

Hisense USA Corporation
Petitioner

v.

Brightplus Ventures LLC
Patent Owner

United States Patent & Trademark Office

IPR No. 2023-01168

Patent No. 9,605,835

Ni, Wang & Massand, PLLC

Issues to be Decided

- Validity of Claims 1-5 and 7-14
 - Petitioner has asserted 3 grounds based on 6 references.

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

Pet. at 4

Issues to be Decided

- Validity of Amended Claims
 - Patent Owner has proposed amendments 21-29 to substitute original claims 1-5, 7, 9-10, and 13.

Paper 25 at 1-2 and 27-29

- Petitioner argues that the following references teach the proposed amended claims.

	Ground 1	Ground 2
Claim 21[a]	+ Park and/or Li	+ Park and/or Li
Claim 21[b]	+ Park, Li, and/or Grootes	+ Park, Li, and/or Grootes
Claim 21[c]	+ Park and/or Li	+ Park and/or Li
Claim 21[d]	+ Park and/or Li	+ Park and/or Li
Claim 21[e]	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 21[f]	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 21[g]	+ Ayabe, Park, and/or Li	+ Ayabe, Park, and/or Li
Claim 21[h]	+ Saccomanno, Ayabe, Park, and/or Li	+ Saccomanno, Ayabe, Park, and/or Li
Claim 21[i]	+ Li	+ Li
Claim 22	+ Park and/or Li	+ Park and/or Li
Claim 23	Ground 1	Ground 2
Claim 24	Ground 1	Ground 2
Claim 25	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 26	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 27	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 28	+ Mueller and/or Grootes	+ Mueller and/or Grootes
Claim 29	Ground 1	Ground 2

DEMONSTRATIVE EXHIBIT--NOT EVIDENCE

Paper 28 at 22

The '835 Patent



US009605835B2

(12) **United States Patent**
Roberts

(10) **Patent No.:** **US 9,605,835 B2**
(45) **Date of Patent:** ***Mar. 28, 2017**

(54) **SOLID-STATE LUMINAIRES FOR GENERAL ILLUMINATION**

(71) Applicant: **Cree, Inc.**, Durham, NC (US)

(72) Inventor: **John K. Roberts**, Grand Rapids, MI (US)

(73) Assignee: **Cree, Inc.**, Durham, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.
This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/611,800**

(22) Filed: **Feb. 2, 2015**

(65) **Prior Publication Data**

US 2016/0010830 A1 Jan. 14, 2016

Related U.S. Application Data

(63) Continuation of application No. 13/657,141, filed on Oct. 22, 2012, now Pat. No. 8,946,609, which is a (Continued)

(51) **Int. Cl.**
F21V 13/10 (2006.01)
H04N 9/31 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **F21V 13/10** (2013.01); **F21K 9/00** (2013.01); **F21V 7/10** (2013.01); **F21V 13/04** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC . F21K 9/00; F21V 13/04; F21V 29/22; F21V 29/2206; F21V 29/70; F21V 29/74;
(Continued)

(56) **References Cited**

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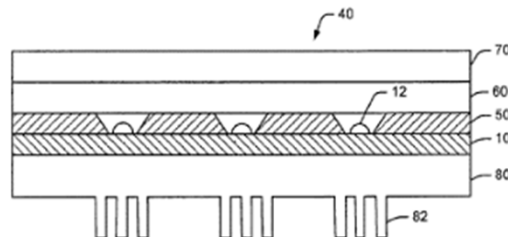
U.S. Appl. No. 11/613,692, filed Dec. 20, 2006, Nogley,
(Continued)

Primary Examiner — Francis M Legame, Jr.
(74) **Attorney, Agent, or Firm** — Myers Bigel, P.A.

