

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. 7,690,812
Filing Date: March 15, 2007
Issue Date: April 6, 2010
Title: APPARATUS AND METHODS FOR CONFORMABLE DIFFUSE
REFLECTORS FOR SOLID STATE LIGHTING DEVICES

Inter Partes Review No. IPR2023-01385

**PETITIONER'S OPPOSITION TO PATENT OWNER'S CONTINGENT
MOTION TO AMEND UNDER 37 C.F.R. § 42.121**

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1001	U.S. Patent No. 7,690,812 (“the ’812 Patent”)
1002	Prosecution History of U.S. Patent No. 7,690,812
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1004	Curriculum Vitae of P. Morgan Pattison, Ph.D.
1005	US 7,497,592 to Chou (“Chou”)
1006	US 2006/0262310A1 to Starry (“Starry”)
1007	US 2007/0103908 to Tabito <i>et al.</i> (“Tabito”)
1008	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)
1009	Scheduling Order in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 35 (N.D. Ga.)
1010	Judicial Caseload Profile for the Northern District of Georgia
1011	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.)
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1013	U.S. Pub. No. 2006/0187660 to Liu (“Liu”)
1014	U.S. Patent No. 7,324,174 to Tabito (“Tabito 174”)
1015	Declaration of P. Morgan Pattison, Ph.D.
1016	U.S. Patent No. 7,481,553 to Kim <i>et al.</i> (“Kim”)
1017	U.S. Pub. No. 2007/0064171 (“Sharp”)
1018	U.S. Pub. No. 2003/0223249 to Lee <i>et al.</i> (“Lee”)
1019	Transcript of the September 10, 2024 Deposition of Mr. Bohannon

I. Introduction

Patent Owner (“PO”) failed to meet the requirements for amendment in its Contingent Motion to Amend Under 37 C.F.R. § 42.121 (“MTA”). PO’s substitute claims cover a well-known lighting panel design with a reflector sheet that does not contact the solid state light element that is separate from a protruding feature. This design would have been obvious to a POSITA for a multitude of reasons, including avoiding heat transfer, improving electrical insulation, allowing thermal expansion, and improving manufacturing efficiency. Moreover, a POSITA would have understood that a lighting tile is bound to have protruding features separate and away from the LED. Furthermore, this design is disclosed in many prior art references to the ’812 Patent. However, PO attempts to capture through substitute claims well known designs that are practically ubiquitous and common for solid state lighting tiles. This is improper. Therefore, PO’s motion to amend should be denied.

II. Prior Art Renders Proposed Substitute Claims 25–28 Invalid.

A. Substitute Claims 25–28 are Rendered Obvious by Kim in View of Sharp.

U.S. Patent No. 7,481,553 to Kim et al. (“Kim”) was filed on December 15, 2006 and issued on January 27, 2009. Kim is prior art under at least 35 U.S.C. § 102(e). Kim is directed to “[a] backlight assembly include[ing] a plurality of light emitting diode units, each of the plurality of light emitting diode units including at least one light emitting diode and a printed circuit board mounting the at least one

light emitting diode, and a reflective sheet on the printed circuit board, the reflective sheet having at least one hole corresponding to the at least one light emitting diode.”

Ex. 1016, Abstract.

U.S. Pat. Pub. No. 2007/0064171 (“Sharp”) was filed on September 8, 2006 and published on March 22, 2007. Sharp is prior art under at least 35 U.S.C. § 102(e). Sharp is directed to “a light emitting diode substrate, which has a light emitting diode and is placed on the back side of a panel module having an image display surface on the front side, and a reflection sheet for reflecting light emitted by the light emitting diode to the panel module, the reflection sheet is placed on the front side of the light emitting diode substrate, and the reflection sheet is provided with a through-hole into which the light emitting diode is inserted.” Ex. 1017, Abstract.

1. A POSITA Would Have Been Motivated to Combine Kim and Sharp.

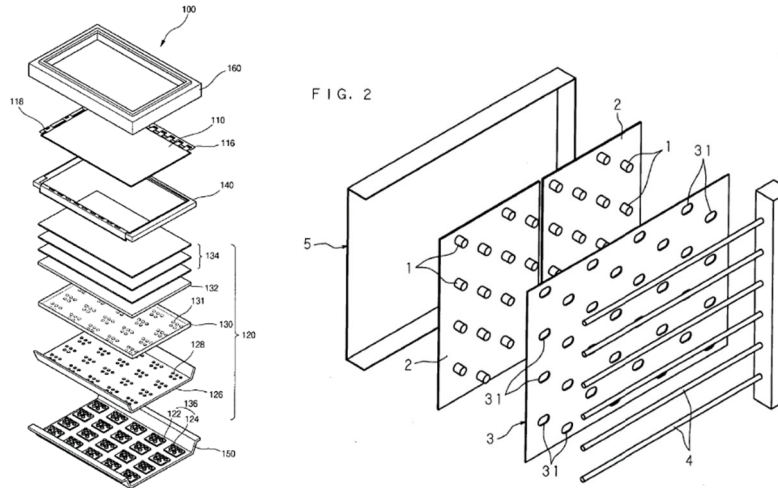
A POSITA would have been motivated to combine Kim and Sharp. Ex. 1015, ¶¶45–47. Both disclose reflectors and LEDs in a backlight assembly. Kim does not specifically disclose the reflector’s spatial relationship to the LEDs. Ex. 1015, ¶¶23–24, 46. Sharp, however, provides details regarding the space between the reflector and the LEDs. Ex. 1017, [0009]; *see also* Ex. 1015, ¶¶30–34.

