

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hisense USA Corporation
Petitioner

v.

Brightplus Ventures LLC
Patent Owner

Patent No. 9,605,835
Filing Date: February 2, 2015
Issue Date: March 28, 2017
Title: SOLID-STATE LUMINAIRES FOR GENERAL ILLUMINATION

Inter Partes Review No. IPR2023-01168

PETITION FOR *INTER PARTES* REVIEW

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LIST OF EXHIBITS

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 9,605,835 (“the ’835 Patent”)
1002	Prosecution History of U.S. Patent No. 9,605,835
1003	Declaration of Morgan Pattison, Ph.D.
1004	Curriculum Vitae of Morgan Pattison, Ph.D.
1005	US 2006/0227545 to Mok <i>et al.</i> (“Mok”)
1006	WO 03/056876 to Holman <i>et al.</i> (“Holman”)
1007	US 2005/0135115 to Lamb <i>et al.</i> (“Lamb”)
1008	US 2005/0265029 to Epstein <i>et al.</i> (“Epstein”)
1009	US 2006/0082698 to Ko <i>et al.</i> (“Ko”)
1010	US 2003/0118805 to Kretman <i>et al.</i> (“Kretman”)
1011	Counterclaim filed by Patent Owner in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 9 (N.D. Ga. Sep. 16, 2022)
1012	Scheduling Order in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 35 (N.D. Ga.)
1013	Judicial Caseload Profile for the Northern District of Georgia
1014	Cover Pleading to Patent Owner’s Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.)
1015	Han-Ping D. Shieh, et al., <i>Micro-Optics for Liquid Cristal Displays Applications</i> , IEEE/OSA Journal of Display Tech., Vol. 1, No. 10, Sep. 2005.
1016	Cover Pleading to Patent Owner’s Supplemental Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.) served June 21, 2023

I. Mandatory Notices (37 C.F.R. § 42.8(b))

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

The petitioner Hisense USA Corporation, is a Georgia corporation with a principal place of business at 7310 McGinnis Ferry Road, Suwanee, GA, 30024. Petitioner is a subsidiary of Hisense Group, which is organized under the laws of China. Other privies or real parties in interest include companies within the Hisense Group, including Hisense International (Hong Kong) America Investment Co., Ltd.; Hisense Group Holdings Co., Ltd.; Hisense Visual Technology Co., Ltd.; Hisense International (Hong Kong) America Investment Co., Ltd.; Hisense International (HK) Co., Ltd.; Hisense International Co., Ltd.; TVS REGZA Corporation.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

The '835 Patent is asserted against Petitioner in a Counterclaim in *Hisense USA Corp. v. Brightplus Ventures LLC*, No. 1:22-cv-02774 (N.D. Ga.) (the “Underlying Litigation”). The Underlying Litigation was initially filed by Petitioner on July 14, 2022, and the '835 Patent was first asserted in a Counterclaim filed in the Underlying Litigation on September 16, 2022. *See* Ex. 1011. The current schedule in the Underlying Litigation is attached as Exhibit 1012. In addition to Petitioner, the following entities are Counterclaim defendants

in the Underlying Litigation: Hisense Co., Hisense International (HK) Co. Ltd.,
Hisense Visual Technology Co. Ltd., and TVS Regza Corp.

**C. Designation of Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3))
and Service Information (37 C.F.R. § 42.8(b)(4)).**

<u>Lead Counsel</u>	<u>Backup Counsel</u>
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Petitioner may be served via email to its lead and backup counsel at the email addresses above.

II. Introduction

The '835 patent is invalid. The independent claims recite little more than a plurality of Light Emitting Diodes (“LEDs”) mounted on a panel including a reflector with a Brightness Enhancement Film (“BEF”) and a planar diffuser sheet. Each of these elements was well-known in the art, and each of these elements had been used in combination for exactly the same purpose—a backlight for an LCD display—for years prior to the earliest claimed priority date, April 2006. Thus the combination of these known elements would have been obvious to a Person of Ordinary Skill in the Art before that date. The challenged claims should be cancelled as obvious.

III. IPR Requirements

A. Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the '835 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR. The '835 Patent issued on March 28, 2017, and this Petition is filed within one year of service of the Complaint against Petitioner alleging infringement of the '835 Patent (*see* Ex. 1011) and is not barred under 35 U.S.C. §315(b).

B. Fees (37 C.F.R. § 42.103)

This Petition requests review of thirteen (13) claims of the '835 Patent and is accompanied by a payment of \$41,500, which includes the \$19,000 IPR request fee, and the \$22,500 post-institution fee. *See* 37 C.F.R. § 42.15(a). Thus, this Petition meets the fee requirements under 35 U.S.C. § 312(a)(1). The Board is hereby authorized to charge any additional fees required by this action to Deposit Account No. 20-1430.

C. Challenge Under 37 C.F.R. § 42.104(b)

This petition requests cancellation of claims 1-5 and 7-14 as rendered obvious under 35 U.S.C. § 103 based on the following prior art references:

- US 2006/0227545 to Mok (“Mok”) (Exhibit 1005);
- WO 03/056876 to Holman (“Holman”) (Exhibit 1006);
- US 2005/0135115 to Lamb (“Lamb”) (Exhibit 1007);

- US 2005/0265029 to Epstein (“Epstein”) (Exhibit 1008);
- US 2006/0082698 to Ko (“Ko”) (Exhibit 1009); and
- US 2003/0118805 to Kretman (“Kretman”) (Exhibit 1010).

The statutory grounds for the challenge of each claim are set forth below:

Ground	35 U.S.C.	Claims	References
1	103	1-5 and 7-14	Mok, Holman, and Lamb in view of the Knowledge of a POSITA
2	103	1-5 and 7-14	Epstein, Holman, and Lamb in view of the Knowledge of a POSITA
3	103	1-5 and 7-14	Ko, Kretman, and Epstein in view of the Knowledge of a POSITA

The record establishes a reasonable likelihood of prevailing as to each ground of invalidity with respect to the Challenged Claims.

IV. Background

A. The ’835 Patent

The ’835 Patent was filed on February 2, 2015, and claimed priority as a continuation to a series of applications, with an original priority date of April 21, 2006. The ’835 Patent describes multiple embodiments, however, the claims of the ’835 Patent relate to a lighting panel that includes a substrate for solid state lighting devices (e.g., LEDs), a reflector, a BEF, and a diffuser sheet between the reflector and BEF.

This embodiment is described with respect to Figure 5A as a “lighting panel 40 includes at least one tile 10 on which a plurality of lighting elements 12 are disposed on one side thereof.” ’835 Patent, col. 11:21-23. Reflector sheet 50 is included to “provide and/or improve light recycling in the lighting panel 40.” *Id.*, col., 11:24-25. As shown in Figure 5A, the “lighting panel 40 ... further include[s] a brightness enhancement film 70 separated from the tile 10 and the reflector sheet 50 by a diffuser sheet 60.” *Id.*, col. 11:52-54.

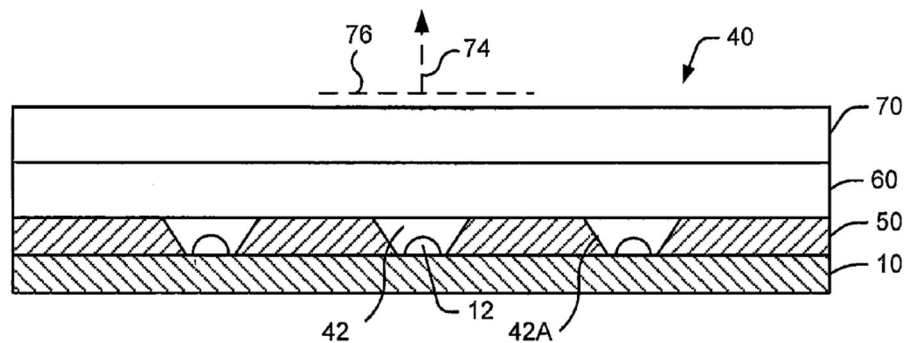


FIGURE 5A

Id., Fig. 5A. “The diffuser sheet 60 may scatter light passing therethrough in order to further diffuse light emitted by the lighting elements 12 and/or reflected by the reflector sheet 50.” *Id.*, col. 11:54-57. The ’835 Patent further acknowledges that “[d]iffuser sheets are commonly used, for example, in display panels, as is known to those skilled in the art.” *Id.*, col 11:57-29.

B. Prosecution of the '835 Patent.

The Application that led to the '835 Patent was originally filed with a single claim. The Examiner rejected this claim for double-patenting over claim 1 of U.S. 8,946,609, to which the '835 Patent claimed priority. The Applicant responded by making non-substantive amendments to claim 1, adding new claims 2-20, and arguing that the claims were not coextensive in scope because the claims of the '609 Patent recited a “reflector sheet that comprises a lambertian reflector,” whereas the pending claims recited a “reflector.” Ex. 1002, at 107.

In the next Office Action, the Examiner maintained the double-patenting rejection of claims 1-20 in view of claims 1-18 of the '609 Patent, but indicated that the claims were otherwise allowable. *Id* at 58-64. The Applicant responded by filing a terminal disclaimer. *Id.*, at 49. The Examiner issued a notice of allowance.

V. Expert Testimony, Level of Skill in the Art, and Claim Construction

A. Declaration Evidence

This petition is supported by the declaration of P. Morgan Pattison, Ph.D, an expert with extensive experience in the relevant industry. Ex. 1003. Dr. Pattison has over (25) years of experience in the areas of light emitting diodes (LEDs), organic light emitting diodes (OLEDs), lighting, solid state lighting (SSL), displays, lasers, and optoelectronic materials and devices. Ex. 1003, ¶7.

B. Person of Ordinary Skill in the Art

A person of ordinary skill in the art of the '835 Patent would have had at least a graduate degree in mechanical engineering, physics, materials science, electrical engineering, or a related discipline, coupled with at least four years' experience in designing backlighting systems for displays; the level of ordinary skill in the art is approximate and additional education could make up for a lack of experience or vice-versa. In the Underlying Litigation Patent Owner asserted a slightly different level of skill in the art. As Dr. Pattison testifies, '835 Patent would be obvious under either level of skill. *See* Ex. 1003, ¶¶25-28.

C. Claim Construction

Nothing in the specification or prosecution history of the '835 Patent expressly defines any term appearing in any claim of the '835 Patent that is of consequence to the prior art in this Petition. Further, the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition, and thus for purposes of this proceeding only, Petitioner believes that no claim term requires construction.

VI. Prior Art

A. Mok

Mok was published on October 12, 2006, and was filed as an application on April 11, 2005, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(a).

Mok describes a light emitting panel including “a plurality of light emitting elements” and that “[o]ne or more light conditioners ... receive and condition light produced by the light emitting elements.” Mok, Abstract. As described by Mok, “[t]he light conditioners may comprise a diffuser 16 that is positioned adjacent the base panel 12 so that the diffuser 16 receives and diffuses light produced by the various light emitting elements 14 provided on the base panel 12, and a brightness enhancer 18 that is positioned adjacent the diffuser 16.” *Id.*, [0015].

B. Holman

Holman was published on July 10, 2003, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(b). Holman describes and shows a BEF on a reflector sheet without an intervening air gap. Holman discloses the use of orthogonal, elevated prism sheets 58 and 60. *See, e.g.*, Holman, pp. 10-11, Prism sheets 58 and 60 are BEF. *Id.*; *see also*, pp. 8-9 (explicitly disclosing that the prism sheet “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.*, pp. 8-9.

C. Lamb

Lamb was published on June 23, 2005, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(a).

Lamb relates to backlighting systems to be used with liquid crystal displays and provides explicit disclosures related to the refraction and recycling of light by BEFs. Lamb, [0035] (“The enhancement film 14 refracts light within a certain angle toward the viewer. Light 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.”).

D. Epstein

Epstein was published on December 1, 2005, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(a).

Epstein describes “an optical assembly for emitting light comprises an array of light emitting diodes (LEDs) mounted to a substrate. The LEDs emit light in a direction generally perpendicular to the substrate.” Epstein, [0005]. Epstein describes an intermediate layer 422 (and related embodiment intermediate layer 622 of FIG. 6) that may be a reflector for light at the wavelength emitted by the LED 420 (or LED 620). *See* Epstein, [0048] & [0067]. Epstein further discloses

that the intermediate layer 422 (and related embodiment intermediate layer 622) may be bonded to the substrate 408 (and related embodiment substrate 608). *Id.*

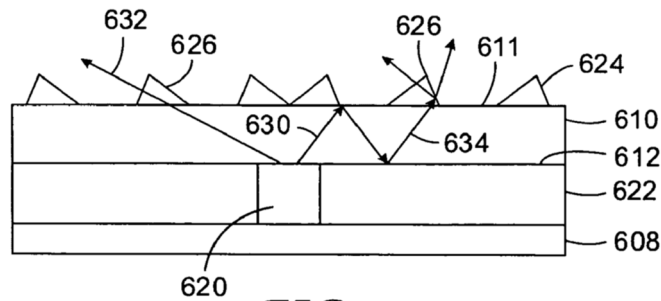


FIG. 6

Epstein, Fig. 6. Epstein also describes the use of BEFs 662 and 664. Epstein, [0074].

E. Ko

Ko was published on April 20, 2006, and was filed as an application on October 14, 2004, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(a).

Ko describes that “[i]n a directly-illuminated liquid crystal display (LCD), for example an LCD monitor or an LCD-TV, a number of light management films, including a diffuser layer, lie between the light source and the LCD panel to provide bright, uniform illumination.” Ko, Abstract. Ko further describes a reflector 118, which may be a specular reflector or may be a diffuse reflector for reflecting light. Ko, [0043] (“The backlight 112 may also include a reflector 118 for reflecting light propagating downwards from the light sources 116, in a

direction away from the LC panel 102. The reflector 118 may also be useful for recycling light within the display device 100, as is explained below. The reflector 118 may be a specular reflector or may be a diffuse reflector.”).

F. Kretman

Kretman was published on June 26, 2003, and is thus prior art to the '835 Patent under at least 35 U.S.C. § 102(b).

Kretman is incorporated by reference into Ko and describes that “diffuse reflective articles are useful in backlight units of liquid crystal displays....” Kretman, Abstract. Further, Kretman discloses “forming a plurality of surface elements in the diffuse reflective material. These surface elements are positioned to reduce or eliminate optical coupling with a substrate against which the diffuse reflective material is subsequently placed.” Kretman, [0026].

