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Paper 8
Date: February 18, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HOME DEPOT USA, INC.,
Petitioner,

v.

LYNK LABS, INC.,
Patent Owner.

IPR2021-01367
Patent 10,154,551 B2

Before JON B. TORNQUIST, JENNIFER MEYER CHAGNON, and SCOTT RAEVSKY, *Administrative Patent Judges.*

TORNQUIST, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background and Summary

Home Depot USA, Inc. ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1, 3, 4, 5, 7, and 8 ("Challenged Claims") of U.S. Patent No. 10,154,551 B2 (Ex. 1001, "the '551 patent"). Lynk Labs, Inc. ("Patent Owner") filed a Preliminary Response to the Petition. Paper 5 ("Prelim. Resp."). With authorization, Petitioner filed a Reply and Patent Owner filed a Sur-Reply. Paper 6 ("Reply"); Paper 7 ("Sur-Reply").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a) (2021). The standard for institution is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

After considering the parties' arguments and evidence, and for the reasons set forth below, Petitioner demonstrates a reasonable likelihood of prevailing with respect to the Challenged Claims of the '551 patent. Accordingly, we institute an *inter partes* review with respect to all challenged claims and grounds asserted in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S.Ct. 1348, 1355 (2018).

B. Real Parties-in-Interest

Petitioner identifies itself, The Home Depot Inc., and Home Depot Product Authority, LLC as the real parties-in-interest ("RPI"). Pet. 1. "In an abundance of caution, Petitioner also identifies as potential RPIs": "Bel Air Lighting, Inc.; New Bright Technology; Cordelia Lighting; Elec-Tech Solid

State Lighting (HK) Ltd.; Globe Electric; King of Fans, Inc.; Leedarson Lighting/Green Intelligence Co.; and Year Young Industrial Co." *Id.*

Patent Owner identifies itself as the real party-in-interest. Paper 4, 1.

C. Related Matters

The parties identify the following district court proceeding as a related matter: *Lynk Labs, Inc. v. Home Depot USA, Inc., The Home Depot Inc., and Home Depot Product Authority, LLC*, No. 6:21-cv-00097 (W.D. Tex.), which was recently transferred to the Northern District of Georgia ("the related litigation"). Pet. 2; Paper 4, 1; Ex. 1042. Patent Owner also informs us that the '551 patent is currently at issue in *Lynk Labs, Inc. v. Samsung Electronics Co.,* No. 6:21-cv-00526-ADA (W.D. Tex.). Paper 4, 1.

D. The '551 Patent

The '551 patent "relates to alternating current ('AC') driven LEDs, LED circuits, and AC drive circuits and methods." Ex. 1001, 2:24–26. The '551 patent explains that LEDs "are intrinsically DC devices that only pass current in one polarity and historically have been driven by DC voltage sources using resistors, current regulators, and voltage regulators to limit the voltage and current delivered to the LEDs." *Id.* at 2:31–35. With proper considerations, however, the '551 patent reports that "LEDs may be driven more efficiently with AC than with DC drive schemes." *Id.* at 2:38–39.

The '551 patent discloses various methods of driving LEDs, including the use of a single bridge rectifier to drive parallel LEDs, using a capacitor to smooth the AC waveform to reduce ripple and to protect the LEDs, and using various driver designs to provide a relatively constant or fixed voltage and frequency to LED circuits. *Id.* at 4:39–43, 4:49–51, 5:59–61.

E. Illustrative Claims

Petitioner challenges claims 1, 3, 4, 5, 7, and 8 of the '551 patent. Pet. 6–7. Claim 1, reproduced below, is illustrative of the challenged claims:

> 1. A lighting system comprising:
>
> an LED circuit having at least one LED;
>
> a bridge rectifier;
>
> at least one capacitor;
>
> a driver connected to the bridge rectifier;
>
> the driver, bridge rectifier, at least one capacitor and at least one LED circuit all mounted on a reflective substrate,
>
> the driver providing rectified AC voltage and current to the LED circuit,
>
> the driver having an input of a first rectified AC voltage and a first frequency from a mains power source.

Ex. 1001, 18:52–63.

F. Prior Art and Asserted Grounds

Petitioner asserts that claims 1, 3, 4, 5, 7, and 8 would have been unpatentable on the following grounds (Pet. 6–7):

Claims Challenged	35 U.S.C. §[1]	Reference(s)/Basis
1, 5	103	Deese[2], Kuo[3]

[1] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Petitioner contends the first-to-file provisions of the AIA apply in this proceeding because at least two claims of the '551 patent have an earliest effective filing date of October 30, 2017. Pet. 15. Patent Owner does not dispute Petitioner's assertions. Accordingly, on this record, we apply the AIA versions of §§ 102 and 103. *See* 35 U.S.C. § 100(i)(2).
[2] US 5,457,450, issued October 10, 1995. Ex. 1006 ("Deese").
[3] US 6,019,493, issued February 1, 2000. Ex. 1013 ("Kuo").

Claims Challenged	35 U.S.C. §[1]	Reference(s)/Basis
4, 8	103	Deese, Kuo, Hochstein418[4]
1, 3, 5, 7	103	Lys[5], Worley[6]
1, 3, 5, 7	103	Hochstein168[7], Worley
4, 8	103	Lys, Worley, Hochstein418
4, 8	103	Hochstein168, Worley, Hochstein418
3, 7	103	Deese, Kuo, Hochstein168

In support of its grounds for unpatentability, Petitioner relies upon the declaration of Dr. Dean Neikirk. Ex. 1002.

II. ANALYSIS

A. Discretion Under 35 U.S.C. § 314(a)

Patent Owner contends that we should exercise our discretion under 35 U.S.C. § 314(a) to deny institution of *inter partes* review in light of the related litigation. Prelim. Resp. 4–15 (citing, *e.g.*, *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*")). Petitioner counters that the *Fintiv* factors actually weigh against discretionary denial. Pet. 7–11.

After Patent Owner filed its Preliminary Response, we authorized further briefing from the parties to address how the transfer of the related litigation affects the analysis of the *Fintiv* factors. Reply 1; Sur-Reply 2–3; Ex. 1042.

[4] US 5,785,418, issued July 28, 1998. Ex. 1014 ("Hochstein418").
[5] US Patent Publication No. US 2004/0212321 A1, published October 28, 2004. Ex. 1007 ("Lys").
[6] US Patent Publication No. US 2003/0001657 A1, published January 2, 2003. Ex. 1008 ("Worley").
[7] PCT/US97/10514, published December 31, 1997 (WO/ 97/50168). Ex. 1009 ("Hochstein168").

In *Fintiv*, the Board articulated a list of factors that we consider in determining whether to exercise discretion to deny institution based on an advanced stage of a parallel proceeding:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;
>
> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Fintiv, Paper 11 at 5–6. In evaluating these factors, we take "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* at 6.

1. *Factor 1—Likelihood of Stay*

Petitioner has moved for a stay in the Northern District of Georgia and asserts that this motion is likely to be granted. Reply 1. Patent Owner responds that no stay has been granted and it is improper to speculate as to whether the court might grant one. Sur-Reply 2.

We decline to speculate as to whether Petitioner's stay request will be granted. *See Fintiv*, Paper 15 at 12 (PTAB May 13, 2020) (informative); *Sand Revolution II, LLC v. Cont'l Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative). Thus, this factor is neutral.

