

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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EPSON AMERICA, INC.,  
Petitioner,

v.

CASCADES PROJECTION LLC,  
Patent Owner.

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Case IPR2015-01206  
Patent 7,688,347 B2

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Before HOWARD B. BLANKENSHIP, THOMAS L. GIANNETTI, and  
ROBERT L. KINDER, *Administrative Patent Judges*.

BLANKENSHIP, *Administrative Patent Judge*.

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

## I. BACKGROUND

Petitioner Epson America, Inc. filed a request for an *inter partes* review of claims 29, 30, 32, 33, 48, and 69 of U.S. Patent No. 7,688,347 B2 (Ex. 1001, “the ’347 patent”) under 35 U.S.C. §§ 311–319. Paper 1 (“Petition” or “Pet.”). Patent Owner Cascades Projection LLC filed a preliminary response. Paper 6 (“Prelim. Resp.”). The Board instituted this *inter partes* review of claims 29, 30, 32, 33, 48, and 69 on asserted grounds of obviousness. Paper 15 (“Dec. on Inst.”).

Subsequent to institution, Patent Owner filed a patent owner response. Paper 27 (“PO Resp.”). Petitioner filed a reply. Paper 29 (“Pet. Reply”). Patent Owner filed a Motion to Exclude. Paper 32 (“PO Mot. to Exclude”). Petitioner filed an Opposition to the Motion to Exclude. Paper 35. Patent Owner filed a Reply to the Opposition. Paper 36.

An oral hearing concerning this case was held on July 20, 2016. The record contains a transcript of the hearing. Paper 42 (“Tr.”).

The Board has jurisdiction under 35 U.S.C. § 6(b). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 29, 30, 32, 33, 48, and 69 of the ’347 patent are unpatentable.

### *A. Related Proceedings*

Petitioner identifies multiple lawsuits involving the ’347 patent that are ongoing in the U.S. District Court for the Central District of California. Pet. 1. Certain claims of the ’347 patent are also challenged in *Sony Corporation v. Cascades Projection LLC*, Case IPR2015-01846.

*B. The '347 Patent*

The '347 patent relates to liquid crystal display (LCD) technology using an external light source and a light valve such as an active matrix LCD. The light valve modulates the light source, imposing image or data information on the light beam so that the beam can be projected onto a viewing surface. *See generally* Ex. 1001, at [57] & col. 10, ll. 36–57. Using an arrangement similar to that of a cathode-ray tube (CRT) projection system, a properly constructed light valve projection system can produce an image brighter than that produced by a CRT projection system. *Id.* at col. 10, ll. 41–43.

*C. Illustrative Claims*

Claims 29 and 69, reproduced below, are illustrative.

29. A display system comprising: a light source; an element having pixels, said element being capable of having an image formed thereon; and means for focusing different segments of a light beam emanating from said light source onto said element at proper angles such that light is focused onto the pixels of said element, comprising at least one input lens array located between said light source and said element.

69. A display system comprising: a light source; an element capable of having an image formed thereon, said element having a predetermined shape; and means for enhancing brightness of an image by shaping a beam illuminating said image-forming element such that the shape of the beam substantially matches the shape of said image-forming element, wherein said enhancing means also includes a Fresnel polarizer means.

*D. Asserted Prior Art*

van den Brandt et al. (“Brandt”) (Ex. 1003)	US 5,098,184	Mar. 24, 1992
Sato et al. (“Sato”) (Ex. 1006)	US 5,042,921	Aug. 27, 1991
Uchiyama (Ex. 1004) <sup>1</sup>	JP A-5-45724	Feb. 26, 1993
Dolgoff (“EP ’630”) (Ex. 1007)	EP 0 509 630 A2	Oct. 21, 1992

*E. Instituted Ground of Unpatentability*

We instituted *inter partes* review on the following grounds of unpatentability under 35 U.S.C. § 103(a) (Dec. on Inst. 23):

References	Claims
Brandt and Uchiyama	29, 30, and 32
Brandt and EP ’630	33
Brandt and Sato	48 and 69

II. ANALYSIS

*A. Claim Construction*

In this proceeding, initially, the parties contended that the claims of the ’347 patent should be given their broadest reasonable construction. Dec. on Inst. 4. However, that standard is applicable only to unexpired patents. *See* 37 C.F.R. § 42.100(b) (“A claim in an unexpired patent shall be given its

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<sup>1</sup> Exhibit 1005 is a certified English translation of the Japanese-language document.

broadest reasonable construction in light of the specification of the patent in which it appears.”). For expired patents, we apply the *Phillips* standard used in district court patent litigation. *See infra*.

For the reasons that follow, we conclude that the ’347 patent has expired. The term of the patent grant begins on the date on which the patent issues and ends 20 years from the date on which the application for the patent was filed in the United States “or, if the application contains a specific reference to an earlier filed application or applications under section 120, 121, or 365(c) from the date on which the earliest such application was filed.” 35 U.S.C. § 154(a)(2) (2002). The ’347 patent is based on an application filed April 3, 2002, but claims the benefit of priority under 35 U.S.C. § 120 to a chain of parent applications, with the earliest-referenced application (No. 07/659,596) filed February 21, 1991. Ex. 1001, at [60] & col. 1, ll. 9–19. The term of the ’347 patent is extended or adjusted, however, by 2034 days. Ex. 1001, at [\*]; *see* 35 U.S.C. § 154(b) (2002) (adjustment of patent term). Based on the earliest-claimed priority and the extension or adjustment of term, the USPTO patent term calculator tool (*available at* <http://www.uspto.gov/patent/laws-and-regulations/patent-term-calculator>) yields a calculated expiration date of September 16, 2016.

