UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CURRENT LIGHTING SOLUTIONS, LLC,
and
HLI SOLUTIONS, INC.,

Petitioners,

v.

ALSI HOLDINGS, LLC
Patent Owner.

U.S. Patent No. 9,699,854 to Wassel

Case No.: IPR2023-00125

PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. § 311 *ET SEQ.* AND 37 C.F.R. § 42.100 *ET SEQ.*
(U.S. PATENT NO. 9,699,854)

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1004	Curriculum Vitae of Dr. Jack Josefowicz	
1005	USPN 8,322,881	
1006	U.S. Provisional App. No. 61/094,571	'571 Provisional
1007	U.S. Provisional App. No. 61/094,558	'558 Provisional
1008	U.S. Provisional App. No. 61/015,713	'713 Provisional
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1013	Recycling and Disposal of CFLs and Other Bulbs that Contain Mercury _ US EPA - https://www.epa.gov/cfl/recycling-and-disposal-cfls-and-other-bulbs-contain-mercury	
1014	Disposal of Fluorescent Light Ballasts (FLB) _ US EPA - https://www.epa.gov/pcbs/disposal-fluorescent-light-ballasts-flb	
1015	Nakamura, *The Roles of Structural Imperfections in InGaN-Based Blue Light-Emitting Diodes and Laser Diodes,* Science Magazine, Vol. 281, pp. 956-961 at 956-957 (August 14, 1998)	Nakamura
1016	Nakada et. al., *Improved Characteristics of InGaN Multiple-Quantum-Well Light-Emitting Diode by GaN/AlGaN distributed Reflector Grown on Sapphire,* Applied Physics Letters, Vol. 76, No. 14, pp. 1804-1806 (April 3, 2000)	Nakada

Exhibit No.	Description	Identifier
1017	USPN 5,578,839	
1018	Nakamura et al., "*Candela-Class High-Brightness InGaN/AlGaN Double-Heterostructure Blue-Light-Emitting Diodes,"* Appl. Phys. Lett. 64, pp. 1687-1689 (1994)	
1019	Mueller-Mach et al., *Highly efficient all-nitride phosphor-converted white light emitting diode*, Physica Status Solidi (A) Applications and Materials, Vol. 202, Issue 9, pp. 1727-1732 at 1728 (June 6, 2005)	
1020	USPN 7,223,998	
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1022	U.S. Patent Publication No. 2008/0089069	Medendorp
1023	USPN 5,857,767	
1024	USPN 7,144,135	
1025	USPN 2,422,378	
1026	USPN 3,123,308	Franck
1027	USPN 4,041,306	Compton
1028	USPN 7,144,135	
1029	USPN 2,908,197	
1030	Michael Gauvin et al., "Multi-CPU architecture speeds ray tracing," https://www.laserfocusworld.com/software-accessories/software/article/16553028/multicpu-architecture-speeds-ray-tracing	
1031	National Lighting Product Information Program, Parking Lot and Area Luminaires, Vol. 9(1) (2004)	
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1035	ALSI infringement contentions for the '854 Patent	
1036	U.S. Patent Pub. No. 2007/0121343	Brown
1037	USPN 6,257,735	Baar
1038	USPN 6,641,284	Stopa

Exhibit No.	Description	Identifier
1039	Lumen (unit) – McGraw Hill Dictionary of Scientific and Technical Terms	
1040	USPN 7,198,386	
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Mandatory Notices under 37 C.F.R. § 42.8

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

Petitioners certify that Current Lighting Solutions, LLC and HLI Solutions, Inc., ("Petitioners"), are the real parties-in-interest.

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

Petitioners identify the following related judicial matter: *ALSI Holdings, LLC v. Current Lighting Solutions, LLC, d/b/a GE Current, a Daintree Company, and HLI Solutions, Inc., f/k/a Hubbell Lighting, Inc., both d/b/a Hubbell Control Solutions and/or Current*, Case No. 6:21-cv-01187-ADA, pending in the Western District of Texas. The '854 Patent is being asserted in this proceeding, along with U.S. Patent Nos. 8,322,881 (related family); 8:186,855; 8,721,114; 9,049,753; and U.S. Design Patent Nos. D650,508 and D612,088.

Concurrently, Petitioner is or will file related petitions regarding U.S. Patent Nos. 8,322,881 (related family) and 8,721,114 (common assignee).

Lead and Back-Up Counsel - 37 C.F.R. § 42.8(b)(3)

Petitioners identify the following lead and back-up counsel:

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Thomas W. Cunningham (Reg. No. 48,722) Kyle G. Konz (Reg. No. 68,910) Corey J. Neil (Reg. No. 75,749) BROOKS KUSHMAN P.C. 1000 Town Center, 22nd Floor Southfield, MI 48075 Telephone (248) 358-4400 Facsimile (248) 358-3351 tcunningham@brookskushman.com kkonz@brookskushman.com cneil@brookskushman.com	

Pursuant to 37 C.F.R. § 42.10(b), an appropriate Power of Attorney is filed concurrently herewith.

Service Information - 37 C.F.R. § 42.8(b)(4)

Service information for lead and back-up counsel is provided in the designation of lead and back-up counsel above. Petitioners hereby consent to service by email at the following email address: CUPO0111IPR@brookskushman.com.

Fees - 37 C.F.R. § 42.15(a)

The filing fees associated with this Petition are being charged to Deposit Account 023978. The Board is authorized to charge any additional fees or credit any refunds pertaining to this Petition to Deposit Account 023978.

I. Introduction

Petitioners, Current Lighting Solutions, LLC and HLI Solutions, Inc., requests *inter partes* review of U.S. Patent No. 9,699,854 ("the '854 Patent") in accordance with 35 U.S.C. §§ 311–319 and 37 C.F.R. § 42.100 *et seq.*

II. Requirements under 37 C.F.R. § 42.104

A. Grounds for Standing - 37 C.F.R. § 42.104(a)

Pursuant to 37 C.F.R. § 42.104(a), Petitioners certify that the '854 Patent is available for IPR and they are not barred or estopped from requesting IPR.

B. Challenged Claims - 37 C.F.R. § 42.104(b)(1)

Petitioners request review for claims 1-15 and 18-20 of the '854 Patent and request that the Patent Trial and Appeal Board ("PTAB") cancel those claims as unpatentable.

C. Grounds of Challenge – 37 C.F.R. § 42.104(b)(2)

The grounds of unpatentability presented are as follows:

Ground	Basis[1]	References	Challenged Claims
1	§ 103	U.S.P.N. 6,641,284 ("Stopa;" Ex.1038) in view of U.S.P.N. 6,318,886 ("Stopa II;" Ex.1045) and the knowledge of a POSITA	1-15 and 18-20
2	§ 103	U.S. Publication No. 2008/0089069 ("Medendorp," Ex.1022) in view of U.S.P.N. 6,257,735 ("Baar," Ex.1037) and the knowledge of a POSITA	1-2, 6-9, 13, 15, and 18-20
3	§ 103	U.S. Publication No. 2007/0121343 ("Brown," Ex.1036) in view of U.S.P.N. 6,641,284 ("Stopa," Ex.1038) and the knowledge of a POSITA	1-2, 6-15, 18 and 20

There is a reasonable likelihood that at least one Challenged Claim is unpatentable and Petitioners request review and a judgment finding them unpatentable.

III. Person of Ordinary Skill in the Art (POSITA)

A person of ordinary skill in the art of the '854 Patent (POSITA) would have at least a bachelor's degree in a relevant scientific field, e.g., physics, materials science or engineering, or electrical engineering, and two or more years of

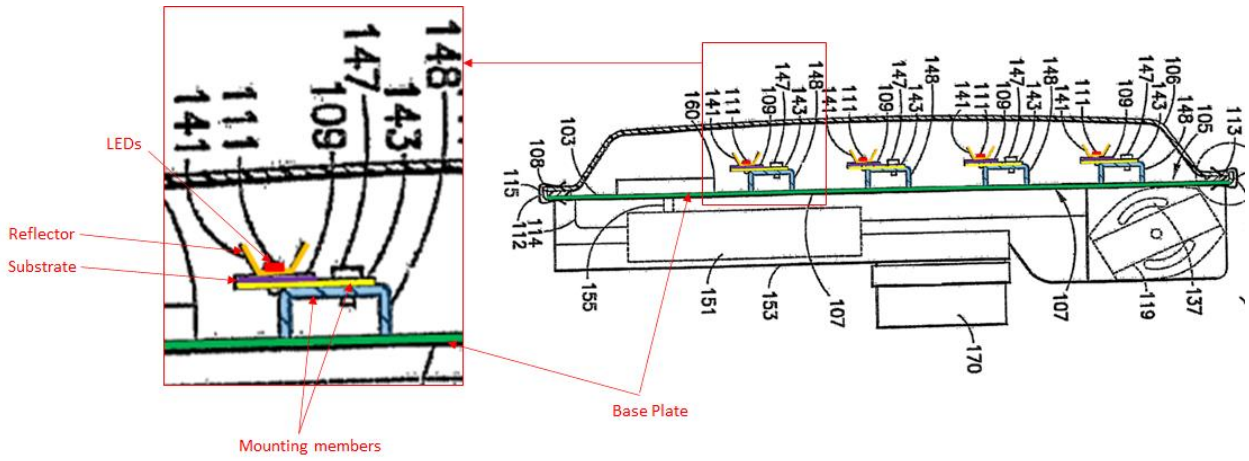
[1] Pre-AIA Sections 102, 103 and 112 apply.

experience in the lighting design field dealing particularly with LED fixtures for lighting applications. (Ex.1003, Josefowicz Decl., ¶¶36-37.) This description is approximate and additional development experience could make up for less education and vice versa. (*Id.*)

IV. The ’854 Patent

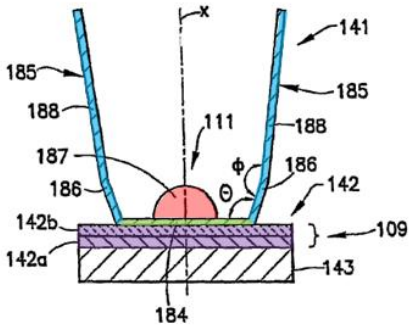
The ’854 Patent was filed May 13, 2014 and claims priority to a provisional application filed Dec. 21, 2007. (Ex.1001.) Patent Owner has stated the priority date is December 21, 2007 – i.e., the earliest claimed provisional application filing. (Ex.1035 at 1.)

The ’854 Patent relates to the design of LED lighting fixtures. (Ex.1001, 1:20-24.) Generally, the ’854 Patent describes and claims a fixture that includes a base plate, reflector, and a substrate upon having a plurality of LEDs. As shown below, intermediate mounting members may allow for indirect coupling between the substrate/LEDs and the base plate. (Ex.1001, 12:45-13:5.)



Ex.1001, Fig. 5[2]

The Challenged Claims focus on an embodiment (shown below) that includes a ***multi-faceted*** side wall (blue) reflector design – i.e., at least one angled bend (shown by Φ) in each side wall.



The multi-faceted side walls are meant to redirect the light emitted from LEDs[3] (red) as a uniform beam – which can be "focused" (e.g., spotlight) or

[2] Unless stated, coloring and annotations in red have been added.

[3] The LEDs are assembled on a circuit board substrate (purple) – collectively a *lighting strip.*

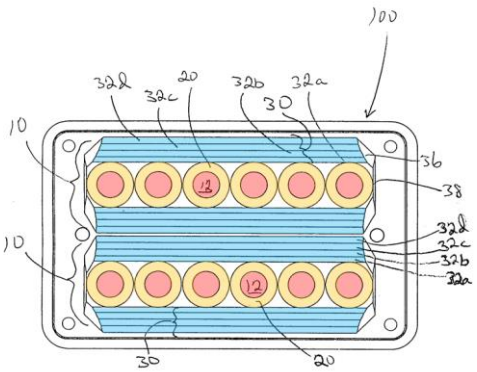
"diffused" (e.g., office or streetlight). (Ex.1001, 5:59-6:1.) The '854 Patent states the "multi-faceted" side wall reflector shown above directs the light of the LEDs as a uniform beam, which can be either a "focused beam" (e.g., spotlight) or a "diffused beam" (e.g., office or streetlight). (Ex.1001, 5:59-6:1.) But the "multi-faceted" reflector design is not limited to the embodiment shown by Figure 16. (Ex.1001, 17:41-54.) Instead, the "multi-faceted reflector may also include reflectors having a ***parabolic shape***."[4] (Ex.1001, 17:52-54.) Or the "reflectors ***may be rounded-type*** with multiple facet angles." (Ex.1001, 19:39-41.) The multi-faceted reflector design is therefore met by any reflector that does not have side-walls that are completely straight.[5]

A. Prosecution History

As filed, Applicant's claims recited a lighting strip and a multi-faceted side walls that redirect the light. (Ex.1002, pg. 29.) The Examiner rejected these claims in view of 2005/0111220 ("Smith," Ex.1009).

[4] Emphasis in bold/italics for quotes has been added unless otherwise stated.

[5] The '854 Patent includes one embodiment where the reflector side walls are ***not*** multi-faceted. (Ex.1001, 19:60-20:15; Fig. 25.)

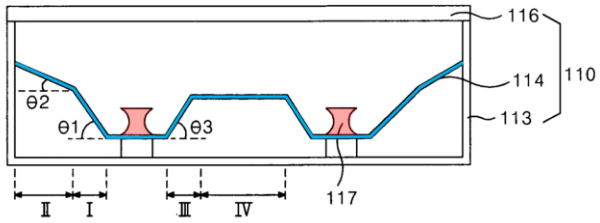


Ex.1009, Fig. 1

Smith discloses linearly arranged of LEDs (red) inserted through an opening (labeled "12") of a reflector ("100"). The openings position LEDs adjacent a circular parabolic reflector "20" (orange) and adjacent a second reflector surface - i.e., "longitudinal convex ribs 32a-32d" (blue). The Examiner argued Smith disclosed ***two multi-faceted reflector surfaces*** (orange and blue).

In response, Applicant argued Smith's circular reflector (orange) extends around a single LED and the longitudinal reflector surfaces (blue) "do not extend away from the bottom portion" of the LEDs. (Ex.1002, pg. 155.) Unpersuaded, the Examiner issued a final rejection (Ex.1002, pg. 169.) and maintained this rejection ***four additional times***. (Ex.1002, pgs. 192, 198-200, 250, 257-260, 301-302.) Ultimately, the Applicant amended the claims and argued Smith did not include a "reflector sheet" because its LEDs were individually surrounded by a parabolic reflector whereas the claims required the side-walls extend the entire length of the lighting strip. (Ex.1002, pgs. 349, 357-358.)

The Examiner's next rejection relied on U.S. Patent App. No. 2007/0002565 ("Han," Ex.1041) – shown below – as disclosing a sheet-like reflector having a multi-faceted side walls (blue) surrounding LED arrays (red). But the Examiner indicated certain dependent claims were allowable. (Ex.1002, pg. 375.) To gain allowance, the Applicant stated it amended claim 1 to include the allowable matter of dependent claim 16. (Ex.1002, pg. 394.)



Ex.1041, Fig. 4

But claim 1 did not include all the limitations of dependent claim 16. Claim 1 was not re-written to include: (1) a base plate made of "anodized aluminum comprising an enhanced conductive non-uniform heat-transferring surface texture;" and (2) a lighting strip "connected in direct physical contact" with the base plate. (Ex.1002, pg. 353; *see also* pgs. 375-376.) Instead, claim 1 was re-written to include only a limitation reciting heat transfer occurring between the lighting strip and the base plate. (Ex.1002, pgs. 354 and 386-387.)

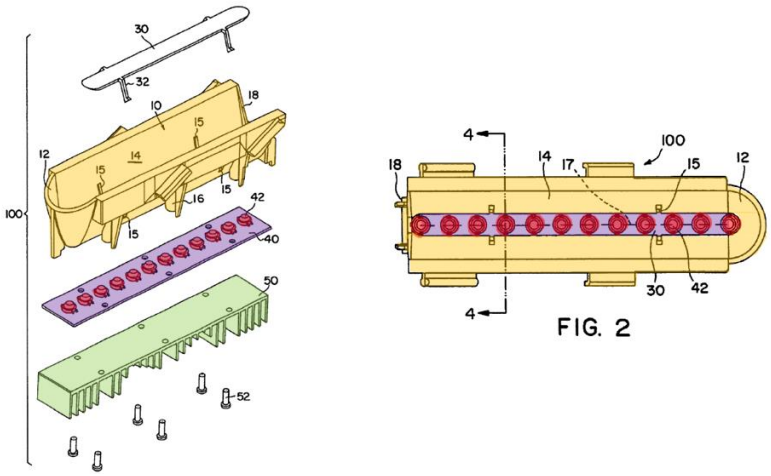
V. Prior Art

Multi-faceted reflectors were known to exist – as shown by Smith and Han. A POSITA also understood reflector design was well-known and has been used for

decades in both conventional and LED lighting fixtures. (Ex.1003, ¶¶74-90.) A POSITA also was capable and understood various methods to dissipate heat generated by LEDs. (Ex.1003, ¶¶67-73.) Petitioner contends the Challenged Claims do not include any novel aspect not taught by the prior art.

A. Stopa

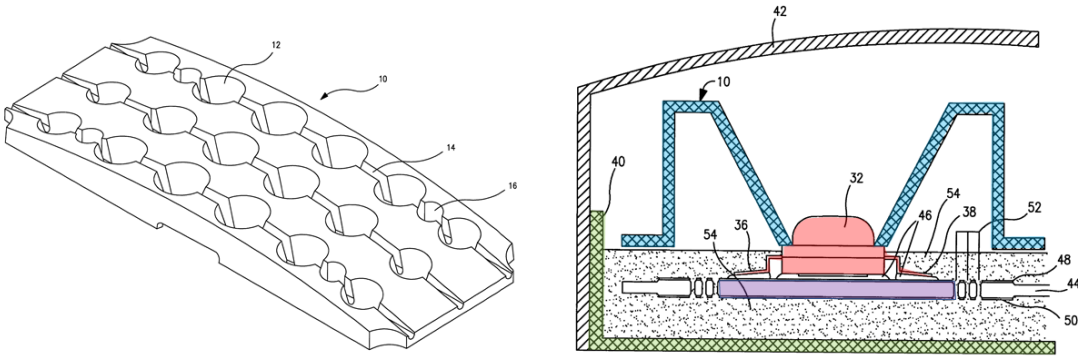
U.S. Patent No. 6,641,284 ("Stopa," Ex.1038) qualifies as prior art under 35 U.S.C. § 102 and discloses an LED light assembly 100 having a parabolic reflector (orange) with an open slot to receive a printed circuit board ("PCB") having a linear row of LEDs (red). (Ex.1038, Abstract, 4:59-65, 5:5-27, 6:24-29.) The PCB is coupled to an aluminum heat sink (green) for dissipating heat generated by the LEDs. Stopa's parabolic reflector is designed to provide a uniform light output. (Ex.1038, 3:31-35.)



Ex.1038, Figs. 1 and 2

B. Stopa II

U.S. Patent No. 6,318,886 ("Stopa II," Ex.1045) qualifies as prior art under 35 U.S.C. § 102 and is disclosed and incorporated by reference within the Stopa patent. (*See* Ex.1038, 2:20-54.) Stopa II's three linear rows of LEDs a surrounded by a conical reflector. (Ex.1045, 3:50-65.) Stopa II's reflector (blue) surrounding one of the row of LEDs (red) assembled on a printed circuit board (purple). (Ex.1045, 4:54-63.) The heat generated by the LEDs is dissipated to the "conductive base" (green). (Ex.1045, 4:64-5:46.) Stopa II even teaches a applying a metalized reflective coating (e.g., aluminum sheet) to the reflector surface. (Ex.1045, 3:52-64.)

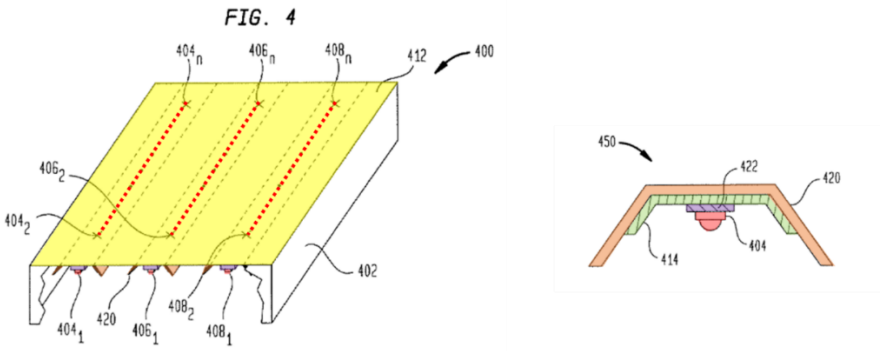


Ex.1045, Figs. 3 and 7

C. Medendorp

Medendorp qualifies as prior art under 35 U.S.C. § 102 and discloses an LED assembly that can be used to retrofit a pre-existing fluorescent light fixture. (Ex.1022, ¶¶0010, 0024, 0031, Fig. 5.) As shown below, "a sheet of anisotropic

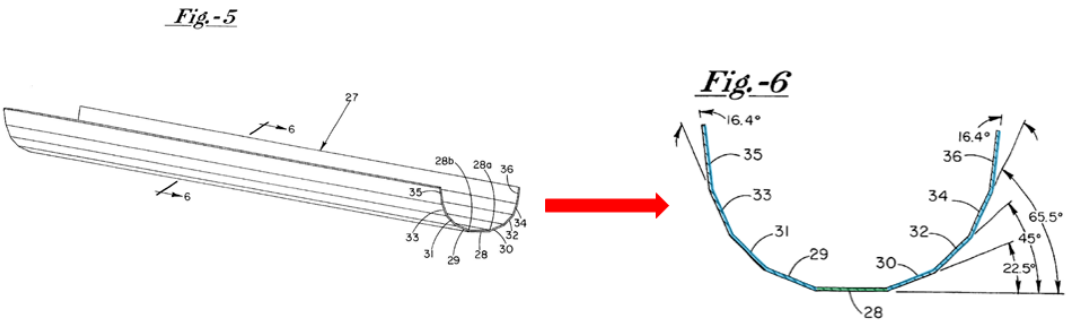
heat spreading material 414" (green) is applied to the fluorescent fixture's reflector (orange). (Ex.1022, ¶0024.) A linear row of LEDs (red) is assembled on a printed circuit board ("PCB") (purple) and then is assembled onto the "heat spreading material." Medendorp discloses "techniques for more efficiently transferring heat away from LEDs to the surrounding metal or other materials of a mounting fixture, ***such as the reflective metal of a luminaire fixture***." (Ex.1022, ¶0008.)



Ex.1022, Figs. 4 & 5

D. Baar

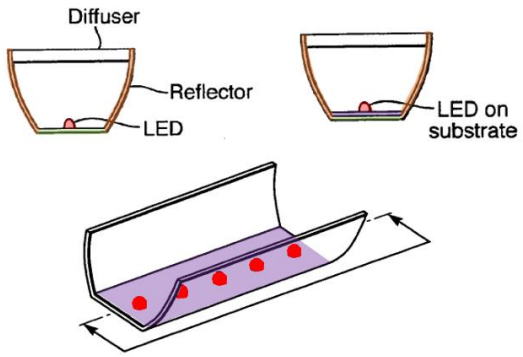
Baar issued qualifies as prior art under 35 U.S.C. § 102 and discloses a fluorescent fixture for use in sports arenas, warehouses, supermarkets, or large areas. (Ex.1037, 1:14-26.) Barr's reflector, shown below, includes multi-faceted sidewalls (blue) with a bottom panel 28 interconnected to a plurality of reflective panels, e.g., panels "29"-"35" and "30"-"36." (Ex.1037, 3:47-4:19.) This design provides uniform light distribution that reduces shadows. (Ex.1037, 4:30-49.)



