

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE USA CORPORATION,
Petitioner,

v.

BRIGHTPLUS VENTURES LLC,
Patent Owner.

IPR2023-01168
Patent 9,605,835 B2

Before MICHELLE N. WORMMEESTER, KEVIN C. TROCK, and
JOHN D. HAMANN, *Administrative Patent Judges*.

WORMMEESTER, *Administrative Patent Judge*.

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

I. INTRODUCTION

Hisense USA Corporation (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–5 and 7–14 of U.S. Patent No. 9,605,835 B2 (Ex. 1001, “the ’835 patent”). Brightplus Ventures LLC (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”).

We have authority under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a). Pursuant to 35 U.S.C. § 314(a), an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” For the reasons that follow, we institute an *inter partes* review as to all the challenged claims of the ’835 patent based on all the challenges presented.

II. BACKGROUND

A. Related Proceedings

The parties identify two pending federal district court cases. *See* Pet. 1; Paper 4 § I.b (Patent Owner’s mandatory notices).

B. The ’835 Patent

The ’835 patent describes solid state lighting panels. Ex. 1001, code (57), 1:21–23. To illustrate one embodiment, Figure 5A of the ’835 patent is reproduced below.

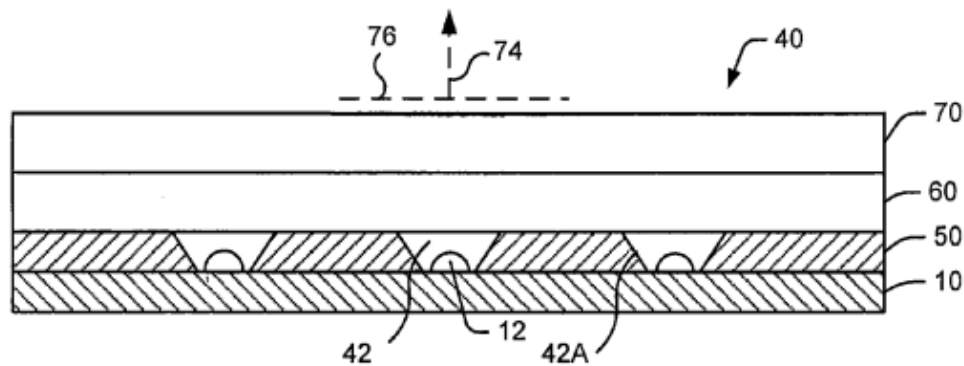


FIGURE 5A

Figure 5A is a cross-sectional view of lighting panel 40, which includes tile 10, lighting elements 12, reflector sheet 50, diffuser sheet 60, and brightness enhancement film 70. *Id.* at 6:17–19, 11:20–59. Lighting panel 40 may include more than one tile 10. *Id.* at 11:20–24. Reflector sheet 50 includes apertures 42 that align with lighting elements 12. *Id.* at 11:35–37. Apertures 42 have sidewalls 42A that are angled relative to the surface of tile 10 to form reflective optical cavities around lighting elements 12. *Id.* at 11:48–51.

In operation, some light rays are emitted by lighting panel 40, while other light rays are reflected back into lighting panel 40 where they may be recycled. Ex. 1001, 12:10–14. Recycling refers to the emission of light rays that are reflected back into lighting panel 40 at a different location or in a different direction. *See id.* at 12:14–15. To illustrate, Figures 6A and 6B of the '835 patent are reproduced below.

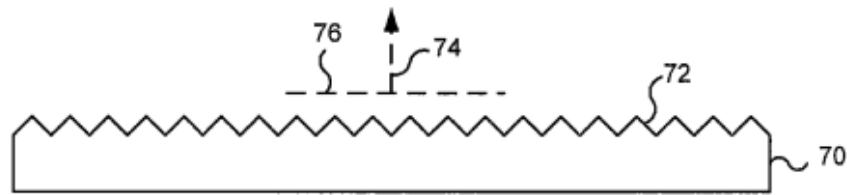


FIGURE 6A

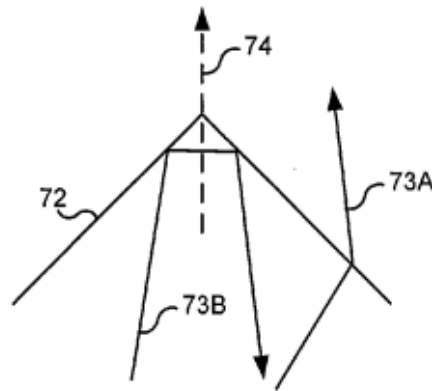


FIGURE 6B

Figures 6A and 6B show brightness enhancement film 70 in more detail. *Id.* at 6:20–22. Brightness enhancement film 70 includes three-dimensional light extraction features 72 with sidewalls that are angled relative to principal plane 76 of lighting panel 40. *Id.* at 12:16–26. Some light rays incident on light extractions 72, such as light ray 73A, are bent toward optical axis 74 when they exit brightness enhancement film 70. *Id.* Optical axis 74 is perpendicular to principal plane 76. *Id.* Other light rays incident on light extractions 72, such as light ray 73B, are internally reflected back into diffuser sheet 60 where they are further recycled and diffused. *Id.*

The '835 patent explains that “[s]uch light recycling may improve the uniformity of emission from the panel 40,” and “increase the on-axis intensity of the emitted light.” Ex. 1001, 12:14–15, 12:26–28.

C. Illustrative Claim

Petitioner challenges claims 1–5 and 7–14 of the '835 patent, where claim 1 is the only independent challenged claim. Claim 1 is illustrative of the claimed invention and is reproduced below.

1. A lighting panel, comprising:
 - at least one substrate having a first side parallel to a principal plane of the lighting panel;
 - a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;
 - a reflector on the first side of the at least one substrate;
 - a brightness enhancement film on the reflector, wherein the reflector is arranged between the at least one substrate and the brightness enhancement film and the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially reflect light having a second orientation, different from the first orientation, back into the lighting panel, and
 - a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet.

Ex. 1001, 22:33–52.

D. Asserted Challenges to Patentability

Petitioner challenges claims 1–5 and 7–14 of the '835 patent as follows. Pet. 4, 11–72.

Claims Challenged	35 U.S.C. § ¹	References/Basis
1–5, 7–14	103	Mok, ² Holman, ³ Lamb, ⁴ knowledge of a POSITA ⁵
1–5, 7–14	103	Epstein, ⁶ Holman, Lamb, knowledge of a POSITA
1–5, 7–14	103	Ko, ⁷ Kretman, ⁸ Epstein, knowledge of a POSITA

In support of its challenges, Petitioner relies on a Declaration of P. Morgan Pattison, Ph.D. (Ex. 1003). Patent Owner relies on a Declaration of William Bohannon (Ex. 2001) to support its Preliminary Response.

III. DISCUSSION

A. Claim Construction

In an *inter partes* review proceeding, we construe a claim of a patent “using the same claim construction standard that would be used to construe

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 103, effective March 16, 2013. Because the application from which the ’835 patent issued claims priority to an application filed before this date, the pre-AIA version of § 103 applies.

² Mok et al., U.S. Publ’n No. 2006/0227545 A1, published Oct. 12, 2006 (Ex. 1005).

³ Holman et al., Int’l Publ’n No. 03/056876 A2, published July 10, 2003 (Ex. 1006).

⁴ Lamb et al., U.S. Publ’n No. 2005/0135115 A1, published June 23, 2005 (Ex. 1007).

⁵ POSITA stands for person of ordinary skill in the art.

⁶ Epstein et al., U.S. Publ’n No. 2005/0265029 A1, published Dec. 1, 2005 (Ex. 1008).

⁷ Ko et al., U.S. Publ’n No. 2006/0082698 A1, published Apr. 20, 2006 (Ex. 1009).

⁸ Kretman et al., U.S. Publ’n No. 2003/0118805 A1, published June 26, 2003 (Ex. 1010).

the claim in a civil action under 35 U.S.C. 282(b).” *See* 37 C.F.R. § 42.100(b). That standard involves construing claims in accordance with the ordinary and customary meaning of such claims as would have been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc).

Petitioner asserts that it “believes that no claim term requires construction.” Pet. 7. Patent Owner proposes a construction for the claim term “on.” Prelim. Resp. 3–5. For purposes of this Decision, we address the claim term “on” below. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

I. “on”

The term “on” appears in several of the challenged claims, including independent claim 1. For example, claim 1 recites “a reflector on the first side of the at least one substrate.”

Patent Owner asserts that Petitioner’s proposed construction of the term “on” in parallel litigation is “directly on the other element or intervening elements may be present.” Prelim. Resp. 3. By contrast, Patent Owner argues that the term “on” means “directly on, or on with intervening elements present,” and adds that “there cannot be an airgap.” *Id.* at 3, 5.

With respect to the first part of its proposed construction (i.e., “directly on, or on with intervening elements present”), Patent Owner points

to the '835 patent's teaching that "when an element such as a layer, region or substrate is referred to as being 'on' or extending 'onto' another element, it can be directly on or extend directly onto the other element or intervening elements may also be present." Prelim. Resp. 4 (quoting Ex. 1001, 6:66–7:3).⁹ Patent Owner asserts that "[t]he disagreement between the parties appears to be of form, rather than substance." *Id.* at 4–5.

We agree with Patent Owner that the parties' disagreement is a matter of form, not substance. That is, we see no meaningful dispute between the parties as to the first part of Patent Owner's proposed construction.

As to the second part of its proposed construction (i.e., "there cannot be an airgap"), Patent Owner asserts that "this is consistent with the purpose of the invention which avoids light loss or light leakage." Prelim. Resp. 5. Patent Owner does not cite any portion of the '835 patent as support, but relies instead on the declaration testimony of Mr. Bohannon. *Id.* (citing Ex. 2001 ¶ 46). Mr. Bohannon merely states that "[a]n air gap makes for a larger, thicker structure with the potential for undesirable light leakage and lower efficiency." Ex. 2001 ¶ 46.

On the record before us, we determine that the second part of Patent Owner's proposed construction is overly narrow. The claim language recites nothing about air gaps, let alone excluding air gaps between layers. Ex. 1001, claim 1. As our reviewing court has explained, "it is the *claims*[] . . . which define the scope of the patent right." *Laitram Corp. v. NEC Corp.*, 163 F.3d 1342, 1347 (Fed. Cir. 1998). Additionally, the '835 patent says that "intervening elements may also be present." Ex. 1001, 6:66–7:3.

⁹ Patent Owner cites "'075 Pat., col. 6:47–51," which does not appear to be of record. The quoted language appears at Ex. 1001, 6:66–7:3.

The '835 patent does not say anything about excluding air gaps between layers. Accordingly, we see no reason why an intervening element would exclude an air gap.

We note that Figure 5A of the '835 patent shows an embodiment where there does not appear to be any air gap between layers. *See* Ex. 1001, Fig. 5A. Nowhere does the written description, however, limit the meaning of “on” to that embodiment. Our reviewing court has “cautioned against limiting the claimed invention to preferred embodiments or specific examples in the specification.” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1346–47 (Fed. Cir. 2015) (quoting *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1328 (Fed. Cir. 2002)). Indeed, the '835 patent states that its “invention may . . . be embodied in many different forms and should not be construed as limited to the embodiments set forth herein.” Ex. 1001, 6:49–51. Moreover, we further note that Figure 5B of the '835 patent shows an embodiment where there *does* appear to be air gaps between layers. *See* Ex. 1001, Fig. 5B.

Read together, the teachings in the '835 patent seem to undercut Patent Owner’s position that claim 1 excludes air gaps between layers. The teachings instead indicate that claim 1 encompasses, but is not limited to, embodiments where there are no air gaps between layers. *See* Ex. 1001, 6:49–51, 6:66–7:3, Figs. 5A, 5B.

2. Summary

As noted above, “we need only construe terms . . . to the extent necessary to resolve the controversy.” *Nidec*, 868 F.3d at 1017. For purposes of this Decision, we do not construe the entire scope of the term

“on.” On the record before us, we determine only that the term “on” does not exclude air gaps between layers, as proposed by Patent Owner. *See* Prelim. Resp. 5.