Patent Owner submits, however, that the priority claim to the earliest application (filed February 21, 1991) was canceled during prosecution of the ’347 patent application, resulting in an earliest-claimed priority date of April 4, 1994 (filing date of U.S. Application No. 08/223,479). Paper 13, 1–2. Applicant’s counsel submitted a paper during prosecution of the ’347 patent that purported to be accompanied by an Application Data Sheet containing a “corrected” claim to priority. Ex. 1002, 421; *see also id.* at 431–32

(“Application Data Sheet”). According to applicant’s counsel, “[f]or present purposes, Applicant does not claim priority to any predecessor” of the application filed April 4, 1994. *Id.* at 431. Counsel also stated that “[t]he present invention was first disclosed in Applicant’s U.S. patent application 08/223,479, filed April 4, 1994.” *Id.*

According to the prosecution history, however, applicant’s “corrected” claim to priority was never accepted or processed by the Examiner. At the time of mailing of the Notice of Allowability, the Bib Data Sheet<sup>2</sup> for the application still reflected the claim for the priority benefit of the application filed February 21, 1991. Ex. 1002, 532. On the date of transmitting the issue fee for the patent, counsel submitted a letter regarding the priority date for the patent, referring to the earlier-filed Remarks “to ensure that the priority date is recorded by the U.S. Patent and Trademark Office as April 4, 1994. . . .” Ex. 1002, 540. But the ’347 patent application was not amended during prosecution to change the original claim to priority. Both the ’347 patent’s Title Page and cross-reference section are consistent with the priority claim in the ’347 patent application as originally filed. Ex. 1002, 8 (Application Data Sheet Domestic Priority Information), 9 § [0002] (cross-reference to related applications). We determine, therefore, that the term of the ’347 patent is, thus, measured from February 21, 1991 because the application contains a specific reference to earlier-filed applications under section 120, with term measured “from the date on which the earliest such application was filed.” 35 U.S.C. § 154(a)(2) (2002).

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<sup>2</sup> A Bib Data Sheet contains relevant filing information for an application.

Although not necessarily controlling, we note also that, at present, the USPTO's public Patent Application Information Retrieval (PAIR) system, under the "Continuity Data" tab, indicates that the '347 patent claims the benefit of priority to applications including the earliest-filed February 21, 1991 application. Further, we note that according to the recent file history of the '347 patent, Patent Owner filed (on Nov. 19, 2015) a request for a Certificate of Correction to change the priority claim in the patent. The request was denied (on Jan. 15, 2016). Patent Owner filed (on Feb. 5, 2016) a petition requesting that the denial be overruled. Patent Owner's petition was dismissed (on Oct. 19, 2016) by the Office of Petitions.

We concluded in the Decision on Institution, in view of the record then before us, that the term of the '347 patent would expire prior to the one-year period allotted for an *inter partes* review. Accordingly, for purposes of claim construction, we presumed that the patent had expired. Dec. on Inst. 6. On the present record, we conclude that the patent has expired. As noted *supra*, for claims of an expired patent, the Board's claim interpretation is similar to that of a district court. *See In re Rambus, Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence. . . ." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc)). However, a claim term is presumed to carry its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

*1. Means for Focusing*

A petition for an *inter partes* review must identify how each challenged claim is to be construed. 37 C.F.R. § 42.104(b)(3). As part of that requirement, a petitioner must “identify the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function” of any means-or step-plus-function limitation. *Id.*; *see also* 35 U.S.C. § 112 ¶ 6.<sup>3</sup>

Claim 29 recites “means for focusing different segments of a light beam emanating from said light source onto said element at proper angles such that light is focused onto the pixels of said element, comprising at least one input lens array located between said light source and said element.” According to Petitioner, there are five embodiments in the ’347 patent that are clearly linked or associated with performing the function for the “means for focusing.” Pet. 13. For purposes of its obviousness challenge with respect to claim 29, Petitioner limits its discussion to structure set forth in the Figure 65 embodiment. *Id.* at 13–15.

Figure 65 of the ’347 patent is reproduced below.

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<sup>3</sup> Section 4(c) of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”) re-designated 35 U.S.C. § 112 ¶ 6 as 35 U.S.C. § 112(f). Because the ’347 patent has a filing date prior to September 16, 2012, the effective date of § 4(c) of the AIA, we refer to the pre-AIA version of 35 U.S.C. § 112.



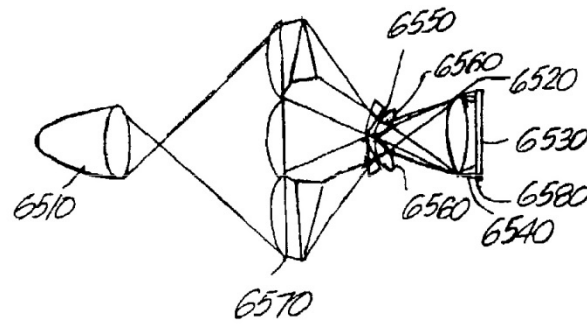


FIG. 65

Figure 65 is an arrangement whereby each beam from a light source can be imaged by an intermediate focusing lens or focusing lenses, one for each beam. Ex. 1001, col. 38, ll. 49–60. The Figure depicts light source 6510 and focusing lenses 6560, whereby each lens 6560 focuses an image of a portion of collimating lens 6570 onto image-forming element (IFE) 6530. *Id.* at col. 38, ll. 60–63. Figure 65 also depicts one or more input lens array(s) 6580 for focusing light into pixel holes in IFE 6530. *Id.* at col. 38, l. 64 – col. 39, l. 4.