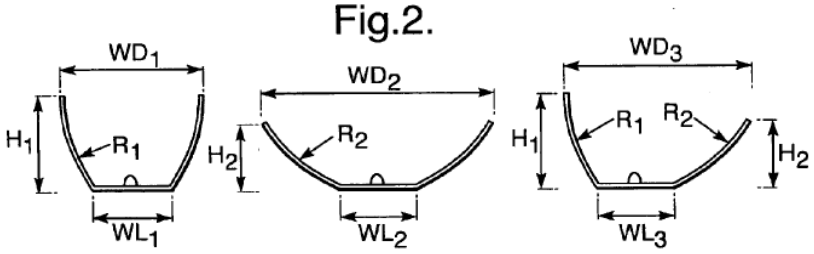
Ex.1037, Figs. 5 and 6

E. Brown

Brown qualifies as prior art under 35 U.S.C. § 102 and discloses an illumination device with high-power white LEDs. (Ex.1036, Brown at Abstract.) A linear LED array (red) is assembled on a substrate (purple). (Ex.1036, ¶0016.) The reflector (orange) can be "made out of a same sheet folded along two lines to create two reflector wings." (Ex.1036, ¶0026.) The reflector sheet may also be bent to have different widths, lengths, or heights. *Id.* at ¶0027. Lastly, the reflector can be adjusted to provide a "focused beam of light" or light "spread … over a wide area." (Ex.1036, ¶0025.)



Ex.1036, Fig. 1



Ex.1036, Fig. 2

VI. Claim Construction — 37 C.F.R. § 42.104(B)(3)

In an IPR proceeding, the claims are construed "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. §42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). Except for one term, Petitioners apply the plain and ordinary meaning.

A. "at an angle"[6]

In district court Petitioner has contended the term - "an angle" - describes *two* side walls' extension and requires that both walls extend at the ***same*** angle. PO has argued the claims cover side walls extending at ***different*** angles and the W.D. Texas District Court has agreed construing the term as "plain and ordinary meaning." (Ex.1032.)

[6] The Unpatentability Grounds below are not affected by the construction of this term.

But the specification of the ’854 Patent only illustrates embodiments where the side walls extend from a base member at the same angle. (*see e.g.*, Ex.1001, Figs. 16, 17, 19, 25.) There is no embodiment nor any disclosure where the side walls extend from the lighting strip at *different* angles.

Other claim limitations re-enforce the plain meaning. Claim 1 specifies (1) the first side wall “extend[s] at an angle along an entire length of the lighting strip,” (2) the second side wall “extend[s] at an angle along an entire length of the lighting strip,” and (3) “the first and second multi-faceted side walls extend away from the lighting strip *at an angle*.” (Ex.1001, Claim 1.) The third limitation—“*at an angle*”—has meaning only if it modifies both side walls (as the grammar plainly requires) and thus requires the same angle. *Innova/Pure Water, Inc. v. Safari Water Filtration Sys.*, 381 F.3d 1111, 1119 (Fed. Cir. 2004) (“While not an absolute rule, all claim terms are presumed to have meaning in a claim.”) Petitioner therefore contends the term “at an angle” should be construed to mean “at a same angle.”

VII. Unpatentability Grounds

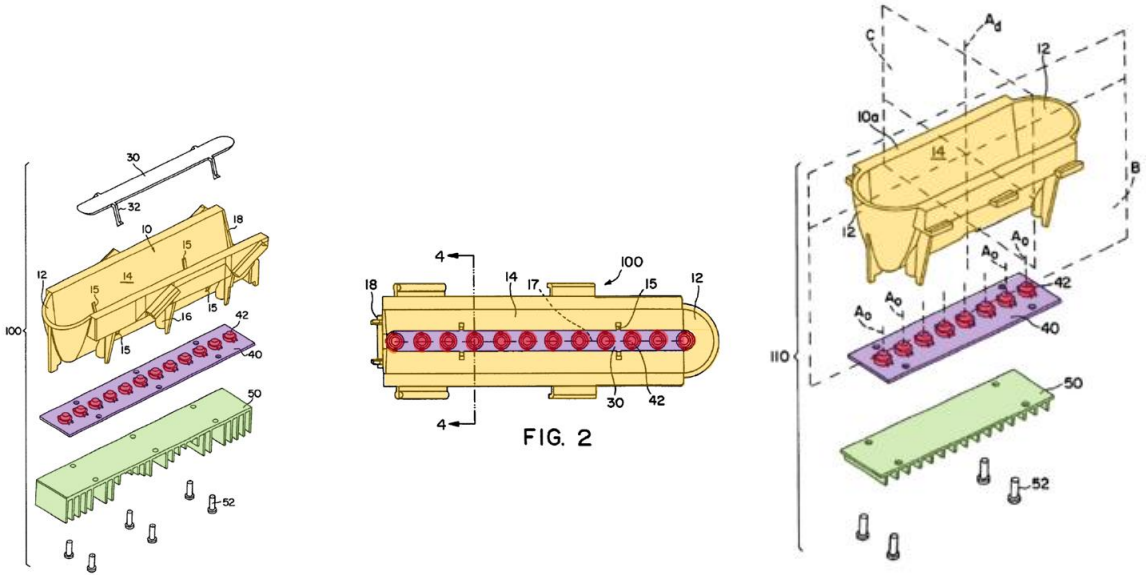
The references below render the claimed subject matter invalid under 35 U.S.C. § 103 and the Petitioners therefore have a reasonable likelihood of prevailing as to each of the following grounds of unpatentability. 35 U.S.C. § 314(a); 37 C.F.R. § 42.104(b)(4).

A. Ground 1 – Stopa, Stopa II, and the knowledge of a POSITA

1. Claim 1

… ***[1.0] A light emitting diode (LED) lighting arrangement for a lighting fixture, comprising:***

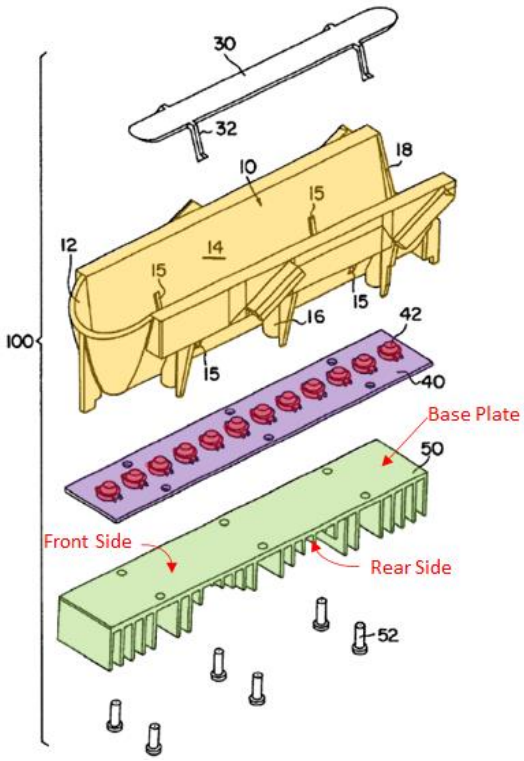
Stopa discloses an LED light assembly (*lighting fixture*) that includes a reflector (orange) having: (1) parabolic side-walls; (2) a linear row of LEDs (red) on a printed circuit board (purple); and (3) a heat sink (green). (Ex.1038, 4:59-65; Abstract.) As shown Stopa's reflector has an open slot to receive the linear row of high-output LEDs (*i.e.*, *LED lighting arrangement*) used for illumination. (Ex.1038, 5:5-10.) Stopa's reflector may have one end open for receiving and attaching additional LED assemblies. (Ex.1038, 5:20-28.) Or the reflector may be closed on both ends as shown by Figure 7 below. (Ex.1038, 6:24-39; Ex.1003, ¶¶110-112.)



Ex.1038, Figs. 1, 2 and 7

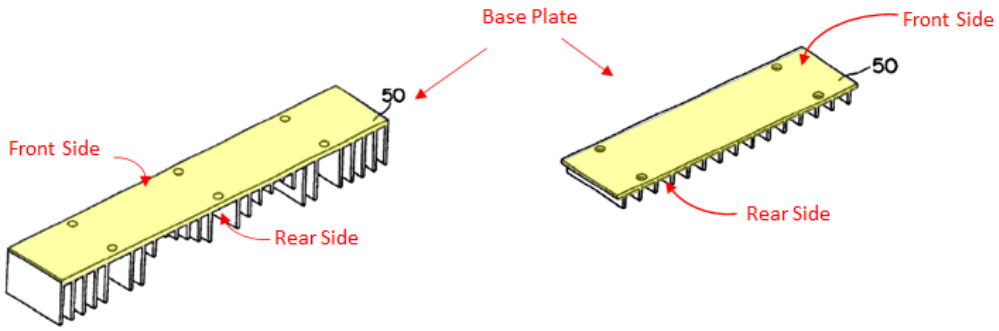
… ***[1.1] a base plate;***

The ’854 Patent states the base plate can be made of ***any suitable material*** (e.g., aluminum) that radiates and transfers thermal energy. (Ex.1001, 6:34-40.) Stopa discloses a heat sink (green) that includes a flat mounting surface (*base plate*) having a front side and rear side.



Ex.1038, Figs. 1 and 4

Stopa's heat sink includes a flat mounting surface (below, yellow) or *base plate* upon which the PC board (with LEDs) is mounted. (Ex.1038, Stopa at 4:59-65; 5:56-6:10, 8:45-50.) The rear side of the heat sink's mounting surface includes conventional fins that allow for the heat generated by the LEDs to be dissipated to the ambient environment. (Ex.1003, ¶¶113-115.) Stopa even states any "heat absorption and transfer mechanisms" may be used to "[c]onduct[] heat away from the high output LEDs." (Ex.1038, 6:3-7.) Stopa's heat sink (or other mechanisms known to a POSITA) satisfy the claimed *base plate*.

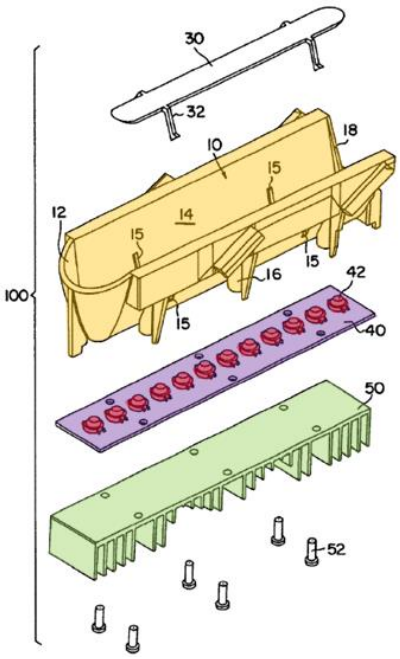


Ex.1038, Figs 1 and 7 (showing just heat sink)

… ***[1.2] a lighting strip coupled to the base plate, the lighting strip comprising a plurality of light emitting diodes (LEDs) arranged along a substantially planar surface of the lighting strip;***

Stopa illustrates and discloses a linear row of high-output LEDs (red) that are arranged on the top flat (i.e., planar) surface of a printed circuit board or "PCB" (purple) – *i.e.*, *lighting strip*.[7] (Ex.1038, 3:24-26; 6:11-17.) Stopa states the "PC board 40 is sandwiched or tightly ***compressed between*** the rear end of the reflector 10 and ***a conventional finned heat sink 50***." (Ex.1038, 5:56-58.) Stopa's *lighting strip* is coupled to the front side of the *base plate* (green). (Ex.1003, ¶¶116-118.)

[7] "Each lighting strip 9 … may be constructed from any suitable material for mounting LEDs and associated circuitry." (Ex.1001, 6:30-33.)



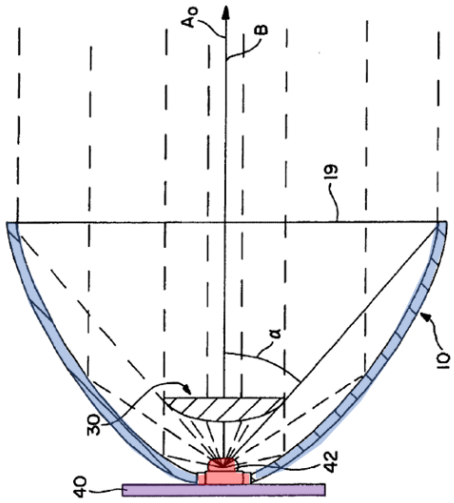
Ex.1038, Figs. 1 and 4

… ***[1.3] at least one reflector sheet comprising***

The ’854 Patent discloses a *reflector sheet* can be “any highly-reflective material … used to construct the reflector assembly.” (Ex.1001, 18:43-46.) A *reflective sheet* is therefore understood as any surface constructed from a highly reflective material, and thus, reflects light. (Ex.1003, ¶119.)

Stopa discloses a single parabolic reflector that includes two side walls (blue) whose shapes may be: (1) narrow, tall and steep; or (2) shallow and wide. (Ex.1038, 7:54-57.) Stopa states the parabolic shape is used to “define the reflecting surface.” *Id*. Stopa’s inner wall reflecting surface (as shown below)

redirects (i.e., reflects) the light output from the LEDs.[8] (Ex.1038, 7:54-67; 6:18-21; Claim 12.) The inner reflecting surface of Stopa's walls would be understood as being constructed as a highly reflective material and would be a *reflector sheet*. (Ex.1003, ¶¶120-121.)

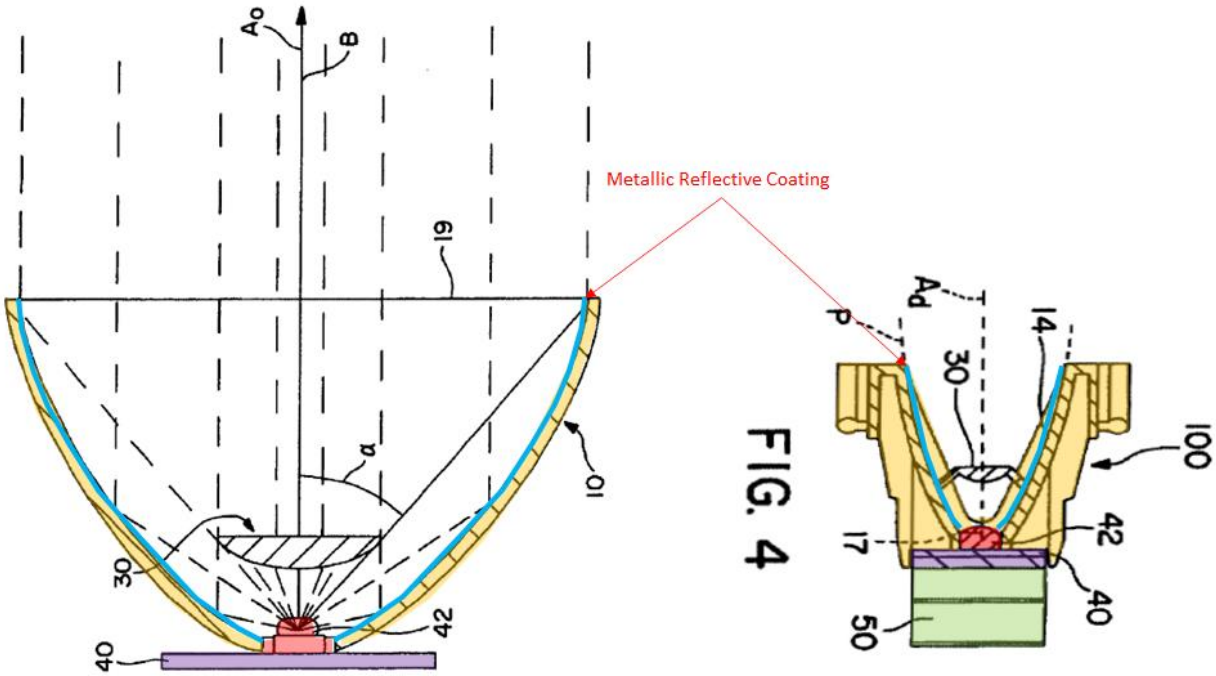


Ex.1038, Fig. 8

Alternatively, Stopa discloses and incorporates by reference U.S. Pat. No. 6,318,886 ("Stopa II," Ex.1045) which is a co-related patent describing another variation of a high-flux LED assembly surrounded by a reflector. (Ex.1038, Stopa at 2:20-24.) Stopa II also discloses a metallic reflective coating may be applied onto the molded plastic reflector. Stopa II states the reflective metallic coating may be a "film of aluminum applied by vacuum deposition." (Ex.1045, Stopa II at 3:50-

[8] Stopa states "parabolic section 14" or inner surface "redirects 'wide angle' light from LEDs." (Ex.1038, 6:33-39.)

63.) Once applied, a POSITA would consider the metallic reflective coating (shown below in blue) to be a metallic *reflector sheet*. (Ex.1003, ¶¶122-125.)



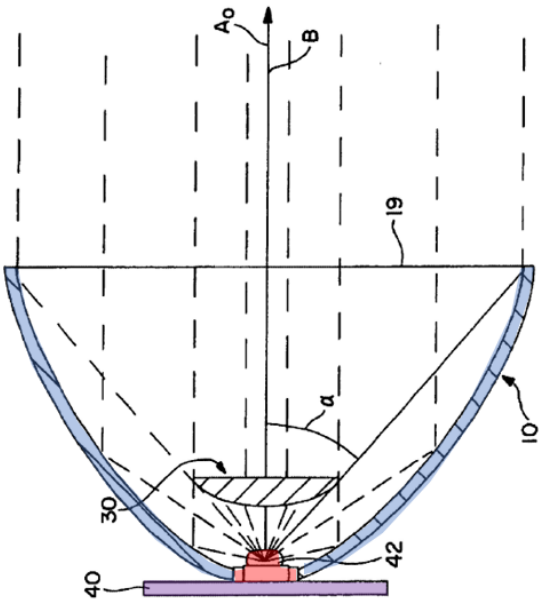
Ex.1038, Stopa, Figs 8 and 4

… ***[1.4a] a first multi-faceted side wall of the at least one reflector sheet extending along the lighting arrangement along an entire length of the lighting strip with a first edge adjacent a first side of the lighting strip and extending at an angle along an entire length of the lighting strip; and***

… ***[1.4b] a second multi-faceted side wall of the at least one reflector sheet extending along the lighting arrangement along an entire length of the lighting strip, the second side wall having a first edge adjacent a second, opposite side of the lighting strip at an angle that extends along an entire length of the lighting strip,***

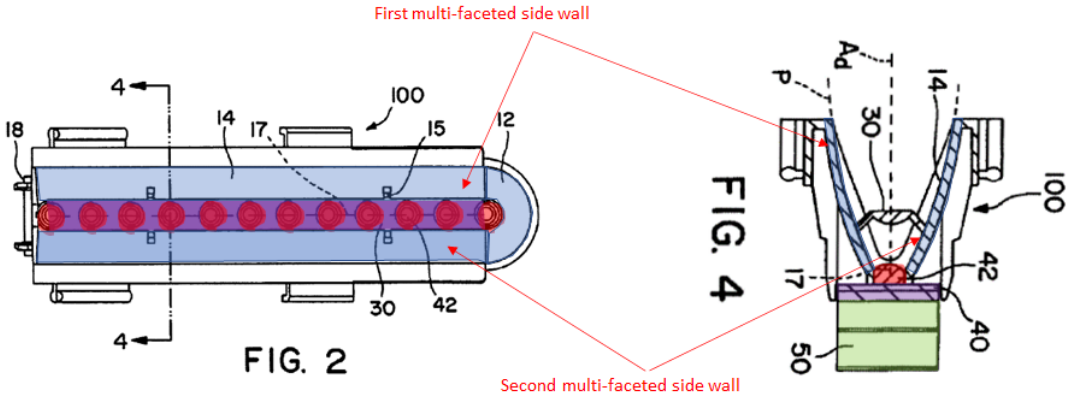
As stated above, the ’854 Patent contemplates a “multi-faceted reflector” can

include reflectors having "a parabolic shape." (Ex.1001, 17:41-54.) Stopa discloses "a parabolic reflector." (Ex.1038, 7:54-67, 8:10-11; Abstract.) Accordingly, Stopa's parabolic side walls (highlighted in blue) satisfy the recited a *first* and *second multi-faceted side wall*. (Ex.1003, ¶¶126-128.)



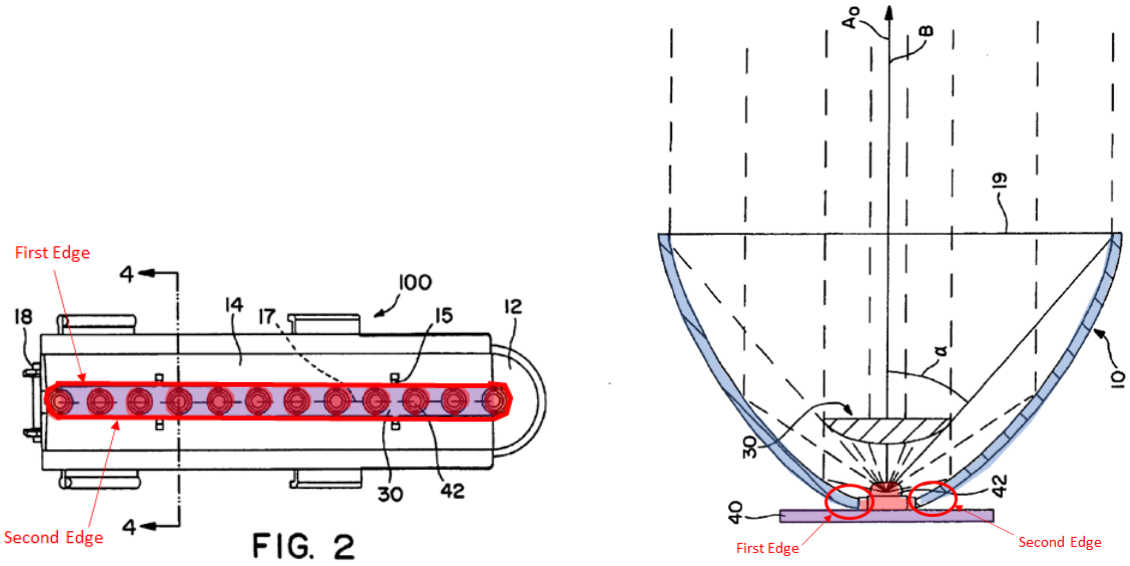
Ex.1038, Fig 4

Again, Stopa discloses LEDs "arranged in a linear array" (*lighting arrangement*) on the PC board (*lighting strip*). (Ex.1038, 4:59-65.) Stopa's *first/second multi-faceted side walls* extend the entire length of the *lighting arrangement* and *lighting strip*. (Ex.1003, ¶130.)



