

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WALMART INC. and CURRENT LIGHTING SOLUTIONS, LLC,
Petitioner,

v.

POWER CONCEPTS, LLC,
Patent Owner.

IPR2022-00534
Patent 10,837,628 B2

Before KEVIN F. TURNER, JEFFREY S. SMITH, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

Opinion for the Board filed by *Administrative Patent Judge*
JEFFREY S. SMITH.

Opinion Concurring filed by *Administrative Patent Judge*
DANIEL J. GALLIGAN.

SMITH, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Walmart Inc. and Current Lighting Solutions, LLC (collectively, “Petitioner”) filed a Petition (Paper 3, “Pet.”) requesting *inter partes* review of claims 1, 2, 4–13, and 15–28 of U.S. Patent No. 10,837,628 B2 (Ex. 1001, “the ’628 patent”) pursuant to 35 U.S.C. § 311(a). Patent Owner disclaimed claims 13 and 15–17, leaving only claims 1, 2, 4–12, and 18–28 at issue. Exs. 2001, 2002. We instituted trial on claims 1, 2, 4–12, and 18–28 (Paper 10, “Dec.”). Patent Owner Power Concepts, LLC filed a Response to the Petition. Paper 18 (“PO Resp.”). Petitioner filed a Reply (Paper 22, “Pet. Reply”) and Patent Owner filed a Sur-Reply (Paper 40, “Sur-Reply”). Patent Owner also filed a Contingent Motion to Amend (Paper 14, “Mot.”), Petitioner filed an Opposition to the Motion to Amend (Paper 20, “Opp.”), Patent Owner filed a Reply to the Opposition (Paper 27, “Reply to Opp.”), and Petitioner filed a Sur-Reply to the Motion to Amend (Paper 35, “Sur-Reply to Mot.”).

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine claims 1, 2, 4–12, and 18–28 are unpatentable, and Patent Owner’s Motion to Amend is *denied* with respect to proposed substitute claims 29–47.

B. *Related Matters*

The parties indicate that the ’628 patent is the subject of *Power Concepts, LLC v. Walmart Inc.*, No. 7:21-cv-00408-TMC (D. S.C.). *See* Pet. xv; Paper 4, 2. The ’628 patent is a continuation of U.S. Patent No. 10,429,041 B2, which is the subject of IPR2022-00569.

C. Challenged Patent

The '628 patent relates to “a ceiling light LED retrofit kit” and discloses “a kit for installation of light emitting diode lighting mounted upon a previously-installed fluorescent lighting fixture.” Ex. 1001, 1:19–22.

Figure 1 of the '628 patent is shown below:

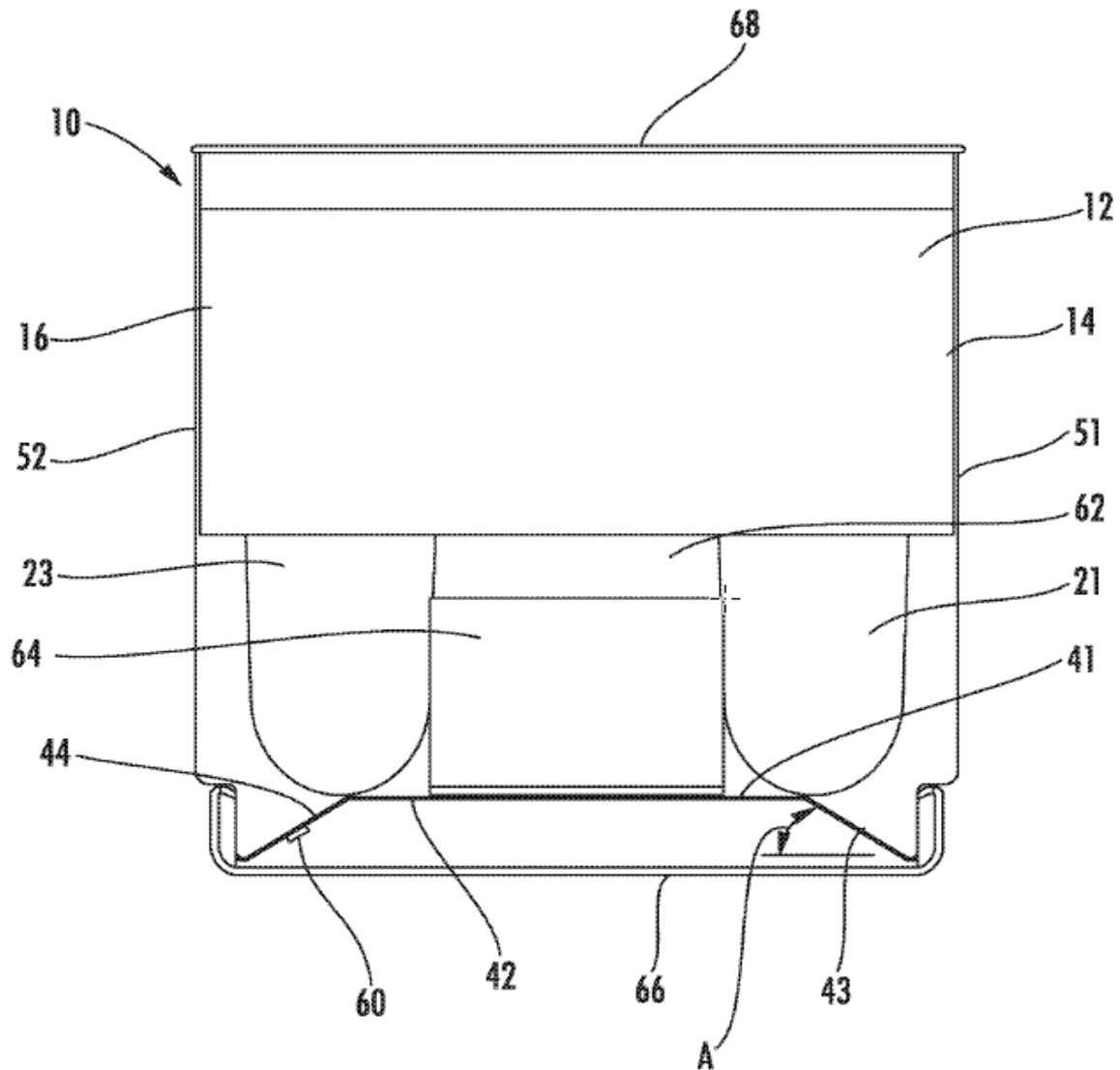


FIG. 1

Figure 1 above is an end elevation view of a ceiling light LED retrofit kit. Ex. 1001, 2:59–61. Fixture 10 includes pre-installed base 12, which has

first and second longitudinal sides 14, 16, and is attached to ceiling 68 of a building. *Id.* at 3:33–36. Base 12 includes first electrical receptacle 21 (also known as a tombstone), second electrical receptacle 22 (opposite to receptacle 21 and shown in Figure 4), and third electrical receptacle 23. *Id.* at 3:36–38, 5:58–60. First and second electrical receptacles 21 and 22 are configured to receive and energize a fluorescent light tube disposed between them. *Id.* at 3:39–42. A light panel includes first side 41 facing fixture 10 and opposed second side 42. *Id.* at 3:45–48. The light panel of Figure 1 includes angled wings 43 and 44. *Id.* at 3:45–49. One or more LEDs 60 are disposed on second side 42 of the light panel, such as on angled wing 44 as shown in Figure 1. *Id.* at 3:49–54. Power supply 64 energizes LED 60 and is located within raceway 62. *Id.* at 3:54–55.

Figure 3 of the '628 patent is shown below:

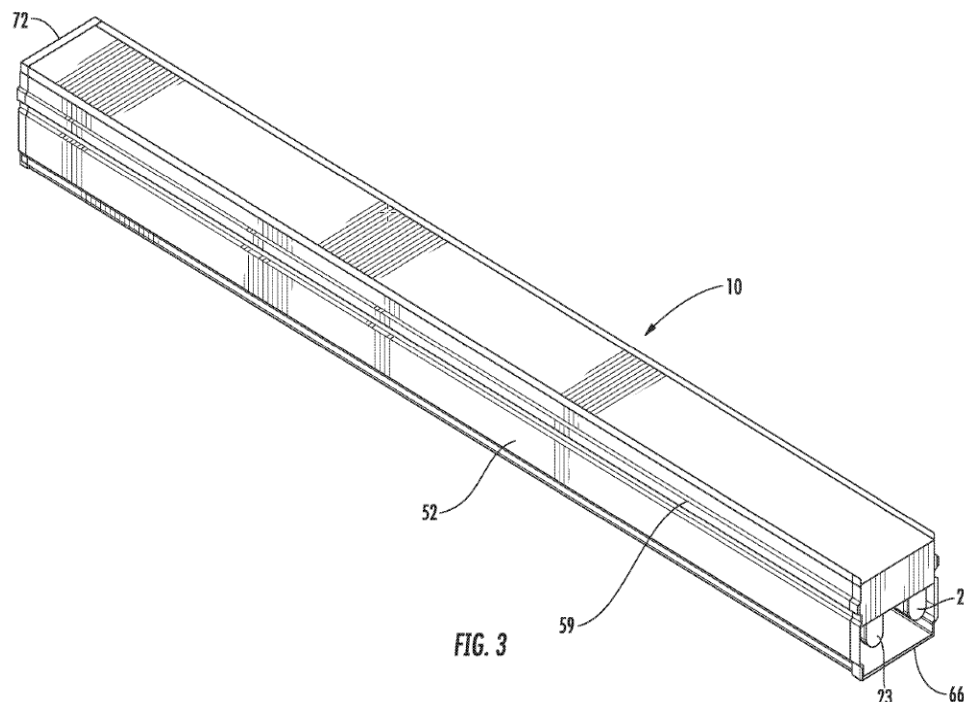


Figure 3 above shows an assembled LED retrofit kit. Ex. 1001, 4:59–60. First profile 51 (shown in Figure 1) and second profile 52 extend

longitudinally. *Id.* at 4:60–62. Lens 66 is attached to the first and second profiles by endcap 72. *Id.* at 4:63–65. The first and second profiles include one or more longitudinal ribs 59. *Id.* at 4:66–67.

D. Illustrative Claim

Challenged claim 1 of the '628 patent recites:

1. A retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube, the retrofit kit comprising:

a light panel, the light panel including a first side facing the previously-installed light fixture and an opposite second side;

the light panel residing at least partially between the first tombstone and the second tombstone;

the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture;

a light emitting diode residing on the second side of the light panel; and

an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode.

E. Evidence

Petitioner relies on the following prior art:

U.S. Patent Application Publication No. 2006/0221606 A1, published Oct. 5, 2006, (Ex. 1007, “Dowling”);

U.S. Patent Application Publication No. 2012/0113628 A1, published May 10, 2012, (Ex. 1008, “Burrow”);

U.S. Patent No. 8,896,208 B2, issued Nov. 25, 2014 (Ex. 1016, “Shew”);

U.S. Patent Application Publication No. 2015/0345751 A1, published Dec. 3, 2015 (Ex. 1014, “Oksengendler”).

Petitioner also relies on the testimony of Alfred Ducharme, Ph.D. (Ex. 1003).

F. Asserted Grounds

Petitioner asserts that claims 1, 2, 4–12, and 18–28 of the '628 patent are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 2, 5–10, 12, 18–20, 22–26, 28	103	Dowling
1, 5–12, 18, 20, 22–24, 26	103	Burrow
1, 4, 18, 21, 24, 27	103	Shew
1, 4, 18, 21, 24, 27	103	Oksengendler

II. ANALYSIS OF THE CHALLENGED CLAIMS

A. Claim Construction

In an *inter partes* review, a claim “shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2021). Under that standard, we construe the claim “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.” *Id.*

Petitioner asserts that it applies the plain and ordinary meaning of the challenged claims to the asserted prior art references. Pet. 6. Dr. Ducharme contends that the preambles of each of independent claims 1, 18, and 24 are not limiting, because the body of each claim defines a structurally complete invention, and the preamble merely states the fixtures for which it would be used. Ex. 1003 ¶¶ 326, 361, 382.

Patent Owner does not explicitly construe any claim terms, but instead, implicitly construes several claim terms in the context of Patent Owner's patentability analysis. To the extent necessary to address the parties' arguments, constructions of additional claim terms are addressed below in the context of our unpatentability analysis. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that only terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy).

B. Level of Ordinary Skill in the Art

Petitioner argues that a person of ordinary skill in the art “would have had a bachelor’s degree in mechanical or electrical engineering and at least two years of experience developing lighting fixtures,” noting that “[t]his description is approximate and additional development experience could make up for less education and vice versa.” Pet. 5 (citing Ex. 1003 ¶¶ 33–36 (Dr. Ducharme setting forth this definition)). Patent Owner’s declarant, Eric Bretschneider, Ph.D., agrees with this definition of the level of ordinary skill in the art. Ex. 2076 ¶ 67. With the exception of the open-ended language “at least,” which introduces ambiguity as to the amount of experience level, we adopt the parties’ agreed definition.

In the briefing, neither party contested the qualifications of the other party’s expert to opine on matters from the perspective of a person of ordinary skill in the art. During oral argument, Patent Owner’s counsel appeared to call into question Dr. Ducharme’s qualifications, arguing that Petitioner “ha[s] not carried” its burden to show that “Dr. Ducharme is a person of skill in the art.” Tr. 75:6–7. Patent Owner’s counsel also stated that Dr. Ducharme does not have a degree in electrical engineering. Tr. 75:22–23. Upon further questioning, Patent Owner’s counsel retracted the

statement about Dr. Ducharme's education when it was pointed out that Dr. Ducharme testified that he has three degrees in electrical engineering: a B.S., M.S., and Ph.D. Tr. 78:5–14; *see* Ex. 1003 ¶ 7 (“I have three degrees in electrical engineering: a B.S., M.S., and Ph.D.”). We find Dr. Ducharme to have the requisite education and experience to testify from the standpoint of a person of ordinary skill in the art. *See* Ex. 1003 ¶¶ 7–14.

C. Asserted Obviousness over Dowling

Petitioner contends that claims 1, 2, 5–10, 12, 18–20, 22–26, and 28 would have been obvious over Dowling. Pet. 10–40.

1. Dowling (Ex. 1007)

Dowling discloses an LED-based lighting retrofit apparatus for fluorescent lighting fixtures. Ex. 1007, codes (54), (57). Figure 3 of Dowling is shown below:

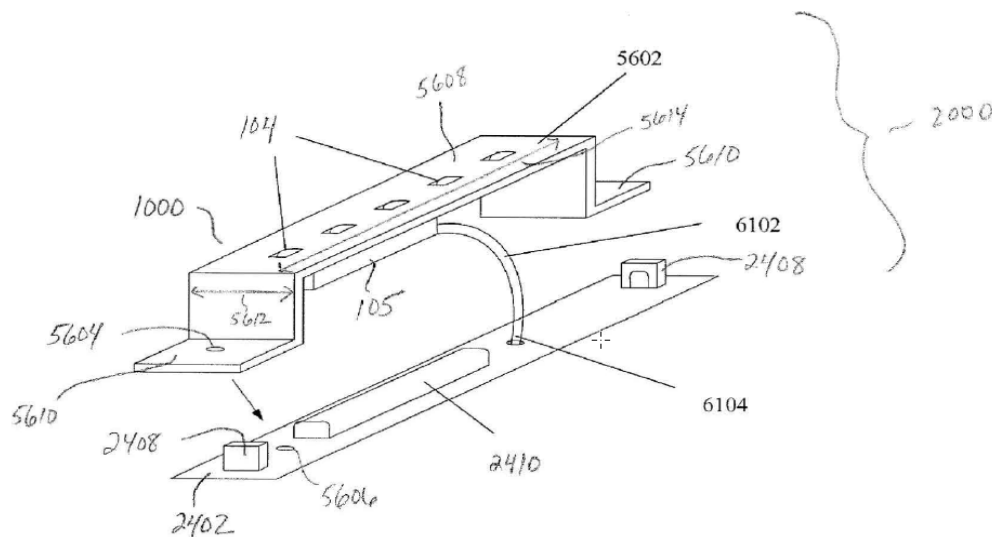


FIG. 3

Figure 3 above shows modified conventional fluorescent lighting fixture 2000 retrofitted with an LED-based retrofit subassembly 1000. Ex. 1007 ¶ 106. Ballast 2410 and fluorescent bulb connectors 2408 are mounted on fluorescent fixture housing 2402. *Id.* ¶ 107. Retrofit

subassembly 1000 is attachable to housing 2402. *Id.* Subassembly 1000 includes mechanical support 5602, to which one or more LEDs 104 are coupled. *Id.* ¶ 108. Mechanical support 5602 is configured as a U-shaped member having elevated portion 5608 and two flanking portions 5610 on opposing sides of the elevated portion. *Id.* ¶ 111. The mechanical support provides clearance between elements of the lighting apparatus included in subassembly 1000, such as controller 105, and original components of the fixture, such as ballast 2410. *Id.*

2. *Dowling in View of the Knowledge of a Person of Ordinary Skill*
Independent Claim 1

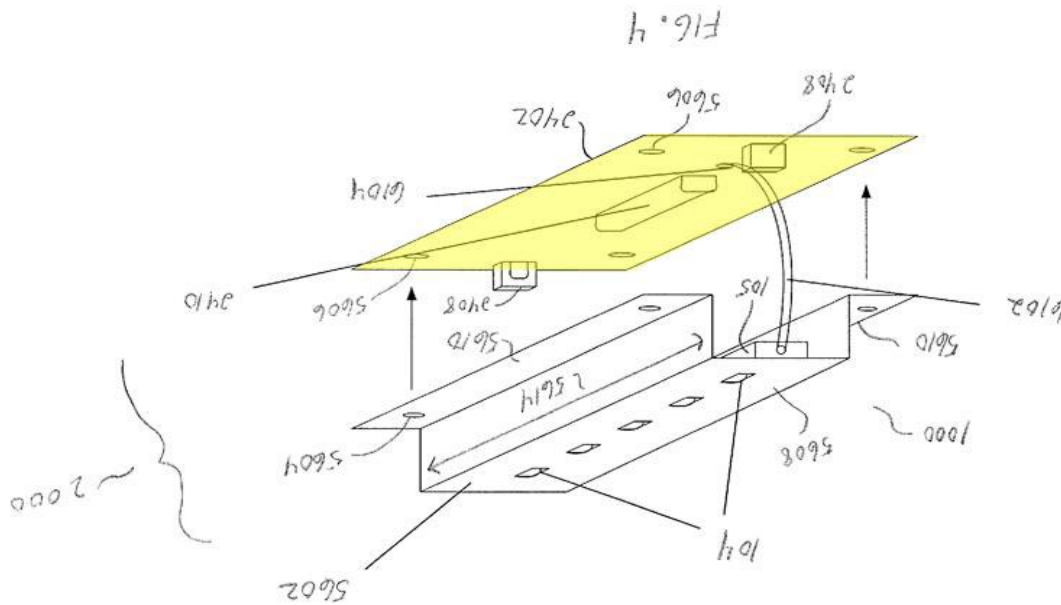
The preamble of claim 1 recites a “retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube.” Petitioner contends that Dowling discloses the preamble in describing an apparatus including LED-based light sources that may be employed as subassemblies for retrofitting conventional lighting fixtures or fixture housings. Pet. 10 (citing Ex. 1007 ¶ 7). Petitioner contends that Dowling discloses a conventional fluorescent lighting fixture that includes tombstones. *Id.* (citing Ex. 1007 ¶¶ 11–12). Petitioner contends that a person of ordinary skill would have understood that electrical power to the fixture would need to be disconnected so that electrical power could be provided to the LED retrofit. *Id.* at 10–11 (citing Ex. 1003 ¶¶ 117–120). Petitioner contends that Dowling discloses removing the fluorescent tube before installing the retrofit assembly. *Id.* at 11–12 (citing Ex. 1007,

Figs. 1 and 4). To the extent the preamble is limiting, we find that Petitioner has demonstrated that Dowling teaches the preamble of claim 1.

Claim 1 recites “a light panel, the light panel including a first side facing the previously installed light fixture and an opposite second side.” Petitioner contends that Dowling discloses this limitation in describing a light panel with first side facing fixture 2402 and an opposite second side. Pet. 12–13 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶¶ 113, 121–123). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 1.

Claim 1 recites “the light panel residing at least partially between the first tombstone and the second tombstone.” Petitioner contends that Dowling discloses this limitation in describing that LED retrofit assembly 1000 includes a central panel 5608 having a light panel, where a portion of the light panel resided between first and second tombstones. Pet. 13 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶¶ 113, 124–126). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 1.

Claim 1 recites “the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture” which is “attached to the ceiling of a building.” Petitioner contends that Dowling’s conventional lighting fixture shown in Figure 1 would be inverted when attached to a ceiling. Pet. 10–11. Petitioner contends that Dowling’s retrofit kit shown in Figures 3 and 4 would also be inverted when attached to the ceiling fixture. *Id.* at 11–14. Inverted Figure 4 of Dowling as shown in the Petition is reproduced below:



Petitioner contends that inverted Figure 4 above shows housing 2402 of the conventional lighting fixture attached to a ceiling and retrofit kit 1000 attached to the fixture. Pet. 11–12. Petitioner contends that inverted Figure 4 teaches the claimed “raceway” above light panel 5608 of retrofit subassembly 1000 and below housing 2402 of modified fixture 2000. Pet. 14 (citing Ex. 1007 ¶¶ 111–112, Figs. 3 and 4; Ex. 1003 ¶¶ 127–129).

Patent Owner contends that Dowling does not teach this limitation because (a) the retrofit kit of Dowling is directed to applications that are non-analogous to interior lighting, (b) the retrofit kit of Dowling requires additional hardware to generate white light used in interior applications such as retail and office lighting, and (c) inverting and attaching the retrofit kit of Dowling to a ceiling would render it inoperable because of insufficient heat dissipation. PO Resp. 8–10; PO Sur-Reply 1–4.

Patent Owner contends that Dowling is directed to non-analogous applications. PO Resp. 8. Patent Owner, relying on Dr. Bretschneider’s

testimony, contends that Dowling is concerned with complex lighting applications common to light shows and special effects and would not be suitable for indoor commercial and retail lighting applications. *Id.* (citing Ex. 1007 ¶¶ 81, 88–90, 109–110; Ex. 2076 ¶¶ 278–284). According to Patent Owner, Dowling requires multiple, differently colored LEDs which require their own drivers and other hardware, in order to produce white light. *Id.* (citing Ex. 2076 ¶¶ 279–284). Patent Owner contends that the coordination of multiple LED color sources to provide the white light needed to illuminate commercial and office interiors creates inefficiencies that frustrate the goal of a retrofit. *Id.* at 8–9 (citing Ex. 2076 ¶¶ 279–284).

However, the challenged claims do not recite applications relating to interior, commercial, retail, and office lighting. Similarly, the challenged claims do not recite limiting the color of the LED to white light. Further, the specification of the '628 patent does not disclose that the color of the light emitted by the LED is white. The specification, in the background section, does mention that “[f]luorescent lighting is commonly used in commercial building and office interiors,” but does not limit claim 1 to commercial building and office interiors. *See* Ex. 1001, 1:26–27. Rather, the specification discloses that the fixture may include a base attached to the interior ceiling of a building, without requiring the building to be either a commercial or an office building. *Id.* at 3:33–34; *see id.* at 2:17–20. Patent Owner’s contentions are not commensurate with the scope of the claims as read in light of the specification. We find that Dowling’s disclosure of colored LEDs and applications common to light shows are within the scope of claim 1 and that Dowling, which is directed to “LED-based light sources that may be employed as subassemblies for retrofitting conventional lighting

fixtures” (Ex. 1007 ¶ 7), is in the same field of endeavor as the ’628 patent and, therefore, is analogous art. *See* Ex. 1001, 1:16–22.

Even were we to accept Patent Owner’s construction of claim 1, we disagree that Dowling is not directed to interior lighting and that Dowling requires multiple LEDs, along with multiple drive circuits and additional hardware, in order to produce white light. Dowling discloses that the lighting apparatus can facilitate “various interior lighting conditions” and that “a lighting fixture retrofitted with the apparatus 100 may be employed in . . . interior . . . lighting” such as “retail/consumer environments.”

Ex. 1007 ¶¶ 81, 90. Dowling discloses that “one . . . light source[] that include[s] one . . . LED[]” generates “essentially white light.” *Id.* ¶ 88; *see id.* ¶¶ 21, 22, 26–28, 82, 89, 90, 109, 127. Therefore, we disagree with Patent Owner and Dr. Bretschneider, and find that Dowling’s disclosure of employing its lighting fixture in interior lighting such as retail and commercial environments, along with Dowling’s disclosure of using one LED that generates white light, suggests a “retrofit kit” having “a light emitting diode” that generates white light for interior uses such as commercial, retail, and office lighting, without requiring multiple drive circuits and additional hardware.

Patent Owner contends that Dowling does not disclose the previously-installed light fixture attached to a ceiling, because the light in Dowling is directed up. PO Resp. 9–10; PO Sur-Reply 2. Patent Owner contends that Petitioner fails to provide any reasoning as to why a person of ordinary skill would be motivated to modify Dowling by inversion, and how the Dowling device would operate once inverted. PO Resp. 9. Patent Owner, relying on testimony of Dr. Bretschneider, contends that inverting the device would result in an untested use that violates industry standards. PO Resp. at 9–10

(citing Ex. 2076 ¶¶ 285–289); *see id.* at 19 (citing Ex. 2076 ¶¶ 106–130). Patent Owner contends that the Dowling lighting assemblies could not be inverted because such inversion would result in suboptimal heat dissipation that would drastically decrease the efficiency and performance of the LEDs, making the inverted Dowling device far less energy efficient than conventional fluorescent lighting. *Id.* at 10 (citing Ex. 2076 ¶¶ 284, 289); *see id.* at 18–19 (citing Ex. 2076 ¶¶ 352–354); Reply Br. 1–2 (citing Ex. 1007 ¶ 117; Ex. 2076 ¶ 120, 285–290). Patent Owner contends that such a modification would render the Dowling device inoperable for its intended purpose. PO Resp. 19.