(57) **ABSTRACT**

A lighting panel includes a tile having a first side parallel to a principal plane of the lighting panel, a plurality of solid state lighting devices arranged on the first side of the tile and configured to emit light, a reflector sheet on the first side of the tile, and a brightness enhancement film on the reflector sheet. The reflector sheet may be arranged between the tile and the brightness enhancement film and the brightness enhancement film may be configured to increase the on-axis intensity of emitted light. A luminaire adapted for general illumination includes a lighting panel as described above, a current supply circuit configured to supply an on-state drive current to a string of lighting devices in response to a control signal, a photosensor arranged to receive light from one of the solid state lighting devices, and a control system configured to receive an output signal from the photosensor and to adjust the control signal responsive to the output signal of the photosensor.

20 Claims, 12 Drawing Sheets



Petitioner Hisense USA Corporation
Exhibit 1001 - Page 1 of 27

SOLID-STATE LUMINAIRES FOR GENERAL ILLUMINATION

Date of Patent: ***Mar. 28, 2017**

Filed: **Feb. 2, 2015**

Applicant: **Cree, Inc.**, Durham, NC (US)

Inventor: **John K. Roberts**, Grand Rapids, MI (US)

20 Claims, 2 Independent

Related U.S. Application Data

Continuation of application No. 13/657,141, filed on Oct. 22, 2012, now Pat. No. 8,946,609, which is a continuation of application No. 12/851,026, filed on Aug. 5, 2010, now Pat. No. 8,294,075, which is a continuation of application No. 11/408,648, filed on Apr. 21, 2006, now Pat. No. 7,777,166.

DEMONSTRATIVE EXHIBIT--NOT EVIDENCE

Inventions of the '835 Patent

- The '835 Patent discloses a novel, improved lighting panel including:
 - A reflector on the first side of a substrate (element 55).
 - A brightness enhancement film on the reflector (element 70).
 - A planar diffuser sheet between the reflector (element 60).
 - Emitting lighting having a first orientation from the lighting panel (element 73A) and reflecting lighting having a second orientation back into the lighting panel (element 73B).
 - Additional layers on the BEF (claim 4) or an additional diffuser sheet between the reflector sheet and the BEF (claim 8).

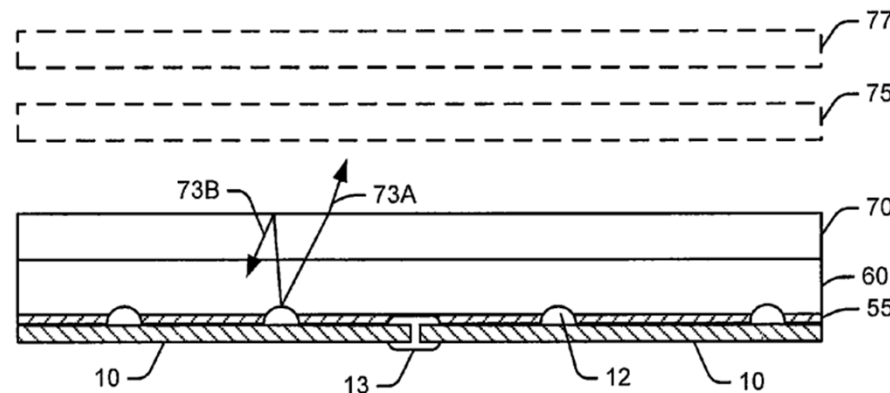


FIGURE 5B

Ex. 1001 at pg. 6

Claim Construction

That which is claimed is:

1. A lighting panel, comprising:

at least one substrate having a first side parallel to a principal plane of the lighting panel;

a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;

a reflector on the first side of the at least one substrate;

a brightness enhancement film on the reflector, wherein the reflector is arranged between the at least one substrate and the brightness enhancement film and the brightness enhancement film is configured to preferentially emit light having a first orientation from the lighting panel and to preferentially reflect light having a second orientation, different from the first orientation, back into the lighting panel, and

a generally planar diffuser sheet between the reflector and the brightness enhancement film, wherein the light having the second orientation that is reflected back into the lighting panel is recycled within at least the diffuser sheet.