Ex.1038, Figs. 2 and 4

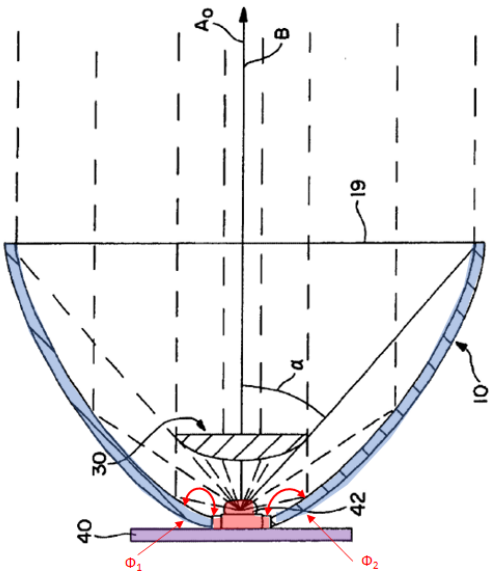
Stopa's side walls also include a *first edge* adjacent the *first side wall* and a *second edge* adjacent the *second side wall*. These edges are emphasized by Stopa's design which includes an "opening" in the reflector for receiving the LEDs. (Ex.1038, 5:5-10.) Stopa's *first edge* and *second edge* extend the entire length of the *lighting strip*. (Ex.1003, ¶¶131-132.)



Ex.1038, Figs. 2 and 8

Lastly, Stopa's *first/second side walls* are symmetrical and therefore extend

from the reflector bottom at *an angle*, i.e., the same angle. *Id.*



Ex.1038, Fig. 8

… ***[1.5] wherein the first and second multi-faceted side walls extend away from the lighting strip at an angle and are configured to cause light produced by the plurality of light emitting diodes (LEDs) to be amplified and formed into a uniform beam,***

As shown above, Stopa's parabolic reflector discloses *first and second multi-faceted side walls* (blue) extending away from the light strip at an angle (Φ_1 and Φ_2). Stopa's parabolic reflector is shaped to "integrate[] the light output of a plurality of point source LEDs ***into a substantially uniform light pattern***." (Ex.1038, 3:66-4:2.)[9] Stopa discloses the parabolic reflector can organize the light

[9] The '854 Patent states that a "uniform beam" may be a focused beam (e.g., spotlight) or a diffused beam (office light/streetlamp). (Ex.1001, 5:61-6:1.)

output of the LEDs "into a wide angle beam and may be efficiently focused or directed in accordance with the needs of the lighting application." (Ex.1038, 6:25-39.) Stopa's parabolic side walls (i.e., *multi-faceted side walls*) direct the light as a *uniform beam*. (Ex.1003, ¶¶133-135.)

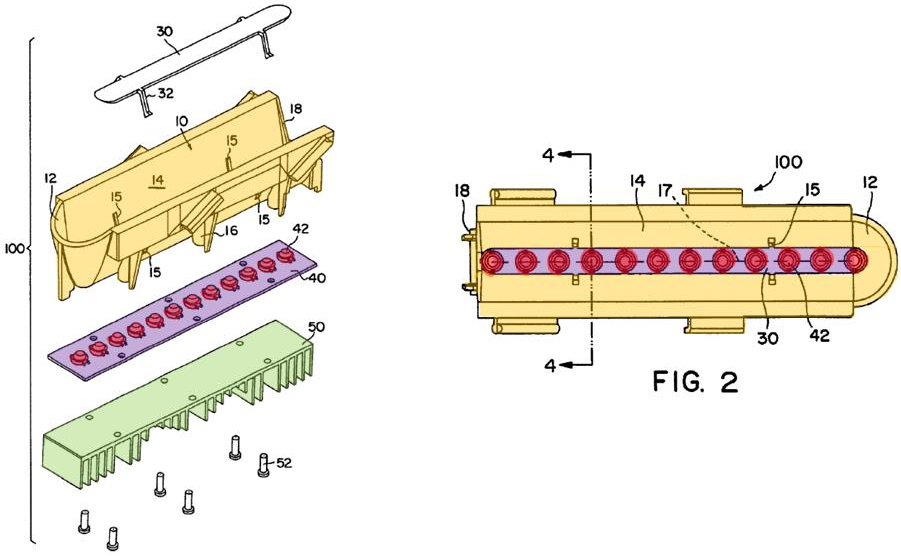
Claim limitation [1.5] also recites the side walls "are configured to cause light produced by the plurality of light emitting diodes (LEDs) to be amplified." The '854 Patent states the "angles creates facets in side walls 303 of reflector 300 which amplify the light provided by LEDs 11 or LEDs 111." (Ex.1001, 19:4-12; 19:13-34; 6:1-7.) A POSITA understands that it is not physically possible for a reflector to "amplify" light. (Ex.1003, ¶¶136-138.) A POSITA would understand a reflector can only collect the photons emitted by the LEDs (i.e., the light) and focus these photons so that more luminous flux is directed onto a specific area of a surface than would be the case if the LEDs radiated that surface directly without a reflector. *Id*. A POSITA understands that to amplify light, the reflector would have to reflect more energy (i.e., energy from the LED) than it receives which is simply not possible. *Id.*

A POSITA would understand the plain and ordinary meaning of the term amplification to mean the more facets (or angles) created in the sidewall provide a more "focused" light beam. (Ex.1003, ¶139.) Stopa discloses focusing the light produced by the LEDs. Stopa even describes a reflector design where "the light

output of a plurality of point light source LEDs ***is effectively integrated and amplified*** into a continuous area or band of light." (Ex.1038, 7:14-16.) Stopa discloses that the *first/second side walls* are *multi-faceted* and extend *from the lighting strip at an angle* (either the same or different angles) to increase the focused LED output intensity (*amplify*) of the light beam redirected by the reflections in order to produce more light on a specific surface area than would be produced by the LEDs without the reflector. (Ex.1003, ¶¶140-142.)

> … ***[1.6] and wherein the coupling between the lighting strips and the base plate provides heat transfer between the lighting strips and the base plate such that heat produced by the plurality of LEDs comprised in the lighting strip is conducted to the base plate for transfer to the ambient environment.***

Stopa discloses a *lighting strip* (purple) coupled to the flat portion of a heat sink – i.e., *base plate* (green). (Ex.1038, 4:59-65.) Once assembled, a "tightly compressed relationship enhances thermal transfer between the PC board 40 and the heat sink 50. (Ex.1038, 5:61-63, 6:3-10, 8:45-50.) Heat dissipation may be enhanced using: (1) a metallic copper cladding applied to the PC board; or (2) a conductive adhesive applied between the PC board and the *base plate*. (Ex.1038, 5:56-6:10; 8:51-54.)



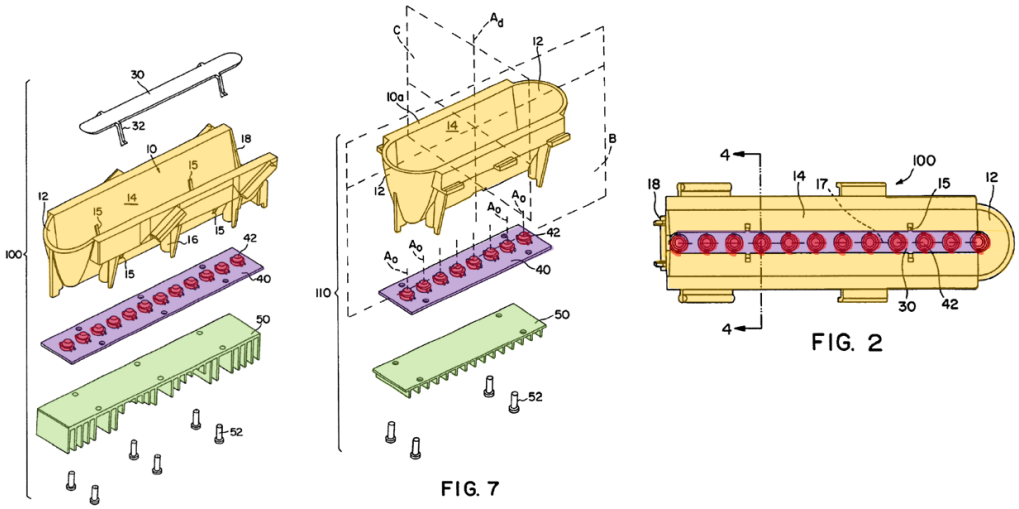
Ex.1038, Figs. 1 and 2

A POSITA would understand the heat generated by the LEDs would be received by the heat sink (green above) for removal to an ambient environment. A POSITA would understand heat transfer using the disclosed heat sink is necessary or the LED's operating life would be diminished. (Ex.1003, ¶¶143-145.)

2. Claim 2

… ***[2] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 1, wherein the light emitting diodes (LEDs) are arranged in a linear row along the length of the lighting strip.***

Stopa discloses a "linear array of LEDs mounted to a PC board." (Ex.1038, 6:11-17.) The LEDs (red) are arranged in a linear row along the *lighting strip* (purple). (Ex.1003, ¶¶146-147.)



Ex.1038, Stopa, Figs. 1, 7 and 2

3. Claim 3

… ***[3] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 1, wherein the first and second multi-faceted side walls extend away from a base member defining a plurality of openings receiving at least a light emitting portion of the plurality of light emitting diodes (LEDs), respectively.***

The '854 Patent explains a "reflector assembly includ[ing] a base member 184 and a pair of desirably integral side walls 185 extend from opposite sides of the base member 184 at an angle."[10] (Ex.1001, 17:31-53.)

[10] In district court, Patent Owner has asserted a bottom portion of a reflector satisfies the recited "base member." (Ex.1035 at 21.)

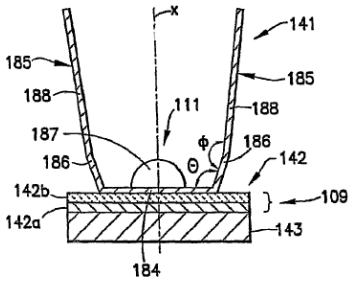


FIG.16

Ex.1001, Fig. 16

Stopa includes a *base member* to support both the first and second reflector side walls. Without such a base portion, Stopa's side walls would not be assembled as one reflector cup. Instead, the walls would necessarily be two separate and distinct pieces. Specifically, Figure 3 is a "right end view of the LED light assembly of FIG. 2." (Ex. 1038, Stopa at 4:20-21.) Figure 5 is "a rear view of the LED light assembly of FIG. 2." (Ex. 1038, Stopa at 4:25-26.) As shown, Stopa includes a *base member* at the bottom that extends the length of the entire reflector. This base member defines the opening where the LEDs are inserted. (Ex.1003, ¶¶148-150.)

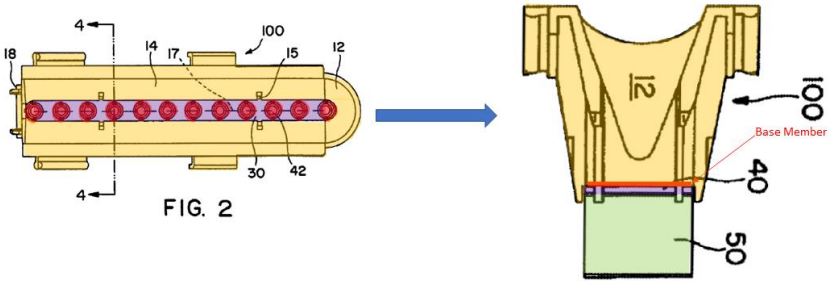


FIG. 2

Ex.1038, Figs. 2 and 3

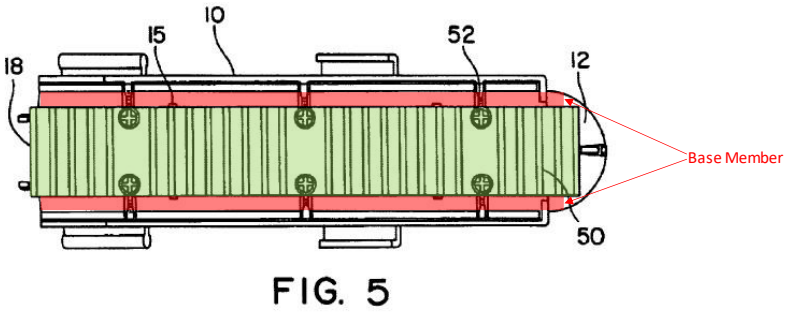
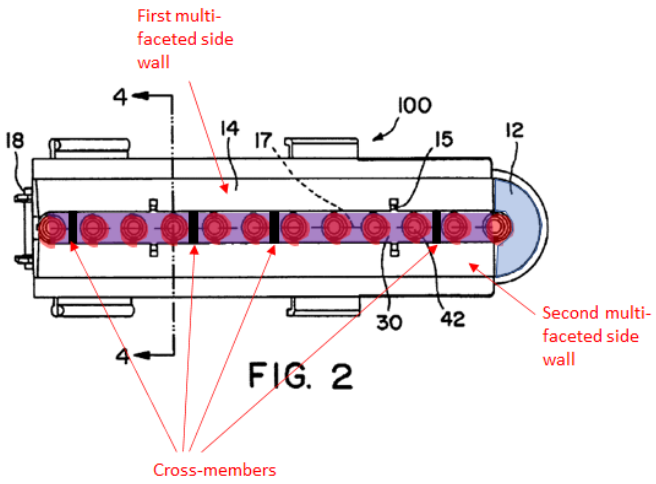


FIG. 5

Ex.1038

Stopa's *base member* defines "an open slot to receive … the array of … LEDs 42." (Ex.1038, 5:7-10.) While Stopa discloses just one open slot, it would have been obvious to a POSITA that Stopa's opening could be divided into, or otherwise designed to include, a plurality of openings. (Ex.1003, ¶151.) For instance, Stopa discloses the spacing and alignment of the LEDs on the PC board. (Ex.1038, 6:11-16.) A POSITA would have therefore known if additional strength and rigidity was needed, cross members (illustrated below in black) could be added in the spacing between each LED. (Ex.1003, ¶¶152-153.) A POSITA would have understood that adding such cross-members would have been nothing more than applying a known technique of adding increased strength to a reflector through the use of cross-members. The cross members would therefore provide a *plurality of openings* for receiving Stopa's linear array of LEDs. *Id*.



Ex.1038, Fig. 2

4. Claim 4

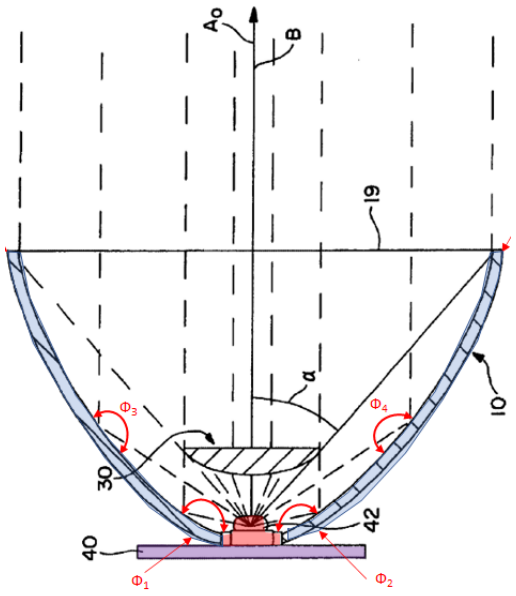
… ***[4] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 3, wherein the first and second multi-faceted side walls are formed integral with the base member.***

As I explained in claim 3, a POSITA would have understood Stopa includes a base portion to support both the first and second reflector walls. Without such a base portion, the two walls would not be assembled as one reflector cup. This *base portion* would necessarily be integrally formed with both *side walls.* (Ex.1003, ¶¶154-155.) Alternatively, a POSITA would have found it obvious to add cross-member supports to Stopa's reflector – which would then constitute the recited base member. Such cross-member supports would likewise be formed integral with the side walls. (Ex.1003, ¶¶156-157.)

5. Claim 5

… ***[5] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 3, wherein the first and second multi-faceted side walls comprise multi-angle side walls.***

As shown below, the light being emitted from the LED is reflected at different angles on the reflector due to its parabolic shape – i.e., multi-faceted side wall design with varying angles. Stopa's parabolic reflector has a *first/second sidewall* having a first portion defining a respective first angle (Φ_1, Φ_3) and a respective second angle (Φ_2, Φ_4). (Ex.1003, ¶¶158-160.)



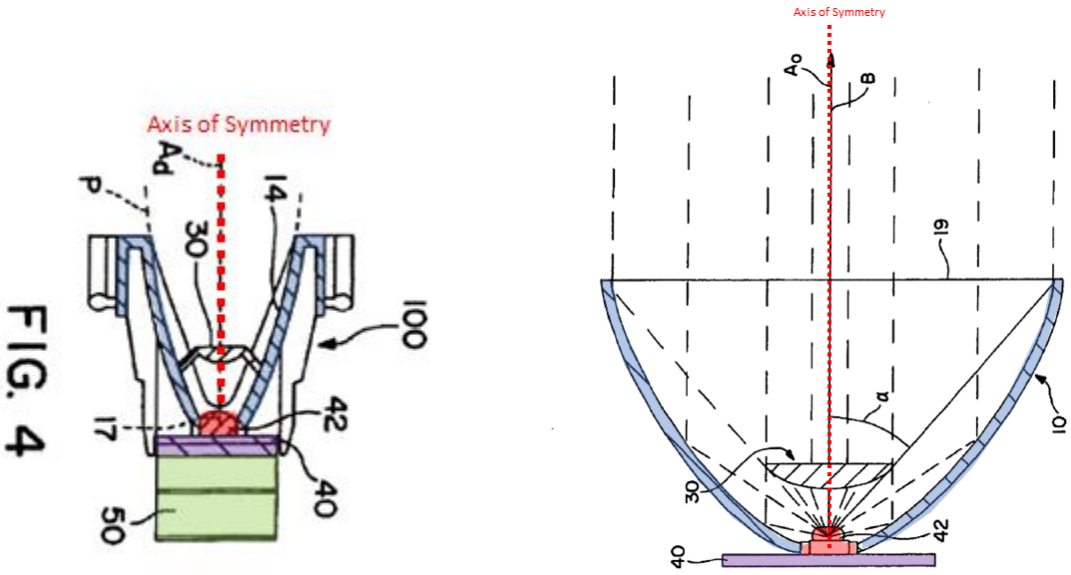
Ex.1038, Fig. 8

6. Claim 6

… ***[6] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 1, wherein the first and second multi-faceted side walls extend away from a base member and are***

symmetrical about an axis of symmetry that runs through a center of the base member.

Stopa discloses a line "A_d bisects parabola P through the focus and vertex of the parabola P." (Ex.1038, 6:23-24.) Stopa states the "reflecting surface flaring from an inner vertex to an open outer end, ***said reflecting surface being symmetrical to a plane through said vertex***." (Ex.1038, 8:65-9:3.) As shown below, Stopa's side walls extend away from the base member (*see* Claim 3) and are symmetrical to a plane extending through the vertex. (Ex.1003, ¶¶161-163.)



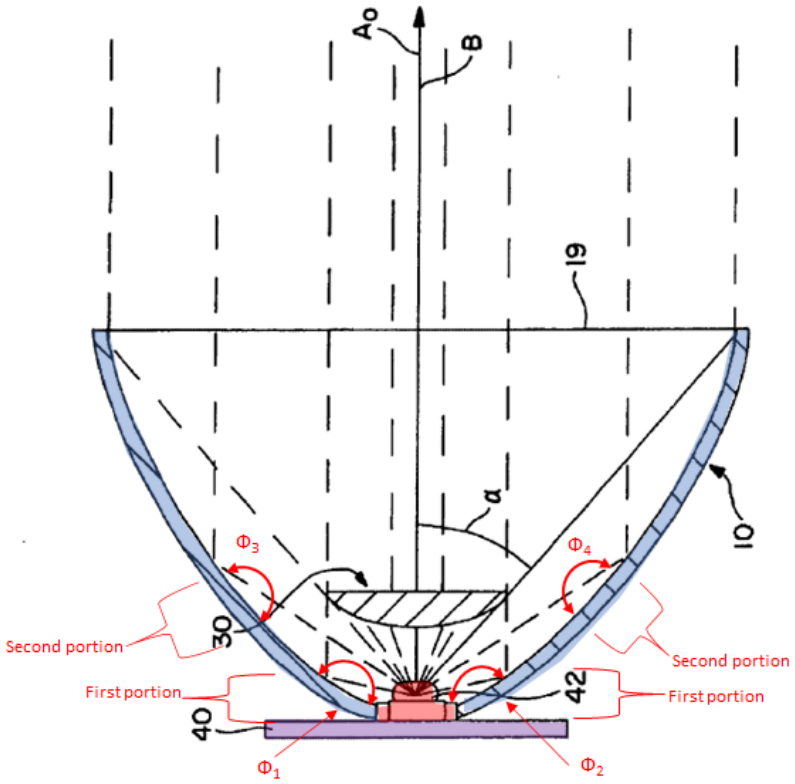
Ex.1038, Figs. 4 and 8

7. Claim 7

… ***[7] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 6, wherein the first and second multi-faceted side walls each comprise a first portion defining a first***

angle with the base member and a second portion defining a second angle with the first portion.

Stopa's parabolic reflector includes a *first/second multi-faceted sidewalls* having first portions defining first angles (Φ_1, Φ_2) with the *base member* (*see* claim 3). (Ex.1003, ¶¶165-166.)



Ex.1038, Fig. 8

8. Claim 8

… ***[8] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 7, wherein the first angle and second angle are different angles.***

As shown above regarding claim 7, Stopa's *side walls* have *first/second*

portions that define *first/second angles*, e.g., respectively angles Φ_1/Φ_3 and Φ_2/Φ_4. Given the parabolic shape, angles Φ_1/Φ_3 and Φ_2/Φ_4 are different. (Ex.1003, ¶¶167-169.)

9. Claim 9

… ***[9] The light emitting diode (LED) lighting arrangement for a lighting fixture as claimed in claim 1, wherein the first and second multi-faceted side walls comprise multi-angle side walls.***

As discussed by claims 7 and 8, Stopa's parabolically shaped reflector includes *first/second side walls* that are multi-angled. (Ex.1003, ¶¶170-172.)

10. Claim 10

… ***[10] The LED lighting arrangement of claim 1, wherein the first multi-faceted side wall adjacent the lighting strip extends along the entire length of the lighting strip from a position level with a bottom portion of a light emitting portion of each of the LEDs, and wherein the second multi-faceted side wall adjacent the lighting strip extends along the entire length of the lighting strip on a side opposite the first multi-faceted side wall from a position level with a bottom portion of a light emitting portion of each of the LEDs.***

Stopa discloses a linear row of high-output LEDs (red) on the *lighting strip* (purple). (Ex.1038, 6:11-17; *see also* 3:24-26, 4:59-65.)