We disagree with Patent Owner’s arguments because they are based on the false premise that Dowling does not disclose retrofitting a ceiling fixture. Dowling’s disclosure is directed to “retrofitting conventional lighting fixtures,” which include “recessed fixtures (e.g., wherein the housing is concealed behind a ceiling or wall).” Ex. 1007 ¶¶ 7, 9. Thus, Petitioner does not propose modifying Dowling by inverting the disclosed device. Rather, Petitioner inverts certain figures of Dowling to show how the device is implemented in the ceiling configuration disclosed in Dowling. *See, e.g.*, Pet. 13 (showing orientation of devices of Figures 3 and 4 when used in a ceiling configuration).

In its Sur-reply, Patent Owner makes the following argument:

The disclosed orientation of Dowling is intentional. Response at 9; EX2076 at ¶¶ 285-289; EX1007 at ¶ 0117 (disclosing that the “mechanical support” of Dowling “may be configured to fit over any surface that includes a corner, such as a corner of . . . a floor . . .”). A [person of ordinary skill in the art (POSA)] would have no motivation to invert Dowling to create a downward-emitting light fixture, and would understand that inverting an LED lighting system that originally had its

heated side facing up would be significantly less efficient, would reduce lifespan, and would exhibit other performance defects. EX2076 at ¶120.

PO Sur-reply 2 (alterations by Patent Owner). Paragraph 117 of Dowling discloses:

FIG. 9 depicts a subassembly configuration according to another embodiment including an L-shaped mechanical support 6702 in which LED light sources 104 are disposed substantially in lines along two planes that are substantially perpendicular to each other. The support 6702 may be configured to fit over any surface that includes a corner, *such as a corner of a wall, a ceiling, a floor, a rectangular fixture, or the like.*

Ex. 1007 ¶ 117 (emphasis added). As the emphasized disclosure makes plain, Patent Owner omitted “ceiling” from its parenthetical rather than address the plain disclosure of the reference.

Based on Dowling’s disclosure of retrofitting a ceiling fixture, we find that Petitioner’s orientation of certain figures as inverted represents how a person of ordinary skill in the art would have understood Dowling’s retrofit kits in a ceiling application. Thus, we do not agree with Patent Owner that Petitioner’s contentions rely on modifying Dowling to invert the device.

Patent Owner’s inoperability arguments fail because, even if “inverting Dowling would dramatically reduce the heat transfer coefficient, which would degrade the performance of the LEDs resulting in a less efficient fixture with a shorter lifespan,” as asserted by Patent Owner (PO Resp. 19), the device still is operable. Indeed, Dr. Bretschneider’s testimony confirms that Dowling would still function in a ceiling, albeit less efficiently. *See, e.g.,* Ex. 2076 ¶ 354 (testifying that a person of ordinary skill in the art “would be aware that installing Dowling’s inverted embodiment of figure 4 in the recess of a housing mounted to a ceiling

would further degrade the heat dissipation capabilities, resulting in even higher operating temperatures and further reductions in lifetime and efficiency”). The claims do not recite any amount of efficiency, heat dissipation, or LED lifespan, and, therefore, Patent Owner’s arguments based on such unclaimed characteristics are unavailing.

Petitioner, relying on testimony of Dr. Ducharme, contends that Dowling teaches retrofitting a fluorescent lighting fixture hanging from a ceiling or recessed within a ceiling, and that a person of ordinary skill would have understood that the fluorescent fixture could have been directly attached to a ceiling. Pet. Reply 2–6 (citing Ex. 1007 ¶¶ 7, 9, 11, 106, 112, claims 1, 2, 13; Ex. 1032 ¶¶ 21–34; Ex. 1038 at 93–94). Petitioner contends that a person of ordinary skill would have understood that the LED-retrofit assembly is constructed from a material such as metal that provides a thermal path for effectively dissipating heat. Pet. Reply 6 (citing Ex. 1007 ¶ 111; Ex. 1032 ¶¶ 35–39; Ex. 1038 ¶ 93). Petitioner further contends that Dowling incorporates Dowling II (Ex. 1040), which is directed to thermal management of LEDs using heat sinks and fans. *Id.* Petitioner contends that a person of ordinary skill would have understood that the heat sinks and fans taught by Dowling II would dissipate heat. *Id.* at 6–7 (citing Ex. 1040, 65:50–66:3, Fig. 124; Ex. 1032 ¶¶ 40–43).

We recognize that the testimonies of Dr. Ducharme and Dr. Bretschneider are at odds, but we find Dr. Ducharme’s testimony, which relies on the teachings of Dowling and the background knowledge of a person of ordinary skill, more credible. Dowling discloses that the fixture could be a down-lighting fixture. Ex. 1007 ¶ 9. In particular, Dowling discloses that modified fixture 2000 could be recessed, such that housing 2402 is concealed behind a ceiling, or could be an under-cabinet fixture. *Id.*

¶¶ 9, 114; *see id.* at Fig. 1, ¶¶ 11–12 (describing a conventional lighting fixture), 105, 106 (“[T]he modified fixture 2000 in which the [LED-based retrofit] assembly 1000 is retrofitted may be a conventional fluorescent lighting fixture (as illustrated, for example, in FIG. 1).”), 107. Dowling discloses that the subassembly may include a support that can fit over any surface that includes a corner, such as a ceiling. *Id.* at ¶ 117; *see* Ex. 1034 ¶ 28 (citing Ex. 2067) (Dr. Ducharme testifies that a person of ordinary skill would have understood that the fixture could be attached directly to the ceiling). We disagree with Dr. Bretschneider because his testimony does not address Dowling’s disclosure of ceiling fixtures that provide down-lighting. *See* Ex. 2076 ¶¶ 106–130, 284–289. We rely on the testimony of Dr. Ducharme (Ex. 1032 ¶¶ 24–34), the teachings of Dowling, and the knowledge of a person of ordinary skill in finding that when a conventional down-lighting fixture is recessed in a ceiling, or mounted to a ceiling as taught by Dowling, a person of ordinary skill would have inverted Dowling’s retrofit kit as contended by Petitioner, in order to provide a down-lighting fixture that directs light downward.

Similarly, with respect to heat dissipation, Dr. Ducharme’s testimony, which relies on the teachings of Dowling and the knowledge of a person of ordinary skill, is more credible than Dr. Bretschneider’s testimony. Dowling discloses that “the mechanical support 5602 may be made of a thermally conductive material (e.g., metal) so as to provide a thermal conduction path to transmit heat from the vicinity of the LEDs 104 and/or the controller 105 so as to be dissipated by the housing 2402 of the fixture.” Ex. 1007 ¶ 111. Dowling also incorporates Dowling II by reference, which discloses removing heat using a fan. Ex. 1007 ¶ 61; Ex. 1040, Fig. 124, 65:50–66:3. Dowling II further discloses using a processor to control the fan to allow

cooling to take place in different amounts and at different times, in order to make “a tradeoff between the negative effects of heat on the lifetime of the LEDs and the negative effects of noise on the environment.” *Id.* at 8:8–23. Dr. Bretschneider does not address Dowling’s disclosure of using a thermally conductive material to dissipate heat. *See* Ex. 2076 ¶¶ 106–130, ¶¶ 284–289. Although Dr. Bretschneider does testify to the disadvantages of using a fan to dissipate heat, Dr. Bretschneider does not address Dowling’s disclosure, through incorporation of Dowling II, of controlling the fan in order to make a tradeoff between the negative effects of not using a fan and the negative effects of using a fan. *See* Ex. 2076 ¶¶ 112–115. Further, Patent Owner and Dr. Bretschneider have not provided persuasive evidence to show that the known techniques of thermal management were insufficient to dissipate 10 W of heat generated by a group of LEDs that emit 2,950 lumens. *See* Ex. 2076 ¶ 140.

Patent Owner contends that Petitioner has not explained why a person of ordinary skill would use a fan if Dowling’s metal structure alone would effectively provide heat dissipation. PO Sur-Reply 3. To the extent that Dowling’s metal structure alone would effectively provide heat dissipation, we agree that a fan would not be necessary. If the metal structure alone would not be sufficient, we are persuaded by the testimony of Dr. Ducharme, and the teachings of Dowling and Dowling II, that a person of ordinary skill would have used a thermally conductive material, or a fan, or both, to provide a sufficient amount of heat dissipation in order to make the device of Dowling operable for its intended purpose and to comply with the LM-79 and LM-80 test standards. *See KSR*, 550 U.S. at 421 (“When there is a design need [to remove heat] and there are a finite number of identified,

predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.”).

Patent Owner, relying on Dr. Bretschneider’s testimony, contends that a person of ordinary skill would not have used a fan because such person would have understood that using a fan for thermal management would be less effective than natural convection and would increase cost and shorten the lifetime of the fixture. PO Sur-Reply 3–4 (citing Ex. 2076 ¶¶ 102–115). We disagree. It is not necessary to show that a combination is “the *best* option, only that it be a *suitable* option.” *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014). “[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). “Instead, the benefits, both lost and gained, should be weighed against one another.” *Id.* That is what we have here, with Dowling II’s disclosure that a lighting fixture can cool itself with a fan “at times when cooling is most necessary (such as when the environment of the LEDs heats up), and at times when cooling is most convenient (such as when people are absent)” in order to provide “a tradeoff between the negative effects of heat on the lifetime of the LEDs and the negative effects of noise on the environment.” Ex. 1040 8:8–23. Neither Patent Owner nor Dr. Bretschneider address Dowling II’s teaching of making a tradeoff between the negative effects of using a fan and the negative effects of not using a fan.

Patent Owner contends that Petitioner does not provide any motivation for using the fan of Dowling II to dissipate heat in the fixture of Dowling. PO Sur-Reply 4. We disagree. First, Dowling incorporates by reference Dowling II, which means that Dowling II is part of the disclosure

of Dowling, rather than a separate document to be combined with Dowling. *See Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000) (“Incorporation by reference provides a method for integrating material from various documents into a host document . . . 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.”); MPEP 2163.07(b). Second, Dowling II’s reason to use a fan is explicit, namely, that “fans allow for cooling to take place” by “remov[ing] heat from the environment of the LEDs.” Ex. 1040, 8:8–9, 65:55–56. “[I]f a technique,” such as providing a fan, “has been used to improve one device, and a person of ordinary skill would recognize that it would improve similar devices in the same way,” namely, by removing heat, “using the technique is obvious unless its actual application is beyond his or her skill.” *KSR*, 550 U.S. at 417.

We rely on the testimony of Dr. Ducharme (Ex. 1032 ¶¶ 6, 8–14, 21–43) and the teachings of Dowling (including Dowling II through incorporation by reference) in finding that the prior art teaches methods of thermal management of Dowling’s retrofit device that would have resulted in an operable device attached to a ceiling that complies with industry standards. Further, the ’628 patent itself does not disclose any methods of thermal management of the retrofit kit or of complying with industry standards. *See* Ex. 1032 ¶¶ 4–6. “In the absence of such a specific description, we assume that anyone desiring to carry out [thermal management of a retrofit kit attached to a ceiling in compliance with industry standards] would know of the equipment and techniques to be used.” *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994). The ’628 patent “assumes anyone desiring to carry out the process [of thermal management]

would know of the equipment and techniques to be used, none being specifically described.” *In re Fox*, 471 F.2d 1405, 1407 (CCPA 1973). Therefore, we find that effective thermal management techniques for a retrofit kit for a fluorescent lighting fixture attached to a ceiling, in compliance with industry standards, were within the knowledge of a person of ordinary skill, and that such person would have used the known thermal management techniques to sufficiently dissipate heat from such retrofit device.

We find that the Petition and supporting evidence show that Dowling, in view of the knowledge of a person of ordinary skill, teaches “the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture” which is “attached to the ceiling of a building” as recited in claim 1.

Claim 1 recites “a light emitting diode residing on the second side of the light panel.” Petitioner contends that Dowling’s disclosures of LEDs 104 in Figures 3 and 4 teach this subject matter. Pet. 15 (citing Ex. 1003 ¶¶ 108, 113, 130, 131). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 1.

Claim 1 recites “an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Dowling discloses this limitation in describing a controller located in the raceway section of LED retrofit assembly 1000 that outputs signals to drive the LEDs to produce various intensities of light. Pet. 15 (citing Ex. 1003 ¶ 85). Petitioner contends that the controller receives power or other signals from a cable. *Id.* at 15–16 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶¶ 132–135).

Patent Owner contends that the claimed electrical conductor must carry power directly to LEDs with no intervening electrical components. PO Resp. 19 (citing Ex. 1001, 2:43–44; Ex. 2076 ¶ 357). Patent Owner contends that the controller of Dowling is a device wired for connection to send signals, not electrical power. *Id.* at 19–20 (citing Ex. 1007 ¶¶ 30, 86, 96, 110, Fig. 12; Ex. 2076 ¶¶ 358–362); Sur-reply 4–5. Patent Owner contends that modifying the controller to carry power would likely destroy the circuitry of the device. PO Resp. 20 (citing Ex. 2076 ¶¶ 363–367).

Petitioner contends that claim 1 recites a conductor “in electrical communication” with the LED, and is not limited to providing electrical power. Pet. Reply 8. Petitioner also contends that the claim does not require the electrical conductor to provide power with no intervening components. *Id.* (citing Ex. 1001, 2:43–44). Petitioner contends that a person of ordinary skill would have understood that Dowling teaches a controller that provides operating power to the LEDs, and regulates power across the LEDs. *Id.* (citing Ex. 1007 ¶¶ 84–85; Ex. 1032 ¶¶ 44, 46–48). Petitioner contends that Dowling incorporates by reference Dowling III, which teaches that the controller converts AC power to DC power for powering the LEDs. *Id.* (citing Ex. 1041, 10:43–61; Ex. 1032 ¶¶ 49–50). Petitioner contends that Dowling’s controller and wiring reside in the raceway, are in electrical communication with the LEDs, and provide electrical power to the LEDs. *Id.* at 8–9 (citing Ex. 1032 ¶¶ 51, 68–69, 74–75).

We agree with Petitioner’s construction of this claim term. Claim 1 recites a conductor “in electrical communication” with the LED. The claim does not recite providing electrical power. Dr. Ducharme testifies that the data signals sent by the controller are “electrical communication.” Ex. 1032 ¶¶ 45–46. We find that the data signals sent by the controller teach

“electrical communication” within the scope of claim 1. Further, even under Patent Owner’s narrower construction that electrical communication requires providing electrical power, we agree with Petitioner that the claim does not require the electrical conductor to provide electrical power directly to the LEDs with no intervening components. We agree with Petitioner and Dr. Ducharme that the controller of Dowling, which is located in the raceway, outputs signals to drive the LEDs to produce varying intensities of light. Pet. 15 (citing Ex. 1007 ¶ 83); Ex. 1003 ¶ 133 (quoting Ex. 1007 ¶ 83); Ex. 1032 ¶¶ 44, 47–48.

Patent Owner’s contentions and Dr. Bretschneider’s testimony, that the controller of Dowling only provides control signals but does not directly provide power to the LEDs, do not address Petitioner’s contention and Dr. Ducharme’s testimony that the controller and the cable provide power to the LEDs. Pet. 15–16 (citing Ex. 1007 Figs. 3 and 4); *see id.* at 30–31 (“As discussed in limitation 1.5 . . . [t]he conductor and cable are used to drive (i.e., provide power) to the ‘LEDs 104’ from a power supply.”); Ex. 1003 ¶ 135 (“Dowling’s electrical conductor (controller 105 and wiring 6102 shaded in red) resides within the raceway (shaded blue) and would be in electrical communication with the [LEDs 104] in order to provide power.”); Ex. 1032 ¶ 51 (“Dowling’s controller and wiring would be an electrical conductor residing in the raceway. . . . Dowling (as further supported by Dowling III clearly teaches a [person of ordinary skill] the controller and wiring are meant to provide the appropriate electrical power (i.e., voltage and current).”).

We find Dr. Ducharme’s testimony more persuasive than Dr. Bretschneider’s, because Dr. Ducharme’s testimony is supported by the teachings of Dowling. Dowling discloses “[a]s shown in FIG. 2, the lighting

apparatus 100 also may include a controller 105 that is configured to output one or more control signals to drive the light sources so as to generate various intensities of light.” Ex. 1007 ¶ 83. Figure 2 of Dowling shows processor 102 of controller 105 electrically connected to LEDs 104A-104D through an unnumbered arrow. Dowling discloses that in one exemplary implementation, “the controller 105 may be configured to output at least one control signal for each light source so as to independently control . . . radiant power.” *Id.* Dowling discloses an example of a control signal generated by the controller to control the light sources as a pulse width modulated (PWM) signal that modulates the power delivered to the light sources. *Id.* ¶¶ 83–84. Dowling discloses that “[a]ccording to the PWM technique . . . the controller 105 may be configured to apply the voltage V_{source} to a given light source in a pulsed fashion (e.g., by outputting a control signal that operates one or more switches to apply the voltage to the light source).” *Id.* ¶ 86. Dowling discloses that “[b]y adjusting the pulse width . . . of the control signal, the controller varies the average amount of time the light source is energized.” *Id.*; see Ex. 1032 ¶¶ 47–48.

Although Dr. Bretschneider quotes from paragraph 86 of Dowling to support his testimony that the controller of Dowling does not directly carry power to the LEDs, Dr. Bretschneider does not address Petitioner’s contention and Dr. Ducharme’s testimony that the controller *and the wiring* apply power to the LEDs. Ex. 2076 ¶ 359; see Pet. 15–16, 30–31; Ex. 1003 ¶ 135; Ex. 1032 ¶¶ 44, 47–51. We agree with Dr. Ducharme and find that a person of ordinary skill, in reading Dowling’s disclosure that “the controller . . . appl[ies] the voltage V_{source} to a given light source,” would have understood that the controller, through the control signal and the wiring

connected to the LEDs, applies power to the LEDs. *See* Ex. 1003 ¶¶ 132–135; Ex. 1032 ¶¶ 44–51.

In its Sur-Reply, Patent Owner asks “why would a [person of ordinary skill] look to Dowling III” “if Dowling’s controller is an electrical conductor.” Sur-Reply 5. Dowling incorporates by reference Dowling III. Ex. 1007 ¶ 58; Ex. 1041. Therefore, Dowling III is part of the original disclosure of Dowling, such that a person looking at Dowling is looking at Dowling III. We agree with Dr. Ducharme that Dowling III shows that a person of ordinary skill would have understood that Dowling’s controller would convert AC power to the appropriate DC power for powering the LEDs. Ex. 1032 ¶¶ 49–51.

We find that the Petition and supporting evidence show that Dowling, in view of the knowledge of a person of ordinary skill, teaches “an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode,” as recited in claim 1.

Secondary Considerations of Non-Obviousness

Patent Owner contends that commercial success and copying are two objective indicia of non-obviousness. PO Resp. 65–66. Petitioner argues that Patent Owner has not established a nexus between the merits of the claimed invention and the objective evidence. Pet. Reply 27. We agree with Petitioner.

As stated by the Federal Circuit,

[f]or objective evidence of secondary considerations to be relevant, there must be a nexus between the merits of the claimed invention and the objective evidence. *See In re GPAC*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). A showing of nexus can be made in two ways: (1) via a presumption of nexus, or (2) via a showing that the evidence is a direct result of the unique characteristics of the claimed invention.

A patent owner is entitled to a presumption of nexus when it shows that the asserted objective evidence is tied to a specific product that “embodies the claimed features, and is coextensive with them.” *Brown & Williamson Tobacco Corp. v. Philip Morris, Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000).

Volvo Penta of the Americas, LLC v. Brunswick Corp., -- F.4th --, No. 2022-1765, 2023 WL 5440530, at *5 (Fed. Cir. Aug. 24, 2023).

Patent Owner argues that its “products are coextensive with the claims of the ’628 patent” and “embod[y] each of the elements identified in at least the independent claims.” PO Resp. 66 (citing Ex. 2078 ¶¶ 9, 14). Thus, Patent Owner attempts to establish a presumption of nexus.

Petitioner contends that Patent Owner has not demonstrated that its products are coextensive or nearly coextensive with the challenged claims. Pet. Reply 26–27. Petitioner contends that Patent Owner has only offered a statement from the inventor that the products are coextensive with substitute claims, but that neither Patent Owner nor its expert have offered any analysis of Patent Owner’s products. *Id.* (citing Ex. 2078 ¶ 9). Although Patent Owner responds in its Sur-Reply, we do not consider Patent Owner’s arguments in the Sur-Reply for the reasons given in the Order Granting Petitioner’s Motion to Strike. Paper 45.

We agree with Petitioner that Patent Owner has not met its burden to establish a nexus between the objective evidence and the merits of the claimed invention for the reasons given by Petitioner. The declaration testimony of the inventor, that Petitioner’s “product embodies the features claimed in the claims and is coextensive with them” (Ex. 2078 ¶ 9), does not provide an analysis of Patent Owner’s product with respect to the claims and thus does not demonstrate nexus. Patent Owner does not attempt to establish nexus by arguing that the objective evidence is a direct result of the unique

characteristics of the claimed invention. Thus, Patent Owner has not demonstrated nexus.

Further, Patent Owner does not sufficiently substantiate its commercial success argument by including information such as sales in the relevant market, market share, growth in market share, replacing units sold, or dollar amounts. *See Kansas Jack, Inc. v. Kuhn*, 719 F.2d 1144, 1151 (Fed. Cir. 1983). Patent Owner also does not provide any evidence explaining the substantial similarity of the alleged copied product to the claimed invention. *See Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010).

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 1 to a person of ordinary skill and that claim 1 would have been obvious to a person of ordinary skill.

Dependent Claims 2, 5–10, and 12

Claim 2 recites “the light panel resides below the first and second tombstones.” Petitioner contends that Dowling discloses this limitation in describing that light panel 5608 provides clearance of components of prior fixture 2402, such that the light panel resides below the first and second tombstones of fixture 2402. Pet. 16–17 (citing Ex. 1007 ¶¶ 111–112, Figs. 3 and 4; Ex. 1003 ¶¶ 136–137). Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 20–21. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 2.

Claim 5 recites “the retrofit kit further includes a first profile and a second profile, the first and second profiles connected to the light panel, the light panel defining a width and the first profile extending from a first side of the width and the second profile extending from the opposite side of the width.” Petitioner contends that Dowling discloses this limitation in describing that LED retrofit assembly 1000 includes a light panel, a first profile, and a second profile, and that between the first and second profiles is a width of the light panel. Pet. 17–18 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶¶ 138–139). Patent Owner contends that claim 5 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 21. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 5.

Claim 6 recites “the first profile, the second profile, and the light panel are integral.” Petitioner contends that Figure 4 of Dowling describes the first profile, second profile, and light panel forming an integral U-shaped member. Pet. 18 (citing Ex. 1007 ¶ 111; Ex. 1003 ¶¶ 140–141). Patent Owner contends that claim 6 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 21. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 6.

Claim 7 recites “the first and second profiles are attached to the fixture.” Petitioner contends that Dowling discloses this limitation in describing screw holes 5604 and 5606 to attach LED retrofit assembly 1000 to light fixture 2402. Pet. 18–19 (citing Ex. 1007 ¶¶ 108, 111, claim 4, Fig. 4; Ex. 1003 ¶¶ 142–146). Patent Owner contends that claim 7 is patentable

over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 21. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 7.

Claim 8 recites “the light panel and the first and second profiles are planar.” Petitioner contends that Dowling discloses this limitation in describing that each of the first profile, second profile, and light panel shown in Figure 4 are planar. Pet. 19–20 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶¶ 147–148). Patent Owner contends that claim 8 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 21. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 8.

Claim 9 recites “the electrical conductor is adapted for electrical connection to a serially-disposed second retrofit kit.” Petitioner contends that Dowling discloses this limitation in describing a number of modified lighting fixtures coupled together to form a networked lighting system, where the lighting controllers may be coupled in serial connections. Pet. 20–21 (citing Ex. 1007 ¶¶ 120–122, Fig. 12; Ex. 1003 ¶¶ 149–151).

Patent Owner contends that the proper construction of this term is that the electrical conductor of the first retrofit kit is connected to a second retrofit kit that is mechanically arranged sequentially relative to the first retrofit kit. PO Resp. 22 (citing Ex. 2076 ¶¶ 383–385); PO Sur-Reply 6–7. Patent Owner contends that, contrary to Dr. Ducharme’s testimony, Dowling does not describe retrofit kits connected electrically in series, but rather, Dowling uses “serially” in reference to networked lighting systems. *Id.* at 22–23 (citing Ex. 2076 ¶¶ 386–392; Ex. 1007 ¶¶ 34, 37, 122, Fig. 12).

Patent Owner contends that even if the claim were directed to connecting retrofit kits in electrical series, modifying the fixtures of Dowling to be electrically connected in series would introduce complications such as decreasing light output, which would discourage a person of ordinary skill from making such modifications. *Id.* at 23 (citing Ex. 2076 ¶¶ 393–400; Ex. 1007 ¶¶ 16, 107; Ex. 1003 ¶ 56).