VII. Full Statement of the Reasons for the Relief Requested

A. Ground 1 – Claims 1-5 and 7-14 are Obvious Under 35 U.S.C. § 103 Over the Combination of Mok, Holman, and Lamb in view of the Knowledge of a POSITA.

1. Motivation to Combine Mok, Holman, and Lamb.

A combination of familiar elements according to known methods which yields no more than predictable results is likely obvious to one of skill in the art. One rationale to support a conclusion of obviousness is the use of a known technique to improve similar devices (methods, or products) in the same way.

MPEP 2143(C). To establish that a combination and/or modification is the use of a known technique to improve similar devices and methods in the same way, it is necessary to establish (1) that the prior art contained a “base” device/method upon which the claimed invention can be seen as an “improvement,” (2) a finding that the prior art contained a “comparable” device/method that is not the same as the base device/method and that has been improved in the same way as the claimed invention, and (3) that the skilled artisan could have applied the known “improvement” in the same way to the base device/method with predictable results. *See* MPEP 2143(C).

A POSITA would have been motivated to modify the light emitting panel described in Mok to include (1) Holman’s BEF and arrangement thereof, reflector sheet comprising plastic, fresnel-type lenses, and heatsink panel, and (2) Lamb’s BEF functionality including three-dimensional light extraction features, and a diffuser sheet between the reflector and the BEF. Ex. 1003, ¶129

First, each of Mok, Holman, and Lamb are in the same field of endeavor, i.e., LED-based lighting devices to provide backlighting for display elements. Ex. 1003, ¶130. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting panel. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to

incorporate the improvements to backlighting systems described in Holman and Lamb into the lighting device disclosed by Mok. *Id.*, ¶136.

Second, Mok recognizes certain major challenges with lighting panels, such as efficiency. Mok [0006]. Those same challenges are also recognized in both Holman and Lamb. Holman, p. 3; Lamb [0006]. “A primary motivation of one of ordinary skill in the art would have been to create a more efficient lighting panel.” Ex. 1003, ¶131.

Holman states numerous times that an “object of the invention to provide an improved system and a method for homogenizing ... uneven light distribution,” which creates a more “efficient and homogenous” illumination system. Holman, pp. 4-6. Holman aims to do so by using components such as a reflector, diffuser, and BEF in various configurations. *See, e.g.*, Holman, pp. 120, 159-160. Those same components are used in various configurations in Mok as well. *See, e.g.*, Mok [0021], [0024], [0028]. Lamb further states that “there remains a need in the field of backlights for large high-performance LCDs for backlighting systems that... are more efficient” (Lamb, [0006]) and does so by using components described in Mok, such as a reflector, diffuser, and BEF to create a more efficient backlighting system. *See, e.g.*, Lamb [0010], [0017], [0035], [0048].

A POSITA would be motivated to modify Mok to include Holman’s specific BEF configuration, wherein the BEF is positioned on a reflector sheet without an

intervening air gap. Such a positioning allows for a thinner panel while maintaining light uniformity. *See, e.g.*, Holman p. 16; Ex. 1003, ¶132. A POSITA would further be motivated to incorporate Holman's plastic diffuse reflector in Mok to provide uniform lighting quality at a lower cost and weight than traditional metal reflectors. *See, e.g.*, Holman p. 8; Ex. 1003, ¶132. Further, a POSITA would be motivated to use Holman's lens array 62 of Fresnel-lenses to increase light diffusion, which improves light uniformity, hence quality for the viewer. Ex. 1003, ¶132 A POSITA would also be motivated to apply Holman's heatsink panel to Mok to improve cooling and efficient operation of LEDs. *Id.*

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. Lamb [0008], [0035], [0048]; Ex. 1003, ¶133.

A POSITA would have been motivated to use the improvements described within Holman and Lamb to improve the quality of backlighting provided by the backlighting system described in Mok. Ex. 1003, ¶135 A POSITA would recognize that the combination would have provided better light diffusion and thus a better display quality as well as improved efficiency, and this would have provided a motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art according to their

known function to achieve a predictable result, e.g., higher light quality. *Id.* ¶136. Thus, combining these three references—Mok, Holman, and Lamb—that all use the same components to achieve the same goal would have been obvious to a POSITA. Ex. 1003, ¶128-138.

2. Independent Claim 1.

[’835 Claim 1 Preamble] A lighting panel, comprising:

Mok discloses “a light emitting panel.” Mok, Abstract.

[’835 Claim 1A] at least one substrate having a first side parallel to a principal plane of the lighting panel;

Mok describes a base panel that “provides a convenient mounting location for the various light emitting elements” and one that is a “generally rectangular shaped, plate-like member ... commensurate with the intended size of the [light emitting] panel.” Mok, [0019]. In Figure 1, the base panel 12 is shown as parallel to principal plane of lighting panel 10.

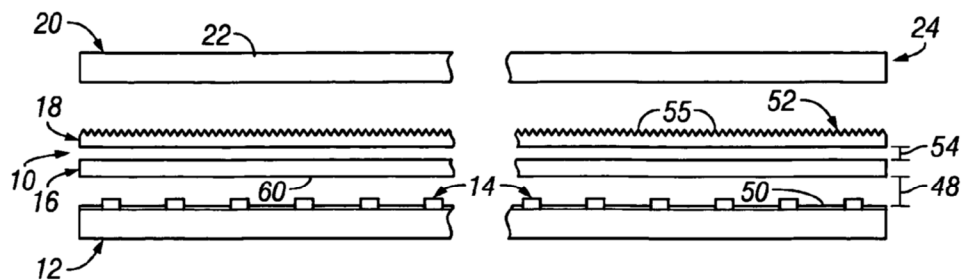


FIG. 1

Mok, Fig. 1.

[’835 Claim 1B] a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;

Mok discloses that “[t]he 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.” Mok, [0019]. The various lighting emitting elements described in Mok are LEDs, which are “solid state lighting devices.” *See, e.g.*, Mok, [0029].

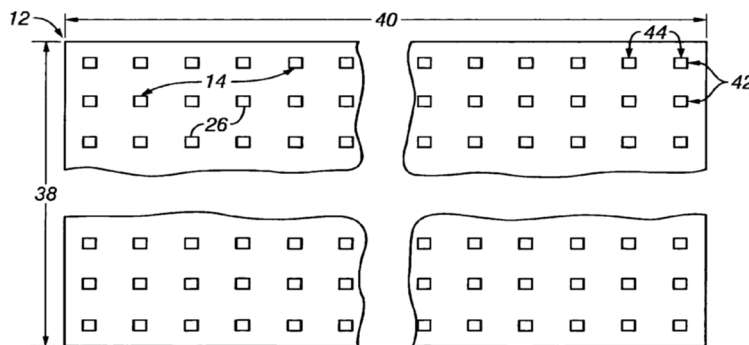


FIG. 2

Mok, Fig. 2; *see also* Ex. 1003, ¶43-44; ¶139, Element 1B.

[’835 Claim 1C] a reflector on the first side of the at least one substrate;

Mok describes that “[t]he reflective surface 50 may comprise a separate component (e.g., a sheet-like material) that is affixed to the base panel 12.” Mok, [0021]. Mok Figure 1 further demonstrates how the reflective surface is on the first side of the base panel or substrate.

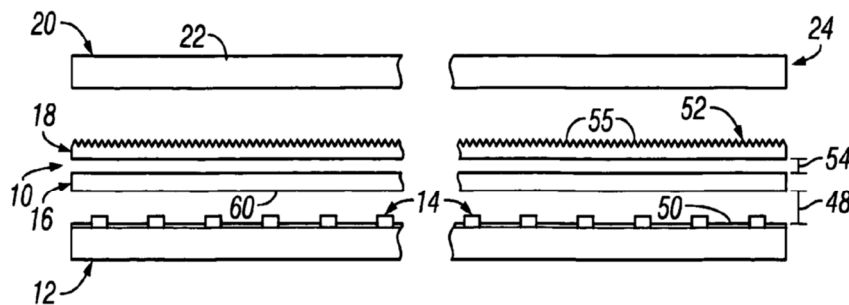


FIG. 1

Mok, Fig. 1; *see also* Ex. 1003, ¶¶50-52; ¶139, Element 1C.

['835 Claim 1D] a brightness enhancement film on the reflector,

Mok describes a brightness enhancer 18 that is a BEF. Mock, [0024] (“the brightness enhancer 18 comprises a brightness enhance film (BEF).”). Mok describes that the 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.*; *see also* Ex. 1003, ¶¶68-71.

Mok Figure 1 shows that the BEF 18 is on diffuser 16 with an intervening area of air, while the diffuser 16 is on the reflector 12 with an intervening area of air. As the '835 patent explains, “on” means directly on or with intervening elements in between. *See* '835 Patent, 6:66-7:12 (“It will be understood 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.”). Mok shows the

diffuser and air gaps as intervening elements such that the BEF is on the reflector.

See Mok, Fig. 1.

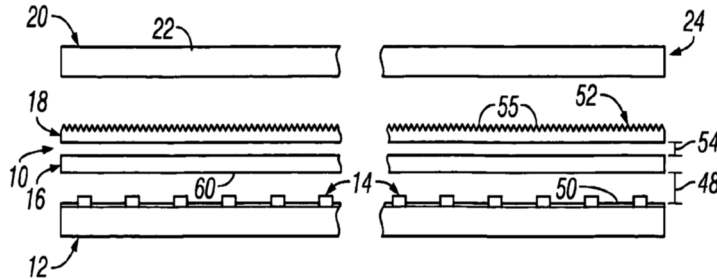


FIG. 1

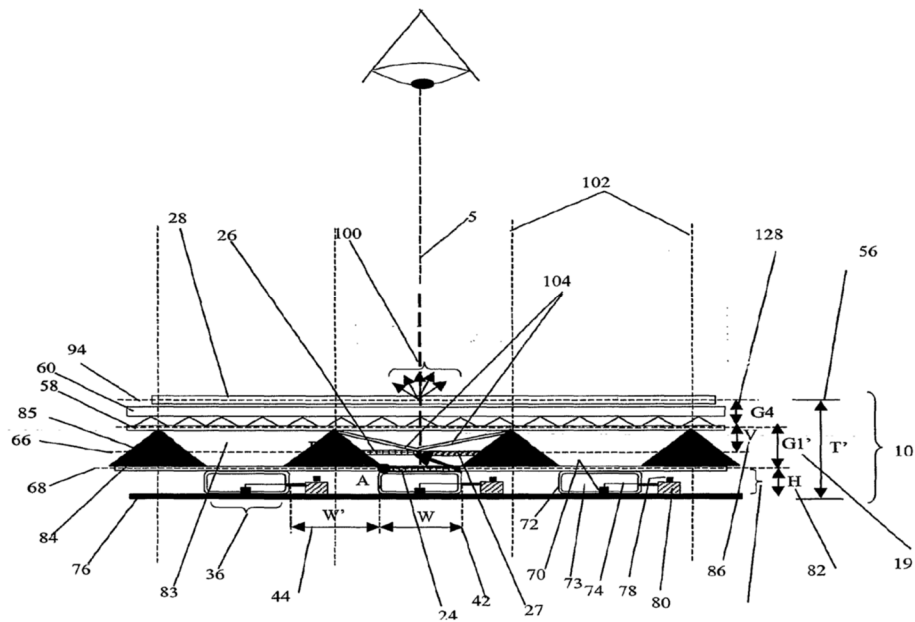
To the extent that an air gap is not an intervening element, a POSITA would understand that various configurations and arrangements of the films, sheets, and surfaces can be accomplished. As discussed above, Holman describes and shows a BEF on a reflector sheet without an intervening air gap.

Holman discloses the use of orthogonal, elevated prism sheets 58 and 60. *See, e.g.*, Holman, pp. 10-11, Prism sheets 58 and 60 are BEFs. *Id.*; *see also*, pp. 8-9 (explicitly disclosing that the prism sheet “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.*, pp. 8-9. Holman also explains that the prism sheets perform the same function as 3M’s trademarked BEFs. *Id.*, p. 122.

As to the physical arrangement of the prism sheets, 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” (*see id.*, pp. 37-38), “diffusely scattering layer 68” (*id.*, p. 44), “compartmentalized spacer layer 84” and “sidewalls 85” (*id.*, p. 16). *See also id.*, FIG. 7 showing a “stacked” arrangement where the BEF (58) is “on” the reflector (76):

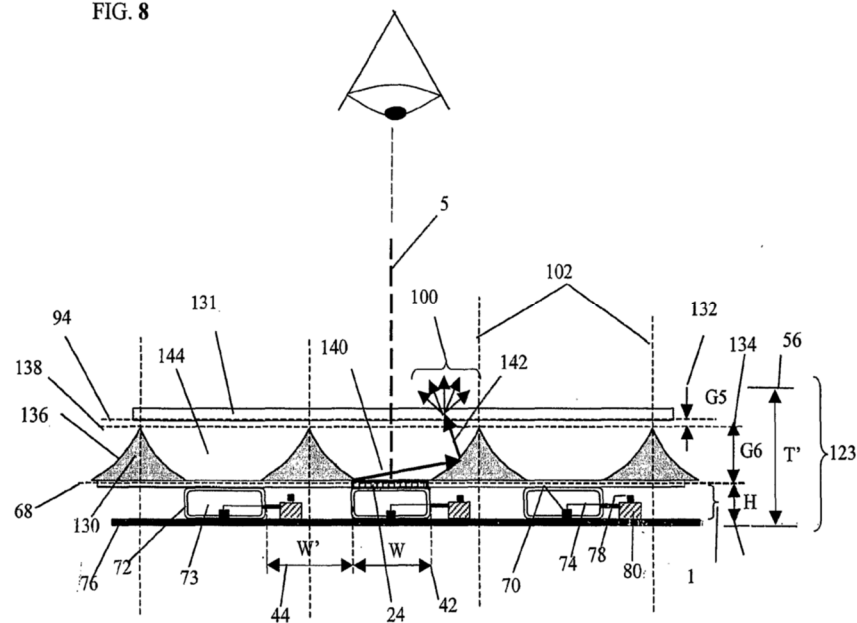
FIG. 7



Id., Figure 7; Ex. 1003, ¶73-76.

