

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Home Depot U.S.A., Inc.,
Petitioner

v.

Lynk Labs, Inc.,
Patent Owner

U.S. Patent No. 11,297,705

Filing Date: February 22, 2021

Issue Date: April 5, 2022

Title: Multi-Voltage and Multi-Brightness LED Lighting Devices and Methods of
Using Same

PGR2023-00016

REPLY DECLARATION OF DR. NEIKIRK

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LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,297,705 to Miskin, et al. (“ 705 patent ”)
1002	Declaration of Dr. Dean Neikirk
1003	File History of U.S. Pat. No. 11,297,705 to Miskin, et al.
1004	U.S. Patent Publication No. 2002/0070914 (“ Bruning ”)
1005	PGR2022-00009, Paper 5 (Patent Owner’s Preliminary Response) (February 28, 2022)
1006	U.S. Patent No. 10,932,341 to Miskin et al. (“ 341 patent ”)
1007	PGR2022-00009, Paper 10 (Decision Granting Institution of Post-Grant Review) (May 25, 2022)
1008	WO2005/084080
1009	U.S. Pat. App. Pub. No. 2017/0354005 (Ser. No. 15/685,429)
1010	U.S. Pat. App. Pub. No. 2014/0153232 (Ser. No. 14/172,644)
1011	U.S. Pat. App. Pub. No. 2018/0035510 (“ Doheny ”)
1012	U.S. Pat. App. Pub. No. 2018/0206305 (“ Van Winkle ”)
1013	U.S. Pat. App. Pub. No. 2002/0163529 (“ Evanicky ”)
1014	U.S. Provisional App. No. 61/217,215
1015	U.S. Provisional App. No. 60/997,771
1016	US 2012/0069560 (publication of 13/322,796)
1017	US 2009/017433 (publication of 12/287,267)
1018	WO 2010/138211 (publication of PCT/US2010/001597)
1019	US 2019/0182919 (publication of 16/274,164)
1020	U.S. Patent No. 10,537,001 to Miskin et al. (“ 001 patent ”)
1021	Petitioner’s Opening Claim Construction Brief in <i>Lynk Labs, Inc. v. The Home Depot USA, Inc. et al.</i> , 1:21-cv-5021-VMC (N.D. Ga.) (Dkt. No. 36) (Oct. 6, 2021)

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1022	Patent Owner's Responsive Claim Construction Brief in <i>Lynk Labs, Inc. v. The Home Depot USA, Inc. et al.</i> , 1:21-cv-5021-VMC (N.D. Ga.) (Dkt. No. 40) (Oct. 27, 2021)
1023	001 Patent Prosecution History Patent Owner's Amendments and Arguments/Remarks on June 13, 2019
1024	479 Patent Prosecution History Examiner's Non-Final Rejection on October 2, 2018
1025	U.S. Patent Publication No. 2012/0081009 (" Shteynberg ")
1026	783 Patent Prosecution History Patent Owner's Amendments and Arguments/Remarks on August 22, 2019
1027	EP0515664B1 to Krakower (" Krakower ")
1028	Excerpt from "IEEE 100 The Authoritative Dictionary of IEEE Standards Terms," Seventh Ed. (2000) with definition of "driver"
1029	783 Patent Prosecution History Patent Owner's Amendments and Arguments/Remarks on June 16, 2020
1030	PGR2022-00009, Paper 20 (Patent Owner's Response) (August 17, 2022)
1031	U.S. Pat. App. Pub. No. 2006/0022999 (" Lee ")
1032	PGR2022-00009, Paper 38 (Final Written Decision Determining All Challenged Claims Unpatentable) (May 22, 2023)
1033	Declaration of Ms. Mary Dahl in Support of Motion for Pro Hac Vice Admission
1034	Declaration of Dr. Dean Neikirk
1035	IPR2021-01541, Paper 39 (Final Written Decision Determining All Challenged Claims Unpatentable) (April 26, 2023)
1036	Deposition Transcript of Dr. Eric Bretschneider in PGR2022-0009 (October 20, 2022) (previously marked Exhibit 1035 in PGR2022-00009)

Exhibit No.	Description
1037	U.S. Patent No. 7,748,877 to Colby (“ Colby ”)
1038	Deposition Transcript of Dr. Alfred Ducharme in PGR2022-00016 (January 16, 2024)
1039	Printout from https://www.merriam-webster.com/dictionary/inverter (Last accessed January 22, 2024)
1040	Printout from https://www.britannica.com/technology/transformer-electronics (Last accessed January 22, 2024)
1041	Printout from https://www.electronics-tutorials.ws/accircuits/rms-voltage.html (Last accessed January 22, 2024)

I, Dr. Dean Neikirk, hereby declare as follows:

I. INTRODUCTION

1. I previously submitted a declaration in connection with this matter supporting certain positions advanced by Home Depot in its petition for post-grant review, dated January 5, 2023 (Exhibit 1002, “Opening Report”).

2. I have been retained at my normal hourly rate of \$800 per hour. No part of my compensation is dependent upon the outcome of the petition for post-grant review or the specifics of my testimony.

A. SUMMARY OF BACKGROUND AND QUALIFICATIONS

3. I incorporate by reference my qualifications from Section I of my Opening Report as if stated herein in full, including my *curriculum vitae*, which was attached to as **Appendix A** thereto.

4. Additionally, I provide the following information.

5. I was a member of the Society of Photo-Optical Instrumentation Engineers (SPIE) from about 1985 to about 2010, making many presentations at SPIE conferences on infrared and optical devices. I am an Institute of Electrical and Electronics Engineers (IEEE) member from about 1985 to today (and a senior member from about 1995), publishing many papers in IEEE scholarly journals on infrared, solid state, and electromagnetics devices. Both of these organizations are heavily involved in LED devices.

6. Further, as I mentioned in my Opening Report (§ 5), my research experience also includes research into the interaction of light with materials. Specifically, from 1978 to 2021, this included researching new materials for generating light, including laser hosts and LED compound semiconductor materials.