Petitioner contends that, even under Patent Owner’s construction, a person of ordinary skill would have understood that conventional fluorescent lighting could be mechanically arranged in series in aisle-way lighting within a store, for example, and that, when retrofitted with Dowling’s assembly, two aisle-way fixtures would be serially disposed. Pet. Reply 9 (citing Ex. 1032 ¶¶ 59–60, 76). Petitioner contends that Dowling teaches a lighting unit controller (LUC) “responsible for communicating with and generally controlling one or more lighting fixtures 2000 coupled to it.” *Id.* at 9–10 (citing Ex. 1007 ¶ 122, Fig. 12; Ex. 1032 ¶ 57). Petitioner contends that Dowling teaches that “different numbers of lighting fixtures may be coupled to a given LUC in a variety of different configurations” including those connected “serially.” *Id.* at 10.

We do not agree with Patent Owner’s construction, that the claim term “serially-disposed second retrofit kit” means that the retrofit kit is mechanically arranged sequentially relative to the first retrofit kit, because the specification discloses disposing light panels “in electrical series,” not in mechanical series. Ex. 1001, 5:13–15. However, even under Patent Owner’s construction, we find that Dowling and the knowledge of a person of ordinary skill teaches the claimed “serially-disposed second retrofit kit.” We agree with Dr. Ducharme’s testimony that a person of ordinary skill would have understood that two fluorescent fixtures, mechanically disposed

in series in an aisle-way of a store, when retrofitted with Dowling's LED assemblies, teaches "a serially-disposed second retrofit kit" under Patent Owner's construction. Ex. 1032 ¶¶ 59–60; Ex. 1003 ¶ 88.

We do not agree with Patent Owner and Dr. Bretschneider, that the LUC of Dowling does not provide power to the serially connected fixtures, for the reasons given in the next paragraph. However, even accepting Patent Owner's contention and Dr. Bretschneider's testimony, that the LUC of Dowling provides data but not power, claim 9 recites "the electrical conductor is adapted for electrical connection to a serially-disposed second retrofit kit." The claim makes no reference to providing electrical power, and cannot be properly construed as so limited. The data connection between the LUC and the serially connected fixtures of Dowling teaches an "electrical connection" within the meaning of claim 9. *See* Ex. 1032 ¶ 46. We find that the scope of the claim encompasses multiple modified lighting fixtures coupled to the LUC by serial data connections.

We do not agree with Patent Owner's contention and Dr. Bretschneider's testimony that modifying the fixture of Dowling to be physically or electrically connected in series to a second fixture would require modifications that would introduce complications discouraging a person of ordinary skill from making the modifications. Contrary to Dr. Bretschneider's testimony that "each LUC is connected to a single lighting unit" (Ex. 2076 ¶ 387), Dowling teaches connecting multiple modified lighting fixtures 2000 to a controller in series. Ex. 1007 ¶ 122; Ex. 1032 ¶¶ 56–58; *see* Ex. 1007 Fig. 11 (showing one controller 105 connected to two LED arrays 140), ¶ 119. We agree with Dr. Ducharme that Dowling teaches that "numbers of lighting fixtures [2000] may be coupled to a given LUC in a variety of different configurations" including "serial[]

connections.” Ex. 1007 ¶ 122; Ex. 1032 ¶¶ 56–57; Ex. 1003 ¶¶ 150–151. We agree with Dr. Ducharme that a person of ordinary skill would have understood that Dowling’s LUC provides power for powering the serially connected fixtures. Ex. 1032 ¶ 58.

Further, the ’628 patent discloses that “a plurality of light panels 40 may be disposed end to end in electrical series, for particular advantages,” but does not describe any techniques to address the complications identified by Patent Owner and Dr. Bretschneider, such as voltage and brightness changes that occur when disposing the panels in electrical series. Ex. 1001, 5:13–15, 5:24–26; see Ex. 2076 ¶¶ 393–400. In the absence of a specific description of such techniques in the ’628 patent, we find that addressing complications when disposing light panels end-to-end in electrical series was within the knowledge of a person of ordinary skill. *Epstein*, 32 F.3d at 1568; *Fox*, 471 F.2d at 1407. Therefore, we find that Dowling and the knowledge of a person of ordinary skill teach the limitations of claim 9.

Claim 10 recites “a lens proximate to the second side and distal to the fixture.” Petitioner contends that Dowling discloses that the light source may include lenses. Pet. 21 (citing Ex. 1007 ¶¶ 24, 99). Petitioner contends that Figure 7 of Dowling shows first LED subassembly 1000A facing toward the ceiling, and second LED subassembly 1000B facing toward the ground. *Id.* at 21–22 (citing Ex. 1007, Fig. 7; Ex. 1003 ¶¶ 115, 152–155). Dr. Ducharme cites Figure 7 as an “example[] of the use of a lens (130) proximate to the second side of the light panel (1000B) and distal to the fixture with embodiments.” Ex. 1003 ¶ 155.

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that the claimed “light emitting diode” as properly construed includes an integrated lens, because LEDs used in lighting typically have such an

integrated lens. PO Resp. 24 (citing Ex. 2076 ¶ 404). Dr. Bretschneider also testifies that the fact that Dowling’s lens is an integral component of the LED means that the lens is part and parcel with the LED itself. Ex. 2076 ¶ 404.

We disagree with Patent Owner and Dr. Bretschneider about the scope of the claimed “light emitting diode.” Looking at the intrinsic evidence, neither the claim nor the specification defines the light emitting diode as requiring an integrated lens. With respect to Dr. Bretschneider’s analysis of Dowling’s lens described in paragraph 24, we disagree with Dr. Bretschneider’s conclusion that Dowling does not teach a lens as claimed. Ex. 2076 ¶ 404 (citing Ex. 1007 ¶ 24).

Dowling describes lenses as “other optical components” and “optical elements,” whether integrated with an LED or not, which indicates that a person of ordinary skill would have considered the LED and the lens as different optical components, whether integrated or not. *See* Ex. 1007 ¶ 24 (The “light source may include as an integral component . . . other optical components” such as “lenses.”); ¶ 99 (The “lighting apparatus . . . may include one or more optical elements” such as “lenses.”). We find that, based on those disclosures of Dowling, a person of ordinary skill would have considered the lens and the LED of Dowling to be separate components. *See Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1336 (Fed. Cir. 2008) (“[T]he meaning of a prior art reference requires analysis of the understanding of an artisan of ordinary skill.”); *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1049 (Fed. Cir. 2019) (the obviousness analysis requires considering a prior art reference “not only for what it expressly teaches, but also for what it fairly suggests”). Therefore, we disagree with Dr. Bretschneider that a person of ordinary skill would have considered the

lens of Dowling as part of the LED as claimed. The scope of “light emitting diode” does not include a lens that is typically integrated with the light emitting diode. We find that the lens described in paragraph 24 of Dowling teaches a “lens” as claimed.

Further, Petitioner’s contention relies on the lens shown in Figure 7 of Dowling. Pet. 21–22. Dr. Ducharme testifies that lenses were well known in the art, that they were used for various reasons (e.g., reduce glare and hide light panels), and that “the decision to use a lens, particularly with LED lights given the focused nature of the emitted light, the type, design and placement of said lens were all common design choices at the time of the invention.” Ex. 1003 ¶¶ 86, 154. Dr. Ducharme cites Figure 7 as an “example[] of the use of a lens (130) proximate to the second side of the light panel (1000B) and distal to the fixture with embodiments.” Ex. 1003 ¶ 155.

Patent Owner contends that subassembly 1000A shown in Figure 7 of Dowling corresponds to the claimed second side, because the Petition identifies component 5608 shown in Figures 3 and 4 of Dowling as having a second side, and subassembly 1000A of Figure 7 corresponds to component 5608 of Figures 3 and 4. PO Resp. 24–26 (citing Ex. 2076 ¶¶ 405–410). Patent Owner contends that lens 130 shown in Figure 7 of Dowling is proximate to the fixture and distal to the second side, which Patent Owner contends is subassembly 1000A. *Id.* As discussed above, however, Dr. Ducharme cites Figure 7 as an *example* of the use of a lens. Dr. Ducharme also testifies that conventional fixtures that are being retrofitted may contain a lens cover, in which case the same lens cover could simply be used after retrofitting. Ex. 1032 ¶ 63; *see* Pet. Reply 10–11.

Patent Owner contends that a person of ordinary skill would not modify any embodiment of Dowling with a lens, because adding such a lens would reduce the light emitted from the device, and would reduce efficiency by trapping heat and increasing LED temperature. PO Resp. 26 (citing Ex. 2076 ¶¶ 411–413). However, Dowling teaches that the benefits of using a lens include changing the spatial distribution and the propagation direction of the light. Ex. 1007 ¶ 99; *see* Ex. 1003 ¶¶ 86–87 (Dr. Ducharme testifies about the known benefits of incorporating a lens into the retrofit, such as reducing glare, diffusing light, protecting or hiding light panels, and enhancing appearance). Neither Patent Owner nor Dr. Bretschneider explain how the disadvantages of using a lens would outweigh the benefits. Further, to the extent that adding the lens causes thermal issues, we find that effective thermal management techniques were within the knowledge of a person of ordinary skill as discussed above in our analysis of claim 1. We find that a person of ordinary skill would have used the known thermal management techniques to sufficiently dissipate heat from a retrofit device that includes a lens. We find that Petitioner has demonstrated that Dowling teaches the limitations of claim 10.

Claim 12 recites “the light panel is planar.” Petitioner contends that Dowling discloses this limitation in describing a planar light panel. Pet. 22 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶¶ 156–157). Patent Owner contends that claim 12 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 26. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 12.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the

evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 2, 5–10, and 12 to a person of ordinary skill and that claims 2, 5–10, and 12 would have been obvious to a person of ordinary skill.

Independent Claim 18

The preamble of claim 18 recites a “retrofit kit for mounting with a de-energized ceiling light fixture that has a base with a first longitudinal side for facing a ceiling and an opposite second longitudinal side, the fixture further having a first tombstone and a second tombstone configured to receive therebetween a linear fluorescent light tube.” Petitioner contends that Dowling discloses the preamble for the reasons given in Petitioner’s analysis of claim 1. Pet. 26–27 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶ 170). To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Dowling teaches the preamble of claim 18.

Claim 18 recites “a first end and a second end.” Petitioner contends that Dowling discloses this limitation in describing a retrofit kit with first and second ends. Pet. 27 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶¶ 171–172). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Claim 18 recites “a first profile and a second profile.” Petitioner contends that Dowling discloses this limitation in describing a first profile and a second profile. Pet. 27–28 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶ 173). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Claim 18 recites “a light panel disposed between the first profile and the second profile, the light panel having a first side for facing the second side of the base of the light fixture and an opposite second side for

illuminating the area underneath the light panel when the retrofit kit is mounted onto the ceiling light fixture and electrical power is supplied to the light panel.” Petitioner contends that Dowling discloses a light panel with a first side that faces the bottom side of the base of the light fixture and a second opposite side that contains LEDs for illuminating the area below when power is supplied. Pet. 28–29 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶¶ 174–176).

Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of claims 1 and 2. PO Resp. 27–28 (citing Ex. 1007 ¶¶ 107–113, Fig. 4; Ex. 2076 ¶¶ 348–354, 417–420). We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Claim 18 recites “the second side of the light panel comprises a light emitting diode.” Petitioner contends that Dowling discloses this limitation in describing LEDs 104 located on the second side of the light panel. Pet. 29 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶ 176). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Claim 18 recites “the light panel, the first profile, and the second profile extend longitudinally from the first retrofit kit end to the second retrofit kit end and, when the retrofit kit is mounted onto the ceiling light fixture, the light panel, the first profile, and the second profile extend longitudinally from proximate the first tombstone to proximate the second tombstone.” Petitioner contends that Dowling discloses this limitation in describing a light panel and first and second profiles that extend from the first end to the second end of the retrofit kit, such that when retrofit kit 1000 is mounted to fixture 2402, the light panel and first and second profiles

extend longitudinally from the first and second tombstones. Pet. 29–30 (citing Ex. 1007, Fig. 4; Ex. 1003 ¶ 177).

Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of the previous limitation, “the second side of the light panel comprises a light emitting diode.” PO Resp. 28 (citing Ex. 2076 ¶¶ 348–354, 421–425). We disagree with Patent Owner for the reasons given in our analysis of the previous limitation. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Claim 18 recites “electrical wiring residing external to the retrofit kit and between the retrofit kit and the de-energized ceiling light fixture, to connect the light emitting diode to a power supply for illuminating the area underneath the second side of the light panel.” Petitioner contends that Dowling discloses this limitation in describing a controller and cable to provide power and signals to the controller of the retrofit assembly. Pet. 30 (citing Ex. 1007 ¶¶ 83, 110). Petitioner contends that the cable and conductor reside in a raceway between assembly 1000 and fixture 2402, and are used to provide power to the LEDs from a power supply. *Id.* at 30–31 (citing Ex. 1007 ¶¶ 83, 110, Figs. 3 and 4; Ex. 1003 ¶¶ 179–181).

Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 28–29 (citing Ex. 2076 ¶¶ 426, 428–435). We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 18.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 18 to a person of

ordinary skill and that claim 18 would have been obvious to a person of ordinary skill.

Dependent Claims 19, 20, 22, and 23

Claim 19 recites “the light panel resides below the first and second tombstones.” Petitioner contends that Dowling discloses this limitation in describing a light panel that resides below first and second tombstones. Pet. 31–32 (citing Ex. 1007, Fig. 4; Ex. 1032 ¶ 182). Patent Owner contends that claim 19 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claims 1 and 18. PO Resp. 30. We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 18. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 19.

Claim 20 recites “the retrofit kit is connected directly to the fixture and not connected directly to the tombstones.” Petitioner contends that Dowling discloses this limitation for the reasons given in Petitioner’s analysis of claim 7. Pet. 32 (citing Ex. 1007 ¶¶ 107–108; Ex. 1003 ¶¶ 140–146, 183–185). Patent Owner contends that claim 20 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 30–31. We disagree with Patent Owner for the reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 20.

Claim 22 recites “the first profile, the second profile, and the light panel are integral.” Petitioner contends that Dowling discloses this limitation for the reasons given in Petitioner’s analysis of claim 6. Pet. 32 (citing Ex. 1007 ¶ 111; Ex. 1003 ¶¶ 186–187). Patent Owner contends that claim 22 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 31. We disagree with Patent Owner for the

reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 22.

Claim 23 recites “the light panel is at least partially planar.” Petitioner contends that Dowling discloses this limitation for the reasons given in Petitioner’s analysis of claim 8. Pet. 32 (citing Ex. 1003 ¶¶ 188–189). Patent Owner contends that claim 23 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 31. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 23.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 19, 20, 22, and 23 to a person of ordinary skill and that claims 19, 20, 22, and 23 would have been obvious to a person of ordinary skill.

Independent Claim 24

The preamble of claim 24 recites a “method for retrofitting a fluorescent lighting ceiling fixture.” Petitioner contends that Dowling discloses the preamble in describing LED-based lighting assemblies that serve as retrofit apparatus for conventional lighting fixtures, such as fluorescent fixtures. Pet. 33 (citing Ex. 1007, code (57); Ex. 1003 ¶ 190). To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Dowling teaches the preamble of claim 24.

Claim 24 recites “a) identifying a fluorescent lighting ceiling fixture having a pre-installed base with first and second tombstones disposed to receive between them a fluorescent lighting tube.” Petitioner contends that

Dowling discloses this limitation in describing fixture 2402 having a pre-installed base with first and second tombstones 2408 disposed to receive fluorescent lighting tube 2404. Pet. 33 (citing Ex. 1007 ¶¶ 11–12, Figs. 1 and 4; Ex. 1003 ¶¶ 191–192).

Claim 24 recites “b) disconnecting electrical connections to the fluorescent lighting ceiling fixture.” Petitioner contends that a person of ordinary skill would have understood that when disconnecting any existing lighting fixture, or when installing any new lighting fixture or retrofit, the lighting fixture of Dowling would be disconnected from the power source for safety reasons. Pet. 34 (citing Ex. 1003 ¶¶ 193–194).

Claim 24 recites “c) removing all fluorescent lighting tubes from the ceiling fixture.” Petitioner contends that Dowling discloses this limitation in describing that subassembly 1000 can be attached to fixture 2402 after the fluorescent bulbs have been removed. Pet. 34 (citing Ex. 1007 ¶ 107, Figs. 1 and 4; Ex. 1003 ¶¶ 195–196).

Claim 24 recites “d) leaving as installed the first and second tombstones in position in the ceiling fixture.” Petitioner contends that Dowling discloses this limitation in describing that retrofit assembly 1000 is installed without having to remove any fixture components, including the tombstones. Pet. 34–35 (citing Ex. 1007 ¶ 111, Figs. 1, 3, and 4; Ex. 1003 ¶¶ 197–199).

Claim 24 recites “e) providing a ceiling light LED retrofit kit adapted to attach with the pre-installed base, the ceiling light LED retrofit kit including: a first profile, an opposing second profile, a light panel disposed between the first profile and the opposing second profile, and a light emitting diode.” Petitioner contends that Dowling discloses this limitation in describing that assembly 1000 is attached to the base of fixture 2402 and

includes a light panel disposed between first and second profiles. Pet. 35–36 (citing Ex. 1007 ¶¶ 111–112, Fig. 4; Ex. 1003 ¶ 200).

Dowling discloses “f) attaching the ceiling light LED retrofit kit to the ceiling fixture, leaving a raceway between the ceiling fixture and the ceiling light LED retrofit kit and external to the ceiling light LED retrofit kit.”

Petitioner contends that Dowling discloses this limitation in describing a raceway located between assembly 1000 and fixture 2402 and external to assembly 1000. Pet. 36–37 (citing Ex. 1007, Figs. 3 and 4; Ex. 1003 ¶¶ 202–203).

Patent Owner contends that Dowling does not teach steps a)–f) for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 31–32. We disagree with Patent Owner for the reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Dowling teaches steps a)–f) of claim 24.

Claim 24 recites “g) disposing an electrical conductor at least partially within the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Dowling discloses this limitation in disclosing cable 6102 and controller 105 disposed partially within the raceway and in electrical communication with LEDs 104. Pet. 37 (citing Ex. 1007 ¶¶ 83, 110, Figs. 3 and 4; Ex. 1003 ¶¶ 204–205). Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of claims 1 and 18. PO Resp. 32. We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 18. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 24.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the

evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 24 to a person of ordinary skill and that claim 24 would have been obvious to a person of ordinary skill.

Dependent Claims 25, 26, and 28

Claim 25 recites “providing a retrofit kit of claim 1.” Petitioner contends that Dowling teaches this limitation for the reasons given in Petitioner’s analysis of claim 1. Pet. 38 (citing Ex. 1003 ¶ 207). We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 25.

Claim 25 recites “disposing the retrofit kit of claim 1 in end-to-end series with the ceiling light LED retrofit kit of claim 24.” Petitioner contends that Dowling teaches this limitation for the reasons given in Petitioner’s analysis of claim 9. Pet. 38 (citing Ex. 1003 ¶¶ 208–209). Patent Owner contends that Dowling does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 9. PO Resp. 33–34. We disagree with Patent Owner for the reasons given in our analysis of claim 9. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 25.

Claim 25 recites “connecting the electrical conductor of claim 24 to the electrical conductor of claim 1.” Petitioner contends that Dowling discloses this limitation in describing a number of lighting fixtures coupled to a given LUC in a variety of different configurations. Pet. 38 (citing Ex. 1007 ¶ 122). Petitioner contends that a person of ordinary skill would understand that the electrical conductor of claim 24 could be connected to the conductor of claim 1 in a similar fashion. *Id.* at 38–39 (citing Ex. 1007, Fig. 12; Ex. 1003 ¶¶ 210–211). Patent Owner contends that Dowling does

not teach this limitation for the reasons given in Patent Owner’s analysis of claim 24. PO Resp. 34–35. We disagree with Patent Owner for the reasons given in our analysis of claim 24. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 24.

Patent Owner further contends that Dowling does not render claim 25 obvious for the reasons given in Patent Owner’s analysis of claims 1 and 24. PO Resp. 32–33. We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 24.

Claim 26 recites “the step of attaching the ceiling light LED retrofit kit to the ceiling fixture includes attaching the ceiling light LED retrofit kit directly to the ceiling fixture.” Petitioner contends that Dowling discloses this limitation for the reasons given in Petitioner’s analysis of claim 7. Pet. 39 (citing Ex. 1003 ¶¶ 212–213). Patent Owner contends that claim 26 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claims 18 and 24. PO Resp. 35–36. We disagree with Patent Owner for the reasons given in our analysis of claims 18 and 24. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 26.

Claim 28 recites “the fluorescent lighting ceiling fixture includes an electrical ballast, further including the step of leaving the electrical ballast within the fluorescent lighting ceiling fixture.” Petitioner contends that Dowling discloses this limitation in describing that retrofit assembly 1000 is installed without having to remove any original fixture components other than the fluorescent bulbs. Pet. 39–40 (citing Ex. 1003 ¶ 111, Figs. 1 and 3; Ex. 1003 ¶¶ 214–215). Patent Owner contends that claim 28 is patentable over Dowling for the reasons given in Patent Owner’s analysis of claims 18 and 24. PO Resp. 35–36. We disagree with Patent Owner for the reasons

given in our analysis of claims 18 and 24. We find that Petitioner has demonstrated that Dowling teaches this limitation of claim 28.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 25, 26, and 28 to a person of ordinary skill and that claims 25, 26, and 28 would have been obvious to a person of ordinary skill.

D. Asserted Obviousness over Burrow

Petitioner contends that claims 1, 5–12, 18, 20, 22–24, and 26 would have been obvious over Burrow. Pet. 40–64.

1. Burrow (Ex. 1008)

Burrow discloses a light emitting diode retrofit conversion kit for a fluorescent light fixture that includes a housing adapted to be secured to a troffer, a power supply carried by the housing, and a plurality of light emitting diodes carried by the housing. Ex. 1008, codes (54), (57). Figure 13 of Burrow is shown below:

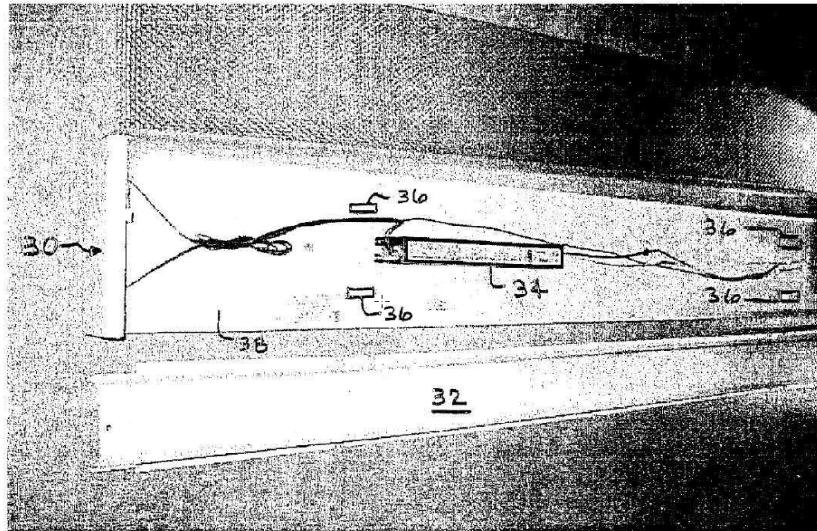


FIG. 13
(PRIOR ART)

Figure 13 above shows an existing fluorescent fixture, including troffer 30, ballast cover 32, ballast 34, tube sockets (not shown), and snap tabs 36 located along mounting surface 38 of troffer 30. Ex. 1008 ¶ 37.

Figure 1 of Burrow is reproduced below:

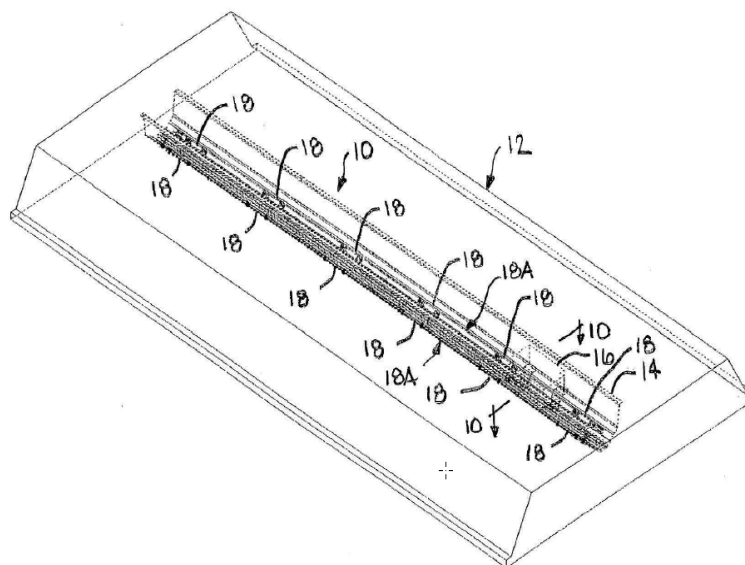


FIG. 1

Figure 1 above shows a perspective view of light emitting diode retrofit kit 10 adapted for use in fluorescent light fixture 12. Ex. 1008 ¶ 25. Kit 10 includes housing 14, power supply 16, and LEDs 18 coupled to the power supply by suitable means. *Id.* ¶ 26. Housing 14 is formed as an extrusion and can be cut to any length. *Id.* ¶¶ 26, 38.