2. *Factor 2—Proximity of the Trial Date to the Final Written Decision Due Date*

The court has not set a trial date and Petitioner estimates that a final written decision is to be expected no later than March 2023, about six months before any trial in the related litigation would begin. Reply 1. Petitioner calculates this expected trial date based on the 30.8 month median time from filing of a complaint to trial in the Northern District of Georgia. *Id.* (citing Ex. 1043). Patent Owner argues that Petitioner's estimated trial date overlooks the fact that Patent Owner has filed a motion for an expedited trial schedule. Sur-Reply 3.

Although the parties speculate as to when trial may occur, no trial date has been set; thus, this factor weighs against exercising our discretion to deny institution. *See Oticon Med. AB v. Cochlear Ltd.*, IPR2019-00975, Paper 15 at 23–24 (PTAB Oct. 16, 2019) (precedential as to §§ II.B, II.C) (lack of a trial date weighs against exercising discretion to deny institution, even when discovery is "well underway").

3. *Factor 3—Investment in Proceedings*

Petitioner contends this factor weighs against exercising discretion because the related litigation is "in its early stages" and "[n]o fact or expert discovery, dispositive motions, *Markman* hearing, or final contentions have occurred or are expected to occur prior to the Board rendering its institution decision." Pet. 9; Reply 1.

Patent Owner does not expressly dispute that the related litigation is currently in its early stages, but contends Petitioner's assertions regarding the level of effort that will be expended prior to the institution decision is "simply speculative" given the pending motion to expedite the trial schedule. *See* Sur-Reply 3.

Given that the related litigation is in its early stages, we find that this factor weighs against exercising our discretion to deny institution.

4. *Factor 4—Overlap of Issues*

Petitioner stipulates that "if IPR is instituted, Petitioner[] will not pursue the same instituted grounds or grounds based on the same primary reference in the related district court litigation." Pet. 10.

Patent Owner argues that there is a significant level of overlap of issues between this IPR and the district court litigation, as evidenced by the fact that three of the same references (Deese, Lys, and Hochstein168) are raised in both proceedings. Prelim. Resp. 10–11.

Petitioner's stipulation "mitigates to some degree the concerns of duplicative efforts between the district court and the Board, as well as concerns of potentially conflicting decisions." *Sand Revolution*, Paper 24 at 11–12. Thus, we find that this factor weighs, at least to some extent, against exercising our discretion to deny institution.

5. *Factor 5—Identity of Parties*

The parties are the same in this proceeding and in the related litigation. Pet. 10; Prelim. Resp. 12. Thus, this factor weighs in favor of exercising our discretion to deny institution.

6. *Factor 6—Other Circumstances*

The sixth *Fintiv* factor takes into account any other relevant circumstances that would counsel for or against exercising discretion to deny institution, including the merits. *Fintiv*, Paper 11, 14–15. Petitioner argues that this factor weighs against exercising discretion because "[t]he Challenged Claims are clearly invalid, Petitioners have not previously challenged any related patents based on the references relied upon in this petition, the 551 patent has never been challenged in a post-issuance

proceeding, and the references were not cited during prosecution of the 551 patent." Pet. 11.

Patent Owner argues that the merits are not strong. Prelim. Resp. 13–14.

As we explain below, Petitioner has met its institution burden for each challenged claim. Under these circumstances, and under the specific facts of this case, we find that this factor is neutral.

7. *Conclusion*

Applying a holistic analysis of the relevant facts and the particular circumstances of this case, we conclude that the facts and factors counseling against exercising discretion collectively outweigh those in favor of exercising discretion. Accordingly, we do not exercise our discretion to deny institution under 35 U.S.C. § 314(a).

B. 35 U.S.C. § 325(d)

Patent Owner contends we should exercise our discretion under 35 U.S.C. § 325(d) to deny the Petition because Worley was before the Examiner during prosecution. Prelim. Resp. 43.

Pursuant to 35 U.S.C. § 325(d), in determining whether to institute review "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." The following two-part framework is used to determine whether to exercise discretion under § 325(d) to deny institution:

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the

> Office erred in a manner material to the patentability of the challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

Patent Owner contends we should exercise our discretion to deny the Petition because Worley was previously considered during prosecution and because Petitioner has "identified no error during prosecution, or explained why the examiner's decision to allow the claims should be undone." Prelim. Resp. 43–44.

Worley is applied in only four of eight asserted grounds, so Patent Owner's § 325(d) argument does not sufficiently implicate the Petition as a whole. Moreover, in each ground Worley is combined with one or more references that were not before the Examiner during prosecution. Pet. 6–7 (setting forth the asserted grounds); Ex. 1001, code (56). Patent Owner presents no evidence that the additional references relied upon in each of these grounds are cumulative of art that was presented during prosecution of the '551 patent. *See* Prelim. Resp. 43–44. As such, there is insufficient evidence of record to establish that "the same or substantially the same art" or "the same arguments" were previously presented to the Office. Accordingly, we decline to exercise discretion under § 325(d) to deny the Petition.

C. Claim Construction

In this proceeding, the claims of the '551 patent are 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). Under that standard, the words of a claim are generally given their "ordinary and customary meaning," which is the meaning the term would have had to

a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

Petitioner proposes constructions for the terms "power factor correction circuitry" and "driver." Pet. 16–18. Patent Owner proposes constructions for the terms "driver" and "reflective substrate." Prelim. Resp. 18–20.

Upon review of the parties' arguments and supporting evidence, we find that only the term "driver" requires construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.")).

Driver

Independent claims 1 and 5 of the '551 patent require "a driver" that is connected to a bridge rectifier. Ex. 1001, 18:54–56, 19:7–13. Petitioner contends a "driver" is a term-of-art that refers to "circuitry that supplies an input to another circuit." Pet. 17–18. In support of this construction, Petitioner directs our attention to a 2000 IEEE technical dictionary that defines a "driver" as "[a]n electronic circuit that supplies input to another electronic circuit" or as "[a] program, circuit or device used to power or control other programs, circuits or devices." *Id.* at 18 (quoting Ex. 1010, 339 ("IEEE 100 – The Authoritative Dictionary of IEEE Standard Terms")).

Patent Owner contends Petitioner's proposed definition is overbroad, as the '551 patent makes clear that the claimed "driver" does not just supply any input to any circuit, but instead "provides a stable voltage and frequency to an LED circuit." Prelim. Resp. 18–19 (citing Ex. 1001, 3:64–65 ("the

driver providing an AC voltage and current to one or more LED circuits."), 5:59–61). Patent Owner further contends that the specification of the '551 patent clarifies that a "driver" is "capable of conditioning the voltage and frequency provided to LED circuits in the event of changes in load." *Id.* at 19 (citing Ex. 1001, 6:28–31 ("The LED circuit driver provides a relatively fixed voltage and relatively fixed frequency AC output even with changes to the load using feedback AC voltage regulator circuitry.")). Thus, Patent Owner asserts that one of ordinary skill in the art would have understood that a "driver" is "a component that conditions a power input and provides a power output to an LED circuit." *Id.* (citing Ex. 2003, 7–9).