A. “on”

Brightplus’s Proposed Construction 1:22-cv-02774	Hisense’s Construction 1:22-cv-02774
directly on, or on with intervening elements present”	directly on the other element or intervening elements may be present

While the term “on” has not been construed Patent Owner submits that an air gap is not an intervening layer.

Paper. 13 at pg. 4

Ex. 1001 at 22:33-52

Original Claims: Ground 1

- Mok's does not teach a BEF on the reflector, but a BEF above or close to (e.g., adjacent) the diffuser 16. The BEF and diffuser are spaced by distance 48.
- Holman confining structure 72 is a lighting element 72 and is not an “intervening element”. Thus, Holman does not disclose a BEF “on” the reflector.
- Lamb, similarly, does not disclose a BEF “on” a reflector as demonstrated by Fig. 2. The “reflector sheet 127” is separated from all the other layers and elements.

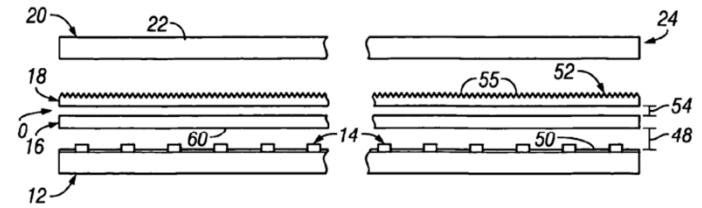
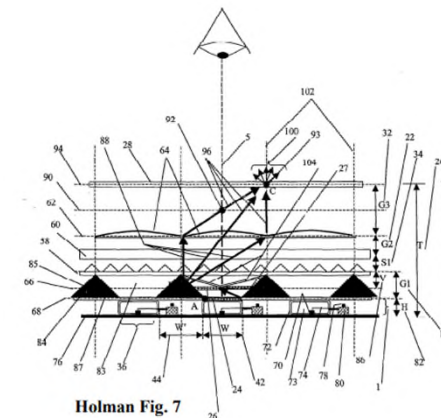


FIG. 1



Holman Fig. 7

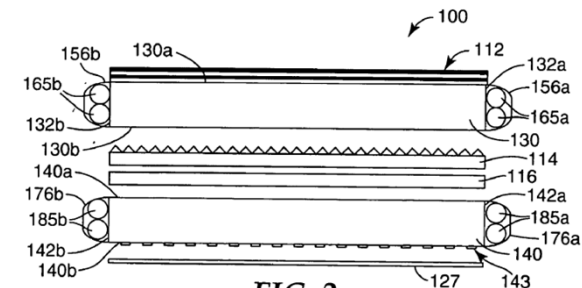


FIG. 2

Original Claims: Ground 1

- A POSITA would not be motivated to combine the references. Mok discloses a significant separation between the BEF and diffuser sheet (e.g., 50mm). Petitioner has not explained how combining this disclosure with Holman would outweigh the drawbacks of a large increase in panel thickness.
- As stated by the Board, Petitioner does not offer convincing evidence that the references

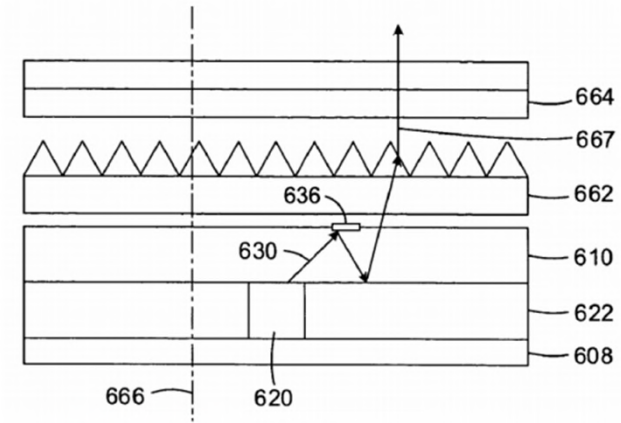
Petitioner does not articulate sufficient reason for combining Mok and Lamb to provide the “additional layer.” *See* Pet. 26–27 (“As discussed above, a POSITA would be motivated to combine Mok with Lamb.”). Petitioner asserts that an ordinarily skilled artisan “would have been motivated to modify the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