B. Alleged Obviousness over Mok, Holman, and Lamb

Petitioner asserts that claims 1–5 and 7–14 of the ’835 patent would have been obvious over Mok, Holman, Lamb, and the knowledge of a person of ordinary skill in the art. Pet. 11–35. Patent Owner challenges certain aspects of Petitioner’s analysis for claims 1, 11, and 14. Prelim. Resp. 10–18. For the reasons explained below, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on its asserted challenge as to claims 1–3, 5, 7, and 9–14. We express concerns, however, regarding Petitioner’s analysis for claims 4 and 8.

1. Overview of Asserted References

Before addressing the parties’ arguments, we provide an overview of the asserted references, Mok, Holman, and Lamb.

a. Mok

Mok describes light emitting panels. Ex. 1005 ¶ 7. To illustrate one embodiment, Figure 1 of Mok is reproduced below.

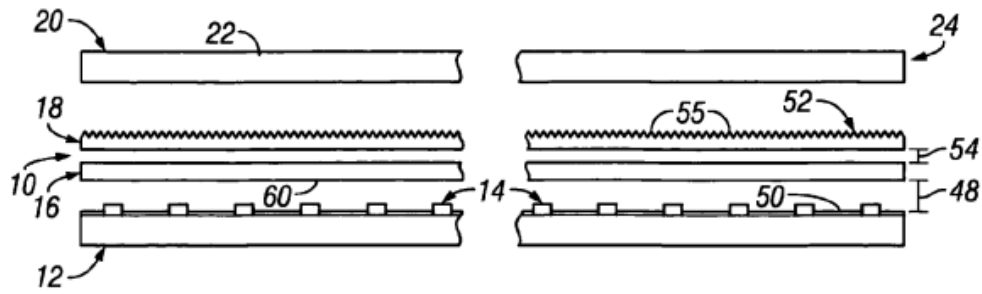


FIG. 1

Figure 1 shows a side view of light emitting panel 10, which is positioned adjacent to display device 20 to form backlit display system 24. *Id.* ¶¶ 10, 15. Display device 20 includes liquid crystal display panel 22. *Id.* ¶ 15.

Light emitting panel 10 includes base panel 12, light emitting elements 14, diffuser 16, and brightness enhancer 18. Ex. 1005 ¶ 15. Base panel 12 includes reflective surface 50, which recycles (i.e., reflects) light that is reflected by back surface 60 of diffuser 16. *Id.* ¶ 21. Reflective surface 50 may be a separate component that is affixed to base panel 12. *Id.*

Diffuser 16 receives and diffuses light produced by light emitting elements 14 and light reflected by reflective surface 50. Ex. 1005 ¶ 22. Diffuser 16 is “adjacent” to base panel 12. *Id.* ¶ 15. For example, diffuser 16 may be separated from base panel 12 by distance 48. *Id.* ¶ 23. Mok explains that “larger spaced-distances 48 will improve the uniformity of the light produced by the panel, but at the expense of panel thickness and some loss of efficiency.” *Id.*

Brightness enhancer 18 includes prisms 55 defined by front surface 52 of brightness enhancer 18, which collect light from diffuser 16 and direct it out front surface 52. Ex. 1005 ¶ 24. This maximizes the on-axis brightness of panel 10. *Id.* Brightness enhancer 18 is “adjacent” to diffuser 16. *Id.* ¶ 15. For example, brightness enhancer 18 may be separated from

Figure 7 shows a side view of a light source panel optical system. *Id.* at 150.¹⁰ The optical system comprises various components, including emitting entities 72 with LEDs 70 and emitting apertures 24, diffuser 68, structure 84 with sidewalls 85, prism sheets 58 and 60, and output screen 28. *Id.* at 10–11, 13, 36–37, 39. With respect to the prism sheets, Holman explains,

One unique aspect of elevated prism sheets 58 and 60 . . . is that they do not have to exhibit the extreme standards in cosmetic perfection that have been associated with 3M's BEF in direct view brightness enhancement applications. Cosmetic defects in 3M's BEF are directly viewable through the LCD display screens beneath which they are used. And, the LCD viewing standard is for zero viewing defects. Accordingly, extreme quality measures are taken during BEF's manufacturing, packaging and handling to prevent cosmetic damage to the prism substrate and prism tips, which are extremely fragile. Preventative measures include discarding all damaged BEF sheets. No such costly measures are needed with present prism sheets 58 and 60. Cosmetic defects in prism sheets 58 and 60 cannot be directly viewed, and are therefore much less critical to function. Some degree of spatial mixing has been included above the prism sheets that blur or totally homogenize any visual defects local prism imperfections might contribute.

Id. at 121.

¹⁰ Our citations to Holman, as well as Patent Owner's citations to Holman, refer to the original page numbers in Holman. Petitioner's citations to Holman refer to the assigned Bates numbers in Holman.

c. Lamb

Lamb relates to backlighting systems. Ex. 1007, code (57). As background, Lamb describes a “traditional direct-lit backlight.” *Id.* ¶ 34. To illustrate, Figure 1 of Lamb is reproduced below.

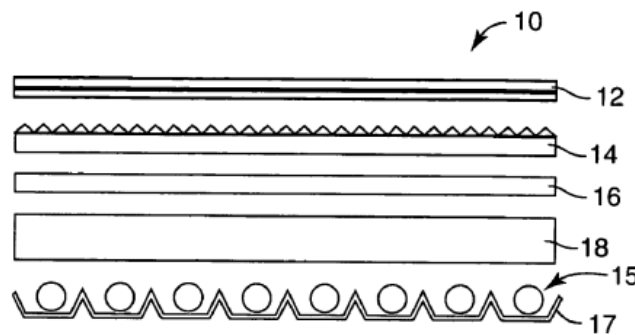


FIG. 1
PRIOR ART

Figure 1 shows a “cross-sectional view of a presently available direct-lit backlight for LCD televisions.” *Id.* ¶ 20. Backlight 10 includes light bulbs 15, reflector 17, diffuse plate 18, diffuser sheet 16, enhancement film 14, and reflective polarizer 12. *Id.* ¶¶ 34–35.

Lamb specifies that its enhancement film 14 may comprise “Vikuiti™ Brightness Enhancement Film BEF, available from 3M Company.” Ex. 1007 ¶ 35. Lamb explains that enhancement film 14 refracts light within a certain angle toward the viewer. *Id.* According to Lamb, light outside that angle is recycled, which means that it is reflected back into backlight 10 where it travels within the system until it reaches the appropriate angle for exiting the system. *Id.*

2. Analysis of Claims 1–5 and 7–14

We turn now to the claims, starting with independent claim 1.

a. Independent Claim 1

Claim 1 is directed to a “lighting panel” comprising a “substrate,” a “plurality of solid state lighting devices,” a “reflector,” and a “generally planar diffuser.” Claim 1 recites various limitations associated with these claim elements, which Petitioner designates as limitations 1A through 1G. We address each limitation in turn.

i. Limitation 1A: “substrate”

Claim 1 recites “at least one substrate having a first side parallel to a principal plane of the lighting panel.” For this limitation, which Petitioner designates as limitation 1A, Petitioner identifies Mok’s base panel 12 as a “substrate.” Pet. 15. As support, Petitioner directs us to where Mok teaches that its “base panel 12 provides a convenient mounting location for the various light emitting elements 14.” *Id.* (quoting Ex. 1005 ¶ 19). Petitioner also directs us to Figure 1 of Mok, reproduced below. *Id.*

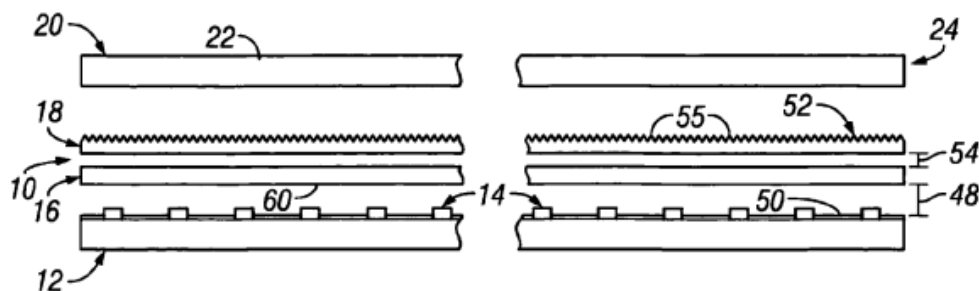


FIG. 1

Figure 1 of Mok shows a side view of light emitting panel 10. Ex. 1005 ¶¶ 10, 15. Petitioner asserts that “the base panel 12 is shown as parallel to [the] principal plane of lighting panel 10.” Pet. 15.

Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and

evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Mok teaches the recited “substrate” of limitation 1A.

ii. Limitation 1B: “solid state lighting devices”

Claim 1 further recites “a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light.” For this limitation, which Petitioner designates as limitation 1B, Petitioner identifies Mok’s light emitting elements 14 as “solid state lighting devices.” Pet. 16. As support, Petitioner directs us to where Mok teaches that its “base panel 12 provides a convenient mounting location for the various light emitting elements 14, allowing them to be arranged in a two dimensional array or pattern over both the length 38 and width 40 of the base panel 12.” *Id.* (citing Ex. 1005 ¶ 19, Fig. 2). Petitioner further asserts that “[t]he various lighting emitting elements described in Mok are LEDs, which are ‘sol[i]d state lighting devices.’” *Id.* (citing Ex. 1005 ¶ 29 (discussing use of LEDs)); *see also* Ex. 1005 ¶ 33 (discussing “utilizing white light emitting LEDs for the light emitting elements 14”). Petitioner relies on the declaration testimony of Dr. Pattison. Pet. 16 (citing Ex. 1003 ¶ 44).

Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Mok teaches the recited “solid state lighting devices” of limitation 1B.

iii. Limitation 1C: “reflector”

Claim 1 further recites “a reflector on the first side of the at least one substrate.” For this limitation, which Petitioner designates as limitation 1C, Petitioner identifies Mok’s reflective surface 50 as a “reflector.” As support, Petitioner directs us to where Mok teaches that its “reflective surface 50 may comprise a separate component (e.g., a sheet-like material) that is affixed to the base panel 12.” Pet. 16 (quoting Ex. 1005 ¶ 21). Petitioner also directs us to Figure 1 of Mok, reproduced below. *Id.* at 16–17.

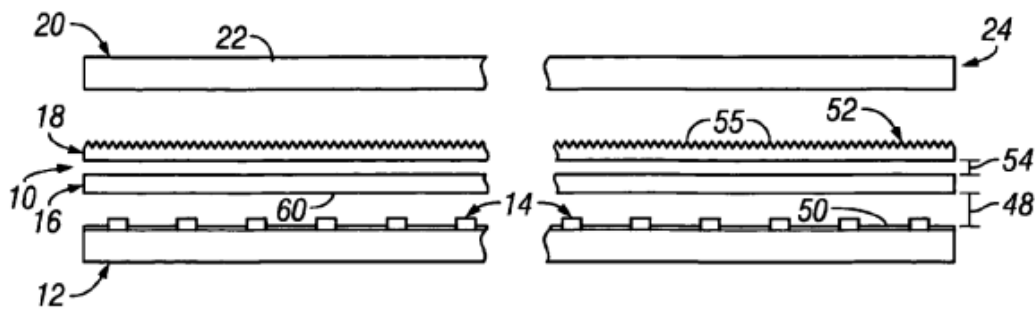


FIG. 1

Figure 1 of Mok shows a side view of light emitting panel 10. Ex. 1005 ¶¶ 10, 15. Petitioner asserts that “Mok Figure 1 . . . demonstrates how the reflective surface is on the first side of the base panel or substrate.” Pet. 16.

Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Mok teaches the recited “reflector” of limitation 1C.

iv. Limitation 1D: “brightness enhancement film”

Claim 1 further recites “a brightness enhancement film on the reflector.” For this limitation, which Petitioner designates as limitation 1D, Petitioner presents two theories. The first theory relies solely on Mok, and the second theory relies on the combined teachings of Mok and Holman.

For its first theory, Petitioner identifies Mok’s brightness enhancer 18 as a “brightness enhancement film.” Pet. 17. As support, Petitioner asserts that Mok’s “brightness enhancer collects light from the diffuser 16 and directs it out the front surface 52 of the brightness enhancer 18, thereby maximizing the on-axis brightness of the panel.” *Id.* (citing Ex. 1005 ¶ 24). Petitioner further directs us to where Mok teaches that its “brightness enhancer 18 comprises a brightness enhance film (BEF) available from 3M and sold under the registered trademark Vikuiti®.” *Id.* (citing Ex. 1005 ¶ 24).