For the reasons set forth below, we find that neither parties' proposed construction of "driver" is entirely supported by the disclosures of the '551 patent. We start our claim construction analysis by looking to the claims, the specification, and, if in evidence, the prosecution history. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

a) Claims

Independent claims 1 and 5 require "a driver." Ex. 1001, 18:56, 19:7. When that driver must have certain capabilities or perform particular functions, the claims further recite these requirements. For example, in claims 1 and 5 the "driver" must provide "rectified AC voltage and current to the LED circuit." *Id.* at 18:60–61. Likewise, independent claim 23 requires a "driver" that is "capable of adjusting the frequency and/or voltage output of the driver to a desired relatively fixed value in response to changes to the load." *Id.* at 20:57–61. Thus, the structure of the claims does not support construing the term "driver" to require a device or circuit that provides "a stable voltage and frequency" or a device or circuit that provides power to an LED circuit, as asserted by Patent Owner.

b) Written Description

As noted by Petitioner, one dictionary definition of "driver" includes circuity that provides an input to another circuit. Ex. 1010, 339. Simply providing an input to another circuit, however, would not allow the driver to accomplish the goals outlined in the '551 patent. Instead, in each embodiment of the '551 patent the driver is used to power a device or circuit, not merely provide a generic signal. *See* Ex. 1001, 6:37–39. This use of the term "driver" generally aligns with the second dictionary definition provided by Petitioner, i.e., "a program, circuit, or device used to power or control other programs, circuits or devices."[8] Ex. 1010, 339 (definition 3); Ex. 1001, 6:37–39; *see Vitronics*, 1584 n.6 (noting that dictionary definitions may be used when construing claims, "so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents"). Thus, we find a "driver," as that term is used in the '551 patent, must be capable of providing power to another device or circuit.

With respect to Patent Owner's proposed construction, we note that although the '551 patent discloses that a driver may be designed to provide a relatively fixed voltage and frequency output to LEDs, the written description does not suggest that the term "driver," by itself, requires such functionality. Indeed, the '551 patent reports optionally including an LED circuit inverter driver in order to sense changes to the load and re-adjust the

[8] Consistent with this dictionary definition, the "driver" may both power and control another program, circuit, or device. On this record, however, mere control of another program, circuit, or device is insufficient to meet the requirements of the claimed "driver," which must provide power to the program, circuit, or device. Thus, at this stage we do not find it necessary to include the optional capability of "control" in our adopted construction.

frequency and/or voltage output to a desired relatively fixed value. Ex. 1001, 6:43–51 (noting that "mains power sources" provide a relatively fixed voltage and frequency AC output and that "an LED circuit inverter driver" "may" be used to deliver higher, lower, or equal output and voltage from the driver circuit).

c) Prosecution History

Neither party asserts that the prosecution history of the '551 patent, or that of any of its related applications, provides insight into the correct construction of the term "device."

d) Conclusion with Respect to "Driver"

Considering the claims and written description of the '551 patent, as well as the technical dictionary definitions provided by Petitioner, we construe "driver" to mean "a program, circuitry, or device used to power other programs, circuits, or devices." *See Vitronics*, 90 F.3d at 1584 n.6 (approving the use of dictionary definitions, so long as those definitions are consistent with the intrinsic record). This construction is generally consistent with the claims and written description of the '551 patent and with the technical dictionary definition provided by Petitioner, and avoids reading extraneous limitations or functions into the claim term.

D. Claims 1 and 5 over Deese and Kuo

Petitioner contends the subject matter of claims 1 and 5 would have been obvious over the combined disclosures of Deese and Kuo. Pet. 19–36.

1. Deese

Deese discloses an LED traffic light system that uses voltage compensation circuits to allow operation "over a wide range of input power voltages, while generating sufficient light intensity to control traffic at a highway intersection." Ex. 1006, code (57).

Figure 3 of Deese is reproduced below:

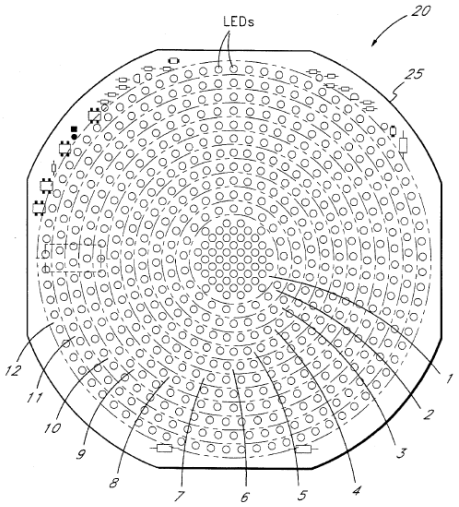


FIG. 3

Figure 3 "is a front view of a circuit board containing the LEDs and associated electronic circuitry of a first embodiment" of Deese and depicts "LED configuration and control circuitry 20." *Id.* at 4:3–5, 4:55–56; *see also id.* at 5:25–28 (explaining that circuit board 25 supports the "associated electronic driver and control circuitry"). As shown in Figure 3, LED arrays 1–12 are arranged on circular printed circuit board 25 in a generally concentric pattern. *Id.* at 5:24–27, 5:36–37.

Figure 4 of Deese is reproduced below:

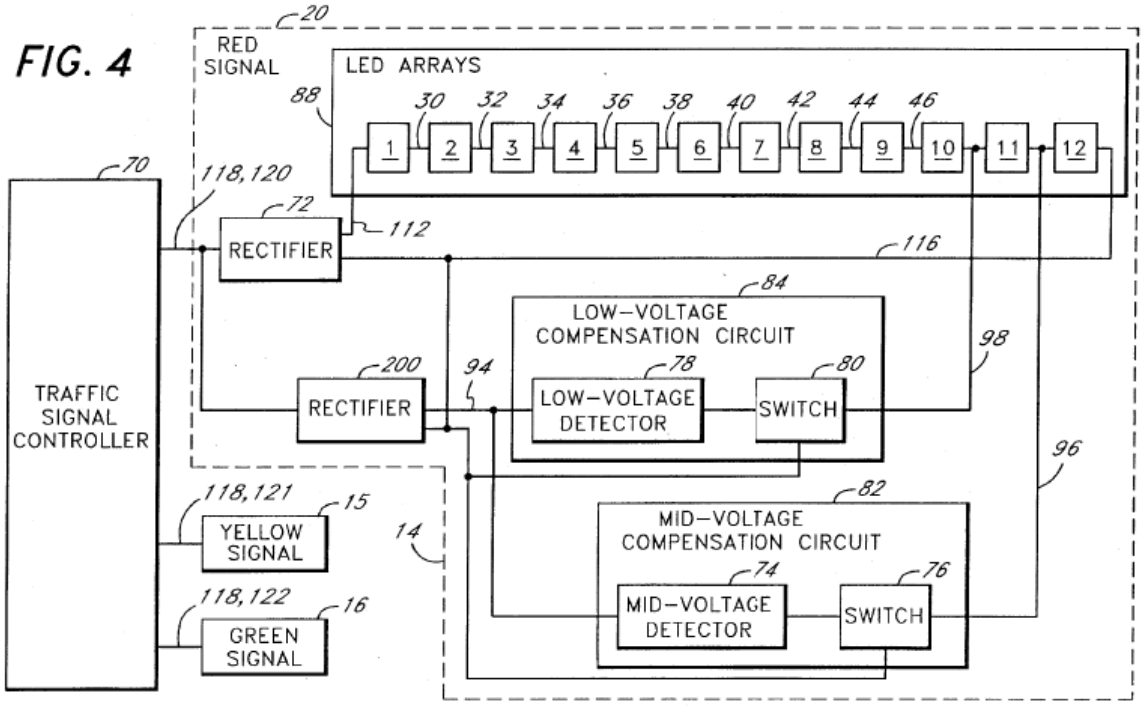


Figure 4 is a functional block diagram of a first embodiment of Deese. *Id.* at 4:6–7. In Figure 4, conventional traffic signal controller 70 selectively energizes red, yellow, and green traffic lights 14, 15, and 16. *Id.* at 5:48–50. LED circuit 20 of the red LED traffic light is energized by line power delivered via AC power line 118 and return signal line 120. *Id.* at 5:50–52.