Figure 11 of Burrow is reproduced below:

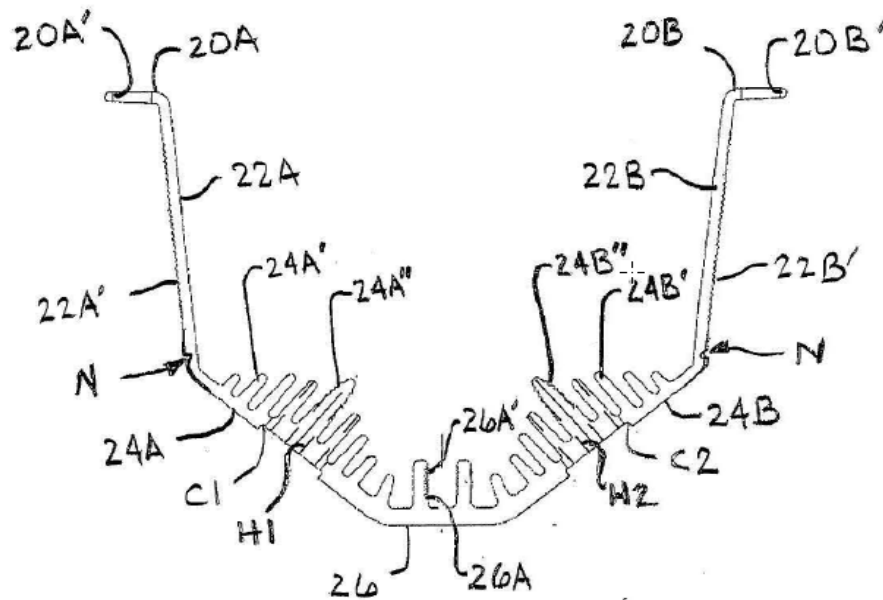


FIG. 11

Figure 11 above shows a portion of the housing of the light emitting diode retrofit kit. Ex. 1008 ¶ 22. Figure 11 shows a U-shaped embodiment of the housing including mounting flanges 20A, 20B, mounting holes 20A' and 20B', first pair of angled side walls 22A, 22B, second pair of angled side walls 24A, 24B, and bottom wall 26. Ex. 1008 ¶¶ 27, 31.

2. *Burrow in View of the Knowledge of a Person of Ordinary Skill*

Independent Claim 1

The preamble of claim 1 recites a “retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube.” Petitioner contends that Burrow discloses the preamble in describing a light emitting diode retrofit conversion kit adapted for use in a fluorescent fixture that a skilled artisan would attach to the ceiling of a building. Pet. 40 (citing Ex. 1008 ¶¶ 1–2, 25, Fig. 1). Petitioner contends that a skilled artisan would have understood that the fluorescent fixture would include tombstones at both ends of the fixture for providing power to fluorescent tubes. *Id.* at 40–41 (citing Ex. 1008, Fig. 13; Ex. 1003 ¶¶ 217–222). Petitioner contends that a person of ordinary skill would have understood that, after weighing factors such as the difficulty in removing the tombstones, installation costs, labor costs, and disposal costs, the tombstones may be left in place. *Id.* at 41 (citing Ex. 1003 ¶¶ 223–226). To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Burrow teaches the preamble of claim 1.

Claim 1 recites “a light panel, the light panel including a first side facing the previously-installed light fixture and an opposite second side.” Petitioner contends that Burrow discloses this limitation in describing a light panel including a first side facing the previously-installed fixture and an opposite second side facing away from the fixture. Pet. 42 (citing Ex. 1008 ¶ 37, Figs. 1 and 10; Ex. 1003 ¶¶ 227–228). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 1.

Claim 1 recites “the light panel residing at least partially between the first tombstone and the second tombstone.” Petitioner contends that a person of ordinary skill would have recognized that the pre-existing fluorescent fixtures used to install Burrow’s LED retrofit kit would have included tombstones for the fluorescent bulbs. Pet. 42. Petitioner contends that it would have been obvious to a person of ordinary skill to leave the tombstones within the pre-existing fluorescent fixtures because removing the tombstones could be time-consuming or difficult. *Id.* at 42–43. Petitioner contends that with the tombstones not removed, the light panel of Burrow would reside at least partially between a first tombstone and a second tombstone. *Id.* at 43 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 229–237).

Patent Owner contends that tombstones are not part of the Burrow device because Burrow does not mention tombstones and does not show tombstones in the figures. PO Resp. 36–37 (citing Ex. 1008 ¶¶ 25–34, 36–37, Figs. 1–13; Ex. 2076 ¶¶ 518–520). Patent Owner contends that “Burrow’s only disclosure of tombstones, which it refers to as ‘sockets,’ relates to the fact that these tombstones are ‘normally’ to be removed.” PO Resp. 11; *see also* PO Sur-reply 8 (“Despite Petitioners’ argument, a POSA would not be motivated to ignore the explicit teachings of Burrow regarding removal of the tombstones.”). Patent Owner contends that a person of ordinary skill would have understood that tombstones are designed to be easily installed and removed. PO Resp. 37 (citing Ex. 2061). Patent Owner contends that adding tombstones to the Burrow device would obstruct air flow, causing the device to operate at lower efficiency with a shorter lifespan. *Id.* at 37 (citing Ex. 2076 ¶¶ 518–520); PO Sur-Reply 7–10 (citing Ex. 2076 ¶¶ 107, 151, 290–296, 299–300, 302–307, 521, 522, 524, 569). Patent Owner contends that shortening the length of the light source

and leaving the tombstones in the device would also reduce efficiency by exacerbating heat dissipation issues, cause unsafe conditions, and distort optical properties of the device, thus rendering the device inoperable for its intended purpose. PO Resp. 37 (citing Ex. 2076 ¶¶ 521–525).

Petitioner contends that although Burrow discloses that the tombstones could be removed, a person of ordinary skill would have understood that there may be instances where removal would be unnecessary, such as when the retrofit kit is shorter than the fixture, or when the tombstones could not be removed without damaging the fixture. Pet. Reply 12 (citing Ex. 1032 ¶¶ 82–85). Petitioner further contends that a person of ordinary skill would have understood that the device of Burrow would be operable and safe with the tombstones in place, because the retrofit assembly could be installed over the tombstones or in between the tombstones. *Id.* (citing Ex. 1032 ¶ 86). Petitioner contends that in either installation, a person of ordinary skill would have understood that the retrofit kit would have been designed to include sufficient thermal management of heat generated by the LEDs. *Id.* Petitioner contends that Burrow teaches several ways of improving thermal management and heat dissipation, including using fins, ports, and vent holes, as well as designing the housing out of aluminum. *Id.* at 12–13 (citing Ex. 1032 ¶¶ 87–88, 90; Ex. 1008 ¶ 39).

We disagree with Patent Owner and Dr. Bretschneider that tombstones are not part of the device of Burrow because Burrow does not mention tombstones. Paragraph 37 of Burrow discloses that the retrofit will normally require removing the prior art tube sockets, or tombstones. Ex. 1008 ¶ 37. We also disagree with Dr. Bretschneider that tombstones of fluorescent fixtures were designed to be easily installed and removed in a

matter of seconds with no significant effort. *See* Ex. 2076 ¶ 517 (citing Ex. 2061). Although Dr. Bretschneider cites to linear fluorescent lampholders that can be easily installed and removed, the cited lampholders are a “new line” of lampholders that “provide fast, easy assembly.” Ex. 2061, 1.

In contrast, Dr. Ducharme testifies that the tombstone sockets of an old fluorescent lighting fixture may be left in place if removing the tombstones is difficult, time consuming, or costly. Ex. 1003 ¶ 232–235; *see id.* ¶¶ 72–77, 79–81. For example, Dr. Ducharme cites Oksengendler’s disclosure that some tombstones are not meant to be removed. Ex. 1003 ¶ 79 (citing Ex. 1014 ¶¶ 6–7). In particular, Oksengendler discloses that there are “situations where the tombstone sockets were not designed to be removed from the existing fixture or installation.” Ex. 1014 ¶ 7.

Dr. Ducharme testifies that “removal of the sockets may damage the pre-existing fluorescent fixture which would not be desirable. This is particularly true for older fluorescent fixtures where the tombstones were never intended to be removed or replaced.” Ex. 1032 ¶ 85. Dr. Bretschneider does not address the known problems of difficulty, time, and cost of removing tombstones from older fluorescent fixtures where the tombstones were never intended to be removed. Ex. 1005, 1:64–2:17; Ex. 1014 ¶ 7; Ex. 1003 ¶¶ 73–77, 79. We agree with Dr. Ducharme that there are situations in which it is desirable to leave existing tombstones in place, such as when the retrofit kit is shorter than the fixture, or when the tombstones could not be removed without damaging the fixture, or without excessive difficulty, time, or cost. Ex. 1003 ¶¶ 72–77, 79–81, 232–235; Ex. 1032 ¶¶ 82–86. As we stated in the Institution Decision, Burrow discloses that the “retrofit will normally,” not always, require removing the

existing tombstones. Ex. 1008 ¶ 37; *see* Dec. 19. Based on the full record developed during trial, we find that a person of ordinary skill would have retained the tombstones of Burrow in certain instances to yield the benefits of avoiding the time, labor, and costs of removing the tombstones, as well as avoiding damage to the fixture.

We disagree with Patent Owner and Dr. Bretschneider that leaving the tombstones in place would obstruct air flow, increase temperature, and render the device inoperable. Rather, we agree with Dr. Ducharme that a person of ordinary skill would have designed the retrofit kit to include sufficient thermal management as taught by Burrow, such as fins, ports, and vent holes, as well as designing the housing out of aluminum. Ex. 1008 ¶ 39; Ex. 1032 ¶¶ 86–90. We agree with Dr. Ducharme because Dr. Ducharme’s testimony about the thermal dissipation advantages provided by aluminum and other thermal management techniques is supported by the teachings of Burrow. Ex. 1032 ¶ 88 (citing Ex. 1008 ¶ 39); *see id.* at 89–90.

Patent Owner argues that a person of ordinary skill in the art would “not look to Burrow to achieve the objectives of the ’628 patent because the only means by which Burrow suggests its ‘housing’ may be formed is via extrusion from aluminum,” which, according to Patent Owner, has properties that make its use “undesirable” in this application. PO Resp. 12–13 (citing Ex. 1008 ¶¶ 5–7, 26, 31, 38, 39, 41; Ex. 2076 ¶¶ 308–315). It is not clear what legal assertion Patent Owner is making here. Patent Owner’s argument about not looking to a reference sounds of an analogous art argument, but Patent Owner made no such argument in its papers and confirmed during oral argument that it is not arguing that the asserted references are non-analogous. Tr. 40:24–41:10. We find that Burrow is

analogous art to the '628 patent because it is in the same field of endeavor – LED retrofit kits. Ex. 1008, code (57) (disclosing a “light emitting diode retrofit conversion kit adapted for use in a fluorescent light fixture”); Ex. 1001, claim 1.

Patent Owner also does not argue that a person of ordinary skill in the art would not have had a reasonable expectation of success in arriving at the claimed invention using Burrow or that Burrow does not enable a person of ordinary skill to make the claimed invention. But, to the extent Patent Owner’s arguments about the properties of aluminum are directed to these legal inquiries, we disagree. Both of these inquiries focus on the claimed invention. *See Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1292 (Fed. Cir. 2013) (“[T]he person of ordinary skill need only have a reasonable expectation of success of developing the claimed invention.”), *Raytheon Techs. Corp. v. Gen. Elec. Co.*, 993 F.3d 1374, 1380 (Fed. Cir. 2021) (“To render a claim obvious, the prior art, taken as a whole, must enable a skilled artisan to make and use the claimed invention.”).

Here, the claims recite no particular material to be used. Indeed, the '628 patent does not disclose what a suitable material would be for its retrofit kits. Even were we to credit Dr. Bretschneider’s testimony about aluminum, Burrow is not limited to using aluminum but, rather, gives aluminum as an example. Burrow discloses that the LED retrofit kit’s “housing 14 can be formed *from any suitable material*, such as for example aluminum.” Ex. 1008 ¶ 26 (emphasis added). Even if aluminum were unsuitable for a particular application, we find that determining a suitable material to use was within the knowledge of a person of ordinary skill in the art, as evidenced by Burrow’s disclosure and the '628 patent’s not providing

any guidance on what material to use, instead leaving this decision to the ordinarily skilled artisan.

With respect to Dr. Bretschneider's testimony that a person of ordinary skill would not use aluminum because aluminum materials are heavy, thick, and difficult to shape or form (Ex. 2076 ¶ 309), we find that Dr. Bretschneider's testimony is inconsistent with the knowledge of a person of ordinary skill as shown by the disclosure of Burrow. Ex. 1008 ¶¶ 26, 39. Although Dr. Bretschneider relies exclusively on his personal knowledge in testifying that Burrow's aluminum "retrofit would be extremely cumbersome to an installer for overhead applications as this weight would need to be held above head-height and extended out from the installer's body for significant periods of time" (Ex. 2076 ¶ 309), Dr. Bretschneider does not testify, nor cite to any facts to show, that installing the aluminum retrofit would have been beyond the installer's ability.

With respect to bending stress of aluminum, Dr. Bretschneider does cite to Exhibit 2062 to support his testimony that installing Burrow's aluminum retrofit using the snap tabs of an existing troffer would require bending the retrofit such that the bending stress would exceed the elastic limit of aluminum. Ex. 2076 ¶ 313 (citing Ex. 2062). However, Dr. Bretschneider does not explain how Exhibit 2062 supports this conclusion. Rather, Exhibit 2062 lists several applications of aluminum, including pipe, railings, furniture, and architectural extrusions, along with various mechanical, thermal, and electrical properties of aluminum. Absent from Exhibit 2062 and Dr. Bretschneider's testimony is any analysis of how installing Burrow's aluminum retrofit would exceed the bending stress of the aluminum retrofit.

Further, in the absence of a specific description of thermal management of a retrofit kit in the '628 patent, we find that effective thermal management techniques of Burrow's retrofit kit were within the knowledge of a person of ordinary skill. *Epstein*, 32 F.3d at 1568; *Fox*, 471 F.2d at 1407. We find that a person of ordinary skill would have used known thermal management techniques to sufficiently dissipate heat from the retrofit device of Burrow. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 1.

Claim 1 recites "the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture." Petitioner contends that Burrow discloses this limitation in describing a raceway that exists below the previously-installed light fixture and above the light panel when the retrofit kit is installed into the previously-installed fixture. Pet. 43–44 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 238–239). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 1.

Claim 1 recites "a light emitting diode residing on the second side of the light panel." Petitioner contends that Burrow discloses this limitation in describing LEDs located on the second side of the light panel. Pet. 44 (citing Ex. 1008 ¶¶ 33–34; Ex. 1003 ¶¶ 240–242). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 1.

Claim 1 recites "an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode." Petitioner contends that Burrow discloses this limitation in describing a power source that resides within the raceway and is used to provide power to the LEDs. Pet. 45 (citing Ex. 1008 ¶¶ 32, 38; Ex. 1003 ¶¶ 243–244).

Patent Owner contends that the claimed electrical conductor carries electrical power directly to the LEDs with no intervening components.

PO Resp. 38. Patent Owner contends that Burrow does not disclose connections between an electrical conductor and the LEDs. *Id.* (citing Ex. 1008 ¶¶ 8, 33, 40; Ex. 2076 ¶¶ 530–532). Patent Owner contends that electrical conductors do not reside in the raceway of Burrow. *Id.*

Petitioner contends that a person of ordinary skill would have coupled the power supply of Burrow to the LEDs by suitable means such as wiring to provide the DC voltage and current directly to the LEDs without intervening components. Pet. Reply 13–14 (citing Ex. 1008 ¶ 26; Ex. 1032 ¶¶ 91–93). Dr. Ducharme testifies that the power source of Burrow provides power (i.e., is in electrical communication) with the LED lights. Ex. 1003 ¶ 243 (citing Ex. 1008 ¶¶ 32, 38, annotated Figs. 1, 10). Dr. Ducharme testifies that the power supply of Burrow resides within the raceway of the retrofit kit. Ex. 1032 ¶ 91 (citing Ex. 1008 ¶¶ 32, 38). Dr. Ducharme testifies that a person of ordinary skill would have understood that electrical wiring would provide voltage from the power supply to the LEDs because otherwise the LEDs would not even operate. Ex. 1032 ¶ 93. Dr. Ducharme testifies that the most common method would be to include red (positive) and black (negative) wires from the power supply to the LED boards. *Id.*

Patent Owner contends that Petitioner is changing its argument in contending that the power supply of Burrow is connected to the LEDs by an electrical conductor. PO Sur-Reply 10. Patent Owner contends that a person of ordinary skill would not have had a reasonable expectation of success in adding an electrical conductor to connect the power supply to the LEDs of Burrow because of thermal constraints and the difficulty of installation. *Id.* (citing Ex. 2076 ¶¶ 308–310).

We disagree with Patent Owner. We agree with Dr. Ducharme that a person of ordinary skill in the art would have understood that the power supply of Burrow is connected to the LEDs through electrical communication such as wiring. Ex. 1003 ¶ 323 (citing Ex. 1008 ¶ 26); *see id.* ¶ 243; Ex. 1032 ¶¶ 92–93. Burrow discloses “a power supply 16, and a plurality of LED’s 18 operatively coupled[] to the power supply 16 by suitable means.” Ex. 1008 ¶ 26. We agree with Dr. Ducharme that a person of ordinary skill would have understood that the power supply of Burrow, which is located in the raceway, is in electrical communication with the LEDs by suitable means, such as wiring, to provide the necessary voltage to the LEDs for operation; otherwise, the LEDs would not even operate. *See* Ex. 1032 ¶¶ 92–93.

We disagree with Patent Owner and Dr. Bretschneider that a person of ordinary skill would not have had a reasonable expectation of success in connecting the power supply of Burrow to the LEDs using wiring because of thermal issues and other difficulties. Rather, we rely on the teachings of Burrow and the testimony of Dr. Ducharme in finding that addressing thermal issues and other difficulties when connecting a power supply to LEDs using wiring was within the knowledge of a person of ordinary skill. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 1.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 1 to a person of ordinary skill and that claim 1 would have been obvious to a person of ordinary skill.

Dependent claims 5–12

Claim 5 recites “the retrofit kit further includes a first profile and a second profile, the first and second profiles connected to the light panel, the light panel defining a width and the first profile extending from a first side of the width and the second profile extending from the opposite side of the width.” Petitioner contends that Burrow discloses this limitation in describing a first profile and a second profile connected to the light panel, where the light panel defines a width, and the second profile extends from an opposite second side of the width. Pet. 45–46 (citing Ex. 1008 ¶ 38, Figs. 1, 10, 10A, and 11; Ex. 1003 ¶ 245). Patent Owner contends that claim 5 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 38. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 5.

Claim 6 recites “the first profile, the second profile, and the light panel are integral.” Petitioner contends that Burrow discloses this limitation in describing that the first profile, second profile, and light panel are integral and collectively form the housing of the LED retrofit kit. Pet. 46–47 (citing Ex. 1008 ¶¶ 27–28, 38, Figs. 1, 10, 10A, and 11; Ex. 1003 ¶¶ 249–252). Patent Owner contends that claim 6 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 39. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 6.

Claim 7 recites “the first and second profiles are attached to the fixture.” Petitioner contends that Burrow discloses this limitation in describing mounting flanges or mounting holes that may be used to attach

the retrofit kit to the base of the fluorescent fixture. Petitioner contends that Burrow discloses that the first and second profiles of the retrofit kit may be attached to the fixture using screws inserted into preformed holes. Pet. 47–48 (citing Ex. 1003 ¶¶ 27, 37, Fig. 11; Ex. 1003 ¶¶ 253–256). Patent Owner contends that claim 7 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 39. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 7.

Claim 8 recites “the light panel and the first and second profiles are planar.” Petitioner contends that Burrow discloses this limitation in describing that the light panel, the first profile, and the second profile are planar. Pet. 48 (citing Ex. 1008, Figs. 10A and 11; Ex. 1003 ¶ 257). Patent Owner contends that claim 8 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 39. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 8.

Claim 9 recites “the electrical conductor is adapted for electrical connection to a serially-disposed second retrofit kit.” Petitioner contends that connecting lighting end-to-end in series was well-known to a person of ordinary skill in the art in warehouse or retail applications for the benefit of illuminating long aisles. Pet. 49 (citing Ex. 1003 ¶ 258). Petitioner contends that a person of ordinary skill in the art would have electrically connected the electrical conductor of Burrow to multiple LED retrofit kits in series to yield the benefits of controlling multiple LED retrofit fixtures from a single controller, reducing installation costs, and using less wiring. *Id.*

Patent Owner contends that “serially-disposed” refers to the physical location and orientation of the claimed retrofit kits, and not to an electrical

connection. PO Resp. 39–40 (citing Ex. 2076 ¶ 539). Patent Owner contends that Petitioner fails to explain why a person of ordinary skill would have physically arranged the devices of Burrow sequentially. *Id.* at 40.

Dr. Ducharme testifies that connecting lighting fixtures in series is particularly useful in warehouses or retail establishments where long aisles need illuminating. Ex. 1003 ¶¶ 88, 258; Ex. 1032 ¶ 96. Even were we to accept Patent Owner’s construction, we agree with Dr. Ducharme’s testimony, that a person of ordinary skill would have understood that two fluorescent fixtures, mechanically disposed in series in an aisle-way of a store, when retrofitted with Burrow’s LED assemblies, teaches “a serially-disposed second retrofit kit.” *Id.*

Patent Owner contends that a person of ordinary skill would not have used the aluminum retrofit kit of Burrow because aluminum is heavy and difficult to install. PO Sur-Reply 11 (citing Ex. 2076 ¶¶ 308–310). We disagree with Patent Owner’s arguments about Burrow’s disclosure of aluminum for the reasons discussed with respect to claim 1.

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that a person of ordinary skill would not have modified Burrow to connect the fixtures electrically in series, because doing so would have introduced complications that would have rendered the fixtures inoperable. PO Resp. 40–41 (citing Ex. 2076 ¶¶ 545–558); PO Sur-Reply 11 (citing Ex. 2076 ¶¶ 308–310, 539–550). We disagree. As we discussed above, the ’628 patent does not describe any techniques to address the complications identified by Patent Owner and Dr. Bretschneider that occur when disposing the fixtures in electrical series. *See* Ex. 1001, 5:13–15, 5:24–26. In the absence of a specific description of such techniques in the ’628 patent, we find that addressing complications when disposing the fixtures end to end in

electrical series was within the knowledge of a person of ordinary skill. *Epstein*, 32 F.3d at 1568; *Fox*, 471 F.2d at 1407.

Patent Owner contends that Petitioner has not provided motivation for a person of ordinary skill to use the retrofit kit of Burrow in aisle-way lighting. PO Sur-Reply 11. We disagree with Patent Owner. We agree with Dr. Ducharme that a person of ordinary skill knew of fluorescent fixtures arranged mechanically in series to illuminate an aisle-way. Ex. 1003 ¶¶ 71, 88, 258; Ex. 1032 ¶¶ 60, 96. We agree with Dr. Ducharme, that a person of ordinary skill would have understood that the power supply of Burrow could be used to power LEDs within two serially disposed fixtures. Ex. 1032 ¶ 97; Ex. 1003 ¶¶ 88–89, 258. We agree with Dr. Ducharme that a person of ordinary skill would have used a single power supply across multiple LED retrofit kits using low-voltage DC wiring to yield the benefits of controlling a number of fixtures with a single controller, reducing costs, increasing safety, and providing for easier installation and maintenance. Ex. 1003 ¶ 89, 258; Ex. 1032 ¶ 97. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 9.

Claim 10 recites “a lens proximate to the second side and distal to the fixture.” Petitioner contends that Burrow discloses this limitation in describing additional lenses used to enhance or modify the output of the LED lights from the retrofit kit. Pet. 49–50 (citing Ex. 1008 ¶ 41, Figs. 1 and 10). Petitioner contends that a person of ordinary skill would have understood that the lens would be disposed proximate to the second side of the light panel and distal to the fixture. *Id.* (citing Ex. 1003 ¶¶ 259–260).

Patent Owner contends that adding a lens over the retrofit kit of Burrow would further obstruct heat dissipation resulting in decreased efficiency and lifetime. PO Resp. 42 (citing Ex. 2076 ¶ 564). We disagree

with Patent Owner for the reasons given in our analysis of claim 1 and our analysis of claim 10 for the asserted ground based on Dowling.

Furthermore, Burrow expressly discloses the use of lenses. Ex. 1008 ¶ 41 (“Still further the light output of the LED retrofit conversion kit 10 of the present invention may be affected by the diffuser lens installed in the existing fluorescent troffer fixture. New lenses and diffusers may be designed to enhance or modify the output characteristics of the light of the present invention.”). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 10.

Claim 11 recites “the light panel has a first angled wing and a second angled wing, the first and second angled wings residing at acute angles to horizontal.” Petitioner contends that Burrow discloses this limitation in describing a first angled wing and a second angled wing that reside at acute angles to horizontal. Pet. 50 (citing Ex. 1008, Fig. 10; Ex. 1003 ¶¶ 261–263). Patent Owner contends that claim 11 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 42. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 11.

Claim 12 recites “the light panel is planar.” Petitioner contends that Burrow discloses this limitation in describing a light panel that is planar. Pet. 51 (citing Ex. 1008 Figs. 10 and 11; Ex. 1003 ¶ 264). Patent Owner contends that claim 12 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 42. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 12.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 5–12 to a person of ordinary skill and that claims 5–12 would have been obvious to a person of ordinary skill.

Independent Claim 18

The preamble of claim 18 recites a “retrofit kit for mounting with a de-energized ceiling light fixture that has a base with a first longitudinal side for facing a ceiling and an opposite second longitudinal side, the fixture further having a first tombstone and a second tombstone configured to receive therebetween a linear fluorescent light tube.” Petitioner contends that Burrow discloses the preamble in describing a fixture having a base that includes a first longitudinal side facing the ceiling and a second longitudinal side for attaching the LED retrofit kit. Pet. 55–56 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 283–284). Petitioner contends that it would have been obvious to leave the tombstones within the fixture for the reasons given in Petitioner’s analysis of claim 1. *Id.* To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Burrow teaches the preamble of claim 18.