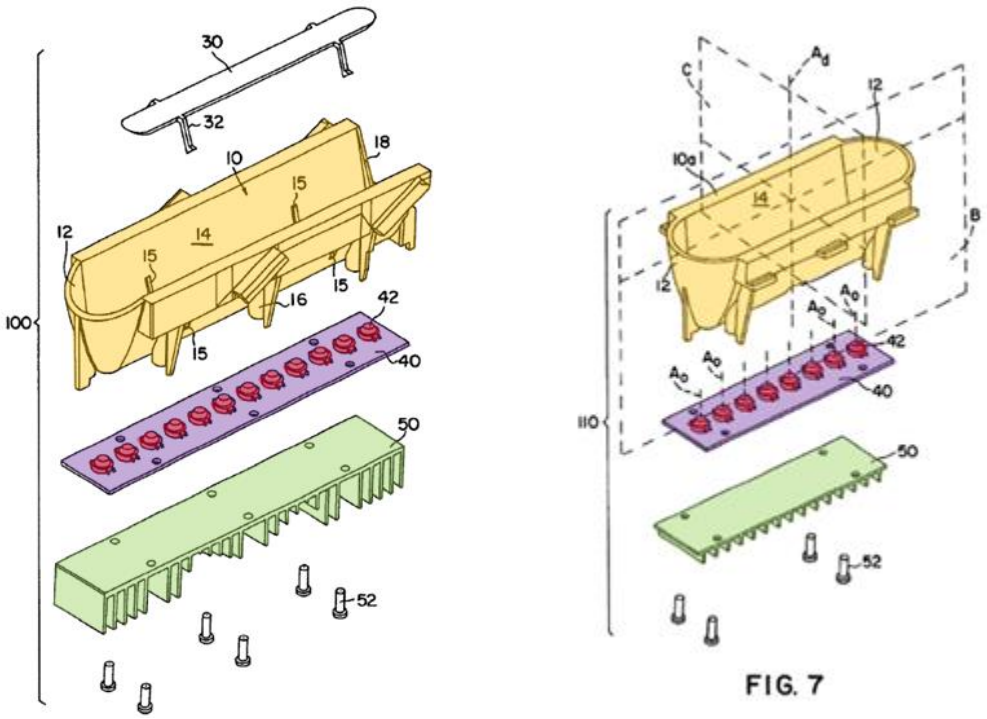
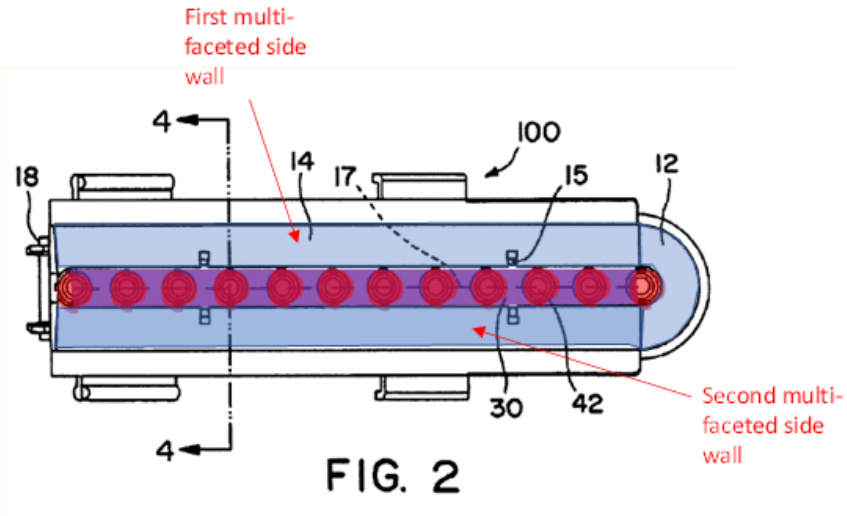


FIG. 7

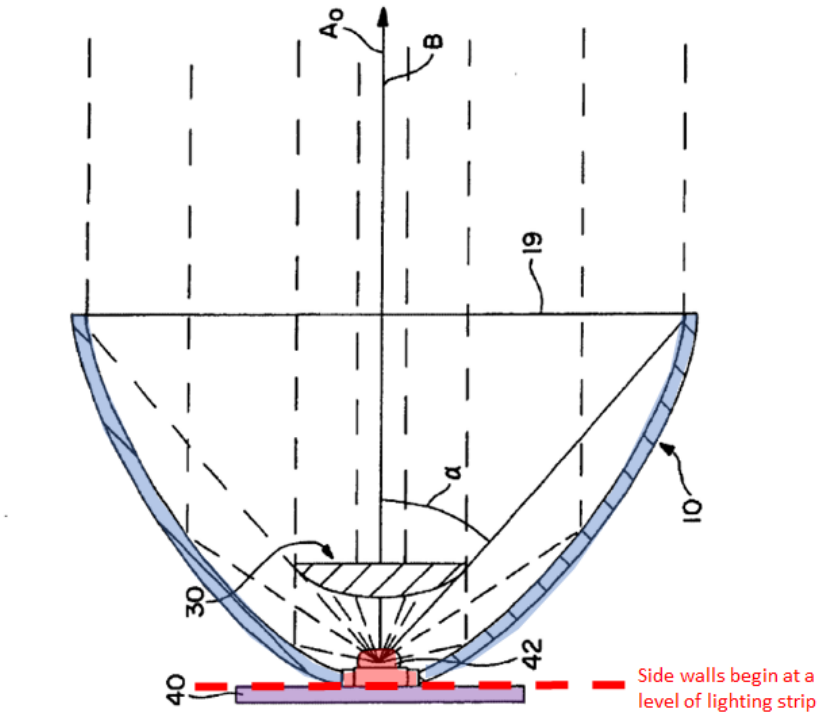
Ex.1038, Figs. 1 and 7

Stopa's reflector includes an "open slot to receive … the … LEDs" which extends the entire length of the *lighting strip* (purple) and along the *first* and *second multi-faceted side walls* (blue). (Ex.1038, 5:5-10.) The *side walls* are on opposites sides and each are adjacent (i.e., next to) one side of the *lighting strip*. (Ex.1003, ¶¶173-174.)



Ex.1038, Fig. 2

Stopa's *side walls* also begin from a position level with a bottom portion of a light emitting portion of each of the LEDs. (Ex.1003, ¶175.)

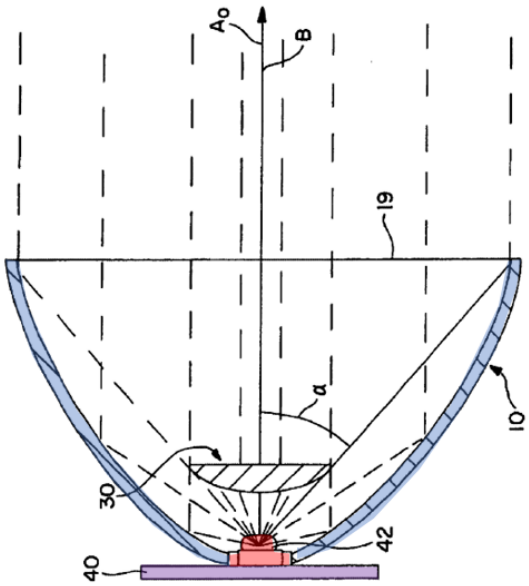


Ex.1038, Fig. 8

11. Claim 11

… ***[11] The LED lighting arrangement of claim 1, wherein the first multi-faceted side wall and the second multi-faceted side wall are separately coupled to the lighting arrangement.***

As shown below, the *first/second side walls* (blue) are separately coupled to the left and right side of the linear row of LEDs – i.e., *lighting arrangement*. (Ex.1038, 5:56-6:10; Ex.1003, ¶¶177-178.)



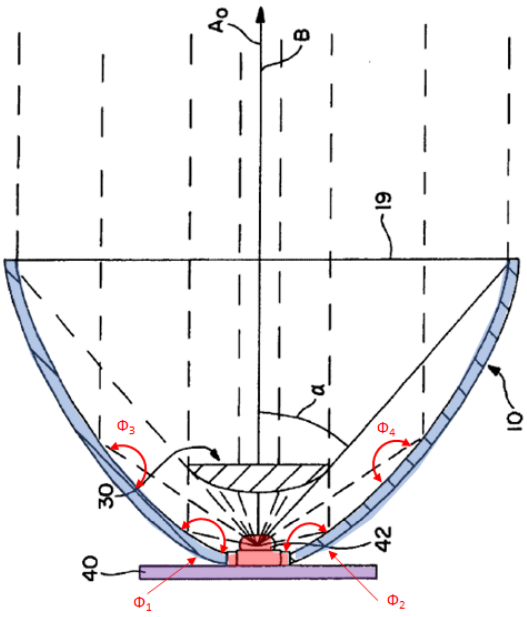
Ex.1038, Fig. 8

12. Claim 12

… ***[12] The LED lighting arrangement of claim 1, wherein the first multi-faceted side wall comprises a first reflector sheet bent to form first facets, and wherein the second multi-faceted side wall comprises a second reflector sheet bent to form second facets.***

The ’854 Patent states a “combination of these angles creates facets in [the]

side walls … thereby creating a multi-faceted side wall." (Ex.1001, 17:45-48.) As explained in limitations [1.4a]/[1.4b] and claim 7, Stopa's parabolic reflector includes *first/second multi-faceted sidewalls* having first portions respectively defining first angles (Φ_1, Φ_3) and second angles (Φ_2, Φ_4) which are *first/second facets*. (Ex.1003, ¶¶179-181.)



Ex.1038, Fig. 8

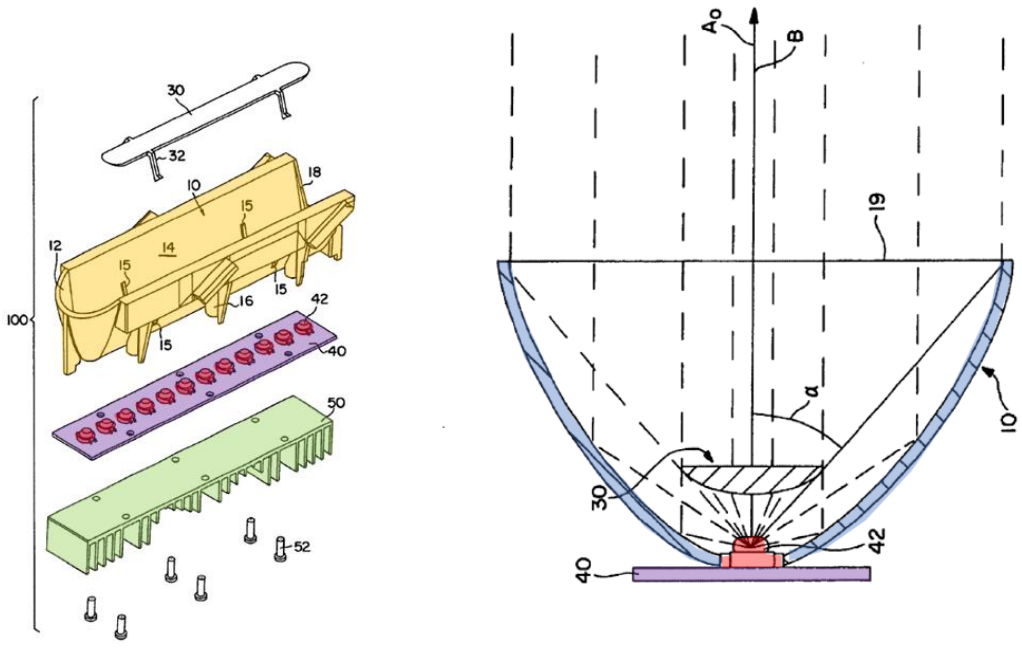
Alternatively, as described in limitation [1.3], a POSITA would have found it obvious to add the metallic coating (e.g., aluminum film) disclosed by Stopa II (Ex.1045). Once applied the metallic sheet takes the shape of the parabolic multi-faceted sidewall also defining multiple angles which are *first/second facets*. (Ex.1003, ¶¶182-184.) And whether the design is parabolic or includes multiple

flat facets is a design choice that would have been obvious to a POSITA. *Id.* ¶182.

13. Claim 13

… ***[13.0] The LED lighting arrangement of claim 1, wherein the first side wall and second side wall each are formed by a single reflector sheet.***

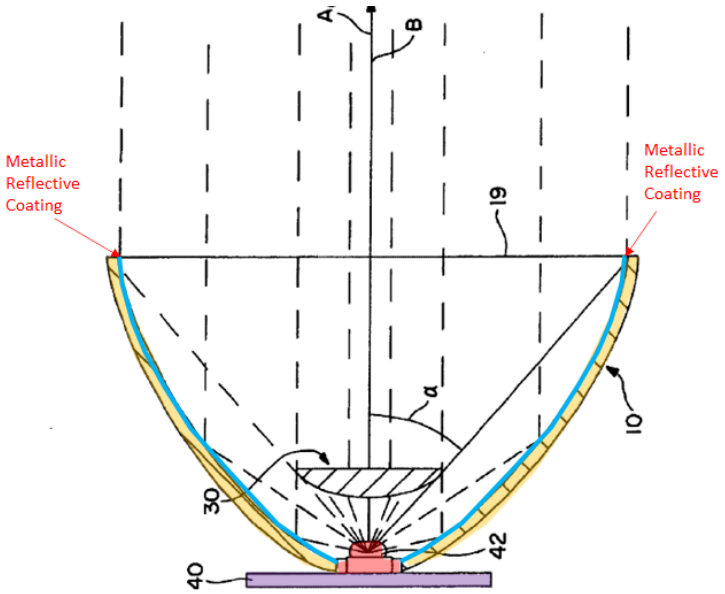
As stated in limitation [1.3] and claim 12, Stopa states the parabolic reflector shape "define[s] the reflecting surface." *Id*. This reflecting surface is the wall's inner surface which would be constructed of a highly reflective material to direct the light emitted by the LEDs. Stopa's reflector is a one-piece design (as shown by Figure 1) and the inner surface would therefore be a *single reflector sheet.* (Ex.1003, ¶185.)



Ex.1038, Figs. 1 and 8

As stated in limitation [1.3], it would have also been obvious to add the

metallic coating disclosed by Stopa II onto the inner surface of Stopa's parabolic reflector. The metallic coating would provide a reflector that is formed from a single reflector sheet of metal. (Ex.1003, ¶186.)

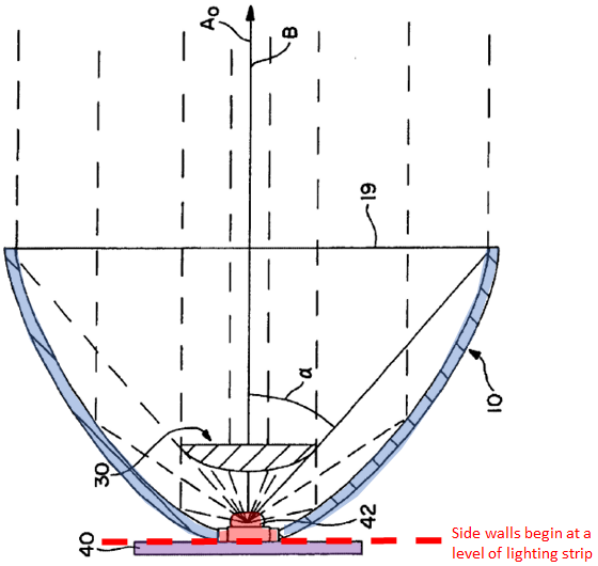


Ex.1038, Fig. 8

14. Claim 14

… ***[14] The LED lighting arrangement of claim 1, wherein the first and second multi-faceted side walls begin at a level of the lighting strip and extend away from the lighting strip.***

Stopa discloses the reflector includes "open slot to receive and align the array of high-output LED." (Ex.1038, Stopa at 5:5-10.) Stopa further discloses that the *first/second side walls* begin at the top of Stopa's *lighting strip* (purple) each extends upward and away from said lighting strip. (Ex.1003, ¶¶188-190.)



Ex.1038, Fig. 8

15. Claim 15

… ***[15.0] A light emitting diode (LED) lighting fixture, comprising:***

See claim [1.0].

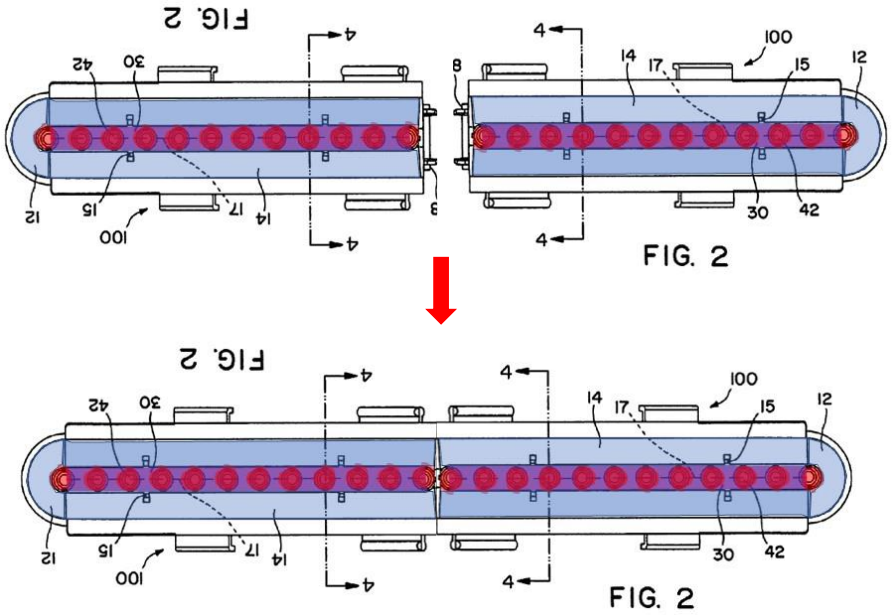
… ***[15.1] a base plate having a front side and a rear side;***

See claim [1.1].

… ***[15.2] a plurality of lighting strips mounted on the front side of the base plate, each of the lighting strips comprising a plurality of light emitting diodes (LEDs) arranged along a length of the lighting strip; and***

Stopa discloses the "open end" of one LED light assembly "may be aligned and fixed to the open end of additional LED light assemblies to form an extended length light assembly." (Ex.1038, 5:20-24.) Stopa therefore discloses coupling two

of the LED lighting units together to form one combined lighting unit. (Ex.1003, ¶¶193-194.)



Ex.1038, Fig. 2

A POSITA would have understood the LED lighting unit illustrated by Figure 2 could be combined to include at least two PC boards with LED arrays – *plurality of lighting strips* each having a *plurality of LEDs.* As discussed in [1.1], both PC boards would also be mounted to the front side of the heat sink (*base plate*). (Ex.1003, ¶194.)

Limitation [15.1] recites "a base plate" which means it could include one or

more base plates.[11] Stopa's combined LED light assembly would therefore include multiple heat sinks having a front surface (*base plate*) upon which each PC board is mounted. Regardless, a POSITA would have found it obvious to modify Stopa's heat sink to be one continuous heat sink that spans both *lighting strips*. Such a modification would have been simple substitution of two heat sinks for one combined heat sink that would provide the same heat dissipating properties. Also, a POSITA would have also known that one heat sink – as opposed to separate heat sinks – could provide improved overall heat dissipation properties than separate heat sinks and such a modification would have also been obvious to try. (Ex.1003, ¶¶195-196.)

… ***[15.3] driver circuitry and control circuitry electrically coupled to the plurality of light emitting diodes (LEDs) for providing power to the light emitting diodes (LEDs),***

Limitation 15.3 recites driver circuitry and control circuitry for providing power to the LEDs. Stopa necessarily includes circuitry to power and operate the LEDs. (Ex.1003, ¶197.) For instance, Stopa discusses commercially available Lumiled LEDs being used and that "drive currents through the LED" could be

[11] "As a general rule, the words 'a' or 'an' in a patent claim carry the meaning of 'one or more.'" *TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1303 (Fed.Cir.2008).

increased to provide "greater light output." (Ex.1038, 5:43-55.) A POSITA would have understood that to allow drive currents to be increased, there must be related *driver circuitry* to power the LEDs and *control circuitry* in the form of a microprocessor or digital circuitry that adjusts or provides increased or decreased drive currents to increase or decrease the light output. (Ex.1003, ¶¶198-199.)

> … ***[15.4] wherein each of the lighting strips includes at least one reflector sheet comprising:***
>
> … ***[15.5a] a first multi-faceted side wall of the at least one reflector sheet extending at an angle from a first side of the lighting strip along an entire length of the lighting strip, the first side wall comprising a sheet bent to form the angle,***
>
> … ***[15.5b] a second multi-faceted side wall of the at least one reflector sheet extending along the lighting arrangement adjacent a second, opposite side of the lighting strip along an entire length of the lighting strip, and***
>
> *See* [1.3], [1.4a], and [1.4b].
>
> … ***[15.6] wherein the first and second multi-faceted side walls extend away from the lighting strip at an angle and are configured to cause light produced by the plurality of light emitting diodes (LEDs) to be amplified and formed into a uniform beam, and***
>
> *See* [1.5].
>
> … ***[15.7] wherein contact between the lighting strips and the base plate provides heat transfer between the lighting strips and the base***

plate such that heat produced by the plurality of LEDs comprised in the lighting strip is conducted to the base plate for transfer to the ambient environment.

See [1.6].

16. Claim 18

… ***[18] The light emitting diode (LED) lighting fixture as claimed in claim 15, wherein each light emitting diode (LED) of each lighting strip is electrically connected in series, and each lighting strip is electrically connected to the driver circuitry in parallel.***

Stopa discloses or renders obvious *driver circuit* as discussed in [15.3]. A POSITA would have understood electrical circuits can only be connected in series or in parallel. A POSITA would have understood Stopa's linearly arranged row of LEDs would likely be connected in series as this (1) would be the most efficient way to run high power LEDs with a constant current LED driver, and (2) aids in providing the same amount of current to each LED. (Ex.1003, ¶¶204-205.) A POSITA would have understood series connected LEDs would provide the same light intensity. *Id*.

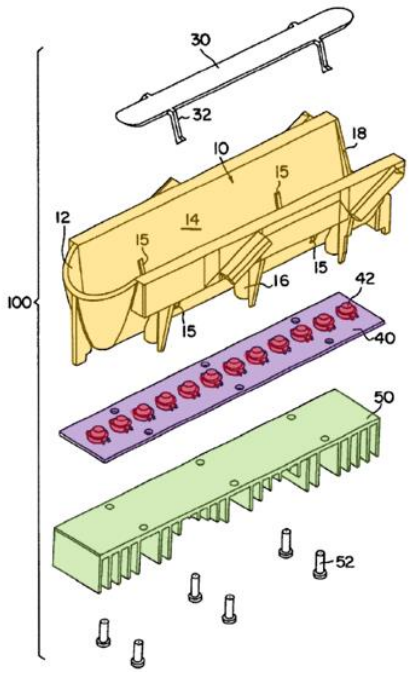
A POSITA would also understand the most efficient connection for driver circuitry is in parallel to the series-connected LEDs as this would only require a single positive/negative voltage connection to Stopa's PC board. A POSITA would not connect driver circuitry in series with each individual LED as this would be

inefficient and impractical. *Id*.

17. Claim 19

… ***[19] The light emitting diode (LED) lighting fixture as claimed in claim 15, wherein each plurality of lighting strips is individually removably mounted to the base plate, so as to permit individual replacement of each lighting strip irrespective of the other lighting strips.***

Stopa illustrates a PC board that is mounted to the heat sink's top surface using a series of "fasteners 42." (Ex.1038, 5:58-61.)



