in light of the specification of the '227 patent, claims an “optical ribbon” encompassing optical fibers that are grouped and aligned in a generally planar array.

IPR2016-01648, Paper 27, 16–17. This discussion explained that the only disclosure in the '227 patent of connecting a “multi-fiber connector” to “a

plurality of optical fiber connectors,” as recited in claim 3, was via individual fibers. Claim 3’s recitation of an “optical ribbon” connecting these connectors, therefore, encompasses the disclosure in the specification of the ’227 patent that describes this subject matter, namely that “the optical paths of connector 40 and the optical connectors at stations 51–56 are optically interconnected by optical fibers disposed in cavity 62 of the module 60.” Ex. 1001, 3:30–33; *see also id.* at Fig. 2.

Patent Owner also argues, “As the ’227 patent explains, a ‘break-out section 50’ is used to separate the individual fibers from the ribbon—i.e., break apart the ribbon common layer.” PO Resp. 17 (citing Ex. 1001, 3:17). We disagree. The ’227 patent states, “FIG. 2 illustrates an exemplary fiber wiring scheme for routing of optical fibers from connector 40 to single or multi-fiber connectors located at connector stations 51–56, defined at a break-out section 50 of module 60. Each connector station 51–56 preferably includes one or more connectors.” Ex. 1001, 3:14–19. Break-out section 50, therefore, designates where connector stations 51–56 are located, as also illustrated in Figure 2, but it does not “separate the individual fibers from the ribbon,” as asserted by Patent Owner. Rather, the connectors at break-out section 50 connect to optical fibers within the module that are already separated, specifically “optical fibers disposed in cavity 62.” Ex. 1001, 3:30–33. Indeed, Patent Owner acknowledges this in IPR2017-01323 when it states that, “[a]s the ’600 patent explains, module 60 uses internal fibers to perform this interconnection: ‘connector 40 and the optical connectors at stations 51-56 are optically interconnected by optical fibers disposed in cavity 62 of the module 60.’” IPR2017-01323, Paper 14, 20 (quoting ’600 patent, 3:20–24). The ’227 patent purports to be a continuation of the ’600

patent (Ex. 1001, 1:6–9), and the quoted portion of the '600 patent is the same as the disclosure of the '227 patent at column 3, lines 30–34. Thus, the '227 patent does not describe that break-out section 50 separates fibers from the ribbon.

We see nothing the record before us indicating that we should deviate from our construction of the term “optical ribbon” in the Final Written Decision in IPR2016-01648. See IPR2016-01648, Paper 27, 10–19. We, therefore, adopt the construction in that case—that the broadest reasonable interpretation of the term “optical ribbon” in view of the specification of the '227 patent “encompasses optical fibers that are bonded together in a generally planar array or optical fibers that are grouped and aligned in a generally planar array.” IPR2016-01648, Paper 27, 18–19. We apply this construction below in our analysis of the grounds of unpatentability.

2. Remaining Terms

In our Decision on Institution, we determined that the remaining terms of the challenged claims did not require express constructions at that time. Dec. on Inst. 19. Based on the record developed during trial, we maintain our initial determination that the remaining terms of the challenged claims do not require express constructions.

C. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying

factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) any secondary considerations, if in evidence. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Overview of References

Petitioner relies on Toyooka, Eichenberger, and Giebel in its contentions of obviousness. Pet. 5, 14–36.

1. Toyooka

Toyooka discloses optical fiber wiring units, such as the one reproduced below in Figure 1.