7. I researched compound semiconductors which are used to make LEDs, and the interaction of emitted and absorbed light with semiconductor devices and materials during the 1984 to 2021 time frame. To provide greater detail on my research, I was also involved in designing LED circuits for use in new diagnostic systems which were advanced systems that pre-dated any possible commercial application. As such, this research was published so others could make use of that information. My work on these advanced systems constituted foundational research that was required before there could be any commercial application of that new knowledge.

B. MATERIALS REVIEWED

8. My opinions are based on many years of education, research, and experience, as well as my study of relevant materials. In forming my opinions, I have considered the materials identified in this declaration, as well as Paper 8, Decision Granting Institution of Post-Grant Review, and Lynk Labs, Inc.'s ("Lynk

Labs”) Patent Owner Response, including exhibits submitted thereto, in particular, Exhibit 2045, Declaration of Alfred Ducharme, Ph.D., dated October 27, 2023.

9. I may rely upon these materials and/or additional materials to respond to arguments raised by Lynk Labs. I may also consider additional documents and information in forming any necessary opinions, including documents that may not yet have been provided to me.

10. My analysis of the materials produced in this proceeding is ongoing and I will continue to review any new material as it is provided. This declaration represents only those opinions that I have formed to date. I reserve the right to revise, supplement, or amend my opinions stated herein based on new information and on my continuing analysis of the materials already provided.

II. RELEVANT LEGAL STANDARDS

11. I incorporate by reference the relevant legal standards from Section III of my Opening Report as if stated herein in full.

12. In addition, I have been informed that a patent term in a post-grant review is generally afforded its plain and ordinary meaning to a POSITA at the time of the patent’s claimed invention, in view of the patent claims, the specification, and the prosecution history, with consideration of extrinsic evidence such as dictionaries and other sources of definitions that a POSITA would have looked to at the time.

III. CLAIM CONSTRUCTION

A. “Forward Voltage”

13. I have been asked to opine on the meaning of “forward voltage” as it relates to the claims of the ’705 patent. In addition to my opinions provided for construing this claim term in my Opening Report (Section V.E.1.), I provide the following opinions.

14. I understand that Patent Owner and its expert, Dr. Ducharme, contend that “forward voltage” should be interpreted as “the operating voltage for the claimed LED circuit.” POR, 8-26. I have considered their arguments and I disagree.

15. As I provided in my Opening Report, the applicant’s statements made during the prosecution of the parent application (the now ’001 Patent) to which the 705 patent claims priority—“‘forward voltage’ of an LED circuit, as recited in claim 1, is the minimum voltage difference required between the anode and the cathode of the LEDs in the claimed circuit to allow current to flow through the LEDs”—was definitional and should be applied. Opening Report, ¶¶ 63-64. In my opinion, this definition is consistent with a POSITA’s understanding of a forward voltage. Thus, in my opinion, the express definition should be applied.

16. Patent Owner and Dr. Ducharme point to various extrinsic evidence, such as Exhibits 2036-2037, 2042, and 2051. POR, 15-18. These show relatively

minor variations in purported “forward voltages” based on manufacturing tolerances and operating conditions. For example, Patent Owner and Dr. Ducharme argue that the Samsung datasheet (Ex. 2036) demonstrates that LEDs have multiple forward voltages. POR, 15-17. I disagree. For example, Exhibit 2036 provides a range of voltages that an LED may operate in depending on operating conditions such as temperature. However, given a constant temperature and current, there is only one forward voltage for a given LED circuit.

17. Notwithstanding, the variations in voltage are minor. Indeed, Ex. 2036 demonstrates that there is only a 2% change in forward voltage over the temperature range of 25C to 85C. Ex. 2036, 10. In my opinion, this is inconsistent with the specification and claims which discusses the forward voltage of two LED circuits wired in a series configuration is twice that of the LED circuits wired in a parallel configuration, and the current through the LED circuits in a parallel configuration is twice that of the LED circuits in a series configuration. Ex. 1001, 5:10-18. Further regarding the extrinsic datasheets (Ex. 2036 at 3 and 2037 at 2), it is my opinion that a POSITA would have understood that the discussed forward voltage ranges relate to the potential variance of the forward voltage from one produced LED to another produced LED, and not a voltage range attributable to any one given LED. Therefore, it is my opinion that a POSITA would have understood the extrinsic record supports Petitioner’s construction.

18. Dr. Ducharme also cites Ex. 2052 and Ex. 2053 to argue that there is a distinction between “forward voltage” and minimum voltage, as defined by the applicant during prosecution. I disagree. Exhibits 2052 and 2053 illustrate the distinction between “supply voltage” and “forward voltage.” In my opinion, “supply voltage” is more commensurate with Petitioner’s alternative construction and Patent Owner’s proposed construction than the proper construction of “forward voltage” in the context of the ’705 patent.

19. The claims and specification are directed to voltage-driven LEDs and so it is entirely consistent with these references to refer to the forward voltage according to the minimum as defined in the intrinsic record.

20. Exhibit 2038 is explicit that the “forward voltage” is a single, minimum voltage. EX2038, 2 (“minimum voltage difference”), 2 (“The forward voltage defines the amount of voltage required for the current to flow through the diode junction. Any voltages below this level cause the LED to remain ‘open’ or non-conductive.”). Exhibit 2038 does mention an LED datasheet as an example, but that datasheet merely shows minor variances in the single forward voltage that is possible based on manufacturing tolerances.

B. “Selectable by a User Switching the Switch”

21. Patent Owner argues that “[t]o the extent the Petitioner argues for ‘indirect’ control, the switch (whether direct or indirect) must still be located

electrically between the LED driver and LED circuit, and also be physically selectable by a user.” POR, 27 (emphasis added). Patent Owner argues with respect to the prior art that the user must “physically” contact the same sub-portion of the switch that is “electrically connected” to the circuit to distinguish the proposed switches that combine Bruning’s transistors and controllers with Evanicky’s knobs/sliders (Ground 3) or Lee’s slider (Ground 6).