Ex.1038, Fig. 1

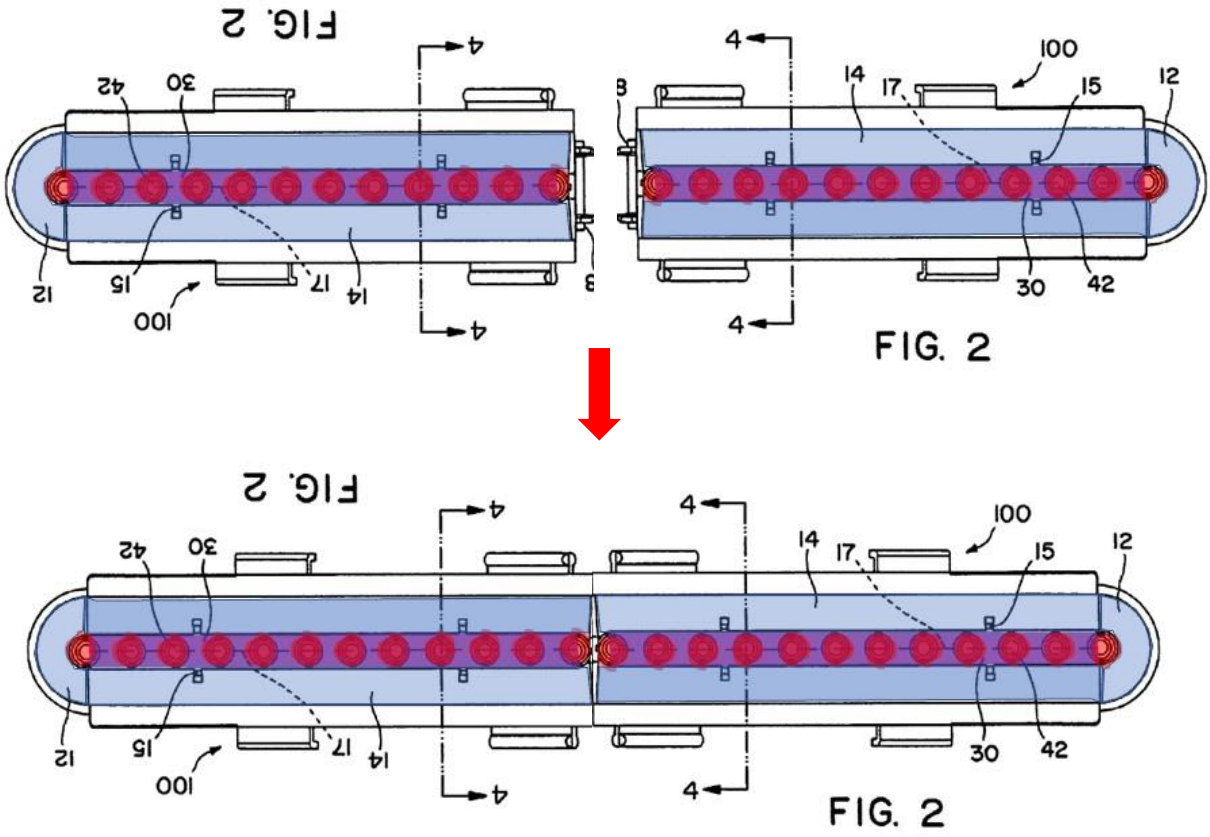
A POSITA would have recognized Stopa's design allows the *lighting strip* (purple) to be disassembled from the reflector cup and heat sink. If a single LED were to fail, or the PC board were to fail, it would have been obvious to a POSITA

that the LED light assembly could be disassembled *via* the screws and the PC board could be replaced. (Ex. 1003, ¶¶207-210.) A POSITA would have known even if multiple LED light assemblies are combined together (*see* limitation [15.2]) a POSITA would have still understood one PC board could be removed and replaced. *Id.*

18. Claim 20

… ***[20] The light emitting diode (LED) lighting fixture as claimed in claim 15, wherein the light emitting diodes (LEDs) in each of the lighting strips are arranged in a linear row along the length of the lighting strip.***

Stopa discloses a PC board with a linearly arranged row of LEDs – *see* [1.2] above. Stopa discloses connecting multiple lighting strips together in a row – *see* [15.2] above. When combined, the LEDs (red) would be arranged in a linear row the entire length of both PC boards (*lighting strips*). (Ex.1003, ¶¶211-212.)



Ex.1038, Fig. 2

B. Reasons or motivation to combine Stopa and Stopa II

It is known that "[i]ncorporation by reference provides a method for integrating material from various documents into a host document—a patent or printed publication in an anticipation determination—by citing such material in a manner that makes clear that the material is effectively part of the host document as if it were explicitly contained therein." *Material Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000).

Stopa explains as background that Stopa II "describes a high-flux LED assembly in which an array of LEDs are provided with a reflector surrounding each

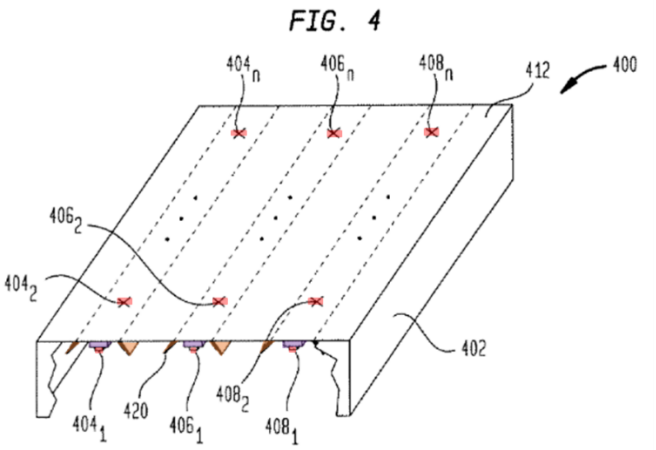
LED." (Ex.1038, Stopa at 2:21-24.) Stopa also states regarding Stopa II that "***the entire contents of which are hereby incorporated by reference*** into this specification." (Ex.1038, 2:20-22.) This plain language provides an express, teaching suggestion, or motivation for a POSITA to combine the teachings of Stopa and Stopa II. (Ex.1003, ¶¶213-215.) A POSITA would have also recognized Stopa explains in greater detail Stopa II's LED light assembly design and operation. (Ex.1038, 2:20-52.) To a POSITA, combining the two references would have been nothing more than applying the known techniques disclosed in Stopa II to improve the light intensity from the reflector assembly of Stopa. (Ex.1003, ¶214.)

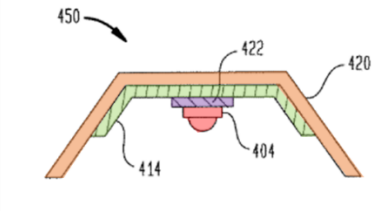
C. Ground 2 - Medendorp, Baar, and the knowledge of a POSITA

1. Claim 1

… ***Limitation [1.0]***

Medendorp discloses an "LED-based lighting fixtures intended to replace standard fluorescent lighting fixtures." (Ex.1022, Medendorp, ¶¶0001, 0008.) Medendorp discloses a linear array of LEDs (red) – *LED lighting arrangement* - may be used to retrofit the fixture's reflector assembly (orange). (Ex.1022, ¶0023; ¶¶0003-0004; Ex.1003, ¶¶216-220.)

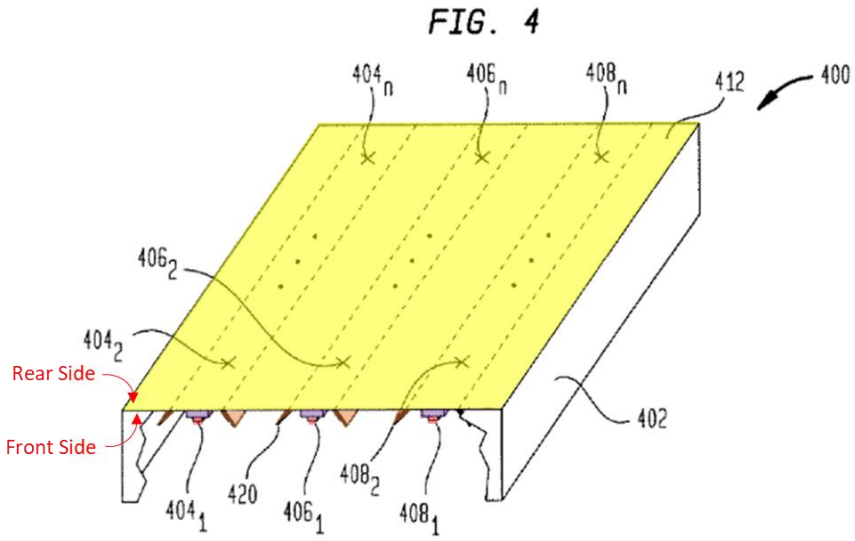




Ex.1022, Figs. 4 and 5

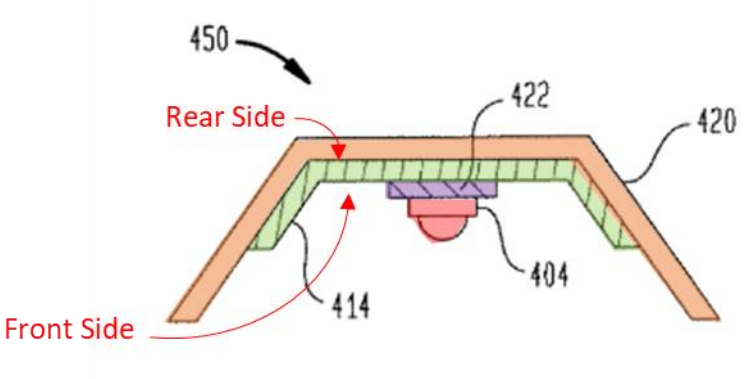
… ***Limitation [1.1]***

As shown below, Medendorp discloses a pre-existing fluorescent fixture 400 having a top surface (shaded yellow) that has been retrofitted with a linear row of LEDs. (Ex.1022, ¶¶003, 0023.) A POSITA would have understood the top surface of the fluorescent fixture satisfies the recited *base plate* which would include a front side and a rear side. (Ex.1003, ¶221.)



Ex.1022, Fig. 4

Alternatively, Medendorp discloses "a sheet of anisotropic heat spreading material 414" (below in green) that also satisfies the recited *base plate* and includes a front side and rear side. (Ex.1022, ¶0024; Ex.1003, ¶¶222-223.)

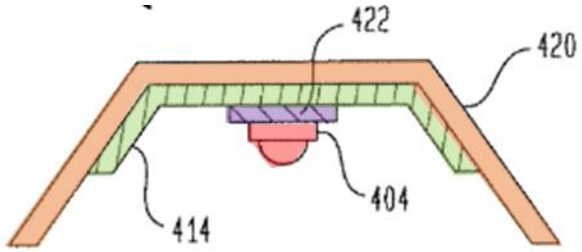


Ex.1022, Fig. 5

… ***Limitation [1.2]***

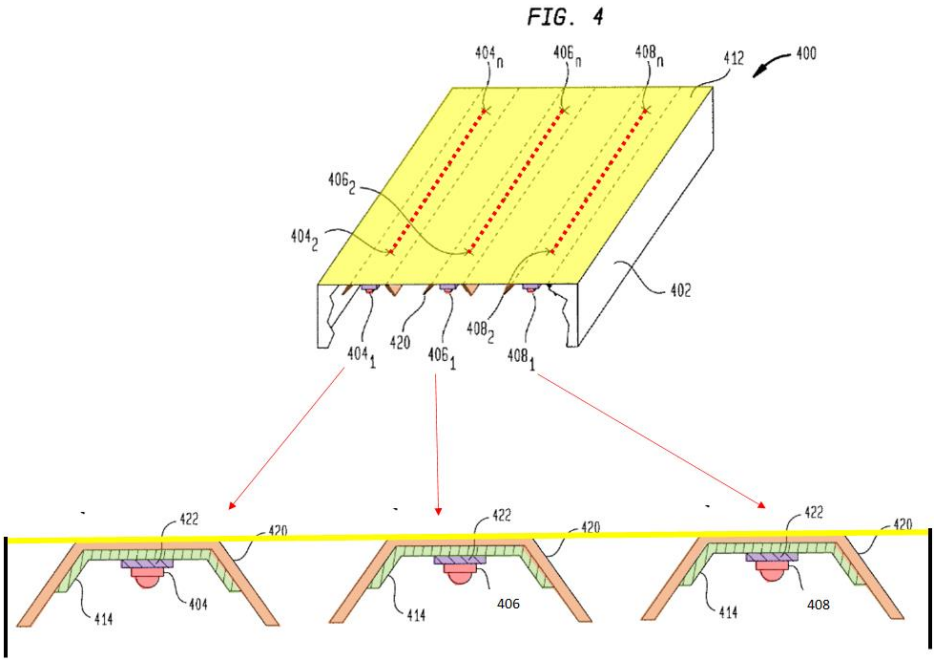
Medendorp discloses "a plurality of LEDs 404" are arranged on flat surface (planar surface) of a "metal core or FR4 board" or printed circuit board (purple) –

the *lighting strip*. (Ex.1022, ¶0024; Ex.1003, ¶224.)



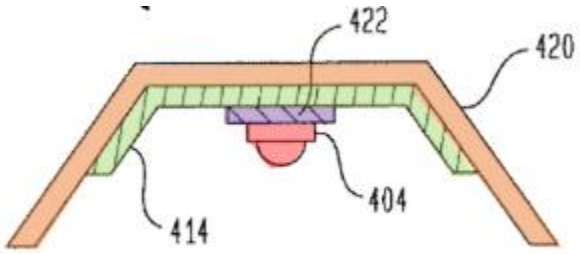
Ex.1022, Fig. 5

The ’854 Patent discloses an embodiment where the *lighting strip* is indirectly coupled to the *base plate* through intermediary parts. (*See* Ex.1001, 13:6-25; Figs. 1 & 10B.) Medendorp’s *lighting strip* is coupled to the top surface of the fluorescent fixture (*i.e.*, *base plate*) *via* the reflector (orange) and heat spreading material (green above). Medendorp’s *lighting strip* is therefore *coupled* to the *base plate* (yellow) consistent with teachings of the ’854 Patent. (Ex.1003, ¶225.)



Ex.1022, Figs. 4 and 5

Alternatively, and as discussed in [1.1] above, Medendorp discloses "a sheet of anisotropic heat spreading material 414" or *base plate* (green) that is directly coupled to the *lighting strip* (purple). (Ex.1003, ¶¶226-227.)

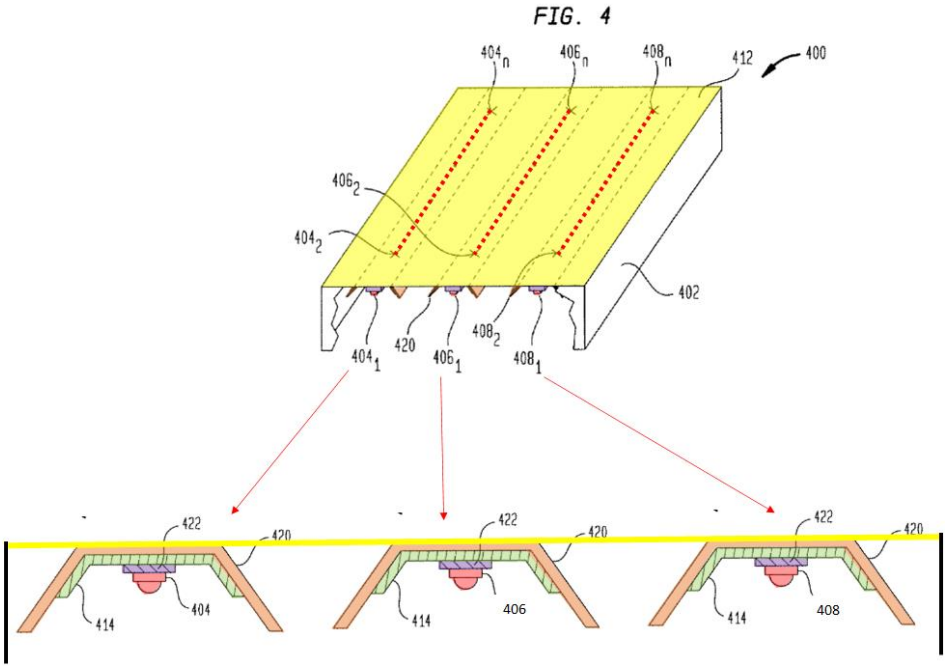


Ex.1022, Fig. 5

… ***Limitation [1.3]***

Medendorp discloses a plurality of reflectors (labeled "420" and shaded orange) upon which a linear row of LEDs 404, 406, and 408 (shaded red) are

connected. (Ex.1022, ¶0024.)



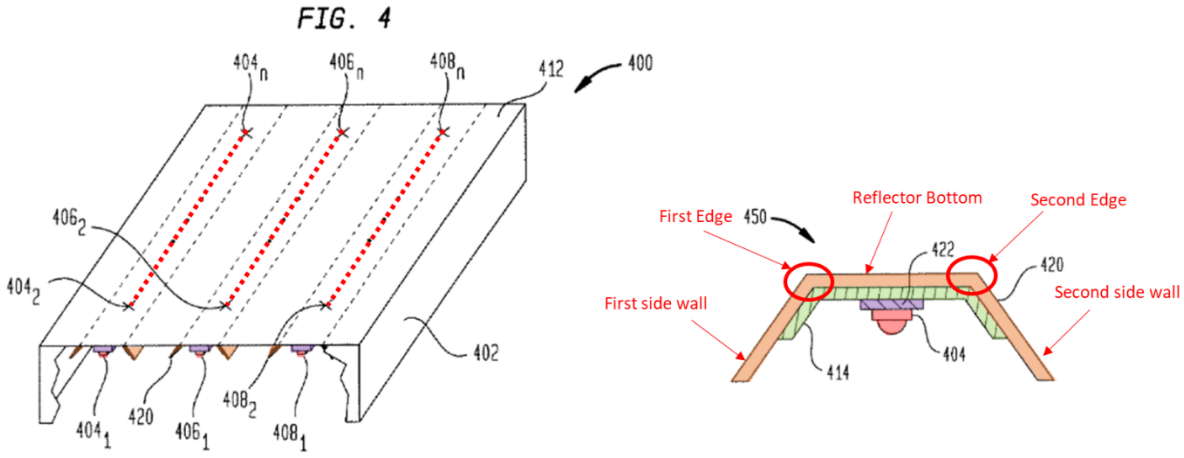
Ex.1022, Figs. 4 & 5

Medendorp states: "the present invention addresses techniques for more efficiently transferring heat away from LEDs to the surrounding metal or other materials of a mounting fixture, such as the reflective metal of a luminaire fixture." (Ex.1022, ¶0008.) A POSITA would have understood the "reflective metal" would include the reflector material as it was commonly known to use metal (e.g., aluminum) to construct the various components of fluorescent fixtures. (Ex.1003, ¶¶229-230.)

… ***Limitation [1.4a] & [1.4b]***

Medendorp's reflector includes a *first sidewall* and a *second sidewall*. The *first* and *second sidewalls* are connected to the reflector's bottom at a *first edge* and

a *second edge*.



Ex.1022, Figs. 4 & 5

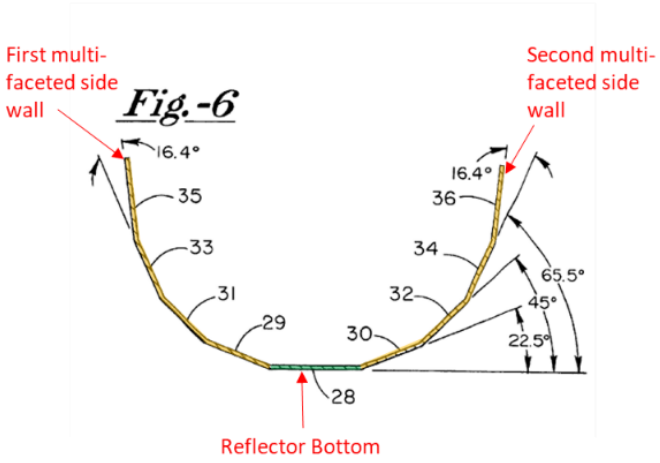
Medendorp teaches the *first/second side walls* of the reflectors extend the entire length of the *lighting strip* (dotted red line above left). The reflector and *lighting strip* (purple) would extend the entire length of the prior fluorescent fixture. (Ex.1022, ¶0005; Ex.1003, ¶¶231-233.)

Medendorp discloses a *lighting strip* (purple) with a *first side/second side* that are adjacent – or near to – the *first edge/second edge*.[12] (Ex.1003, ¶¶234-235.) While Medendorp discloses a faceted side-wall reflector, it does not expressly disclose a *multi-faceted side wall reflector*. But a POSITA would have known that Medendorp's reflectors are merely exemplary and fluorescent fixtures were known

[12] Medendorp's design is nearly identical to the embodiment shown by Figure 25 of the '854 Patent.

to include varying reflector shapes including multi-faceted side wall designs. (Ex.1003, ¶¶235-240.)

For example, Baar discloses a "U-shaped" reflector (constructed from aluminum) having a flat bottom surface with multi-faceted – i.e., multi-angled – side walls. (Ex.1037, 3:46-53; Ex.1003, ¶241.)



Ex.1037, Fig. 6

Baar's *first* and *second multi-faceted sidewalls* extend from the edges of the reflector bottom (i.e., "flat panel 28"). Baar's *first/second multi-faceted sidewalls* are composed of a plurality of reflective panels (facets) which are disclosed as extending and being bent at different angles. (Ex.1037, 3:58-4:19.)

It would have been obvious to apply Medendorp's "retrofitting" LED lighting system to Baar's fluorescent lighting. It would have been obvious to a POSITA that Medendorp's LED lighting strip could replace the fluorescent bulb

which would have been used within Baar's multi-faceted side wall reflector. Once employed, a POSITA would have known Medendorp discloses all elements of limitation [1.4] including *first/second multi-faceted sidewalls*. A POSITA would have understood Medendorp's retrofitting assembly could be installed in Baar's reflector as shown below. Specifically, the "anisotropic heat spreading material" (green hatched shading) would be applied to the surface of Baar's multi-faceted reflector. The *lighting strip* (purple) with linear plurality of LEDs (red) would then be placed onto the heat spreading material. (Ex.1003, ¶¶242-244.)

Likewise, it would have been obvious to a POSITA to use the multi-faceted reflector design of Baar in Medendorp's retrofit LED assembly. Indeed, lighting fixtures were known to include varying reflector shapes including multi-faceted side wall designs. (Ex. 1003, ¶¶235-240). It would have been an obvious design choice to use such a multi-faceted reflector in the Medendorp light assembly if a greater focus of light was desired. (cite).

Lastly, Baar's *first/second side walls* include *edges* where the bottom surface "28" meets the side wall facet "29" and "30." (Ex.1003, ¶243.) Baar's *first/second side walls* also extend from the reflector bottom at an angle of 22.5 degrees, i.e., the same angle. Medendorp also has a *first/second edge* where the reflector bottom is met by the two side walls. (Ex.1003, ¶234.) Medendorp also visually illustrates

both the *first/second side walls* extend from the reflector bottom at the same angle. (Ex.1003, ¶¶245-246.)

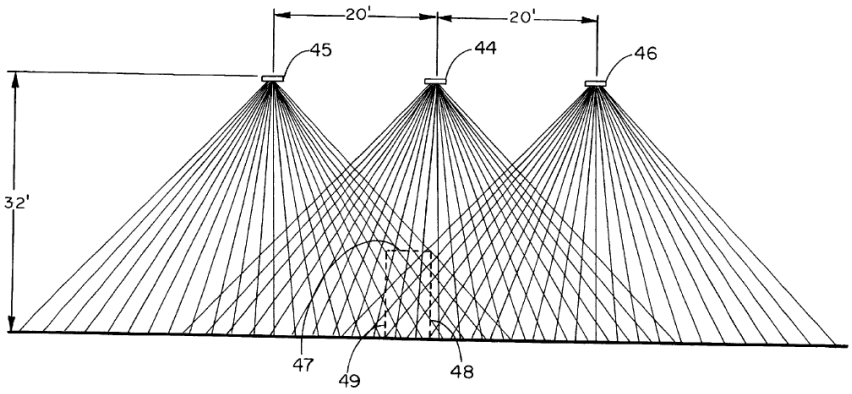
… ***Limitation [1.5]***

Medendorp discloses reflector sidewalls extending from the reflector base at the same angle. Baar also discloses reflector sidewalls extending from the reflector bottom at an angle of 22.5 degrees – i.e., the same angle. The '854 Patent states a *uniform beam* includes focused beam or diffused beams (e.g. streetlight or office light). (Ex.1001, 5:61-6:1.)