Claim 18 recites “a first end and a second end.” Petitioner contends that Burrow discloses this limitation in describing a retrofit kit having a first end and a second end. Pet. 56–57 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 285–286). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Claim 18 recites “a first profile and a second profile.” Petitioner contends that Burrow discloses this limitation in describing that the retrofit

kit includes a first profile and a second profile. Pet. 57–58 (citing Ex. 1008, Figs. 10A and 11; Ex. 1003 ¶ 287). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Claim 18 recites “a light panel disposed between the first profile and the second profile, the light panel having a first side for facing the second side of the base of the light fixture and an opposite second side for illuminating the area underneath the light panel when the retrofit kit is mounted onto the ceiling light fixture and electrical power is supplied to the light panel.” Petitioner contends that Burrow discloses this limitation in describing a light panel with a first side that faces the bottom side of the base of the pre-existing fixture and a second side that contains LEDs for illuminating the area below when electrical power is supplied from the power supply. Pet. 58 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 288–289). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Claim 18 recites “wherein the second side of the light panel comprises a light emitting diode.” Petitioner contends that Burrow discloses this limitation in describing that the second side of the light panel comprises LEDs. Pet. 59 (citing Ex. 1003 ¶ 290). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Claim 18 recites “wherein the light panel, the first profile, and the second profile extend longitudinally from the first retrofit kit end to the second retrofit kit end and, when the retrofit kit is mounted onto the ceiling light fixture, the light panel, the first profile, and the second profile extend longitudinally from proximate the first tombstone to proximate the second tombstone.” Petitioner contends that a person of ordinary skill in the art would have left the tombstones within the fixture for the benefit of avoiding

the difficulty of removing the tombstones, and the benefit of not spending time removing the tombstones. Pet. 59 (citing Ex. 1008, Figs. 1 and 10; Ex. 1003 ¶¶ 291–292). Patent Owner contends that Burrow does not teach this limitation for reasons similar to those presented in Patent Owner’s analysis of claim 1. PO Resp. 42–44. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Claim 18 recites “electrical wiring residing external to the retrofit kit and between the retrofit kit and the de-energized ceiling light fixture, to connect the light emitting diode to a power supply for illuminating the area underneath the second side of the light panel.” Petitioner contends that Burrow discloses this limitation in describing that the LED retrofit kit includes a power supply. Pet. 60 (citing Ex. 1003 ¶ 293). Petitioner contends that a person of ordinary skill would have understood that electrical wiring between the power supply and the LEDs would be housed within the raceway used for concealing the supply, and that the wiring would be external to the retrofit kit and between the retrofit kit and the fixture. *Id.* We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 18.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 18 to a person of ordinary skill and that claim 18 would have been obvious to a person of ordinary skill.

Dependent Claims 20, 22, and 23

Claim 20 recites “the retrofit kit is connected directly to the fixture and not connected directly to the tombstones.” Petitioner contends that Burrow discloses this limitation for the reasons given in Petitioner’s analysis of claims 7 and 16. Pet. 60 (citing Ex. 1008 ¶¶ 294–297). Patent Owner contends that claim 20 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 44. We disagree with Patent Owner for the reasons given in our analysis of claims 7 and 18. Further, we find that Petitioner’s arguments regarding claim 16, as applied to claim 20, are persuasive. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 20.

Claim 22 recites “the first profile, the second profile, and the light panel are integral.” Petitioner contends that Burrow discloses this limitation for the reasons given in Petitioner’s analysis of claim 6. Pet. 60 (citing Ex. 1003 ¶ 60). Patent Owner contends that claim 22 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 44. We disagree with Patent Owner for the reasons given in our analysis of claims 6 and 18. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 22.

Claim 23 recites “the light panel is at least partially planar.” Petitioner contends that Burrow discloses this limitation for the reasons given in Petitioner’s analysis of claim 12. Pet. 60 (citing Ex. 1003 ¶ 299). Patent Owner contends that claim 23 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 44. We disagree with Patent Owner for the reasons given in our analysis of claims 12 and 18. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 23.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 20, 22, and 23 to a person of ordinary skill and that claims 20, 22, and 23 would have been obvious to a person of ordinary skill.

Independent Claim 24

The preamble of claim 24 recites a “method for retrofitting a fluorescent lighting ceiling fixture.” Petitioner contends that Burrow discloses the preamble in describing a light emitting diode retrofit conversion kit adapted for use in a fluorescent light fixture. Pet. 60 (citing Ex. 1008 ¶ 1; Ex. 1003 ¶ 300). To the extent that the preamble is limiting, we find that Petitioner has demonstrated that Burrow teaches the preamble of claim 24.

Claim 24 recites “a) identifying a fluorescent lighting ceiling fixture having a pre-installed base with first and second tombstones disposed to receive between them a fluorescent lighting tube.” Petitioner contends that Burrow discloses this limitation in describing an LED retrofit kit connected to a base of a fluorescent light fixture. Pet. 60–61 (citing Ex. 1008 ¶ 1; Ex. 1003 ¶¶ 301–307). Petitioner contends that a person of ordinary skill would have understood that the fixture would have been designed to position two fluorescent lights on either side of the ballast shroud cover shown in Figure 13 of Burrow. *Id.* Petitioner contends that a person of ordinary skill would have understood that the fixture would have included a pair of tombstones at both ends of the fixture for providing power to the fluorescent tubes. *Id.*

Patent Owner contends that Burrow does not teach this limitation for reasons similar to those presented in Patent Owner's analysis of claims 1 and 18. PO Resp. 44–46. We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 18. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “b) disconnecting electrical connections to the fluorescent lighting ceiling fixture.” Petitioner contends that Burrow discloses this limitation in describing removing various components from the fixture prior to installing the retrofit kit. Pet. 61 (citing Ex. 1008 ¶¶ 37). Petitioner contends that a person of ordinary skill would have understood that the electrical connections would be disconnected prior to removing any component for safety reasons, and that even if components are not removed, electrical connections should be disconnected when installing the retrofit kit. *Id.* (citing Ex. 1003 ¶¶ 308–309). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “c) removing all fluorescent lighting tubes from the ceiling fixture.” Petitioner contends that Burrow discloses this limitation in describing removing the fluorescent tubes prior to installing the retrofit kit. Pet. 61 (citing Ex. 1008 ¶¶ 37; Ex. 1003 ¶¶ 310–311). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “d) leaving as installed the first and second tombstones in position in the ceiling fixture.” Petitioner contends that Burrow teaches this limitation for the reasons given in Petitioner's analysis of claim 1. Pet. 62. In particular, Petitioner contends that a person of ordinary skill would not have removed the tombstones to yield the benefit of avoiding the difficulty of removing them. *Id.* (citing Ex. 1003 ¶¶ 312–316).

Patent Owner contends that Burrow does not teach this limitation for reasons similar to those presented in Patent Owner's analysis of claims 1 and 18. PO Resp. 44–46. We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 18. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “e) providing a ceiling light LED retrofit kit adapted to attach with the pre-installed base, the ceiling light LED retrofit kit including: a first profile, an opposing second profile, a light panel disposed between the first profile and the opposing second profile, and a light emitting diode.” Petitioner contends that Burrow teaches this limitation for the reasons given in Petitioner's analysis of claim 7. Pet. 62 (citing Ex. 1003 ¶¶ 317–318). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “f) attaching the ceiling light LED retrofit kit to the ceiling fixture, leaving a raceway between the ceiling fixture and the ceiling light LED retrofit kit and external to the ceiling light LED retrofit kit.” Petitioner contends that Burrow teaches this limitation for the reasons given in Petitioner's analysis of claims 1 and 16. Pet. 62–63 (citing Ex. 1003 ¶ 37, Figs. 1 and 10; Ex. 1003 ¶¶ 319–320). We find that Petitioner's arguments regarding claims 1 and 16, as applied to claim 24, are persuasive. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Claim 24 recites “g) disposing an electrical conductor at least partially within the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Burrow discloses this limitation for the reasons given in Petitioner's analysis of claim 1. Pet. 63–64 (citing

Ex. 1008 ¶¶ 26, 32, 38, Figs. 1 and 10; Ex. 1003 ¶¶ 321–323). We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 24.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 24 to a person of ordinary skill and that claim 24 would have been obvious to a person of ordinary skill.

Dependent Claim 26

Claim 26 recites “the step of attaching the ceiling light LED retrofit kit to the ceiling fixture includes attaching the ceiling light LED retrofit kit directly to the ceiling fixture.” Petitioner contends that Burrow discloses this limitation for the reasons given in Petitioner’s analysis of claim 20. Pet. 64 (citing Ex. 1003 ¶ 324).

Patent Owner contends that claim 26 is patentable over Burrow for the reasons given in Patent Owner’s analysis of claim 24. PO Resp. 46. We disagree with Patent Owner for the reasons given in our analysis of claim 24. We find that Petitioner has demonstrated that Burrow teaches this limitation of claim 26.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Burrow and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claim 26 to a person of ordinary skill and that claim 26 would have been obvious to a person of ordinary skill.

E. Asserted Obviousness over Shew

Petitioner contends that claims 1, 4, 18, 21, 24, and 27 would have been obvious over Shew. Pet. 64–89.

1. Shew (Ex. 1016)

Shew relates to light assemblies that incorporate a night-light or an emergency light within an LED light assembly. Ex. 1016, 1:16–18.

Figure 3 of Shew is reproduced below:

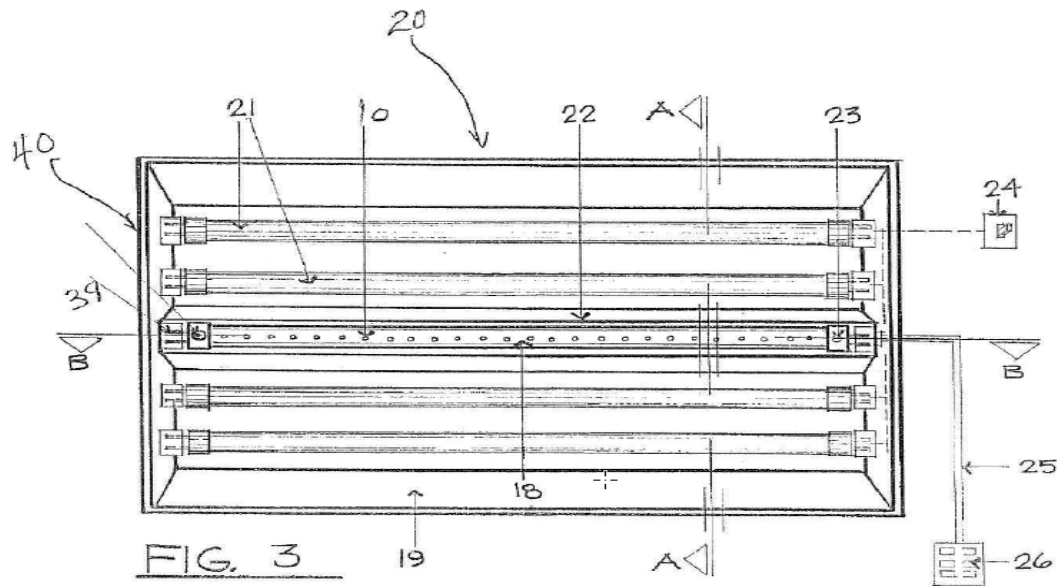


Figure 3 above shows a light assembly within a conventional fluorescent troffer assembly. Ex. 1016, 2:18–19. Troffer or housing 20 contains fluorescent tubes 21. *Id.* at 4:31–34. Figure 7 of Shew is reproduced below:

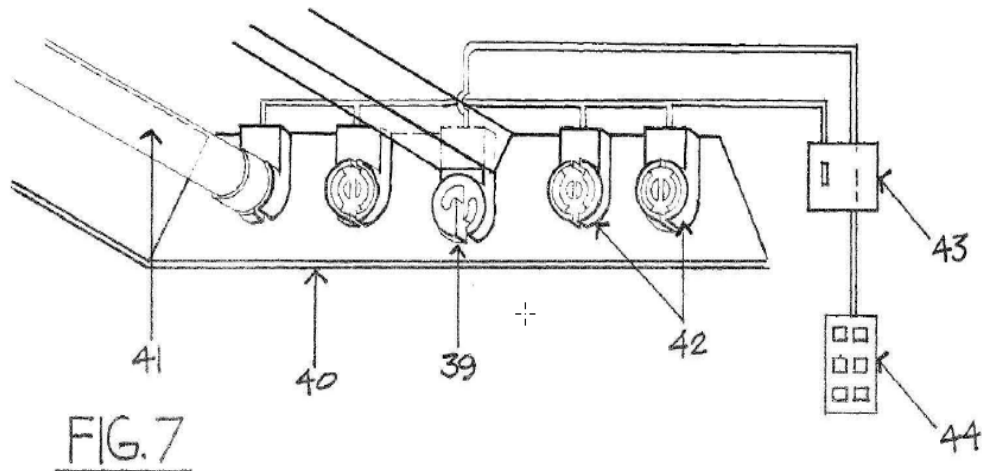


Figure 7 above shows one end 40 of troffer or housing 20 of Figure 3. Ex. 1016, 4:62–63. Sockets 42 are configured to receive conventional solid state lighting units such as fluorescent or LED tubes. *Id.* at 4:63–64, 4:31–34. The housing or troffer may contain either tubeless or tubular lighting units. *Id.* at 6:41–62.

2. *Shew in View of the Knowledge of a Person of Ordinary Skill*
Claims 1 and 4

The preamble of claim 1 recites a “retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube.” Petitioner contends that Shew discloses the preamble in describing an LED retrofit kit for mounting to a previously installed fluorescent lighting fixture devoid of fluorescent tubes, where the fixture includes tombstones designed to energize fluorescent tubes. Pet. 64–65 (citing Ex. 1016, 4:31–34, Figs. 3, 23, and 24; Ex. 1003 ¶¶ 326–329). To the extent that the preamble is limiting, we find that Shew teaches the preamble of claim 1.

Claim 1 recites “a light panel, the light panel including a first side facing the previously-installed light fixture and an opposite second side.” Petitioner contends that Shew discloses this limitation in describing a light panel with a first side facing the fluorescent fixture and a second opposite side. Pet. 66–67 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶ 330). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 1.

Claim 1 recites “the light panel residing at least partially between the first tombstone and the second tombstone.” Petitioner contends that Shew discloses this limitation in describing a light panel that resides at least partially between first and second tombstones. Pet. 68 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶ 331). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 1.

Claim 1 recites “the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture.” Petitioner contends that Shew discloses this limitation in describing a raceway between the light panel and the previously-installed light fixture. Pet. 69 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 332–334). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 1.

Claim 1 recites “a light emitting diode residing on the second side of the light panel.” Petitioner contends that Shew discloses this limitation in describing a plurality of LED arrays/strips fixed to the second side of the light panel. Pet. 69–70 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 335–337). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 1.

Claim 1 recites “an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Shew discloses this limitation in describing an electrical conductor including wiring, prongs, and a female socket, located in the raceway and used to power the LED arrays. Pet. 70–71 (citing Ex. 1016, 10:4–9, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 338–339). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 1.

Patent Owner contends that the claim term “electrical conductor . . . in electrical communication with the light emitting diode” means that the conductor carries electrical power directly to the LEDs with no intervening components. PO Resp. 47 (citing Ex. 2076 ¶¶ 604–608). Patent Owner contends that the wiring, battery sources, prongs, and female socket of Shew do not carry power directly to the LEDs with no intervening components. *Id.* at 47–48. Patent Owner contends that construing “electrical conductor” to encompass anything that conducts electricity to the LEDs would incorporate structures like main wires, transformers, and the entire electrical grid. PO Sur-Reply 13–14 (citing Ex. 2076 ¶ 605).

Petitioner contends that Patent Owner’s contention is based on an incorrect construction of the claimed “electrical conductor.” Pet. Reply 15–16. Petitioner contends that neither the claim nor the ’628 patent requires the claimed “electrical conductor” to carry power directly to the LED with no intervening components. *Id.* Petitioner contends that the wirings, prongs, female socket, and battery source of Shew allow electric current to flow through them to supply power to the LEDs. Pet. Reply 15 (citing Ex. 1032 ¶ 104). Petitioner contends that components of Shew that conduct electricity

to the LEDs are in electrical communication with the LEDs within the scope of claim 1. *Id.* at 16 (citing Ex. 1032 ¶ 106).

We agree with Petitioner that the scope of “electrical conductor” encompasses a component of the retrofit kit that conducts electricity to the LEDs. We disagree with Patent Owner that this construction would incorporate structures like the entire electrical grid, because the “electrical conductor” resides in the raceway defined by “the light panel [of the retrofit kit] and . . . the previously-installed light fixture” as claimed, which excludes the entire electrical grid. We also agree with Dr. Ducharme that Dr. Bretschneider’s and Patent Owner’s construction is unsupported by evidence. We agree with Dr. Ducharme that the ’628 patent does not use the term “electrical conductor” other than in the claims, with no indication in the claims or anywhere else in the specification that the term requires the conductor to carry power directly to the LEDs with no intervening components. Ex. 1032 ¶ 106.

Turning to the disclosure of the reference, Dr. Ducharme’s testimony is supported by Shew, which discloses that “a plurality of *LED arrays/strips* 328 are fixed to a panel or sub-housing 340 and *electronically communicate with two female sockets* 336 *by seating* two conductive plugs or two sets of *prongs* 339 *electrically communicating with the set of LED arrays* 328.” Ex. 1016, 10:5–9; Ex. 1032 ¶¶ 104–106 (citing Ex. 1016, 7:47–49, 7:66–8:17, 10, 3–24). We find that the wirings, prongs, female socket, and battery source of Shew that allow electric current to flow through them to supply power to the LEDs teach the “electrical conductor . . . in electrical communication with the light emitting diode” as claimed.

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that Shew discloses a tube embodiment and a tubeless embodiment, neither

of which are a “retrofit kit,” because no physical or electrical modifications are made to the fixture. PO Resp. 13–14 (citing Ex. 2076 ¶¶ 324–326).

Dr. Bretschneider relies on the Designlight Consortium’s (DLC’s) definition of “retrofit kits,” which excludes tube replacements, to support his testimony. Ex. 2076 ¶ 325 (citing Ex. 2036, 14), ¶¶ 326–327. The “DCL defines ‘retrofit kits’ for troffers as products that require physical or electrical alterations to the existing fixture.” Ex. 2036, 15.

We disagree with Dr. Bretschneider’s construction. In construing the claim term “retrofit kit,” Dr. Bretschneider relies on “extrinsic evidence,” which “is less significant than the intrinsic record in determining the legally operative meaning of the claim language.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1317 (Fed. Cir. 2005) (en banc). Dr. Bretschneider does not address the intrinsic evidence, including the claim and the specification, in construing the term “retrofit kit” recited in the preamble of claim 1. Turning to the intrinsic evidence, “the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips*, 415 F.3d at 1312. Here, the preamble of claim 1 recites “the retrofit kit comprising,” then recites the elements of the retrofit kit in the body of the claim. The body of the claim does not recite any limitation of the retrofit kit that requires physical or electrical alterations to the existing fixture. *See id.* (“if we once begin to include elements not mentioned in the claim, in order to limit such claim . . . , we should never know where to stop”).

Further, “claims must be read in view of the specification, of which they are a part.” *Id.* at 1315. “[T]he specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Id.* The specification discloses that the “invention is directed toward a ceiling light LED retrofit

kit; more specifically, a kit for installation of light emitting diode lighting mounted upon a previously-installed fluorescent lighting fixture.” Ex. 1001, 1:18–21. The specification does not define a retrofit kit as a product that requires physical or electrical alterations to the existing structure, but rather, discloses the “invention” of a “retrofit kit” as “a kit for installation of light emitting diode lighting mounted upon a previously-installed fluorescent lighting fixture.” *Id.*

To the extent that certain embodiments in the specification make physical or electrical alterations to the existing structure, the specification discloses that “[r]eference will now be ma[d]e in detail to the presently preferred embodiments of the invention, one or more examples of which are illustrated in the drawings. Each example is provided by way of explanation of the invention, and not by way of limitation of the invention.” Ex. 1001, 3:20–24; *see id.* at 6:4–15. Further, the Federal Circuit has held that “it is improper to read limitations from a preferred embodiment described in the specification – even if it is the only embodiment – into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Dealertrack, Inc. v. Huber*, 674 F.3d 1315, 1327 (Fed. Cir. 2012); *Phillips*, 415 F.3d at 1323 (internal quotations omitted) (“[C]laims may embrace different subject matter than is illustrated in the specific embodiments in the specification.”). The intrinsic evidence indicates that the patentee intended the scope of “retrofit kit” to encompass more than a fixture that requires physical or electrical alterations. Given that neither the claim nor the specification requires physical or electrical alterations to the existing fixture, we decline to read such limitations into the claim.

Further, we find that the extrinsic evidence provided by Shew discloses that “the panel 340 is seated within the troffer 320 and may be used to replace and retrofit current fluorescent tube troffers now in service.” Ex. 1016, 10:9–11, Fig. 24; *see Vitronics*, 90 F.3d at 1584. Dr. Ducharme testifies that when “one desires to replace the light fixture,” one option is to “convert the existing light fixture into a more efficient lighting fixture,” which “is known as retrofitting.” Ex. 1003 ¶ 52. Given that the extrinsic evidence provided by Dr. Bretschneider is inconsistent with both the intrinsic evidence and the extrinsic evidence provided by both Shew and Dr. Ducharme, we find that the intrinsic evidence provides meaning to “retrofit kit,” such that relying on the inconsistent extrinsic evidence is unnecessary. We rely on the intrinsic evidence in finding that Shew teaches a “retrofit kit” within the scope of claim 1.

Patent Owner contends that a person of ordinary skill would not use Shew’s teachings because Shew is directed to emergency lighting. PO Resp. 14 (citing Ex. 2076 ¶ 328). According to Patent Owner, the invention of the ’628 patent is directed to providing and maintaining illumination of workspaces in commercial, office, and retail buildings. *Id.* (citing Ex. 1001, 1:26–29, 2:16–26). However, neither the claim nor the specification excludes emergency lighting from the scope of claim 1. Further, the claim does not recite providing and maintaining illumination of workspaces in commercial, office, and retail buildings, and we do not read these limitations into the claim. *Dealertrack*, 674 F.3d at 1327; *Phillips*, 415 F.3d at 1323. In addition, even under Patent Owner’s construction, Shew discloses that “[d]uring the day, the LED light assembly will function as the primary light source, operating all the LEDs within the light assembly.” Ex. 1016, 1:21–23.

Patent Owner contends that Shew fails to disclose any heat dissipation capabilities. PO Resp. 15 (citing Ex. 2076 ¶¶ 329–331). The claims of the '628 patent, however, do not recite any heat dissipation requirements, and, therefore, Patent Owner's argument is not commensurate in scope with the claims. Furthermore, the '628 patent does not disclose any heat dissipation capabilities. As we discussed previously in our discussion of grounds 1 and 2, given the '628 patent's lack of disclosure of heat dissipation capabilities, we find that effective thermal management techniques for a retrofit kit for a fluorescent lighting fixture attached to a ceiling, in compliance with industry standards, were within the knowledge of a person of ordinary skill, and that such person would have used the known thermal management techniques to sufficiently dissipate heat from such a retrofit device.

Patent Owner also argues that Petitioner does not explain why a person of ordinary skill in the art “would look to” Shew, that “Shew’s statements regarding its efficiency are exaggerated and discredit the reference,” and that, “[b]ecause of Shew’s poor thermal management system, the performance, efficiency, and lifetime of the LEDs would be reduced.” PO Resp. 13–15. These arguments are legally unavailing. It is not clear what Patent Owner means by arguing that a person of ordinary skill in the art would not look to a reference, but we find Shew is analogous art as directed to the field of endeavor of the '628 patent—LED retrofit kits, as discussed above. Thus, Shew is properly considered for obviousness. Furthermore, Patent Owner does not set forth a legal argument based on its assertions that Shew may have poor performance. Shew “is prior art for all that it teaches,” *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989), and Petitioner has shown that it teaches the subject matter of claim 1.

To the extent that Patent Owner is attempting to argue about reasonable expectation of success or enablement, the claims do not recite any requirements for heat dissipation, light output, or LED lifespan, and, therefore, these arguments are not commensurate with the scope of the claimed invention to which reasonable expectation of success and enablement apply. Further, Patent Owner's contention and Dr. Bretschneider's testimony that Shew's statements regarding its efficiency are exaggerated (PO Resp. 13; Ex. 2076 ¶¶ 318–322), in addition to being legally irrelevant, are based on the characteristics of LEDs in 2009, rather than the effective filing date of the '628 patent, which is February 24, 2016.

Claim 4 recites “the retrofit kit is mechanically connected directly to the first and second tombstones.” Petitioner contends that Shew discloses this limitation in describing that the retrofit kit includes a set of prongs 339 for mechanically connecting to the tombstones, and a set of prongs 136 which slidably engage within female tombstones to provide electrical communication and mechanical connection. Pet. 72 (citing Ex. 1016, 9:34–47, 10:3–24, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 341–343).

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that the term “mechanically connected” in claim 4 means the joining of two or more elements to limit the relative movement of said elements by providing support and stability to the joined assembly, which excludes inserting prongs into a plug as shown in Figures 18, 23 and 24 of Shew. PO Resp. 48–50 (citing Ex. 2076 ¶¶ 612–619, 624). According to Patent Owner, the connection of Shew would be unable to withstand any significant inwardly directed axial forces, such that the LED panel would pull the prongs out of the tombstones. *Id.*

Petitioner contends that Patent Owner’s construction of “mechanically connected” is improperly narrow and unclear. Pet. Reply 17. Petitioner, relying on the testimony of Dr. Ducharme, contends that when the prongs of Shew’s device are plugged into sockets, they are mechanically connected to the sockets to ensure that the prongs are properly supported so that the electrical communication is maintained with the sockets. *Id.* at 16–17 (citing Ex. 1032 ¶ 110; *see id.* ¶¶ 108–109, 111; Ex. 1003 ¶¶ 342–343).