22. Additionally, a switch that is selectable by a user and that is also electrically connected between the LED driver and LED circuit does not necessarily have to be directly selectable by a user. For example, a user can indirectly select transistors that are electrically connected between the LED driver and the LED circuit. Likewise, a user can directly select a switch assembly that comprises a user interface and that is also electrically connected between the LED driver and LED circuit.

23. As I explained in my Opening Report, the ordinary meaning of “switch” encompasses, for example, mechanical, electronic, electro-mechanical, and programmable switches. Thus, a “switch” can be the assembly of multiple subcomponents, for example, a transistor, processing circuitry, and the user interface that the user physically touches. I understand that Patent Owner and its expert do not dispute that a switch can have a complex structure.

24. Patent Owner appears to argue that the portion or subcomponent of the switch that the user physically touches must be electrically connected between LED driver and an LED circuit. In my opinion, this is not supported by the plain and ordinary meaning of the claim language, and I disagree with Patent Owner. There is no support in the claims, specification or field for a construction requiring a user to physically contact the electrical connection of the LED circuit itself. A POSITA would have known that the portion of the switch physically touched by the user would normally be a separate component that would be electrically insulated from the portion of the switch that is electrically connected to the LED circuit. This electrical insulation would prevent the user from being shocked.

25. For example, even on a mechanical toggle switch, the user would not be touching the subcomponent that is electrically connected between the LED driver and the LED circuit; the user would instead be touching a subcomponent that is electrically insulated from the current flowing through the circuitry. As another example, the user would not physically touch the gate of a MOSFET, which is insulated from the source and drain.

26. Thus, a POSITA would have understood the claimed switch to encompass switches with at least two components: a first component that is electrically connected as claimed and a second component, electrically isolated from the first component, that the user can safely contact. This is reflected in the

construction of “switch” that encompasses multi-component switches such as electro-mechanical and programmable switches, which I understand Patent Owner does not dispute.

IV. EFFECTIVE FILING DATE

A. The Effective Filing Date of Claims 1-20 of the '705 Patent Is No Earlier than February 22, 2021

1. Claims 1-20 of the '705 Patent

27. Patent Owner and Dr. Ducharme argue that the '597 PCT and its incorporated applications provide support for every claim of the '705 patent. POR, 33-34. I have considered their arguments and I disagree.

28. For example, Patent Owner and Dr. Ducharme argue that paragraph 22 of the '215 application discloses a dimmer switch can be placed at the output of the LED driver. POR, 34-35, 39. I disagree. It is my opinion that paragraph 22 does not disclose to a POSITA that the inventors were in actual possession of a switch in the claimed location (“electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit”) at the time of filing.

29. A POSITA reading paragraph 22 of the '215 application would not have understood it as “disclos[ing] a switch coupled to the output of the LED driver” (POR, 35). Paragraph 22 of the '215 application states that the “LED circuit driver may be coupled to a dimmer switch that ... allows for adjustability of

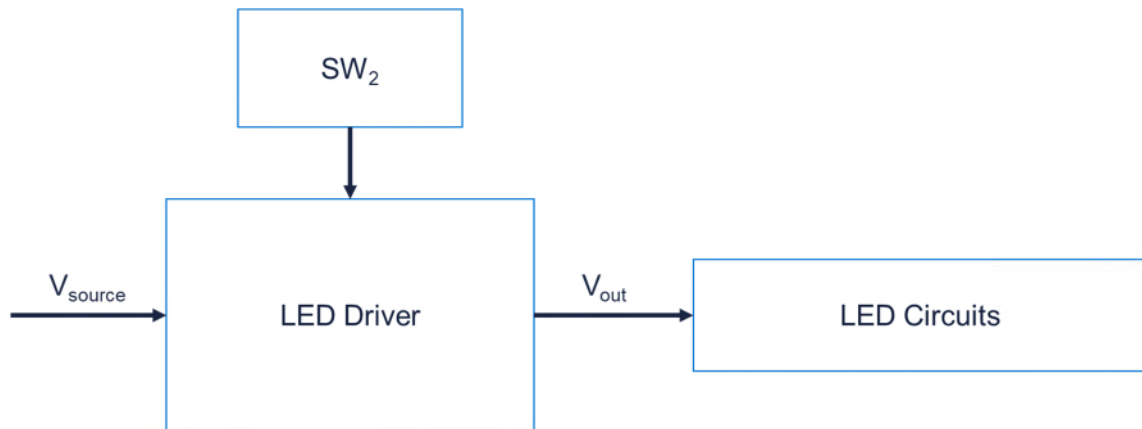
the otherwise relatively fixed voltage and/or relatively fixed frequency output of the LED circuit driver.” EX1014 [22] (emphasis added). With respect to location, paragraph 22 merely states that the switch is “coupled to” the driver. EX1014, [22]. Dimmer switches regulate the input to the LED driver in such a way that the output of the driver is adjusted, and thus a POSITA would understand the dimmer switch would normally be before the driver. For example, dimmer switches can adjust the input voltage, amplitude, and/or duty cycle to the LED driver such that the output of the LED driver is also adjusted. The diagrams below illustrate two options for the placement of the dimmer switch relative to the LED driver.

30. In the first option, the dimmer switch SW_1 is placed upstream of the LED driver. The dimmer switch can adjust the voltage V_{in} going into the LED driver, that may then adjust the LED driver’s output V_{out} . An example of such a switch would be a variac or a variable transformer which can adjust the voltage fed into the LED driver, thereby adjusting the LED driver’s output.



31. In the second option, the dimmer switch is coupled to the driver outside the input voltage path and provides a control signal to the driver that causes the driver to adjust its output. As illustrated below, the switch SW_2 provides a

control signal into the LED driver that causes the LED driver to adjust its output V_{out} . An example of such a switch would be a switch that controls a transistor in the LED driver; where the switch controls the gate of the transistor, for example, varying the transistor's duty cycle. As a result, the output of the LED driver is adjusted.