Medendorp discloses the retrofit kit can be applied to "streetlights" or "low bay" fluorescent lighting fixtures. (Ex.1022, ¶0035.) Medendorp can be utilized in fixtures having reflectors designed to provide *uniform* lighting. (Ex.1003, ¶¶247-249.)

For instance, Baar discloses a reflector that focuses light within large areas such as "warehouses, sports arenas, supermarkets, etc." (Ex.1037, 1:17-18.) Baar's light reflector is configured "to produce a more uniform light distribution." (Ex.1037, 2:34-36.) Baar's reflector is disclosed as providing a "much more uniform light distribution and precludes any problem of spots and shadows." (Ex.1037, 4:30-49.) Medendorp's retrofit LED lighting system when installed in Baar's reflector, or vice versa, would therefore provide a uniform light distribution. (Ex.1003, ¶249.)

Fig.-11



Ex.1037, Fig. 11

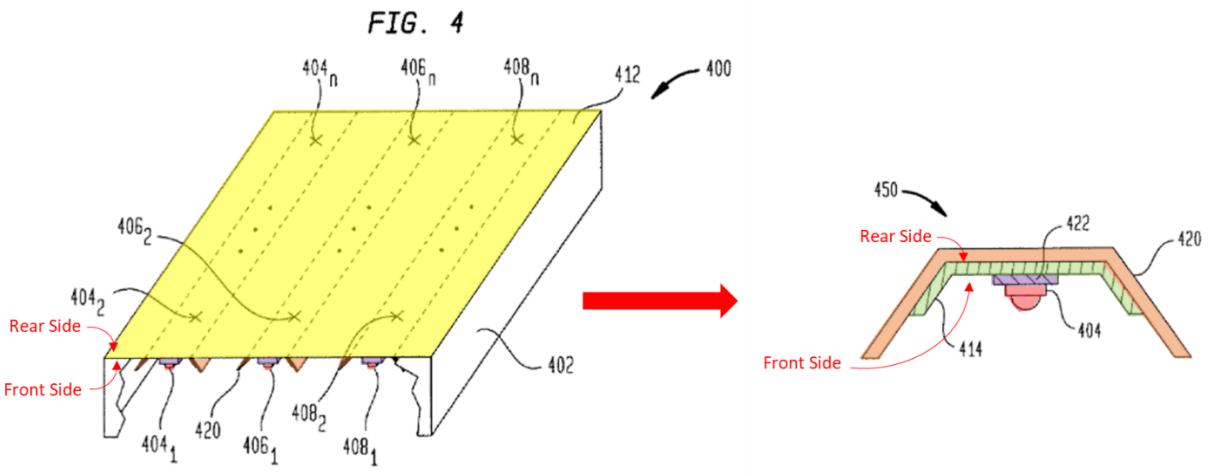
As discussed in Ground 1 limitation [1.5], the term "amplify" would be understood by a POSITA as "focusing" light output with a reflector having multiple angles as indicated by the '854 Patent. (Ex.1001, 19:13-34; Ex.1003, ¶250.) Medendorp's LED light output would be focused by Baar's multi-angled reflector to increase the light level where it is required on the roadway or other surfaces. Once retrofitted with the Medendorp's retrofit assembly, a POSITA would have known that Baar's reflector structure would cause the LED light to be a uniform and amplified (focused) beam. (Ex.1003, ¶¶250-251.)

… ***Limitation [1.6]***

Medendorp discloses the "present invention addresses techniques for more efficiently transferring heat away from LEDs to the surrounding metal or other materials of a mounting fixture, ***such as the reflective metal of a luminaire***

fixture." (Ex.1022, ¶0008.) Medendorp also discloses a "heat spreading material 414 [that] … transfers heat [generated by the LEDs] to the ambient air." (Ex.1022, ¶0024.)

A POSITA would have understood the heat generated by the *lighting strip* would dissipate from the "heat spreading material 414" through the rear side of the luminaire's metallic top surface (highlighted yellow below) out to the ambient environment. Or the heat could be dissipated directly from the heat spreading material (green) to the ambient environment. (Ex.1003, ¶¶252-253.)



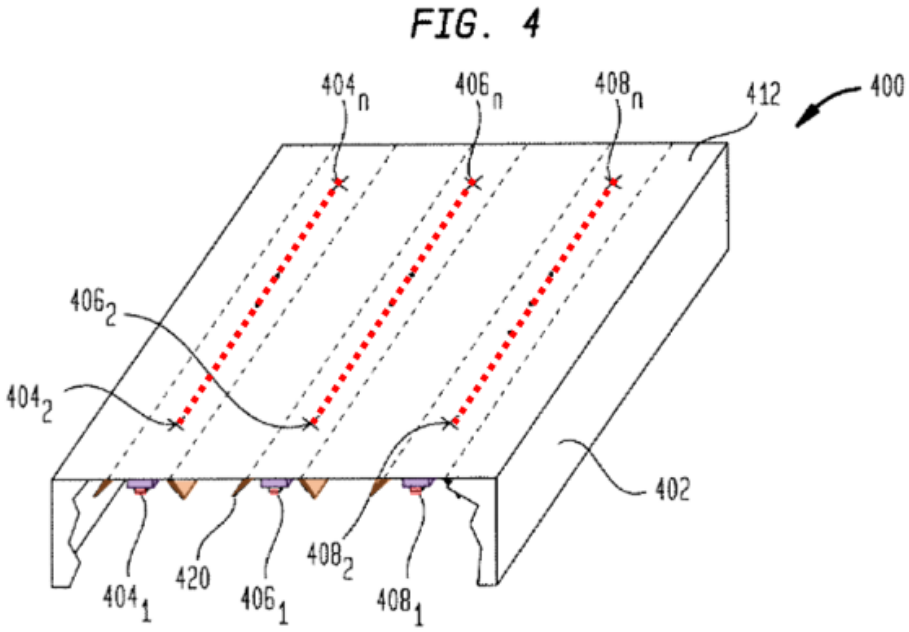
Ex.1022, Figs. 4 & 5

Both the luminaire's top surface and the "heat spreading material 414" satisfy the recited *base plate* and both provide a transfer path for heat generated by the *lighting strips* to be dissipated to the *ambient environment*. (Ex.1003, ¶¶254-255.) Baar likewise discloses a fluorescent fixture having a metallic frame and reflectors which could be designed out of aluminum. (Ex.1037, 3:31-34; 5:1-7;

3:49-52.) Medendorp's retrofit when applied to Baar's metallic fixture would operate to dissipate heat generated by the LEDs outward through the metal frame to the ambient environment. (Ex.1003, ¶256.)

2. Claim 2

As discussed in [1.2] above, Medendorp discloses a retrofit LED light assembly with a linear array or strips of LEDs (red dots below) attached to a pre-existing reflector. (Ex.1003, ¶¶258-259.)



Ex.1022, Fig. 4

3. Claim 6

With reference to Figure 16, the '854 Patent states "the reflector assembly includes ***a base member 184*** and a pair of desirably integral side walls 185 extend from opposite sides of the base member 184 at an angle." (Ex.1001, 17:34-37;

Ex.1003, ¶260.)

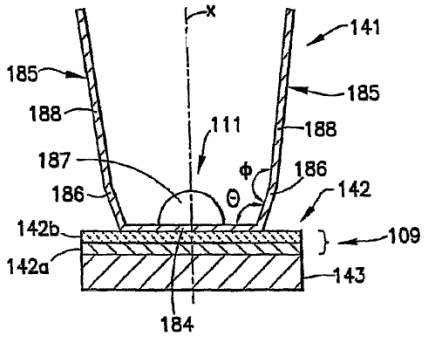
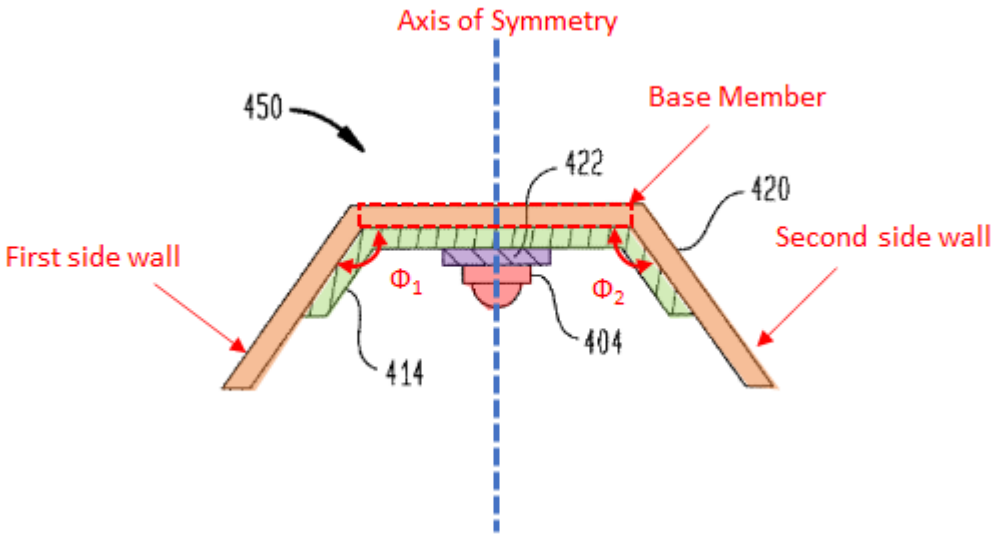


FIG.16

Ex.1001, Fig. 16

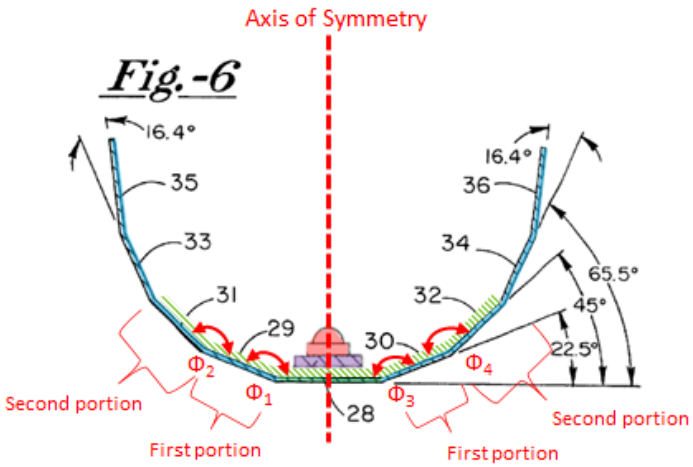
Medendorp's reflector includes a bottom surface – i.e., *base member*. The *first/second sidewalls* extend away from Medendorp's *base member*. The *first/second sidewalls* are also symmetrical about axis of symmetry that runs through a center of the *base member*. (Ex.1003, ¶261.)



Ex.1022, Fig. 5

It would have been obvious to a POSITA to apply Medendorp's retrofit

solution to Baar's fluorescent fixture, and similarly, Baar's reflector in Medendorp's light assembly. When retrofitted with Medendorp's LED solution, Baar's *first/second multi-faceted sidewalls* are also symmetrical about an axis of symmetry that runs through a center of the *base member*. (Ex.1003, ¶262.)



Ex.1037, Fig. 6

4. Claim 7

As shown above, Baar's reflector (retrofitted with Medendorp's LED light) illustrates *first/second side walls* (blue) respectively having panels "29"/"30" (*first portions*) angled 22.5° relative to the "base panel 28" (*base member*) and the panels "31"/"32" (*second portions*) angled 22.5° relative to *first portions*. Baar therefore discloses *first/second multi-faceted sidewalls* having respective *first portions* defining *first angles* (Φ_1, Φ_3) with the *base member* and *second portions* defining second angles (Φ_2, Φ_4) with the first portions. (Ex.1037, 3:58-4:4; Ex.1003, ¶¶264-267.)

5. Claim 8

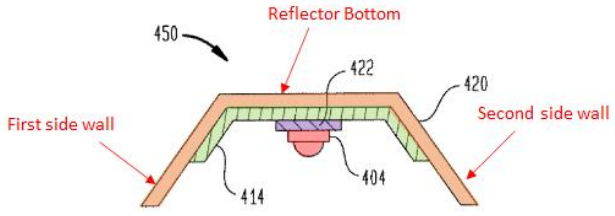
As explained by claim 7 above, both of Baar's *first portions* are angled at 22.5° relative to the *base member* and both of Baar's *second portions* are angled at 22.5° relative to the *first portion* and 45° relative to the *base member*. Therefore, both the *first/second sidewalls* include a *first angle* different than the *second angle*. (Ex.1037, 3:58-4:4; Ex.1003, ¶¶268-270.)

6. Claim 9

As shown by claim 7, Baar's reflector includes *first/second multi-faceted sidewalls* (blue) which are *multi-angle side walls* (e.g., Φ_1, $\Phi 2$, Φ_3, Φ_4). (Ex.1037, 3:58-4:4; Ex.1003, ¶¶272-273.)

7. Claim 13

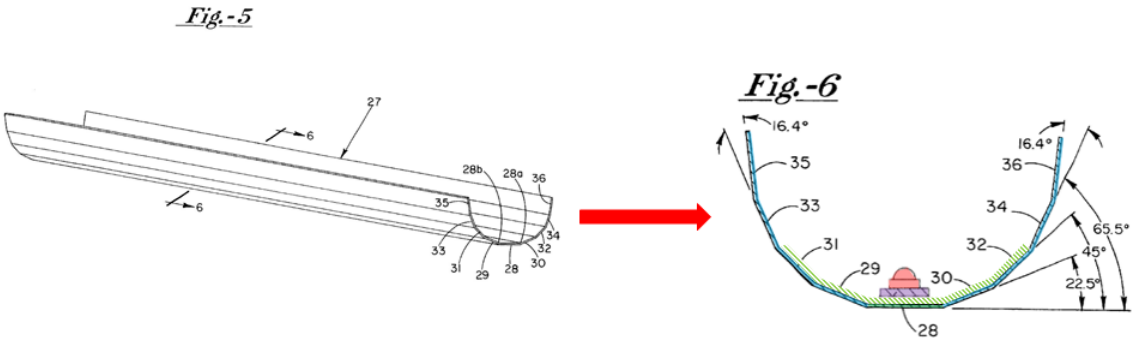
First, it was obvious to design a reflector with side-walls from a single sheet. (Ex.1003, ¶276.) Regardless, Medendorp discloses a fixture (including reflector) constructed of metal. (Ex.1022, ¶0008.) Medendorp discloses a *first/second side walls formed by a single reflector sheet*. (Ex.1003, ¶274.)



Ex.1022, Fig. 5

Likewise, Baar discloses a reflector that is formed from a single sheet of

light metal (e.g., aluminum) that is "preferably about 1 inch in width." (Ex.1037, 3:46-57.) Once retrofitted, Baar's reflector discloses a *first second multi-faceted side wall* (blue) which are formed from a *single reflector sheet* of metal. (Ex.1003, ¶¶275-277.)



Ex.1037, Fig. 6

8. Claim 15

… ***Limitation [15.0]***

See limitation [1.0].

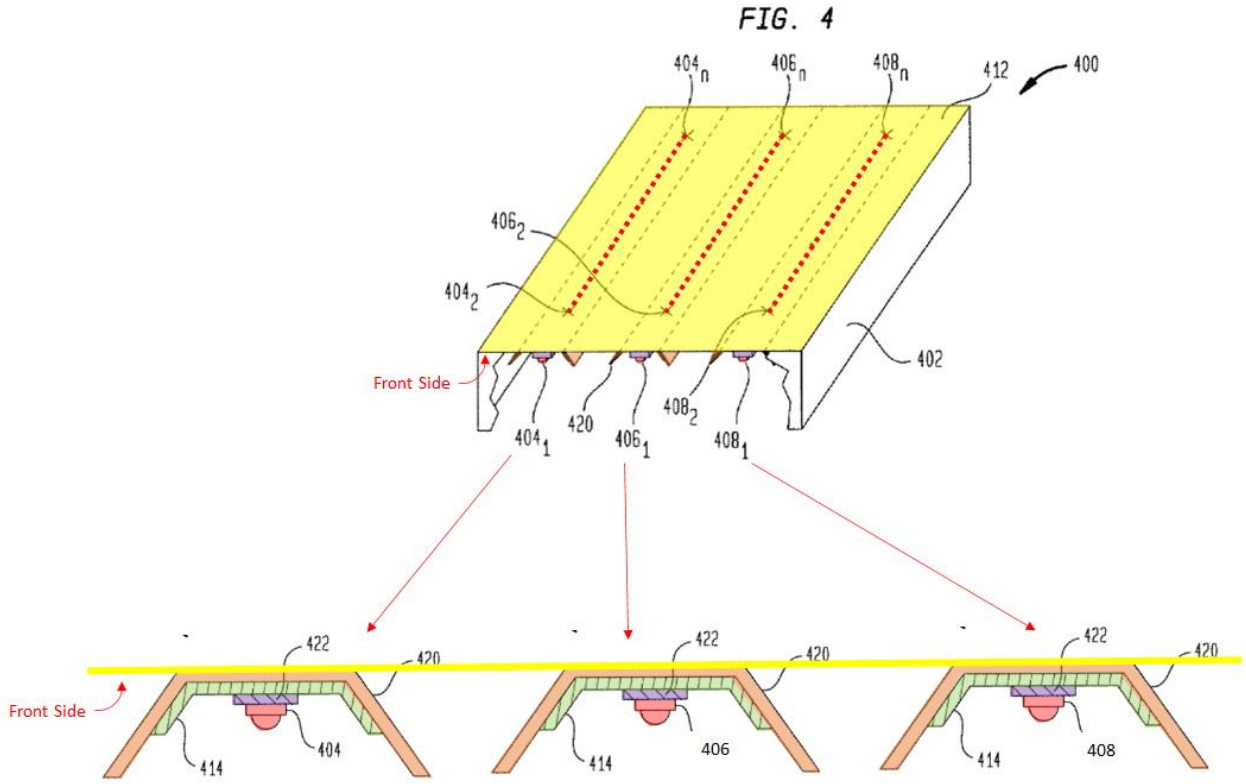
… ***Limitation [15.1]***

See limitation [1.1].

… ***Limitation [15.2]***

Medendorp discloses a plurality of *lighting strips* (purple below) with linear rows of LEDs (dotted red line below). Each respective LED array (404, 406, and 408) are coupled to the front side of the *base plate*. (Ex.1022, ¶0023; Ex.1003, ¶¶279-282.) Also, Baar discloses a fluorescent fixture with multiple reflectors.

(Ex.1037, 3:31-46.) Baar's fluorescent fixture when retrofitted with Medendorp's LED lighting would likewise include *lighting strips* coupled to the baseplate.



Ex.1022, Figs. 4 and 5

… ***Limitation [15.3]***

It was known and obvious to a POSITA that printed circuit boards with LEDs require a DC current and voltage to drive and power the LEDs. Without a power supply (including an AC/DC converter) and driver circuitry Medendorp's lighting fixture would not be able to function. (Ex. 1003, ¶¶283-284.) LED lighting fixtures also require control circuitry for controlling the illumination of the LEDs, such as, brightness or intensity. *Id.*

A POSITA also understood pre-existing ***fluorescent*** lighting fixtures are powered by AC power. A POSITA would have known and understand that Medendorp would require driver circuitry and control circuity to convert the AC power to DC for powering the LED lights. (Ex. 1003, ¶285.) A POSITA would also recognize that Medendorp discloses driving LEDs at "125mA" and that LEDs can be controlled to deliver … any color light. (Ex 1022, ¶¶0001, 0005, 0023; Ex.1003, ¶285.) A POSITA would have known that Medendorp would include *driver circuitry* to drive the LEDs at a given current and *control circuitry* to control the LEDs to vary the color of light. *Id.*

Alternatively, Medendorp incorporates by reference in its entirety U.S.P.N. 7,648,257 (Ex.1044, "Villard") disclosing *driver and control circuitry* that a POSITA would have understood could be used within Medendorp.[13] (Ex.1022, ¶0033.) Villard discloses known LED solutions for applying power (i.e., *driver circuitry*), as well as *control circuits* that allow for variations in lighting intensity and wireless communication with the LEDs. (Ex.1044, 8:29-35; 8:36-40; 9:6-18;

[13] Again incorporation by reference is a proper way to integrate another patent into the host document. *Material Advanced Display*, 212 F.3d at 1282. Here Medendorp provides an express, teaching suggestion, or motivation to combine the teachings of Medendorp and Villard.

9:19-31.) It would have been obvious to a POSITA that Villard's *control and driver circuitry* could be incorporated into the LED retrofit lighting solution disclosed by Medendorp – including Baar's fixture retrofitted with Medendorp. (Ex.1003, ¶¶286-289.)

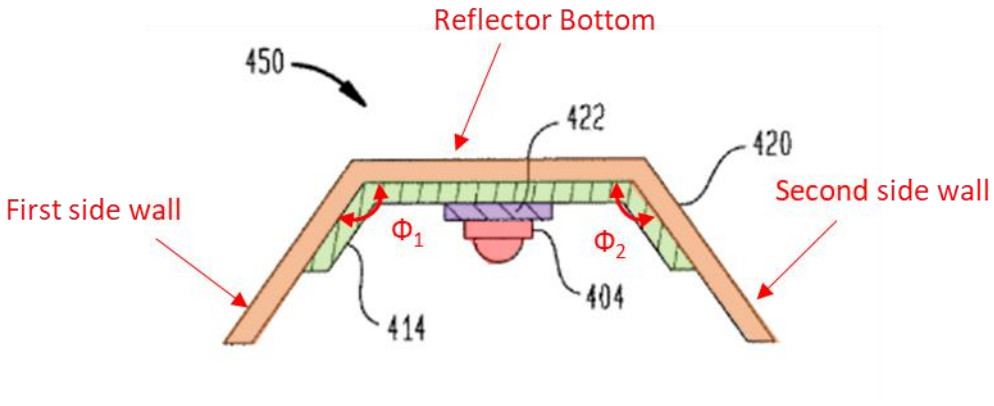
… ***Limitation [15.4]***

See limitation [1.2]/[1.3].

… ***Limitation [15.5a] and [15.5b]***

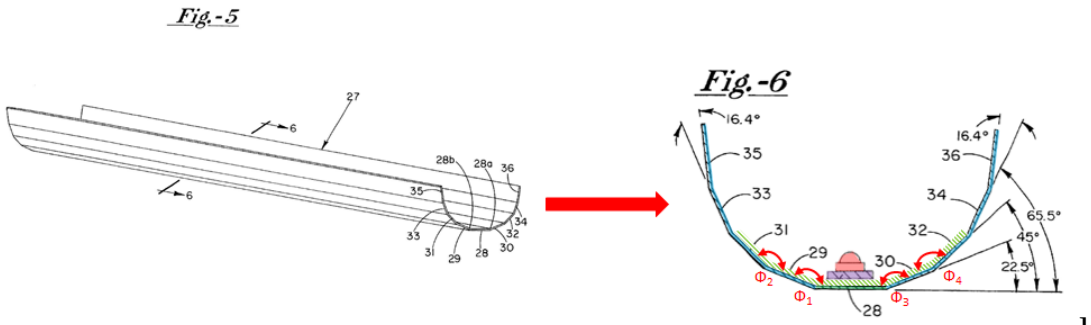
See limitations [1.4a]/[1.4b].