A POSITA would have been motivated to apply Sharp’s gap between the through-holes and the LEDs to Kim’s backlight assembly. Ex. 1015, ¶¶47. Sharp explains that having a gap is preferred because it is “capable of preventing the

circumferential surface of the through-hole of the reflection sheet from coming into contact with the circumferential surface of the light emitting diode even when the reflection sheet thermally expands somewhat.” Ex. 1017, [0009]. Moreover, a gap reduces unevenness of brightness and color, maintains consistent light reflection despite irregularity in the positional relationship between the LED and the through-hole, and prevents the reflector from creasing as it thermally expands. Ex. 1015, ¶32.

The advantages of Sharp’s gap also align with Kim’s goals. For example, Kim seeks to “improve[] productivity and reduce[] production costs.” Ex. 1016, 2:50–53; Ex. 1015, ¶29. Sharp teaches having a “reflection sheet without being influenced by the mount position of the light emitting diode substrate even when there is an irregularity in the positional relationship between the light emitting diode and the through-hole due to the mount position of the light emitting diode substrate.” Ex. 1017, [0011]. This advantage translates to improved manufacturing efficiency and a reduction in production costs because the manufacturing tolerances can be greater, requiring less precision during manufacturing. Ex. 1015, ¶33.

A side-by-side comparison of Kim and Sharp illustrates the similarities in the backlight assemblies, highlighting that it would have been obvious to a POSITA to modify the reflective sheet through-holes in Kim in view of Sharp’s teaching of having a gap between the edge of the through-holes and the LEDs. Ex. 1015, ¶46.



Ex. 1016, Fig. 2; Ex. 1017, Fig. 2. As seen above in the figure on the left, Kim's bottom frame 150, which includes the PCB 122 and LEDs 124, is overlaid by the reflective sheet 126, which "is formed with a plurality of holes 128 corresponding to the respective LEDs 124." Ex. 1016, 4:22–38. Sharp, in the figure on the right, features LEDs 1 on the LED substrate 2 overlaid by the reflection sheet 3, which has "[t]hrough-holes 31 ... with a distance therebetween at positions corresponding to the light emitting diodes 1." Ex. 1017, [0048]–[0051], Ex. 1015, ¶34.

Finally, Kim and Sharp are in the same field of display backlight assemblies. Thus, this combination is nothing more than the use of a known solution described by Sharp in a similar system described by Kim. Ex. 1015, ¶45.

2. Substitute Claim 25.

[’812 Substitute Claim 25 Preamble] A solid state lighting tile, comprising:

Kim describes "a backlight assembly including at least one light emitting diode (LED) as a light source." Ex. 1016, 1:13–14; Ex. 1015, ¶24.

[’812 Substitute Claim 25A] a substrate;

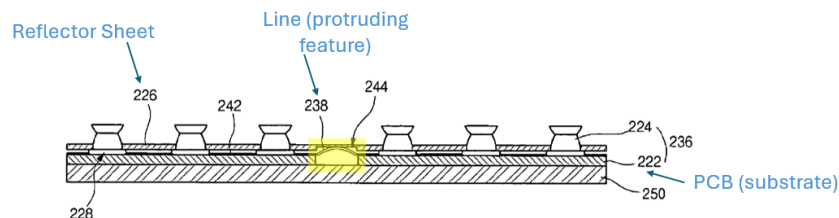
With respect to Fig. 3, Kim describes “the LED unit 236 includes a PCB 222 and a plurality of LEDs 224 mounted on the PCB 222 in a row.” Ex. 1016, 5:24–25. The printed circuit board PCB 222 is a substrate for a lighting tile. Ex. 1015, ¶24.

[’812 Substitute Claim 25B] a solid state lighting element mounted on a surface of the substrate;

Kim discloses, as shown in Fig. 3, “a plurality of LEDs 224 mounted on the PCB 222 in a row.” Ex. 1016, 5:24–25. As stated above, LEDs 224 are solid state lighting elements and PCB 222 is a substrate. Ex. 1015, ¶24.

[’812 Substitute Claim 25C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile;

Fig. 3 of Kim, reproduced below, illustrates “a portion of the reflective sheet 226 corresponding to a space between the adjacent LED units 236 has a concave portion 244 to prevent the reflective sheet 226 from contacting the line 238. That is, the reflective sheet 226 includes the concave portion 244 so that a projected portion of the line 238 is not pressed by the reflective sheet 226.” Ex. 1016, 5:36–41.



Ex. 1016, Fig. 3 (annotated). As shown highlighted above, the reflective sheet 226, which is on the surface of the PCB 222 (substrate), conforms to a shape of the line

238 (a protruding feature) via the concave portion 244. Ex. 1015, ¶25–28.