AC power lines 118 and 120 are connected to rectifier 72, which converts the AC power delivered by traffic signal controller 70 to DC power. *Id.* at 5:64–66. DC power is then provided to LED arrays 1–12, which each comprise seven strings of series-connected LEDs that are connected in parallel. *Id.* at 5:66–7:3, 7:30–59.

As shown in Figure 4, line voltage power line 118 and line voltage return line 120 are also connected to rectifier 200, which provides reference voltage 94 to mid-voltage detector 74 and low-voltage detector 78. *Id.* at 7:34–41. When reference voltage 94 is greater than the intermediate voltage

threshold (approximately 107 volts), mid-voltage detector 74 of mid-voltage compensation circuit 82 operates to open switch 76 connected between line 96 and DC return line 116. *Id.* at 7:45–51. If reference voltage 94 is less than the intermediate voltage threshold, switch 76 is closed, effectively shorting line 96 to DC return line 116 and removing LED array 12 from the circuit. *Id.* at 7:53–60.

Low voltage compensation circuit 84 operates in a similar manner to mid-voltage compensation circuit 82, but utilizes a lower voltage threshold of approximately 96 volts. *Id.* at 7:63–67. If reference voltage 94 is less than the low voltage threshold, switch 80 shorts line 98 to DC return line 116, effectively removing LED arrays 11 and 12 from the circuit. *Id.* at 8:9–18.

Figure 5 of Deese is reproduced below:

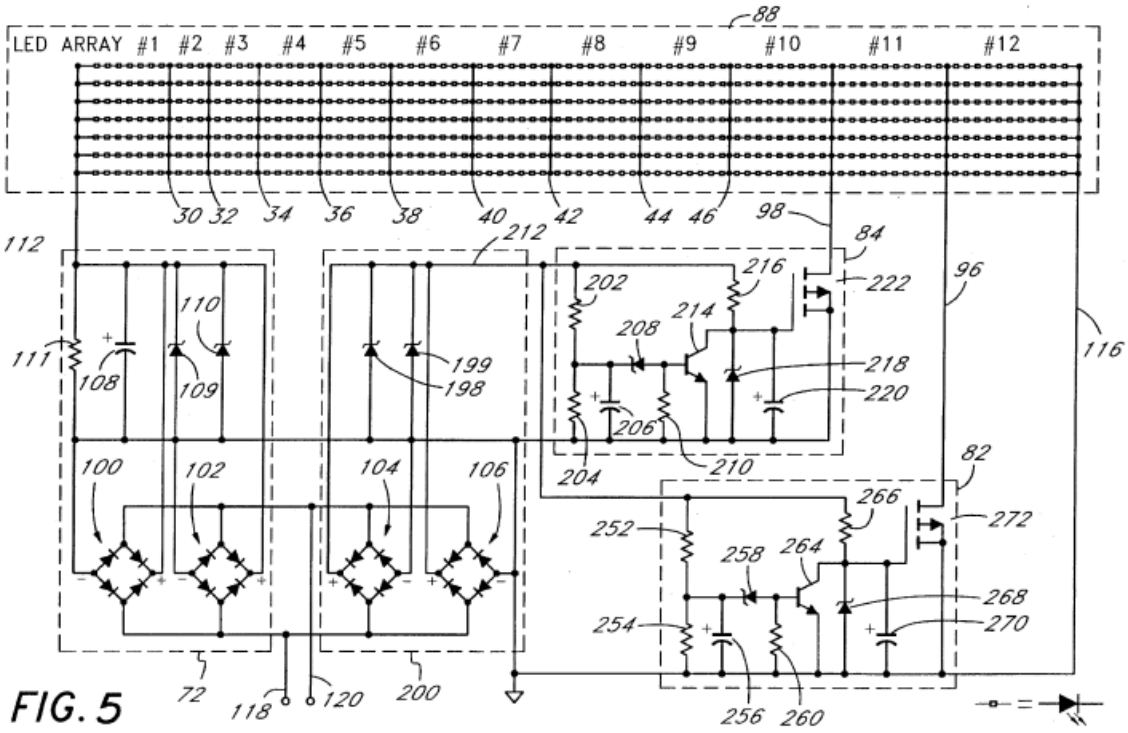


FIG. 5

Figure 5 is a schematic diagram of the first embodiment of Deese. *Id.* at 4:11–12. In Figure 5, AC power lines 118 and 120 are connected to

rectifier 72, which comprises a pair of "dual in-line package (DIP) bridge rectifiers 100 and 102, a resistor 111, a capacitor 108, and a pair of zener diodes 109 and 110." *Id.* at 9:52–55. Regulated DC voltage on line 112 is connected to the positive terminal of LED array 1, and DC return line 116 is connected to the negative terminal of LED array 12. *Id.* at 10:4–9. Deese explains that bridge rectifiers 100 and 102 convert AC to DC voltage, capacitor 108 and resistor 111 provide voltage filtering for the voltage across regulated DC power line 112 and DC return line 116, and zener diodes 109 and 110 protect LED circuit 20 from damage caused by a lightning strike. *Id.* at 10:10–27.

Second rectifier 200 comprises a pair of DIP bridge rectifiers 104 and 106 and a pair of zener diodes 198 and 199. *Id.* at 10:30–33. Second rectifier 200 is "substantially independent" of first rectifier 72, such that noise produced by the LEDs does not affect the regulated DC reference voltage on line 212 that is provided to voltage compensation circuits 82 and 84. *Id.* at 10:50–54. As discussed above, mid-voltage and low voltage compensation circuits 82 and 84, respectively, are designed to remove LEDs 11 and/or 12 from the circuit, depending on the regulated DC voltage on line 112. *Id.* at 10:61–12:11.

2. Kuo

Kuo discloses a traffic light that utilizes LEDs and different lenses to amplify the intensity of light from the LEDs. Ex. 1013, 1:6–9. Figure 2 of Kuo is reproduced below:

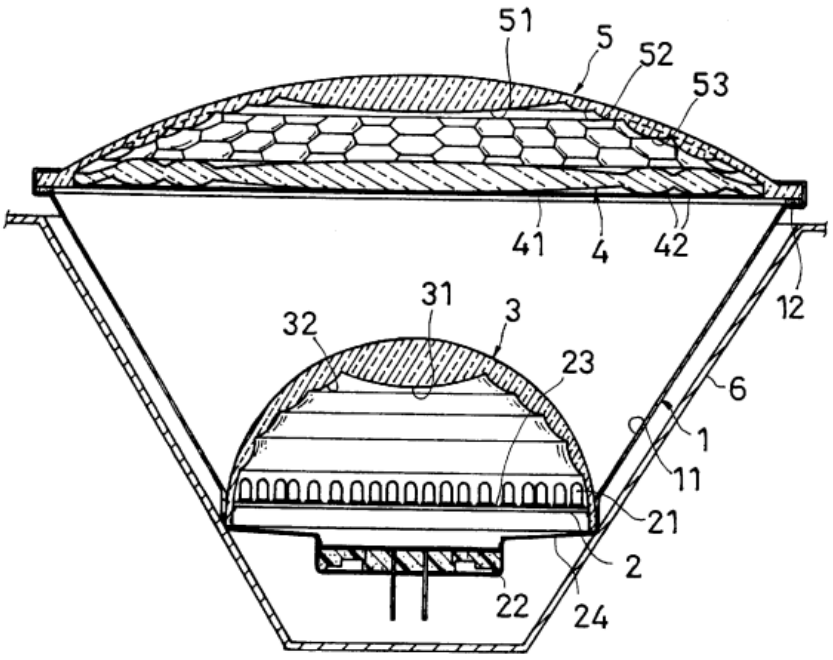


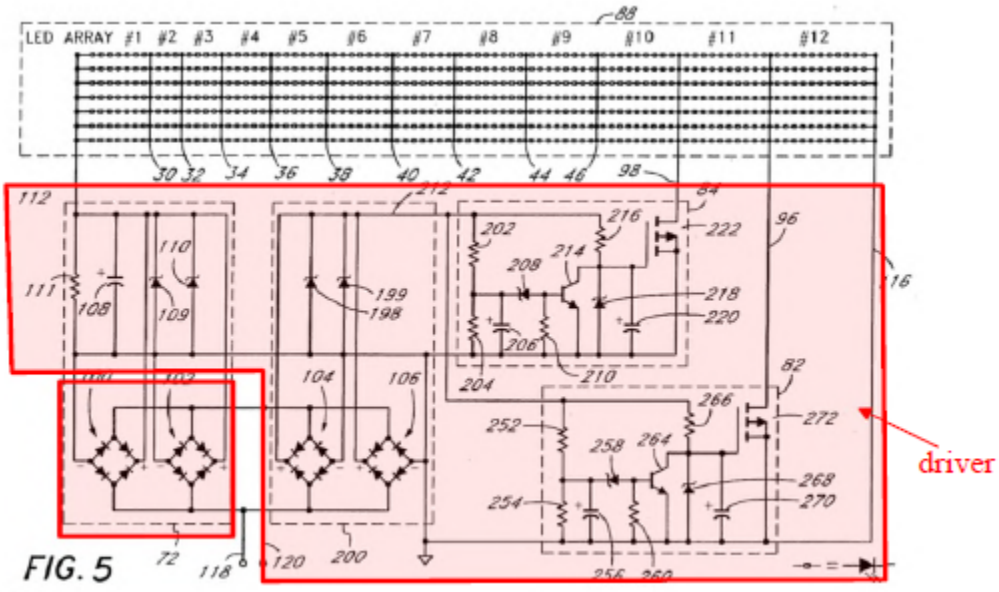
FIG.2

Figure 2 is a sectional assembly view of the high efficiency light of Kuo. Ex. 1013, 2:15–16. As shown in Figure 2, lamp shade 1, having a light reflecting surface 11, is mounted in signal light bracket 6. *Id.* at 2:30–35. Circuit board 2 has LEDs 21 on its top surface and power save control circuit 22 mounted on its bottom surface. *Id.* at 2:37–39. The top side 23 of circuit board 2 on which the LEDs are installed is coated with a light reflecting substance. *Id.* at 3:1–3.

3. Analysis: Claims 1 and 5

Petitioner contends that Deese discloses most of the limitations of claims 1 and 5, including a "lighting system" comprising "an LED circuit" (LED arrays 1–12) "having at least one LED" (Pet. 23–25 (citing Ex. 1006, 4:3–12, 5:24–7:21, 6:31–52, Figs 3–5), bridge rectifiers 100 and 102 (*id.* at 25–26 (citing Ex. 1006, 5:46–6:3, 7:33–8:18, 9:52–10:60, Figs 4–5)), and

multiple capacitors (*id.* at 26–27 (citing Ex. 1006, 4:11–12, 9:52–11:45, Fig. 5)). Petitioner further contends that Deese expressly describes Figure 3 as including a driver and provides an annotated version of Figure 5, below, that identifies the circuitry that Petitioner considers to be the driver. *Id.* at 28–29.



The figure above is an annotated version of Figure 5 showing Petitioner's identification of the bridge rectifier (red box, lower left corner) and driver of Deese. *Id.* at 29–30.

Petitioner argues that the driver, bridge rectifier, capacitor, and LED circuits of Deese are all mounted on printed circuit board 25 that would reflect some light and that Kuo discloses coating a circuit board containing LEDs with a reflecting substance. *Id.* at 30–31 (citing Ex. 1013, 3:1–3). Petitioner also argues that Deese discloses a driver providing rectified AC voltage and current to the LED circuit and that the input of the driver is a first rectified AC voltage having a first frequency from a mains power source. *Id.* at 32–33.

With respect to the unique limitations of independent claim 5, Petitioner contends that a person of ordinary skill in the art would have understood that the driver of Deese has an input of a first rectified AC voltage and current from the bridge rectifier and provides a second rectified AC voltage and current to the LED circuit. *Id.* at 34 (citing Ex. 1002 ¶ 73). Petitioner further contends that capacitor 108 of Deese is connected to all the LEDs in LED array 88 and serves to smooth the rectified AC voltage waveform from rectifiers 100 and 102. *Id.* at 35 (citing Ex. 1006, 10:10–30, Fig. 5).

Petitioner contends one of ordinary skill in the art would have sought to combine the disclosures of Deese and Kuo because Deese, Kuo, and the '551 patent are all in the same field of LED lighting systems, and one of ordinary skill in the art "would have recognized that Deese's goal of generating sufficient light intensity and brightness" would have been furthered by using Kuo's reflective coating on the top layer of circuit board 25. *Id.* at 20–22.

Patent Owner contends Petitioner's arguments and evidence are insufficient to support institution because (1) Deese and Kuo are not analogous art to the '551 patent; (2) the Petition fails to explain where Deese and Kuo disclose a driver connected to a bridge rectifier; (3) the Petition fails to show that the driver, bridge rectifier, capacitor, and LED circuit of Deese and Kuo would all be mounted on the same reflective substrate; and (4) the Petition fails to provide an adequate rationale for combining the disclosures of Deese and Kuo. Prelim. Resp. 21–39. We address these arguments in turn.

a) Analogous Art

To resolve whether art is analogous we must determine "(1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the references are not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the problem with which the inventor is involved." *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004).

Petitioner contends Deese, Kuo, and the '551 patent are analogous art because they are all directed to LED lighting systems. Pet. 20 (citing Ex. 1002 ¶ 44).

Patent Owner contends the function of the traffic signals of Deese and Kuo is to convey a signal or provide information, whereas the function of the LED lighting systems of the '551 patent is to illuminate an area. Prelim. Resp. 21–22. Patent Owner further contends that traffic signal lights turn on and off every few seconds, whereas the lighting systems of the '551 patent are designed to stay active for long periods of time and provide steady illumination. *Id.* at 23. In view of these differences in function and purpose, Patent Owner contends the traffic light systems of Deese and Kuo are "not something a [person of ordinary skill in the art] would ordinarily rely upon when designing the LED lighting systems of the '551 Patent." *Id.* at 21–22.

The '551 patent states that the field of invention is "alternating current ('AC') driven LEDs, LED circuits and AC drive circuits and methods." Ex. 1001, 2:21–26. Thus, we agree with Petitioner that the relevant field is LED lighting systems. Pet. 20. On the present record, Deese discloses AC driven LEDs, LED circuits, and AC drive circuits, and Kuo discloses a "high efficiency" LED lighting systems, as well as methods of maximizing emitted light from LEDs. Ex. 1006, 5:55–58; Ex. 1013, 1:45–60, 3:1–3, code (54).