Petitioner also directs us to Figure 1 of Mok, reproduced below. Pet. 17–18.

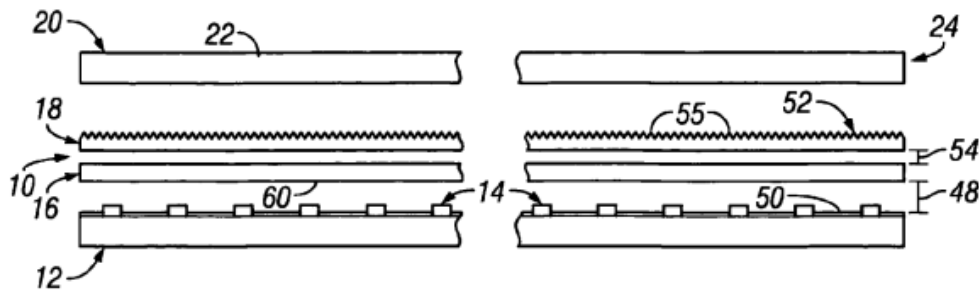


FIG. 1

Figure 1 of Mok shows a side view of light emitting panel 10. Ex. 1005 ¶¶ 10, 15. Petitioner asserts that “Mok shows the diffuser [16] and air gaps [48, 54] as intervening elements such that the BEF [18] is on the reflector [50].” Pet. 17–18.

Under its second theory, Petitioner asserts that, “[t]o the extent that an air gap is not an intervening element, . . . Holman describes and shows a BEF on a reflector sheet without an intervening air gap.” Pet. 18. Petitioner identifies each of Holman’s prism sheets 58 and 60 as a “brightness enhancement film.” *Id.* As support, Petitioner directs us to where Holman teaches that its prism sheets “may be one of the 90-degree offerings manufactured by the Minnesota Mining & Manufacturing Company (3M) under the trade name BEF, as in brightness enhancement film.” *Id.* (citing Ex. 1006, 8–9). Petitioner further asserts that “Holman discloses that prism sheets 58 and 60 are on the reflector (i.e., ‘reflecting layer 76’) via intervening elements that include ‘confining structure 72,’ ‘diffusely scattering layer 68,’ ‘compartmentalized spacer layer 84’ and ‘sidewalls 85.’”¹¹ *Id.* at 18–19 (internal citations omitted) (citing Ex. 1006, 16, 37–38, 44). Petitioner adds that Figure 7 of Holman “show[s] a ‘stacked’ arrangement where the BEF (58) is ‘on’ the reflector (76).” *Id.* at 19. To illustrate, Figure 7 of Holman is reproduced below.

¹¹ Petitioner’s citations to Holman do not appear to include any references to a “reflecting layer 76.” This does not affect the outcome of our analysis at this stage of the proceeding.

FIG. 7

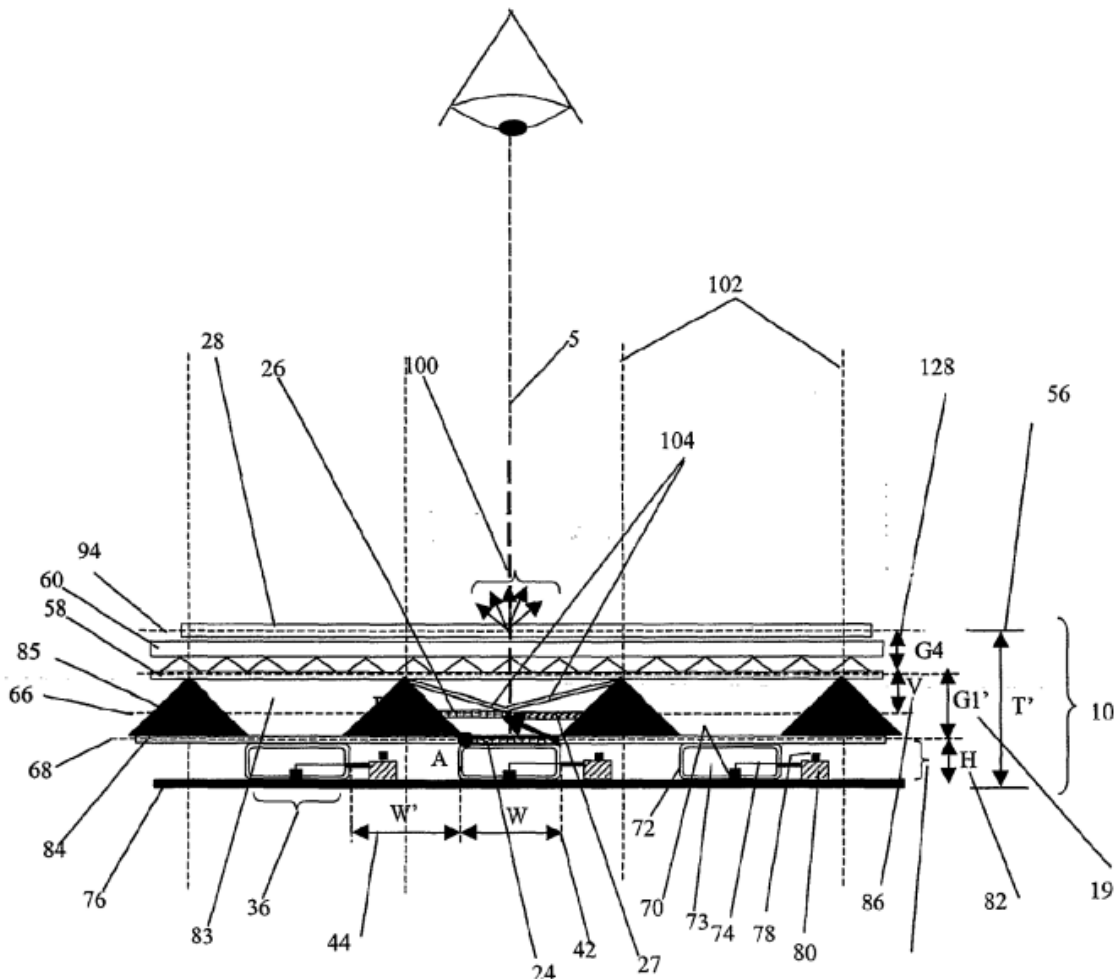


Figure 7 of Holman shows a side view of a light source panel optical system. Ex. 1006, 150. Petitioner contends that “[i]t would have been obvious to modify Mok’s layer arrangement using Holman’s teachings because there is a general pressure in the art to reduce the thickness of panels, among other reasons.” Pet. 20.

With respect to Petitioner’s first theory (which relies solely on Mok), Patent Owner argues that “the [claim] term ‘on’ requires that the BEF be ‘directly on’ the diffuser or with intervening elements present,” and that “[t]he air gap in Mok does not disclose this element.” Prelim. Resp. 11.

Here, the air gap to which Patent Owner is referring is distance 48 between diffuser 16 and reflective surface 50 of base panel 12. *See id.*; Ex. 1005, Fig. 1.

We disagree with Patent Owner. As discussed above in the claim construction section, we determine that the term “on” does not exclude air gaps between layers. *See supra* Part III.A. Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for limitation 1D.

Moreover, Mok does not appear to require an air gap between its diffuser and reflective surface (of the base panel). Mok teaches that its “diffuser 16 . . . is positioned ***adjacent*** the base panel 12,” and that “[t]he diffuser 16 ***may be*** mounted in front of the base panel 12 and ***separated therefrom by a spaced-distance*** 48.” Ex. 1005 ¶¶ 15, 23 (emphases added). Additionally, Mok teaches that its “brightness enhancer 18 . . . is positioned ***adjacent*** the diffuser 16,” and that “the brightness enhancer 18 is ***preferably stacked directly on (or applied to)*** the diffuser 16, thereby minimizing or eliminating the distance 54.” *Id.* ¶¶ 15, 25 (emphases added). Read together, these teachings suggest that Mok contemplates stacking diffuser 16 directly on reflective surface 50 of base panel 12.

With respect to Petitioner’s second theory (which relies on the combined teachings of Mok and Holman), Patent Owner argues that Holman’s “prism sheets 58 and 60 are not BEFs as used in the ’835 Patent.” Prelim. Resp. 12. As support, Patent Owner asserts that “Holman differentiates between prism[] sheets and BEFs.” *Id.* (citing Ex. 1006, 121). Patent Owner points in particular to Holman’s teaching,

One unique aspect of elevated prism sheets 58 and 60 as used in all previous illumination examples, is that they do not have to exhibit the extreme standards in cosmetic perfection that have

been associated with 3M's BEF in direct view brightness enhancement applications. . . . Preventative measures include discarding all damaged BEF sheets. No such costly measures are needed with present prism sheets 58 and 60. Cosmetic defects in prism sheets 58 and 60 cannot be directly viewed

Ex. 1006, 121.

We disagree with Patent Owner. The cited teaching in Holman does not differentiate between Holman's prism sheets and BEFs, as Patent Owner contends. *See* Prelim. Resp. 12. Rather, the cited teaching in Holman explains that Holman's prism sheets do not have to be cosmetically perfect because "[c]osmetic defects in prism sheets 58 and 60 cannot be directly viewed" in Holman's system. Ex. 1006, 121. Indeed, as Petitioner points out, Holman teaches that its prism sheets "may be one of the 90-degree offerings manufactured by the Minnesota Mining & Manufacturing Company (3M) under the trade name BEF, as in brightness enhancement film." *Id.* at 7–8 (cited by Pet. 18). Accordingly, Patent Owner's argument does not undermine Petitioner's showing for limitation 1D.

Patent Owner further argues that an ordinarily skilled artisan would not be "motivated to use the teachings of Holman to modify Mok to arrive at [limitation 1D]." Prelim. Resp. 13. Patent Owner asserts that Petitioner "claims it would've been obvious to modify Mok's layer arrangement using Holman's teachings because *there is a general pressure in the art to reduce the thickness of panels,*" but, according to Patent Owner, "Mok specifically teaches away from this reasoning." *Id.* at 12 (citing Pet. 20). As support, Patent Owner points to Mok's teaching that "*larger spaced-distances 48 will improve the uniformity of the light produced by the panel, but at the*

expense of panel thickness and some loss of efficiency.” Id. (quoting Ex. 1005 ¶ 23) (emphasis added by Patent Owner).

We disagree with Patent Owner. Although a larger distance between the diffuser and the reflective surface of the base panel may improve light uniformity, Patent Owner essentially alleges there would be tradeoffs in combining Mok and Holman to reduce panel thickness. Our reviewing court, however, has explained that “[t]he fact that [a] motivating benefit comes at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another.” *See Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000). The relative advantages (e.g., reduced panel thickness) and disadvantages (e.g., reduced light uniformity) of modifying Mok’s lighting panel to include Holman’s stacking arrangement amount to a tradeoff, a decision well within the level of an ordinarily skilled artisan. Indeed, Mok acknowledges this tradeoff. *See* Ex. 1005 ¶ 23 (“Generally speaking, larger spaced-distances 48 will improve the uniformity of the light produced by the panel, but at the expense of panel thickness and some loss of efficiency.”). Accordingly, Patent Owner’s teaching away argument does not undermine Petitioner’s showing for limitation 1D.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that limitation 1D is satisfied under both theories. With respect to Petitioner’s first theory, we are persuaded that Mok’s brightness enhancer 18 teaches the recited “brightness enhancement film” of limitation 1D. With respect to Petitioner’s second theory, we are persuaded that Petitioner’s proposed combination of Mok and Holman teaches the recited “brightness enhancement film” of limitation 1D. We also

are persuaded that Petitioner’s proffered reasoning for modifying Mok’s lighting panel to include Holman’s stacking arrangement, namely, to reduce panel thickness, is sufficient to support institution. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (“[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”).

v. Limitation 1E: arrangement of “reflector”

Claim 1 further recites that “the reflector is arranged between the at least one substrate and the brightness enhancement film.” For this limitation, which Petitioner designates as limitation 1E, Petitioner asserts that “Mok describes and shows a reflector (reflective surface 50) as between a substrate, which is the base panel 12, and BEF (brightness enhancer 18).” Pet. 20. As support, Petitioner directs us to Figure 1 of Mok, reproduced below. *Id.* at 20–21.