In a similar, alternative embodiment, Holman discloses a BEF 131 that rests on a transparent dielectric material 144. The transparent dielectric material rests on diffusely scattering layer 68, which in turn rests on confining structure 72. Confining structure 72 abuts reflector 76. *See Holman, FIG. 8:*

FIG. 8



Id., Figure 8; Ex. 1003, ¶77.

Thus, Mok in combination with Holman describes a BEF on a reflector. It 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. Ex. 1003, ¶139, Element 1D.

['835 Claim 1E] wherein the reflector is arranged between the at least one substrate and the brightness enhancement film and

Mok describes and shows a reflector (reflective surface 50) as between a substrate, which is the base panel 12, and BEF (brightness enhancer 18). *See* Mok Figure 1 below.

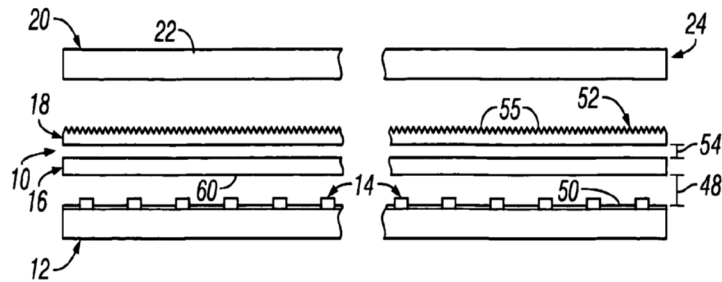


FIG. 1

Mok Figure 1; Ex. 1003, ¶107-8.

Figure 5B of the '835 Patent mirrors the arrangement shown in Figure 1 of Mok, confirming that Mok discloses this element of the '835 Patent.

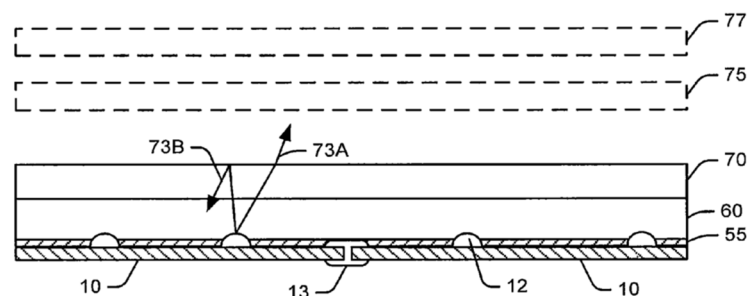


FIGURE 5B

'835 Patent Figure 5B.

Holman also shows a reflector arranged between the substrate and BEF. *See* Holman, Figure 8. Ex. 1003, ¶109; ¶139, Element 1E.

[’835 Claim 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, and

Mok discloses that the BEF preferentially emits light having a first orientation and preferentially reflects light having a second orientation, which is different from the first orientation. First, a POSITA would understand that BEFs are designed and configured to work in this manner. Ex. 1003, ¶68. Mok reinforces this point when it describes the use of “light conditioners” to, on the one hand, diffuse light to create uniform lighting within the panel and on the other hand to use a “brightness enhancer” to collect diffused light and direct it out of a front surface to “maximize the on-axis brightness of the light emitting panel.” Mok, [0015]. Mok similarly describes the concept of recycling light, although in relation to light reflected by the diffuser. Mok, [0024]. A POSITA would understand that the same phenomenon occurs with BEFs, including the specific BEF referenced by Mok. *See* Mok, [0024]; Ex. 1003, ¶70-71.

Further, Mok in combination with Lamb discloses this element. Lamb relates to backlighting systems to be used with liquid crystal displays and provides explicit disclosures related to the refraction and recycling of light by BEFs. Lamb, [0035] (“The enhancement film 14 refracts light within a certain angle toward the viewer. Light 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. 1003, ¶72-75.

Lamb discloses the same structures disclosed in Mok, such as LEDs, a reflector, a BEF, and a diffuser. Lamb, [0010], [0035], [0039]. Mok and Lamb also both teach that the BEF may be Vikuiti BEF, available from 3M Company. *See* Mok, [0024]; Lamb, [0035]. It 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. Ex. 1003, ¶133; ¶139, Element 1F.

[’835 Claim 1G] 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.

As described above, the diffuser sheet resides below the BEF in each of these references, and thus recycled light will be reflected back into the diffuser sheet. *See, e.g.*, Mok, [0022] (describing a “diffuser 16 is positioned in spaced-apart relation to the base panel 12 so that it receives and diffuses light produced by the light emitting elements 14 as well as light that maybe reflected by the reflective surface 50 provided on base panel 12.”). Mok Figure 1 also shows the diffuser 16 as a planar sheet.

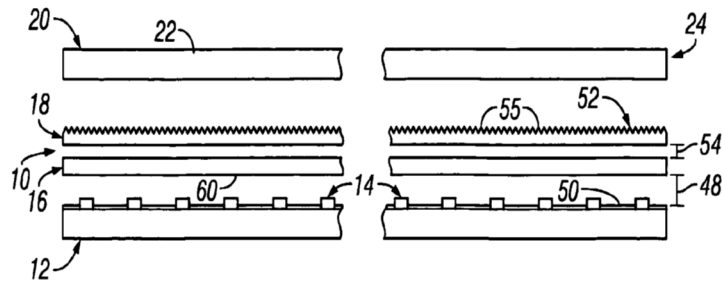


FIG. 1

Mok, Fig. 1. Because light having a second orientation will be reflected back into the diffuser sheet in Mok (*see* claim element 1F), the reflected light will be recycled within the diffuser sheet. Ex. 1003, ¶113-114.

To the extent Mok does not explicitly describe recycling, Lamb does. Lamb describes “‘a recycling enhancement structure’ may be any structure that is capable of ‘recycling’ light in a manner similar or equivalent to the enhancement films 12 and 14.” Lamb, [0042]. Lamb further describes a specific example of such a film “as a multilayer reflective polarizer Vikuiti™ Dual Brightness Enhancement Film (DBEF), available from 3M Company.” *Id.* These structures “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.*, [0045]; *see also* [0048]; Ex. 1003, ¶115.

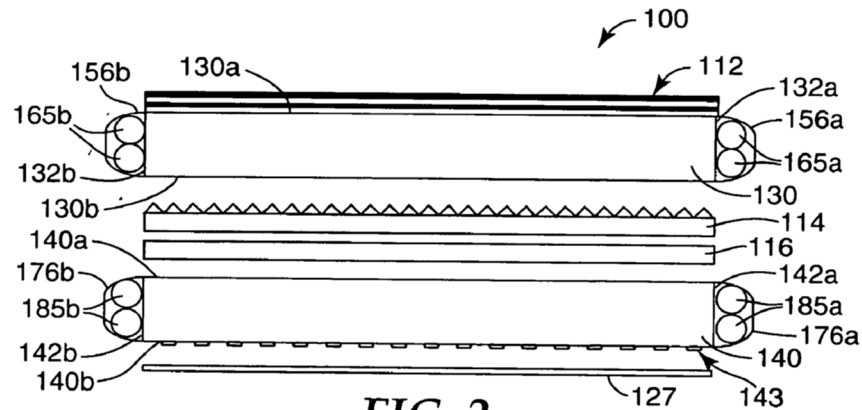


FIG. 2

Lamb, Fig. 2. Thus, Lamb explicitly describes that which is implicitly disclosed in Mok and known to a POSITA—BEFs will reflect some amount of light, which is in turn recycled in the below diffuser sheet layer. Ex. 1003, ¶115.

Thus, to the extent not explicitly taught in Mok, the combination of Mok and Lamb teach this claim element. *Id.*; ¶139, Element 1G.

3. Dependent Claim 2.

[’835 Claim 2] The lighting panel of claim 1, wherein the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon.

Mok describes a coating on the substrate, which is white paint, which it describes as a diffuse reflector. Mok, [0021] (“The reflective surface 50 may comprise ... a diffuse reflective surface (e.g., white paint)... the reflective surface 50 may be deposited directly on the base panel 12 by any of a wide range of processes....”). A POSITA would understand that a diffuse reflector (e.g., white paint) reflects and scatters light. Ex. 1003, ¶51; ¶139, Claim 2.

4. Dependent Claim 3.

[’835 Claim 3] The lighting panel of claim 1, wherein the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon.

Mok describes that “[t]he reflective surface 50 may comprise a separate component (e.g., a sheet-like material) that is affixed to the base panel 12.” Mok, [0021]. Mok also describes reflective surfaces, including one made of aluminum, and another comprising white paint, which it describes as “a diffuse reflective surface.” *Id.* A POSITA would recognize that such a surface would reflect and scatter light incident thereon. *See supra* Claim 2; Ex. 1003, ¶52; ¶139, Claim 3.

5. Dependent Claim 4.

[’835 Claim 4] The lighting panel of claim 1, further comprising at least one additional layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light.

Mok, in combination with Lamb discloses this claim. Mok discloses a BEF 18, and Lamb discloses a recycling enhancement structure 314 that includes a BEF. *See* Lamb [0057]. As discussed above, a POSITA would be motivated to combine Mok with Lamb. Lamb’s recycling enhancement structure 314 is between a first lightguide 330 and a second lightguide 340. Lamb [0057]. Lamb further discloses that “[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.” Lamb [0058]. Thus, Lamb explicitly discloses the

use of an additional layer in the form of a diffuse extractor on a BEF. Ex. 1003, ¶121; ¶139, Claim 2.

6. Dependent Claim 5.

[’835 Claim 5] The lighting panel of claim 3, wherein the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices.

Mok Figures 1 and 2 show a reflective surface 50 with apertures for solid state lighting devices. *See, e.g.*, Mok, [0021]. As Mok explains, the solid state lighting devices are mounted to the substrate or base panel. *See, e.g.*, Mok, [0019] (“The base panel 12 provides a convenient mounting location for the various light emitting elements 14....”). As shown in Figure 1 below, the reflective surface or sheet (50) has apertures that are aligned with and correspond to the plurality of solid state lighting devices.

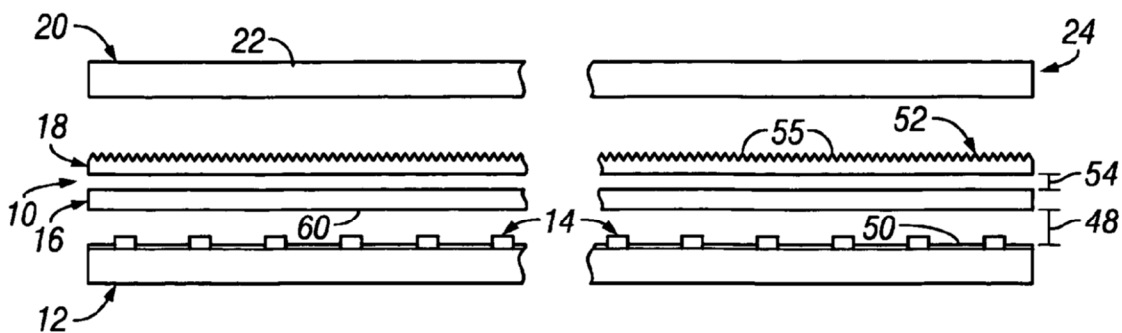


FIG. 1

Mok Figure 1; Ex. 1003, ¶64-66. Additionally, FIG. 2 shows the reflector sheet 50 of FIG. 1 with apertures through which LEDs 14 align.

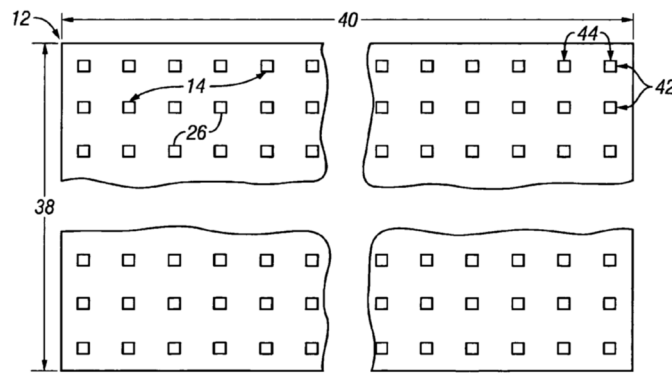
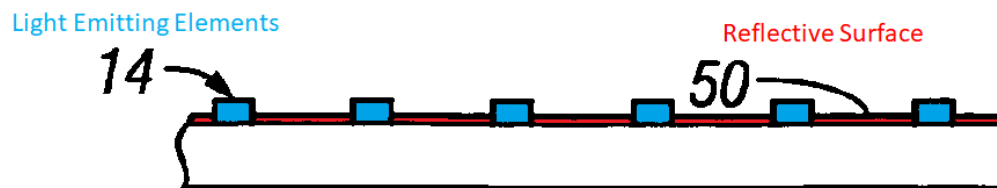


FIG. 2

Mok Figure 2. An enlarged and annotated view of Mok Figure 1, further demonstrates how Mok discloses a base panel 12 covered with a reflective surface 50 wherein apertures in the reflective sheet are aligned with LEDs 14.



Mok, Figure 1 (annotated); Ex. 1003, ¶66; ¶139, Claim 5.

7. Dependent Claim 7.

[’835 Claim 7] The lighting panel of claim 3, wherein the reflector sheet comprises a plastic foam.

Mok discloses a reflector, as in claim 3. Mok, [0003]. As discussed above, a POSITA would be motivated to combine Mok and Holman, and Holman discloses a reflector that may be composed of a plastic material. Holman, p. 8; Ex. 1003, ¶60. As Dr. Pattison explains, Plastic is a generic term, and plastic foams were well

known in the art. *Id.* This is demonstrated by, e.g., Ko, which describes “[p]olymer foams may also be used” to form the substrate. Ko, [0056].

A POSITA would thus recognize that using plastic foam as the reflector was well-known in the art and would have been motivated to use such a plastic foam in this application because plastic foams are lightweight, thin, and inexpensive, which are all desirable in backlight applications. *See* Ex. 1003, ¶62. This claim is obvious in view of the combination of Mok, Holman, and the knowledge of a POSITA. Ex. 1003, ¶62; ¶139, Claim 7.

8. Dependent Claim 8.

[’835 Claim 8] The lighting panel of claim 1, further comprising a diffuser sheet between the reflector sheet and the brightness enhancement film.