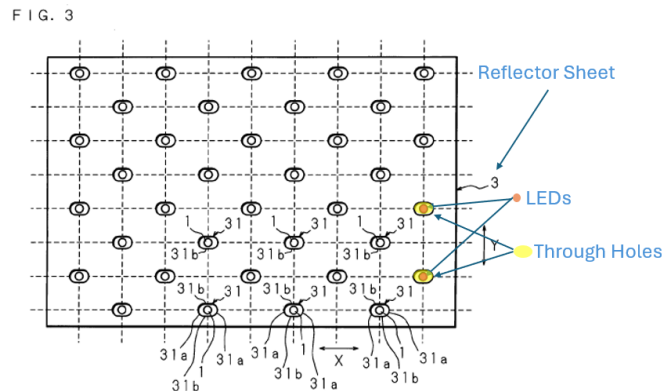
Moreover, Kim discloses the reflective sheet 226 conforming to a shape of the line 238 under any reasonable construction of “configured to conform to a shape of a protruding feature.” Under PO’s construction, the reflective sheet 226 provides cover and relief for a shape of the line 238. Ex. 1015, ¶27. Likewise, under Petitioner’s construction, the reflective sheet 226 overlays (e.g., by deformation), and has the same shape, outline, or contour of the line 238. Ex. 1015, ¶28. To the extent PO argues that Fig. 3 does not show the reflective sheet 226 as having the same shape, outline, or contour of the line 238, that is incorrect. Kim describes the reflective sheet 226 as having a “concave portion 244” which fits around the line 238. Ex. 1016, 5:36–41. Concave means that the reflective sheet 226 rounds inward, which conforms to the shape of the line 238. Ex. 1015, ¶28.

[’812 Substitute Claim 25D] wherein the reflector sheet comprises at least one aperture configured to be proximate to the at least one solid state lighting element, wherein the reflector sheet does not contact the at least one solid state lighting element; and

Kim discloses “[t]he reflective sheet 126 is formed with a plurality of holes 128 corresponding to the respective LEDs 124. Each LED 124 passes through the corresponding hole 128, thereby being exposed from the reflective sheet 126.” Ex. 1016, 4:34–38. Kim does not specify if the reflective sheet contacts the LEDs.

Sharp describes a gap between the diode and reflector that is preferred because it can prevent the reflection sheet from contacting the LED when it thermally

expands. *Id.*; Ex. 1017, [0009]; *see also* Ex. 1015, ¶32. Sharp’s figure 3, reproduced below, illustrates the gap between the edge of through-holes 31 in the reflection sheet 3 and the LEDs 1. Ex. 1017, [0046], [0051]; *see also* Fig. 1.



Ex. 1017, Fig. 3 (annotated).

A POSITA would have been motivated to apply Sharp’s gap between the reflecting sheet through-holes and the LEDs to Kim. Ex. 1015, ¶45-47. Indeed, Sharp identifies the advantage of having a “reflection sheet without being influenced by the mount position of the light emitting diode substrate even when there is an irregularity in the positional relationship between the light emitting diode and the through-hole due to the mount position of the light emitting diode substrate.” Ex. 1017, [0011]. Additionally, Kim seeks to “improve[] productivity and reduce[] production costs.” Ex. 1016, 2:50–53; Ex. 1015, ¶29. Sharp’s system improves productivity and a reduces production costs because the manufacturing tolerances can be greater, thereby requiring less precision during manufacturing. Ex. 1015, ¶33.

[’812 Substitute Claim 25E] wherein the protruding feature is separate and positioned away from the at least one solid state lighting element.

Kim figure 3, reproduced above, shows a line 238 (protruding feature) that is separate and positioned away from the LED 224 (solid state lighting element). Ex. 1016, Fig. 3. Line 238 is a protruding feature on the tile, and LED 224 is a solid state lighting element. *Id.*, Ex. 1015, ¶¶24–25.

3. Substitute Claim 26.

[’812 Substitute Claim 26] The tile of claim 25, wherein the reflector sheet covers and maintains a substantially flat surface over the protruding feature, wherein the flat surface is parallel to the surface of the substrate.

Kim discloses a reflector sheet that covers and maintains a substantially flat surface over a protruding feature that is parallel to the substrate. *See* Ex. 1016, Fig. 3 (reflective sheet 226 covering line 238 and flat surface parallel to PCB 222).

4. Substitute Claim 27.

[’812 Substitute Claim 27 Preamble] A method of forming a solid state lighting device comprising:

See supra Substitute Claim 25[Preamble]. The product disclosed in Kim renders obvious a method for forming that product. *Purdue Pharma L.P. v. Epic Pharma, LLC*, 811 F.3d 1345, 1354 (Fed. Cir. 2016).

[’812 Substitute Claim Elements 27A–27E]

Kim discloses each of the substitute claim elements 27A–27E for the same reasons as discussed above regarding elements 25A–25E. *See supra* Section II.A.2.

5. Substitute Claim 28.

See supra Substitute Claim 26.

B. Substitute Claims 25–28 are Rendered Obvious by Tabito alone and Chou in view of Tabito.

As stated in the Petition, Chou discloses all claim elements in original claims 1 and 15 (Petition, § VII.A), which correspond to substitute claim elements 25 Preamble – 25C. *See* MTA, Appendix A. A POSITA would have been motivated to combine Chou and Tabito for at least the reasons discussed in Petition. Petition § VII.C.1. Tabito discloses the proposed additional claim limitations in Claims 25–28. As such, Chou in view of Tabito discloses all of the elements of substitute claims 25 and 27. Additionally, Tabito alone renders obvious claims 25-28 because Tabito discloses also all claim elements in substitute claim elements 25[Preamble] – 25[C].