As such, both references appear to be within the same field of endeavor as the '551 patent. Ex. 1001, 2:39–42 (noting that LED based lighting may be used for, among other things, "general lighting" and "signs").

Moreover, to the extent that either Deese or Kuo is not considered to be within the field of LED lighting systems, on this preliminary record both references appear reasonably pertinent to the problem of efficiently driving LEDs and LED circuits for which the inventor was involved. *Id.* at 2:38–39 (noting that "[w]ith proper design considerations LEDs may be driven more efficiently"). Accordingly, Petitioner demonstrates sufficiently for purposes of institution that Deese and Kuo are analogous art to the '551 patent.[9]

b) The Driver of Deese

Patent Owner contends Petitioner does not explain why control circuitry 20 of Deese is a driver, and asserts that Petitioner takes inconsistent positions regarding the structure of the driver of Deese in IPR2021-01369, where the entire circuit (with all bridge rectifiers) is identified as a "driver." Prelim. Resp. 24–25.

Our preliminary construction of the term "driver" is broad: "a program, circuitry, or device used to power other programs, circuits, or devices." The Petition provides detailed explanations, supported by the testimony of Dr. Neikirk, as to why the identified portions of Deese's circuitry provide power to the LED array. Pet. 28–30 (asserting that the identified circuit of Deese "is supplying a voltage and current to LED Array

[9] At this stage of the proceeding, only Petitioner provides testimony as to whether Deese and Kuo are analogous art to the '551 patent. Ex. 1002 ¶ 44. As our analysis of this issue is preliminary, Patent Owner may marshal further evidence and argument to support its argument that Deese and Kuo are not analogous art to the '551 patent.

88."); Ex. 1002 ¶¶ 56–57. Accordingly, Petitioner explains sufficiently for purposes of institution where Deese disclose a "driver."

With respect to the use of different portions of Deese to support different claims, we note that Petitioner may identify the same or different circuitry of Deese as the claimed driver in different proceedings, provided this analysis is consistent with the proper construction of the term "driver" and the structure of a particular claim. Thus, Petitioner's different identifications of the "driver" of Deese in one or more proceedings does not, by itself, support denial of the Petition.[10]

c) Mounted on a Single Substrate

Patent Owner argues that because the Figures of Deese do not depict the driver or indicate where the driver is located or mounted, Petitioner fails to demonstrate that the driver, bridge rectifier, capacitor and LED circuit of Deese are all mounted on the same substrate. Prelim. Resp. 27–28.

As noted above, Petitioner asserts that a portion of LED configuration and control circuit 20 constitutes a driver and that all of the relevant components are mounted on circular printed circuit board 25 of Deese. Pet. 28–31. The disclosures of Deese support this conclusion. Ex. 1006, Figs 3–5. As such, Petitioner demonstrates a reasonable likelihood that Deese discloses a single substrate with the driver, bridge rectifier, capacitor and LED circuit mounted thereon.

[10] Patent Owner asserts that Deese discloses that the driver and control circuitry are different components. Prelim. Resp. 25–26. Even if true, however, Petitioner is not limited to the circuitry components that Deese considers to be a driver, provided the circuitry identified by Petitioner satisfies the adopted construction of "driver."

d) Reason to Combine

Patent Owner contends the Petition fails to provide a "*KSR* rationale" to "justify combining the teachings of Deese and Kuo," and further fails to analyze how one of ordinary skill in the art would consider or weigh the challenges faced in combining Deese and Kuo or how the level of skill in the art would influence the obviousness analysis. Prelim. Resp. 34 (referencing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398 (2007)). Patent Owner also contends that Dr. Neikirk's opinions supporting the reason to combine Deese and Kuo are entitled to little weight as they are near carbon-copies of the attorney-drafted Petition and fail to disclose the underlying facts or data on which they are based. *Id.* at 35.

Contrary to Patent Owner's arguments, *KSR* does not require that parties use a "*KSR* rationale" to support their obviousness arguments. Rather, *KSR* mandates taking an "expansive and flexible approach" to the question of obviousness, and asks whether a challenger has identified "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR*, 550 U.S. at 418. Petitioner provides such an explanation, asserting that one of ordinary skill in the art would have sought to use Kuo's reflecting coating on the circuit board of Deese in order to increase the light intensity and brightness of the traffic light. Pet. 22 (citing Ex. 1002 ¶ 47); *KSR*, 550 U.S. at 416 ("[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.").

In view of the foregoing, Petitioner provides a sufficient explanation for purposes of institution as to why one of ordinary skill in the art would

have sought to combine the disclosures of Deese and Kuo to arrive at the subject matter of independent claims 1 and 5.

e) Conclusion with Respect to Independent Claims 1 and 5

Upon review of the parties' arguments and supporting evidence, we find that Petitioner sufficiently identifies where Deese and Kuo teach or suggest every limitation of claims 1 and 5. Pet. 23–36. Petitioner also provides a rationale supported by factual underpinnings to explain why one of ordinary skill in the art would have sought to combine Deese and Kuo to arrive at the subject matter of claims 1 and 5 with a reasonable expectation of success. *Id.* at 20–23 (asserting that adding a coating of a reflective substance was "an extremely basic technique"). Accordingly, Petitioner demonstrates a reasonable likelihood that claims 1 and 5 would have been obvious over Deese and Kuo.

E. Claims 1, 3, 5, and 7 over Lys and Worley

Petitioner contends the subject matter of claims 1, 3, 5, and 7 would have been obvious over the combined disclosures of Lys and Worley. Pet. 40–54.

1. Lys

Lys discloses methods and apparatus for providing power to devices via an AC power source, and for facilitating the use of LED-based light sources on AC power circuits. Ex. 1007, Abst. Figure 7 of Lys is reproduced below:

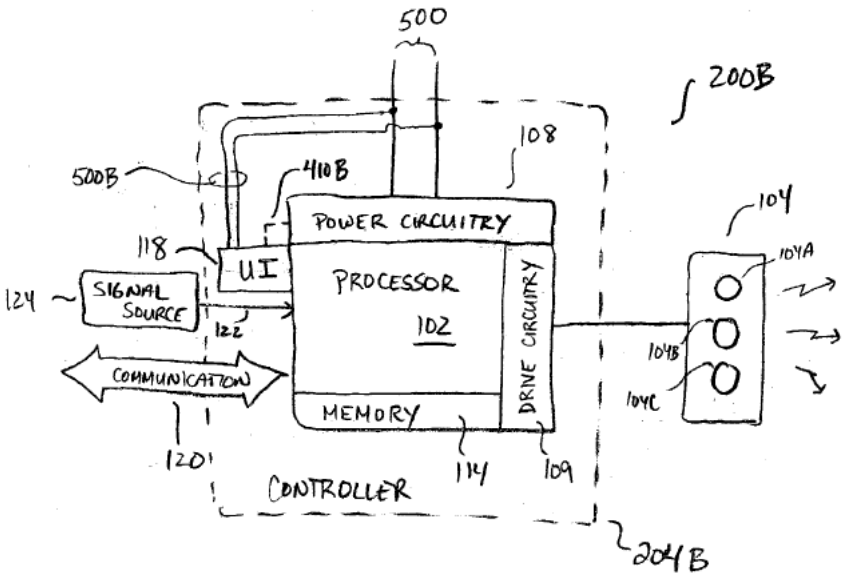


FIG. 7

Figure 7 is a block diagram of a processor-based lighting unit that includes an LED-based light source. *Id.* ¶ 59. In Figure 7, lighting unit 200B includes one or more light sources 104A, 104B, and 104C that include one or more LEDs. *Id.* ¶ 97. Lighting unit 200B also may include processor 102 that is configured to control drive unit circuitry 109 and power circuitry 108. *Id.* ¶ 111.