Mok Figure 1 shows a diffuser sheet 16 that is between the reflective surface 50 and brightness enhancer 18.

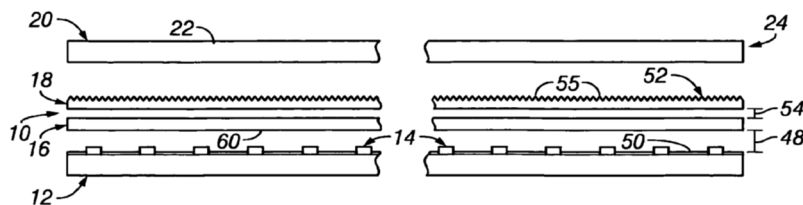


FIG. 1

Mok, Fig. 1, [0021]; Ex. 1003, ¶113; ¶139, Claim 8.

9. Dependent Claim 9.

[’835 Claim 9] The lighting panel of claim 1, wherein the brightness enhancement film comprises a plurality of 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.

Mok describes that a “brightness enhancer 18 comprises a plurality of optical elements, such as prisms 55 defined by the front surface 52 of the brightness enhancer 18, that collect light from the diffuser 16 and direct it out the front surface 52 of the brightness enhancer 18. The brightness enhancer 18 thereby maximizes the on-axis brightness of the panel 10.” Mok, [0021]. Prisms are three dimensional structures, and a POSITA would understand that maximizing “on-axis brightness” includes bending at least some light rays toward the direction normal to the principal plane of the lighting panel. Ex. 1003, ¶86-87.

Further, Lamb discloses a BEF with three dimensional prismatic structures. Lamb, [0044]-[0046]. Lamb teaches that the prismatic structures “redirect and recycle light to increase on-axis output brightness of the backlighting system 200 *by refracting toward the viewer light within a certain angle* and reflecting back light outside that angle.” Lamb, [0052] (emphasis added). Thus, Lamb discloses bending, i.e. refracting, at least some light rays toward the direction normal to the principal plane of the lighting panel. Ex. 1003, ¶88; ¶139, Claim 9.

10. Dependent Claim 10.

[’835 Claim 10] The lighting panel of claim 9, wherein the light extraction features are random features.

Mok describes the well known purpose of three dimensional light extraction features, such as prisms, for collecting light from the diffuser and directing it out the front surface of the BEF. Mok [0024]. Mok then explicitly suggests the use of a variety of alternative types of BEFs. *Id.* (BEF 18 “comprises a plurality of optical elements, such as prisms 55”). Mok does not explicitly describe the use of random three dimensional light extraction features, but including such features would have been an obvious variation of the BEFs disclosed by Mok. Ex. 1003, ¶¶94-95, 138. As Dr. Pattison explains, “[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.” Ex. 1003, ¶94. BEFs with random light extraction features were well known in the art and used to collect light from diffusers and direct light out the front surface of the BEF. Ex. 1003, ¶¶94-85. “Further, randomized optical patterns also help to minimize optical dispersion which is the separation of colors, such as with a prism, where in a display the objective is to combine colors.” Ex. 1003, ¶95.

Further, Lamb discloses the “randomization” of light being emitted from its optical layers. Lamb [0042]. Lamb’s disclosure confirms the well-known aspect of

randomizing light and the use of such light extraction features in lighting panels. Ex. 1003, ¶93. As discussed, it would have been obvious to combine Lamb's teachings in Mok's lighting panel, particularly given Mok's specific instruction that other light extraction features can be used in its apparatus. Accordingly, this claim is obvious. Ex. 1003, ¶139, Claim 10.

11. Dependent Claim 11.

[’835 Claim 11] The lighting panel of claim 9, wherein 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.

Mok discloses a BEF, which a POSITA would understand limits direct emission. Further, Lamb expressly discloses recycling enhancement structures 112 and 114, which are BEFs. Lamb, [0042] and [0044]. As Lamb describes, “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.*, [0045]. Thus, Lamb discloses recycling light and thereby limiting direct emission from the lighting panel and encourage light recycling/diffusion in the lighting panel. Ex. 1003, ¶98-99. Further, these are standard functions of BEFs. *Id.*; ¶139, Claim 11.

12. Dependent Claim 12.

[’835 Claim 12] The lighting panel of claim 9, wherein the light extraction features comprise fresnel-type lenses.

Mok discloses a lighting panel with light extraction features. *See supra* Claim 9. Holman discloses that the “lens 356 may be a Fresnel or a pair of Fresnel lens elements.” Holman, p. 70. “By definition, Fresnel lenses have the functionality of a conventional lens but are much thinner since they compress the optical features of the lens into an almost flat element.” Ex. 1003, ¶¶96-97. A POSITA would understand that lenses are light extraction features and that Fresnel type lens advantageously allow for thinner optical components and help collimate light. Ex. 1003, ¶¶96-97. Both of these features are features that would be compatible with and advance Mok’s goals of creating efficient, thin lighting displays. Ex. 1003, ¶¶96-97; ¶139, Claim 12.

13. Dependent Claim 13.

[’835 Claim 13] The lighting panel of claim 9, wherein the brightness enhancement film is configured to substantially collimate light emitted by the lighting panel.

A POSITA would understand that “substantially collimate light” means to “substantially align light,” and this is disclosed by Mok. Ex. 1003, ¶103. In particular, Mok describes that “[t]he brightness enhancer 18 collects diffused light from the diffuser 16 and directs it out of a front surface 52 of the brightness enhancer 18 to maximize the on-axis brightness of the light emitting panel 10.”

Mok, [0015]; Ex. 1003, ¶104; ¶139, Claim 13.

14. Dependent Claim 14.

[’835 Claim 14] The lighting panel of claim 1, further comprising 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.

Mok identifies and recognizes the issue of heat generation and dissipation.

Mok, [0004] and [0006]. Mok further discloses the use of printed circuit board for a base panel. *Id.*, [0019]. A POSITA 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. Ex. 1003, ¶124-25.

Further, heat sinks were well known in the art, as demonstrated by Holman. Holman, like Mok, recognizes the need for heat extraction from LEDs which emit light. *See, e.g.*, Holman, pp. 8, 33, and 39. To solve this issue, Holman mentions a need for “adequate heat sinking.” *Id.*, p. 31. Holman describes a base layer 220 that functions as part of a heat sink. *Id.*, p. 40. In Holman, the LEDs 70 are mounted to the base layer 220. *See id.*, Figs. 7 and 13. Light is emitted from the LEDs 70 in a direction away from the base layer 220 and the base layer draws heat away from the LEDs 70 in the direction opposite the direction of light emission. *Id.* A POSITA 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. Ex. 1003, ¶126; ¶139, Claim 14.

B. Ground 2 – Claims 1-5 and 7-14 are Obvious Under 35 U.S.C. § 103 Over the Combination of Epstein, Holman, and Lamb in view of the Knowledge of a POSITA.

1. Motivation to Combine Epstein, Holman, and Lamb.

A POSITA would have been motivated to modify the lighting system described in Epstein to include both (1) Holman’s BEF mounted on a reflector sheet without an intervening air gap and reflector sheet comprising a plastic, and (2) Lamb’s express functionality for the disclosed BEF. Ex. 1003, ¶141.

First, each of Epstein, Holman, and Lamb are in the same field of endeavor, i.e., LED-based lighting devices to provide backlighting for display elements. Ex. 1003, ¶142. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting panel. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to backlighting systems described in Holman and Lamb into the lighting device disclosed by Epstein. *Id.*

Second, Epstein, Holman, and Lamb are all aimed at the same goal—increasing the efficiency of lighting systems. Epstein [0121]; Holman, p. 3; Lamb [0006]; Ex. 1003, ¶143-44. Epstein and Holman describe accomplishing those similar functions by using the same components—LED light sources, reflectors,

diffusers, and BEFs—in a variety of configurations. The same is true for Epstein and Lamb, which also both describe improved backlighting systems using similar components like a reflector, a diffuser, and a BEF. *See, e.g.*, Lamb [0035], [0048]. The three references similarly discuss ways to improve light output and manage light uniformity by using a variety of films, layers, and structures and by modifying and arranging these structures in a variety of physical configurations.

A POSITA would be motivated to modify Epstein to include Holman's specific arrangement of BEF configuration, wherein the BEF is positioned on a reflector sheet without an intervening air gap. Such a positioning allows for a thinner panel while maintaining light uniformity. *See, e.g.*, Holman p. 16; Ex. 1003, ¶146. A POSITA would further be motivated to use Holman's plastic diffuse reflector in Epstein to provide uniform lighting quality at a lower cost and weight than traditional metal reflectors. *See, e.g.*, Holman p. 8; Ex. 1003, ¶146. A POSITA would further have been motivated to apply Lamb's BEF to the Epstein-Holman combination to eliminate thick diffuser plates, provide increased brightness by recycling light, and increase the exit light's spatial uniformity. Lamb [0008], [0035], [0048]; Ex. 1003, ¶146.

A POSITA would recognize that each of Epstein, Holman, and Lamb describes known methods for improving the lighting quality and efficiency of similar LED-based backlighting systems. Ex. 1003, ¶144 A POSITA would have

been motivated to use the improvements described in Holman and Lamb to improve the quality of backlighting provided by the backlighting system described in Epstein. Ex. 1003, ¶144. A POSITA would recognize that the combination would have provided better light diffusion and thus a better display quality as well as improved efficiency, and this would have provided a motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art according to their known function to achieve a predictable result, e.g., higher light quality. Accordingly, it would have obvious to modify Epstein to include the specific configurations disclosed within Holman and Lamb. Ex. 1003, ¶141-47.

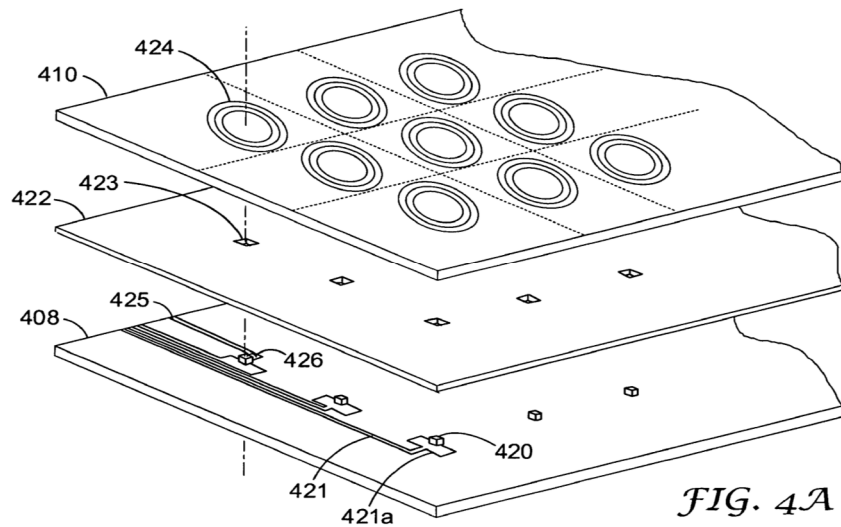
2. Independent Claim 1.

[’835 Claim 1 Preamble] A lighting panel, comprising:

Epstein discloses “backlighting of liquid crystal displays.” Epstein Abstract.

[’835 Claim 1A] at least one substrate having a first side parallel to a principal plane of the lighting panel;

Epstein Figure 4A, pictured below shows that the “lighting unit 400 comprises a substrate 408 on which are arrayed a number of LEDs 420.” Epstein, [0046].



Epstein, Fig. 4A.

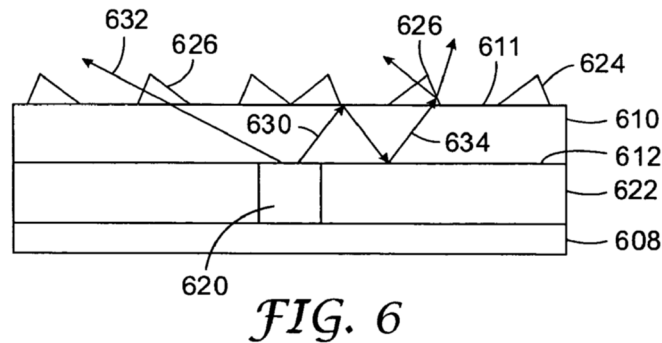
[’835 Claim 1B] a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;

Epstein describes a lighting unit 400 that comprises a number of LEDs 420 that emit light and are arrayed on a first side of a substrate 408. Epstein, [0046].

LEDs are solid state lighting devices. Ex. 1003, ¶45-46; ¶148, Element 1B.

[’835 Claim 1C] a reflector on the first side of the at least one substrate;

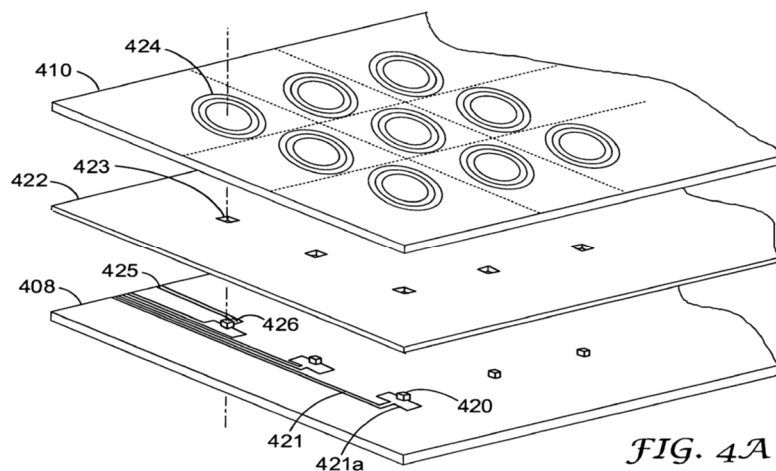
Epstein describes an intermediate layer 422 (and related embodiment intermediate layer 622 of FIG. 6) that may be a reflector for light at the wavelength emitted by the LED 420 (or LED 620). See Epstein, [0048] & [0067].



Epstein, Fig. 6; Ex. 1003, ¶¶53-55; ¶148, Element 1C.

[’835 Claim 1D] a brightness enhancement film on the reflector,

With respect to Figure 6, Epstein describes the use of BEFs 662 and 664, stating 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.” Epstein, [0074]. As pictured in Figure 4A, the reflector 422 is on one side of the substrate (408), followed by a guiding layer 410 that also includes an array of light extraction elements 424 associated with each LED 420.