1. Substitute Claim 25.

[’812 Substitute Claim 25 Preamble] A solid state lighting tile, comprising:

Tabito describes “a liquid crystal display apparatus, having a light transmitting liquid crystal display (LCD) device, and ... a backlight device used for this liquid crystal display apparatus.” Ex. 1007, [0001]; Ex. 1015, ¶59, 73.

[’812 Substitute Claim 25A] a substrate;

Tabito describes “a back panel 13,” a substrate for the lighting tile. Ex. 1007, [0047], Fig. 2; Ex. 1003, ¶37, 59-60.

[’812 Substitute Claim 25B] a solid state lighting element mounted on a surface of the substrate;

Tabito discloses that “[e]ach light emitting unit includes many LED units (18) mounted on an interconnection substrate (17) and is mounted in this state on a heat dissipating plate (28)”, which is further mounted on a surface of the back panel 13, as shown in Figs. 2 and 5. *See e.g.*, Ex. 1007, Abstract, [0051]-[0052], [0103]-[0104]; *see also* Ex. 1003, ¶ 56; Ex. 1015, ¶17, 19.

['812 Substitute Claim 25C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile;

As shown in Fig. 2, Tabito discloses a reflecting plate 26 on the surface of the back panel 13 (substrate). *See* Ex. 1007, [0081]-[0083], [0088] Fig. 2; *see also* Ex. 1003, ¶59 Ex. 1015, ¶15. Fig. 5 of Tabito (not shown in publication likely due to a clerical error but shown in the patented version Tabito 174) further shows that the reflecting plate 26 configured to conform to a shape of a set screw 39 (shown in red below, a protruding feature on the tile). *See* Tabito, [0100] and [0103].

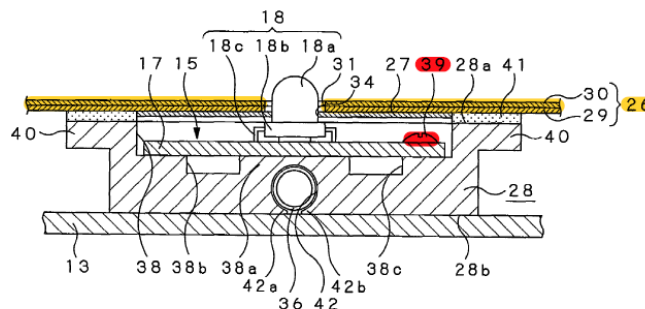


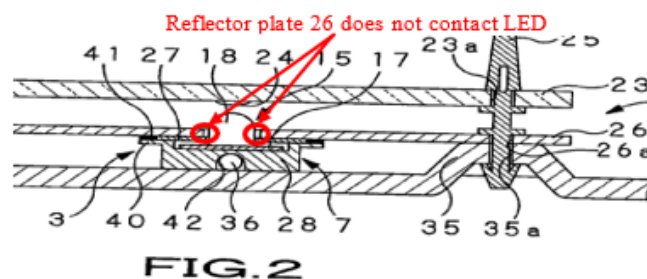
FIG.5

Ex. 1014 (Tabito 174), Fig. 5 (annotated); *see also* Ex. 1015, ¶15-19, 21.

Tabito's reflecting plate 26 conforms to a shape of a protruding feature on a tile under the Board's construction and PO's proposed construction as it provides cover and relief from the protrusion. *See* Institution Decision ("ID") at 14; Ex. 1015, 19. Indeed, Tabito's reflector sheet 26 is configured to conform in the same way as the reflector sheet in FIG. 3 of the '812 Patent. Moreover, Tabito's reflector sheet 26 is provided without any aspect that extends down into the volume containing Tabito's set screw 39 or into interference with the set screw 39. Ex. 1015, ¶19.

2. Tabito Discloses the New Elements of Claims 25 and 27.

Tabito discloses a reflector sheet that is not in contact with the solid state lighting element. PO erroneously argues that "Tabito does not teach a reflector sheet that is not in contact with the LED" because "in Fig 2 [], the reflecting plate 26 directly contacts the LED 18." MTA, 14. Figure 2 shows the reflecting plate 26 not in contact with the LED 18. *See* Ex. 1015, ¶15–17.



Ex. 1007, Fig. 2 (cropped and annotated); *see also id.*, [0027].

Also, the specification confirms that the reflecting plate 26 is not in contact with the LED 18. *See* Ex. 1007, [0036]; *see also* [0074]; Ex. 1015, ¶15–17. Tabito

Figure 3 shows a reflecting plate 26 with guide openings 32 with a “width slightly larger than the outer diameter of the light emitting part 18a of the LED unit 18 and a length long enough to allow five LED units 15 to pass therethrough.” *Id.* at [0069].

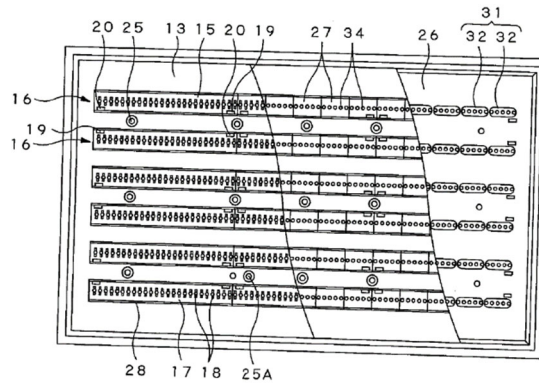
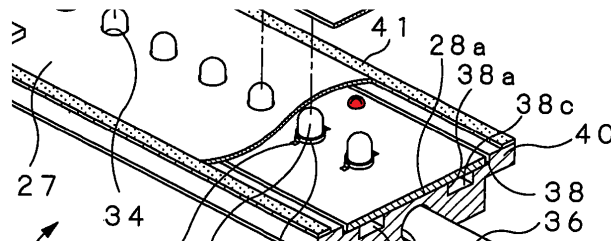


FIG. 3

Ex. 1007, Fig. 3.