ii. Claim 8

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

Original Claims: Grounds 2 and 3

- Epstein does not disclose a BEF “on” the guiding layer, as shown in Fig. 11, there is an air gap between guiding layer 610 and BEF 662.



Epstein FIG. 11

- Lastly, neither Ko, nor Kretman make up for this lack of disclosure. Ko's Fig. 1 demonstrates all the layers, including reflector 118, as being spaced apart.

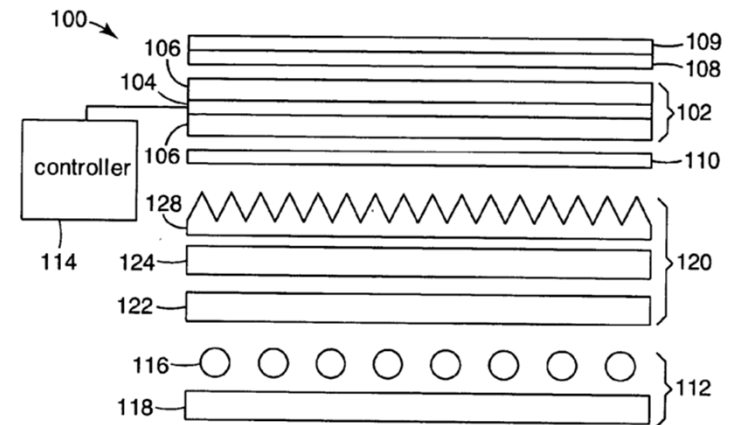


FIG. 1

Patent Owner's Amended Claims

- Patent Owner's amended claims do not add new matter and have written support.

- Proposed Claim 21: EX1001 at 8:30-33; 4:15-18; 14:8-11; Fig. 2; 9:62-10:8; 9:43-46; Fig. 11; 14:45-57; 14:63-15:6; 9:10-15; 11:49-51; Fig. 5A; Fig. 5B and Fig. 7
- Proposed Claim 22: EX1001 at 9:43-46
- Proposed Claim 23: EX1001 at Fig. 5A
- Proposed Claim 24: EX1001 at Fig. 5A
- Proposed Claim 25: EX1001 at Fig. 11 and accompanying description
- Proposed Claim 26: EX1001 at Fig. 11 and accompanying description
- Proposed Claim 27: EX 1001 at 14:45-57
- Proposed Claim 28: EX 1001 at 14:16-20; 16:1-4; 20:9-12
- Proposed Claim 29: EX1001 at Fig. 5a; Fig. 5B; and Fig. 7

- The '835 Patent's specification match the originally filed disclosure (see, Ex. 1002 at 282-330).

Paper 25 at 3

Patent Owner's Amended Claims

- The inventors of the '835 understood that a substrate comprising a metal core printed circuit board could be mounted on a lighting tile.

The terminology used herein is for the purpose of describing 20
particular embodiments only and is not intended to be
limiting of the invention. As used herein, the singular forms
“a”, “an” and “the” are intended to include the plural forms
as well, unless the context clearly indicates otherwise. It will
be further understood that the terms “comprises” “compris- 25
ing,” “includes” and/or “including” when used herein,
specify the presence of stated features, integers, steps,
operations, elements, and/or components, but do not pre-
clude the presence or addition of one or more other features,
integers, steps, operations, elements, components, and/or 30
groups thereof.