Epstein, Fig. 4A. Ex. 1003, ¶78-81.

Epstein Figure 6 further shows the physical relationship between these various layers as the reflective layer 622 is on the substrate 608 with the guiding layer 610 above the reflective layer 622. *See, e.g.*, Epstein Figures 6, 10A, 12 (*see also* similar disclosures in FIG. 4A). Because the '835 patent explains that “on” means directly on or with intervening elements in between (*See* '835 Patent, 6:66-7:12), Epstein’s BEF 662 is on the reflector 622 with intervening element 610 in between.

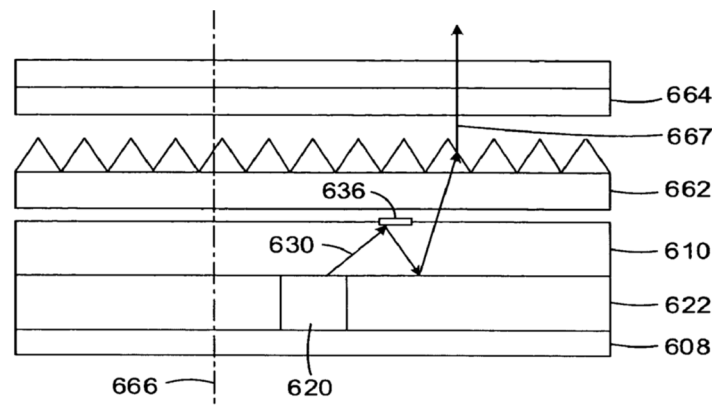


FIG. 11

Epstein, Fig. 11; Ex. 1003, ¶80.

To the extent 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. *See supra* Ground 1, Claim 1D. In particular, Holman describes and shows a 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.” *See, e.g.*, Holman, pp. 8-11, 37-38. One of skill in the art would have been motivated to use Holman’s stacked arrangement of layers in Epstein’s embodiments for the reasons discussed above, including that efficient lighting panels having thin dimensions was a desirable feature. Ex. 1003, ¶146; ¶148, Element 1D.

[’835 Claim 1E] wherein the reflector is arranged between the at least one substrate and the brightness enhancement film and

Epstein’s reflector 622 is positioned between the substrate and the BEF. *See* Figure 11. As shown, reflector 622 is positioned between the BEFs 662 and 664 and the substrate 608. Epstein, Figure 11.

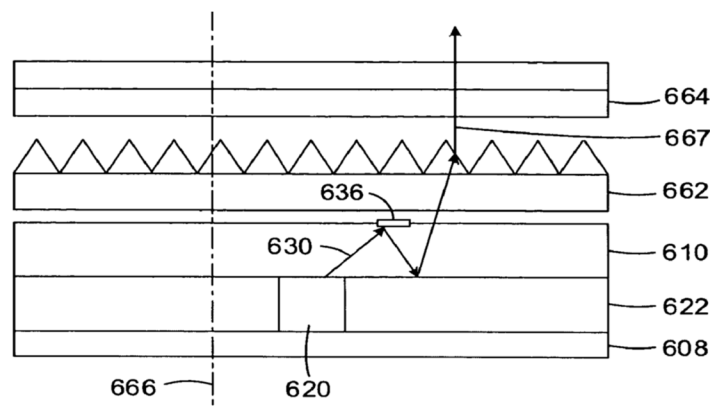


FIG. 11

Epstein, Figure 11, *see also* Fig. 4A; Ex. 1003, ¶110; ¶148, Element 1E.

[’835 Claim 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, and

Epstein discloses that “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 660. 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.” Epstein, [0074]. The intermediate layer 622 may be a reflector that causes some depolarization so that the light reflected may be recycled and passed through a reflective polarizer, in addition to stating 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.” Epstein, [0074] & [0076].

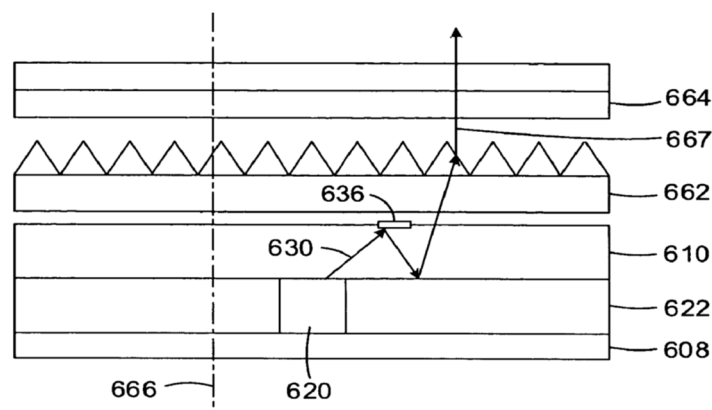


FIG. 11

Epstein, Fig. 11; Ex. 1003, ¶78-81; ¶148, Element 1F.

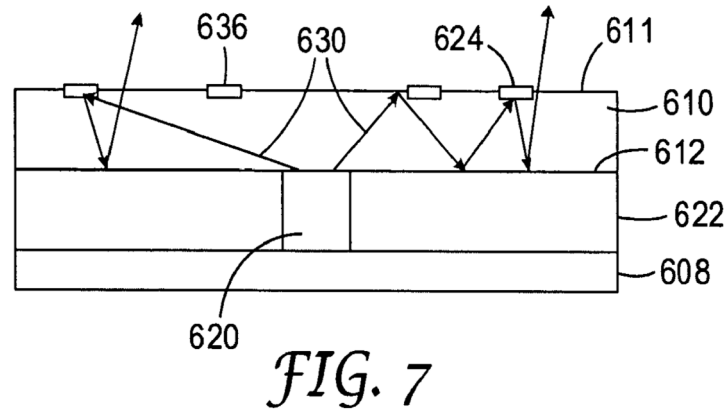
[’835 Claim 1G] a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light

having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet.

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.” Epstein, [0074]. The second direction that the light is refracted in is a second orientation. Ex. 1003, ¶116-17.

Epstein further discloses that “a reflective polarizing layer may be provided above the light emitting element, for example a multilayer optical film (MOF) reflective polarizer” and that “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.” Epstein, [0075].

Thus, Epstein discloses both light having a second orientation, and light that is reflected into a lighting panel and recycled. Ex. 1003, ¶116-17. Because 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.



Epstein, Figure 7; Ex. 1003, ¶117.

To the extent that Epstein does not explicitly describe this feature of the claim, Lamb does. Lamb discloses a 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. *See supra*, Ground 1, Claim 1G.

A POSITA 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. Ex. 1003, ¶146; ¶148, Element 1G.

3. Dependent Claim 2.

[’835 Claim 2] The lighting panel of claim 1, wherein the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon.

Epstein discloses that “intermediate layer 422 may also include some other type of reflector, such as a metalized layer or multilayer dielectric coating.” Epstein [0048]. An example of this coating is “a white pigmented material” that

acts as a “diffusely reflective light extraction material.” *Id.*, [0081]; *see also* [0079]; Ex. 1003, ¶54; ¶148, Claim 2.

4. Dependent Claim 3.

[’835 Claim 3] The lighting panel of claim 1, wherein the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon.

Epstein discloses that “[t]he intermediate layer 422 may comprise, for example, a multi-layer polymer reflective film ... [or] a white diffuse reflector such as a matrix containing diffusely reflecting particles, for example titanium dioxide particles.” Epstein, [0048]. A “diffuse reflector” such as that disclosed by Epstein reflects and scatter light incident thereon. Ex. 1003, ¶55; ¶148, Claim 3.

5. Dependent Claim 4.

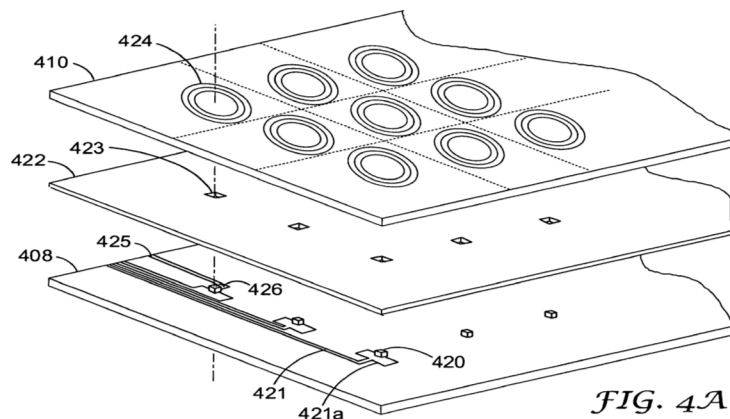
[’835 Claim 4] The lighting panel of claim 1, further comprising at least one additional layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light.

Epstein discloses that brightness enhancement layer 664 may be layered with a contrast/projection filter 668. Epstein [0074]-[0075], FIG. 12. A POSITA would know that a contrast/projection filter diffuses light. Ex. 1003, ¶122. Epstein also discloses that the brightness enhancement layer may comprise a layer of prismatic elements, which collimate light. Epstein, [0074]; Ex. 1003, ¶122; ¶148, Claim 4.

6. Dependent Claim 5.

[’835 Claim 5] The lighting panel of claim 3, wherein the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices.

Epstein describes a reflector 422 with a guiding layer 410, stating that “the guiding layer 410 may include an array of light extraction elements 424 associated with each LED 420. The intermediate layer 422, i.e., reflector, includes apertures 423, also referred to as vias, that are registered to the LEDs 420 disposed on the substrate 408.” Epstein, [0048].



Epstein, Fig. 4A; Ex. 1003, ¶67; ¶148, Claim 5.

7. Dependent Claim 7.

[’835 Claim 7] The lighting panel of claim 3, wherein the reflector sheet comprises a plastic foam.

Epstein discloses a reflector sheet. *See* Epstein, [0008]. As discussed above, a POSITA would be motivated to combine Epstein and Holman, and Holman discloses a reflector that may be composed of a plastic material. Holman, p. 9. As

discussed with respect to Ground 1, Claim 7, Plastic is a generic term, and plastic foams were well known in the art. *See supra*, Ground 1, Claim 7; Ex. 1003, ¶¶59-62; ¶148, Claim 7.

8. Dependent Claim 8.

[’835 Claim 8] The lighting panel of claim 1, further comprising a diffuser sheet between the reflector sheet and the brightness enhancement film.

Epstein discloses a guiding layer 610 that is a diffuser. Epstein further discloses that guiding layer 610 may comprise a diffuser 1902, positioned on the far side of the guiding layer 610 from the LED 620 or located in the guiding layer. Epstein, [0084]; Figs. 19A, & 11. The reflector 622 is located on the substrate 608, which is below the guiding layer 610. Epstein, [0048], Fig. 11. The BEF 662 and 664 are above the guiding later 610. *See, e.g., id.* [0074]. Therefore, the diffuser, which is directly on or in the guiding later 610, is between the reflector on the substrate 608, and the BEF 662 and 664. A POSITA would know that a diffuser is a diffuser sheet.

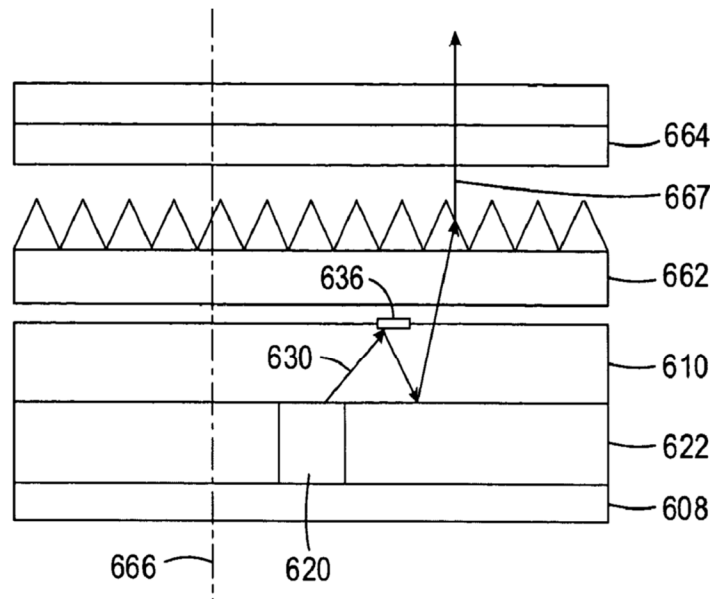


FIG. 11

Epstein, Fig. 11; Ex. 1003, ¶116-17; ¶148, Claim 8.

9. Dependent Claim 9.

['835 Claim 9] The lighting panel of claim 1, wherein the brightness enhancement film comprises a plurality of 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.

Epstein discloses a BEF, which “typically comprise a plurality of prismatic refractive elements which ... refract the transmitted light in a direction more parallel to the axis.” Epstein, [0074]. Figure 11 shows “a diffractive light extraction element 636 [that] emits light from the guiding layer 610 in a first direction relative to the axis 660. 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.* Accordingly Epstein discloses three dimensional

structures, i.e. prismatic elements, as part of the BEF that will bend light in a direction normal to the principal plane of the lighting panel.

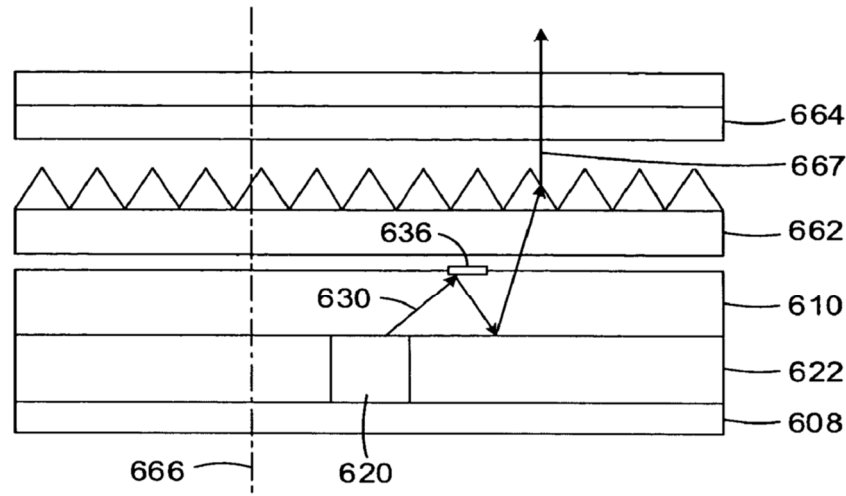


FIG. 11

Epstein, Figure 11; Ex. 1003, ¶89; ¶148, Claim 9.