According to Petitioner, Figure 65 also depicts two sets of deflecting prisms or mirrors — the first located just after lens array 6570, and the second set located near foci 6550 — that are not numbered but are shown in the Figure and included to reduce the beam size. Pet. 14 (citing Ex. 1011 (Declaration of Dr. Frederic J. Kahn) ¶ 74). Petitioner submits further that the “means for focusing” includes, consistent with claim 29, “at least one input lens array [6580] located between said light source [6510] and said element [6530].” Pet. 15 (citing Ex. 1011 ¶ 76). Further,

the structure depicted in Figure 65 that performs the function of the “means for focusing . . .” includes lens array 6570, the deflecting prisms (shown but not numbered) located just after lens array 6570, another set of prisms, mirrors or similar optical

elements (not numbered) near the foci 6550, focusing lens array 6560, collimating lens 6520, and input lens array 6580.

Pet. 15 (citing Ex. 1011 ¶ 77).

In our Decision on Institution, we modified Petitioner’s construction of the “means for focusing.” We modified the construction because Section 112 paragraph 6, does not “permit incorporation of structure from the written description beyond that necessary to perform the claimed function.” *Asyst Techs, Inc. v. Empak, Inc.*, 268 F.3d 1364, 1369–70 (Fed. Cir. 2001) (citation omitted). Structural features that do not actually perform the recited function do not constitute corresponding structure and thus do not serve as claim limitations. *Id.* at 1370. The structure corresponding to a function set forth in a means-plus-function limitation must actually perform the recited function, not merely enable the pertinent structure to operate as intended. *Id.* at 1371. In the Figure 65 embodiment, the corresponding structure for the claim 29 “means for focusing” appears to require no more than focusing lenses 6560 and the unnumbered prisms near foci 6550 for effecting the “proper angles” as claimed. Ex. 1001, col. 38, l. 49 – col. 39, l. 4. The claim specifies further, however, that the “means for focusing” includes “at least one input lens array located between said light source and said element” — e.g., input lens array 6580 as shown in Figure 65.

For purposes of the Decision on Institution, we determined that the structure corresponding to the claim 29 “means for focusing” consists of focusing lenses 6560 (’347 patent Fig. 65) and the unnumbered prisms near foci 6550. Dec. on Inst. 12. The claim further requires that the “means for focusing” includes the structural element of at least one input lens array located between the light source and the element having pixels (e.g., input

lens array 6580 as depicted in Figure 65). The “at least one input lens array” is exemplified by the lens array(s) 6580 as depicted in Figure 65, but is not limited to that particular structure and equivalents thereof. *Id.* Although the “input lens array” is part of the “means for focusing,” the “input lens array” is recited as a structural limitation as opposed to a nonce word associated with a function and the limitation is, thus, not interpreted in accordance with § 112, sixth paragraph.

Patent Owner accepts our construction with the exception of an alleged “error” in identifying lens array(s) 6580 as depicted in Figure 65 of the patent as exemplary of the claimed “input lens array.” PO Resp. 21–22. According to Patent Owner, the claimed “input lens array” corresponds to “item” 6570. *Id.* First, we note that the ’347 patent does not refer to “item” 6570 but to “collimating lens” 6570. Ex. 1001, col. 38, ll. 60–63. Further, Patent Owner’s position is based on prosecution history (Ex. 1002, 372, 381) that is alleged to have drawn a distinction between light falling “onto” pixels as compared with “into” pixel holes. PO Resp. 22. Consistent with our consideration of the issue in another challenge of the ’347 patent, we are not convinced of any material difference between light falling “onto” pixels and “into” pixel holes. *See Sony Corp. v. Cascades Projection LLC*, IPR2015-01846, slip op. at 8–9 (PTAB Feb. 26, 2016) (Paper 13). Patent Owner also relies on the Declaration of Mr. William K. Bohannon (Ex. 2008 ¶¶ 37–38). PO Resp. 22. According to Mr. Bohannon, the ’347 patent describes lens array 6580 as being used to “‘cram’ light into the pixel holes, being made to miss the opaque areas between pixels.” Ex. 2008 ¶ 37. That statement, however, highlights a problem in attempting to draw a distinction between “onto” pixels and “into” pixel holes. Whether light is “into” pixel holes or

“onto” pixels, the light is incident on pixels — not on the opaque areas between the pixels.

In view of the foregoing, we maintain our earlier construction of the “means for focusing.” Based on the embodiment identified by Petitioner for purposes of this Petition, we determine that the structure corresponding to the claim 29 “means for focusing” consists of focusing lenses 6560 (’347 patent Fig. 65) and the unnumbered prisms near foci 6550. The claim further requires that the “means for focusing” includes the structural element of at least one input lens array located between the light source and the element having pixels (e.g., input lens array 6580 as depicted in Figure 65).

## *2. Means for Enhancing Brightness*

Claim 69 recites “means for enhancing brightness of an image by shaping a beam illuminating said image-forming element such that the shape of the beam substantially matches the shape of said image-forming element.” Independent claim 47, from which challenged claim 48 depends, recites the same limitation except that the image-forming element is an “electronic” image-forming element.

Petitioner identifies structures in the Figure 65 embodiment that are deemed to correspond to the “means for enhancing brightness.” Pet. 17–19. We are persuaded that the structures that Petitioner identifies as corresponding to the claimed functions represent a proper construction for the “means.” Patent Owner does not disagree with Petitioner’s identification of the corresponding structures. PO Resp. 24–25.

### *3. Means for Bringing Light*

Claim 30 depends from claim 29 and recites “further comprising means for bringing light from different sections of the light beam emanating from said light source to foci.” Petitioner focuses again on the Figure 65 embodiment described by the ’347 patent, submitting that the structure corresponding to the means for bringing light “includes lens array 6570 and the deflecting prisms (shown but not numbered) located just after lens array 6570.” Pet. 17.

We are persuaded that Petitioner has properly identified corresponding structure for the “means for bringing light.” As we have noted, (§ 1, *supra*), we consider the “means for focusing” of base claim 29 as not requiring lens array 6570 and its associated deflecting prisms.