Figure 8 of Lys is reproduced below:

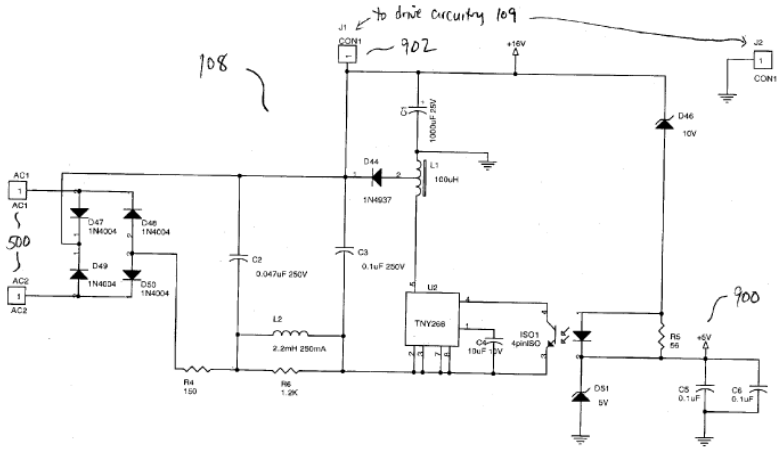


FIG. 8

Figure 8 is a circuit diagram illustrating various components of the power circuitry of Lys's lighting system. *Id.* ¶ 60. As shown in Figure 8, the power circuitry may have a bridge rectifier and several capacitors. *Id.* ¶¶ 85, 112, Fig. 8. Other than circuitry and a rudimentary design of a light bulb, however, Lys is silent as to the substrates that the LED lights and circuits are mounted on. *Id.* at Fig. 3.

2. Worley

Worley discloses an "LED lamp package for packaging an LED driver with an LED." Ex. 1008, code (57). Figure 4A or Worley is reproduced below:

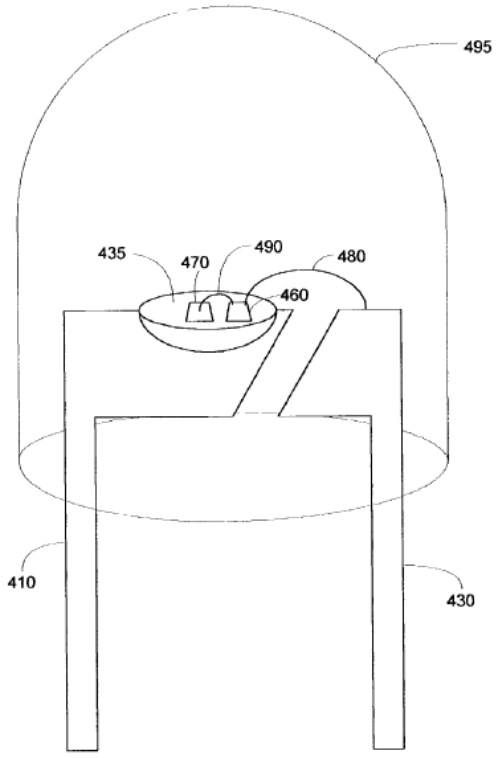


Fig. 4A

Figure 4A is a perspective view of an LED lamp package of Worley. *Id.* ¶ 18. The LED lamp package of Figure 4A includes ground lead 410, control input lead 420 (not shown in Figure 4A), and voltage supply lead

430. *Id.* ¶ 29. Ground lead 410 includes reflector dish 435, LED driver chip 460 on which LED driver circuit 220 (not shown in Figure 4A) is fabricated, and LED chip 470 on which LED 205 is fabricated (not shown in Figure 4A). *Id.* ¶¶ 29–30.

Figure 6B of Worley is reproduced below:

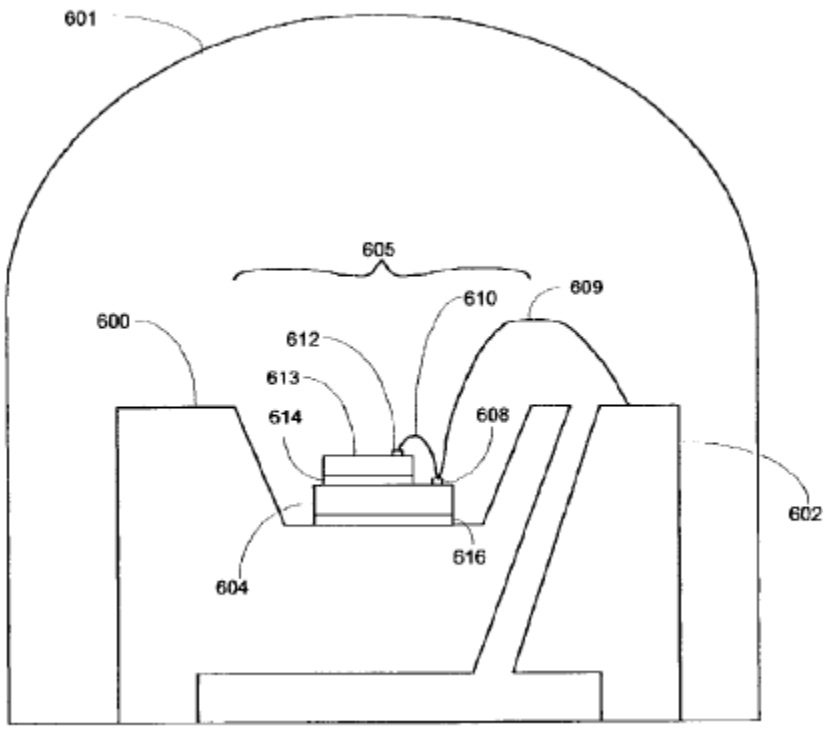


Fig. 6B

Figure 6B is a cross-sectional view of an LED lamp package "in which the LED chip is mounted on top of the LED driver chip." *Id.* ¶ 20. Worley discloses that ground lead 600 includes a reflector dish 605, which may be pressed into ground lead 600. *Id.* ¶ 37. The lamp package shown in Figure 6B includes LED driver chip 604, on which an LED driver circuit is fabricated, and LED chip 613, on which an LED is fabricated. *Id.* ¶ 38. LED driver chip 604 is mounted on reflector dish 605 and LED chip 613 is mounted on top of LED driver chip 604. *Id.*

3. Analysis: Independent Claims 1 and 5

Petitioner contends that Lys discloses most of the limitations of claims 1 and 5, including: an LED circuit having at least one LED (Pet. 44 (citing Ex. 1007 ¶¶ 59–61, 97, 99, Figs 7–9)), a bridge rectifier (*id.* at 45–46 (citing Ex. 1007, Fig. 8)), at least one capacitor (*id.* at 46–47 (citing Ex. 1007, 67, 87, 92, Fig. 8)), drive circuitry that is connected to the bridge rectifier (*id.* at 47–49 (citing Ex. 1007 ¶¶ 84–92, 95–98, 111–112, 131–139, Figs. 2–11)), a driver providing rectified AC voltage and current to the LED circuit (*id.* at 50 (citing Ex. 1007 ¶¶ 4, 8, 17, 18, 69, 83, 85, 87, 90, 111, 131, Figs. 3–5, 7–9)), and a driver with a first input of a rectified AC voltage and frequency from a mains power source (*id.* at 51 (citing Ex. 1002 ¶ 111)).