PO also wrongly argues that “Tabito [does not] teach a protruding feature separate from the lighting element.” MTA, 14. A protruding feature, a set screw is clearly seen in at least Figure 4, which is shown below with the set screw in red.



Ex. 1007, Fig. 4 (cropped and annotated). Also, Tabito discloses: “LED unit 18 is stored in the hermetically sealed light guide section 14” which is separate from the set screw 39. *Id.* at [0100] and [0103]. Fig. 5 is a cross-sectional view of Fig. 4 in

Tabito and clearly discloses the protruding feature is separated and positioned away from the solid state lighting element. Ex. 1014 (Tabito 174), at Fig. 5; Ex. 1015, ¶19.

3. Tabito Discloses Substitute Claims 26 and 28.

Tabito discloses a reflector sheet that covers and maintains a substantially flat surface over a protruding feature, wherein the flat surface is parallel to the substrate. For example, Tabito Figures 4 and 5 discussed above both disclose reflector plate 26 covering and maintaining a flat surface over set screw 39, wherein the reflector plate 26 is parallel to the substrate. Ex. 1015, ¶21.

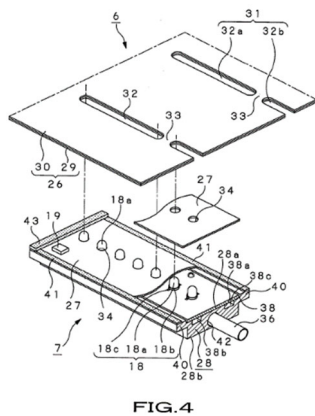


FIG. 4

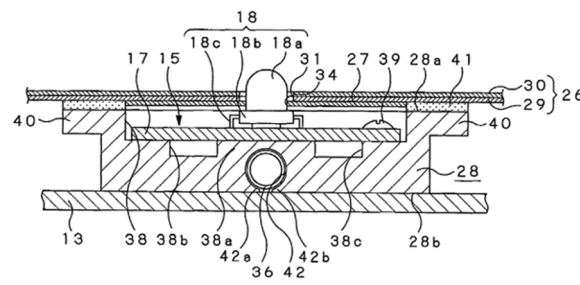


FIG. 5

Ex. 1007 (Tabito), Fig. 4; Ex. 1014 (Tabito 174), at Fig. 5.

C. Substitute Claims 25–28 are Rendered Obvious by Liu alone and Chou in View of Liu.

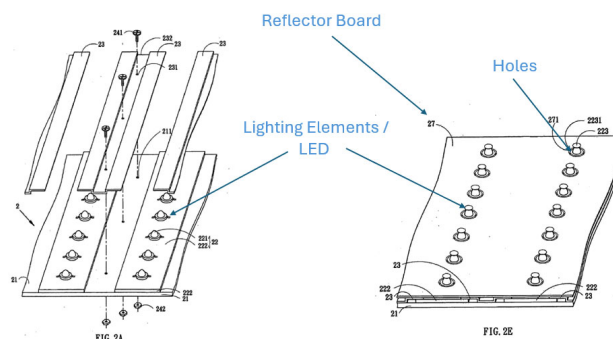
As stated in the Petition, Chou discloses all claim elements in substitute claim elements 25 Preamble – 25C. Petition, § VII.A; MTA, Appendix A. Liu¹ discloses

¹ While Liu was considered by the Examiner during prosecution, “35 U.S.C. § 325(d) does not apply to motions to amend.” *Foundation Medicine, Inc. v. Guardant Health, Inc.*, IPR2019-00634, Paper No. 52 at 69 (PTAB Aug. 18, 2020).

the additional claim limitations in claims 25–28. As discussed below, a POSITA would have been motivated to combine Chou and Liu. Thus, claims 25-28 are obvious by Chou in view of Liu. Also, Liu alone renders obvious claims 25-28 as Liu discloses all claim elements in claim elements 25[Preamble] – 25[C].

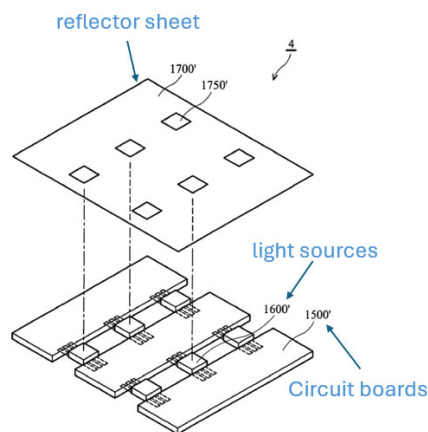
1. A POSITA Would Have Combined Chou and Liu.