10. Dependent Claim 10.

[’835 Claim 10] The lighting panel of claim 9, wherein the light extraction features are random features.

Epstein discloses a variety of components, such as prisms, a contrast/projection filter 668, and multilayer optical film (MOF) reflective polarizer such as Vikuiti™ DBEF film. Epstein [0074]-[0075]. It would have been obvious to a POSITA modify the exemplary embodiments shown to include other light extraction features, including ones that randomize light as doing so conditions light for lighting panels. Ex. 1003, ¶92-95. As Dr. Pattison explains, “The 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.” Ex. 1003, ¶94. Further, “including random features on a BEF helps avoid interference effects. This provides a motivation to use randomized patterns on the surface of the BEF.” Ex. 1003, ¶95.

Further, as discussed above, it would be obvious to combine Epstein with Lamb, which describes the “randomization” of the polarization and direction of light. Lamb [0042]. This further shows that it would be obvious to a POSITA to modify the shown invention to include a plurality of other, random light extraction features. Ex. 1003, ¶92-93, 145; ¶148, Claim 10.

11. Dependent Claim 11.

[’835 Claim 11] The lighting panel of claim 9, wherein 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.

Epstein describes the use of BEFs. Epstein, [0074]. A POSITA would understand that a BEF limits direct emission as Epstein explicitly teaches that its BEF may reflect light, including when a reflective polarizer is used. *See* Epstein, [0074]-[0075]. Further, Lamb discloses recycling enhancement structures 112 and 114, the components of which are part of its BEF. *See supra* Ground 1, Claim 11. It would have been obvious to include the features of Lamb’s brightness

enhancement layers with Epstein's disclosed structures because doing so improves the diffuse quality of light and improves light output of the display device. Ex. 1003, ¶102; ¶148, Claim 11.

12. Dependent Claim 12.

[’835 Claim 12] The lighting panel of claim 9, wherein the light extraction features comprise fresnel-type lenses.

Epstein discloses that “the lenses are formed on a lens sheet 1852 as prismatic lenses, for example Fresnel lenses.” Epstein, [0110]; Ex. 1003, ¶96; ¶148, Claim 12.

13. Dependent Claim 13.

[’835 Claim 13] The lighting panel of claim 9, wherein the brightness enhancement film is configured to substantially collimate light emitted by the lighting panel.

A POSITA would understand that “substantially collimate light” means to “substantially align light,” and this is disclosed by Epstein. Ex. 1003, ¶103, 105. Epstein describes 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.” Epstein, [0074]. Epstein Figure 11 further demonstrates that the light 667 is gathered in parallel by the BEF, which a POSITA would understand to be aligning light.

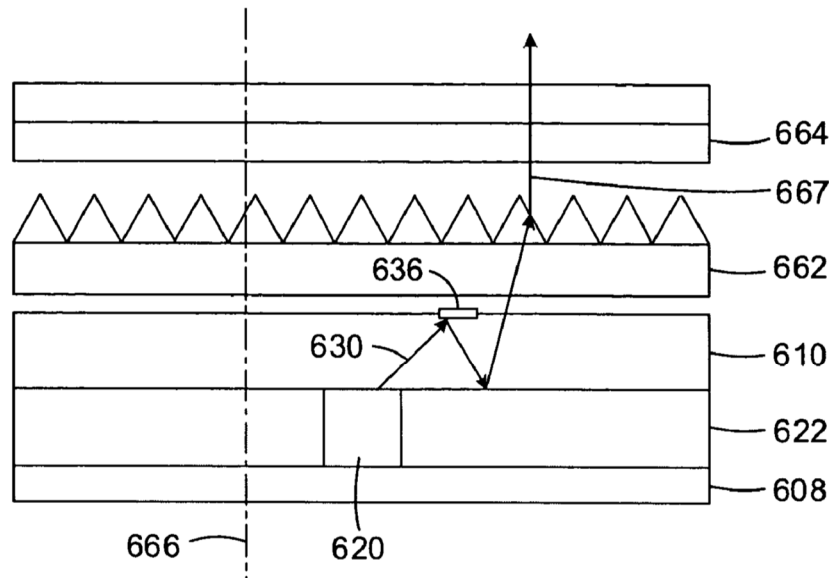


FIG. 11

Epstein, Fig. 11; Ex. 1003, ¶105; ¶148, Claim 13.

14. Dependent Claim 14.

[’835 Claim 14] The lighting panel of claim 1, further comprising 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.

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.” Epstein, [0054]. A POSITA would know that a metallic layer for extracting heat is a heatsink panel. Ex. 1003, ¶126. 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; ¶148, Claim 14.

C. Ground 3 – Claims 1-5 and 7-14 are Obvious Under 35 U.S.C. § 103 Over the Combination of Ko, Kretman, and Epstein in view of the Knowledge of a POSITA.

1. Motivation to Combine Ko, Kretman, and Epstein.

A POSITA would have been motivated to modify the light emitting panel described in Ko to include both (1) features such as the reflector and arrangement thereof, and the brightness enhancement layer described in Kretman, and (2) features such as the reflector and Fresnel lenses described in Epstein

First, Ko specifically incorporates Kretman by reference. Ko [0043]. This provides an explicit motivation to combine the two references, as this combination is explicitly contemplated by Ko itself. Indeed, “[t]he information incorporated [from Kretman] is as much a part of [Ko] as filed as if the text was repeated in [Ko], and should be treated as part of the text of [Ko] as filed.” MPEP § 2163.07(b).

Second, Each of Ko, Kretman, and Epstein are in the same field of endeavor, i.e., LED-based lighting devices to provide backlighting for display elements. Ex. 1003, ¶152. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting panel. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to

incorporate the improvements to backlighting systems described in Kretman and Epstein into the lighting device disclosed by Ko. *Id.*

Third, the references are all aimed at the same goal, which is “to increase the efficient use of light to illuminate.” Kretman [0078]; *see also* Epstein [0121]; Ko Abstract. Accordingly, all three references use similar components, such as reflectors, a diffusers, and a brightness enhancing layers. Ko [0038], [0043], [0051]; Kretman [0078], [0080]; Epstein [0008], [0072]. Given that all three references use the same components to achieve the same goal, it would have been obvious to a POSITA to combine them. Ex. 1003, ¶153.

A POSITA would recognize that each of Ko, Kretman, and Epstein describes known methods for improving the lighting quality and efficiency of similar LED-based backlighting systems. Ex. 1003, ¶154. A POSITA would have been motivated to use the improvements described in Kretman and Epstein to improve the quality of backlighting provided by the backlighting system described in Ko. *Id.* A POSITA would recognize that the combination would have provided better light diffusion and thus a better display quality as well as improved efficiency, and this would have provided a motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art according to their known function to achieve a predictable result, e.g., higher light quality. *Id.*, ¶150-56.

2. Independent Claim 1.

[’835 Claim 1 Preamble] A lighting panel, comprising:

Ko discloses that “[t]he invention relates to optical displays... that are directly illuminated by light sources from behind.” Ko, [0001].

[’835 Claim 1A] at least one substrate having a first side parallel to a principal plane of the lighting panel;

Ko describes various light management layers and substrates, all of which are parallel to the principal plane of the lighting panel. *See, e.g.*, FIG. 1.

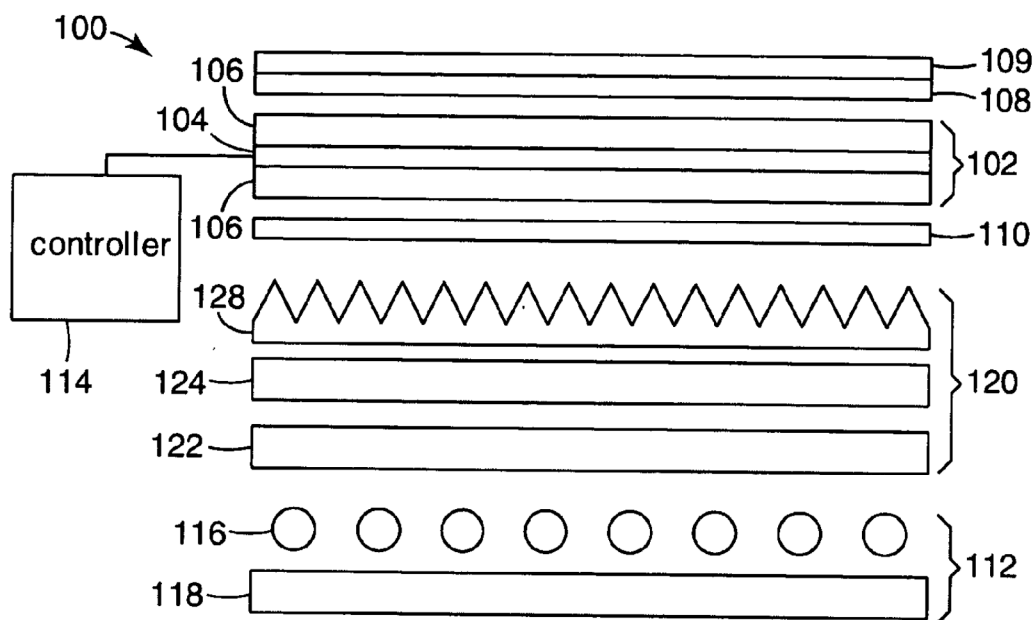


FIG. 1

Ko, Fig. 1; Ex. 1003, ¶47-48; ¶157, Element 1A.

[’835 Claim 1B] a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;

Ko discloses that “[t]he backlight 112 includes a number of light sources 116 that generate the light that illuminates the LC panel 102.” Ko, [0042]; Ex. 1003, ¶47.

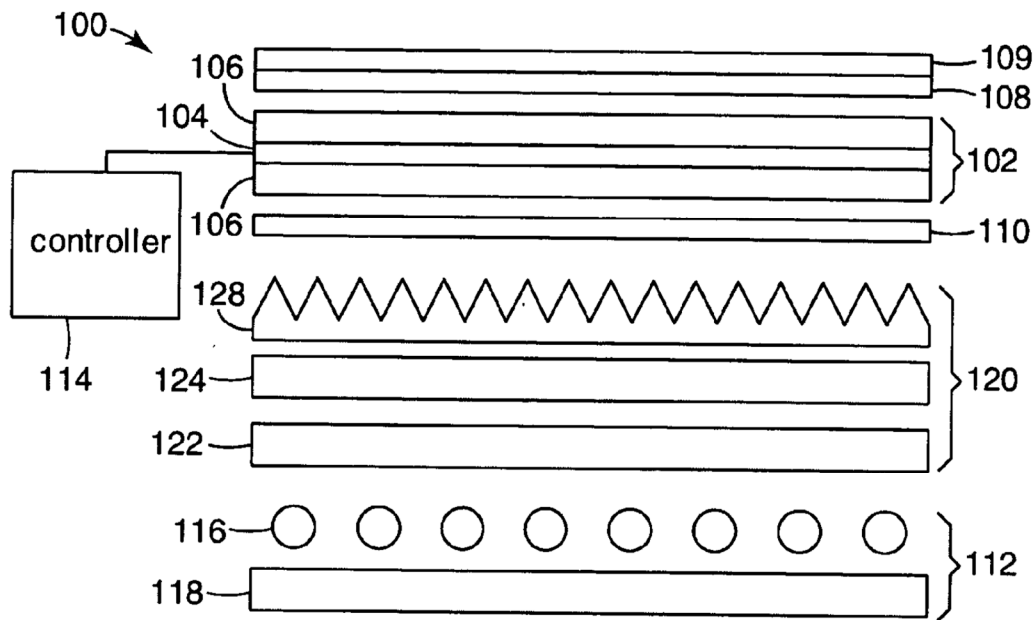


FIG. 1

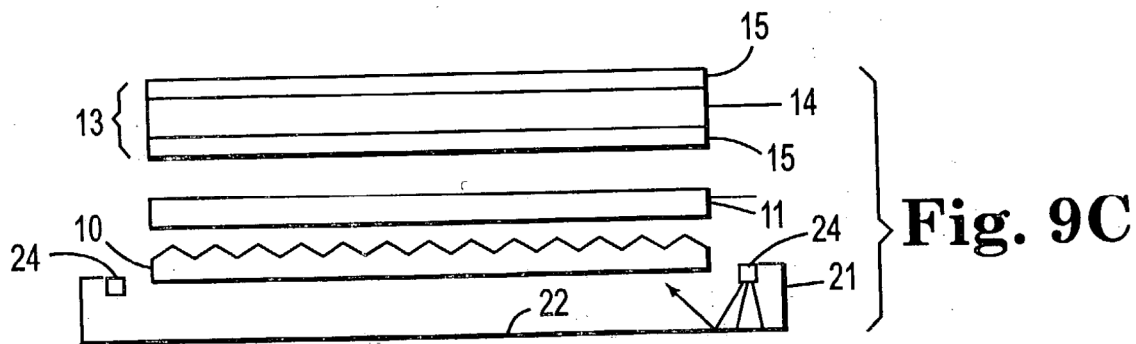
Ko, Figure 1. LEDs are generally directional which means that they must be supported or placed on a substrate. Ex. 1003, ¶48. To the extent that Ko does not disclose the use of LEDs in a planar array on a substrate, Epstein discloses this arrangement. *See* Epstein, [0046] and 4A; Ex. 1003, ¶45-46. Given Ko’s disclosure of LEDs as an appropriate solid state lighting source, it would have been obvious to incorporate Epstein’s arrangement of LEDs on a planar array on the first side of

a substrate in Ko's light management system and lighting panel. Ex. 1003, ¶154; ¶157, Element 1B.

[’835 Claim 1C] a reflector on the first side of the at least one substrate;

Ko describes a reflector 118, which may be a specular reflector or may be a diffuse reflector for reflecting light. Ko, [0043] (“The backlight 112 may also include a reflector 118 for reflecting light propagating downwards from the light sources 116”).