### *4. Fresnel Polarizer*

The parties agree that the “Fresnel polarizer means” recited in claims 48 and 69 is not a limitation to be construed in accordance with 35 U.S.C. § 112, sixth paragraph, because there is no recited function associated with the “means.” The parties disagree, however, on the meaning of “Fresnel polarizer” in the context of the ’347 patent disclosure.

Petitioner submits that “Fresnel polarizer” should be construed as a polarizer constructed with stepped, sawtooth-like elements so as to have the optical properties of a much thicker polarizer. Pet. 10 (citing Ex. 1011 ¶¶ 45–64). Petitioner refers also to a technical dictionary definition of “Fresnel lens,” defined as a “thin lens constructed with stepped setbacks so as to have the optical properties of a much thicker lens.” Pet. 10–11 (citing Ex. 1008, 5). Petitioner also points to numerous instances where the ’347

patent describes and depicts a “Fresnel polarizer” or a “Fresnel polarizer plate” as having a stepped sawtooth-like construction. Pet. 11. *See, e.g.*, Ex. 1001, col. 45, ll. 1–5 (“Fresnel polarizer plate 7830 of FIG. 78”); *id.* at col. 38, ll. 20–21 (“Fresnel prisms can be used instead of standard prisms to save space, weight and cost.”).

Patent Owner agrees in part with Petitioner’s proffered construction, but advocates a narrower interpretation having additional limitations. Patent Owner submits that “Fresnel polarizer” should be construed, with the additional limitations emphasized below, as a:

polarizer constructed with stepped, sawtooth-like elements so as to have the optical properties of a much thicker polarizer, *with an optical coating layer where two sawtooth-like elements touch, and with polarization conversion of reflected incident light through a wave plate in a manner to cause nearly all incident light to exit with primarily one polarization.*

PO Resp. 28 (emphasis added) (citing Ex. 2008 ¶ 48).<sup>4</sup>

With respect to the addition of “an optical coating layer where two sawtooth-like elements touch,” Patent Owner argues that “Fresnel polarizer” is a “coined” term and the optical coating is a feature in every “Fresnel polarizer” described in the ’347 patent. PO Resp. 20. Petitioner notes,

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<sup>4</sup> Patent Owner’s construction is far from that which it presented in the Preliminary Response, submitting that a “Fresnel polarizer” should be construed as “a polarization device that contains multiple MacNeille-type polarizers, each of which is smaller than an entire beam being polarized, and each of which is mounted in a fixed relationship to the remaining MacNeille-type polarizers, and where the polarization device selectively alters the polarization planes of multiple portions of an output beam.” Prelim. Resp. 43.

however, that the patent does not teach that every Fresnel polarizer must have an optical coating layer. In particular, the '347 patent discloses that a less expensive hologram may serve as an alternative to a multi-layer coating. Ex. 1001, col. 46, ll. 34–39; Pet. Reply 16–17. Patent Owner also quotes from the deposition (Ex. 2007) of Petitioner's expert, Dr. Kahn, and argues that the expert agreed that an essential feature of a Fresnel polarizer, as described by the '347 patent, is an optical coating at the boundary where two subparts touch. PO Resp. 17–18. As Petitioner notes, however, the alleged admission related to disclosures in the '347 patent concerning optical coating embodiments, without addressing or questioning the witness about the above-noted disclosure concerning the alternative hologram embodiment. Pet. Reply 16; Ex. 2007, 68:5–74:10.

Although an inventor is free to define the specific terms used to describe the invention, “this must be done with reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

To act as its own lexicographer, a patentee must “clearly set forth a definition of the disputed claim term” other than its plain and ordinary meaning. It is not enough for a patentee to simply disclose a single embodiment or use a word in the same manner in all embodiments, the patentee must “clearly express an intent” to redefine the term.

*Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (citations omitted). We are not persuaded that the Specification provides a clear definition of “Fresnel polarizer” such that it is limited to having “an optical coating layer where two sawtooth-like elements touch.”

We turn next to consider Patent Owner’s additional limitation of “with polarization conversion of reflected incident light through a wave plate in a manner to cause nearly all incident light to exit with primarily one polarization.” Patent Owner argues that a “further feature spanning all embodiments” is “transmission of essentially all incident light in a single polarization through partial reflection followed by polarization conversion through a wave plate.” PO Resp. 18 (emphasis deleted). Petitioner notes, however, that the ’347 patent does not teach that all “Fresnel polarizers” must have polarization conversion. Pet. Reply 16–17; Ex. 1001, col. 53, l. 65 – col. 54, l. 26. Moreover, Patent Owner does not provide evidence or argument to show that one of ordinary skill in the art would understand the quantities of light that would be within, and outside, the meaning of “nearly all” incident light. The introduction of undefined terms into the construction would cause the claims to be of indeterminate scope.

We are persuaded that, consistent with Petitioner’s interpretation, “Fresnel polarizer” should be construed as a polarizer constructed with stepped, sawtooth-like elements so as to have the optical properties of a much thicker polarizer.

*B. Claims 29, 30, and 32 — Brandt and Uchiyama*

Petitioner asserts that the subject matter of claim 29 would have been obvious over the combination of Brandt and Uchiyama or EP ’630. Pet. 21–32 (claim chart). We instituted *inter partes* review as to independent claim 29, and claims 30 and 32 depending therefrom, based on asserted obviousness of the claims in view of Brandt and Uchiyama.



Although Uchiyama was published after the effective filing date of the '347 patent — i.e., subsequent to the earliest claim to priority under § 120 — Petitioner relies on Patent Owner's disclaimer of the earliest-filed application. Pet. 4; *see also* Ex. 1002, 16 (“The present invention was first disclosed in Applicant's U.S. patent application 08/223,479, filed April 4, 1994.”). Because Uchiyama was published more than one year prior to April 4, 1994, on this record, the document is a § 102(b) reference.<sup>5</sup>

1. Brandt

Figure 2 of Brandt is reproduced below.