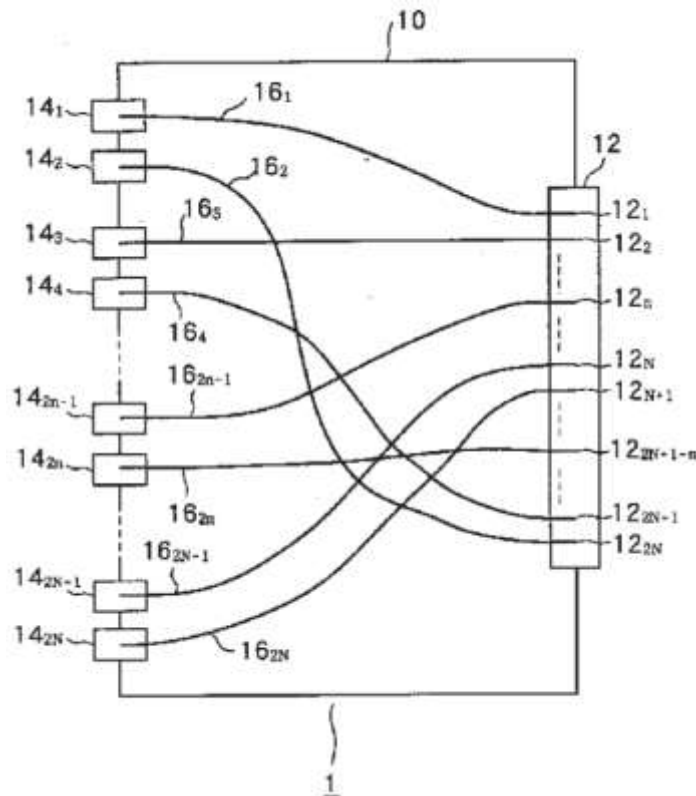


Figure 1 depicts an optical fiber wiring unit having “multicore connector 12” on one side of “box 10” and “single-core connectors 14₁ to 14_{2N}” on the

other side of box 10. Ex. 1004 ¶ 20. Toyooka describes that “each of the two single-core connectors constituting each connector pair is connected, by means of an optical fiber, to each of the two symmetrically situated cores of the multicore connector 12.” *Id.* ¶ 23. As such, single-core connectors 14₁ and 14₂ are connected, respectively, to cores 12₁ and 12_{2N}, which are situated symmetrically on multicore connector 12. *Id.* ¶ 24. This pattern continues and, ultimately, single-core connectors 14_{2N-1} and 14_{2N} are paired with 12_N and 12_{N+1}, respectively. See Ex. 1004, Fig. 1.

Toyooka also depicts “a connection configuration of conventional optical-fiber wiring units and multicore optical-fiber tape” in Figure 5, reproduced below. Ex. 1004 ¶ 5.

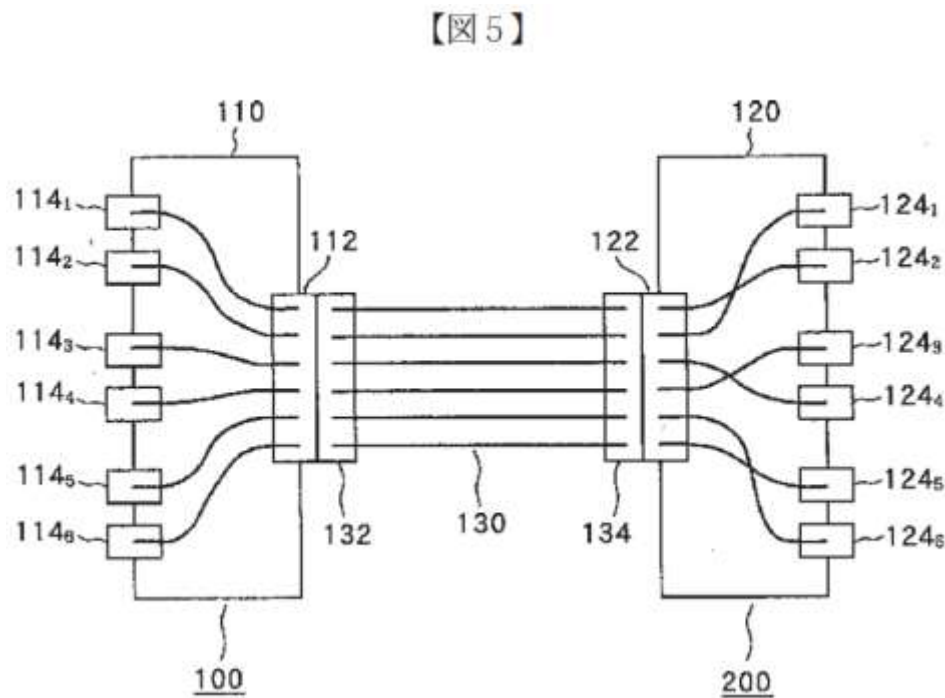


Figure 5 shows a configuration in which “two optical-fiber wiring units 100 and 200 are connected with a multicore optical-fiber tape 130.” Ex. 1004 ¶ 5.

2. Eichenberger

Eichenberger “relates generally to the field of optical fiber data transmission and communication and more particularly concerns an optical interface in the form of an optical interface for interconnecting a 4-channel optoelectronic transmitter-receiver module and an 8-fiber optical fiber transmission ribbon.” Ex. 1004, 1:8–13. Figure 2 of Eichenberger is reproduced below.