Ex. 1001 at 7:20-31

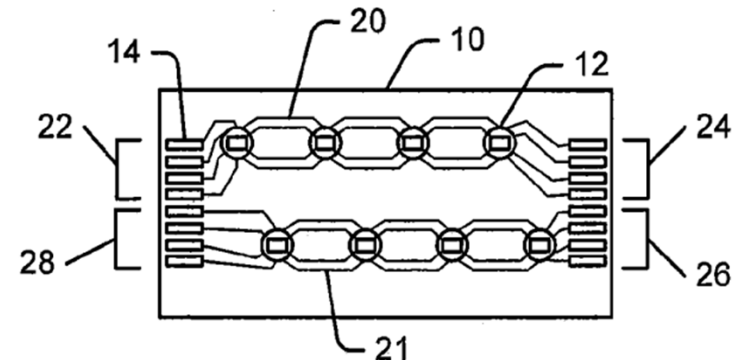
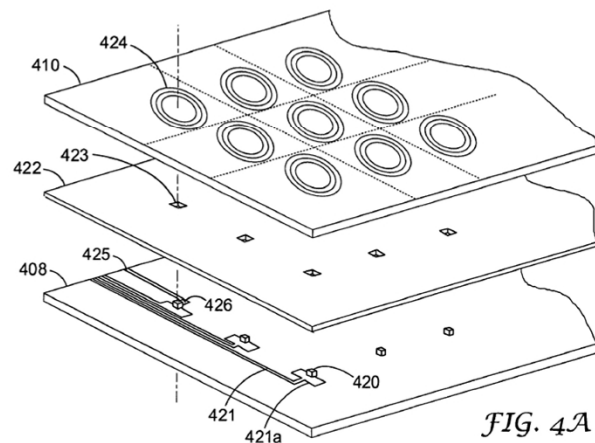


FIGURE 1

Grounds 1 & 2 - Amended Claim 21(a)

at least one substrate comprising a metal core printed circuit board having traces formed thereon mounted on a lighting tile and having a first side parallel to a principal plane of the lighting panel;

- Epstein also does not disclose a lighting tile to which substrate 308/408 is mounted to.



- Mok does not disclose that base panel 12 is mounted to a lighting tile.

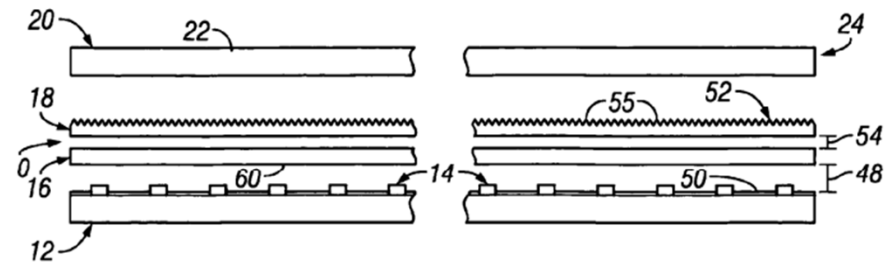


FIG. 1

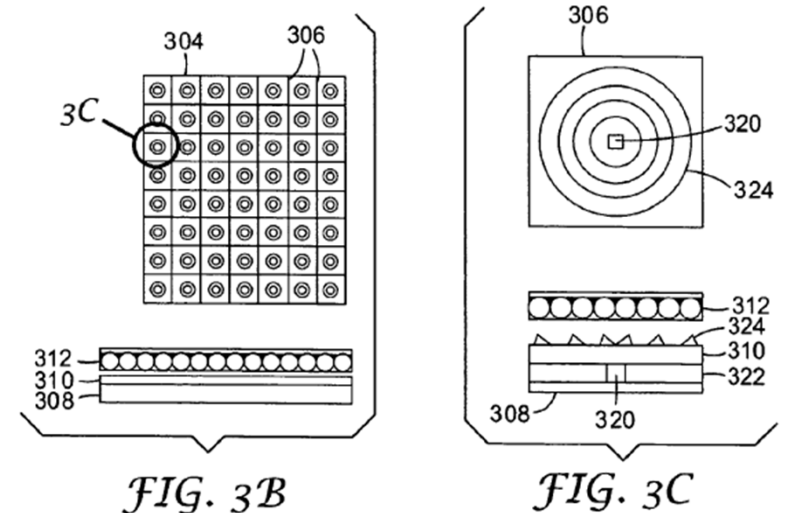
- None of the other references (e.g., Lamb, Holman, Park, and/or Li) disclose a substrate comprising a PCB mounted to a lighting tile as claimed.