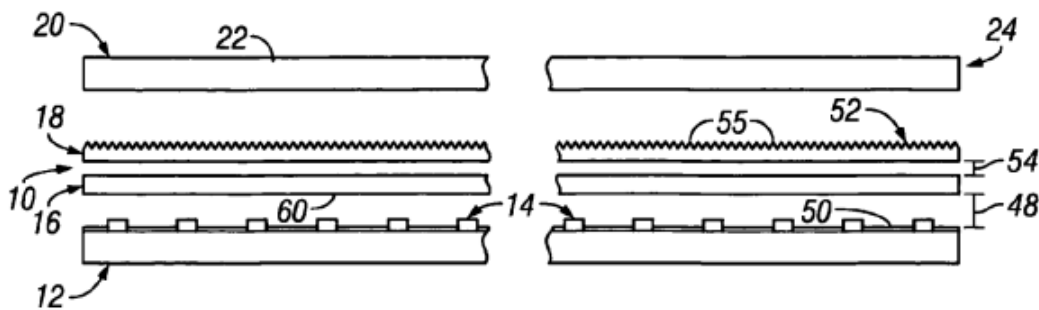


FIG. 1

Figure 1 of Mok shows a side view of light emitting panel 10. Ex. 1005 ¶¶ 10, 15.

Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and

evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Mok teaches the recited arrangement of the reflector of limitation 1E.

vi. Limitation 1F: configuration of “brightness enhancement film”

Claim 1 further recites that “the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially reflect light having a second orientation, different from the first orientation, back into the lighting panel.” For this limitation, which Petitioner designates as limitation 1F, Petitioner relies on the combined teachings of Mok and Lamb. Petitioner directs us to where Mok teaches that its “brightness enhancer 18 comprises a brightness enhance film (BEF) available from 3M and sold under the registered trademark Vikuiti®.” Pet. 22 (citing Ex. 1005 ¶ 24). Petitioner also directs us to where Lamb describes “a layer of enhancement film 14 having prismatic surface structures, such as Vikuiti™ Brightness Enhancement Film BEF, available from 3M Company.” *Id.* (citing Ex. 1007 ¶ 35). That is the same 3M product described in Mok. Lamb explains that its “enhancement film 14 refracts light within a certain angle toward the viewer,” and that “[l]ight outside that angle is ‘recycled,’ i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system.” Ex. 1007 ¶ 35 (cited by Pet. 22).

Petitioner contends that “[i]t would have been obvious to use the BEF disclosed in Lamb in Mok’s lighting panel because it both increases on axis light, a desirable feature recognized by Lamb and Mok, and increases

efficiency by recycling light, another desirable feature of lighting panels.”
Pet. 23; *see also id.* at 22 (citing Ex. 1005 ¶ 15), 24 (citing Ex. 1007 ¶ 45).

Patent Owner responds that “the 3M product [described in Mok] is not a brightness enhancement film because it does not recycle light as required of a ‘brightness enhancement film’ as claimed in the ’835 patent.” Prelim. Resp. 13. According to Patent Owner, “[t]he ‘brightness enhancement film’ as taught in the ’835 Patent has 2 angles, one that emits (e.g. passes) light and one that reflects light to be recycled.” *Id.*

We disagree with Patent Owner. As discussed above, the 3M product described in Mok is also described in Lamb. Ex. 1005 ¶ 24 (“[T]he brightness enhancer 18 comprises a brightness enhance film (BEF) available from 3M and sold under the registered trademark Vikuiti®.”); Ex. 1007 ¶ 35 (“The traditional backlight 10 further includes . . . a layer of enhancement film 14 having prismatic surface structures, such as Vikuiti™ Brightness Enhancement Film BEF, available from 3M Company.”). Lamb explains that “[t]he enhancement film 14 [the 3M product] refracts light within a certain angle toward the viewer,” and that “[l]ight outside that angle is ‘recycled,’ i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system.” Ex. 1007 ¶ 35. Contrary to Patent Owner’s position, the 3M product described in both Mok and Lamb does have two angles, one at which light is emitted and one at which light is reflected to be recycled. Patent Owner’s argument thus fails to undermine Petitioner’s showing for limitation 1F.

Patent Owner further argues that an ordinarily skilled artisan “would not be motivated to combine Lamb with Mok and/or Holman.” Prelim. Resp. 13 (capitalization and emphasis omitted). Patent Owner asserts that

“Mok and Holman are directed to solving problems using a compact and efficient backlight,” whereas Lamb “discloses a system for illuminating a display that would now be commonly known as ‘edge lighting.’” *Id.* at 13–14. According to Patent Owner, Lamb’s system is incompatible with a backlighting system. *Id.* at 14–16.

By focusing on whether Lamb’s system is compatible with a backlighting system, Patent Owner disregards Lamb’s broader teaching that the 3M product already described in Mok emits light having a first orientation from the lighting panel and reflects light having a second orientation back into the lighting panel. Our reviewing court has explained that “[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,” but, “[r]ather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981). That Mok describes using the 3M product as its brightness enhancer and that Lamb describes using the same 3M product as its enhancement film is sufficient reason for combining Mok and Lamb. *See* Ex. 1005 ¶ 24; Ex. 1007 ¶ 35. Petitioner need only show that Lamb’s enhancement film would have been a “suitable option” for implementation in Mok’s lighting panel. *See Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023). Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for limitation 1F.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that its proposed combination of Mok and Lamb teaches the recited configuration of the brightness

enhancement film of limitation 1F. We also are persuaded that Petitioner’s proffered reasoning for modifying Mok’s lighting panel to include Lamb’s enhancement film, namely, to increase on axis light and to increase efficiency by recycling light, is sufficient to support institution. *See Kahn*, 441 F.3d at 988; *see also Intel*, 61 F.4th at 1381 (explaining that the petitioner need only show that the proposed combination would have provided a “suitable option”).

vii. *Limitation 1G: “diffuser sheet”*

Lastly, claim 1 recites “a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet.” For this limitation, which Petitioner designates as limitation 1G, Petitioner identifies Mok’s diffuser 16 as a “diffuser sheet.” As support, Petitioner directs us to Figure 1 of Mok, reproduced below. Pet. 23–24.

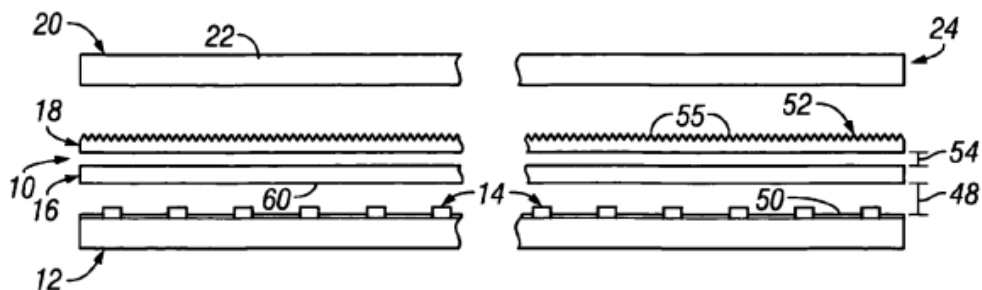


FIG. 1

Figure 1 of Mok illustrates a side view of light emitting panel 10. Ex. 1005 ¶¶ 10, 15. We note that Figure 1 shows Mok’s diffuser 16 between reflective surface 50 and brightness enhancer 18. *See id.*, Fig. 1. Petitioner asserts that “Figure 1 also shows the diffuser 16 as a planar sheet.” Pet. 23.

As discussed above with respect to limitation 1F, Petitioner’s proposed combination of Mok and Lamb replaces Mok’s brightness enhancer 18 with Lamb’s enhancement film 14. Pet. 23. Lamb explains that “[t]he enhancement film 14 refracts light within a certain angle toward the viewer,” and that “[l]ight outside that angle is ‘recycled,’ i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system.” Ex. 1007 ¶ 35 (cited by Pet. 22). Petitioner asserts that “[b]ecause light having a second orientation will be reflected back into the diffuser sheet in Mok . . . , the reflected light will be recycled within the diffuser sheet.” Pet. 24; *see also* Ex. 1005, Fig. 1.

Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Mok teaches the recited “diffuser sheet” of limitation 1G.

b. Dependent Claims 2–5 and 7–10

Claims 2–5 and 7–10 depend from claim 1, either directly or indirectly. Patent Owner does not separately challenge Petitioner’s analysis for these dependent claims. Having reviewed Petitioner’s arguments and evidence for these claims, we are persuaded that Petitioner’s showing for claims 2, 3, 5, 7, 9, and 10 is sufficient for purposes of this Decision. *See* Pet. 25–32 (citing, e.g., Ex. 1003 ¶¶ 60, 94–95; Ex. 1005 ¶¶ 19, 21, 24, Figs. 1, 2; Ex. 1006, 8; Ex. 1007 ¶¶ 45, 52). We express concerns, however, regarding Petitioner’s analysis for claims 4 and 8.

i. Claim 4

Claim 4 depends from claim 1 and recites “at least one additional layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light.” For this limitation, Petitioner asserts that “Mok discloses a BEF 18, and Lamb discloses a recycling enhancement structure 314 that includes a BEF.” Pet. 26 (citing Ex. 1007 ¶ 57). Petitioner further asserts that Lamb’s recycling enhancement structure 314 is between a first lightguide 330 and a second lightguide 340,” where “[l]ight extraction from the second lightguide 340 may be accomplished by placing an extractor 343, preferably a diffuse extractor, at a surface of the lightguide 340.” *Id.* (quoting Ex. 1007 ¶ 58); *see also* Ex. 1007, Fig. 4.

Although we are persuaded that Petitioner’s proposed combination of Mok and Lamb teaches the recited “additional layer” of claim 4, we find that Petitioner does not articulate sufficient reason for combining Mok and Lamb to provide the “additional layer.” *See* Pet. 26–27 (“As discussed above, a POSITA would be motivated to combine Mok with Lamb.”). Petitioner asserts that an ordinarily skilled artisan “would have been motivated to modify the light emitting panel described in Mok to include . . . Lamb’s BEF functionality including three-dimensional light extraction features, and a diffuser sheet between the reflector and the BEF.” *Id.* at 12; *see also id.* at 14 (“A POSITA would further have been motivated to apply Lamb’s BEF to the Mok-Holman combination to eliminate thick diffuser plates, provide increased brightness by recycling light, and increase the exit light’s spatial uniformity.”). Petitioner does not address why an ordinarily skilled artisan would have considered combining Mok and Lamb to provide an “additional

layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light,” as required by claim 4.

ii. Claim 8

Claim 8 depends from claim 1 and recites “[t]he lighting panel of claim 1, further comprising a diffuser sheet between the reflector sheet and the brightness enhancement film.” For this limitation, Petitioner identifies Mok’s diffuser 16 as a “diffuser sheet.” Pet. 29. Petitioner asserts that Mok’s “diffuser sheet 16 . . . is between the reflective surface 50 and brightness enhancer 18.” *Id.* (citing Ex. 1005 ¶ 21, Fig. 1). As discussed above with respect to claim limitation 1G, however, Petitioner identifies Mok’s same diffuser 16 as the recited “diffuser sheet” of claim 1. *Id.* at 23–24. The “diffuser sheet” of claim 1 is different than the “diffuser sheet” of claim 8. *See* Ex. 1001, claim 8 (“further comprising a diffuser sheet”). Petitioner does not address how Mok’s diffuser 16 satisfies both the “diffuser sheet” of claim 1 and the further “diffuser sheet” of claim 8.

c. Dependent Claim 11

Claim 11, which depends from claim 9, recites that “the brightness enhancement film is configured to limit direct emission from the lighting panel of light emitted by the plurality of solid state light emitting devices to thereby encourage light recycling/diffusion in the lighting panel.” For this limitation, Petitioner asserts that “Lamb expressly discloses recycling enhancement structures 112 and 114, which are BEFs.” Pet. 32 (citing Ex. 1007 ¶¶ 42, 44–45). In Lamb, “BEF” refers to “Vikuiti™ Brightness Enhancement Film (BEF), available from 3M Company.” Ex. 1007 ¶¶ 35,

45. Petitioner directs us to where Lamb teaches that “the second recycling enhancement structure 114 includes prismatic structures, e.g., prismatic structured film, that would aid in redirecting and recycling light to increase on-axis brightness of the backlight 100 by refracting toward the viewer light within a certain angle and reflecting back light outside that angle.” Pet. 32 (quoting Ex. 1007 ¶ 45). Lamb expressly specifies that “[o]ne example of such prismatic structured films suitable for use within the second recycling enhancement structure 114 is Vikuiti™ Brightness Enhancement Film (BEF), available from 3M Company.” Ex. 1007 ¶ 45.