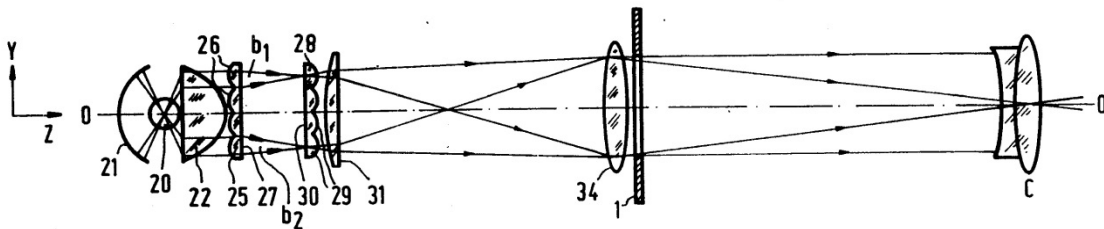


FIG. 2

Figure 2 depicts an illumination system in which lamp 20 emits light in the direction of display panel 1, as well as in a rearward direction. Ex. 1003, col. 12, ll. 29–34. The light emitted by the lamp and its image are received by condenser lens system 22, which concentrates the light to a parallel beam incident on first lens plate 25. *Id.* at col. 12, ll. 41–45. Each of lenses 26 images source 20 on associated lens 29 of second lens plate 28. Source-facing side 30 of plate 28 is flat, and the side remote from the source supports a matrix of lenses 29. Each lens 29 ensures that a radiation spot

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<sup>5</sup> EP '630 was published more than one year prior to April 4, 1994 and is, thus, also a reference under 35 U.S.C. § 102(b).

formed on corresponding lens 26 is imaged on display panel 1. Lens 31, arranged behind second lens plate 28, ensures that all re-images are superimposed on one another in the plane of the display panel. *Id.* at col. 12, ll. 49–67. Further lens 34, which images the exit pupil of the illumination system in the entrance pupil of the projection lens system, is arranged in front of display panel 1. *Id.* at col. 13, ll. 34–37.

## 2. Uchiyama

Fig. 4A of Uchiyama is reproduced below.

【図4】

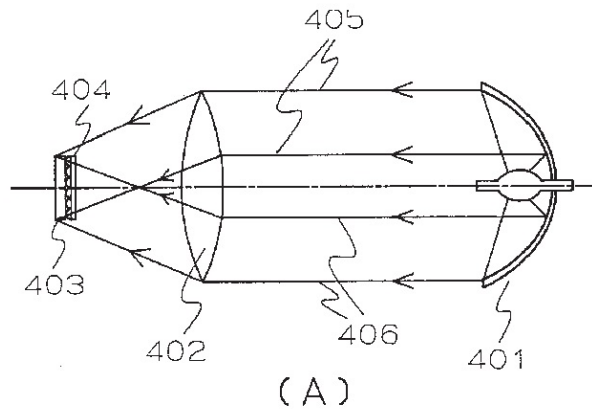


Figure 4A depicts a “related art” projection-type liquid crystal display apparatus. Ex. 1005, 4. The apparatus includes lamp 401, condenser lens 402, lens array 404, and liquid crystal valve 403. *Id.* Reference characters 405 and 406 represent light fluxes incident on liquid crystal light valve 403. *Id.*

Figure 1A of Uchiyama is reproduced below.

【図 1】

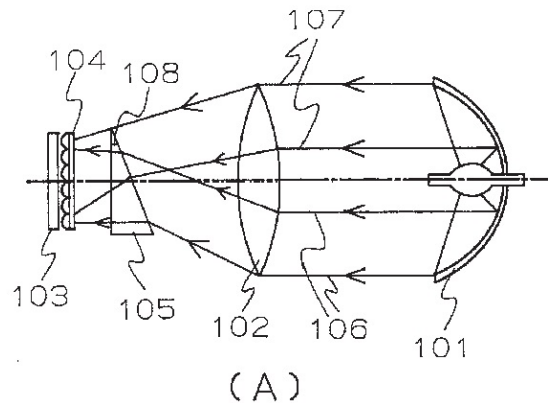


Figure 1A depicts an illumination optical system of a projection-type liquid crystal display apparatus according to Uchiyama's invention. *Id.* at 7. The apparatus includes condenser lens 102 and input lens array 104, differing from the "related art" apparatus (Fig. 4) in that prism 105 is disposed in the optical path. *Id.* at 8. Addition and placement of the prism yields an increase in the luminance of the projected image. *Id.* at 3, 8.

### 3. Brandt and Uchiyama

Petitioner identifies structures depicted in Brandt's Figure 2 that it deems to be the same as or equivalent to the structures making up the "means for focusing" depicted in Figure 65 of the '347 patent. Pet. 23–29. Petitioner admits that Brandt's Figure 2 apparatus lacks the prisms or other optical elements to change the beam size in the manner shown in Figure 65 of the '347 patent. *Id.* at 24. Petitioner submits, however, that it would have been obvious to add to Brandt's structure prisms, and an input lens array as taught by Uchiyama, relying on the teachings of Uchiyama and the declaration of Dr. Kahn. *Id.* at 37, 39; Ex. 1011 (Kahn Decl.) ¶¶ 136–152.

Patent Owner argues that the prior art references “operate in a substantially different way from the ‘means for focusing’ corresponding structure.” PO Resp. 41. Initially, however, Patent Owner addresses alleged deficiencies in Brandt, rather than addressing the applied combination of Brandt and Uchiyama. PO Resp. 41–44. Pointing out supposed deficiencies in Brandt does not demonstrate error in the asserted ground of obviousness. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references).