Grounds 1 & 2 - Amended Claims 21 (b) & (c)

a plurality of strings of packaged solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light;

wherein the plurality of strings of packaged solid state lighting devices is mounted on the lighting tile;

- Neither Mok, nor Holman disclose this limitation. Mok's base panel 12 is not mounted to a lighting tile.
- Epstein does not disclose substrate 308 as being mounted to any other layer or that lighting elements 306 are mounted on tile 304. Rather, Epstein teaches a plurality of lighting units 306 arranged in a tile 304; tile 304 does not include any layers other than 308, 310, and 312 as shown by Figs. 3B and 3C.
- None of the other references (e.g., Lamb, Holman, Park, Grootes and/or Li) disclose these limitations.



Grounds 1 & 2 - Amended Claim 21(g)

a reflector mounted to the lighting tile and on the first side of the at least one substrate, the reflector being outside of the packaged solid state lighting devices;

- The claim requires that a reflector is *mounted to* the lighting tile.
- As stated previously, neither Mok nor Epstein disclose a lighting tile. Additionally, neither reference teach a reflector that is mounted to a lighting tile.
- Li discloses a reflector 2 on a light source module 1, see Fig. 1, but not that the light source module is mounted to a separate element or that reflector 2 is mounted to a lighting tile.
- Petitioner has not offered compelling evidence as to why these references teach a reflector mounted to a lighting tile.
- None of the other references (e.g., Lamb, Holman, Ayabe, Park, and/or Li) disclose these limitations.

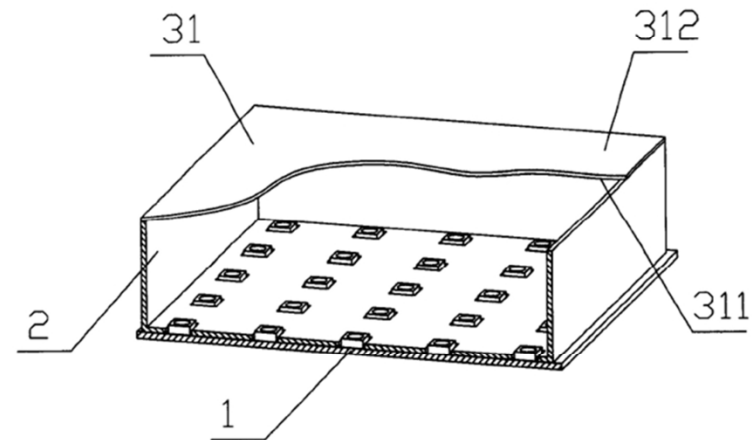


FIG. 1

Grounds 1 & 2 - Amended Claim 21(h)