32. Additionally, the larger context of the intrinsic record is elucidating. As the Board correctly observed in its D.I., the “’215 provisional includes twenty-one figures (LED circuit diagrams), but only three of them show a switch, and in each instance that switch is connected between an AC (not *DC*) voltage output and at least one of a first operating LED circuit or at least one additional LED circuit.” D.I., 22. In fact, none of the ’215 application, ’597 PCT, or ’705 patent’s figures show a switch connected between a DC voltage and an LED circuit, or a switch connected after a bridge rectifier.

33. Patent Owner and Dr. Ducharme also argue that the dimmer switch in paragraph 22 of the '215 application is “meant to be combined with the LED circuit driver and associated circuitry.” POR, 35. However, their argument fails to address the lack of disclosure of a dimmer switch in the requisite location relative to the driver.

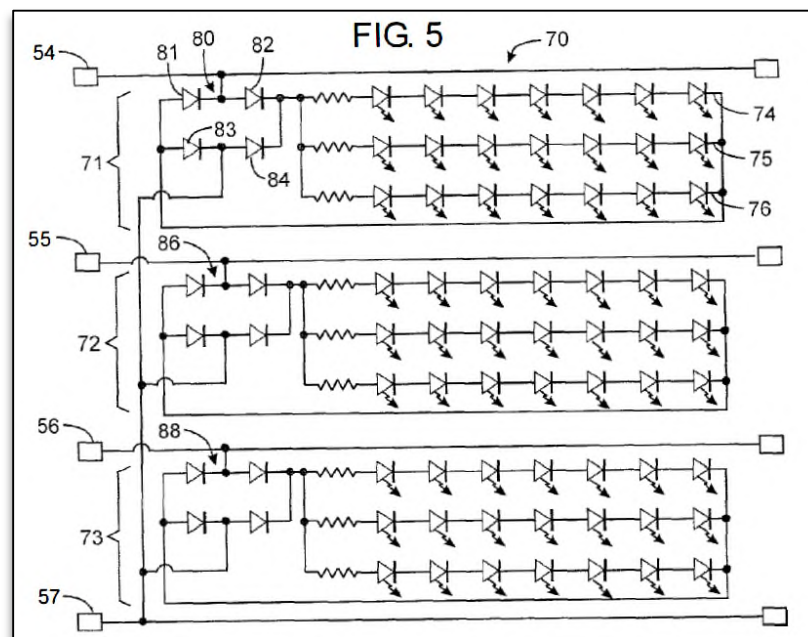
34. None of the 705 patent's priority applications disclose a switch connected between the DC voltage output of an LED driver and an LED circuit.

35. For example, although Patent Owner points to the bridge rectifiers in Figures 16-19 of the '215 application and Figure 8 of the '796 application and the '597 PCT (POR, 37-39), those bridge rectifiers are directly connected in series to the LEDs without an intervening switch. EX1014, Figs. 16-19; EX1016, [0059], Fig. 8; EX1018, [58], Fig. 8.

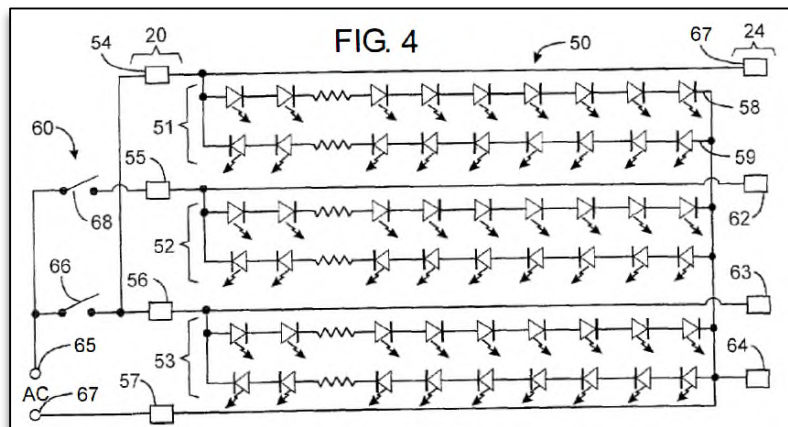
36. The priority applications not only do not provide support for the claimed switch in the '705 patent, they teach away from the claims. For example, Patent Owner cites Figure 8 of the '597 PCT. However, the subsequent Figure 9 shows “figure 8 with a switch 74 electrically connected between the multi-brightness LED lighting device 62 and the AC voltage source 78.” EX1018, [59], Fig. 9. Thus, the switch is taught as being connected to the LED driver's input (not output, as claimed) and to an AC voltage (not DC, as claimed). It is my opinion

that this switch disclosed in the priority application is of the type distinguished by the applicant during prosecution.

37. Specifically, during prosecution, the applicant argued that Lefebvre “fails to show a switch electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit.” EX1003, 183. The applicant argued that Lefebvre’s “Fig. 5 fails to show a switch electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit. Instead, Fig. 5 shows bridge rectifiers (80, 86, 88) connected to terminals (54, 55, 56, 57) and a lighting assembly (70).” EX1003, 182.



38. The applicant also distinguished Lefebvre's Figure 4 on the basis that "Fig. 4 from *Lefebvre* shows switches (66, 68) connected to an AC power source, but do not show LED drivers, let alone switches (66, 68) electrically connected between a DC voltage output (of an LED driver) and at least one of a first operating LED circuit or at least one additional LED circuit." EX1003, 182.



39. The applicant argued that "[e]ven if *Lefebvre*'s circuits of Figs. 4 and 5 were combined, the switches would be placed *before* the bridged rectifiers (80 86, 88)." EX1003, 183.

40. The applicant distinguished Lefebvre by arguing that "[t]he switches of Claim 1 instead are located after a DC voltage output (of an LED driver), which provides for control of a DC voltage rather than attempting to control an AC voltage that is later converted into a DC voltage." EX1003, 7. The applicant then alleged that there were various benefits to placing the switch after an LED circuit:

Placing a switch *after* an LED driver is more efficient since the LED driver can optionally output a lower voltage, thereby reducing the amount of high voltage isolation needed for the switch. This LED driver-switch configuration enables the use of smaller and safer switches, and is safer for a user to actuate the switch while there is power being delivered through the lighting system.

EX1003, 183 (emphasis in the original).