Patent Owner counters that “Mok does not describe a BEF that preferentially emits light having a certain incident angle,” and that Mok “merely describ[es] reorientation of the light to be more normal to the surface of the display, not recycling the light.” Prelim. Resp. 16.

As discussed above, however, Mok teaches that its “brightness enhancer 18 comprises a brightness enhance film (BEF) available from 3M and sold under the registered trademark Vikuiti®.” Ex. 1005 ¶ 24 (cited by Pet. 22). Lamb describes the same 3M product as “redirecting and recycling light to increase on-axis brightness of the backlight 100 by refracting toward the viewer light within a certain angle and reflecting back light outside that angle.” Ex. 1007 ¶ 45 (cited by Pet. 32). Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for claim 11.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that its proposed combination of Mok and Lamb teaches the recited limitation of claim 11.

d. Dependent Claims 12 and 13

Claims 12 and 13 depend from claim 9. Patent Owner does not separately challenge Petitioner’s analysis for these claims. Having reviewed Petitioner’s arguments and evidence for claims 12 and 13, we are persuaded that Petitioner’s showing for these claims is sufficient for purposes of this Decision. *See* Pet. 33–34 (citing, e.g., Ex. 1003 ¶¶ 96–97, 103–104; Ex. 1005 ¶ 15; Ex. 1006, 70).

e. Dependent Claim 14

Claim 14 depends from claim 1 and recites “a heatsink panel on a second side of the at least one substrate opposite to the first side and configured to draw heat away from the at least one substrate in a direction opposite to a direction of light emission from the at least one substrate.” For this limitation, Petitioner asserts that “Mok . . . discloses the use of [a] printed circuit board for a base panel,” and that an ordinarily skilled artisan “would know that a printed circuit board is a heat sink, as heat is dissipated through electrical connections and the metal base of the printed circuit board.” Pet. 34 (citing Ex. 1005 ¶ 19). Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* (citing Ex. 1003 ¶¶ 124–125).

Petitioner adds that “heat sinks were well known in the art.” Pet. 34. As support, Petitioner asserts that “Holman mentions a need for ‘adequate heat sinking,’” and that “Holman describes a base layer 220 that functions as part of a heat sink.” *Id.* (citing Ex. 1006, 31, 40). Petitioner further asserts that Holman’s “LEDs 70 are mounted to the base layer 220,” that “[l]ight is emitted from the LEDs 70 in a direction away from the base layer 220,” and

that “the base layer draws heat away from the LEDs 70 in the direction opposite the direction of light emission.” *Id.* (citing Ex. 1006, Figs. 7, 13).

According to Petitioner, an ordinarily skilled artisan “would understand that a base layer that is a heat sink could be easily modified so that a heat sink panel was on one side of the base layer as the purpose of a heat sink is to draw heat away from heat sensitive components, such as light emitting devices.” Pet. 34. Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* (citing Ex. 1003 ¶ 126). Dr. Pattison testifies,

Epstein discloses that “[t]he substrate 408 may be provided with a metallic layer on its lower surface (not shown) for extracting heat generated by the LEDs 420. In addition, the conductors 421 may be provided with large area pads 421a to aid in spreading the heat generated by the LEDs 420.” . . . A person of skill in the art would have understand and recognized that a metallic layer for extracting heat is a heatsink panel. The metallic layer for extracting heat is on the opposite side of the substrate as the LEDs, and thus draws heat away from the direction opposite to the direction of light emission.

Ex. 1003 ¶ 126 (citing Ex. 1008 ¶ 54); *see also* Ex. 1008, Fig. 4A. In other words, Petitioner proposes modifying Holman’s base layer 220 by adding a metallic layer (i.e., heatsink panel) to provide an alternative way to implement Holman’s heat sinking mechanism.

Petitioner additionally asserts that an ordinarily skilled artisan “would also be motivated to apply Holman’s heatsink panel to Mok to improve cooling and efficient operation of LEDs.” Pet. 14.

With respect to Petitioner’s reliance on Mok, Patent Owner responds that Mok’s printed circuit board is not a heatsink because it “does not penetrate the substrate,” and “[i]t is not designed, intended or functional to draw heat away from the LEDs without substantially more than being simply

a printed circuit board.” Prelim. Resp. 17. We agree with Patent Owner that Petitioner has not sufficiently shown that a printed circuit board is a heatsink. Although heat may be dissipated through electrical connections and the metal base of a printed circuit board, Petitioner does not explain how such heat dissipation teaches “draw[ing] heat away from the at least one substrate in a direction opposite to a direction of light emission from the at least one substrate,” as required by claim 14.

As to Petitioner’s reliance on Holman, Patent Owner asserts that “Holman does not teach or suggest that the base layer is considered by itself a heatsink panel on a second side of the at least one substrate.” Prelim. Resp. 17. Patent Owner points to where Holman teaches that its base layer 220 is “electrically-insulating,” and further asserts that “[e]lectrically insulating materials are generally not advantageous for heat sinking because they do not conduct heat any better than they conduct electricity.” *Id.* at 18. Patent Owner adds that even if base layer 220 were to function as a heat sink, “Holman discloses moving heat from the LEDs to the substrate, not away from the substrate or the sensitive display components which they light.” *Id.* Patent Owner relies on the declaration testimony of Mr. Bohannon. *Id.* (citing Ex. 2001 ¶ 57).

Patent Owner’s argument in this regard does not undermine Petitioner’s showing for claim 14. Holman teaches that its base layer 220 “must be counted on to service as part of the collective heat sink.” Ex. 1006, 39 (cited by Pet. 34). Petitioner contends that an ordinarily skilled artisan would have modified Holman’s base layer 220 to include a heat sink panel on one side of the base layer to draw away heat from light emitting devices located on the other side of the base layer. Pet. 34. Petitioner’s contention

is supported by Dr. Pattison’s declaration testimony that it was well known to provide a metallic layer (i.e., heat sink panel) on the lower surface of a substrate to extract heat generated by LEDs located on the upper surface of the substrate. Ex. 1003 ¶ 126 (citing Ex. 1008 ¶ 54); *see also* Ex. 1008, Fig. 4A. Dr. Pattison explains, “The metallic layer for extracting heat is on the opposite side of the substrate as the LEDs, and thus draws heat away from the direction opposite to the direction of light emission.” Ex. 1003 ¶ 126.

That Holman describes a mechanism for heat sinking, and that providing a metallic layer on one side of a substrate to extract heat from light emitting devices on the other side of the substrate was a known way to do that, is sufficient reason for modifying Holman’s base layer to include such a metallic layer. *See* Ex. 1003 ¶ 126; Ex. 1006, 39; Ex. 1008 ¶ 54, Fig. 4A. Petitioner need only show that providing a metallic layer on a substrate in the manner proposed would have been a “suitable option” for implementation in Holman’s system. *See Intel*, 61 F.4th at 1381. Moreover, adding Holman’s modified heat sinking mechanism to Mok’s lighting panel to “improve cooling and efficient operation of LEDs” is sufficient reason to combine Mok and Holman. *See* Pet. 14; *Kahn*, 441 F.3d at 988. Patent Owner does not argue otherwise.

On the record before us, we are persuaded that Petitioner’s proposed combination of Mok and Holman teaches or suggests the recited limitation of claim 14. Additionally, for the reasons explained above, we also are persuaded that Petitioner’s proffered reasoning for modifying Holman’s base layer to include a metallic layer (i.e., to provide an alternative way to implement Holman’s heat sinking mechanism), and Petitioner’s proffered

reasoning for modifying Mok’s lighting panel to include Holman’s modified heat sinking mechanism (i.e., to improve cooling and efficient operation of LEDs), are sufficient to support institution.

3. Summary

In view of the foregoing, we determine that Petitioner has demonstrated a reasonable likelihood of showing that claims 1–3, 5, 7, and 9–14 would have been obvious over Mok, Holman, and Lamb. We express concerns, however, regarding Petitioner’s analysis for claims 4 and 8.

C. Alleged Obviousness over Epstein, Holman, and Lamb

Petitioner asserts that claims 1–5 and 7–14 of the ’835 patent would have been obvious over Epstein, Holman, Lamb, and the knowledge of a person of ordinary skill in the art. Pet. 35–53. Patent Owner challenges certain aspects of Petitioner’s analysis for claims 1, 10, and 11. Prelim. Resp. 18–23. For the reasons explained below, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing on its asserted challenge.

We provided an overview of Holman and Lamb above. *See supra* Part III.B.1. Before addressing the parties’ arguments, we additionally provide an overview of Epstein.

1. Overview of Epstein

Epstein describes “lighting or display assemblies.” Ex. 1008 ¶ 1. To illustrate one embodiment, Figure 11 of Epstein is reproduced below.

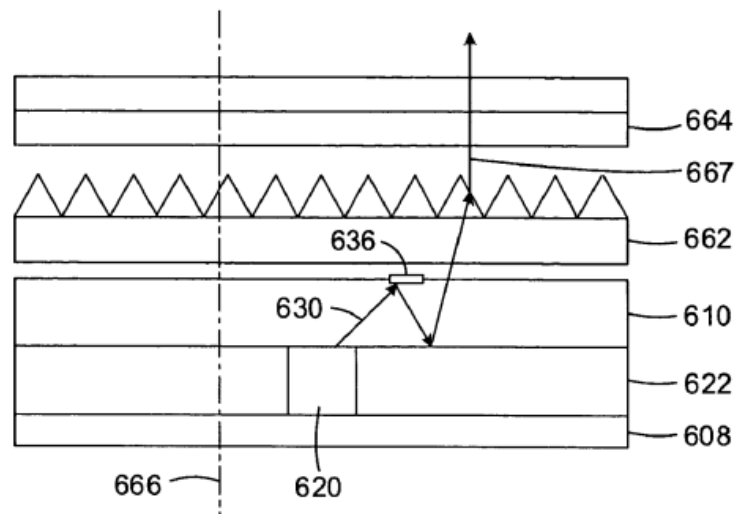


FIG. 11

Figure 11 shows a light emitting element. *Id.* ¶ 23. The light emitting element includes substrate 608, LED 620, intermediate layer 622, guiding layer 610, diffractive light extraction element 636, first brightness enhancing film 662, and second brightness enhancing film 664. *Id.* ¶¶ 67, 74. Intermediate layer 622 may be a reflecting film. *Id.* ¶ 67.

Light 630 from LED 620 passes into guiding layer 610. Ex. 1008 ¶ 67. Using diffractive light extraction element 636, the light emitting element emits light from guiding layer 610 in a first direction relative to axis 666. *Id.* ¶ 74, Fig. 11. Light 667 is refracted when it exits first brightness enhancing layer 662 in a second direction that is closer to axis 666 than the first direction. *Id.* ¶ 74.

2. Analysis of Claims 1–5 and 7–14

We turn now to the claims, starting with independent claim 1.

a. Independent Claim 1

As discussed above, claim 1 is directed to a “lighting panel” and recites various limitations, which Petitioner designates as limitations 1A through 1G. We address these limitations in turn.

i. Limitation 1A: “substrate”

Claim 1 recites “at least one substrate having a first side parallel to a principal plane of the lighting panel.” For this limitation, Petitioner identifies Epstein’s substrate 408 as a “substrate.” Pet. 37 (citing Ex. 1008 ¶ 46, Fig. 4A). Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Epstein teaches the recited “substrate” of limitation 1A.

ii. Limitation 1B: “solid state lighting devices”

Claim 1 further recites “a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light.” For this limitation, Petitioner identifies Epstein’s LEDs 420 as “solid state lighting devices.” Pet. 38 (citing Ex. 1008 ¶ 46). Petitioner asserts that “LEDs are solid state lighting devices.” *Id.* (citing Ex. 1003 ¶ 46). Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Epstein teaches the recited “solid state lighting devices” of limitation 1B.

iii. Limitation 1C: “reflector”

Claim 1 further recites “a reflector on the first side of the at least one substrate.” For this limitation, Petitioner identifies Epstein’s intermediate layer 422 (or intermediate layer 622) as a “reflector.” Pet. 38–39 (citing Ex. 1008 ¶¶ 48, 67, Fig. 6). Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Epstein teaches the recited “reflector” of limitation 1C.

iv. Limitation 1D: “brightness enhancement film”

Claim 1 further recites “a brightness enhancement film on the reflector.” For this limitation, Petitioner presents two theories. The first theory relies solely on Epstein, and the second theory relies on the combined teachings of Epstein and Holman.