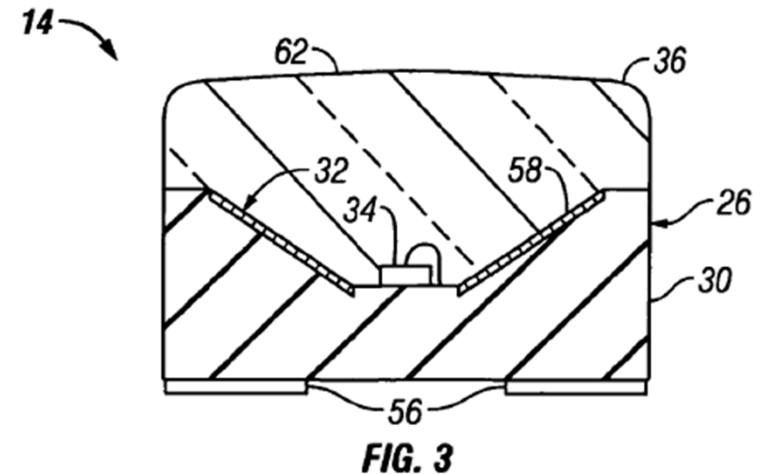
wherein the reflector extends to cover the lighting tile and includes a plurality of sidewalls outside of the packaged solid state lighting devices that are angled with respect to the principal plane of the lighting panel;

- As stated for previous claim elements, none of the prior art references teach a lighting tile as claimed. Epstein's substrate 408 is not a lighting tile, and therefore the intermediate layer 422/522/622 does not cover a lighting tile.
- Holman's disclosures in Figs. 3, 7, 13, and 14 refer to an LED chip 70 which is located inside of package element 161... the sidewall reflector of Fig. 14 is a packaging element and is not outside the package.
- None of the other references (e.g., Lamb, Holman, Saccomanno, Ayabe, Park, and/or Li) disclose these limitations.

Grounds 1 & 2 - Amended Claim 22

22. (proposed substitute for Claim 2) The lighting panel of claim 1 21, wherein the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon wherein the lens surrounds each of the packaged solid state lighting devices

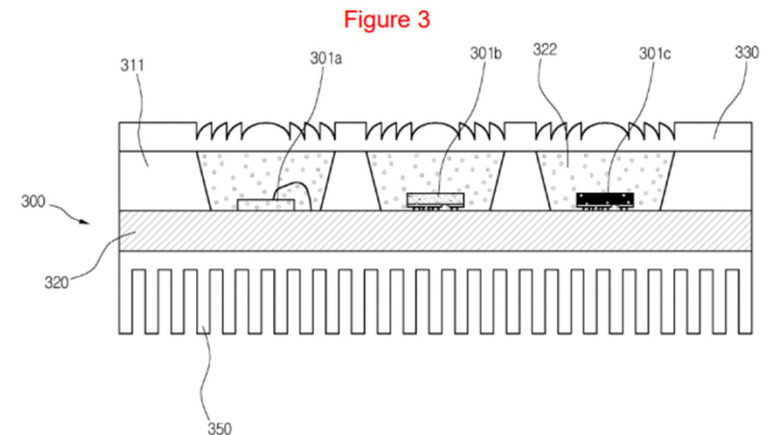
- The claim requires that a lens surrounds each of the packaged solid state lighting devices.
- Mok discloses a lens 36 that is only on top of the LED and reflector cup, but not a lens that surrounds the light emitting elements 14.



Grounds 1 & 2 - Amended Claim 22

22. (proposed substitute for Claim 2) The lighting panel of claim 1 21, wherein the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon wherein the lens surrounds each of the packaged solid state lighting devices

- Park's Fig. 3 demonstrates a single lens part 330 mounted on top of LED package 300.
- Li discloses a lens above each packaged LED light source (Ex. 1033 at 11).
- On top of or above is not equivalent to *surrounding*, thus, neither reference renders the claim obvious.
- None of the other references (e.g., Lamb, and/or Holman) disclose these limitations.



Grounds 1 & 2 - Amended Claim 23

23. (proposed substitute for Claim 3) The lighting panel of claim 4 21, wherein the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon wherein the generally planar diffuser contacts the sidewalls of the reflector with no intervening elements.

- Epstein's Fig. 11 demonstrates that LED 620 is the only element in contact with the sidewalls of intermediate layer 620. This is illustrated by the red annotation.
- In Epstein, only the top surface of layer 622 is in contact with guiding layer 610. Therefore, Epstein does not render this claim obvious.