We find that the term “mechanically connected” does not appear in the ’628 patent other than in the claims, and therefore the claims read in light of the ’628 patent do not require Dr. Bretschneider’s narrow construction. We have reviewed the competing testimonies of Dr. Bretschneider and Dr. Ducharme, and find that Dr. Ducharme’s testimony is more credible. We agree with Dr. Ducharme that Dr. Bretschneider’s construction lacks evidentiary support, and that the meaning of providing “support and stability to the joined assembly” is unclear. Ex. 1032 ¶ 110 (citing Ex. 2076 ¶ 613). We find that inserting prongs into a plug as shown in Figures 18, 23, and 24 of Shew teaches “mechanically connected” as claimed.

We agree with Dr. Ducharme that a person of ordinary skill would have understood that when prongs 339 of the retrofit kit shown in Figures 23 and 24 of Shew are plugged into sockets 336 for electrical communication, the prongs of the retrofit kit are mechanically connected directly to the tombstones to ensure that the prongs are properly supported so that electrical communication is maintained with the sockets. *Id.* ¶ 108. We agree with Dr. Ducharme that the slidable engagement between female mounts 194, 196 (tombstones) and the prongs of LED retrofit kit 110 shown in Figure 18 of Shew necessarily forms a mechanical connection within the meaning of claim 4 to ensure that the retrofit kit is properly supported inside the fixture

to maintain a stable electrical connection. *Id.* ¶ 109. We find that Shew teaches this limitation of claim 4.

Patent Owner further contends that Shew is not a retrofit. PO Resp. 50 (citing Ex. 2076 ¶¶ 621–622). In particular, Patent Owner contends that Shew is not a retrofit as required by claim 4 because the tube embodiments of Shew do not require physical or electrical modifications to a preexisting fixture. *Id.* We disagree with Patent Owner for the reasons given in our analysis of claim 1.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Shew and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 1 and 4 to a person of ordinary skill and that claims 1 and 4 would have been obvious to a person of ordinary skill.

Claims 18 and 21

Claim 18 recites a “retrofit kit for mounting with a de-energized ceiling light fixture that has a base with a first longitudinal side for facing a ceiling and an opposite second longitudinal side, the fixture further having a first tombstone and a second tombstone configured to receive therebetween a linear fluorescent light tube.” Petitioner contends that Shew discloses this limitation in describing a retrofit kit that mounts to a de-energized fluorescent fixture having tombstones left in place. Pet. 77–78 (citing Ex. 1016, 9:34–47, 10:3–24, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 360–366). Petitioner contends that a person of ordinary skill would disconnect power to the fixture for safety reasons. *Id.* at 78 (citing Ex. 1003 ¶ 364). To the extent that the preamble is limiting, we find that Shew teaches the preamble of claim 18.

Claim 18 recites “a first end and a second end.” Petitioner contends that Figures 18, 23, and 24 of Shew disclose this limitation. Pet. 78–79 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶ 367). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Claim 18 recites “a first profile and a second profile.” Petitioner contends that Figures 18 and 24 of Shew disclose this limitation. Pet. 79–80 (citing Ex. 1016, Figs. 18 and 24; Ex. 1003 ¶ 368). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Claim 18 recites “a light panel disposed between the first profile and the second profile, the light panel having a first side for facing the second side of the base of the light fixture and an opposite second side for illuminating the area underneath the light panel when the retrofit kit is mounted onto the ceiling light fixture and electrical power is supplied to the light panel.” Petitioner contends that Figures 18 and 24 of Shew disclose this limitation. Pet. 80–81 (citing Ex. 1016, Figs. 18 and 24; Ex. 1003 ¶¶ 370–371). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Claim 18 recites “wherein the second side of the light panel comprises a light emitting diode.” Petitioner contends that Shew discloses this limitation in describing LED array/strips 328 and 128 located on the second side of the light panel. Pet. 81 (citing Ex. 1003 ¶¶ 372–373). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Claim 18 recites “wherein the light panel, the first profile, and the second profile extend longitudinally from the first retrofit kit end to the second retrofit kit end and, when the retrofit kit is mounted onto the ceiling light fixture, the light panel, the first profile, and the second profile extend longitudinally from proximate the first tombstone to proximate the second

tombstone.” Petitioner contends that Figures 18 and 24 of Shew disclose this limitation. Pet. 81–82 (citing Ex. 1016, Figs. 18 and 24; Ex. 1003 ¶¶ 374–376). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Claim 18 recites “electrical wiring residing external to the retrofit kit and between the retrofit kit and the de-energized ceiling light fixture, to connect the light emitting diode to a power supply for illuminating the area underneath the second side of the light panel.” Petitioner contends that Shew discloses this limitation in describing electrical wiring and plugs in the raceway which is external to the retrofit kit. Pet. 82–83 (citing Ex. 1016, Figs. 23 and 24). Petitioner contends that a person of ordinary skill would have de-energized the fixture when connecting the retrofit kit for safety reasons. *Id.* (citing Ex. 1003 ¶¶ 377–378). Petitioner contends that once the retrofit kit is installed, AC power would be converted to DC power to power the LEDs. *Id.* Petitioner also contends that Shew discloses this limitation in describing a battery source connected to the LED array. Pet. 83–84 (citing Ex. 1016, 7:59–8:4). Petitioner contends that the electrical wiring for the battery is located within the raceway between the retrofit kit and the light fixture. *Id.* (citing Ex. 1016, 7:47–49, 7:66–8:17, 9:34–47, 10:3–24, Fig. 26; Ex. 1003 ¶ 379). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 18.

Patent Owner contends that Shew does not teach the claimed “retrofit kit” and does not teach the claimed “electrical wiring” for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 51–52. We disagree with Patent Owner for the reasons given in our analysis of claim 1.

Claim 21 recites “the retrofit kit is connected directly to the first and second tombstones.” Petitioner contends that Shew discloses this limitation

for the reasons given in Petitioner’s analysis of claim 4. Pet. 84 (citing Ex. 1003 ¶ 380). Patent Owner contends that claim 21 is patentable over Shew for the reasons given in Patent Owner’s analysis of claim 18. We disagree with Patent Owner for the reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Shew teaches this limitation of claim 21.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Shew and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 18 and 21 to a person of ordinary skill and that claims 18 and 21 would have been obvious to a person of ordinary skill.

Claims 24 and 27

The preamble of claim 24 recites a “method for retrofitting a fluorescent lighting ceiling fixture.” Petitioner contends that Shew discloses the preamble in describing a retrofit panel used to retrofit current fluorescent tube troffers. Pet. 84 (citing Ex. 1016, 9:10–14, 10:9–11; Ex. 1003 ¶ 382). To the extent that the preamble is limiting, we find that Shew teaches the preamble.

Claim 24 recites “a) identifying a fluorescent lighting ceiling fixture having a pre-installed base with first and second tombstones disposed to receive between them a fluorescent lighting tube.” Petitioner contends that Shew discloses this limitation for the reasons given in Petitioner’s analysis of claim 1. Pet. 84–85 (citing Ex. 1016, 4:31–35; Ex. 1003 ¶¶ 383–384). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “b) disconnecting electrical connections to the fluorescent lighting ceiling fixture.” Petitioner contends that a person of ordinary skill would have understood the need to disconnect the electrical connection to the fixture prior to installing the retrofit system for safety reasons. Pet. 85 (citing Ex. 1003 ¶ 385).

Patent Owner contends that Shew does not disclose a retrofit for the reasons given in Patent Owner’s analysis of claims 1 and 18. PO Res. 52. We disagree with Patent Owner for the reasons given in claims 1 and 18.

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that a person of ordinary skill would not disconnect the power when installing the retrofit of Shew. PO Resp. 52–53 (citing Ex. 2076 ¶¶ 648–651). Dr. Ducharme testifies that a person of ordinary skill would disconnect electrical connections before installing the retrofit kit of Shew to avoid serious electrical hazards and safety risks. Ex. 1032 ¶¶ 122–125. We further highlight that the scope of the claimed “disconnecting electrical connections” encompasses removing a connection from a power source, interrupting a connection, breaking a connection stopping supply of electricity, and separating a piece of equipment from its source of power; such as, for example, by turning off a switch. *See* Dec. 14–15 (citing Exs. 3001–3003). We agree with Dr. Ducharme that “[i]f electrical power is not disconnected before beginning the installation process,” for example, by turning off a switch, “there is a risk of electrical shock or electrocution.” Ex. 1032 ¶ 123. We rely on the testimony of Dr. Ducharme in finding that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “c) removing all fluorescent lighting tubes from the ceiling fixture.” Petitioner contends that Figures 23 and 24 of Shew disclose this limitation. Pet. 85 (citing Ex. 1016, 9:10–14, Figs. 23 and 24; Ex. 1003

¶¶ 386–388). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “d) leaving as installed the first and second tombstones in position in the ceiling fixture.” Petitioner contends that Figures 18 and 23 disclose this limitation. Pet. 86 (citing Ex. 1016, 9:34–47, 10:3–24, Figs. 18 and 23; Ex. 1003 ¶¶ 389–391). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “e) providing a ceiling light LED retrofit kit adapted to attach with the pre-installed base, the ceiling light LED retrofit kit including: a first profile, an opposing second profile, a light panel disposed between the first profile and the opposing second profile, and a light emitting diode.” Petitioner contends that Figures 18 and 24 of Shew disclose this limitation for the reasons given in Petitioner’s analysis of claim 18. Pet. 86 (citing Ex. 1016, Figs. 18, 24; Ex. 1003 ¶¶ 392–393). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “f) attaching the ceiling light LED retrofit kit to the ceiling fixture, leaving a raceway between the ceiling fixture and the ceiling light LED retrofit kit and external to the ceiling light LED retrofit kit.” Petitioner contends that Figures 18, 23, and 24 of Shew disclose this limitation for the reasons given in Petitioner’s analysis of claim 1. Pet. 87 (citing Ex. 1016, Figs. 18, 23, and 24; Ex. 1003 ¶¶ 394–395). We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 24 recites “g) disposing an electrical conductor at least partially within the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Figures 18, 23, 24, and 26 of Shew disclose this limitation for the reasons given in Petitioner’s analysis of claims 1 and

18. Pet. 87–89 (citing Ex. 1016, 7:47–49, 7:66–8:17, 9:34–47, 10:4–9, Figs. 18, 23, 24, and 26; Ex. 1003 ¶¶ 396–397). Patent Owner contends that Shew does not disclose this limitation for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 53–54. We disagree with Patent Owner for the reasons given in our analysis of claim 1. We find that Petitioner has demonstrated that Shew teaches this limitation of claim 24.

Claim 27 recites “the step of attaching the ceiling light LED retrofit kit to the ceiling fixture includes attaching the ceiling light LED retrofit kit directly to the first and second tombstones.” Petitioner contends that Shew discloses this limitation for the reasons given in Petitioner’s analysis of claim 4. Pet. 89 (citing Ex. 1003 ¶¶ 398–399). Patent Owner contends that claim 27 is patentable over Shew for the reasons given in Patent Owner’s analysis of claim 24. PO Resp. 54. We disagree with Patent Owner for the reasons given in our analysis of claim 24. We find that Petitioner has demonstrated that Shew teaches this limitation of claim 27.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Shew and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 24 and 27 to a person of ordinary skill and that claims 24 and 27 would have been obvious to a person of ordinary skill.

F. Asserted Obviousness over Oksengendler

Petitioner contends that claims 1, 4, 18, 21, 24, and 27 would have been obvious over Oksengendler.

1. Oksengendler (Ex. 1014)

Oksengendler discloses a retrofit system for a luminaire including a tombstone socket, an integrated holder, and a tombstone socket receptacle.

Retrofit system 107 is aligned between tombstone sockets 104, such that light engine 111 is arranged in the same location as a fluorescent lamp that retrofit system 107 is replacing. *Id.*

2. *Oksengendler in View of the Knowledge of a Person of Ordinary Skill*
Claims 1 and 4

The preamble of claim 1 recites a “retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube.” Petitioner contends that Oksengendler discloses this limitation in describing a retrofit system that mounts to a previously installed fluorescent lighting fixture that includes tombstones. Pet. 89–91 (citing Ex. 1014 ¶¶ 36–37, 42, Figs. 1 and 2, claims 4–6; Ex. 1003 ¶¶ 401–405). Petitioner contends that a person of ordinary skill would have disconnected power to the fixture when installing the retrofit system for safety reasons. *Id.* at 90 (citing Ex. 1003 ¶¶ 401–405).

Patent Owner contends that Oksengendler does not disclose an LED retrofit because the device of Oksengendler does not require physical or electrical modifications to an existing light fixture. PO Resp. 15–16 (citing Ex. 2076 ¶¶ 332–339). We disagree with Patent Owner for the reasons given in our analysis of the asserted ground based on Shew. We further highlight that the title of Oksengendler is “Luminaire Retrofit System,” and the abstract discloses a “retrofit system for a luminaire including a tombstone socket,” where the “retrofit system includes an integrated holder and a tombstone socket receptacle.” Ex. 1014, codes (54), (57).

Patent Owner contends that the Oksengendler devices would frustrate the objective of the '628 patent related to concealing the previously installed fixture. PO Resp. 16 (citing Ex. 2076 ¶¶ 340–341; Ex. 1001, 1:41–44); *see* Ex. 1001 at 3:42–45. However, the claim does not recite concealing the previously installed fixture, and we find no basis for reading such a requirement into the claim.

Patent Owner contends that Oksengendler does not disclose thermal management and that light output and the life expectancy of the LEDs would be reduced because of the lack of heat dissipation. PO Resp. 16–17 (citing Ex. 2076 ¶¶ 342–345). Given that the '628 patent does not disclose thermal management, we disagree with Patent Owner for the reasons given in our discussion of the other three grounds. Furthermore, the claims do not recite any requirements for heat dissipation, light output, or LED lifespan, and, therefore, these arguments are not commensurate with the scope of the claim. To the extent that the preamble is limiting, we find that Oksengendler teaches the preamble of claim 1.

Claim 1 recites “a light panel, the light panel including a first side facing the previously-installed light fixture and an opposite second side.” Petitioner contends that Oksengendler discloses this limitation in describing a light panel with a first side facing the previous fixture and a second opposite side. Pet. 91–92 (citing Ex. 1014 ¶¶ 16–18, Figs. 1, 3, 5, and 7; Ex. 1003 ¶ 406). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 1.

Claim 1 recites “the light panel residing at least partially between the first tombstone and the second tombstone.” Petitioner contends that Oksengendler discloses this limitation in describing first and second tombstones located at two opposing ends of the retrofit system, where the

light panel resides at least partially between the first and second tombstones. Pet. 92–93 (citing Ex. 1014 ¶¶ 42, Figs. 1, 2, and 7, claims 4–6; Ex. 1003 ¶¶ 407–408). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 1.

Claim 1 recites “the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture.” Petitioner contends that Oksengendler discloses this limitation in describing a raceway defined by a U-shaped profile that extends along the length of the retrofit system. Pet. 93–94 (citing Ex. 1014 ¶¶ 39, Figs. 1 and 7; Ex. 1003 ¶¶ 410–412).

Patent Owner, relying on the testimony of Dr. Bretschneider, contends that Oksengendler discloses a cavity that houses power supplies, which is not a raceway or conduit that houses and protects electrical wiring. PO Resp. 54–56 (citing Ex. 2076 ¶¶ 673–677). Patent Owner contends that a person of ordinary skill would run a conductive via directly from the power supplies to the LEDs directly through the housing. *Id.*

Petitioner, relying on the testimony of Dr. Ducharme, contends that a person of ordinary skill would have understood that the power supplies of Oksengendler would include wiring internally and externally to move power to the LEDs. Pet. Reply 21 (citing Ex. 1032 ¶ 132). Petitioner also contends that Patent Owner improperly narrows the meaning of “raceway” as synonymous with “conduit” because the ’628 patent discloses storing the power supply in the raceway. *Id.* (citing Ex. 1032 ¶¶ 133–134; Ex. 1001, 4:19–20, 4:33–55, 5:8).

Dr. Ducharme testifies that the cavity that stores power supplies as taught by Oksengendler is a raceway consistent with the meaning of the claimed “raceway.” Ex. 1032 ¶¶ 132–135. We agree with Dr. Ducharme

and find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 1.

Claim 1 recites “a light emitting diode residing on the second side of the light panel.” Petitioner contends that Oksengendler discloses this limitation in describing a light engine that includes LEDs located on the second side of the light panel. Pet. 94 (citing Ex. 1014 ¶¶ 4, 42; Ex. 1003 ¶¶ 413–414). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 1.

Claim 1 recites “an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Oksengendler discloses this limitation in describing power supplies that power the LEDs and that a person of ordinary skill would understand that the power supplies would be in electrical communication with the LEDs. Pet. 94–95 (citing Ex. 1014, code (57), ¶¶ 8, 47, 49, Fig. 7, claim 1; Ex. 1003 ¶¶ 415–416).

Patent Owner contends that the claimed “electrical conductor” is properly construed as a wire that carries electrical power directly to the LEDs. PO Resp. 56 (citing Ex. 2076 ¶¶ 682, 685). Patent Owner contends that the power supplies of Oksengendler are not wires and do not carry electrical power directly to the LEDs without intervening components. *Id.*

Petitioner contends that the ’628 patent does not require the electrical conductor to carry power directly to the LED with no intervening components. Pet. Reply 22. Petitioner contends that a person of ordinary skill would have understood that an electrical conductor is any material that allows electric current to flow through it, such as the wiring and power supplies of Oksengendler. *Id.* (citing Ex. 1032 ¶ 138). Dr. Ducharme testifies that the wiring and power supplies of Oksengendler are examples of

devices that allow electric current to flow through them to supply electric power to the light emitting diodes. Ex. 1032 ¶ 137 (citing Ex. 1014 ¶¶ 8, 47, 49, claim 1).

A person of ordinary skill would have understood that the scope of the claimed “electrical conductor,” read in light of the specification, encompasses any material that allows electric current to flow through it to conduct electricity to the LEDs, with or without intervening components. We find that the wiring and power supplies of Oksengendler teach an “electrical conductor” within the meaning of the claim. Ex. 1032 ¶¶ 137–139. We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 1.

Claim 4 recites “the retrofit kit is mechanically connected directly to the first and second tombstones.” Petitioner contends that Oksengendler discloses this limitation in describing that the retrofit system mechanically connects to the first and second tombstones as shown by protrusions 110a and 110b which surround and connect directly to the tombstones as shown in Figures 1 and 2. Pet. 95–96 (citing Ex. 1014, Figs. 1 and 2; Ex. 1003 ¶¶ 417–418). Petitioner also contends that a person of ordinary skill would have understood that the retrofit is mechanically connected to the tombstones using protrusions 110a and 110b. *Id.* at 96 (citing Ex. 1003 ¶¶ 417–418).

Patent Owner contends that a person of ordinary skill would understand a mechanical connection to be joining of two or more elements to limit the relative movement of the elements by providing support and stability to the joined assembly. PO Resp. 57 (citing Ex. 2076 ¶ 692). Patent Owner contends that the LED device of Oksengendler fits around the tombstones, such that protrusions of the device rest on either side of the

tombstones. *Id.* at 57–58 (citing Ex. 2076 ¶¶ 695–698; Ex. 1014, Fig. 1). Patent Owner contends that Oksengendler includes a support mount that does not interface with the tombstones to provide temporary and permanent support. *Id.* at 59 (citing Ex. 2076 ¶¶ 699–703; Ex. 1014 ¶¶ 55–68).

Petitioner contends that Patent Owner incorrectly narrows the scope of “mechanically connected” as claimed because neither the claims nor the specification requires the mechanical connection to provide support and stability to the joined assembly. Pet. Reply 23–24 (citing Ex. 1032 ¶¶ 141–142). Petitioner further contends that the phrase “support and stability to the joined assembly” included in Patent Owner’s construction of “mechanically connected” is unclear. *Id.* at 23. Petitioner contends that the protrusions of Oksengendler, which rest on either side of the tombstones, provide horizontal support, which demonstrates a “mechanical connection” within the scope of claim 4. *Id.* at 23–24 (citing Ex. 1014 ¶¶ 58–59; Ex. 2076 ¶ 694; Ex. 1032 ¶ 142).

We find that Dr. Bretschneider’s construction of “mechanically connected” is unduly narrow and is also unclear. We agree with Dr. Ducharme that Oksengendler discloses that the retrofit kit is connected to the tombstones in such a way that at least the horizontal movement of the kit is prevented, such that relative movement of the kit is limited and support is provided. *Id.* ¶ 143. We agree with Dr. Ducharme that the protrusions of Oksengendler, which prevent horizontal movement of the retrofit kit and provide support, teach “mechanically connected” within the meaning of the claim. *Id.* ¶¶ 141–144.

Patent Owner contends that Oksengendler does not disclose a retrofit as required by claim 4. PO Resp. 59 (citing Ex. 2076 ¶¶ 703–707). We disagree with Patent Owner for the reasons given in our analysis of claim 1.

We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 4.

Claims 18 and 21

The preamble of claim 18 recites a “retrofit kit for mounting with a de-energized ceiling light fixture that has a base with a first longitudinal side for facing a ceiling and an opposite second longitudinal side, the fixture further having a first tombstone and a second tombstone configured to receive therebetween a linear fluorescent light tube.” Petitioner contends that Oksengendler discloses this limitation in describing a retrofit kit for mounting to de-energized fluorescent lighting fixtures having first and second tombstones configured to receive a fluorescent tube therebetween. Pet. 99–100 (citing Ex. 1014 ¶¶ 4, 9, Fig. 1; Ex. 1003 ¶¶ 438–439). To the extent that the preamble is limiting, we find that Oksengendler teaches the preamble of claim 18.

Claim 18 recites “a first end and a second end.” Petitioner contends that Oksengendler discloses this limitation in describing a light panel with first and second ends disposed proximate to first and second tombstones. Pet. 100 (citing Ex. 1014 ¶ 42; Ex. 1003 ¶¶ 440–441). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 18 recites “a first profile and a second profile.” Petitioner contends that Oksengendler discloses this limitation in describing a retrofit assembly having a light panel disposed between first and second profiles. Pet. 100–101 (citing Ex. 1014, Figs. 1 and 7; Ex. 1003 ¶¶ 442–443). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 18 recites “a light panel disposed between the first profile and the second profile, the light panel having a first side for facing the second side of the base of the light fixture and an opposite second side for illuminating the area underneath the light panel when the retrofit kit is mounted onto the ceiling light fixture and electrical power is supplied to the light panel.” Petitioner contends that Oksengendler discloses this limitation in describing a light panel including LEDs disposed between first and second profiles. Pet. 101–02 (citing Ex. 1014 ¶¶ 4, 42, Fig. 6; Ex. 1003 ¶¶ 444–445).

Patent Owner contends that Oksengendler does not teach the claimed “LED retrofit kit” for the reasons given in Patent Owner’s analysis of claim 1. PO Resp. 60. Petitioner contends that Oksengendler does teach a retrofit kit. Pet. Reply 24–25 (citing Ex. 1032 ¶¶ 145–146; Ex. 1014 ¶ 42). We disagree with Patent Owner for the reasons given in our analysis of claim 1. We rely on the testimony of Dr. Ducharme in finding that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 18 recites “wherein the second side of the light panel comprises a light emitting diode.” Petitioner contends that Oksengendler discloses this limitation in describing a second side of the light panel including LEDs. Pet. 102 (citing Ex. 1014 ¶¶ 4, 42; Ex. 1003 ¶¶ 446–447). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 18 recites “wherein the light panel, the first profile, and the second profile extend longitudinally from the first retrofit kit end to the second retrofit kit end and, when the retrofit kit is mounted onto the ceiling light fixture, the light panel, the first profile, and the second profile extend longitudinally from proximate the first tombstone to proximate the second

tombstone.” Petitioner contends that Oksengendler discloses this limitation in describing a light panel that extends from a first end to a second end. Pet. 102–103 (citing Ex. 1014 ¶ 42, Figs. 1, 3, and 5; Ex. 1003 ¶¶ 448–449). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 18 recites “electrical wiring residing external to the retrofit kit and between the retrofit kit and the de-energized ceiling light fixture, to connect the light emitting diode to a power supply for illuminating the area underneath the second side of the light panel.” Petitioner contends that Oksengendler discloses this limitation in describing an electrical conductor located in the raceway between the retrofit kit and the fixture for powering the LEDs. Pet. 103–104 (citing Ex. 1014 ¶¶ 47, 49, Figs. 1 and 7, claim 1; Ex. 1003 ¶¶ 450–453).

Patent Owner contends that Oksengendler does not teach this limitation for reasons similar to those presented in Patent Owner’s analysis of claim 1. PO Resp. 60–62 (citing Ex. 2076 ¶¶ 716–725, 727–729). In particular, Patent Owner contends that the wiring would not reside in the raceway of Oksengendler. *Id.* Petitioner contends that a person of ordinary skill would have understood that the power supply and the LEDs would have been connected by wiring, which would have been between the de-energized fixture and the LED light panel. Pet. Reply 26 (citing Ex. 1032 ¶ 149). We disagree with Patent Owner for the reasons given in our analysis of claim 1. We rely on the testimony of Dr. Ducharme (Ex. 1032 ¶ 149) in finding that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 18.

Claim 21 recites “the retrofit kit is connected directly to the first and second tombstones.” Petitioner contends that Oksengendler discloses this

limitation for the reasons given in Petitioner’s analysis of claim 4. Pet. 104 (citing Ex. 1003 ¶ 454). Patent Owner contends that Oksengendler does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 62–63 (citing Ex. 2076 ¶ 732). We disagree with Patent Owner for the reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 21.