A POSITA would have been motivated to combine Chou and Liu. Chou describes LED backlight assemblies as a light source for a display. Ex. 1005, 1:6-8; Ex. 1015, ¶11–14. Liu similarly describes a “backlight module and the lighting units.” Ex. 1013, [0016]. Specifically, “a backlight module 2 is composed of a backboard 21 and a plurality of lighting units 22 arranged in equal space and in parallel to one another on the backboard 21. Each lighting unit 22 comprises a plurality of lighting elements 221 and a metal board 222 carrying the lighting elements 221. The lighting element 221 can be a conventional lighting device such as a light emitting diode (LED) soldered on the metal board 222.” *Id.* at [0017]. In order to attach multiple lighting units together, “the lighting units 22 are fastened by using a rigid metal board 23 and fasteners (241,242).” *Id.* at [0018].



Id., Figs. 2A/2E (annotated). The “reflective board 27 has holes 271 with dimension larger than that of the side-emitting lighting elements 223, such that the side-emitting lighting elements 223 could protrude from the holes 271.” *Id.* at [0022].

Liu’s method of attaching multiple lighting units together and utilizing a reflector that has holes of a dimension that is larger than the LEDs would also be suitable for use in Chou’s lighting assembly. Ex. 1015, ¶50. A POSITA would have been motivated to apply Liu’s configuration to Chou to provide a more rigid structure and reduce the risk that multiple lighting units separate at the welds and to increase the efficiency of applying a reflector to the lighting unit. *Id.* For example, Chou Fig. 9 illustrates circuit boards 1500' attached by the welds of the light sources 1600' between them with a reflector sheet 1700' covering the entire assembly.



Chou, Fig. 9 (annotated). Thus, it would have been obvious to use Liu’s teaching on how to best support the various components of Chou’s lighting system. Ex. 1015,

¶50. This improvement would increase the durability of the mount for the reflecting plate, and thereby would increase device longevity and durability. *Id.*

Chou and Liu are in the same field of backlight assembly for display devices. Thus, a POSITA would recognize that this combination is nothing more than the use of a known solution described by Liu in a similar system described by Chou. This combination would be within the skillset of a POSITA. Ex. 1015, ¶48.

2. **Substitute Claim 25.**

[’812 Substitute Claim 25 Preamble] A solid state lighting tile, comprising:

Liu discloses “backlight module and the lighting units.” Ex. 1013, [0016]-[0017]; Ex. 1015, ¶35.

[’812 Substitute Claim 25A] a substrate;

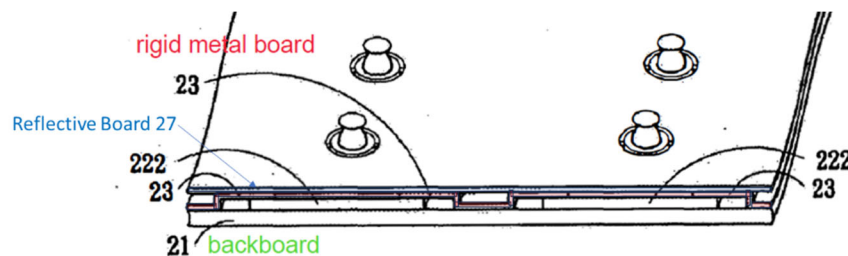
Liu describes “a backboard 21,” a substrate for the lighting tile. Ex. 1013, [0017]; Ex. 1015, ¶35.

[’812 Substitute Claim 25B] a solid state lighting element mounted on a surface of the substrate;

Liu discloses that “a plurality of lighting units 22 arranged ... on the backboard 21. Each lighting unit 22 comprises a plurality of lighting elements 221.... The lighting element 221 can be a conventional lighting device such as a light emitting diode (LED).” In Fig. 2E, “side-emitting lighting elements 223 are used as the light source.” Ex. 1013, [0017], [0022]; Ex. 1015, ¶35.

[’812 Substitute Claim 25C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile;

As shown in annotated Fig. 2E below, Liu discloses “a reflective board 27” (blue) on the surface of the backboard 21 (substrate) configured to conform to a shape of a rigid metal board 23 (red). *See* Ex. 1013, [0022] (“The reflective board 27 covers the metal boards 222, which are fastened by the rigid metal board 23”); Ex. 1015, ¶36-39. “The rigid metal board 23 ... has a raised portion along its center to face towards the backboard 21” (i.e., a protruding feature on the tile). Liu, [0018]. Fig. 2A-D of Liu further shows that the reflective board 27 configured to conform to a shape of other protruding features such as “fasteners (241, 242)” on the tile.” *See* Ex. 101, [0018]; Ex. 1015, ¶39.



Ex. 1013, Fig. 2E (cropped and annotated).

Liu’s reflective board 27 is configured to conform to a shape of a protruding feature on a tile under the Board’s preliminary construction and PO’s proposed construction as it provides cover and relief from the protrusion. *See* ID at 14; Ex. 1015, ¶39. Indeed, Liu’s reflective board 27 is configured to conform in the same

way as the reflector sheet in FIG. 3 of the '812 Patent. And again, Liu's reflector board 27 does not extend down or interfere with the protrusions. Ex. 1015, ¶39.

3. Liu discloses the new elements in claims 25 and 27.

Liu discloses the proposed additional limitation [25D]/[27D]. For example, “reflective board 27 has holes 271 with dimension larger than that of the side-emitting lighting elements 223, such that the side-emitting lighting elements 223 could protrude from the holes 271.” Ex. 1013, [0022]; Fig. 2E. Holes 271 are apertures in reflective board 27 and side-emitting lighting elements 223 are solid state lighting elements. Ex. 1015, ¶38–39.