Patent Owner next addresses Uchiyama, arguing that Uchiyama “uses prisms to achieve a substantially different result: to exacerbate (not reduce) [non-uniformity] of the projected light,” which would have been “anathema” to the purposes of the corresponding structure in Figure 65 of the ’347 patent. PO Resp. 44 (citing Ex. 2008 ¶ 68). According to Patent Owner’s expert, Mr. Bohannon, “Uchiyama uses prisms to achieve a substantially different result than the [’]347 patent: to cram light through a microlens-pixel combination that exacerbates (not reduces) non-uniformity of the projected light.” Ex. 2008 ¶ 68. Mr. Bohannon does not, however, inform us of the basis for the opinion. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). As Mr. Bohannon notes earlier in the Declaration, the ’347 patent teaches that light should be “crammed” into pixel holes. Ex. 2008 ¶ 37; Ex. 1001, col. 48, ll. 1–9. The “cramming” of light, however, relates to brightness of the image, rather than uniformity. According to the ’347 patent: “Light that hits [spaces between pixels] does

not reach the screen, decreasing the brightness of the projected image. . . . To get around this problem, light must be crammed into the pixel holes, being made to miss the opaque areas between pixels.” Ex. 1001, col. 48, ll. 3–9. Uchiyama contains a similar teaching. According to the reference, disposing prism 105 in the optical path results in the brightness of a projected image increasing by a factor of 1.35 as compared to the lens array when no prism was provided. Ex. 1005, 9 (final 5 lines). To the extent that uniformity may have been considered in the design of a projection apparatus, Uchiyama’s second embodiment (using a combination of prisms) addresses the problem of the “slight amount of brightness unevenness” in the first embodiment. Pet. Reply 4–5; Ex. 1005, 5 (Figs. 3A, 3B), 10–11.

Patent Owner argues that one of the “chief results” achieved with the Figure 65 embodiment of the ’347 patent is “light evenness and uniformity.” PO Resp. 45. Patent Owner goes so far as to state that Brandt “teaches away” from the “claimed result.” *Id.* (citing Ex. 2008 ¶ 70). The claimed function associated with the “means for focusing” of claim 29, however, is the function of “focusing different segments of a light beam emanating from said light source onto said element at proper angles such that light is focused onto the pixels of said element.” Patent Owner acknowledged at the oral hearing that “[t]he words of the claim don’t have any words in the functional recitation which talk about evenness in so many words or beam steering in so many words.” Tr. 41:11–13.

We agree with Petitioner that the challenged claims do not require any particular degree of uniformity or light waste. Pet. Reply 1 (citing Ex. 1017 (Bohannon Deposition) at 70:9–71:3, 90:14–93:10, 155:5–156:3 (uniformity); 72:9–73:8, 158:3–17 (light waste)). *See JVW Enters. v.*

*Interact Accessories, Inc.*, 424 F.3d 1324, 1331 (Fed. Cir. 2005) (“[A] court may not construe a means-plus-function limitation ‘by adopting a function different from that explicitly recited in the claim.’”) (quoting *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999)); *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1334 (Fed. Cir. 2006) (“[A] court errs when it improperly imports unclaimed functions into a means-plus-function claim limitation.”); *JVW Enters.*, 424 F.3d at 1331 (“[A] court errs ‘by importing the functions of a working device into the[ ] specific claims, rather than reading the claims for their meaning independent of any working embodiment.’”) (quoting *Rodime PLC v. Seagate Tech., Inc.*, 174 F.3d 1294, 1303 (Fed. Cir. 1999)) (alteration in original).

Patent Owner further argues that the Petition does not “provide a detailed explanation of precisely how these prisms taught in the prior art would be combined with the teachings of Brandt or Uchiyama and how the resulting apparatuses would operate.” PO Resp. 47. However, “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.” *Allied Erecting and Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (citing *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)). Rather, the test is whether “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention.” *Id.* (citing *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1381 (Fed. Cir. 2007)). In this case, supported by the references and by expert testimony, Petitioner identifies at least two persuasive reasons why one of ordinary skill in the art would have combined the teachings of the prior art

references to achieve the claimed invention: (1) to increase the brightness of a projector display (Pet. 34–37); and (2) to reduce beam size (*id.* at 37–41).

Claim 32 depends from claim 29 and recites that a focused image “has the same size as said element.” Petitioner refers to disclosure in Brandt that “the shape of the cross-section of the illuminating beam at the object is adapted to the shape of the object, such that substantially all radiation incident on the first lens plate reaches the object.” Ex. 1003, col. 3, ll. 13–17; Pet. 32. According to Dr. Kahn, Brandt, thus, “discloses that the image focused on display panel 1 [Fig. 1] has the same size as the display panel.” Ex. 1011 ¶ 160.

Patent Owner argues that the relied-upon quotes in Brandt relate to shape, not size. PO Resp. 51 (citing Ex. 2008 ¶¶ 74–76). However, we credit the testimony of Dr. Kahn over that of Mr. Bohannon. We find that Dr. Kahn’s opinion is supported by the text of Brandt, which specifies that “substantially all” radiation incident on the first lens plate reaches the object (Ex. 1003, col. 3, ll. 13–17), indicating that both shape *and size* of the focused image is matched to the display panel (or element).

Upon review of the Petition and supporting evidence, and Patent Owner’s evidence and arguments in response, we determine that Petitioner has demonstrated, by a preponderance of the evidence, claims 29, 30, and 32 are unpatentable for obviousness over Brandt and Uchiyama.

### *C. Claim 33 — Brandt and EP ’630*

In its Petition, Petitioner asserts grounds against claims 29, 30, 32, and 33 as obvious over Brandt and Uchiyama, or in the alternative as obvious over Brandt and EP ’630. *E.g.*, Pet. 7, 20. We instituted trial as to

claim 33 on the ground based on Brandt and EP '630 because Petitioner relies solely on Brandt and EP '630 to show the further requirements of dependent claim 33. Dec. on Inst. 20, 23; Pet. 33.