Clams 24 and 27

The preamble of claim 24 recites a “method for retrofitting a fluorescent lighting ceiling fixture.” Petitioner contends that Oksengendler discloses this limitation in describing a retrofit system for a luminaire that uses solid state light sources, while occupying the existing space of a conventional fluorescent lamp. Pet. 104 (citing Ex. 1014 ¶ 8; Ex. 1003 ¶ 456). To the extent that the preamble is limiting, we find that Oksengendler teaches the preamble of claim 24.

Claim 24 recites “a) identifying a fluorescent lighting ceiling fixture having a pre-installed base with first and second tombstones disposed to receive between them a fluorescent lighting tube.” Petitioner contends that Oksengendler discloses this limitation in describing a fixture that includes tombstones for receiving a fluorescent lighting tube. Pet. 104–105 (citing Ex. 1014 ¶¶ 3, 42, Figs. 1, 2, and 7, claim 4; Ex. 1003 ¶¶ 457–459). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “b) disconnecting electrical connections to the fluorescent lighting ceiling fixture.” Petitioner contends that a person of ordinary skill would have understood that retrofitting a lighting system requires disconnecting power for safe installation. Pet. 105 (citing Ex. 1003

¶ 460). Patent Owner contends that Oksengendler does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 18. PO Resp. 63 (citing Ex. 2076 ¶¶ 733–738). We disagree with Patent Owner for the reasons given in our analysis of claim 18. We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “c) removing all fluorescent lighting tubes from the ceiling fixture.” Petitioner contends that Oksengendler discloses this limitation in describing removing fluorescent lighting tubes from the fixture. Pet. 106 (citing Ex. 1014 ¶ 8; Ex. 1003 ¶¶ 461–462). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “d) leaving as installed the first and second tombstones in position in the ceiling fixture.” Petitioner contends that Figures 1 and 2 of Oksengendler disclose leaving the tombstones in position when installing the retrofit kit. Pet. 106 (citing Ex. 1014 ¶ 42, Figs. 1 and 2, claim 4; Ex. 1003 ¶¶ 463–464). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “e) providing a ceiling light LED retrofit kit adapted to attach with the pre-installed base, the ceiling light LED retrofit kit including: a first profile, an opposing second profile, a light panel disposed between the first profile and the opposing second profile, and a light emitting diode.” Petitioner contends that Figure 7 of Oksengendler discloses this limitation. Pet. 106 (citing Ex. 1014 ¶ 42, Fig. 7; Ex. 1003 ¶¶ 465–466). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “f) attaching the ceiling light LED retrofit kit to the ceiling fixture, leaving a raceway between the ceiling fixture and the ceiling light LED retrofit kit and external to the ceiling light LED retrofit kit.”

Petitioner contends that Oksengendler discloses a raceway defined by the light panel and the fixture. Pet. 107 (citing Ex. 1014 ¶¶ 39, Figs. 1 and 7; Ex. 1003 ¶¶ 467–469). Patent Owner contends that Oksengendler does not teach this limitation for the reasons given in Patent Owner’s analysis of claims 1 and 18. PO Resp. 63 (citing Ex. 2076 ¶¶ 745–752). We disagree with Patent Owner for the reasons given in our analysis of claims 1 and 18. We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 24 recites “g) disposing an electrical conductor at least partially within the raceway and in electrical communication with the light emitting diode.” Petitioner contends that Oksengendler discloses this limitation in describing an electrical conductor located in the raceway to power the LEDs. Pet. 107–08 (citing Ex. 1014 ¶¶ 47, 49, Figs. 1 and 7, claim 1; Ex. 1003 ¶¶ 470–470). Patent Owner contends that Oksengendler does not teach this limitation for the reasons given in Patent Owner’s analysis of claims 1 and 18. PO Resp. 64 (citing Ex. 2076 ¶¶ 760–764). We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 24.

Claim 27 recites “wherein the step of attaching the ceiling light LED retrofit kit to the ceiling fixture includes attaching the ceiling light LED retrofit kit directly to the first and second tombstones.” Petitioner contends that Oksengendler discloses this limitation for the reasons given in Petitioner’s analysis of claim 4. Pet. 108 (citing Ex. 1003 ¶ 472). Patent Owner contends that Oksengendler does not teach this limitation for the reasons given in Patent Owner’s analysis of claim 4. PO Resp. 64–65 (citing Ex. 2076 ¶¶ 765, 768–771). We disagree with Patent Owner for the reasons given in our analysis of claim 4. We find that Petitioner has demonstrated that Oksengendler teaches this limitation of claim 27.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Oksengendler and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of claims 1, 4, 18, 21, 24, and 27 to a person of ordinary skill and that claims 1, 4, 18, 21, 24, and 27 would have been obvious to a person of ordinary skill.

III. ANALYSIS OF THE CONTINGENT MOTION TO AMEND

37 C.F.R. § 42.121(d)(1) and (2) provides:

(d) Burden of Persuasion. On a motion to amend:

(1) A patent owner bears the burden of persuasion to show, by a preponderance of the evidence, that the motion to amend complies with the requirements of paragraphs (1) and (3) of 35 U.S.C. 316(d), as well as paragraphs (a)(2), (a)(3), (b)(1), and (b)(2) of this section;

(2) A petitioner bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.

Patent Owner does not bear the burden of persuasion to demonstrate the patentability of substitute claims presented in a motion to amend. Rather, the burden of persuasion ordinarily will lie with Petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence. Ultimately, the Board determines whether substitute claims are unpatentable by a preponderance of the evidence based on the entirety of the record, including any opposition made by the petitioner. *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential).

Patent Owner proposes claims 29–47 as substitutes for claims 1, 2, 4–12, 21–28 if they are found unpatentable. Mot. 1. Substitute claim 29 is reproduced below (with underlining indicating added language).

29. A retrofit kit for mounting with a previously-installed light fixture attached to the ceiling of a building to which electrical power has been disconnected, the previously-installed light fixture having first and second tombstones configured to energize a fluorescent light tube, the previously-installed light fixture being devoid of a fluorescent light tube, the retrofit kit comprising:

a light panel, the light panel including a first side facing the previously-installed light fixture and an opposite second side;

the light panel residing at least partially between the first tombstone and the second tombstone;

the light panel defining a raceway external to and above the light panel and below the previously-installed light fixture;

a light emitting diode residing on the second side of the light panel;
and

an electrical conductor, the electrical conductor residing in the raceway and in electrical communication with the light emitting diode,

in which the electrical conductor is adapted for series electrical connection to a second retrofit kit.

A. Whether the Substitute Claims Contain New Matter

Petitioner contends that substitute claims 31, 36, 43, 44, and 46 contain new subject matter. Opp. 3–5; *see* 35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii).

Claims 31 and 46

Petitioner asserts that proposed substitute claim 31, reciting “the retrofit kit is ***mechanically connected*** directly to the first and second tombstones,” is not supported by the ’729 application (16/546,729, filed Aug. 21, 2019) nor the ’295 provisional application (62/299,295, filed Feb.

24, 2016). Opp. 4 (citing Ex. 1002, 19 ¶ 37); *see also id.* n.4 (raising same issue for proposed substitute claim 46). Petitioner asserts that instead, the '729 application discloses that “the tombstones ‘may be left within the ceiling light LED retrofit kit.’” *Id.* Dr. Bretschneider states that the '729 application discloses attaching the LED retrofit kit to the pre-installed base (tombstone). Ex. 2006 ¶ 138 (citing Ex. 1002 ¶ 35). We agree with Dr. Bretschneider that the '729 application discloses attaching the LED retrofit kit to the tombstone, and find that such disclosure provides sufficient written description support for proposed substitute claims 31 and 46.

Claim 36

Proposed substitute claim 36 recites “wherein the electrical conductor is so adapted for making said electrical connection without the required assistance of a licensed electrician.” Mot. 5, App’x A–8. Patent Owner contends that paragraphs 5, 6, and 37 of the '295 provisional application provide support for this limitation. *See id.* at 7. Paragraphs 5 and 6 disclose that known methods of converting fluorescent lighting to LED lighting “require intensive use of skilled electricians” to wire the device and that it would be desirable to “reduce the need for skilled electrician efforts.” Ex. 1004 ¶¶ 5–6. Patent Owner also cites to paragraphs 6 and 7 of the '729 application, which include the same disclosure. *See* Mot. 7; Ex. 1002, 14 ¶¶ 6–7.

Petitioner argues that the '295 provisional application and the '729 application refer to a “skilled electrician” not a “licensed electrician.” Opp. 4 (citing Ex. 1002, 14 ¶¶ 6–7, 21 ¶¶ 46, 48). Petitioner argues that “the disclosure *lacks* the term ‘licensed electrician,’ *lacks* a definition of ‘licensed electrician,’ and *lacks* an explanation of what type of electrical connection would be allowed without the assistance of a licensed electrician.” *Id.* at 4–5

(citing Ex. 2002). Accordingly, Petitioner argues that neither the '295 provisional application nor the '729 application provide support for proposed substitute claim 36. *See id.* (citing Ex. 1031 ¶¶ 118–121).

We agree with Petitioner. The '295 and '729 applications describe a “skilled” electrician, not a “licensed” electrician. Patent Owner does not show that one of ordinary skill in the art would interpret these terms to be equivalent. *See Purdue Pharma L.P. v. Faulding, Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000) (“[T]o satisfy the written description requirement . . . one skilled in the art, reading the original disclosure, must immediately discern the limitation at issue in the claims.” (citations omitted)). Accordingly, we find that proposed substitute claim 36 adds new matter.

Claims 43 and 44

Petitioner specifically asserts that certain added limitations of claims 43 and 44 are not supported by the '295 provisional application or the '729 application. Opp. 3. Petitioner asserts that the limitations of connecting electrical conductors in series are not supported because “the original disclosure does not even disclose the term ‘electrical conductor,’ or connecting electrical conductors, let alone connecting electrical conductors in series.” *Id.* (citing Ex. 1002, 21 ¶¶ 46, 48).

Proposed substitute claim 43 recites “connecting the disposed electrical conductor to the electrical conductor of claim 1 in electrical series.” *See* Mot. App’x A–18. Proposed substitute claim 44 recites “connecting the electrical conductor of the ceiling light LED retrofit kit adapted to attach with the pre-installed base to the electrical conductor of the retrofit kit for mounting with a previously installed light fixture.” *See* Mot. App’x A–19. Patent Owner cites to the '729 application, paragraphs 46 and

48, as support for these limitations. *See* Mot. 8–9. Paragraphs 46 and 48 recite:

[0046] In particular applications, a plurality of light panels 40 may be disposed end to end in electrical series, for particular advantages. In such configurations, a splice 74 may be used at the juncture of any two abutting light panels 40. An embodiment of a splice is depicted in FIG. 6.

[0048] In some applications, a plurality of light panels 40 may be disposed end to end in electrical series, for particular advantages. In such configurations, a splice 74 may be used at the juncture of any two abutting light panels 40. An embodiment of a splice 74 is depicted in FIG. 8. In this embodiment, the splice may include one or more corresponding ribs, for example, 59a and 59b, that correspond to the one or more longitudinal ribs, for example, 59, along the first profile 51 and the second profile 52, respectively.

The portions of the '729 application identified by Patent Owner for support do not use the phrase an “electrical conductor.” Rather, the portions describe “a plurality of light panels 40 may be disposed end to end in electrical series.” *See id.* However, Patent Owner identifies support for the claimed “electrical conductor” recited in claim 43 in paragraphs 14 and 15 of the '729 application. Mot. 8. Patent Owner identifies support for the claimed “electrical conductor” recited in claim 44 in paragraph 35 of the '729 application. Mot. 9. Paragraph 15 discloses “[w]iring, in electrical communication with the light emitting diode, resides within the raceway.” Paragraph 35 discloses “electrical wiring in electrical communication with light emitting diode 60 may reside within raceway 62.”

Both parties' experts testify that electrical wiring corresponds to an electrical conductor. Ex. 1031 ¶ 58 (“If the term ‘electrical conductor’ means simply a wire, then I believe claim 43 is unpatentable as being obvious.”); Ex. 2006 ¶¶ 272, 321. The subsequent claim limitations recite

connecting the electrical conductors (electrical wiring) in electrical series. “[T]o satisfy the written description requirement, the disclosure as originally filed does not have to provide *in haec verba* support for the claimed subject matter at issue.” *Purdue Pharma L.P.*, 230 F.3d at 1323. Nonetheless, the disclosure must convey with reasonable clarity to those skilled in the art that the inventor was in possession of the invention. *See id.*

We agree with Dr. Bretschneider (Ex. 2006 ¶¶ 272, 321), that the electrical wiring in electrical communication with the LED disclosed by the ’729 application is an electrical conductor in communication with the LED. Petitioner’s contention that “connecting the disposed electrical conductor to the electrical conductor of claim 1 in electrical series” recited in claim 43 and “connecting the electrical conductor of the ceiling light LED retrofit kit adapted to attach with the pre-installed base to the electrical conductor of the retrofit kit for mounting with a previously installed light fixture” recited in claim 44 lack written description support is based on the premise that the ’729 application does not support the term “electrical conductor,” which we find unpersuasive. *See* Opp. 3. We find that paragraphs 46 and 48 of the ’729 application, which disclose connecting the light panels end to end in electrical series, provide written description support for connecting the electrical conductors as claimed. We find that Patent Owner has shown support for an “electrical conductor” connected in electrical series as recited in claims 43 and 44.

We find that Patent Owner has satisfied the statutory and regulatory requirements associated with filing a motion to amend for proposed substitute claims 29–35 and 37–47, but not with respect to proposed substitute claim 36 (as adding new matter under 35 U.S.C. § 316(d)(3) and 37 C.F.R. § 42.121(a)(2)(ii)).

B. Whether the Substitute Claims are Indefinite

Petitioner asserts that “substitute claim 36 fails to inform with reasonable certainty to those skilled in the art what it means that the ‘electrical conductor is so adapted for making said electrical connection without the required assistance of a *licensed electrician*.’” Opp. 6. Petitioner asserts that the ’295 provisional application and the ’729 application do not disclose or provide insight as to a licensed electrician as opposed to a skilled electrician. *See id.* (citing Ex. 1002, 2 ¶¶ 6–7).

Petitioner’s declarant Dr. Ducharme attests that “[a] licensed electrician is an individual who has obtained a license from a regulatory authority such as a state or local government” and that the licensing standards set forth “differ depending upon a given industry” and “change over time.” Ex. 1031 ¶ 132. Petitioner asserts that “one skilled in the art is left to speculate as to what type of electrical connections require a licensed electrician and which do not — there is no reasonable certainty of the scope of the claimed invention, as the standard requires.” Opp. 6 (citing *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014)).

We agree with Petitioner. Specifically, we agree that there is no reasonable certainty as to the definition of a licensed electrician, nor how to adapt an electrical conductor to be connected without the required assistance of a licensed electrician. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014) (“[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.”); USPTO Memorandum on the Approach to Indefiniteness Under 35 U.S.C. § 112 in AIA Post-Grant Proceedings (Jan. 6, 2021), *available at* <https://www.uspto.gov/sites/default/>

files/documents/IndefinitenessMemo.pdf. We find that substitute claim 36 is unpatentable as indefinite under 35 U.S.C. § 112.

C. Whether the Substitute Claims Would Have Been Obvious

Petitioner contends the proposed substitute claims are unpatentable under the following grounds:

(1) Dowling and McCane¹ as to claims 29–41, 43, 44, 46, and 47;
and

(2) Dowling and Carney² as to claims 42 and 45.
Opp. 7–25.

1. McCane

McCane discloses a retrofit kit for retrofitting an LED light engine into an existing light fixture housing. Ex. 1029, code (57). McCane discloses that the retrofit kit includes a hook bracket mounted in the housing in order to suspend an end of the engine in order to permit an installer to electrically connect the engine. *Id.* McCane discloses that the retrofit kit also includes a mounting bracket to secure the free end of the engine into the housing after the engine has been rotated into the housing. *Id.*

¹ U.S. Patent Application Publication No. 2015/0362132 A1, published December 17, 2015 (Ex. 1029, “McCane”).

² U.S. Patent Application Publication No. 2014/0177209 A1, published June 26, 2014 (Ex. 1030, “Carney”).

Figure 11 of McCane is reproduced below.

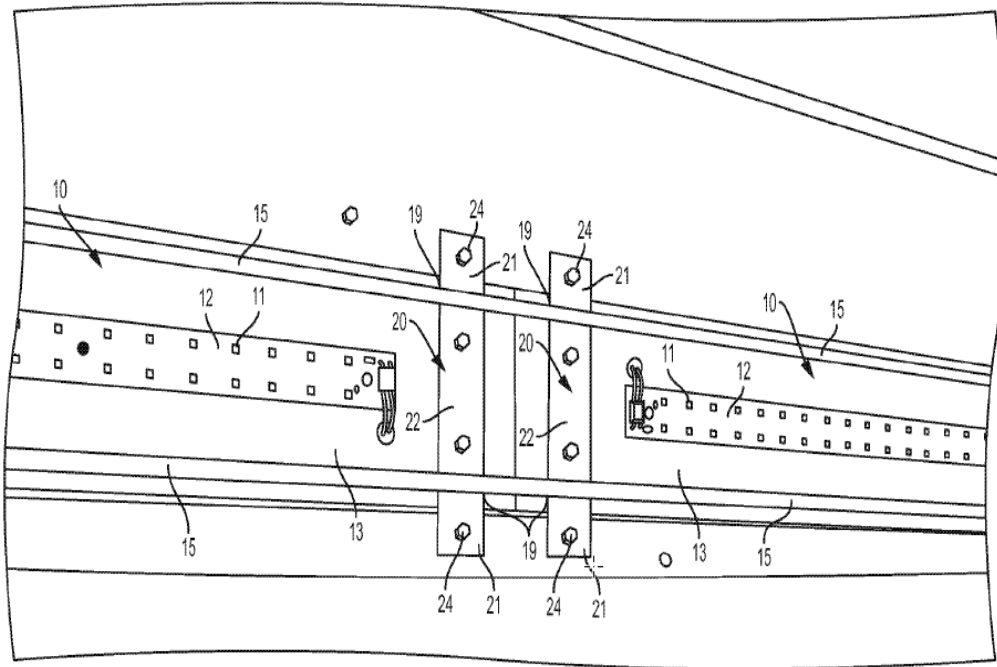


FIG. 11

Figure 11 above shows a bottom perspective view of multiple light engines installed in a light fixture housing. Ex. 1029 ¶ 22. Figure 11 shows printed circuit boards (PCBs) 12 populated with a plurality of LEDs 11. *Id.* ¶ 28. Each PCB can have wiring for connecting to a power supply, which can be shared between PCBs 12, or each PCB can have its own power supply. *Id.* McCane discloses that in certain embodiments, multiple retrofit kits may be necessary such that multiple light engines 10 are installed in a series arrangement (i.e., end-to-end) within the housing, such as shown in Figure 11. *Id.* ¶¶ 39, 47.

2. Obviousness of Substitute Claims 29–41, 43, 44, 46, and 47

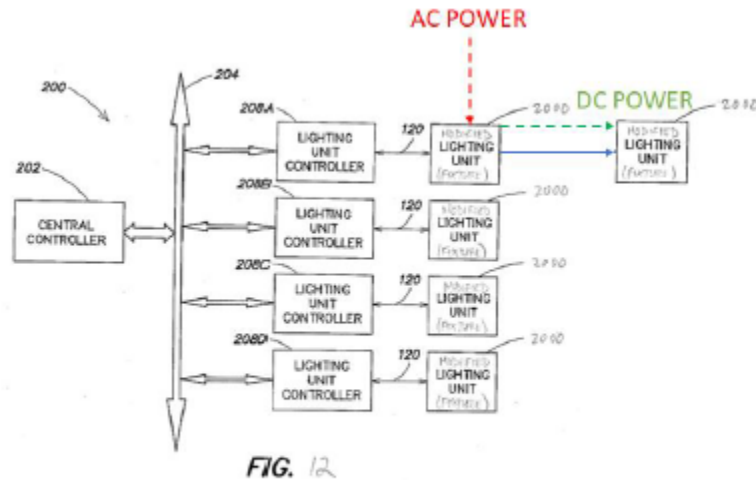
Independent Claim 29

Substitute claim 29 recites the limitations of original claim 1, and adds the limitation “in which the electrical conductor is adapted for series

electrical connection to a second retrofit kit.” Petitioner contends that this limitation, although worded slightly differently, has the same scope as that recited in original claim 9, and is therefore taught by Dowling for the reasons given in Petitioner’s analysis of claim 9. Opp. 9–10 (citing Mot. 4; Pet. 10–16, 20–21; Ex. 1003 ¶¶ 117–135, 149–151; Ex. 1031 ¶¶ 25–26). We agree with Petitioner for the reasons given in our analysis of claim 9. We address the specific contentions raised by the parties for substitute claim 29 to complete the record.

Petitioner asserts that Dowling teaches that lighting units may be coupled in various configurations, including serial connections, parallel connections, and combinations of serial and parallel connections. Opp. 9–10 (citing Pet. 20–21; Ex. 1007 ¶ 122; Ex. 1003 ¶¶ 149–151; Ex. 1031 ¶ 26). Petitioner further asserts that Dowling teaches connecting multiple LED retrofit kits to a shared power supply. *Id.* at 10–11 (citing Ex. 1007 ¶ 114; Ex. 1031 ¶ 31).

Petitioner illustrates the series D/C power connection between two lighting fixtures in Figure 12 of Dowling, reproduced as modified by Petitioner below.



Ex. 1007, Fig. 12 (modified)

Opp. 14. Modified Figure 12 above shows a diagram of a networked lighting system including multiple modified lighting fixtures having LED-based retrofit subassemblies. Ex. 1007 ¶¶ 79. Lighting system 200 includes a central controller 202 connected via a generic connection, shown as up and down arrow 204, to multiple lighting unit controllers 208A–208D. *Id.* ¶¶ 122–123. Each lighting unit control 208 is connected to modified light fixtures 2000 via communication ports 120. *Id.* Petitioner modified Figure 12 by adding second modified light fixture 2000 “attached” by a blue line to first modified light fixture 2000. Opp. 12–13. Petitioner also modified Figure 12 by adding a first arrow for AC power directed to the first modified light fixture and a second arrow labeled DC power from the first to the second modified light fixture. *Id.* at 13–14 (citing Ex. 1031 ¶¶ 42–43).

Petitioner relies on McCane and Dowling to show that a person of ordinary skill would have understood how to connect retrofit assemblies together using a common power supply. Opp. 11 (citing Ex. 1031 ¶¶ 34–35;

Ex. 1029 ¶¶ 28, 36). Dr. Ducharme testifies that McCane teaches multiple retrofit kits installed in longer fixtures (1×8 fixtures), that share a power supply. Ex. 1031 ¶¶ 34–35 (citing Ex. 1031 ¶¶ 28, 36). McCane discloses multiple retrofit kits connected end-to-end in series. Ex. 1029 ¶¶ 39, 47. McCane discloses that “multiple retrofit kits may be necessary such that multiple light engines 10 are installed in a series arrangement (i.e., end-to-end) within the housing 50.” Ex. 1029 ¶ 39.

Petitioner asserts that a person of ordinary skill would have been motivated to use a shared power supply to both reduce cost and improve the overall control for the light fixture. Opp. 11 (citing Ex. 1031 ¶ 31). Petitioner asserts a person of ordinary skill would have understood that there would have been two design choices to share a common power supply between electrically connected retrofit kits: (1) series or (2) parallel. *Id.* “Given the limited design choices for providing an electrical connection,” a person of ordinary skill “would have understood and been motivated to try either or both choices.” *Id.* (citing Ex. 1031 ¶¶ 32–33, 36–37). According to Petitioner, “given there [are] only two design choices to provide D/C power from the first lighting fixture [of Dowling] to the second fixture, it would have been obvious to connect the two lighting units using a series connection.” *Id.* at 14.

Patent Owner contends that Dowling does not disclose multiple retrofitted fixtures connected in series. Mot. 12–13 (citing Ex. 2006 ¶¶ 379–383). We disagree for the reasons given in our analysis of claim 9. We further agree with Dr. Ducharme that a person of ordinary skill would have understood that Figure 12 and its corresponding description in the specification teaches multiple retrofitted fixtures connected in series. Ex. 1031 ¶¶ 38–43.

Patent Owner argues that Dowling’s serial connection refers “to the nature of data transfer for control and communication from Dowling’s [lighting unit controllers] to each fixture, *not* with respect to its electrical wiring *between* fixtures.” Mot. 13 (citing Ex. 2006 ¶¶ 379–392; Ex. 2011; Ex. 1007, Fig. 12); Reply to Opp. 2 (citing Ex. 2111 ¶¶ 73–86), 4–5 (citing Ex. 2111 86–90). According to Patent Owner, the claims require a first retrofit kit to provide operating power to the second. Reply to Opp. 5–6 (citing Ex. 2111 ¶¶ 91–92). Petitioner responds that, even if Dowling refers to serial data communications connections, Dowling’s data connections would still teach an electrical connection within the scope of the claim. Opp. 10 (citing Ex. 1031 ¶¶ 27–29; Ex. 2006 ¶ 396).

We agree with Dr. Ducharme that the scope of “the electrical conductor is adapted for series electrical connection to a second retrofit kit” is not limited to carrying electricity sufficient to power an LED retrofit, but instead, encompasses a connection that provides electricity in series. Ex. 1031 ¶¶ 27–28. We rely on Dr. Ducharme’s testimony in finding that the scope of the “electrical connection” encompasses data communications that provide electrical voltage and current between first and second retrofit kits as taught by Dowling. *Id.* ¶ 29; *see* Ex. 2006 ¶ 396. We also agree with Dr. Ducharme that Dowling teaches carrying electricity to power the LED retrofits even under Patent Owner’s narrower construction. Ex. 1031 ¶¶ 30–43. We find that Dowling’s disclosure of a lighting unit controller (LUC) that controls lighting fixtures coupled to it, where “different numbers of lighting fixtures may be coupled to a given LUC in . . . serial[] connections,” teaches carrying electricity to power the LED retrofits. Ex. 1007 ¶ 122.