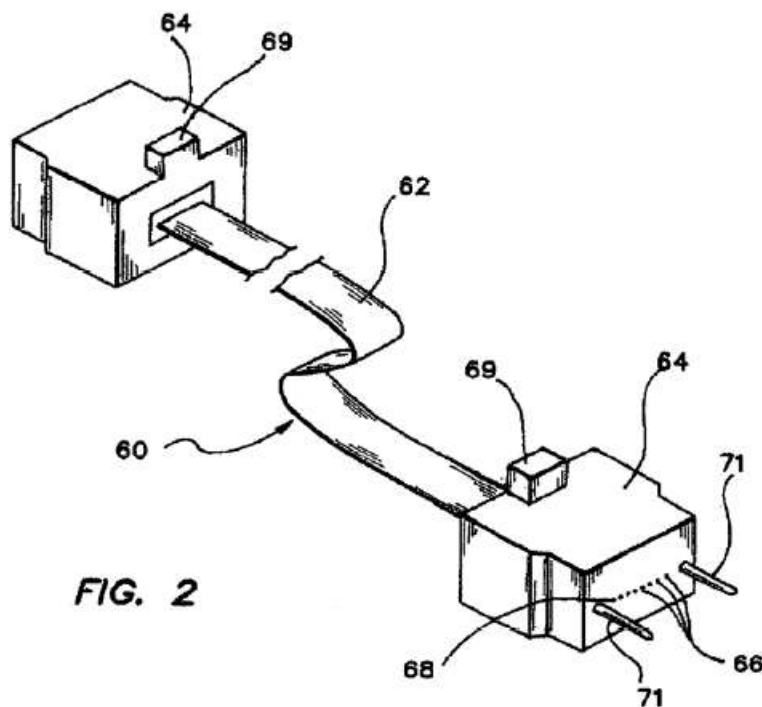


Figure 2 depicts “a perspective view of an 8-fiber transmission cable consisting of an 8-fiber transmission ribbon terminated at each end with an 8-fiber connector, showing the special keying of the two connectors.”

Ex. 1004, 5:22–24. Eichenberger discloses:

As shown in FIG. 2 the connectors 64 have key tabs 69 which limit the orientation of the connector when inserted in connector receptacle 56, in that the connector can only be mated to the receptacle with the key tab point upwards in FIG. 1. In conventional ribbon cables the connectors at opposite ends of the

optical ribbon have the key tabs pointing in opposite directions, thereby to force a 180 degree twist along the length of the ribbon so as to preserve same channel numbering on the transmitter and receiver sides. When connecting two identical transceiver modules 10, however, a “straight” ribbon cable is needed to guarantee that the transmit side of one be connected to the receive side of the other module.

Ex. 1004, 7:52–64.

3. Giebel

Giebel “relates generally to fiber optic connectors and associated fabrication methods and, more particularly, to multi-fiber connectors having male and female configurations and associated fabrication methods.”

Ex. 1006, 1:6–9. Giebel discloses gender selectable fiber optic connector 10 having shroud 18 and alignment key 28. Ex. 1006, 6:50–54, 8:58–9:3, Figs. 5–6. In particular, Giebel discloses:

[S]hroud 18 can also include various alignment features for aligning the resulting fiber optic connector 10 with another fiber optic connector or with an alignment sleeve, an outlet or other receptacle. In this regard, the shroud body 20 can include an outwardly extending alignment key 28 and the forward end of the shroud body can define several cut-outs 30 that are sized and shaped to mate with corresponding features within an alignment sleeve, an outlet or other receptacle. For example, the alignment key and cut-out portions of the shroud bodies illustrated in FIGS. 1–5 are adapted to engage corresponding alignment features within a conventional sleeve, outlet or receptacle that has been designed to receive MT connectors.

Ex. 1006, 8:58–9:3.