Further, Kretman discloses “forming a plurality of surface elements in the diffuse reflective material. These surface elements are positioned to reduce or eliminate optical coupling with a substrate against which the diffuse reflective material is subsequently placed.” Kretman, [0026]. Kretman further discloses that “the optical cavity 21 is lined with a diffuse reflector 22.” Kretman, [0087]. A POSITA would understand the arrangement of the reflector 22 on the optical cavity 21 to be a reflector on the first side of a substrate, as described in Kretman [0026]. Ex. 1003, ¶56-58.



Kretman, Fig. 9C.

Finally, to the extent that Ko or Kretman do not disclose a reflector on a substrate, it would have been obvious to use Epstein's LED planar array as a light source in Ko's lighting panel. Ex. 1003, ¶53-55. First, Ko discloses the use of LEDs. Second, Epstein teaches that LEDs may be placed on a substrate in a planar array and that when doing so, it is useful to place a reflector on the surface of the substrate to reflect light that is being recycled within the panel. *See Supra*, Ground 2, Claim Elements 1A-1C; ¶157, Element 1C.

['835 Claim 1D] a brightness enhancement film on the reflector,

Ko discloses light management layers, including a diffuser plate 122, a brightness enhancing layer 128 and a reflective polarizer 124 and a reflector 118. Ko, [0005], [0045], and [0051]. The brightness enhancement layer 128 is on the reflector 118 via intervening layers. Ko Figure 1 shows the brightness enhancing layer 128 on the reflector 118. Ko, [0039].

As discussed above, the '835 patent explains, "on" means directly on or with

intervening elements in between. *See* '835 Patent, 6:66-7:12. Ko describes that the brightness enhancement layer 128 may be attached to the reflective polarizer 124, which in turn is attached to the diffuser plate 122. Ko, [0073]. As illustrated in Ko Figure 1, the reflector 118 is on the brightness enhancement layer 128, with the intervening layers being the light sources 116, the diffuser plate 122, and the reflective polarizer 124. Ko Figure 1.

Ko's arrangement of layers may or may not include air gaps. Ko describes that "[t]he brightness enhancing layer 410 may be attached to the reflective polarizer 406, as is schematically illustrated in FIG. 4C, for example using via an adhesive layer 412. In other exemplary embodiments, the brightness enhancing layer 410 may not be attached to the reflective polarizer 406, but may be free-standing relative to the diffuser plate 400, with an air gap between the reflective polarizer 406 and the brightness enhancing layer 410." *Id.*, [0073]. Thus, Ko Figure 1 shows a BEF both directly on the reflector without an intervening air layer, and with an intervening air layer. Ex. 1003, ¶82-84.

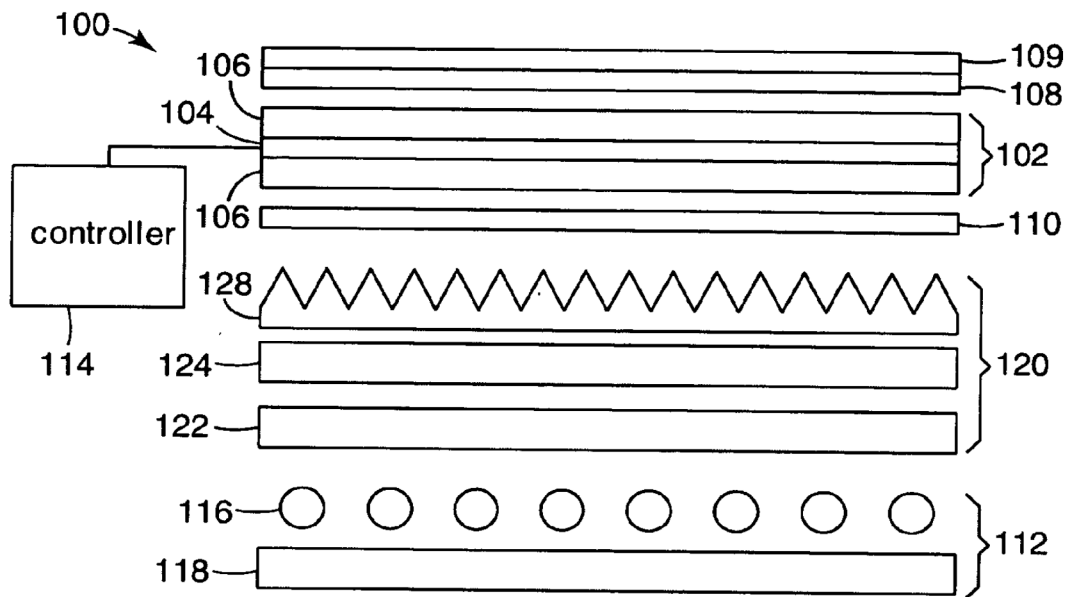


FIG. 1

Ko, Fig. 1; Ex. 1003, ¶82-84; ¶157, Element 1D.

['835 Claim 1E] wherein the reflector is arranged between the at least one substrate and the brightness enhancement film and

Ko Figure 1 shows an arrangement of the lighting panel. Ko, FIG 1, [0005], [0045], [0051]. Although Ko's FIG. 1 shows a reflector below the lighting elements, it would have been obvious to include an arrangement whereby the reflector is between the substrate supporting the LEDs and the brightness enhancement layers. Ko describes that the backlight 112 may include a reflector 118 for reflecting light and explains that backlight 112 may include LEDs. Ko, [0043]; Ex. 1003, ¶111.

Further, Epstein teaches that LEDs may be mounted on a substrate and teaches how a reflector may be placed on top of the substrate supporting the LEDs.

It would have been obvious to use the LED array structure of Epstein in place of Ko's backlighting as Ko explicitly mentions that the light source may include LEDs. Ko, [0042]; Ex. 1003, ¶110; ¶157, Element 1E.

[’835 Claim 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, and

Ko teaches increasing “the amount of light propagating on-axis through the LC layer 104, thus increasing the brightness of the image seen by the viewer. One example is a prismatic brightness enhancing layer, which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection.” Ko, [0051]. Ko also describes light sources that “provide a two dimensional plane or surface that may be used for attaching the diffuser layer and other optical layers.” Ko, [0085].

Kretman, discloses that a “reflector can be used to reflect incident light between layer 10 and the diffuse reflective layer 17 to increase display luminance by controlling the angles over which light is emitted. The reflected light is scattered by the diffuse reflector 17 into all angles. The light within the transmission angles of the brightness enhancing layer 10 is transmitted towards the viewer. Light in the second angular range is reflected for additional scattering.” Kretman, [0082].

Ko in combination with Kretman discloses a brightness enhancement layer that emits light having a first orientation from the lighting panel and to at least a second orientation, different from the first orientation, back into the lighting panel.

Ex. 1003, ¶¶82-85; ¶157, Element 1F.

[’835 *Claim 1G*] 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.

Ko teaches that “the arrangement 120 of light management layers may include a diffuser plate 122” which is “is used to diffuse the light received from the light sources.” Ko, [0044]. The light management layers also include a reflector 118 and a brightness enhancing layer 128. Ko, [0045] & [0051]. As shown in Ko Figure 1, the diffuser plate 122 is between the reflector 118 and the brightness enhancing layer 128.

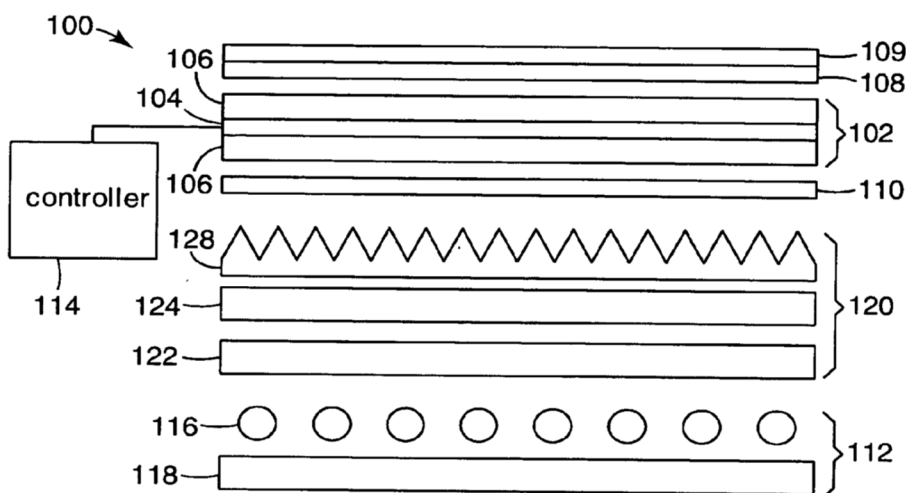


FIG. 1

Ko Figure 1; Ex. 1003, ¶118-119.

Ko further 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, and so this light may be recycled by reflection between the reflecting polarizer 124 and the reflector 118.... In this manner, the reflecting polarizer 124 may be used to increase the fraction of light emitted by the light sources 116 that reaches the LC layer 104, and so the image produced by the display device 100 is brighter.” Ko, [0045]; Ex. 1003, ¶119; ¶157, Element 1G.

3. Dependent Claim 2.

[’835 Claim 2] The lighting panel of claim 1, wherein the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon.

Kretman discloses surface elements in diffuse reflective material, which “are positioned to reduce or eliminate optical coupling with a substrate against which the diffuse reflective material is subsequently placed.” Kretman, [0026]. The surface elements may be formed by “coating a material onto the diffuse reflective material to form the structures.” *Id.* As discussed, a diffuse reflector reflects and scatters light incident thereon. Ex. 1003, ¶58; ¶157, Claim 2.

4. Dependent Claim 3.

[’835 Claim 3] The lighting panel of claim 1, wherein the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon.

Ko discloses a reflector 118 that “may be a specular reflector or may be a diffuse reflector.” Ko, [0043]. Ko gives an example of a reflector sheet as “Vikuiti™ Enhanced Specular Reflection (ESR) film available from 3M Company,” which a POSITA would recognize is a reflector sheet. Ex. 1003, ¶56; ¶157, Claim 3.

5. Dependent Claim 4.

[’835 Claim 4] The lighting panel of claim 1, further comprising at least one additional layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light.

Ko describes a brightness enhancing layer 128 that also comprises a reflecting polarizer 124 layer as show in Figure 1. Ko, [0045].

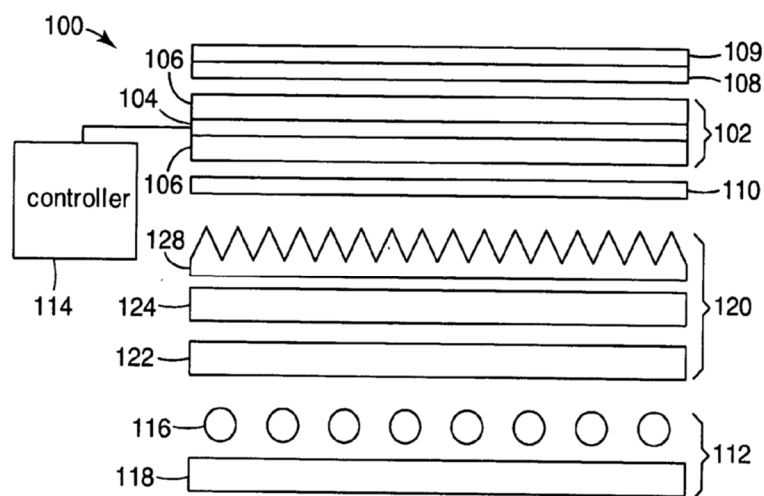


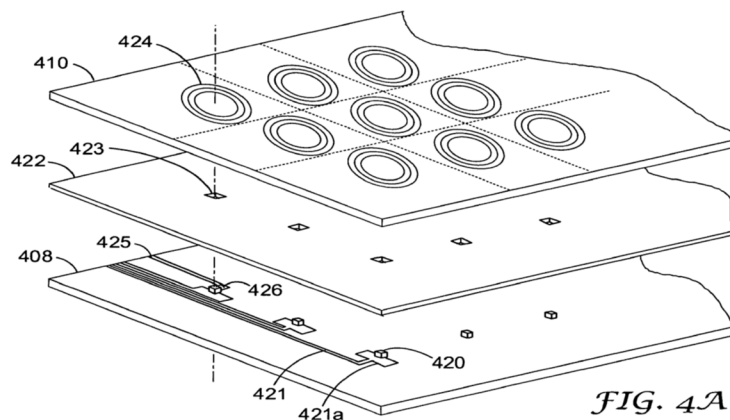
FIG. 1

Ko Figure 1; Ex. 1003, ¶123; ¶157, Claim 4.

6. Dependent Claim 5.

[’835 Claim 5] The lighting panel of claim 3, wherein the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices.

Ko discloses a plurality of light sources 116, which may be LEDs. Ko, [0042]. Kretman discloses a “diffuse reflector lining a portion of the cavity and partially wrapping around the light source so as to direct light from the light source into the optical cavity.” Kretman, [0019]. Epstein describes a reflector 422 with a guiding layer 410 and an “intermediate layer 422 includes apertures 423, also referred to as vias, that are registered to the LEDs 420 disposed on the substrate 408.” Epstein, [0048].



Epstein, Fig. 4A. As discussed above, it would have been obvious to use Epstein’s planar array of LEDs on a substrate as an arrangement for Ko’s backlighting system. Ex. 1003, ¶67. Ko specifically discloses using LEDs as light sources in its

backlighting system and Epstein describes the specific physical configuration of such a system. Ex. 1003, ¶152; ¶157, Claim 5.

7. Dependent Claim 7.

[’835 Claim 7] The lighting panel of claim 3, wherein the reflector sheet comprises a plastic foam.

Ko discloses that “[p]olymer foams may also be used” to form the substrate, which is a reflector. Ko, [0056]. A POSITA would understand that polymer foam is a plastic foam. Ex. 1003, ¶62-62; ¶157, Claim 7.

8. Dependent Claim 8.

[’835 Claim 8] The lighting panel of claim 1, further comprising a diffuser sheet between the reflector sheet and the brightness enhancement film.

Ko discloses a diffuser plate 122, a reflecting polarizer 124, a reflector 118 and a brightness enhancing layer 128. Ko, [0044]-[0045], [0051]. The brightness enhancing layer 128 and the reflecting polarizer 124 are on one side of the diffuser plate 122, and the reflector 118 is on the other side of the diffuser plate. Ko, Fig. 1. The diffuser is thus between a reflector and a brightness enhancing layer. Ex. 1003, ¶118-19; ¶157, Claim 8.