Liu also discloses [25E]/[27E]. Liu figure 2B discloses protruding features (*e.g.*, rigid metal board 23 and bolts 241) which are separate and positioned away from the lighting units 22. Ex. 1015, ¶36–37.

4. Liu discloses substitute claims 26 and 28.

Liu Fig. 2E, shown above, discloses a reflective board 27 that covers and maintains a substantially flat surface over the protruding features, rigid metal board 23 and bolts 241, wherein the flat surface of the reflective board 27 is parallel to the surface of the substrate, *e.g.*, backboard 21. Ex. 1015, ¶38.

D. Substitute Claims 25–28 Are Rendered Obvious by Lee in View of Sharp and the Knowledge of a POSITA

Lee (Ex. 1018) is prior art under at least 35 U.S.C. § 102(b). Lee is directed to a backlight assembly with a liquid crystal display. Ex. 1018, [0015].

1. A POSITA Would Have Combined Lee and Sharp.

A POSITA would have been motivated to combine Lee and Sharp. Both disclose reflectors and LEDs in a backlight assembly. Lee does not disclose a reflector sheet that does not contact the lighting element. Ex. 1015, ¶52. Sharp, however, provides details regarding the space between the reflector and the LEDs. Ex. 1017, [0009] (“a backlight device and display device constructed to have a gap between the through-hole of the reflection sheet and the circumferential surface of the inserted light emitting diode.”); *see also* Ex. 1015, ¶30–34.

A POSITA would have been motivated to apply Sharp’s gap between the through-holes and the LEDs to Lee’s backlight assembly. Ex. 1015, ¶51–53. Sharp explains that having a gap is preferred because it is “capable of preventing the circumferential surface of the through-hole of the reflection sheet from coming into contact with the circumferential surface of the light emitting diode even when the reflection sheet thermally expands somewhat.” Ex. 1017, [0009]. Moreover, a gap reduces unevenness of brightness and color, maintains consistent light reflection despite irregularity in the positional relationship between the LED and the through-hole, and prevents the reflector from creasing as it thermally expands. Ex. 1015, ¶32.

The advantages of having the gap between the reflector and the LED described in Sharp further improves upon the assembly in Lee. For example, Lee seeks to improve the display quality of the LCD device. Ex. 1018, [0025]. Lee’s backlight

assembly includes a reflecting plate 223 disposed over a second power line 221d “so as to prevent the second power line 221d from affecting an image display.” Ex. 1018, [0049]. Sharp also teaches a reflection sheet, but specifies that it does not contact the LEDs so it is not “influenced by the mount position of the light emitting diode substrate even when there is an irregularity in the positional relationship between the light emitting diode and the through-hole due to the mount position of the light emitting diode substrate.” Ex. 1017, [0011].

A comparison of Lee and Sharp illustrates the similarities of their backlight assemblies, highlighting that it would have been obvious to a POSITA to modify the reflective sheet in Lee in view of Sharp’s teaching of having apertures or through-holes in the reflecting sheet with gaps between the edge of the through-holes and the LEDs. Ex. 1015, ¶52–53. As shown below, Lee’s bottom chassis 224, is overlaid by the reflective sheet 223 and light source 221, which includes second power lines 221d underneath the reflecting plate 223. Ex. 1018, [0047]–[0049]. Similarly, Sharp, shown in the figure on the right, features LEDs 1 on the LED substrate 2 overlaid by the reflection sheet 3, which has “[t]hrough-holes 31 ... arranged with a distance therebetween at positions corresponding to the light emitting diodes 1.” Ex. 1017, [0048]–[0051], Ex. 1015, ¶34.



Ex. 1018, Fig. 1 and Ex. 1017, Fig. 2. Finally, Lee and Sharp are in the same field of backlight assemblies for displays. Thus, a POSITA would recognize that this combination is nothing more than the use of a known solution described by Sharp in a similar system described by Kim. This combination would be within the skillset of a POSITA. Ex. 1015, ¶51.

2. Substitute Claim 25.

[’812 Substitute Claim 25 Preamble] A solid state lighting tile, comprising:

Lee describes a backlight assembly consisting of a liquid crystal display panel, which contains a light source such as an LED. Ex. 1018, [0015]; Ex. 1015, ¶40.

[’812 Substitute Claim 25A] a substrate;

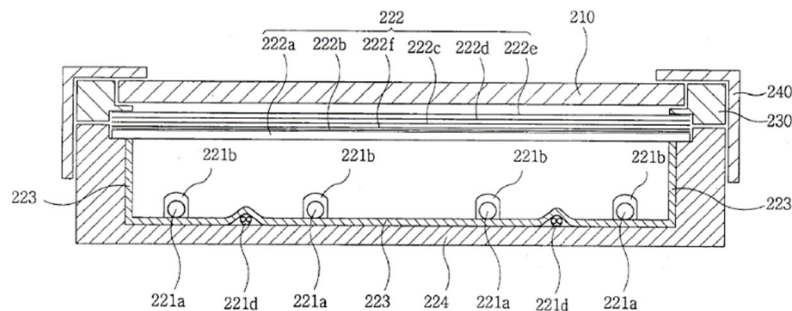
With respect to Figs. 1 and 2, Lee describes a bottom chassis 224. Ex. 1018, [0049]. The bottom chassis 224 is a substrate for a lighting tile. Ex. 1015, ¶42.