E. Claim 11 – Obviousness over Toyooka and Giebel

Petitioner contends claim 11, which depends from claim 1, is unpatentable under 35 U.S.C. §103(a) as obvious over the combined teachings of Toyooka and Giebel. Pet. 5, 49–60. Petitioner relies on

Toyooka to teach the limitations of claim 1, and its contentions in this regard are substantively the same as its contentions in IPR2016-01648 asserting that Toyooka anticipated claim 1. *Compare* Pet. 50–58,⁵ with IPR2016-01648, Paper 2, 18–24, 30–32. Patent Owner’s arguments with respect to claim 11 in this case are directed to limitations of claim 1 and are substantively the same as arguments it made in IPR2016-01648 that Toyooka does not describe particular limitations of claim 1. *Compare* PO Resp. 19–25, with IPR2016-01648, Paper 13, 17–20, 28–30. We fully addressed the parties’ evidence and arguments in the Final Written Decision IPR2016-01648, and we found that Toyooka describes all of the limitations of claim 1 and, therefore, anticipated claim 1. IPR2016-01648, Paper 27, 37–52. We herein adopt our analysis from the Final Written Decision in IPR2016-01648 as to the limitations of claim 1, and, therefore, we turn to the additional recited limitation of claim 11.

Claim 11 recites, “The universal breakout harness of claim 1, wherein the optical fiber connectors include at least one multi-fiber connector.” Petitioner asserts that “Giebel teaches a multi-fiber connector mounted on a plurality of fibers 32.” Pet. 59 (citing Ex. 1006, 9:54–65; Ex. 1003 ¶ 108). We agree with Petitioner’s contention, and we find Giebel teaches a “multi-fiber connector,” as recited in claim 11, because it describes “multi-fiber ferrule 14.” Ex. 1006, 9:55–56.

Petitioner argues that “[i]t would have been . . . obvious to a [person of ordinary skill in the art] to replace the N individual, single-core

⁵ Petitioner’s challenge to claim 11 is based only on Toyooka and Giebel, and, therefore, we do not rely on Petitioner’s citation to Eichenberger. See Pet. 51.

connectors 14 with $N/2$ multi-fiber connectors to reduce the number of ferrules included per module” in order to “reduce the manufacturing cost and complexity in manufacturing the ribbon module 10 taught by Toyooka.” Pet. 59 (citing Ex. 1003 ¶ 110). We are persuaded by Petitioner’s contentions, and we find a person of ordinary skill in the art would have had reason to, and would have been motivated to, use multi-fiber connectors, as taught in Giebel, in the module of Toyooka to reduce the number of ferrules in the module. We credit Dr. DeCusatis’s testimony that “[i]ncluding half as many ferrules and connectors would reduce the manufacturing cost and complexity in manufacturing the ribbon module 10 taught by Toyooka.” Ex. 1003 ¶ 110. We further note that Toyooka discloses that two-core connectors may be used to service $2N$ fibers rather using $2N$ single-core connectors. Ex. 1004 ¶ 42 (“[I]n the optical-fiber wiring unit shown in the above-mentioned embodiment, $2N$ pieces of single-core connectors are provided to thereby form an N number of connector pairs; however, N pieces of two-core connectors may be provided in place thereof.”), *cited in* Dec. on Inst. 31. This further supports the finding that a person of ordinary skill in the art would have had reason to use multi-fiber connectors rather than single-core connectors.

We find that the combination of Toyooka and Giebel teaches the limitations of claim 11, and we find a person of ordinary skill in the art would have had reason to, and would have been motivated to, use multi-fiber connectors, as taught in Giebel, in the module of Toyooka. Having considered the full record developed during trial, Petitioner has demonstrated by a preponderance of the evidence that claim 11 of the ’227

patent is unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Toyooka and Giebel.

F. Claim 6 – Obviousness over Toyooka, Eichenberger, and Giebel

Petitioner contends claim 6, which depends from claim 3, is unpatentable under 35 U.S.C. §103(a) as obvious over the combined teachings of Toyooka, Eichenberger, and Giebel. Pet. 5, 21–32. Petitioner relies on Toyooka to teach the limitations of claim 3, and its contentions in this regard are substantively the same as its contentions in IPR2016-01648 asserting that Toyooka anticipated claim 3. *Compare* Pet. 22–24, 26–27, with IPR2016-01648, Paper 2, 28–30, 34–35. Patent Owner’s arguments with respect to claim 6 in this case are directed to limitations of claim 3 and are substantively the same as arguments it made in IPR2016-01648 that Toyooka does not describe particular limitations of claim 3. *Compare* PO Resp. 25–28, with IPR2016-01648, Paper 13, 30–33. We fully addressed the parties’ evidence and arguments in the Final Written Decision IPR2016-01648, and we found that Toyooka describes all of the limitations of claim 3 and, therefore, anticipated claim 3. IPR2016-01648, Paper 27, 55–59. We herein adopt our analysis from the Final Written Decision in IPR2016-01648 as to the limitations of claim 3, and, therefore, we turn to the additional recited limitations of claim 6.