Patent Owner argues that a person of ordinary skill “would understand that modifying the fixture of Dowling to be

physically/electrically connected in series to a second fixture would require significant physical and electrical modifications” and the resulting modified fixtures “would not operate if they were connected in series.” Mot. 13–14 (citing Ex. 2006 ¶¶ 390–398). Patent Owner argues that “a POSA would not be motivated to modify the independent circuitry disclosed in Dowling to a series connection because of” various shortcomings of series connections. *Id.* at 14 (citing Ex. 2006 ¶¶ 397–401). Patent Owner lists these shortcomings as: (1) failure of one fixture affects the subsequent fixtures, (2) other failure modes can occur, and (3) adding fixtures in series could decrease the brightness of each individual fixture. *Id.*; see Reply to Opp. 2–4 (citing Ex. 2111 ¶¶ 39–43, 59–72). According to Patent Owner, connecting a lighting fixture that includes a power supply in electrical series to a second lighting fixture would create safety hazards and unpredictable output. Reply to Opp. 6 (citing Ex. 2111 ¶¶ 93–96).

Petitioner, relying on the testimony of Dr. Ducharme, contends that a “[POSA] would have understood that LED drivers could be — and were — designed to provide proper current and voltage to multiple LED devices,” thereby avoiding reduced brightness. Opp. 15 (citing Ex. 1006 ¶ 401; Ex. 1031 ¶ 46). Petitioner asserts that series connection was one of two well-known design choices to provide D/C power between light fixtures. *See id.* at 13–14.

We agree with Petitioner. As we discussed in our analysis of claim 9, the ’628 patent does not disclose such shortcomings, complications, and safety hazards, nor does the ’628 patent disclose any techniques for addressing these problems. In the absence of a specific description of such techniques in the ’628 patent, we find that addressing problems when disposing light panels end to end in electrical series was within the

knowledge of a person of ordinary skill. *Epstein*, 32 F.3d at 1568; *Fox*, 471 F.2d at 1407. We agree with Dr. Ducharme that providing electrical data or power using a series connection between two retrofit kits was within the level of ordinary skill. Ex. 1031 ¶¶ 45–46. Further, we find that the advantages of using a single power supply to power multiple separate LED retrofit kits, such as reduced cost and increased control over the fixture, outweigh the disadvantages identified by Patent Owner. *See* Ex. 1031 ¶¶ 31, 45–46; *Medichem*, 437 F.3d at 1165 (“[A] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.”).

Patent Owner argues that a POSA “would know that as of [Dowling’s] filing date, LEDs were, in fact, less energy efficient than fluorescent lighting sources.” Mot. 14 (citing Ex. 2006 ¶¶ 406–410; Ex. 2016, 9, 15; Ex. 2017, 9). Patent Owner argues that “[a] POSA would, therefore, not rely on Dowling given that the reference proposes a more expensive and less energy efficient lighting system.” *Id.* As discussed above in the section addressing Petitioner’s challenge to claim 1 based on Dowling, we find that Dowling is analogous art and, therefore, is properly considered for obviousness.

Patent Owner contends that McCane discloses a series arrangement (i.e., end-to-end), which refers to the physical orientation of the retrofit kits, but does not disclose series electrical connections between devices. Reply to Opp. 6–7 (citing Ex. 2111 ¶ 105). We disagree with Patent Owner. We rely on the testimony of Dr. Ducharme in finding that both Dowling and McCane teach or suggest connecting LED light fixtures in electrical series. *See* Ex. 1007 ¶ 122; Ex. 1029 ¶¶ 39, 47; Ex. 1031 ¶¶ 10–11, 34–43). We also agree with Dr. Ducharme that both series and parallel electrical connections were

well-known design options available to those of ordinary skill in the art at the time. *See* Ex. 1031 ¶ 42. In particular, we agree that there are two ways to connect devices to a common power source – in parallel and in series. *See Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1341 (Fed. Cir. 2020) (“Even if the two proposed solutions would have required different implementation, that does not negate the fact that server-side and terminal-side plotting are two known, finite, predictable solutions for solving the same problem which, consistent with precedent, renders obvious the challenged limitation.”).

We find that a person of ordinary skill in the art would have adapted the electrical conductor of Dowling for series electrical connection to a second retrofit kit as taught by both Dowling and McCane to yield the predictable benefits of reduced cost and improved control of the lighting fixture. Ex. 1031 ¶ 31. We find that connecting one power supply in series to multiple LED retrofit kits as taught by Dowling and McCane is “[t]he combination of familiar elements according to known methods” that “does no more than yield [the] predictable result[]” of providing power to multiple retrofit kits. *KSR*, 550 U.S. at 416; Ex. 1031 ¶ 31. We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 29.

Dependent Claims 30–39

Petitioner contends that the limitations recited in substitute claims 30, 32–35 and 37–39, which correspond to original claims 2, 5–8, and 10–12, are taught by Dowling for the reasons given in Petitioner’s analysis of claims 2, 5–8, and 10–12. Opp. 18 (citing Pet. 16–23; Ex. 1003 ¶¶ 136–148, 152–157; Ex. 1031 ¶¶ 66–68). We agree with Petitioner for the reasons given in our analysis of claims 2, 5–8, and 10–12. We find that Petitioner has shown that Dowling teaches the limitations of substitute claims 30, 32–

35, and 37–39.

Substitute claim 31 recites “the retrofit kit is mechanically connected directly to the first and second tombstones.” Petitioner, relying on the testimony of Dr. Ducharme, contends that Dowling discloses that the LED retrofit assembly “may be configured to include features to actually engage mechanically and or electrically with the [tombstone].” Opp. 18–19 (quoting Ex. 1007 ¶ 116; citing Ex. 1031 ¶¶ 70–71). We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 31.

Substitute claim 36 recites “the electrical conductor is so adapted for making said electrical connection without the required assistance of a licensed electrician.” Petitioner contends that a person of ordinary skill, who, by definition, includes those that are not licensed electricians, would have been knowledgeable and capable of “making said electrical connection *without* the required assistance of a licensed electrician.” Opp. 4 (citing Ex. 1031 ¶¶ 75–77). We are able to decide the issue of obviousness for claim 36, despite the conclusion above that the claim is indefinite. *See, e.g., Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, 948 F.3d 1342, 1355 (Fed. Cir. 2020)

We agree with Petitioner. Dr. Ducharme and Dr. Bretschneider agree that a person of ordinary skill has a bachelor’s degree in mechanical engineering, or a degree in electrical engineering and two years of experience developing lighting fixtures. Ex. 1003 ¶ 33; Ex. 2006 ¶ 39; Ex. 1031 ¶ 76. We agree with Dr. Ducharme that a person of ordinary skill, including those who are not licensed electricians, would have had the knowledge and capability of electrically wiring two LED retrofit kits together in series. Ex. 1031 ¶ 77. We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 36.

Dependent Claims 40 and 41

Substitute claim 40 depends from original claim 18 and recites “the electrical wiring is further adapted for series electrical connection to a second retrofit kit.” Substitute claim 41 depends from original claim 18 and recites “the retrofit kit as recited in claim 18 and the second retrofit kit are connected in electrical series.” Petitioner contends that original claim 18 is unpatentable for the reasons given in Petitioner’s analysis of claim 18. Opp. 19–20 (citing Pet. 26–31; Ex. 1003 ¶¶ 170–181; Ex. 1031 ¶¶ 85–89). We agree with Petitioner for the reasons given in our analysis of claim 18.

Petitioner contends that the limitations of substitute claims 40 and 41 are taught by the prior art for the reasons given in Petitioner’s analysis of original claim 9 and substitute claim 29. Opp. 20 (citing Pet. 20–21; Ex. 1031 ¶¶ 24–51). We agree with Petitioner for the reasons given in Petitioner’s analysis of claim 18 and substitute claim 29. We find that Petitioner has shown that the prior art teaches the limitations of substitute claims 40 and 41.

Independent Claims 43 and 44

Petitioner contends that the preamble and limitations a-g of substitute claim 43 correspond to the preamble and limitations a-g of original claim 24. Opp. 16. Petitioner contends that the prior art teaches the preamble and limitations a-g of substitute claim 43 for the reasons given in Petitioner’s analysis of claim 24. *Id.* (citing Pet. 33–37; Ex. 1003 ¶¶ 190–205; Ex. 1031 ¶¶ 53–55). We agree with Petitioner for the reasons given in Petitioner’s analysis of claim 24.

Petitioner contends that limitations h-j of substitute claim 43 correspond to limitations h-j of original claim 25, except that the term “end-to-end series” recited in claim 25 has been amended to “electrical series” in

substitute claim 25. Opp. 16–17. Petitioner contends that the prior art teaches limitations h–j of substitute claim 43 for the reasons given in Petitioner’s analysis of claim 25 and substitute claim 29. *Id.* (citing Pet. 38–39; Ex. 1003 ¶¶ 207–211; Ex. 1031 ¶¶ 24–51, 56–61). We agree with Petitioner for the reasons given in our analysis of claims 24, 25, and substitute claim 29. We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 43.

Petitioner contends that substitute claim 44 incorporates the limitations of original claims 1, 24, and 25 and is unpatentable for the reasons given in the Petition. Opp. 17–18 (citing Pet. 10–16, 33–39; Ex. 1003 ¶¶ 117–135). Petitioner further contends that limitation i, which recites “disposing the retrofit kit for mounting with a previously-installed light fixture in end-to-end series with the ceiling light LED retrofit kit adapted to attach with the pre-installed base,” is taught by the prior art for the reasons given in Petitioner’s analysis of claim 29. *Id.* at 18 (citing Ex. 1031 ¶¶ 62–65). Patent Owner contends that substitute “claim 44 is simply claim 25 rewritten in independent form.” Reply to Opp. 8. Patent Owner contends that the claim term “end-to-end series” defines the physical orientation of the devices, not the manner in which the devices are electrically connected. *Id.* at 8–9 (citing Ex. 2111 ¶¶ 87, 105, 108).

Given that Patent Owner concedes that claim 44 is claim 25 rewritten in independent form, we agree with Petitioner and Dr. Ducharme for the reasons given in our analysis of claim 25. We find that Petitioner has shown that the prior art teaches the limitations of claim 44.

Dependent Claims 46 and 47

Substitute claim 46 depends from substitute claim 43 and recites “attaching the ceiling light LED retrofit kit directly to the first and second

tombstones.” Petitioner contends that Dowling discloses this limitation in describing that the retrofit kit can engage mechanically or electrically with the tombstones. Opp. 18–19 (citing Ex. 1007 ¶ 116; Ex. 1031 ¶¶ 69–71).

We agree with Petitioner for the reasons given by Petitioner and Dr. Ducharme. We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 46.

Substitute claim 47 depends from substitute claim 43 and recites “the fluorescent lighting ceiling fixture includes an electrical ballast, further including the step of leaving the electrical ballast within the fluorescent lighting ceiling fixture.” Petitioner contends that Dowling teaches this limitation for the reasons given in Petitioner’s analysis of original claim 28. Opp. 19 (citing Pet. 39–40; Ex. 1003 ¶¶ 214–215; Ex. 1031 ¶¶ 72–74; Ex. 1007 ¶ 111, Fig. 3). We agree with Petitioner for the reasons given in our analysis of claim 28. We find that Petitioner has shown that the prior art teaches the limitations of substitute claim 47.

Conclusion for Substitute Claims 29–41, 43, 44, 46, and 47

Patent Owner contends that commercial success and copying are two objective indicia of non-obviousness. Mot. 25. Patent Owner’s arguments and evidence here are substantially the same as the its arguments in the Response, which we address above in the discussion of the challenges based on Dowling. *See* PO Resp. 65–66. For the reasons discussed above, Patent Owner has not demonstrated nexus.

Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling, McCane, and the knowledge of a person of ordinary skill, would have taught or suggested the limitations of substitute claims 29–

41, 43, 44, 46, and 47 to a person of ordinary skill and that claims 29–41, 43, 44, 46, and 47 would have been obvious to a person of ordinary skill.

3. Carney

Carney discloses a linkable linear light emitting diode system that has a splice connector for connecting two LED linear lighting modules.

Ex. 1030, Title, ¶¶ 96–97, Figs. 18 and 20. Carney’s Figure 18 is reproduced below.

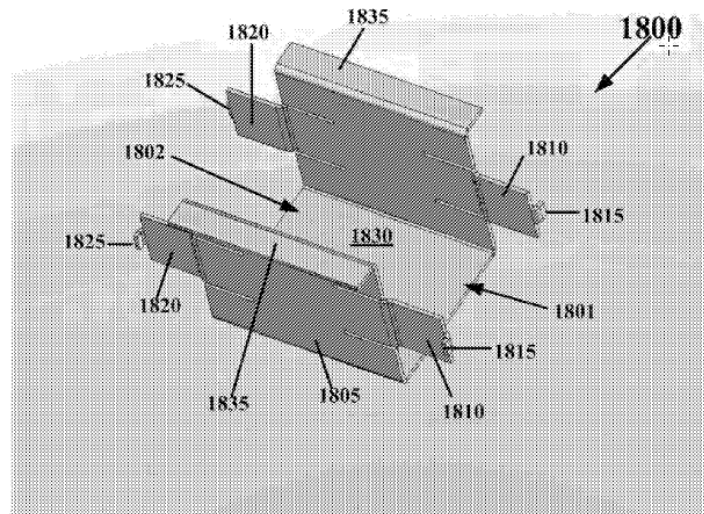


Fig. 18

Carney’s Figure 18 illustrates splice connector 1800 for connecting two LED linear lighting modules. Ex. 1030 ¶ 96. Splice connector 1800 includes cap 1830 with a pair of walls 1805 extending from cap 1830 in a generally orthogonal manner. *Id.* The opposing end of each wall 1805 includes flange 1835 extending from the end of the wall and positioned adjacent to and applying a force against the top surface of the ceiling tile. *Id.*

Carney's Figure 20 is reproduced below.

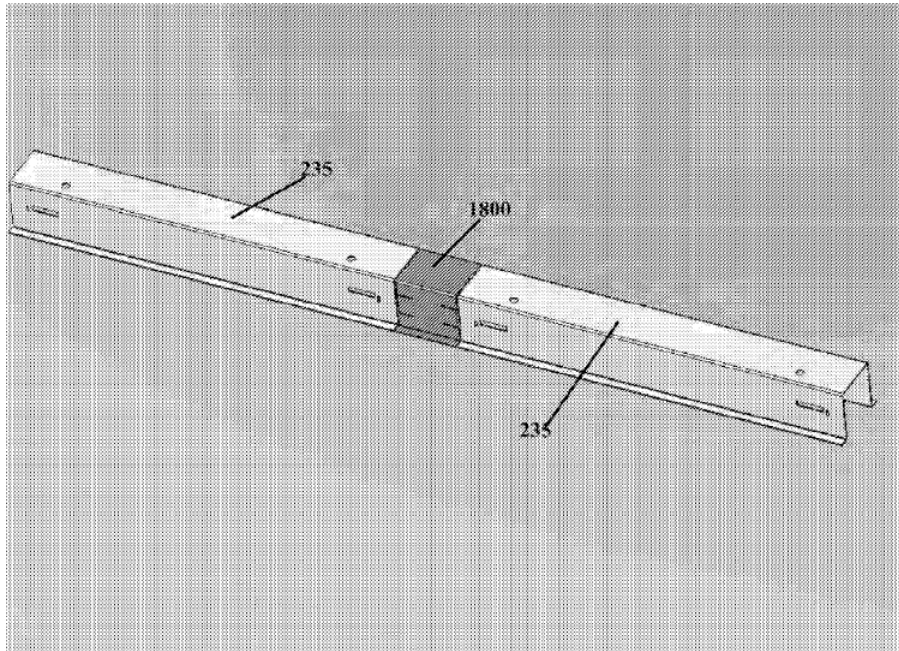


Fig. 20

Carney's Figure 20 illustrates two linear lighting modules each including "housing 235 configured in a generally U-shaped manner having a generally horizontal cap and walls extending downward in a generally orthogonal manner from two opposing sides of the cap to create a cavity." Ex. 1030 ¶ 49. The two main bodies are coupled together end-to-end with splice 1800 covering the coupled ends of the main bodies. *Id.* ¶ 96.

4. Obviousness of Substitute Claims 42 and 45

Substitute claim 42 depends from original claim 18 and recites "a splice joining the first and second retrofit kit." Substitute claim 45 depends from substitute claim 43 and recites "k) joining the ceiling light LED retrofit kit and retrofit kit of claim 29 with a splice."

Petitioner contends that Carney discloses a mechanical splice for connecting two LED linear lighting modules together, and that the shape, design, and construction of differently shaped mechanical splices were

known and within the skill of a person of ordinary skill. Opp. 21–22 (citing Ex. 1030 ¶ 97, Figs. 18 and 20; Ex. 1031 ¶¶ 96–98). Petitioner contends that a person of ordinary skill would have understood that retrofitting longer fluorescent fixtures may require using two of Dowling’s retrofit kits linearly arranged in series, resulting in a gap between the two retrofit kits. *Id.* at 20–21 (citing Ex. 1031 ¶¶ 91–95). Petitioner contends that a person of ordinary skill would have concealed the gap using a splice as taught by Carney. *Id.* at 21 (citing Ex. 1031 ¶¶ 95–96). Petitioner contends that concealing the gap between two serially aligned retrofit kits of Dowling using the splice of Carney does no more than yield the predictable result of providing the appearance of a single unified body as taught by Carney. *Id.* at 22–23 (citing Ex. 1031 ¶¶ 99–100).

Patent Owner contends that Carney is in a different field than that of the ’628 patent because Carney does not disclose a retrofit kit. Reply to Opp. 7 (citing Ex. 1030 ¶ 2; Ex. 2111 ¶¶ 106–107). The proper inquiry for analogous art is whether Carney is “within the field of the inventor’s endeavor” or “reasonably pertinent to the particular problem with which the inventor was involved.” *In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979); *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). “If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports the use of that reference in an obviousness rejection.” *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992). The purpose of the splice in the claimed invention is to cover the juncture of two abutting light panels. Ex. 1001, 5:12–16, 5:24–32, Figs. 6 and 8. Similarly, the purpose of the splice in Carney is to cover the juncture of two abutting light panels. Ex. 1030 ¶ 96, Figs. 18, 20; Ex. 1031 ¶¶ 95–96. A person having ordinary skill in the art would have reasonably expected to solve the

problem of covering the juncture of two abutting light panels by considering a reference that does so using a splice. Therefore, Carney is analogous art to the '628 patent.

Patent Owner contends that Carney uses the term end-to-end with reference to physical arrangement, not electrical connections. Reply to Opp. 7 (citing Ex. 1030 ¶¶ 87; Ex. 2111 ¶ 108). However, Dowling teaches connecting electrical conductors in electrical series as required by base claim 43, for the reasons given in our analysis of claim 43.

Patent Owner contends that Carney discloses that modifying splices is within the knowledge and skill of those of ordinary skill in the art of lighting manufacturing. Reply to Opp. 7–8 (citing Ex. 1030 ¶ 97). According to Patent Owner, a person of ordinary skill in this proceeding would have had experience in developing, not manufacturing, lighting fixtures, and there are material differences between developing and manufacturing. *Id.* at 8 (citing Ex. 2111 ¶¶ 109–110). However, neither Patent Owner nor Dr. Bretschneider identify what the material differences are. In particular, neither Patent Owner nor Dr. Bretschneider explain why a person of ordinary skill with experience in developing lighting fixtures would be unable to develop modified splices after reading the disclosure of Carney. Dr. Ducharme testifies that Carney is in the field of LED lighting design. Ex. 1031 ¶ 99. We rely on the testimony of Dr. Ducharme in finding that a person of ordinary skill with experience in lighting design would have applied Carney's known splice to Dowling's known retrofit kits to yield the predictable result of providing the appearance of a unified body as taught by Carney. Ex. 1031 ¶¶ 98–99.

Patent Owner contends that a person of ordinary skill would not be motivated to combine the splice of Carney with Dowling. Reply to Opp. 9–

10 (citing Ex. 2111 ¶¶ 63–64, 111, 113–117). In particular, Patent Owner contends that covering a gap between Dowling’s retrofit kits would interfere with air flow and compromise the heat dissipating capabilities of Dowling’s subassemblies. *Id.* at 9 (citing Ex. 2111 ¶ 64). We rely on the testimony of Dr. Ducharme in finding that a person of ordinary skill would have been motivated to apply the splice of Carney to the retrofit kits of Dowling to yield the predictable result of providing the appearance of a unified body. Ex. 1031 ¶¶ 92–101. We disagree with Dr. Bretschneider that a person of ordinary skill would have been unable to address any heat related problems arising from covering a gap between retrofit kits with a splice. As we discussed previously, in the absence of a specific description of thermal management techniques arising from using a splice in the ’628 patent, we find that addressing thermal problems arising from using a splice was within the knowledge of a person of ordinary skill. *Epstein*, 32 F.3d at 1568; *Fox*, 471 F.2d at 1407.

We find that Petitioner has shown that the prior art teaches the limitations of substitute claims 42 and 45. Having considered all the evidence and arguments of record, we conclude that Petitioner has demonstrated, by a preponderance of the evidence, that Dowling and Carney would have taught or suggested the limitations of substitute claim 42 to a person of ordinary skill, that Dowling, McCane and Carney³ would have taught or suggested the limitations of substitute claim 45 to a person of

³ Petitioner asserts that claim 43 is unpatentable over Dowling and McCane. Opp. 16. Although Petitioner appears to assert that claim 45, which depends from claim 43, is unpatentable over Dowling and Carney (Opp. 20), we view this as harmless error, because the Opposition persuasively shows that claim 45 is unpatentable over Dowling, McCane, and Carney.

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ordinary skill, and that claims 42 and 45 would have been obvious to a person of ordinary skill.

CONCLUSION⁴

Claims 1, 2, 4–12, and 18–28 are unpatentable over the prior art. We deny Patent Owner’s Motion to Amend because proposed substitute claims 29–47 are unpatentable over the prior art and claim 36 introduces new matter under 35 U.S.C. § 316(d)(3) and is unpatentable under 35 U.S.C. § 112.

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 5–10, 12, 18–20, 22–26, 28	103	Dowling	1, 2, 5–10, 12, 18–20, 22–26, 28	
1, 5–12, 18, 20, 22– 24, 26	103	Burrow	1, 5–12, 18, 20, 22–24, 26	
1, 4, 18, 21, 24, 27	103	Shew	1, 4, 18, 21, 24, 27	
1, 4, 18, 21, 24, 27	103	Oksengendler	1, 4, 18, 21, 24, 27	
Overall Outcome			1, 2, 4–12, 18–28	

⁴ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	29–47
Substitute Claims: Motion to Amend Granted	
Substitute Claims: Motion to Amend Denied	29–47
Substitute Claims: Not Reached	

III. ORDER

It is hereby:

ORDERED claims 1, 2, 4–12, and 18–28 are unpatentable;

FURTHER ORDERED that Patent Owner’s Motion to Amend is
denied; and

FURTHER ORDERED that because this is a final written decision,
parties to the proceeding seeking judicial review of the decision must
comply with the notice and service requirements of 37 C.F.R. § 90.2.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WALMART INC. and CURRENT LIGHTING SOLUTIONS, LLC,
Petitioner,

v.

POWER CONCEPTS, LLC,
Patent Owner.

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Before KEVIN F. TURNER, JEFFREY S. SMITH, and
DANIEL J. GALLIGAN, *Administrative Patent Judges*.

GALLIGAN, *Administrative Patent Judge*, concurring.

I agree with the majority that Petitioner has proven that the challenged claims and the proposed substitute claims are unpatentable. Thus, I concur in the result. I do not join the majority's opinion, however, because I do not agree with all of the reasoning therein.

As one example, in response to Patent Owner's assertion that a person of ordinary skill in the art would not have been "motivated to modify Dowling by inversion" (PO Resp. 9), the majority sets forth a discussion at pages 17–21 of heat dissipation that ultimately indicates that a person of ordinary skill in the art would have included a fan in the light fixture. But

the premise of Patent Owner's argument is false because Dowling discloses a light mounted to a ceiling, as correctly stated in the majority's decision at page 14. *See* Ex. 1007 ¶¶ 7, 9 (Dowling's disclosure of "retrofitting conventional lighting fixtures," which include "recessed fixtures (e.g., wherein the housing is concealed behind a ceiling or wall)"). In my view, this is dispositive and ends the discussion. Indeed, Patent Owner's argument stems from its misrepresentation of Dowling's teachings, including the use of an ellipsis to omit "ceiling" from a discussion of how Dowling's fixture can be mounted, as pointed out by the majority at pages 14–15. *See* PO Sur-reply 2. Because there is no modification, Petitioner is not required to prove that a person of ordinary skill in the art would have been motivated to make a modification, and we need not resolve whether a person of ordinary skill in the art would have included a fan in the light.

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For PETITIONER:

Frank Angileri
John Rondini
Thomas Cunningham
BROOKS KUSHMAN P.C.
fangileri@brookskushman.com
jrondini@brookskushman.com
tcunningham@brookskushman.com

PATENT OWNER:

Timothy St. Clair
Tasneem Dharamsi
Amy Allen Hinson
PARKER POE ADAMS & BERNSTEIN LLP
timstclair@parkerpoe.com
tasneemdharamsi@parkerpoe.com
amyhinson@parkerpoe.com