41. It is my opinion that the priority applications teach the switch configuration disclosed by Lefebvre, which the applicant distinguished during prosecution. Thus, the priority applications teach away from claims 1-20 of the '705 Patent.

42. In addition to not being electrically connected between the LED driver and the LED circuits, the dimmer switch in paragraph 22 of the '215 application cannot provide support for the claimed switch in claims 1-20 of the '705 patent because it does not provide multiple DC voltages, as claimed.

43. As I explained in my Opening Report (§ 25), the discussion of the dimmer switch in the '215 application occurs in two sentences that were copied from a statutory prior art Miskin application to AC driven LED circuits. EX1008. The '215 application discloses that the dimmer switch causes the driver to change the “voltage and/or frequency” of its output. EX1014[22]. Because the driver can change its “frequency,” a POSITA would have understood this disclosure to refer to an AC voltage, consistent with the preceding paragraphs of the specification.

44. The preceding paragraphs of the '215 application use the words “relatively constant” or “fixed” to describe AC waveforms. Thus, a POSITA would not understand “relatively constant” or “fixed” as used in the context of the '215 application to refer to DC. For example, paragraph 17 of the '215 application discusses “AC driven LED circuits (or ‘driven circuits’).” EX1014[17]. Paragraph 17 goes on to state that “drivers according to the invention are described as providing ‘relatively constant’ or ‘fixed’ voltage and frequency.” EX1014[17] (emphasis added). The fact that the output of the drivers have a “frequency” further confirms that the drivers have an AC output. Likewise, paragraph 18 states that “an LED circuit driver provides a relatively fixed voltage and relatively fixed frequency AC output such as mains power sources. The LED circuit driver output voltage and frequency delivered to the LED circuit may be higher or lower than mains power voltage and frequencies by using an LED circuit inverter driver.” EX1014[18] (emphasis added). Thus, paragraph 18 clearly describes an LED driver has an AC output.

45. Subsequent paragraphs in the '215 application likewise describe LED drivers with AC outputs. For example, paragraph 19 describes “the higher frequency LED circuit inverter driver.” EX1014[19]. Patent Owner and Dr. Ducharme point to paragraph 19 of the '215 application, specifically the “LED circuit inverter driver” that provides a “relatively fixed voltage as the LED circuit

load changes” and argues that a POSITA would understand that the “relatively fixed voltage” comprises a DC voltage. I disagree. Paragraph 19 of the ’215 application states: “The higher frequency LED circuit inverter driver may be a electronic transformer, halogen or high intensity discharge (HID) lamp type driver with design modifications for providing a relatively fixed voltage as the LED circuit load changes.” EX1014 [19] (emphasis added). The inverter driver is described as having a “frequency,” indicating that the inverter driver has an AC output. Thus, the “relatively fixed voltage” output of the inverter driver is clearly disclosed as being AC, not DC. Additionally, an inverter is a basic electronic circuit that converts DC input to AC output, and essentially performs the opposite function of a bridge rectifier. For example, Merriam-Webster defines “inverter” as “a device for converting direct current into alternating current.”¹ This further confirms that a POSITA would understand an inverter to provide an AC output. Moreover, this is also consistent with the disclosure of the “electronic transformer” as an example of the “high frequency LED circuit inverter driver.” Transformers are AC devices. For example, Britannica defines a transformer as a “device that transfers electric energy from one alternating-current circuit to one or more other

¹ EX1039, <https://www.merriam-webster.com/dictionary/inverter>

circuits, either increasing (stepping up) or reducing (stepping down) the voltage.”² Further, the example given of a high intensity discharge (HID) lamp is driven by an AC voltage, not by a DC voltage.

46. Paragraph 20 of the '215 application likewise describes “the higher frequency inverter having a relatively fixed voltage.” EX1014[20]. Thus, this is yet another instance of the '215 application describing an AC output as having a “relatively fixed” voltage. A POSITA would understand that “relatively fixed” voltage in the context of the '215 application refers to the “relatively fixed” amplitude of an AC signal, not to a DC voltage.

47. Similarly, paragraph 21 of the '215 application states: “Each individual LED circuit can self-regulate current by matching the capacitor or RC network value of the LED circuit to the known relatively fixed voltage and frequency of the LED circuit driver whether the LED circuit driver is a mains power source, a high frequency LED circuit driver or other circuit driver capable of providing a relatively fixed voltage and relatively fixed frequency output.” EX014 [21]. Paragraph 21 thus unequivocally describes the LED circuit driver as providing a “frequency,” i.e., AC output.

² EX1040, <https://www.britannica.com/technology/transformer-electronics>

48. Especially when read in the context of the preceding paragraphs, a POSITA would not have understood the dimmer switch in paragraph 22 of the '215 application to provide “two different DC forward voltages,” as claimed. When the '215 application discloses that the LED circuit driver has a “relatively fixed voltage and/or relatively fixed frequency output” vis-à-vis the dimmer switch embodiment, a POSITA would understand the LED circuit driver to have an AC output. “Relatively fixed voltage” in the context of the '215 application means that the amplitude of the AC signal is relatively fixed—not that the output is DC. For example, the root mean square (RMS) voltage is a measure that is commonly used to describe the voltage of an AC signal. A relatively fixed RMS voltage does not mean that the signal is DC. The RMS voltage or root mean square voltage of an AC waveform is “the “amount of AC power that produces the same heating effect as an equivalent DC power.”³

The RMS value is the square root of the mean (average) value of the squared function of the instantaneous values. The symbols used for defining an RMS value are V_{RMS} or I_{RMS} .

The term RMS, ONLY refers to time-varying sinusoidal voltages, currents or complex waveforms where the magnitude of the waveform changes over time and is not used in DC circuit analysis or calculations where the magnitude is always constant.