Medendorp discloses a reflector designed from a single sheet with a *first/second side wall* bent at an angle to the bottom. (Ex.1003, ¶292.)



Ex.1022, Fig. 5

When retrofitted with Medendorp's retrofit LED lighting solution, Baar also discloses a reflector having *first/second multi-faceted side walls* bent at multiple angles with respect to the reflector bottom surface. (Ex.1003, ¶¶293-294.)



d

Ex.1037, Fig. 6

… ***Limitation [15.6]***

See limitation [1.5].

… ***Limitation [15.7]***

See limitation [1.6].

9. Claim 18

Medendorp discloses an embodiment where each "PCB has five LEDs" which "are electrically connected in series with each other." (Ex.1022, Medendorp at ¶0034.) As discussed in limitation [15.3] above, a POSITA would have known it was obvious that LED lighting solutions like Medendorp would include known *driver/control* circuitry and it was obvious Medendorp's *lighting strip* would be connected to a *driver circuit* (i.e., power supply) in parallel. (Ex.1003, ¶¶297-299.) A POSITA would understand the positive and negative terminals of a DC-power supply would be connected in parallel with the positive and negative terminals of the *lighting strip*. (Ex.1003, ¶300.)

10. Claim 19

As stated in [15.1] Medendorp/Baar disclose a *base plate* being: (1) fluorescent fixture's top surface; or (2) "sheet of anisotropic heat spreading material 414." A POSITA would have understood that if an LED *lighting strip* were to fail, a replacement *lighting strip* could be inserted without having to remove the other *lighting strips.* Considering Medendorp is a retrofit assembly for fluorescent fixtures, it would have been obvious to a POSITA the retrofit lighting strip could be replaced if it were to fail. (Ex. 1003, ¶¶301-305.) Such a replacement of a lighting strip would require nothing more than disconnecting and removing the *lighting strip* that needs to be replaced. *Id.*

11. Claim 20

As discussed in limitation [15.2], Medendorp discloses that the LEDs are arranged in a linear row along the length of the lighting strip. (Ex.1003, ¶306.)

D. Reasons or motivation to combine Medendorp and Baar

Medendorp discloses an "exemplary process of manufacturing a retrofit lighting fixture employing high power lighting LEDs to replace an existing fluorescent bulb fixture." (Ex.1022, ¶0030.) Medendorp expressly states it is intended to replace fluorescent fixtures "commonly utilized today." (Ex.1022, ¶0035.) Medendorp discloses how to install a heat spreading material and lighting strip (with linear row of LEDs) into the reflector of pre-existing fluorescent

fixtures. (Ex. 1003, ¶¶307-309.) Medendorp therefore provides an express teaching, suggestion, and motivation to a POSITA to replace pre-existing fluorescent fixtures (like Baar) with the LED lighting solution disclosed by Medendorp. *Id.*

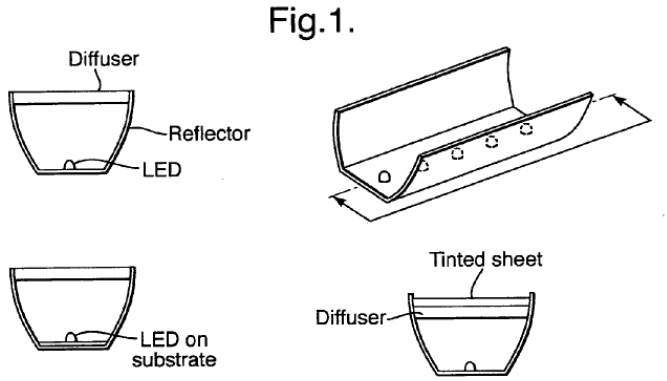
Baar discloses a pre-existing fluorescent fixture having multiple reflectors. A POSITA would have understood how to retrofit Baar's pre-existing fluorescent bulbs with the LED lighting solution of Medendorp. A POSITA would have understood modifying Baar would be nothing more than using the known technology of Medendorp to retrofit Baar's pre-existing fluorescent lighting fixture in the way disclosed by Medendorp. (Ex. 1003, ¶¶310-311.) Once retrofitted, Baar would provide a more energy efficient LED system which will not require as much maintenance due to burnt out fluorescent light bulbs or failing fluorescent ballasts. *Id.*

E. Ground 3 – Brown, Stopa, and the knowledge of a POSITA

1. Claim 1

… ***Limitation [1.0]***

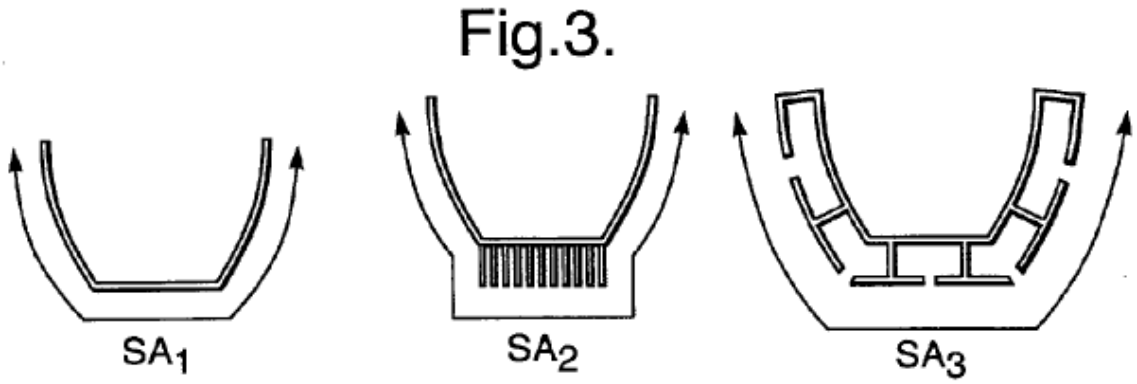
Brown discloses an "illumination device" (*lighting fixture*) which includes "a LED array including a number of light emitting diodes" (*LED lighting arrangement*). (Ex.1036, ¶0016; Ex.1003, ¶¶312-318.)



Ex.1036, Fig. 1

… ***Limitation [1.1]***

Brown discloses the reflector may further include "narrow ribs on the rear of the unit" ("SA_2") attached to the back panel. (Ex.1036, ¶0028.)

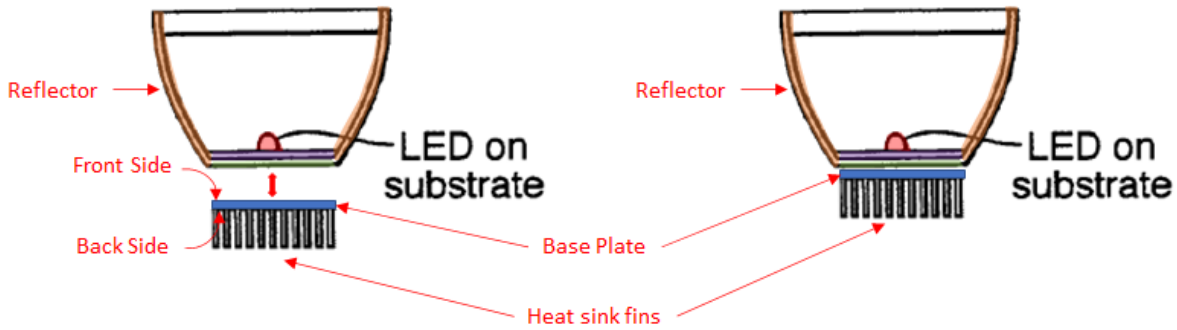


Ex.1036, Fig. 3

A POSITA would have understood numerous known methods existed for constructing a reflector unit with heat sink "ribs." For instance, a POSITA would have known: (1) the ribs could be a separate heat sink piece that is attached to the reflector; or (2) the ribs and reflector are integrally formed from one piece of

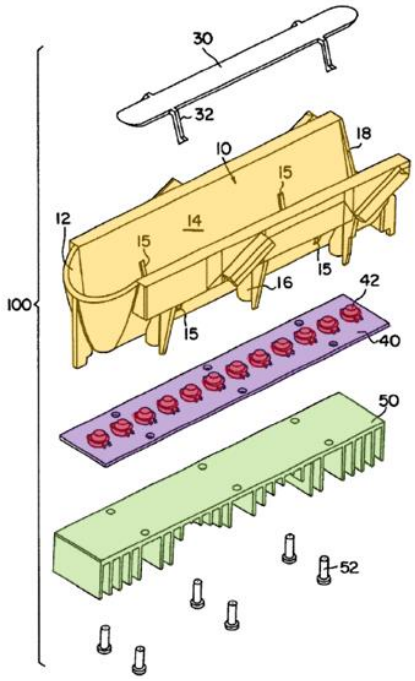
metal. (Ex.1003, ¶¶319-322.)

Brown clarifies, however, the "narrow ribs are ***attached on the backside of the illumination device*** for cooling down LED array generated heat." (Ex.1036, Claim 3.) A POSITA would have understood Brown as teaching the ribs being a separate unit that is ***attached*** to the backside of the reflector. A POSITA would have understood that attempting to manufacture the ribs and reflector as a single unit (e.g., using a molding or stamping process) would be more difficult than using a separate unit which would be more cost-efficient and simpler design. (Ex.1003, ¶¶323-324.) A POSITA would have also known it was common for the heat sink "ribs" and reflector to be constructed as two separate components and then attach the two items (as recited by claim 3) using well-known solutions – e.g., screws or adhesive. As shown below, a POSITA would have understood the heat sink fins would include a support plate (highlighted blue) with a front side or top surface that would ***attach*** to the backside of the reflector's back panel (highlighted green). (Ex.1003, ¶325-326.)



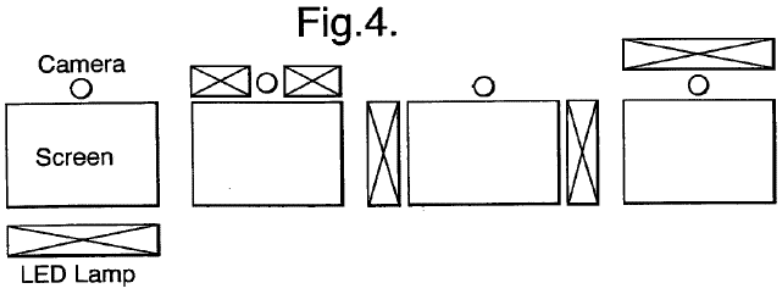
Ex.1036, Fig. 1 modified to include heat sink "fins" of Fig. 3

To the extent Brown does not teach heat sink fins constructed separately from the reflector, it would have been obvious to modify Brown in view of Stopa such that the reflector and heat sink were constructed as two separate components. (Ex. 1003, ¶¶327-330.) Again, this would make for a simpler construction and more cost-efficient from a manufacturing standpoint. *Id.* It would have also been within the skill of a POSITA to use known prior art elements (like separate heat sink and reflector components) and techniques of assembling the heat sink and reflector to yield a predictable result. *Id.*



Ex.1038, Fig. 1

Alternatively, Brown's LED lamp is disclosed as being installed onto additional surface – e.g., a wall or ceiling. (Ex.1036, ¶0039.) Figure 4 illustrates and discloses the LED lamp is to be installed over, under or on each side of a wall that is located around a screen. (Ex.1036, ¶0032.)

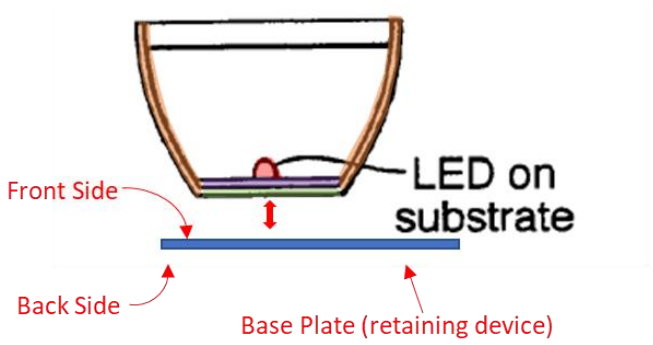


Ex.1036, Fig. 4

To mount the LED lamp in various configurations and locations, Brown

discloses the reflector unit is attached to a "retaining device" allowing it to be positioned in the various locations. Brown states the "retaining device" allows the angle and position of the LED lamp to be adjusted. (Ex.1036, Claim 1, Claim 2; Ex.1003, ¶¶332-333.)

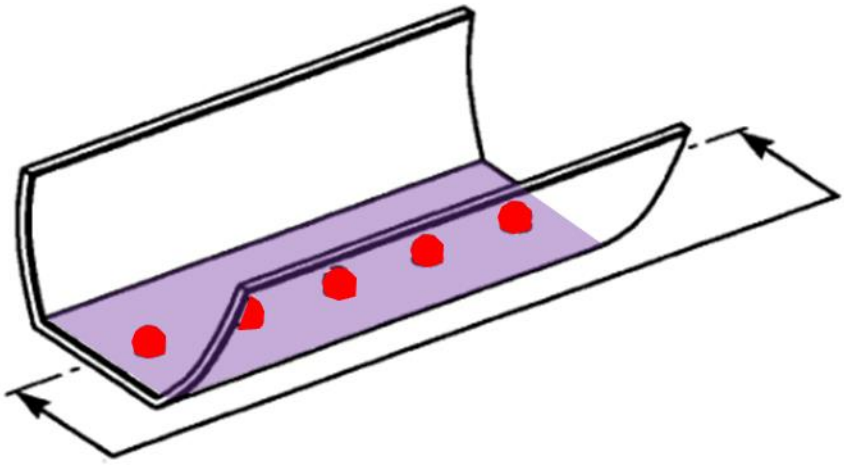
A POSITA would understood the "retaining device" was well-known to a POSITA for attaching and hanging light sources to walls or ceilings and would include a flat surface or *base plate* (blue rectangle below) having a front side and back side. The backside of the reflector would then be attached to the retaining device using some known securing mechanism (e.g., screws). (Ex.1003, ¶¶335-337.)



Ex.1036, Fig. 1

… ***Limitation [1.2]***

Brown discloses a linear row of LEDs (red) being arranged on a flat surface (planar surface) of a substrate (purple). (Ex.1036, ¶0026.) A POSITA would have understood the substrate as being the *lighting strip*. (Ex.1003, ¶¶338-339.)



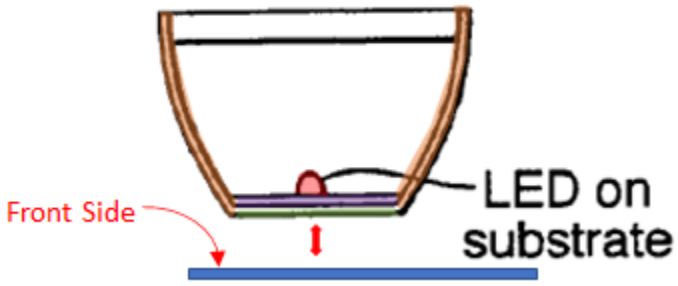
Ex.1036, Fig. 1

Brown discloses coupling the *lighting strip* to one of the *base plates* discussed in limitation [1.1]. For instance, the *lighting strip* (purple) could be indirectly coupled to the heat sink *base plate*.[14] (Ex.1003, ¶340.)

Ex.1036, Fig. 1 modified to include heat sink "fins" of Fig. 3

Alternatively, the *lighting strip* could be coupled to the retaining device *base plate*. (Ex.1003, ¶¶341-342.)

[14] The '854 Patent discloses the *lighting strip* can be indirectly coupled to the *base plate*. (*See* Ex.1001, 13:6-25; Figs. 1 & 10B.)



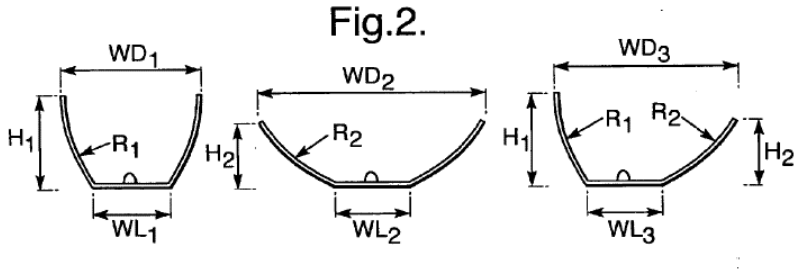
Ex.1036, Fig. 1

… ***Limitation [1.3]***

Brown discloses a reflector "preferably be made of a metal such as steel or aluminium [*sic*]." (Ex.1036, ¶0028.) Brown also discloses the metallic reflector can be assembled from the "***same sheet*** folded along two lines to create two reflector wings." (Ex.1036, ¶0026; Ex.1003, ¶¶343-344.)

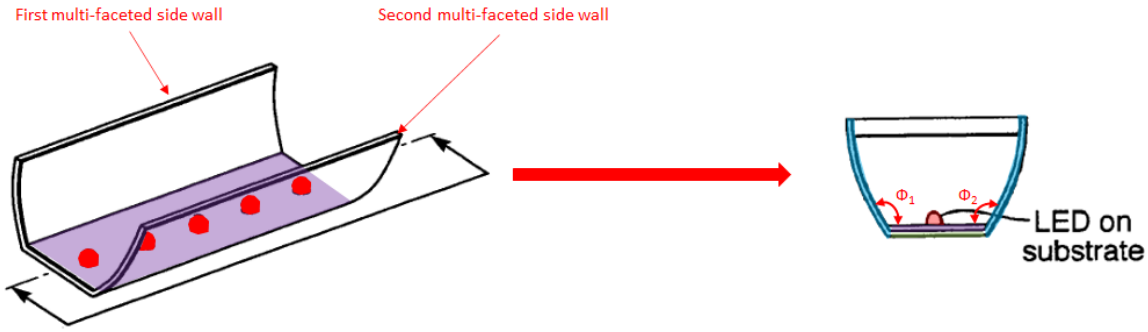
… ***Limitations [1.4a] and [1.4b]***

Brown's reflector sheet is disclosed as including "two reflector wings." (Ex.1036, ¶0026.) Brown discloses the shape and design of the reflector wings can vary and can be constant curvature or the "radii of the sides do not have to be of constant curvature." (Ex.1036 ¶0027.)



Ex.1036, Fig. 2

A POSITA would therefore understand Brown's sidewalls could be designed to have a parabolic or elliptical shape – i.e., not constant curvature design. (Ex. 1003, ¶¶345-349.) A POSITA would therefore understand Brown's reflector wings when designed with non-constant curvature would include *first/second multi-faceted side walls*. *Id.* Brown's *first/second multi-faceted side walls* (blue) also extend the entire length of both: (1) the LEDs (red); and (2) the *lighting strip* (purple). (Ex.1036 ¶0026; Ex.1003, ¶350.)



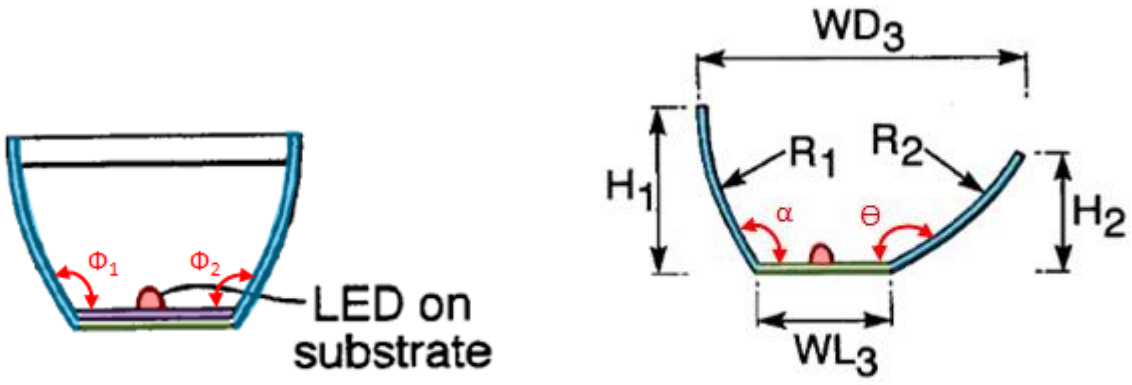
Ex.1036, Fig. 1

Lastly, Brown's reflector wings (orange) join the back panel (green) at a *first/second side edge*. These side edges include *an angle* (labeled Φ_1 and Φ_2). As shown, the angle between the back panel and the reflector wings (*first/second*

multi-faceted side walls) extends the entire length of the lighting strip. Figure 1 therefore illustrates the same angle (Φ_1 and Φ_2) between the back panel (green) and each reflector wing. (Ex.1003, ¶¶351-354.)

… ***Limitation [1.5]***

As discussed in limitations [1.4a] and [1.4b], Brown discloses a *first/second multi-faceted sidewalls* (blue) extending from a *first/second side edge* where the reflector is angled away from the back panel. The side walls can extend away from the back panel (green) at the same angle (below left) or at different angles (below right). (Ex.1003, ¶355.)



Ex.1036, Fig. 2

Again, the ‘854 Patent states that a “uniform beam” may be a focused beam (e.g., spotlight) or a diffused beam (office light/street lamp). (Ex.1001, 5:61-6:1.) Brown discloses an LED reflector design that provides a “focused beam of light” or a reflector that can “spread the light over a wide area” (i.e., diffused). (Ex.1036, ¶0025.) Brown therefore discloses both types of “uniform beam” disclosed by the

'854 Patent. (Ex.1003, ¶¶356-359.)

As discussed in Ground 1 limitation [1.5], the term "amplify" would be understood by a POSITA as "focusing" light output with a reflector having multiple angles as indicated by the '854 Patent. (Ex.1001, 19:13-34; Ex.1003, ¶250.) Brown discloses focusing the light produced by the LEDs by (1) modifying the radii of the side walls to provide a more focused light; (2) using a diffuser (i.e., lens); or (3) applying a reflective coating (e.g., silver coating) on the walls of the inner walls of the reflector. (Ex.1036, ¶¶0026, 0029; Ex.1003, ¶¶360-364.)

A POSITA would have understood the silver coating would assist in ensuring more of the light generated by the LED is not absorbed by the reflector but is instead reflected and outputted from the LED lamp. (Ex. 1003, ¶¶365-367.) The diffuser also works together with the light being reflected by the side walls (i.e., reflector wings) to provide a constant intensity of light. *Id.* Brown therefore discloses *first/second side walls* are *multi-faceted* and extend at *from the lighting strip at an angle* (either the same or different) to increase the focal intensity (*amplify*) of the light beam produced by the LEDs. *Id.*

… ***Limitation [1.6]***

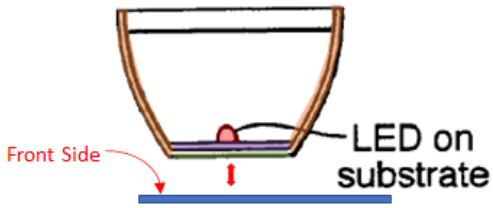
Brown discloses "LED lamp assembly should preferably be made of a metal such as steel or aluminium [*sic*]" so that "the whole assembly will act as a heat sink for the high power LEDs." (Ex.1036, ¶0028.) Brown, even emphasizes the

"reflector can be made of a metal such that it will function as a heat sink and therefore allow prolonged use of high power LEDs." (*Id.*, ¶0037.)

As discussed in limitation [1.1], Brown's reflector (plus *lighting strip*) can be coupled to a front side of the *base plate* (shaded blue below) – i.e., heat sink. A POSITA would understand the heat generated by the LED array (red) would be transferred from the metallic reflector to the base plate and fins. A POSITA would have understood the fins are a common aspect of a heat sink for transferring heat to the ambient environment. (Ex.1003, ¶¶368-369.)