With respect to the unique limitations of independent claim 5, Petitioner contends a person of ordinary skill in the art would have understood that the driver of Lys has an input of a first rectified AC voltage and current from the bridge rectifier and that the driver outputs a second rectified AC voltage and current to the LED circuit. *Id.* at 53 (citing Ex. 1002 ¶ 124). Petitioner further contends that capacitor C2 of Lys, which is connected to all the LEDs, acts to smooth the rectified AC voltage waveform from the rectifier. *Id.* at 53–54 (citing Ex. 1007 ¶¶ 67, 85–88, Figs. 2, 4, 6, 8).

With respect to the mounting limitations of claims 1 and 5, Petitioner concedes that Lys does not disclose how the various components of its lighting system are mounted, but contends that in view of Lys' lack of implementation details, one of ordinary skill in the art would have sought to mount the components of Lys on a reflector, as taught in Worley. *Id.* at 43–44, 49–50.

Patent Owner contends the Petition does not support institution because: (1) the combination of Lys and Worley would not result in the driver, bridge rectifier, capacitor, and LED circuit all being mounted on a single reflective substrate; (2) Worley was considered during prosecution of the '551 patent; and (3) Petitioner's reasons for combining Lys and Worley are defective, place an undue burden upon the Board, and are based on hindsight reconstruction of the claimed subject matter. Prelim. Resp. 40–50. We address these arguments in turn.

a) Mounting of the Circuit Components

Claims 1 and 5 require that the driver, bridge rectifier, capacitor, and LED circuit are mounted on a reflective substrate. Ex. 1001, 18:52–63, 19:8–9. Patent Owner contends that Worley does not disclose this limitation because its LED lamp package includes two substrates: LED driver chip 460 and LED chip 470 (as disclosed in Figure 4A of Worley). Prelim. Resp. 41; Ex. 1007 ¶ 30 (noting that chips 460 and 470 each have their own substrate).

The "indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase comprising." *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008) (quoting *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000)). An exception arises only where the language of the claims, the specification, or the prosecution history necessitate a departure from the rule. *Id.* at 1343.

In this case, we are directed to no clear language or discussion in the '551 patent that would require a singular reflective substrate. *See* Prelim. Resp. 41–43; Sur-Reply 5 (Patent Owner generally asserting that "a" substrate is not multiple substrates). As such, we are provided no reason to deviate from the established rule that the indefinite article "a" includes "one

or more" in open ended comprising claims. *Baldwin*, 512 F.3d at 1342–43. Thus, on this preliminary record, the term "a reflective substrate" does not require a single substrate or the same substrate. Rather, as written, each of the listed components must simply be mounted on a reflective substrate. Thus, Patent Owner's argument does not dissuade us from instituting trial.[11]

b) Reason to Combine

Patent Owner contends Petitioner's rationale for combining Lys and Worley is deficient because the fact that the two references are in the same filed of endeavor, without more, does not support a conclusion of obviousness. Prelim. Resp. 46. Patent Owner further contends that Petitioner fails to address the fact that the LED lamp of Lys is powered by a mains high voltage power source, whereas the LED lamp package of Worley is powered by a low voltage power source. *Id.* at 47 (asserting that failing to take into account the differences in the respective systems "further degrad[es] the rationale for combining the LED lighting system of Lys with the LED lamp package of Worley").

Here, Petitioner argues that because Lys contains insufficient implementation details, one of ordinary skill in the art would have looked to the successful implementation disclosed in Worley for guidance on how to

[11] The parties' arguments are generally directed to whether claims 1 and 5 require a single reflective substrate. Prelim. Resp. 41–42; Reply 5; Sur-Reply 5. We note, however, that the claims require that the identified components are *mounted on* a reflective substrate. The parties should address during trial whether the term "mounted" permits indirect contact between the various components and the reflective substrate. For example, the parties may address whether the '551 patent uses the term "mounted" to connote direct contact, such as a mechanical fit and/or soldering, or allows indirect mounting, such as mounting a chip that contains circuit components to a reflective substrate. Ex. 1001, 5:15–24.

mount the various circuit components. Pet. 43–44. Patent Owner's counter-argument related to the voltage of the two systems does not dissuade us from instituting trial because Patent Owner does not explain sufficiently why the difference in voltage between Lys and Worley would counsel against mounting the identified circuits of Lys on a reflective substrate, as asserted by Petitioner and Dr. Neikirk. As such, Patent Owner's arguments, at most, raise a disputed issue of material fact that is best resolved at trial.

c) Conclusion with Respect to Claims 1 and 5

For the reasons set forth above, Petitioner explains sufficiently where Lys and Worley teach or suggest every limitation of independent claims 1 and 5, and provides a rationale supported by factual underpinnings to support the proposed combination. As such, Petitioner demonstrates a reasonable likelihood that independent claims 1 and 5 would have been obvious over Lys and Worley.

4. Dependent Claims 3 and 7

Petitioner identifies where it contends each limitation of dependent claims 3 and 7 is disclosed in Lys and Worley. Pet. 51–52, 54. Patent Owner does not directly address Petitioner's arguments with respect to these dependent claims.

Upon review of the parties' arguments and evidence, we determine that Petitioner demonstrates a reasonable likelihood that claims 3 and 7 would have been obvious over Lys and Worley.

F. Claims 1, 3, 5, and 7 over Hochstein168 and Worley

Petitioner contends the subject matter of claims 1, 3, 5, and 7 would have been obvious over the combined disclosures of Hochstein168 and Worley. Pet. 54–69.

Although Hochstein168 and Lys differ in their specific implementations of an operational LED array, the parties' arguments related to the combination of Hochstein168 and Worley are generally the same as those set forth for the combination of Lys and Worley. *Compare* Prelim Resp. 40–50, *with id.* at 51–59. Having analyzed the parties' arguments and evidence with respect to the combination of Hochstein168 and Worley, and for the same general reasons set forth above for the combination of Lys and Worley, we determine that Petitioner demonstrates a reasonable likelihood that claims 1, 3, 5, and 7 would have been obvious over Hochstein168 and Worley.

G. Claims 4 and 8 over Lys, Worley, and Hochstein418, Claims 4 and 8 over Hochstein168, Worley, and Hochstein418, and Claims 3 and 7 over Deese, Kuo, and Hochstein168

Petitioner contends claims 4 and 8 would have been obvious over the combined disclosures of Lys, Worley, and Hochstein418, as well as the disclosures of Hochstein168, Worley, and Hochstein418. Pet. 69–76. Petitioner further contends that claims 3 and 7 would have been obvious over Deese, Kuo, and Hochstein168. *Id.* at 76–79.

Patent Owner does not address Petitioner's arguments with respect to dependent claims 3, 4, 7, and 8.

Upon review of Petitioner's arguments and evidence, we determine that Petitioner demonstrates a reasonable likelihood that claims 4 and 8 would have been obvious over Lys, Worley, and Hochstein418, as well as Hochstein168, Worley, and Hochstein418, and that claims 3 and 7 would have been obvious over Deese, Kuo, and Hochstein168.

III. CONCLUSION

For the reasons discussed above, Petitioner demonstrate a reasonable likelihood that it would prevail in showing that claims 1, 3, 4, 5, 7, and 8 are unpatentable.

IV. ORDER

Accordingly, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 3, 4, 5, 7, and 8 of the '551 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '551 patent shall commence on the date of this Decision, and notice is hereby given of the institution of trial.

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