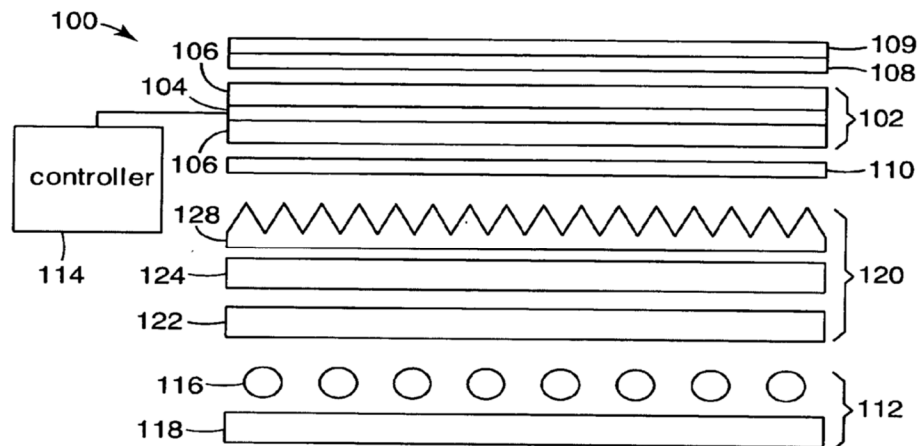


FIG. 1

Ko, Fig. 1.

9. Dependent Claim 9.

[’835 Claim 9] The lighting panel of claim 1, wherein the brightness enhancement film comprises a plurality of 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.

Ko teaches that the “brightness enhancing layer is one that includes a surface structure that redirects off-axis light in a direction closer to the axis of the display.... One example is a prismatic brightness enhancing layer, which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection.” Ko, [0051]. The prismatic ridges on the brightness enhancing layer 128 are three dimensional, as illustrated in Ko Figure 1.

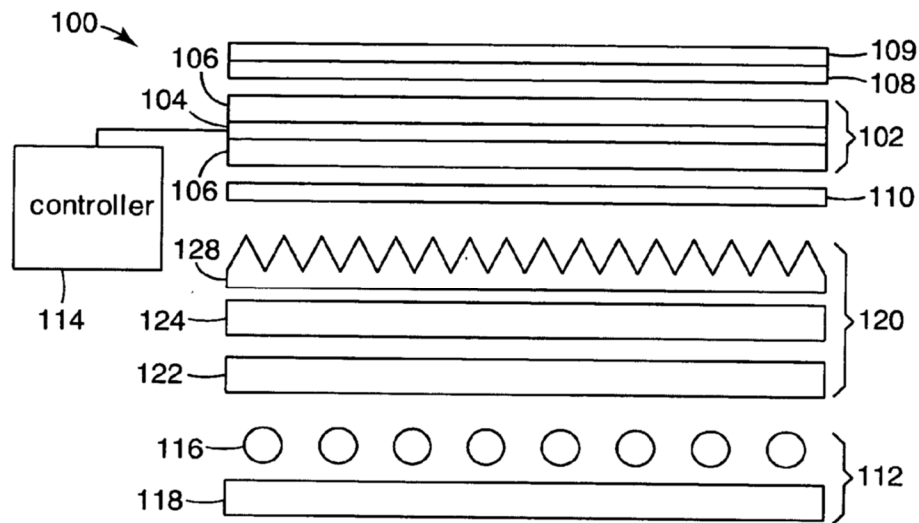


FIG. 1

Ko, Fig. 1; Ex. 1003, ¶90.

Kretman further teaches 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. Kretman, [0082] (“The light within the transmission angles of the brightness enhancing layer 10 is transmitted towards the viewer. Light in the second angular range is reflected for additional scattering.”); Ex. 1003, ¶91; ¶157, Claim 9.

10. Dependent Claim 10.

[’835 Claim 10] The lighting panel of claim 9, wherein the light extraction features are random features.

Ko discloses many different structures such a prismatic films, a cholesteric polarizer, and a diffuser layer 204. Ko [0050]-[0054]. As Dr. Pattison explains, random light extraction features were well known in the art and it would have been

obvious to a POSITA modify the exemplary embodiments shown in Ko include other random components. *See* Ex. 1003, ¶94 (“The 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.”). “[I]ncluding random features on a BEF helps avoid interference effects. This provides a motivation to use randomized patterns on the surface of the BEF.” Ex. 1003, ¶95; ¶157, Claim 10.

11. Dependent Claim 11.

[’835 Claim 11] The lighting panel of claim 9, wherein 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.

Ko discloses that “a first side of the brightness enhancing layer is attached to the diffuser plate” and that “the reflective polarizer is attached to a second side of the brightness enhancing layer.” Ko, Claims 11 and 12. Ko further discloses and LCD panel 012, and states that that “light may be recycled by reflection between the reflecting polarizer 124 and the reflector 118.” Ko, [0045], [0083].

Kretman further disclose that “[i]f the light is not at the correct range of viewing angles, nor of the correct polarization, it is reflected back towards the light guide 6.” Kretman, [0080]. Further, Kretman describes that a “diffuse reflecting article 17 acts as a light recycler by (1) reflecting the light rejected from the

reflective polarizing film 11 and for from the brightness enhancement film 10 and (2) giving that light another opportunity to reach a viewer. This rejecting and recycling can occur numerous times increasing the amount of light directed towards the viewer.” Kretman, [0081]; Ex. 1003, ¶100-101; ¶157, Claim 11.

12. Dependent Claim 12.

[’835 Claim 12] The lighting panel of claim 9, wherein the light extraction features comprise fresnel-type lenses.

Ko, in combination with Epstein, discloses this claim. Ko discloses the lighting panel in claim 9. *See* analysis of claim 9 above. Epstein describes that “the lenses are formed on a lens sheet 1852 as prismatic lenses, for example Fresnel lenses.” Epstein, [0110]. It would have been obvious to include the Fresnel type lenses disclosed in Epstein to help manage light in Ko’s backlight system. Ex. 1003, ¶97. Fresnel lenses were known as efficient structures to collimate light and one of several known light extraction features. *Id.* As Ko is concerned with enhancing light using light management layers, it would have been obvious to include Epstein’s Fresnel lenses as one of the three dimensional light extraction features described by Ko. *Id.*, ¶157, Claim 12.

13. Dependent Claim 13.

[’835 Claim 13] The lighting panel of claim 9, wherein the brightness enhancement film is configured to substantially collimate light emitted by the lighting panel.

A POSITA would understand that “substantially collimate light” means to

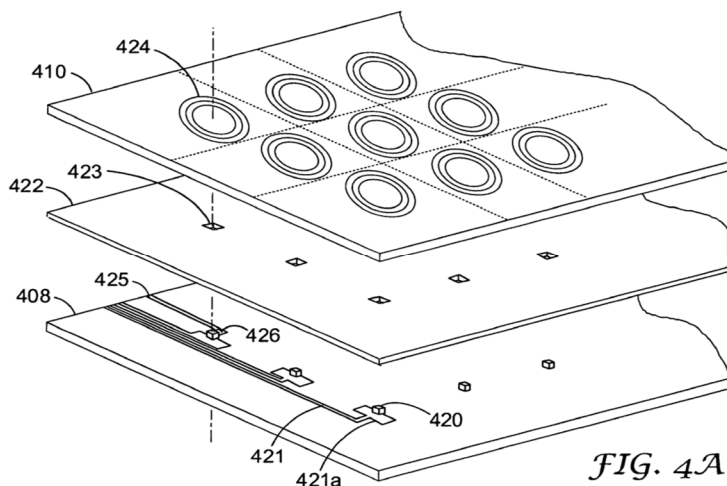
“substantially align light,” and this is disclosed by Ko and Kretman. Ex. 1003, ¶103, 106. Ko describes “a prismatic brightness enhancing layer, which has a number of prismatic ridges that redirect the illumination light, through refraction and reflection.” Ko, [0051]. Kretman also describes that “the gain obtained on a backlight that is 70% reflective on average is 1.6 if a prismatic brightness enhancing sheet is used that has a refractive index of 1.59 with 90 degree facet angles. Increasing the average reflectance of the backlight to 90% increases the gain to 1.8. The gain increases to 2.0 if there is no absorption loss in the backlight. Thus, a 90% reflectance allows close to the highest possible increase in luminance.” Kretman, [0083]. A POSITA would recognize that these brightness enhancing sheets substantially collimate light as required by the claim. Ex. 1003, ¶106; ¶157, Claim 13.

14. Dependent Claim 14.

[’835 Claim 14] The lighting panel of claim 1, further comprising 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.

Kretman recognizes that heat may have a negative effect on lighting systems. Kretman, [0005], [0032], [0076], [0084]. Further, Kretman discloses the use of sides 34 made of materials like aluminum that transfer heat well, and which a POSITA would recognize are commonly used for a heat sink. Kretman, [0094];

Ex. 1003, ¶127. Further, 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 421 a to aid in spreading the heat generated by the LEDs 420.” Epstein, [0054]. A POSITA would know that a metallic layer for extracting heat is a heatsink panel. Ex. 1003, ¶126. 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, ¶126-127.



Epstein, Fig. 4A; ¶157, Claim 14.

VIII. Any Secondary Considerations Cannot Overcome the Clear Evidence of Obviousness.

The Board—at the institution phase—has repeatedly held that evidence of secondary considerations presented by the Patent Owner should be addressed in a trial where the parties may develop, and the Board may consider, a full record. *See*,

e.g., *Tristar Products, Inc. v. Choon's Design, LLC*, IPR2015-01883, Paper No. 6 at 26 (PTAB Mar. 9, 2016). That is the appropriate course here, especially given that “the inventions represent[] no more than ‘the predictable use of prior art elements according to their established functions,’” and, thus any “secondary considerations are inadequate to establish nonobviousness as a matter of law.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (quoting *KSR*, 550 U.S. at 417).

IX. Discretionary Denial is Inappropriate.

The Underlying Litigation does not warrant discretionary denial under 35 U.S.C. § 314(a). The *Fintiv* framework favors institution of this proceeding. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020). As explained below, each of the *Fintiv* factors weighs against discretionary denial or is, at worst, neutral. The Board should institute IPR.

Factor 1 - Whether the Court Granted a Stay or Evidence Exists that One May be Granted if a Proceeding is Instituted. This factor favors institution or is, at worst, neutral. As discussed below, there has been little investment by the parties. The early stage of the litigation and potential simplification (resulting from the Board invalidating all asserted claims of the '835 Patent) weighs against the exercise of discretion.

Factor 2 - Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision. This factor weighs against discretionary denial. This case is at its early stages, the counterclaim asserting the '835 Patent was filed in September 2022. *See* Ex. 1011 Further, Patent Owner only identified asserted claims and served infringement contentions on January 30, 2023, Patent Owner supplemented these contentions on June 21, 2023 (*see* Ex. 1016), and the schedule in the Underlying Litigation does not yet include a date for a *Markman* hearing, much less a trial date. *See* Ex. 1012. Further, the current case schedule does not include a date for the close of fact discovery, the beginning of expert discovery, or dispositive motions. Put simply, much more of the Underlying Litigation lies ahead than behind.

Further, according to the latest court management statistics, the average time from complaint to trial in the Northern District of Georgia—where the Underlying Litigation is Pending—is approximately 36 months. *See* Ex. 1013. Thus, conservatively, a jury trial would not occur in the underlying litigation until late 2025. Thus, a Final Written Decision is likely to be issued well before the date of any scheduled trial.

Factor 3 - Investment in the Parallel Proceeding by the Court and the Parties. This factor weighs against discretionary denial. The parties have made only minimal investment in this litigation to date. Plaintiff's infringement

contentions identifying the asserted claims were served on January 30, 2023. *See* Ex. 1014. These contentions first identified the asserted claims, and Patent Owner supplemented these contentions on June 21, 2023. *See* Ex. 1016. This fact weighs against the exercise of discretion, as the Board explained in *Fintiv*, where “the petitioner filed the petition expeditiously, such as promptly after becoming aware of the claims being asserted, this fact has weighed against exercising the authority to deny institution under *NHK*.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 1 (PTAB Mar. 20, 2020) (precedential). Further, no substantive orders have been entered. Under these facts discretionary denial is improper. *See, e.g., Nokia of America Corp and Ericsson Inc. v. IPCOM, GMBH & Co. KG*, IPR2021-00533, Paper 10 at (PTAB Aug. 12, 2021).

Factor 4 - Overlap Between Issues Raised in the Petition and in the Parallel Proceeding. Petitioner challenges here several claims of the '835 Patent that are not currently asserted in the Underlying Litigation. Exs. 1014, 1016. Thus, at a minimum there is no overlap with respect to many of the challenged claims.

Factor 5 - Whether the Petitioner and the Defendant in the Parallel Proceeding are the Same Party. This factor is neutral. The parties are the same, but this is common in nearly every Petition filed where there is a co-pending litigation.

Factor 6 - Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits. As discussed in detail above, every element of the claims of the '835 patent is either expressly shown in the prior art or is obvious in view of well-known art. The strong merits of the grounds presented in this Petition further support institution. *Fintiv*, Paper 11 at 14-15.

X. Denial Under Section 325(d) is Inappropriate.

This Petition does not present “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. §325(d). None of the prior art references used herein were cited in a rejection during prosecution of U.S. Application No. 14/611,800, which issued as the '835 patent.

XI. Conclusion

In view of the foregoing, there is a reasonable likelihood that Petitioner will prevail with respect to claims 1-5 and 7-14 of the '835 Patent. Petitioner requests that the Board institute IPR.

Respectfully submitted,

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082

CERTIFICATE OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24(d) that the foregoing **Petition for Inter Partes Review** excluding any table of contents, mandatory notices, certificates of service or word count, or appendix of exhibits or claim listing, contains 13,782 words according to the word-processing program used to prepare this paper (Microsoft Word). Petitioner certifies that this **Petition for Inter Partes Review** does not exceed the applicable type-volume limit of 37 C.F.R. § 42.24(a).

Dated: July 14, 2023

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this
Petition for *Inter Partes* Review has been served by Priority Mail Express® upon
the following:

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With a courtesy copy sent via email to litigation counsel in *Hisense USA
Corporation v. Brightplus Ventures LLC*, No. 1:22-cv-02774 (N.D. Ga.).

Dated: July 14, 2023

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