Claim 6 recites, “The method of claim 3, wherein the multi-fiber connector has a key oriented in a predetermined direction and wherein each of the plurality of optical fiber connectors has a key oriented in the same predetermined direction.” With respect to the recitation that “the multi-fiber connector has a key oriented in a predetermined direction,” Petitioner asserts

“Eichenberger teaches that MPO [(multi-fiber push-on)]⁶ connectors have keys 69, and Eichenberger teaches that all MPO connectors are connected key-up to key-up.” Pet. 28 (citing Ex. 1005, 7:52–64). Eichenberger discloses that “connectors 64 have key tabs 69 which limit the orientation of the connector when inserted in connector receptacle 56, in that the connector can only be mated to the receptacle with the key tab point upwards in FIG. 1.” Ex. 1005, 7:52–56. Although this key is on ribbon connector 64 of Eichenberger, Petitioner contends,

It would have been obvious to a person having ordinary skill in the art (“POSITA”) to include a key 69 on connector 40 of Eichenberger to make sure that the two connectors 40, 64 are connected in proper alignment and to maintain polarity. Eichenberger provides the motivation for including keys on MPO connectors by teaching that keys 69 limit orientation of connectors 40, 64 when inserted into an adapter 56.

Pet. 28 (citing Ex. 1003 ¶ 67; Ex. 1005, 7:52–56). Petitioner further contends that “it would have been obvious to a [person of ordinary skill in the art] to modify the multicore connector 112 of Toyooka to include a key so that proper orientation is established when mating connector 112 to connector 132” to “assist an installer . . . with visual detection of proper orientation, prevent an upside-down connection between connector 112 and connector 132, prevent a polarity issue, and prevent an improper optical coupling.” Pet. 29 (citing Ex. 1003 ¶ 69).

We are persuaded by these contentions. We determine that, in view of Eichenberger’s disclosure of a key on the ribbon connector for proper

⁶ See Ex. 1003 ¶ 21 (stating that “the ’227 Patent relates to optical breakout harnesses having a multi-fiber push-on (‘MTP’ or ‘MPO’) optical connector or the like”).

mating with the connector receptacle of the module (Ex. 1005, 7:52–56), having a key on the connector receptacle of the module would have been obvious to a person of ordinary skill in the art. We credit the testimony of Dr. DeCusatis that “includ[ing] a key 69 on connector 40 as well as connector 64” would “make sure that the two connectors 40, 64 are connected in proper alignment and to maintain polarity.” Ex. 1003 ¶ 67. Eichenberger suggests as much by stating that “connectors 64 have key tabs 69 which limit the orientation of the connector when inserted in connector receptacle 56, in that the connector can only be mated to the receptacle with the key tab point upwards in FIG. 1.” Ex. 1005, 7:52–56. To limit the orientation, therefore, both the connector and the connector receptacle on the module would need a key. *See* Ex. 1003 ¶ 67. Thus, we conclude that the subject matter of a “multi-fiber connector ha[ving] a key oriented in a predetermined direction” would have been obvious to a person of ordinary skill in the art.

With respect to the claimed recitation that “each of the plurality of optical fiber connectors has a key oriented in the same predetermined direction,” Petitioner argues “Giebel teaches that an MT RJ connector has an alignment key 28.” Pet. 30 (citing Ex. 1006, 8:58–9:6). Petitioner argues:

It would have been obvious to a POSITA to replace the six single-core connectors 114 of Toyooka with three MT RJ connectors, as taught by Giebel, in order to connect the module 110 of Toyooka to networks that include or use the MT RJ connection standard, which was an especially popular connector standard at the priority date of the ‘227 Patent.

Pet. 30 (citing Ex. 1003 ¶ 71). Petitioner also argues that “[i]t would have been . . . obvious to a [person of ordinary skill in the art] to replace six individual, single-core connectors 114 with three multi-fiber connectors to

reduce the number of ferrules included per module” in order to “reduce the manufacturing cost and complexity in manufacturing the ribbon module 110 taught by Toyooka.” Pet. 30–31 (citing Ex. 1003 ¶ 72). Petitioner further argues:

[I]t would have been obvious to a [person of ordinary skill in the art] in view of Eichenberger’s teaching regarding all keys being up to orient the MT RJ keys 28 key-up. (Ex. 1005, 7:52–56). Furthermore, all the embodiments shown in Giebel illustrate a connector with the key pointing upwards. (*e.g.* Ex. 1006, Fig. 3). It would have also been obvious to a [person of ordinary skill in the art] to replace the single-core connectors 114 of Toyooka with MT RJ connectors to include keyed connectors on the left side of the module 110 to maintain proper orientation of the modified MT RJ connectors 114 as well as the MPO connector 112. (Ex. 1003 ¶ 75).