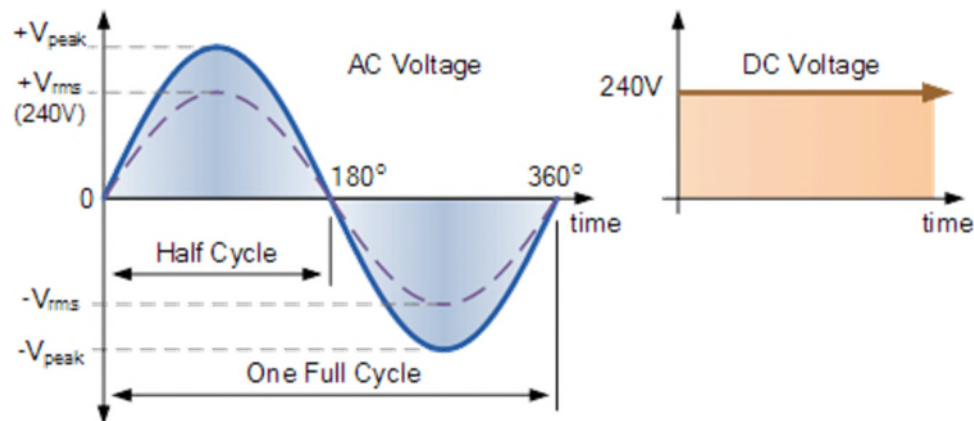
When used to compare the equivalent RMS voltage value of an alternating sinusoidal waveform that supplies the same electrical

³ EX1041, <https://www.electronics-tutorials.ws/accircuits/rms-voltage.html>

power to a given load as an equivalent DC circuit, the RMS value is called the “effective value” and is generally presented as: V_{eff} or I_{eff} .

In other words, the effective value is an equivalent DC value which tells you how many volts or amps of DC that a time-varying sinusoidal waveform is equal to in terms of its ability to produce the same power.

For example, the domestic mains supply in the United Kingdom is 240Vac. This value is assumed to indicate an effective value of “240 Volts rms”. This means then that the sinusoidal rms voltage from the wall sockets of a UK home is capable of producing the same average positive power as 240 volts of steady DC voltage as shown below.



EX1041, <https://www.electronics-tutorials.ws/accircuits/rms-voltage.html>.

2. Claims 3, 10, 17 of the '705 Patent

49. Patent Owner and Dr. Ducharme assert claims 3, 10, and 17 of the '705 patent are supported by the pre-AIA applications. POR, 45-54. I have considered their arguments and I disagree.

50. First, Patent Owner and Dr. Ducharme rely on paragraphs 24 and 25 of the '597 PCT, but none of these paragraphs disclose a switch. POR, 45-46.

Further, the '597 PCT does not disclose that a switch could be combined with the embodiments discussed in the '597 PCT. And each paragraph describes the parallel/serial embodiment, wherein a different forward voltage can be applied to the LED device depending on whether the LED circuits are wired in series or parallel, but wherein only a single forward voltage is applied to each LED circuit. Ex. 1018, [28] (“[A]t least two *single voltage* LED circuits” wherein each LED circuit is “*designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each ... single voltage LED circuit.*”) (emphasis added), [30] (same). Also of importance, there is no disclosure of a switch that is capable of switching LED circuits between parallel and series configuration.

51. A POSITA would have understood that an LED circuit having a single predetermined forward voltage does not have two forward voltages. This is especially true with respect to a first operating LED circuit, since its operation requires providing the predetermined forward voltage. Indeed, if a voltage below the operating voltage level is applied, then the LED will not operate, and if the applied voltage is greater than the operating forward voltage, a number of undesirable effects will occur. Thus, the '597 PCT does not disclose the claimed combinations.

52. Patent Owner and Dr. Ducharme also point to paragraphs 28 and 30 of the '597 PCT. POR, 47. Neither paragraph describes a switch. Moreover, these paragraphs describe the parallel/serial embodiment, wherein only one forward voltage is applied to each LED circuit. EX1018, [28] (“at least two single voltage LED circuits” wherein each LED circuit is “designed to be driven with a predetermined forward voltage and preferably matching forward voltages for each ... single voltage LED circuit.”), [30] (same).

53. Patent Owner and Dr. Ducharme also point to paragraphs 13-15 of the '597 PCT. POR, 46. Paragraphs 13 and 14 do not describe a switch. Paragraph 15 discloses a “switching means,” but that switch does not provide “two different DC forward voltages” to either LED circuit and the switch’s location is not disclosed. Instead, paragraph 15 defines “multi-voltage” with respect to the parallel/serial embodiment, wherein only a single forward voltage is applied to each LED circuit. EX1018, [15] (“switching means that connects and/or disconnects at least one additional LED circuit to and/or from a first LED circuit”).

54. Patent Owner also cites the “dimmer switch” in paragraph 22 of the '215 application (POR, 47, 49), but the dimmer switch does not provide “two different DC forward voltages” under what in my opinion is the proper construction of “forward voltage” or even under the Patent Owner’s proposed construction. Moreover, because the LED driver outputs an AC voltage, switching

that dimmer switch does not provide “two different DC forward voltages” under any construction of “forward voltage.”

55. For at least these reasons, it is my opinion that the pre-AIA priority applications do not disclose the subject matter of claims 3, 10, and 17.

B. The Claims in the '341 Patent Have An Effective Filing Date After March 16, 2013

56. In addition to my opinions regarding the summary of the '341 patent and the effective filing date of claims 3, 4, 10, 11, 17, and 18 of my Opening Report, which I incorporate by reference as if fully set forth herein, I provide the following opinions.

1. Claims 3, 10, and 17 of the '341 Patent

57. Claims 3, 10, and 17 of the '341 Patent contain the same limitation as claims 3, 10, and 17 of the '705 patent. Thus, claims 3, 10, and 17 of the '341 Patent are not supported by pre-AIA applications for the reasons discussed with respect to claims 3, 10, and 17 of the '705 patent.