For its first theory, Petitioner identifies either of Epstein’s brightness enhancing films 662 and 664 as a “brightness enhancement film.” Pet. 39. As support, Petitioner directs us to where Epstein teaches that “one or more brightness enhancing films available from 3M Company, St. Paul, Minn., under the trade name BEF™, may be used to direct the light more in a direction perpendicular to the substrate 608.” *Id.* (quoting Ex. 1008 ¶ 74). Petitioner also directs us to Figure 11 of Epstein, which is reproduced below. *Id.* at 40.

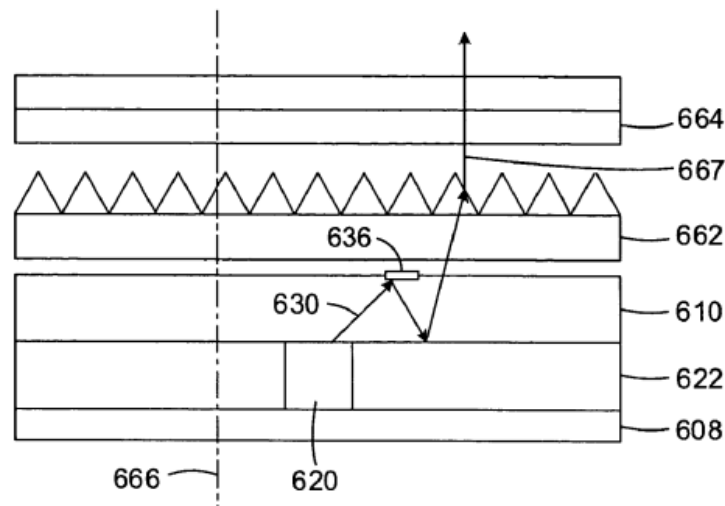


FIG. 11

Figure 11 shows a light emitting element. Ex. 1008 ¶ 23. Petitioner asserts that “Epstein’s BEF 662 is on the reflector 622 with intervening element 610.” Pet. 40.

Under its second theory, Petitioner asserts that, “[t]o the extent that Epstein does not show a BEF ‘on’ the reflector because there is an airgap between the layers, a direct or stacked arrangement is explicitly disclosed in Holman.” Pet. 40. Petitioner identifies each of Holman’s prism sheets 58 and 60 as a “brightness enhancement film.” *Id.* As support, Petitioner directs us to where Holman teaches that its prism sheets “may be one of the 90-degree offerings manufactured by the Minnesota Mining & Manufacturing Company (3M) under the trade name BEF, as in brightness enhancement film.” *Id.* at 40–41 (citing Ex. 1006, 8–9). Petitioner further asserts that “Holman describes and shows BEF (prism sheets 58 and 60) on a reflector sheet (i.e., ‘reflecting layer 76’) without an intervening air gap via intervening elements that include ‘confining structure 72.’” *Id.* (citing Ex. 1006, 8–11, 37–38). According to Petitioner, “[o]ne of skill in the art

would have been motivated to use Holman’s stacked arrangement of layers in Epstein’s embodiments for reasons . . . including that efficient lighting panels having thin dimensions was a desirable feature.” *Id.* at 41. Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* (citing Ex. 1003 ¶ 146).

With respect to Petitioner’s first theory (which relies solely on Epstein), Patent Owner argues that “Epstein does not disclose a BEF directly on the reflector” because “there is an air gap between BEF 662 and guiding layer 610.” Prelim. Resp. 19 (citing Ex. 1008, Fig. 11).

We disagree with Patent Owner. As discussed above in the claim construction section, we determine that the term “on” does not exclude air gaps between layers. *See supra* Part III.A. Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for limitation 1D.

With respect to Petitioner’s second theory (which relies on the combined teachings of Epstein and Holman), Patent Owner argues that “the prism sheets 58 and 60 of Holman are not BEFs as used in the ’835 Patent.” Prelim. Resp. 19. Patent Owner cross-references its discussion regarding limitation 1D with respect to obviousness over Mok, Holman, and Lamb. *Id.* In that discussion, Patent Owner asserts that “Holman differentiates between prism[] sheets and BEFs.” *Id.* at 12 (citing Ex. 1006, 121).

As discussed above, we disagree with Patent Owner. *See supra* Part III.B.2.a.iv. In particular, we find that Holman does not differentiate between Holman’s prism sheets and BEFs; rather, Holman explains that its prism sheets do not have to be cosmetically perfect because “[c]osmetic defects in prism sheets 58 and 60 cannot be directly viewed” in its system. *See* Ex. 1006, 121. Indeed, Holman teaches that its prism sheets “may be

one of the 90-degree offerings manufactured by the Minnesota Mining & Manufacturing Company (3M) under the trade name BEF, as in brightness enhancement film.” *Id.* at 7–8 (cited by Pet. 18). Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for limitation 1D.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that limitation 1D is satisfied under both theories. With respect to Petitioner’s first theory, we are persuaded that either of Epstein’s brightness enhancing films 662 and 664 teaches the recited “brightness enhancement film” of limitation 1D. With respect to Petitioner’s second theory, we are persuaded that Petitioner’s proposed combination of Epstein and Holman teaches the recited “brightness enhancement film” of limitation 1D. We also are persuaded that Petitioner’s proffered reasoning for modifying Epstein’s light emitting element to include Holman’s stacking arrangement, namely, to reduce overall thickness, is sufficient to support institution. *See Kahn*, 441 at 988.

v. Limitation 1E: arrangement of “reflector”

Claim 1 further recites that “the reflector is arranged between the at least one substrate and the brightness enhancement film.” For this limitation, Petitioner asserts that Epstein’s “reflector 622 is positioned between the BEFs 662 and 664 and the substrate 608.” Pet. 41 (citing Ex. 1008, Fig. 11). Patent Owner does not challenge Petitioner’s analysis for this limitation. *See generally* Prelim. Resp. Based on Petitioner’s argument and evidence, we are persuaded that Petitioner has shown

sufficiently for purposes of this Decision that Epstein teaches the recited arrangement of the reflector of limitation 1E.

vi. Limitation 1F: configuration of “brightness enhancement film”

Claim 1 further recites that “the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially reflect light having a second orientation, different from the first orientation, back into the lighting panel.” For this limitation, Petitioner appears to rely on the combined teachings of Epstein and Lamb. Pet. 35 (relying on “Lamb’s express functionality for the disclosed BEF”); *id.* at 42 (relying on Epstein’s enhancing layer 662).

Petitioner directs us to where Epstein teaches,

[A] light emitting element that uses a diffractive light extraction element 636 emits light from the guiding layer 610 in a first direction relative to the axis 66[6]. The light 667 is refracted upon exiting the first brightness enhancing layer 662 in a second direction that is closer to the axis 666 than the first direction.

Id. at 42 (citing Ex. 1008 ¶ 74, Fig. 11). As discussed above, Epstein further teaches that its brightness enhancing layer 662 may comprise a “brightness enhancing film[] available from 3M Company, St. Paul, Minn., under the trade name BEF™.” *Id.* at 39 (citing Ex. 1008 ¶ 74).

Petitioner also directs us to where Lamb describes “a layer of enhancement film 14 having prismatic surface structures, such as Vikuiti™ Brightness Enhancement Film BEF, available from 3M Company.” Pet. 36 (citing Ex. 1007 ¶ 35). That is the same 3M product described in Epstein. *See* Ex. 1008 ¶ 74. Lamb explains that its “enhancement film 14 refracts light within a certain angle toward the viewer,” and that “[l]ight outside that

angle is ‘recycled,’ i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system.”

Ex. 1007 ¶ 35.

Petitioner contends that an ordinarily skilled artisan would have been “motivated to apply Lamb’s BEF to the Epstein-Holman combination to . . . provide increased brightness by recycling light.” Pet. 36. Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* at 36, 42 (citing Ex. 1003 ¶¶ 146, 148).

Patent Owner responds that “Epstein discloses only that the BEF emits light,” and that “[t]here is no teaching of the BEF reflecting light 667 back into the lighting panel.” Prelim. Resp. 20.

Patent Owner’s argument is unavailing. As discussed above, the 3M product described in Epstein is also described in Lamb. Ex. 1008 ¶ 74 (“[O]ne or more brightness enhancing films, available from 3M Company, St. Paul, Minn., under the trade name BEF™,” may be used to direct the light more in a direction perpendicular to the substrate 608.”); Ex. 1007 ¶ 35 (“The traditional backlight 10 further includes . . . a layer of enhancement film 14 having prismatic surface structures, such as Vikuiti™ Brightness Enhancement Film BEF, available from 3M Company.”). Lamb explains that “[t]he enhancement film 14 [the 3M product] refracts light within a certain angle toward the viewer,” and that “[l]ight outside that angle is ‘recycled,’ i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system.” Ex. 1007 ¶ 35. Contrary to Patent Owner’s position, the 3M product described in both Epstein and Lamb emits light at a first angle and reflects light at a second

angle (that is outside the first angle). Accordingly, Patent Owner's argument does not undermine Petitioner's showing for limitation 1F.

Patent Owner further argues that an ordinarily skilled artisan "would not be motivated to combine Lamb with Epstein or Holman." Prelim. Resp. 19 (capitalization and emphasis omitted). Patent Owner asserts that "Lamb relies on a clumsy, double stack of edge lit backlights with CCFLs instead of rear mounted LEDs like those used in Epstein and Holman." *Id.* According to Patent Owner, "Lamb's CCFL arrangement would not even be considered by a POSITA seeking to improve a LED based system." *Id.*

By focusing on the differences between Lamb's system and rear mounted LED systems, Patent Owner disregards Lamb's broader teaching that the 3M product already described in Epstein emits light having a first orientation from the lighting panel and reflects light having a second orientation back into the lighting panel. Our reviewing court has explained that "[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," but, "[r]ather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *See Keller*, 642 F.2d at 425. That Epstein describes using the 3M product as its brightness enhancing film and that Lamb describes using the same 3M product as its enhancement film is sufficient reason for combining Epstein and Lamb. *See* Ex. 1008 ¶ 74; Ex. 1007 ¶ 35. Petitioner need only show that Lamb's enhancement film would have been a "suitable option" for implementation in Epstein's lighting emitting element. *See Intel*, 61 F.4th at 1381. Accordingly, Patent Owner's argument does not undermine Petitioner's showing for limitation 1F.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that its proposed combination of Epstein and Lamb teaches the recited configuration of the brightness enhancement film of limitation 1F. We also are persuaded that Petitioner's proffered reasoning for modifying Epstein's light emitting element to include Lamb's enhancement film, namely, to provide increased brightness by recycling light, is sufficient to support institution. *See Kahn*, 441 F.3d at 988; *see also Intel*, 61 F.4th at 1381 (explaining that the petitioner need only show that the proposed combination would have provided a "suitable option").

vii. Limitation 1G: "diffuser sheet"

Lastly, claim 1 recites "a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet." For this limitation, Petitioner presents two theories. The first theory relies solely on Epstein, and the second theory relies on the combined teachings of Epstein and Lamb.