Pet. 31.

We are persuaded by Petitioner’s contentions. We credit Dr. DeCusatis’s testimony that “MT RJ is a sufficiently popular connection standard, and it was an especially popular connection standard at filing date of the ’600 Patent (to which the ’227 Patent claims priority).” Ex. 1003 ¶ 71. Giebel itself states, “Perhaps one of the most common multi-fiber connectors is the MT RJ connector having a rectangularly-shaped MT ferrule developed by Nippon Telegraph & Telephone Corporation of Tokyo, Japan.” Ex. 1006, 1:15–19. We further credit Dr. DeCusatis’s testimony that “[i]ncluding only three ferrules and connectors would reduce the manufacturing cost and complexity in manufacturing the ribbon module 110 taught by Toyooka.” Ex. 1003 ¶ 72. Based on this evidence, we find a person of ordinary skill in the art would have had reason to, and would have been motivated to use Giebel’s MT RJ connectors in the module of Toyooka

to reduce the number of ferrules in the module and to be compatible with a popular industry standard. Ex. 1003 ¶¶ 71–72.

We also agree with Petitioner’s contention, and we find, that Giebel teaches an alignment key pointing upwards, as illustrated in Figure 3. Ex. 1006, Fig. 3 (showing “alignment key 28” pointing upward), 8:63. We also credit Dr. DeCusatis’s testimony that “replac[ing] the single-core connectors 114 of Toyooka with MT RJ connectors to include keyed connectors on the left side of the module 110” would “maintain proper orientation of the single-core connectors 114 as well as the MPO connector 112.” Ex. 1003 ¶ 75. Based on this evidence, we conclude that the claimed subject matter reciting “each of the plurality of optical fiber connectors has a key oriented in the same predetermined direction” would have been obvious to a person of ordinary skill in the art.

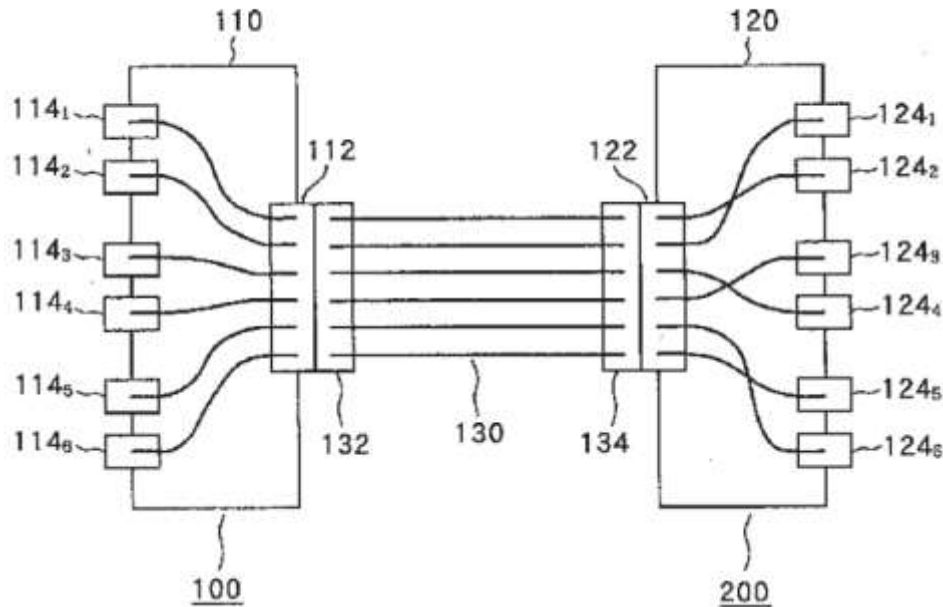
We find that the combination of Toyooka, Eichenberger, and Giebel teaches the limitations of claim 6, and we find a person of ordinary skill in the art would have had reason to, and would have been motivated to, combine the teachings of the references in the manner asserted by Petitioner, as discussed above. Having considered the full record developed during trial, Petitioner has demonstrated by a preponderance of the evidence that claim 6 of the ’227 patent is unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Toyooka, Eichenberger, and Giebel.