Ex.1036, Fig. 1

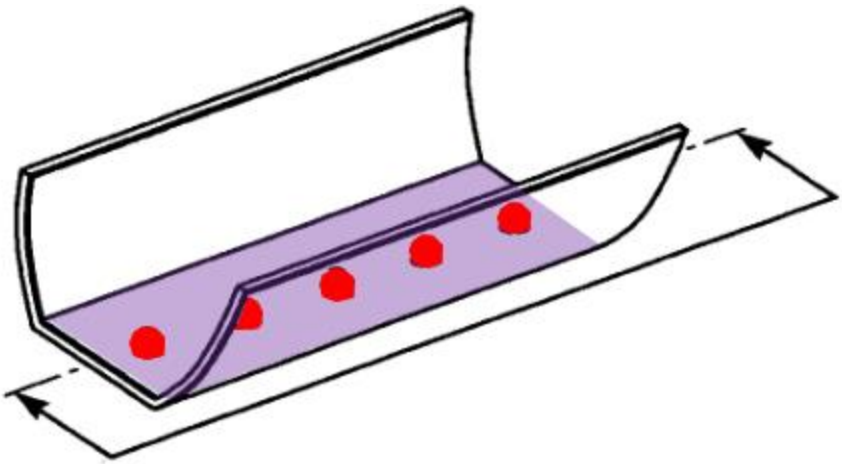
As also discussed in limitation [1.1], a POSITA would have understood Brown's retaining device *base plate* would also be coupled to the reflector. (Ex. 1003, ¶¶370.) A POSITA would have understood heat generated by the LEDs would be transferred from the substrate to the metallic reflector and ultimately to the retaining device *base plate*. *Id.* Any heat received by the retaining device would be dissipated to the ambient environment. *Id.*



Ex.1036, Fig. 1

2. Claim 2

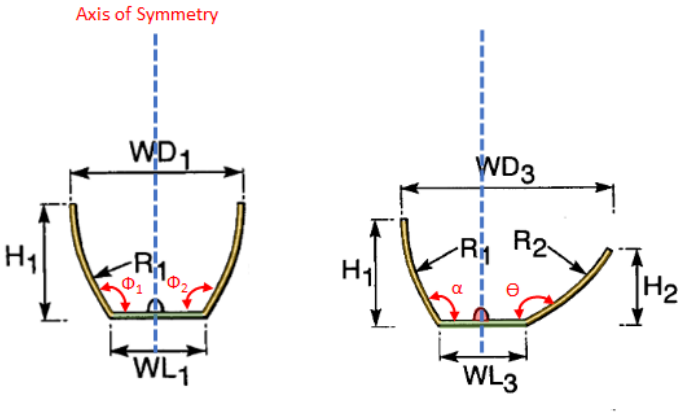
Brown discloses "linear array of LEDs protected by a LED substrate [*lighting strip*] is mounted on a back panel" of the reflector. (Ex.1036, ¶0026; Ex.1003, ¶¶372-373.)



Ex.1036, Fig. 1

3. Claim 6

Brown discloses the reflector height, width, length and radius of the sides can be modified. (Ex.1036, ¶0027.) Brown even states (with respect to Figure 2) the "the LED lamp assembly does not have to be symmetric." (*Id.*, ¶0027.) Brown therefore discloses both symmetrical and non-symmetrical reflector designs.



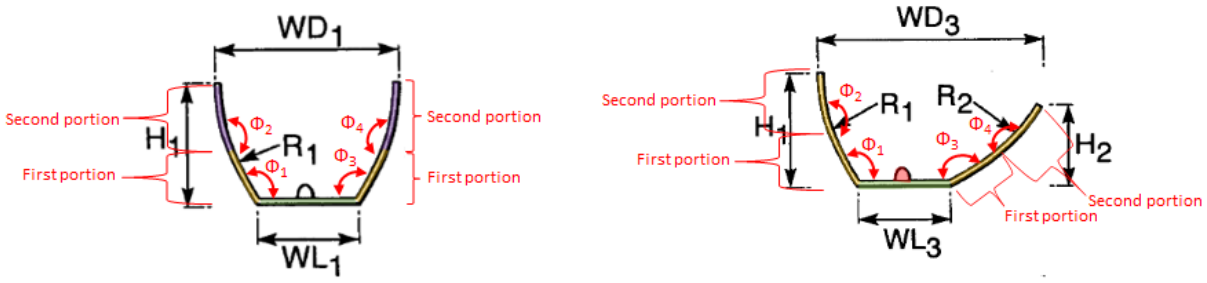
Ex.1036, Fig. 2

The '854 Patent discloses the base member as being the bottom surface of the reflector. (*see* Ex.1001, 17:34-37, Fig. 16.) As annotated above left, the *first/second side walls* extend from the Brown's *base member* ("back panel" shaded green) at the same angle (Φ_1 and Φ_2). The two *multi-faceted side-walls* are symmetrical *about an axis of symmetry that runs through a center of the base member*. This is opposed to Brown's reflector (above right) which is not symmetrical. (Ex.1003, ¶¶374-377.)

4. Claim 7

Again, Brown teaches a reflector that can be shaped to have a constant curvature or with "sides [that] do not have to be of constant curvature" – i.e., side-walls with a parabolic or ellipsoid shape. (Ex.1036, ¶0027; Ex.1003, ¶¶378-379.) Brown's reflector therefore discloses *first/second multi-faceted sidewalls* having first portions defining first angles (Φ_1, Φ_3) with a *base member* (reflector's bottom surface - shaded green) and second portions defining second angles (Φ_2, Φ_4) with

the first portions. As shown below right, first angles (Φ_1, Φ_3) can also vary or be different based on the non-symmetric shape of the reflector side walls. (Ex.1003, ¶¶378-381.)



Ex.1036, Fig. 2

5. Claim 8

Claim 7 above illustrates Brown's *side-walls* include *first/second portions* that define *first/second angles*, i.e., Φ_1, Φ_2, Φ_3, and Φ_4. Brown teaches the angles Φ_1/Φ_2 or Φ_3/Φ_4. are different due to the parabolic shape of the side walls or especially the non-symmetric (above right) shape of the sidewalls. (Ex.1036, ¶0027; Ex.1003, ¶¶382-383.)

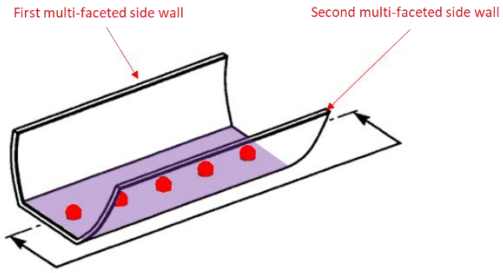
6. Claim 9

Claim 7 illustrates Brown's *side walls* include *first/second portions* that have different angles, i.e., Φ_1, Φ_2, Φ_3, and Φ_4. The *first/second sidewall* initially extends from the back panel at a first angle (Φ_1, Φ_3). The curvature of the *first/second sidewall* would then change as it increases in height to form a second angle (Φ_2, Φ_4) between a second portion and the back panel. The *first angles* (Φ_1, Φ_3) are

different than the *second angles* (Φ_2, Φ_4). Therefore, the first sidewall comprises *multi-angle side walls*. (Ex.1003, ¶¶384-386.)

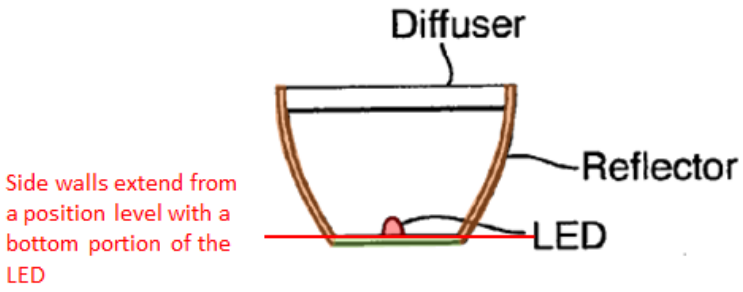
7. Claim 10

Brown discloses the *first and second side walls* are adjacent (i.e., next to) and extend along the entire length of the *lighting strip* (purple). (Ex.1036, ¶0026.) Brown's *first sidewall* is on a side opposite the *second sidewall*. (Ex.1003, ¶387.)



Ex.1036, Fig. 1

Again, Brown's reflector is made from one sheet of metal that includes a "back panel" (*bottom portion* highlighted in green) and reflector wings (*side walls*). (Ex.1036, ¶0026.) Brown discloses the *first/second sidewalls* extend from a positions that is level with a *bottom portion* of a light emitting portion of each LED. (Ex.1003, ¶¶388-389.)



Ex.1036, Fig. 1

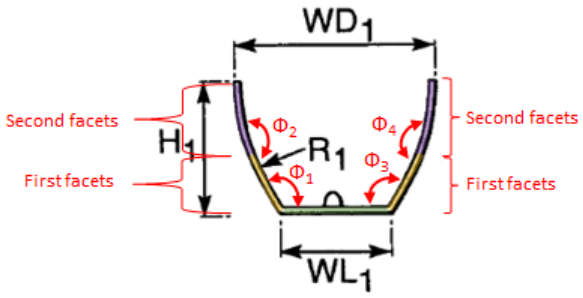
8. Claim 11

Brown discloses a reflector integrally formed from the "same sheet" of metal to create a back panel (bottom portion of reflector) with two folds to form the reflector wings (*side walls*). (Ex.1036, ¶0026.) The *first side wall* and *second side wall* are separately coupled to opposite sides of the *lighting strip* substrate which includes the linear array of LEDs (*lighting arrangement*). (Ex.1003, ¶¶390-391.)

9. Claim 12

Claim 10 illustrates that Brown's reflector integrally formed from the "same sheet" of metal to create a back panel (bottom portion of reflector) with two folds to form the reflector wings (*side walls*). (Ex.1036, ¶0026.) Brown discloses *a first sidewall* comprising a *first reflector sheet* and a *second sidewall* comprising *a second reflector sheet.* Brown also states "radii of the sides do not have to be of constant curvature" and therefore could be parabolic which the '854 Patent states is multi-faceted. (Ex.1036, ¶0027.) Brown's reflector has a *first multi-faceted side wall* that is bent to form *first facets* (shown by angles Φ_1, Φ_2) and a *second multi-*

faceted side wall bent to form *second facets* (shown by angles Φ_3, Φ_4). (Ex.1003, ¶¶392-396.)



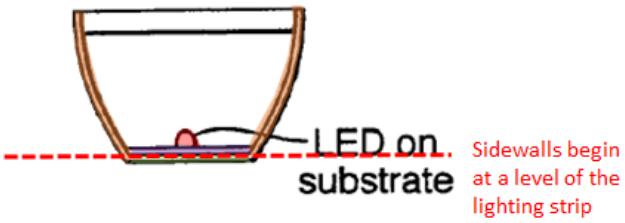
Ex.1036, Fig. 2

10. Claim 13

Brown discloses a reflector integrally formed from the "same sheet" of metal to create a back panel (bottom portion of reflector) with two folds to form the reflector wings (*side walls*). (Ex.1036, ¶0026; Ex.1003, ¶¶397-398.)

11. Claim 14

As shown below, the *first/second sidewalls* begin *at a level of the lighting strip* and each of the *side walls* are shown as *extending way from the lighting strip.* (Ex.1003, ¶¶399-400.)



Ex.1036, Fig. 1

12. Claim 15

… ***Limitation [15.0]***

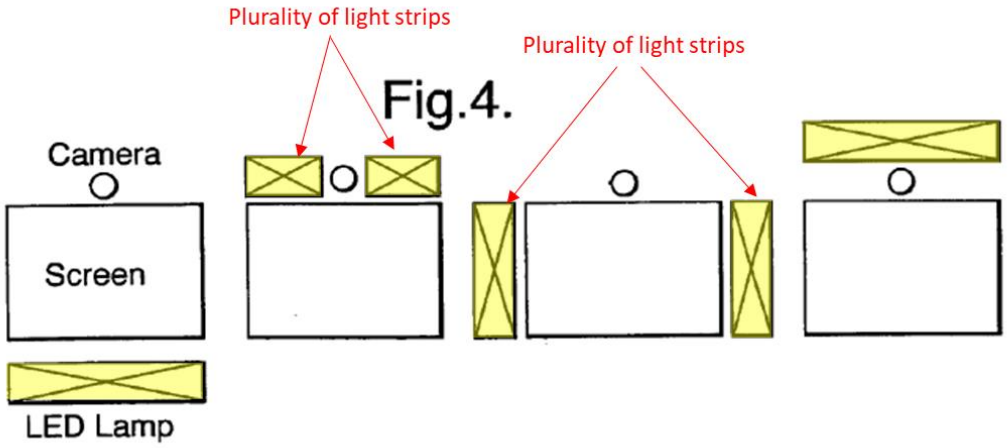
See claim [1.0].

… ***Limitation [15.1]***

See claim [1.1].

… ***Limitation [15.2]***

Brown discloses a singular *light strip* or a *plurality of light strips* may be placed at various locations around a video screen. (Ex.1036, ¶¶0032-0033.)



Ex.1036, Fig. 4

It would have been obvious to a POSITA that the plurality of lighting strips taught by Brown could also be combined in one LED lamp. (Ex. 1003, ¶¶403-410.) Such a modification would have been nothing more than applying a known technique of using multiple lighting strips originally in two separate LED lamps

into the same LED lamp that would provide predictable results. *Id.* For instance, a POSITA would have understood the plurality of lighting strips combined into a single LED lamp could provide a greater intensity of focused light onto a user. As explained in limitation [1.2], the plurality of *lighting strips* (either alone or combined) would be coupled to the front side of a *base plate*. *Id.*

… ***Limitation [15.3]***

Brown discloses a *driver circuit* in the form of a "power source" that can be controlled remotely to "switch on/off or alter the dimming (i.e. the power output) of the LED lamp." (Ex.1036, ¶0035.) Brown's *driver circuit* could also adjust the "light intensity … by varying the power supply of the LED lamp assembly." (Ex.1036, ¶0036; Ex.1003, ¶411.)

Brown also teaches *control circuitry* that can adjust the "position or angle of the LED lamp assembly with a remote control or a user interface." (Ex.1036, ¶0036.) The *control circuitry* is operable through "a user interface like a remote control or via a user menu." (Ex.1036, Brown at ¶0036; *see also* Claim 5.) Brown discloses *control circuitry* that allows a user *via* remote control or user menu to control the position and angle of the reflector lamp or by turning any one of the LED lamps on/off. (Ex.1003, ¶¶412-414.)

… ***Limitations [15.4], [15.5a] and [15.5b]***

See limitations [1.3], [1.4a], and [1.4b] above. To the extent it is argued that

multiple reflectors are required, it would have been obvious to a POSITA that Brown teaches the construction of a reflector with a given *lighting strip* – i.e., substrate and linear array of LEDs. But it would have been obvious that multiple arrays of LEDs and multiple reflectors could be used for a given application as explained by limitation [15.2]. (Ex.1003, ¶¶415-416.)

… ***Limitation [15.6]***

See limitation [1.5].

… ***Limitation [15.7]***

See limitation [1.6].

13. Claim 18

Brown discloses a power supply that itself or separately includes both a *driver circuit* and *control circuit* as discussed in limitation [15.3]. Again, a POSITA understands there are two ways to electrically connect components – series or parallel. Given the limited design choices, it would have been obvious to POSITA that Brown's linear LED array could have been connected in either series or parallel. (Ex.1003, ¶¶419-420.)

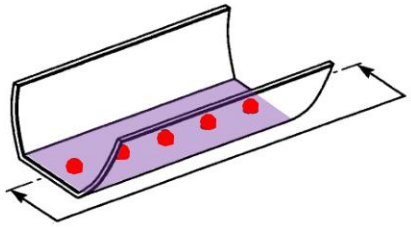
A POSITA would understand Brown's *lighting strip* (i.e., LEDs attached on a substrate) would be electrically connected in series as this would be the most common way of creating wire traces on the substrate for connecting each of the LEDs. (Ex. 1003, ¶421.) To the extent Brown's LEDs were connected in parallel,

then it would have been obvious and within the skill of a POSITA to connect the LEDs in series since the most common and obvious way to connect a series of LEDs in a luminaire is to connect them in series so that the same DC current runs through all of them. *Id.*

It would have also been known that Brown's *driver circuitry* would likely be connected in parallel if the LEDs were connected in series. A POSITA would understand connecting the *driver circuitry* in parallel would allow control for all the LEDs (e.g., for dimming) at the same time. (Ex. 1003, ¶422.) This would be more efficient and economical than providing separate *driver circuits* for each LED itself. *Id.*

14. Claim 20

As I discussed above, Brown discloses "linear array of LEDs protected by a LED substrate [*lighting strip*] is mounted on a back panel." (Ex.1036, ¶0026.)



Ex.1036, Fig. 1

As discussed in limitation [15.2], it would have been obvious to a POSITA to include an LED lamp with multiple LED *lighting strips*. It would have also been obvious that the *plurality of lighting strips* would all include a substrate with a

linear row of LEDs. (Ex.1003, ¶¶424-426.)

F. Reasons or Motivation to combine Brown and Stopa

It would have been obvious to a POSITA to modify Brown to include the teachings of Stopa. First, Brown and Stopa both arise from the same field of endeavor of LED lighting solutions using reflectors and heat sinks. Both Brown and Stopa relate to the same field of LED lighting which utilize reflectors to focus the light into a uniform beam. Brown/Stopa differ slightly regarding (1) the possible construction of the reflectors; and/or (2) placement of the LED lighting strips (i.e., substrates with LEDs) with respect to the reflector and heat sink. (Ex.1003, ¶¶427-429.)

A POSITA understands the choice of substrate placement makes no significant change to the optical performance of the LEDs relative to the reflectors. As such, reflectors for both designs are interchangeable with minimal modification e.g., providing openings for the LEDs. (Ex. 1003, ¶¶429-430.) A POSITA also understands LEDs produce heat that must be properly managed to ensure satisfactory operation of the lighting device. *Id.* Both Brown and Stopa teach heat sinks with fins. Stopa simply teaches a removable heat sink (with fins) that can be attached to the substrate and reflector using a well-known technique – i.e., screws or adhesive. Brown teaches "attaching" the heat sink to the back of the reflector. *Id.* A POSITA would have known and found it obvious that Brown's heat sink fins

would have been attached using similar attachment techniques. *Id.*

VIII. The Board Should Not Deny Institution Under 35 U.S.C. §314(a)

On June 21, 2022, the Director issued interim procedures regarding application of the *Fintiv* factors (Interim Guidance). The Director's Interim Guidance states that "the PTAB will not deny institution of an IPR … under Fintiv (i) when a petition presents compelling evidence of unpatentability. . . or (ii) [consistent] with *Sotera Wireless, Inc.* … a petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition." (Ms. Vidal June 21, 2022 Memo, pgs. 2-3.) Consistent with this guidance, Petitioner specifically follows and addresses these points within its analysis of Factors 4 and 6 below, as well as the remaining *Fintiv* Factors.

FACTOR 1: *Sotera* found this factor neutral because the district court had not been requested to issue a stay. Here, no stay has yet been requested by either party and this factor is speculative at best and neither weighs for or against institution.

FACTOR 2: *Sotera* determined that "[i]f the court's trial date is at or around the same time as the projected statutory deadline or even significantly after the projected statutory deadline, the decision whether to institute will likely implicate other factors discussed herein." (*Sotera* at 15). Although *Sotera's* trial was to begin

around the same time as the final written decision date, the Board refused to exercise discretionary denial. Here, the litigations are at an initial stage and discovery has just begun. (Ex.1046 at 3.) Should the current calendar remain unaltered, trial is scheduled for August 2023. *Id.* While a final written decision in this matter would not occur until after the currently scheduled trial, this factor should not weigh against institution given the weight of the other factors.

FACTOR 3: *Sotera* noted that that "fact discovery is ongoing, expert reports are not due yet, and substantive motion practice is yet to come" and found that "although the parties and the District Court have invested some effort in the parallel proceedings to date, further effort remains to be expended in this case before trial." (*Sotera* at 16.) The same is true in the present matter. Here, fact discovery has just opened with expert reports not being due until next April. *Id*. at 4. Thus, this factor weighs against discretionary denial.

FACTOR 4: Petitioner acknowledges under the district court's scheduling order it was required to recently submit "final" invalidity contentions. (Ex.1046 at 3.) Considering the "final" contentions were due prior to filing the present Petition, Petitioner wants to make clear it is consenting to a ***full*** *Sotera*[15] stipulation

[15] *Sotera Wireless, Inc. v. Masimo Corp*., IPR2020-01019, Paper 12 (P.T.A.B. Dec. 1, 2020) (precedential, designated Dec. 17, 2020).

and ***Petitioner will not pursue in the parallel district court litigation or other parallel proceedings the same grounds as raised in this Petition or any grounds that Petitioner could have reasonably raised before the PTAB***. To re-iterate, Petitioner agrees to not pursue any of the same grounds raised in this Petition, any grounds raised within Petitioner's invalidity contentions, or any grounds Petitioner could have reasonably raised before the PTAB in the parallel district court litigation or any other parallel proceeding.

While this Petition is being filed prior to the 1-year statutory deadline, it should be noted Patent Owner has asserted a significant number of claims across seven different patents. Patent Owner also supplemental its infringement contentions this past summer. Given the breadth of the *Sotera* stipulation above, Petitioner has spent its time thoroughly analyzing and preparing the Petition considering this is its sole opportunity to present the art before the PTAB.

In addition to the *Sotera* stipulation, Petitioner has also challenged claims 11, 12 which have not been asserted by the Patent Owner in district court. It is unlikely the district court will therefore be addressing the validity of all challenged claims and this factor weighs against discretionary denial.

FACTOR 5: The parties in the related district court litigation are the same.

FACTOR 6: This Petition presents a compelling meritorious challenge that should proceed even if the district court litigation is ongoing in parallel. While

some of the prior art may be cited on the face of the Challenged Patent, none was used or relied upon during prosecution. Petitioner also believes the evidence presented above, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.

As indicated above, other circumstances weigh in favor of institution. Here, the merits of the Petition are particularly strong. This Petition explains how the challenged claims are not patentably distinct over the prior art. When viewed holistically, just like in *Sotera*, the timing of the present Petition was reasonable, there has been relatively limited investment in the related litigation, and there is minimal overlap between the present IPR and the related litigation. Thus, the efficiency and integrity of the IPR process is best served by instituting review.

IX. Conclusion

There is a reasonable likelihood that Petitioners will prevail on institution for each of Grounds and institution should be granted.

Respectfully submitted,

Dated: October 28, 2022

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Certificate of Service

The undersigned hereby certifies that the foregoing **PETITION FOR *INTER PARTES* REVIEW UNDER 35 U.S.C. § 311 *ET SEQ*. AND 37 C.F.R. § 42.100 *ET SEQ*. (U.S. PATENT NO. 9,699,854)**, including all exhibits and supporting evidence, was served by overnight courier in its entirety on **October 28, 2022**, upon the following correspondence address as shown for the '854 Patent:

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WASHINGTON, DC 20006-5344
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Respectfully submitted,

Dated: October 28, 2022

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Certificate of Compliance Pursuant to 37 C.F.R. § 42.24

This paper complies with the type-volume limitation of 37 C.F.R. § 42.24. The paper contains 13,517 words, excluding the parts of the paper exempted by §42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(ii) and the type style requirements of § 42.6(a)(iii)&(iv).

Respectfully submitted,

Dated: October 28, 2022

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