For the first theory, Petitioner asserts that "Epstein discloses that 'light 667 is refracted upon exiting the first brightness enhancing layer 662 in a second direction that is closer to the axis 666 than the first direction.'" Pet. 43 (quoting Ex. 1008 ¶ 74). Petitioner identifies Epstein's second direction as corresponding to the recited second orientation. *Id.*

Petitioner further asserts that "Epstein . . . discloses that 'a reflective polarizing layer may be provided above the light emitting element, for

example a multilayer optical film (MOF) reflective polarizer.” Pet. 43 (quoting Ex. 1008 ¶ 75). Petitioner directs us to where Epstein teaches,

The light in the polarization state that is reflected by the reflective polarizer is reflected back towards the substrate 608. One of the layers, for example the intermediate layer 622 may be treated to reflect the light reflected by the reflective polarizer in a manner that causes some depolarization, so that the light reflected by the reflective polarizer may be recycled and eventually passed through the reflective polarizer.

Id. (quoting Ex. 1008 ¶ 75).

Petitioner contends, “Thus, Epstein discloses both light having a second orientation, and light that is reflected into a lighting panel and recycled.” Pet. 43. According to Petitioner, “[b]ecause light reflecting from the BEF is disclosed as reflecting ‘back towards substrate 608’ Epstein discloses that at least some light is recycled within Epstein’s diffuser sheet, i.e. the intermediate layer.” *Id.*

Patent Owner responds that “Epstein does not disclose a BEF which reflects light back nor recycles such light within the diffuser sheet.” Prelim. Resp. 20.

We agree with Patent Owner that Petitioner’s analysis under its first theory does not sufficiently show that Epstein teaches limitation 1G. As noted above, limitation 1G refers to “the light having the second orientation that is reflected back into the lighting panel.” This feature is first recited in limitation 1F: “the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially *reflect light having a second orientation*, different from the first orientation, back into the lighting panel” (emphasis added). Limitation 1F requires light with one orientation to be emitted from the lighting panel

by the brightness enhancement film, and light with a different orientation to be reflected back into the lighting panel by the brightness enhancement film.

Epstein, however, teaches that “light 667 is refracted upon *exiting* the first brightness enhancing layer 662 in a second direction that is closer to the axis 666 than the first direction.” Ex. 1008 ¶ 74 (emphasis added) (cited by Pet. 43). To illustrate, Figure 11 of Epstein is reproduced below.

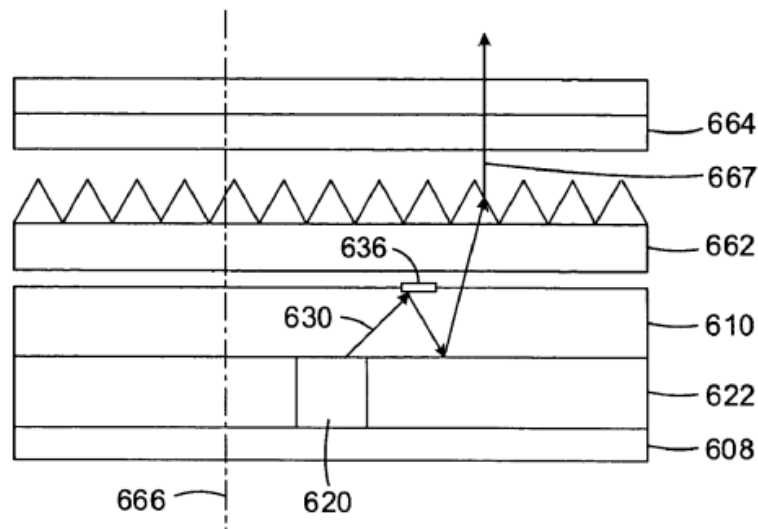


FIG. 11

Figure 11 shows a light emitting element. Ex. 1008 ¶ 23. As illustrated in the figure, Epstein’s second direction refers to the orientation of light 667 upon “exiting” brightness enhancing layer 662. *Id.*, Fig. 11; *see also id.* ¶ 74. In other words, Epstein’s second direction refers to the orientation of light 667 upon being *emitted* by brightness enhancing layer 662, *not reflected* by brightness enhancing layer 662. We note Epstein’s additional teaching about light being reflected back toward substrate 608 by a *reflective polarizer* provided above the light emitting element (which includes brightness enhancing film 662). *Id.* ¶ 75, Fig. 11. Epstein’s reflective polarizer, however, is not a “brightness enhancement film.” Accordingly,

Epstein's second direction does not appear to satisfy the recited "second orientation."

For its second theory, Petitioner asserts that, "[t]o the extent that Epstein does not explicitly describe this feature [limitation 1G] of the claim, . . . Lamb discloses backlighting system 100 that may further include a diffuser sheet 116, a reflector sheet 127, and recycling enhancement structures 112 and 114 that are BEFs." Pet. 44. Petitioner contends that an ordinarily skilled artisan "would be motivated to modify Epstein based on the explicit teachings configuration disclosed by Lamb, which teaches BEFs that recycle light through the diffuser sheet, resulting in uniform, diffuse light that is optimal for display panels." *Id.* Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* (citing Ex. 1003 ¶ 146).

Patent Owner responds that "[t]he teachings of Lamb do not show that light is reflected into the lighting panel and recycled within the diffuser sheet." Prelim. Resp. 21.

We disagree with Patent Owner. Lamb teaches that its recycling enhancement structure 112 is "any structure that is capable of 'recycling' light in a manner similar or equivalent to the enhancement films 12 and 14." Ex. 1007 ¶ 42 (cited by Prelim. Resp. 20). As discussed above, Lamb explains that "[t]he enhancement film 14 refracts light within a certain angle toward the viewer," and that "[l]ight outside that angle is 'recycled,' i.e., reflected back into the backlight 10, where it travels within the system until reaching the proper angle for exiting the system." *Id.* ¶ 35 (cited by Pet. 36). Lamb further teaches that its recycling enhancement structure 112 may also include a reflective polarizer and a diffuser. *Id.* ¶ 42. Patent Owner acknowledges Lamb's teaching that "[o]ne function of the diffuser is the

randomization of the polarization and direction of the *light reflected by the reflective polarizer [of the recycling enhancement structure 112] back into the backlighting system 100.*” *Id.* (emphasis added) (quoted by Prelim. Resp. 20). We further note Lamb’s additional teaching that “if DRPF or DBEF-M is included into the structure 112, light is diffused by either of these films and it is either transmitted to the LCD in the proper polarization state or scattered back into the backlight 100, where it can be recycled.” *Id.* ¶ 43. In Lamb, DRPF and DBEF-M refer to specific commercially available diffusers. *Id.* ¶ 42. Lamb notes that “[i]f the first recycling enhancement structure 112 includes a matte surface, e.g., as in DBEF-M, the first recycling enhancement structure 112 preferably is attached to the lightguide 130 so that the matte surface faces the surface 130a.” *Id.* ¶ 43, Fig. 2. These teachings in Lamb indicate that light is reflected back into the lighting panel and recycled within the diffuser, contrary to Patent Owner’s position.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that its proposed combination of Epstein and Lamb teaches the recited “diffuser sheet” of limitation 1G. We also are persuaded that Petitioner’s proffered reasoning for modifying Epstein’s system to include Lamb’s diffuser, namely, to provide uniform, diffuse light, is sufficient to support institution. *See Kahn*, 441 F.3d at 988.

b. Dependent Claims 2–9

Claims 2–9 depend from claim 1, either directly or indirectly. Patent Owner does not separately challenge Petitioner’s analysis for these dependent claims. *See generally* Prelim. Resp. Having reviewed

Petitioner’s arguments and evidence for claims 2–9, we are persuaded that Petitioner’s showing for these claims is sufficient for purposes of this Decision. *See* Pet. 44–49 (citing, e.g., Ex. 1003 ¶¶ 59–62, 122; Ex. 1006, 8;¹² Ex. 1008 ¶¶ 48, 81, 84, 74–75, Figs. 4A, 11).

c. Dependent Claim 10

Claim 10 depends from claim 9, which recites “the brightness enhancement film comprises a plurality of the three dimensional light extraction features configured to bend at least some light rays passing through the brightness enhancement film toward the direction normal to the principal plane of the lighting panel.” As discussed above, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that Epstein teaches the recited “extraction features” of claim 9. *See supra* Part III.C.2.b (citing Pet. 48–49).

Claim 10 recites “the light extraction features are random features.” For this limitation, Petitioner contends that “[i]t would have been obvious to a POSITA [to] modify the exemplary embodiments shown [in Epstein] to include other light extraction features, including ones that randomize light as doing so conditions light for lighting panels.” Pet. 49; *see also id.* at 50 (“[I]t would be obvious to a POSITA to modify the shown invention to include a plurality of other, random light extraction features.”). Although not cited by Petitioner, Epstein appears to support this contention. *See* Ex. 1008 ¶ 89 (“All types of extraction features may be arranged in a manner that controls the intensity profile of light emitted from the light

¹² Petitioner cites page 9 of Exhibit 1006, but the cited teaching appears on page 8 of Exhibit 1006.

emitting element The extraction features may be arranged to provide a relatively uniform profile illumination profile or some other desirable profile.”).

Petitioner further asserts that “[t]he use of randomly patterned optical components was well understood to avoid the creation of Moire patterns which are optical interference patterns resulting from regular optical elements acting on the light from a display,” and that “including random features on a BEF helps avoid interference effects.” Pet. 49–50. Petitioner relies on the declaration testimony of Dr. Pattison. *Id.* (citing Ex. 1003 ¶¶ 92–95). Petitioner adds that “it would be obvious to combine Epstein with Lamb, which describes the ‘randomization’ of the polarization and direction of light.” *Id.* at 50 (citing Ex. 1008 ¶ 42).

Patent Owner responds that “adding additional light extraction components to that combination [of Epstein and Lamb] would only add further inefficiencies.” Prelim. Resp. 21. Patent Owner does not elaborate on these “further inefficiencies.” Without more, Patent Owner’s argument fails to undermine Petitioner’s showing for claim 10.

On the record before us, we are persuaded that an ordinarily skilled artisan would have known that using randomized features would have helped avoid Moire patterns and dispersion. *See* Ex. 1003 ¶¶ 94–95. We also are persuaded that Petitioner’s proffered reasoning for modifying Epstein’s brightness enhancing film to include random light extraction features, namely, to reduce interference effects, is sufficient to support institution. *See Kahn*, 441 F.3d at 988.

d. Dependent Claim 11

Claim 11, which depends from claim 9, recites that “the brightness enhancement film is configured to limit direct emission from the lighting panel of light emitted by the plurality of solid state light emitting devices to thereby encourage light recycling/diffusion in the lighting panel.” For this limitation, Petitioner asserts that “Lamb discloses recycling enhancement structures 112 and 114, the components of which are part of its BEF.”

Pet. 50. Petitioner further cross-references its discussion of claim 11 with respect to obviousness over Mok, Holman, and Lamb. *Id.* In that discussion, Petitioner directs us to where Lamb teaches that “the second recycling enhancement structure 114 includes prismatic structures, e.g., prismatic structured film, that would aid in redirecting and recycling light to increase on-axis brightness of the backlight 100 by refracting toward the viewer light within a certain angle and reflecting back light outside that angle.” *Id.* at 32 (quoting Ex. 1007 ¶ 45). Lamb expressly specifies that “[o]ne example of such prismatic structured films suitable for use within the second recycling enhancement structure 114 is Vikuiti™ Brightness Enhancement Film (BEF), available from 3M Company.” Ex. 1007 ¶ 45.

In response, Patent Owner argues that “[t]he only function of the Epstein BEF is to orient light in a direction more parallel to axis 666,” which is “normal to the surface of the display,” and that “Epstein does not mention the BEF reflecting or limiting direct emissions.” Prelim. Resp. 21–22.

As discussed above, however, Epstein teaches that its brightness enhancing layer 662 may comprise a “brightness enhancing film[] available from 3M Company, St. Paul, Minn., under the trade name BEF™.” Ex. 1008 ¶ 74 (cited by Pet. 39). Lamb describes the same 3M product as

“redirecting and recycling light to increase on-axis brightness of the backlight 100 by refracting toward the viewer light within a certain angle and reflecting back light outside that angle.” Ex. 1007 ¶ 45 (cited by Pet. 32). Accordingly, Patent Owner’s argument does not undermine Petitioner’s showing for claim 11.