G. Claim 7 – Obviousness over Toyooka and Eichenberger

Petitioner contends independent claim 7 is unpatentable under 35 U.S.C. §103(a) as obvious over the combined teachings of Toyooka and Eichenberger. Pet. 5, 32–49.

Claim 7 is directed to “[a] method of transitioning ribbon cabling into multiple duplex systems.” Petitioner contends that the preamble does not limit the claim but that, even if it does, Toyooka’s Figure 5, reproduced below, teaches a method of transitioning ribbon cabling into multiple duplex systems. Pet. 41 (citing Ex. 1003 ¶ 78).

【図 5】



“Figure 5 is a diagram that shows a connection configuration of conventional optical-fiber wiring units and multicore optical-fiber tape.” Ex. 1004 ¶ 5. Dr. DeCusatis testifies that “Toyooka teaches a method of transitioning ribbon cabling into multiple duplex systems in Fig. 5.” Ex. 1003 ¶ 78. We are persuaded by Petitioner’s contention as to the preamble, and we find Toyooka teaches a method of transitioning ribbon cabling into multiple duplex systems, consistent with the evidence of record, including Dr. DeCusatis’s testimony. See Ex. 1003 ¶ 78.

Claim 7 recites “providing a first transition module and a second transition module by” performing the following three steps:

assigning a sequential number to each of the optical fibers of a first optical ribbon;

installing one end of the first optical ribbon into a first multi-fiber connector having a key with the optical fibers of the first optical ribbon arranged in sequential number from left to right and the key oriented in a predetermined direction; and

installing the other end of the first optical ribbon into a plurality of optical fiber connectors with the optical fibers of the first optical ribbon arranged in reverse sequential number from left to right.

These steps are similar to the steps recited in claim 3, and Petitioner's contentions with respect to these steps are similar to its contentions for claim 3. Pet. 33–38, 41–43. In particular, Petitioner contends that “[t]he fibers within module 110 are a ribbon because they [are] a collection of fibers arranged in a generally planar array” and that those fibers are installed into multicore connector 112 in sequential number from left to right and into single-core connectors 114 in reverse sequential number from left to right. Pet. 42–43 (citing Ex. 1004, Fig. 5; Ex. 1003 ¶¶ 81–83). Patent Owner argues that the fibers within module 110 are not an “optical ribbon.” PO Resp. 25–28. We fully addressed the parties' contentions on this issue in the Final Written Decision IPR2016-01648, and we found that Toyooka describes the limitations of claim 3 and, therefore, anticipated claim 3. IPR2016-01648, Paper 27, 55–59. We herein adopt our analysis from the Final Written Decision in IPR2016-01648 as to the limitations of claim 3.

Claim 7 recites an additional requirement that the first multi-fiber connector have a “key oriented in a predetermined direction.” Similar to its argument with respect to claim 6, Petitioner argues that it would have been obvious to include a key on connector 112 of Toyooka as taught by Eichenberger to ensure “that proper orientation is established when mating

connector 112 to connector 132.” Pet. 43–44 (citing Ex. 1003 ¶¶ 85–87). For the reasons discussed above with respect to claim 6, we conclude that the subject matter of a “multi-fiber connector having a key . . . oriented in a predetermined direction” would have been obvious to a person of ordinary skill in the art.

Claim 7 further recites the following two “connecting” steps:

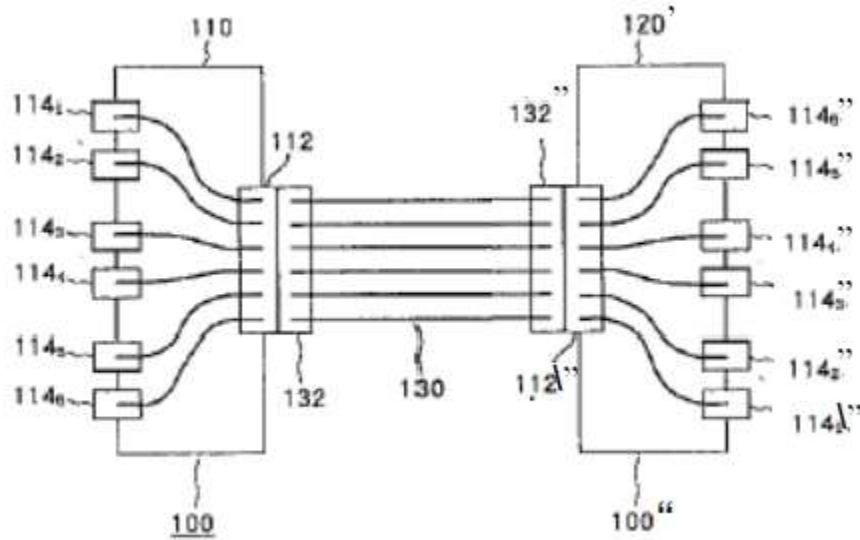
connecting the first multi-fiber connector of the first transition module to a second multi-fiber connector installed on one end of a second optical ribbon having a plurality of optical fibers arranged in a sequential number from left to right, the second multi-fiber connector having a key oriented in the predetermined direction; and