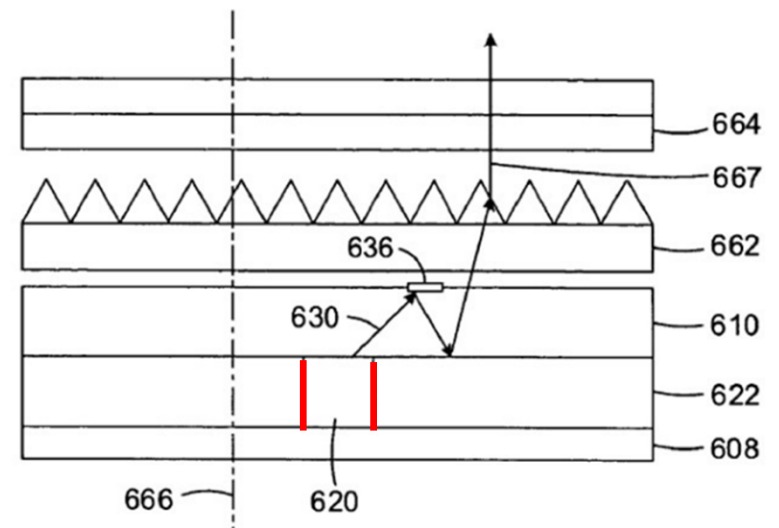
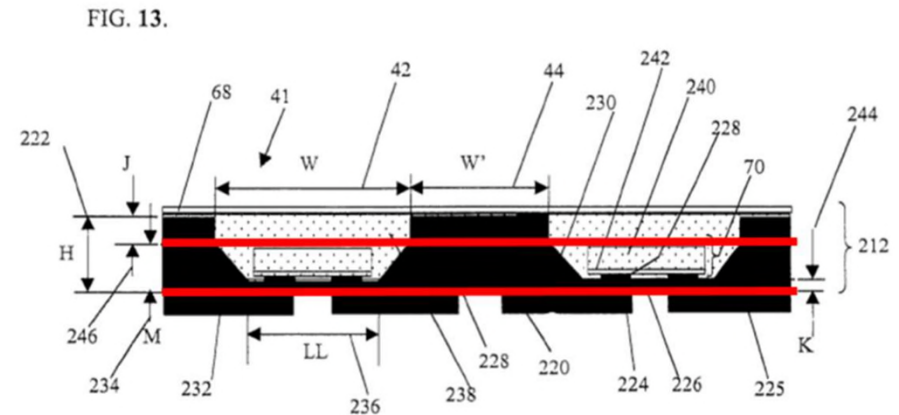


FIG. 11

Grounds 1 & 2 - Amended Claim 23

23. (proposed substitute for Claim 3) The lighting panel of claim + 21, wherein the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon wherein the generally planar diffuser contacts the sidewalls of the reflector with no intervening elements.

- Holman discloses that the sidewall 230 is “sloped at an angle, α ... and covers a height M, 234, that is made approximately equal to the thickness of the LED chip 70” (Ex. 1006 at 38). The red annotations on Fig. 13 illustrate that the sidewalls 230 are not in contact with the diffuser with no intervening element.
- Neither Holman, nor Epstein render this claim obvious.
- None of the other references (e.g., Mok and/or Lamb Holman) disclose these limitations.



Conclusion

- The original grounds 1-3 fail because the combination of the respective references do not render obvious an BEF on the reflector.
- The amended claims are not rendered obvious because the combination of petitioner's references (e.g., Mok, Holman, Lamb, Epstein, Ayabe, Saccomano, Li, Park, Mueller and/or Grootes) fails to disclose a lighting tile and all the limitations relating thereto, a lens surrounding each packaged solid state lighting device, or planar diffuser contacting the sidewalls of the reflector as claimed.