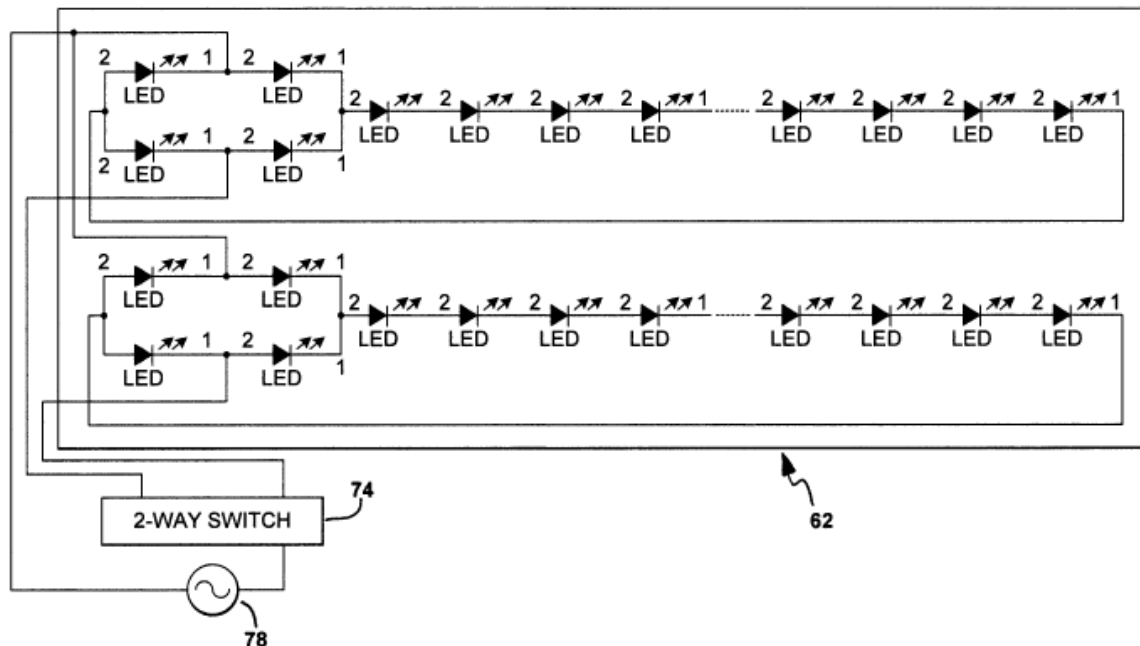
2. Claims 4, 11, and 18 of the '341 Patent

58. Patent Owner and Dr. Ducharme assert the combination of elements in these claims are not only disclosed in the '597 PCT but possible. POR, 54-58. I have considered their arguments and I disagree with their conclusions.

59. The independent claims require an LED lighting device comprising a switch. E.g., Ex. 1006, cl. 1. Thus, a POSITA would understand that the claimed

switch is part of the LED lighting device. However, claims 4, 11, and 18 further provide that the “switch is connected between the AC voltage power source and the LED lighting device.” In my opinion, this is nonsensical—the switch cannot be both part of the LED device and connected between the LED device and an AC voltage power source. Therefore, this claimed combination is not possible.

60. Further, Patent Owner and Dr. Ducharme’s argument that the ’597 PCT clearly discloses this claimed combination is incorrect. Indeed, Figure 9, and its disclosure which mirrors the claim language (Ex. 1018, [59]), clearly shows that switch 74 is external to LED lighting device 62.

FIG. 9

A POSITA would have understood that a switch which is not part of the LED device is the only logical arrangement where a switch can be between the device and the AC voltage source.

61. Accordingly, it is my opinion that these claims are not disclosed in the '597 PCT and are further directed to an impossible arrangement.

C. The Claims in the '001 Patent Have An Effective Filing Date After March 16, 2013

1. Claims 1-15 of the '001 Patent

62. Patent Owner and Dr. Ducharme assert these claims are disclosed in the '001 patent and '597 PCT discussion of a “switch that is selectable to ‘independently switch on or off’ at least a first LED circuit or an additional LED circuit” as required by certain claims in the '001 Patent. POR, 58-59. I have considered their arguments and I disagree with their conclusions.

63. First, the concept of “independently” switching appears only in the claims of the '001 patent. *See e.g.*, Ex. 1020, claim 1. Indeed, neither the '001 patent's specification nor the '597 PCT's specification discusses “independent switching.” Therefore, it is my opinion that a POSITA would not have understood “independently switching” to be supported by any previous application.

64. As I explained in my Opening Report (¶ 56), in the '597 PCT, the operating LED circuit must always be on before the “additional LED circuit” is

switched on or off, such that the claimed LED circuits have a “dependent” relationship. For example, paragraph 56 (POR, 58-59) discloses that AC voltage is only applied to the “additional” circuit via contact 56c if it is already applied to the “operating” circuit via contact 56b. EX1018 [56]. PO’s remaining citations are either irrelevant or show that same dependency. EX1018, [15], [18], [24]-[25], [57]-[58], Fig. 7.

65. Additionally, as I discussed in my Opening Report (¶ 24), only the ’705 Patent’s distinct “additional circuit” embodiment discusses a switch that switches the at least one additional LED circuit on or off in addition to a first LED circuit to achieve a change in brightness. Therefore, it is my opinion that a POSITA would have understood, for example, that to increase the level of brightness as discussed in the ’705 patent’s specification, the at least one additional circuit being turned on depends on the first LED circuit being on. Indeed, the ’001 patent supports this understanding in its discussion of the “additional circuit” embodiment functioning as is known in conventional 2-way and 3-way incandescent lamps. Ex. 1020, 3:45-51.

V. GROUND 1: CLAIMS 3, 10 AND 17 OF THE '705 PATENT ARE INVALID

66. In addition to my opinions regarding the summary of the '705 patent and validity of claims 3, 10, and 17 of my Opening Report, which I incorporate by reference as if fully set forth herein, I provide the following opinions.

A. The Claims Lack Written Description and Enablement

67. Patent Owner and Dr. Ducharme assert that claims 3, 10, and 17 are valid. I have considered their arguments and I disagree.

68. Under what is in my opinion the correct construction of “forward voltage” (*see* Section III above), a POSITA would have understood the first operating LED circuit and the one additional LED circuit each has one minimum forward voltage, and therefore no switch can provide “at least two forward voltages” to either circuit.