connecting the first multi-fiber connector of the second transition module to a third multi-fiber connector installed on the other end of the second optical ribbon, the third multi-fiber connector having a key oriented in the predetermined direction.

Thus, claim 7 recites that multi-fiber connectors on each end of a “second optical ribbon” are connected to multi-fiber connectors on the first and second transition modules, and it recites that the multi-fiber connectors on the “second optical ribbon” have keys “oriented in the predetermined direction.”

Petitioner notes that Toyooka’s Figure 5 “illustrates only a single straight-through wired module 110” and argues that “it would have been obvious to modify module 120 to be identical to module 110 so that identical modules would be used on both ends of the ribbon 130 in view of Eichenberger’s teaching of two identical, straight-through wired modules 10.” Pet. 45 (citing Ex. 1005, 7:52–64, Fig. 1; Ex. 1003 ¶ 88). Petitioner further argues that a person of ordinary skill in the art would have flipped one of the modules to maintain polarity and thus arrive at the

configuration illustrated in the figure below. Pet. 46–47 (citing Ex. 1003 ¶ 89; Ex. 1005, 7:52–64, Fig. 3).



The figure reproduced above is a version of Figure 5 of Toyooka modified by Petitioner. Pet. 47.

We are persuaded by these contentions, and we find a person of ordinary skill in the art would have been motivated to modify the configuration of Figure 5 of Toyooka as proposed by Petitioner to maintain polarity by ensuring that transmitters on one side are connected to receivers on the other side. As Dr. DeCusatis explains, this configuration ensures that there are no polarity issues and that data can be exchanged between the modules. Ex. 1003 ¶ 89. Eichenberger reinforces the importance of matching the transmitters on one side to the receivers on the other, disclosing that, “[w]hen connecting two identical transceiver modules 10, . . . a ‘straight’ ribbon cable is needed to guarantee that the transmit side of one be connected to the receive side of the other module.” Ex. 1005, 7:61–64.

Petitioner further argues that it would have been obvious to include keys on the multi-fiber connectors on the modules and on ribbon 130 connecting the modules to ensure proper orientation and maintain polarity. Pet. 47–48 (citing Ex. 1003 ¶¶ 90, 94; Ex. 1005, 7:52–64). We are persuaded by these contentions. As discussed above with respect to claim 6, Eichenberger discloses that connectors 64 on ribbon 60 “have key tabs 69 which limit the orientation of the connector when inserted in connector receptacle 56, in that the connector can only be mated to the receptacle with the key tab point upwards in FIG. 1.” Ex. 1005, 7:52–56. In view of this disclosure and Dr. DeCusatis’s testimony that keys on the ribbon ensure there is proper orientation and polarity is maintained (Ex. 1003 ¶ 94), we determine that having keys on the module connectors and the ribbon connectors oriented in the same direction (the claimed “predetermined direction”) would have been obvious to a person of ordinary skill in the art.

We find that the combination of Toyooka and Eichenberger teaches the limitations of claim 7, and we find a person of ordinary skill in the art would have had reason to, and would have been motivated to, combine the teachings of the references in the manner asserted by Petitioner, as discussed above. Having considered the full record developed during trial, Petitioner has demonstrated by a preponderance of the evidence that claim 7 of the ’227 patent is unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Toyooka and Eichenberger.

III. ORDER

Accordingly, it is:

ORDERED that claims 6, 7, and 11 of the '227 patent have been shown to be unpatentable; and

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

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For PETITIONER:

Kelly Eberspecher
keberspecher@steptoe.com

Daniel Stringfield
dstringfield@steptoe.com

Katherine Cappaert
kcappaert@steptoe.com

For PATENT OWNER:

Eric Hayes
eric.hayes@kirkland.com

Eugene Goryunov
egoryunov@kirkland.com

George Foster
billy.foster@kirkland.com