With respect to the requirements of independent claim 29, Petitioner submits that it would have been obvious to add prisms or other optical elements to reduce beam size. Pet. 37; *see also id.* at 37–41 (referring, *e.g.*, to Brandt's Figure 9 as showing mirrors to reduce beam size and to Ex. 1011 ¶ 148). We note that Patent Owner alleges that the discussion of Brandt's Figure 9 in the Reply is “outside the scope of invalidity theories instituted for trial.” Paper 30, 2 (item 5) (referring to various pages in the Decision on Institution).<sup>6</sup> According to Patent Owner, Petitioner “did not seek reconsideration of non-inclusion of Brandt Figure 9 among the trial institution grounds. [Patent Owner] lacked notice that Figure 9 evidence would be asserted at trial, and now lacks procedural rights to respond.” *Id.*

Patent Owner's allegation regarding what is “outside the scope of invalidity theories instituted for trial” reflects an apparent misapprehension of the purpose of a decision whether to institute a trial. In the Decision on Institution, we did not identify and discuss all the evidence that the Petition offered in support of its asserted grounds of unpatentability. Rather, we determined that the Petition demonstrated a reasonable likelihood that Petitioner would prevail with respect to at least 1 of the claims challenged in the Petition. Dec. on Inst. 2; 35 U.S.C. § 314(a). As we have noted *supra*, the Petition refers to Brandt's Figure 9 and to the Kahn Declaration's

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<sup>6</sup> We authorized Patent Owner to file a paper pointing out where Petitioner's Reply contained material that it thought to be beyond the scope of a proper reply. Paper 30.



discussion (Ex. 1011) of what the artisan would take from the relevant teachings. Although we did not institute trial with respect to all grounds asserted in the Petition, the fact that the Decision on Institution did not specifically address all aspects of the Petition's reliance on Brandt did not, somehow, remove portions of the reference from consideration in the trial. In other words, "the trial is decided on the basis of the case presented by the petitioner." Tr. 37:15–17 (quoting Patent Owner's counsel).

Claim 33 depends from claim 29 and recites "further comprising a field lens located near said element." For the "field lens" requirement, the teachings of EP '630 may be considered merely cumulative because Brandt discloses a field lens (Fig. 2, lens 34) near the element (display panel 1). Pet. 33; Ex. 1011 ¶ 161; Ex. 1003, col. 13, ll. 34–37.

Patent Owner argues that the combination applied against dependent claim 33 "does not even arguably include any prism structures, a construed requirement of [base] claim 29." PO Resp. 51.

For purposes of the Decision on Institution, we construed the "means for focusing" of claim 29 as requiring the corresponding structure of focusing lenses 6560 ('347 patent Fig. 65) and "the unnumbered prisms near foci 6550." Dec. on Inst. 12. We noted previously in the Decision, however, that according to Petitioner the patent discloses a set of "prisms or mirrors" near foci 6550 to reduce beam size. *Id.* at 8–9. Although Figure 65 of the '347 patent appears to show unnumbered "prisms" near foci 6550, the patent makes clear that "prisms or mirrors" may serve interchangeably. Ex. 1001, col. 38, ll. 49–57 (describing corresponding Fig. 62 structures). Thus, we need not modify our construction of the "means for focusing" to include corresponding structure of prisms or "mirrors" near foci 6550 in the Figure

65 embodiment, because the patent teaches that “mirrors” are the structural equivalents of “prisms” in performing the function associated with the “means for focusing.” We are persuaded that claim 33 does not require “prism” structures, but may be met by “mirror” structures.

Upon review of the Petition and supporting evidence, and Patent Owner’s evidence and arguments in response, we determine that Petitioner has demonstrated, by a preponderance of the evidence, claim 33 is unpatentable for obviousness over Brandt and EP ’630.

*D. Claims 48 and 69 — Brandt and Sato*

Petitioner applies the teachings of Brandt and Sato to demonstrate the obviousness of claims 48 and 69. Pet. 41–51. Claim 48 depends from claim 47 and recites that the “enhancing means” includes a Fresnel polarizer means. As noted in the claim construction section (§ II.A.4, *supra*), on this record we construe “Fresnel polarizer means” as recited in claims 48 and 69 as a polarizer constructed with stepped, sawtooth-like elements so as to have the optical properties of a much thicker polarizer.

Base claim 47 recites “means for enhancing brightness of an image by shaping a beam illuminating said electronic image-forming element such that the shape of the beam substantially matches the shape of said electronic image-forming element.” Petitioner submits that the limitations of claim 47 are present in Brandt, including structures from Brandt’s Figure 2 that are deemed to be the same or equivalent to structures in the ’347 patent corresponding to the “means for enhancing.” Pet. 17–19, 44–46. Again, Petitioner focuses on the ’347 patent’s Figure 65 embodiment. *Id.* at 43. Similar to the challenge of claim 29, Petitioner admits that Brandt’s Figure 2

does not include prisms or similar optical elements as described in the patent's Figure 65 embodiment. *Id.* at 44.

Petitioner submits, further, that Sato discloses a Fresnel polarizer in Figure 7. Pet. 47; Ex. 1011 ¶¶ 173–75. Petitioner also contends that Sato teaches using such a polarizing beam splitter to increase display brightness. Pet. 52–53; Ex. 1011 ¶ 124. *See, e.g.*, Ex. 1006, col. 2, ll. 17–26 (all of the light transmitted through a polarizing beam splitter can be utilized in the display panel); col. 6, ll. 46–48.

Claim 69 recites limitations similar to those of claims 48 and 49, including an “enhancing means” that includes a Fresnel polarizer means. Petitioner refers, in large part, to its analysis of claims 48 and 49. Pet. 50–51.