69. Further, I understand that Patent Owner asserts that these claims are possible because “two different forward voltages can clearly be applied to the two different LED circuits” by applying one forward voltage to the first operating LED circuit and a different forward voltage for the one additional LED circuit. POR, 65. In my opinion, this conclusion is wrong. The claims require at least two forward voltages being provided to either of the LED circuits, or both LED circuits, in the collective. Patent Owner’s interpretation therefore does not embody

the claim. Likewise, in my opinion this argument also fails as Patent Owner and Dr. Ducharme disregard the fact that the claims require a switch that is capable of providing the at least two different forward voltages.

70. Thus, it is my opinion that the claims are not possible.

VI. GROUND 2: CLAIMS 15, 17, AND 19 ARE ANTICIPATED BY BRUNING

71. I understand that Patent Owner does not dispute that claims 15, 17, and 19 are anticipated by Bruning.

VII. GROUND 3: CLAIMS 1-3, 5, 7-10, 12, 14, AND 16 ARE OBVIOUS OVER BRUNING IN VIEW OF EVANICKY

A. “Wherein the switch is electrically connected between the DC voltage output and at least one of the first operating LED circuit or the at least one additional LED circuit”

72. Under the Petition’s first theory, the “switch” is Bruning’s transistor, which is electrically connected as claimed, and which is indirectly selected by the user moving Evanicky’s knob/slider. Pet. 53-54. This combination is consistent with the construction in the Petition (Pet., 26-28) and the construction applied in PGR2022-00009, each of which encompasses “indirect” selection of a switch by a user. EX1032, 58-63. PO does not explicitly argue for a “direct” construction, but includes an ambiguous statement that the switch must be “physically selectable.” POR, 27. In the combination, Bruning’s transistors are indirectly physically selectable by the user physically moving Evanicky’s knob/slider.

73. In PGR2022-00009, the Board addressed essentially identical claim language (“selectable by a user switching the switch”), also in the context of Bruning—and held that the switch need not be directly controlled by the user and that Bruning’s color-specific switch is selectable by a user. EX1032 at 58-63. In its Final Written Decision, the Board explained:

Patent Owner’s second argument again implicitly construes the claimed “switch” to be directly controlled by the claimed user, although Patent Owner apparently withdraws its construction, requiring the same, that was initially set forth in its Preliminary Response. We discern no argument or evidence in the record in support of requiring the claimed “switch” to be directly controlled by the claimed “user.” Merely because “switch Q₁ is a transistor ‘controlled by controller 224’” does not mean that the switch is “not capable of being switched by a user.” Having reviewed the entire record developed during trial, we maintain our preliminary determination that the claims do not exclude controlling the claimed “switch” indirectly, for example, by a user through a controller. As such, we agree with Petitioner that switch Q₁ also teaches the claimed “switch” because switch Q₁ is indirectly controlled by the claimed “user” via controller 224 and/or via Bruning’s panel light setting.

EX1032 at 62 (internal citations omitted). I agree with the Board’s reasoning and conclusion that Bruning’s color-specific switches are selectable by a user switching them.

74. Under the Petition’s second “alternative” theory, the “combination of the color-specific switches of Bruning, the controllers, and the slider/knob of Evanicky together are the switch.” Pet., 53. This combination is consistent with the

ordinary meaning of “switch” applied in the Petition, which encompasses electro-mechanical and programmable switches like the proposed switch. Pet., 26. The proposed switch is electrically connected as claimed (transistor portion of the switch is in the claimed location) and is “directly” and “physically” selected by the user (user moves the switch’s knob/slider portion).

B. “Wherein the switch has at least two positions”

75. Patent Owner does not dispute that Evanicky’s slider/knob has at least two positions; thus, the switch comprising Evanicky’s slider/knob has at least two positions as claimed.

VIII. GROUND 4: CLAIMS 1-2, 5, 7-9, 12, 14-16, AND 19 ARE ANTICIPATED BY DOHENY

76. I understand that Patent Owner does not dispute that Doheny discloses the claimed subject matter, and only disputes whether Doheny qualifies as prior art. POR, 96-97.

77. I disagree with Patent Owner’s assertion that the effective filing date for the challenged claims is at least as early as the May 28, 2010 filing date of the ’597 PCT.

78. Patent Owner relies exclusively on ’597 PCT (EX1018)’s paragraph 15 and ’215 application (EX1014)’s paragraph 22 for support of the “switch is electrically connected between” limitation. POR, 82. But neither paragraph

supports that limitation alone, much less that limitation in combination with the other limitations for the claim as shown above in Section IV.A (PGR Eligibility).

79. The Board previously determined in its Institution Decision, “the effective filing date of the ’705 patent is only as early as the filing date of the ’802 application from which the ’705 patent matured,” i.e., February 22, 2021. I agree with the Board.

IX. GROUND 5: CLAIMS 1-2, 5, 7-9, 12, 14-16, AND 19 ARE RENDERED OBVIOUS BY VAN WINKLE

80. I understand that Patent Owner only disputes whether Van Winkle is prior art, but does not dispute that to the extent Van Winkle is prior art, it would render obvious the claimed subject matter. Van Winkle qualifies as prior art for the reasons discussed in Sections VIII and IV.A.

X. GROUND 6: CLAIMS 1-3, 5, 7-10, 12, 14-17, AND 19 ARE OBVIOUS OVER BRUNING IN VIEW OF LEE

81. Patent Owner argues that Bruning’s transistor is not “selectable by a user switching the switch” and the “slider of Lee” is not electrically connected between the LED driver and the LED circuit. POR, 98. I disagree for the reasons discussed with respect to Ground 3. *See* Section VII. For example, under the Petitions’ second “alternative” theory (Pet., 102-103), the proposed switch is electrically connected as claimed (transistor portion of the switch is in the claimed

location) and is “directly” and “physically” selected by the user (user moves the slider portion of the switch between multiple positions).

XI. CONCLUSION

82. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1101 of Title 18 of the United States Code.

A handwritten signature in black ink, appearing to read "Dean Neikirk", with a long horizontal line extending to the right.

Dr. Dean Neikirk

Dated: January 23, 2024