Patent Owner further argues that “[i]t is not obvious to POSITA to include features of Lamb’s brightness enhancement components in a system with Epstein since Lamb’s light guides are edge lit and therefore entirely different in operation than any optical design based around Epstein’s back lit LED system.” Prelim. Resp. 22. Patent Owner adds that “Lamb employs several more elements than the invention of the ’835 Patent to accomplish recycling/diffusion in the lighting panel.” *Id.*

As discussed above with respect to limitation 1F, Patent Owner, by focusing on the differences between the systems in Lamb and Epstein, loses sight of Lamb’s broader teaching that the 3M product already described in Epstein emits light having a first orientation from the lighting panel and reflects light having a second orientation back into the lighting panel. That Epstein describes using the 3M product as its brightness enhancing film and that Lamb describes using the same 3M product as its enhancement film is sufficient reason for combining Epstein and Lamb. *See* Ex. 1008 ¶ 74; Ex. 1007 ¶ 35. Petitioner need only show that Lamb’s enhancement film would have been a “suitable option” for implementation in Epstein’s lighting emitting element. *See Intel*, 61 F.4th at 1381. Moreover, it is of no consequence that Lamb may use more elements than the ’835 patent discloses to accomplish recycling and diffusion in the lighting panel. The claims do not limit the number of elements that can be used. Accordingly,

Patent Owner's argument does not undermine Petitioner's showing for claim 11.

On the record before us, we are persuaded that Petitioner has shown sufficiently for purposes of this Decision that its proposed combination of Epstein and Lamb teaches the recited limitation of claim 11.

e. Dependent Claims 12–14

Claims 12–14 depend from claim 1, either directly or indirectly. Patent Owner does not separately challenge Petitioner's analysis for these dependent claims. *See generally* Prelim. Resp. Having reviewed Petitioner's arguments and evidence for claims 12–14, we are persuaded that Petitioner's showing for these claims is sufficient for purposes of this Decision. *See* Pet. 51–53 (citing, e.g., Ex. 1003 ¶¶ 96, 126; Ex. 1008 ¶¶ 54, 74, 110, Fig. 11).

3. Summary

In view of the foregoing, we determine that Petitioner has demonstrated a reasonable likelihood of showing that claims 1–5 and 7–14 would have been obvious over Epstein, Holman, and Lamb.

D. Alleged Obviousness over Ko, Kretman, and Epstein

Petitioner asserts that claims 1–5 and 7–14 of the '835 patent would have been obvious over Ko, Kretman, Epstein, and the knowledge of a person of ordinary skill in the art. Pet. 53–72. Patent Owner challenges certain aspects of Petitioner's analysis for claims 1, 11, and 14. Prelim.

Resp. 23–36. For the reasons explained below, we express concerns regarding Petitioner’s analysis for claim 1.

1. Overview of Asserted References

We provided an overview of Epstein above. *See supra* Part III.C.1. Before addressing the parties’ arguments, we additionally provide an overview of Ko and Kretman.

a. Ko

Ko describes liquid crystal displays (LCDs). Ex. 1009 ¶ 1. To illustrate one embodiment, Figure 1 of Ko is reproduced below.

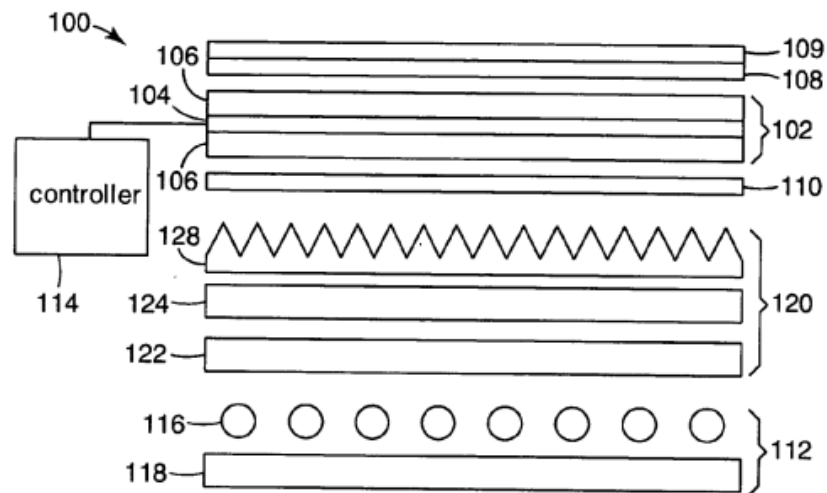


FIG. 1

Figure 1 shows an exploded view of LC display device 100, which includes backlight 112, arrangement 120 of light management layers, lower absorbing polarizer 110, LC panel 102, upper absorbing polarizer 108, and optional layer 109. *Id.* ¶¶ 39–45.

Arrangement 120 includes diffuser plate 122, which diffuses light from light sources 116. Ex. 1009 ¶ 44. This increases the uniformity of the illumination light incident on LC panel 102. *Id.*

Arrangement 120 also includes reflective polarizer 124. Ex. 1009 ¶ 45. Ko explains that light sources 116 generate unpolarized light. *Id.* Ko also explains that absorbing polarizer 110 only transmits a single polarization state, which means that about half of the light generated by light sources 116 is not transmitted to LC layer 104 of LC panel 102. *Id.*

Reflecting polarizer 124, however, reflects the light that would otherwise be absorbed in absorbing polarizer 110 so that it can be recycled by reflection between reflecting polarizer 124 and reflector 118. *Id.* Some of the light reflected by reflecting polarizer 124 will be depolarized and then returned to reflecting polarizer 124 in a polarization state that allows for transmission through reflecting polarizer 124 and absorbing polarizer 110 to LC layer 104. *Id.* This increases the fraction of light emitted by light sources 116 that reaches LC layer 104, resulting in a brighter image produced by display device 100.

Lastly, arrangement 120 includes brightness enhancing layer 128. Ex. 1009 ¶ 51. Ko explains that a brightness enhancing layer includes a surface structure (e.g., a prismatic ridge) that redirects off-axis light in a direction closer to the axis of the display. *Id.* This increases the amount of light propagating on-axis through LC layer 104, which, in turn, increases the brightness of the image seen by the viewer. *Id.*

b. Kretman

Kretman describes LCD devices. Ex. 1010 ¶ 36. To illustrate one embodiment, Figure 9C of Kretman is reproduced below.

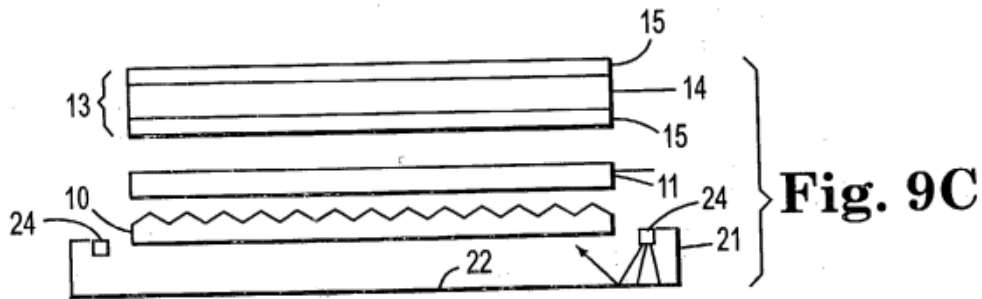


Figure 9C shows an LCD device, which includes light emitting diodes 24 that provide light to optical cavity 21, diffuse reflector 22, brightness enhancement film 10, polarizing film 11, and LCD 13. *Id.* ¶¶ 80–81, 87.

2. Analysis

We express concerns regarding Petitioner’s analysis for limitation 1G in particular. Accordingly, we discuss this limitation in detail.

Limitation 1G recites “a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet.” Limitation 1G’s “light having the second orientation that is reflected back into the lighting panel” is first recited in limitation 1F: “the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially *reflect light having a second orientation*, different from the first orientation, back into the lighting panel” (emphasis added).

Limitation 1F requires light to be reflected back into the lighting panel by the brightness enhancement film.

Petitioner identifies Ko's diffuser plate 122 as a "planar diffuser sheet," Ko's reflector 118 as a "reflector," and Ko's brightness enhancing layer 128 as a "brightness enhancement film." Pet. 62. As support, Petitioner directs us to Figure 1 of Ko, which is reproduced below. *Id.*

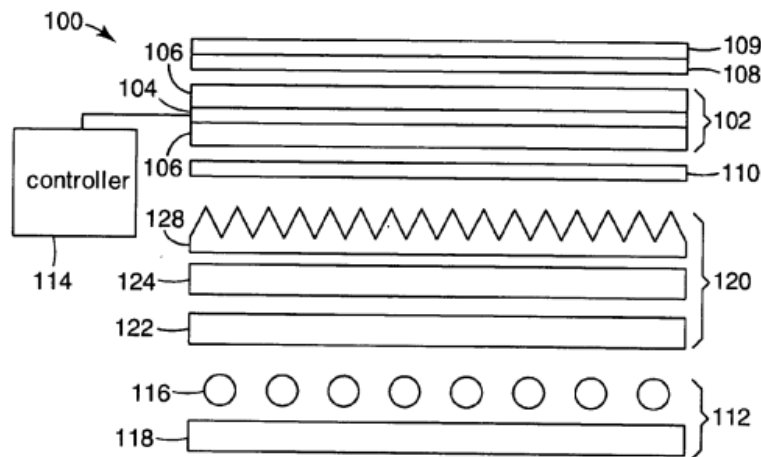


FIG. 1

Figure 1 of Ko shows an exploded view of LC display device 100, which includes backlight 112, arrangement 120 of light management layers, absorbing polarizer 110, LC panel 102, absorbing polarizer 108, and optional layer 109. Ex. 1009 ¶¶ 39–45. Petitioner asserts, "As shown in Ko Figure 1, the diffuser plate 122 is between the reflector 118 and the brightness enhancing layer 128." Pet. 62.

Petitioner further asserts that "Ko . . . teaches recycling light, stating that the reflecting polarizer 124 'may be used to reflect the light that would otherwise be absorbed in the lower absorbing polarizer [110], and so this light may be recycled by reflection between the reflecting polarizer 124 and the reflector 118.'" Pet. 63 (quoting Ex. 1009 ¶ 45).

Patent Owner responds that "Ko accomplishes light recycling through a series of polarizers, not the BEF." Prelim. Resp. 31. Patent Owner asserts that "[t]he arrangement in Ko employs a reflecting polarizer to either emit or

reflect light depending on its state of polarization,” which is “an entirely different arrangement than that described in the ’835 patent which reflects and recycles light at the BEF.” *Id.*

At this stage, we agree with Patent Owner. As explained above, limitation 1F requires light to be reflected back into the lighting panel *by the brightness enhancement film*, and limitation 1G requires the same light that is reflected back into the lighting panel by the brightness enhancement film to be recycled within the diffuser sheet. In Ko, however, “light may be recycled by reflection between the reflecting polarizer 124 and the reflector 118.” Ex. 1009 ¶ 45 (cited by Pet. 63). Ko thus teaches light recycling through a polarizer and a reflector, but not a brightness enhancing layer, as required by the claim.

On the record before us, we are not persuaded by Petitioner’s showing for limitation 1G.

3. Summary

For the reasons given above, we are not persuaded by Petitioner’s showing for claim 1. Because claims 2–5 and 7–14 depend from claim 1, we also are not persuaded by Petitioner’s showing for these dependent claims.

IV. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated on the record before us a reasonable likelihood that it will prevail in showing at least one of the challenged claims of the ’835 patent is unpatentable. Although we express concerns regarding Petitioner’s analysis

regarding certain of the challenges presented, we institute trial on all challenged claims and all challenges presented. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1353 (2018) (“The agency cannot curate the claims at issue but must decide them all.”); 37 C.F.R. § 42.108(a) (“When instituting . . . review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”). We have not, however, made a final determination with respect to the patentability of the challenged claims or the constructions of any claim terms.

V. ORDER

For the reasons given, it is

ORDERED that *inter partes* review is instituted as to all challenged claims of the ’835 patent, namely, claims 1–5 and 7–14, based on all challenges presented in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this Decision.

IPR2023-01168
Patent 9,605,835 B2

PETITIONER:

Matias Ferrario
Michael Morlock
mferrario@kilpatricktownsend.com
mmorlock@kilpatricktownsend.com

PATENT OWNER:

Hao Ni
Neal Massand
Timothy Wang
hni@nilawfirm.com
nmassand@nilawfirm.com
twang@nilawfirm.com