Patent Owner alleges that a combination of Brandt and Sato “would render Sato unsatisfactory for its intended purpose.” PO Resp. 54. According to Patent Owner, “[n]o matter where Sato’s structure (Figure 7) is incorporated into Brandt (Figure 2), the purpose of using Sato’s system—uniform polarization—would be substantially diminished.” *Id.* However, as we noted in our Decision on Institution, the asserted ground of obviousness does not propose to modify anything in Sato. Dec. on Inst. 22. The asserted ground proposes to modify the apparatus of Brandt in view of the teachings of Sato.

In the case of *In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984), our reviewing court found that turning upside down a liquid strainer that removes dirt and water from gasoline and other light oils would render the apparatus “inoperable for its intended purpose.” 733 F.2d at 901–02. Similarly, a predecessor of our reviewing court instructed that if references

in combination would produce a “seemingly inoperative device,” such references teach away from the combination. *In re Spinnoble*, 405 F.2d 578, 587 (CCPA 1969). In this case, however, Petitioner’s asserted ground of obviousness is based on modification of Brandt in view of the teachings of Sato with regard to a Fresnel polarizer. Patent Owner’s alleged “intended purpose” of Sato does not persuade us that the proposed modification of adding a Fresnel polarizer to Brandt would render Brandt unsatisfactory for its intended purpose, or result in an inoperable device. The “intended purpose” in *Gordon* was to separate dirt and water from light oils. 733 F.2d at 901–02. Brandt’s “intended purpose” is to illuminate a display panel. Ex. 1003, *e.g.*, col. 2, ll. 50–58.

Patent Owner in its Patent Owner Response does not cite any authority in support of the proposition that a combination rendering unsatisfactory the “intended purpose” of Sato, even if it did, would be fatal to the conclusion of obviousness. At the oral hearing, however, Patent Owner’s counsel suggested that Federal Circuit precedent supports that view:

MR. GREENSPOON: Well, the argument I’m focusing on is a valid discussion under obviousness law in cases such as *Intelligent Bio-Systems* where if — it’s about the reason to combine and the fact of combining. If you have a reference, like a secondary reference that would become inappropriate for its role when it is combined, then that means you can conclude that a person of skill in the art would not have a reason to combine it. So you do have to go into a discussion of whether it plays its proper role when it’s in its proposed combination.

Tr. 28:6–14.

The decision in *Intelligent Bio-Systems, Inc. v. Illumina Cambridge LTD*, 821 F.3d 1359 (Fed. Cir. 2016), does not support Patent Owner’s apparent position but is, in fact, to the contrary. Our reviewing court held:

The Board seemed to believe that the “reasonable expectation of success” inquiry looked to whether one would reasonably expect the prior art references *to operate as those references intended once combined*. That is not the correct inquiry—one must have a motivation to combine accompanied by a reasonable expectation of achieving *what is claimed in the patent-at-issue*.

821 F.3d at 1367 (emphases added). The proper inquiry, thus, concerns *what is claimed* — not whether all the “intended purposes” in references in combination are preserved.

Upon review of the Petition and supporting evidence, and Patent Owner’s evidence and arguments in response, we determine that Petitioner has demonstrated, by a preponderance of the evidence, claims 48 and 69 are unpatentable for obviousness over Brandt and Sato.

#### *E. Patent Owner’s Motion to Exclude*

Patent Owner moves to exclude Petitioner’s Exhibits 1015,<sup>7</sup> 1018,<sup>8</sup> and 1019.<sup>9</sup> PO Mot. to Exclude 4.

Petitioner’s Reply refers to Exhibit 1015 (but not by number) as disclosing an element that includes polarization conversion and a multi-layer

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<sup>7</sup> Kawasaki et al., EP 0 508,413 A2, pub. Oct. 14, 1992.

<sup>8</sup> Walter G. Driscoll and William Vaughan, *Handbook of Optics*, McGraw-Hill, Inc. 8-1–8-3, 8-44–8-52.

<sup>9</sup> Mitsutake et al., US 5,566,367, iss. Oct. 15, 1996.

optical coating. Pet. Reply 25–26. This Final Written Decision does not rely on Exhibit 1015, as we have determined that the claimed “Fresnel polarizer” does not require a multi-layer optical coating or polarization conversion.

*See* § II.A.4, *supra*.

Petitioner’s Reply refers to Exhibit 1018 as an example of coatings appropriate for constructing polarization converters. Pet. Reply 21–22. This Final Written Decision does not rely on Exhibit 1018, as we have determined that the claimed “Fresnel polarizer” does not require polarization conversion.

Petitioner’s Reply refers to Exhibit 1019 in a discussion of polarization conversion. Pet. Reply 25. This Final Written Decision does not rely on Exhibit 1019.

Patent Owner also moves to exclude certain testimony that addresses Exhibit 1015 and dielectric coatings. PO Mot. to Exclude 8–9.

We have determined that Petitioner has demonstrated, by a preponderance of the evidence, that the challenged claims are unpatentable, without requiring the evidence provided in Exhibits 1015, 1018, and 1019, and arguments and testimony regarding Exhibit 1015 and dielectric coatings. We did not, and need not, consider such arguments or evidence in connection with the Reply. Accordingly, we *dismiss* Patent Owner’s motion to exclude as moot.

### III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 29, 30, and 32 of the ’347 patent are unpatentable under 35 U.S.C. § 103(a) as obvious in

view of Brandt and Uchiyama, claim 33 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Brandt and EP '630, and claims 48 and 69 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Brandt and Sato.

#### IV. ORDER

It is

ORDERED that claims 29, 30, 32, 33, 48, and 69 of the '347 patent are held unpatentable; and

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

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Patent 7,688,347 B2

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