[’812 Substitute Claim 25B] a solid state lighting element mounted on a surface of the substrate;

Lee discloses the light source 221 is mounted on top of the bottom chassis 224. Ex. 1018, Fig. 2; Ex. 1015, ¶42.

[’812 Substitute Claim 25C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile;

Fig. 2 of Lee, shown below, illustrates “[t]he extended second power line 221d may be disposed under the reflecting plate 223 so as to prevent the second power line 221d from affecting an image.” Ex. 1018, [0049]. Ex. 1018, Fig. 2:



Reflecting plate 223 conforms to a shape of the second power line 221d (a protruding feature) under any reasonable construction of “conform.” Ex. 1015, ¶43. To the extent PO argues Fig. 2 does not show reflecting plate 223 as having the same shape, outline, or contour of the protrusion, that is incorrect. A POSITA would understand that to “prevent the second power line 221d from affecting an image display,” the reflecting sheet would conform to the protrusion. Ex. 1018, [0049].

[’812 Substitute Claim 25D] wherein the reflector sheet comprises at least one aperture configured to be proximate to the at least one solid state lighting element, wherein the reflector sheet does not contact the at least one solid state lighting element; and

See supra § III.A.2., ’812 Substitute Claim 25D. A POSITA would have been motivated to apply Sharp’s gap between the reflecting plate 223 in Lee for the reasons discussed above in § II.A.1.

[’812 Substitute Claim 25E] wherein the protruding feature is separate and positioned away from the at least one solid state lighting element.

Lee figure 2 shows second power line 221d (protruding feature) separate and positioned away from the lamps 221a. Ex. 1018, Fig. 2; *see also* Ex. 1015, ¶42.

3. Substitute Claim 26.

[’812 Substitute Claim 26] The tile of claim 25, wherein the reflector sheet covers and maintains a substantially flat surface over the protruding feature, wherein the flat surface is parallel to the surface of the substrate.

A POSITA would understand Lee’s reflecting plate 223 could be modified to maintain a substantially flat surface over the second power line 221d (protruding feature) such that it maintained a substantially flat surface parallel to the bottom chassis 224 (substrate), which would comport with Lee’s goal to “prevent the second power line 221d from affecting an image display.” Ex. 1018, [0049]; Ex. 1015, ¶43.

4. Substitute Claim 27.

[’812 Substitute Claim 27 Preamble]: A method of forming a solid state lighting device comprising: *See supra* Substitute Claim 25[Preamble]; *see also* *Purdue*, 811 F.3d at 1354.

[’812 Substitute Claim Elements 27A–27E] Lee and Sharp disclose each of the substitute claim elements 27A–27E for the same reasons that the combination discloses 25A–25E. *See supra* Section II.D.2.

5. Substitute Claim 28.

See supra Substitute Claim 26.

E. Substitute Claims 25–28 are Rendered Obvious by Chou in View of the Knowledge of a POSITA.

Chou discloses the claim limitations found in the original claims. The additional claim limitations in Claims 25–28 are rendered obvious by Chou.

1. Chou discloses the new elements in claims 25 and 27.

The additional limitation [25D]/[27D] is nearly identical to original claim 12, which was addressed in the Petition and in Petitioner’s Reply to PO’s Response (“Reply”). However, PO presents the same arguments in its MTA.

Chou in view of the knowledge of a POSITA discloses this element. A POSITA would have been motivated to modify Chou’s reflector sheet to slightly increase the angle θ such that the reflector sheet does not contact the solid state light element. Ex. 1015, ¶14. A POSITA “would also recognize that the LED component itself is commonly packaged in a clear protective casing or lens,” which would result in the reflector sheet contacting the casing or lens rather than the LED chip itself. Petition, 20; *see also* Reply, § IV.B. A POSITA would understand that leaving space between the reflector and the LED would be obvious for several reasons, *e.g.*, manufacturing tolerances, heat transfer, and thermal expansion. Ex. 1015, ¶14.

Chou also discloses new limitation [25E]/[27E] because, as discussed, Chou also discloses “solder 800” as an example of a “protruding feature.” Petition at 17; ID at 32-33. Chou’s Fig. 3A illustrates that the solder 800 is “away from” the LED 600:

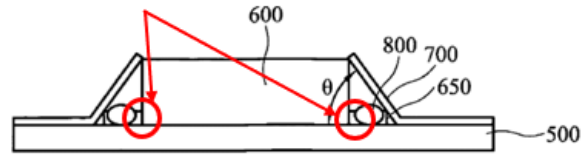


FIG. 3A

Protruding feature solder 800
separate and positioned away from LED 600

2. Chou discloses substitute claims 26 and 28.

Chou states reflector sheet 700 “forms an angle θ between about 0 degree to about 90 degree” (Chou, 3:42–45), which would be substantially flat and parallel to the substrate. Ex. 1015, ¶20. Thus, Chou discloses a reflector sheet that covers and maintains a substantially flat surface over protrusion parallel to the substrate.

III. Conclusion

Patent Owner’s substitute claims are unpatentable.

Respectfully submitted,

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
**PETITIONER'S OPPOSITION TO PATENT OWNER'S CONTINGENT
MOTION TO AMEND** has been served via email on the following:

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Dated: September 17, 2024

By: /s/ Matias Ferrario
Matias Ferrario
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