

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JESCO LIGHTING GROUP, LLC,
Petitioner,

v.

AGS LIGHTING MANAGEMENT LLC,
Patent Owner.

Case No. IPR2025-01328
Patent No. 11,751,302

REPLY DECLARATION OF DR. J. GARY EDEN

Reply Declaration of Dr. J. Gary Eden

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EX1015	Kay, Gregory, “Tunable white light and its benefits become more accessible”, Architectural Products, dated June 28, 2023, available at https://www.arch-products.com/architectural-lighting/article/55092734/tunable-white-light-and-its-benefits-for-commercial-offices-become-more-accessible .
EX1016	U.S. Patent No. 7,014,336B1 (“Ducharme”)
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EX1019	“Tunable White technology At a Glance”, Tridonic, dated March 2019
EX1020	ENERGY STAR® Program Requirements Product Specification for Decorative Light Strings Eligibility Criteria Version 1.5 available at https://www.energystar.gov/sites/default/files/specs/private/spec_v1.5_draft.pdf

Exhibit No.	Description
EX1021	<i>“Decorative Light Strings Specification Version 1.5”</i> , Energy Star, available at https://www.energystar.gov/products/spec/decorative_light_strings_specification_version_1_5_pd .
EX1022	AGS Lighting Management LLC v. Jesco Lighting Group, LLC, 1:25-cv-00141-MN, Dkt. 16-1 (D.Del. April 17, 2025), Email correspondence, dated March 7, 2024.
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EX1031	TPS61042 Constant Current LED Driver

I. INTRODUCTION

1. My name is Dr. J. Gary Eden. I am a Professor of Electrical and Computer Engineering at the University of Illinois and am submitting this declaration at the request of counsel for Jesco Lighting Group in the above captioned case.

2. I have been asked by counsel for Jesco Lighting Group, LLC (“Petitioner”) to respond to certain technical opinions set forth in the April 10, 2026 Patent Owner’s Response of AGS Lighting Management LLC (“Patent Owner”) and in the declarations of Dr. Thomas M. Katona submitted in support of that Response – namely, the November 3, 2025 declaration (Ex. 2018) and the April 10, 2026 supplemental declaration (Ex. 2025). These documents address U.S. Patent No. 11,751,302 (the “’302 Patent,” Ex. 1001).

3. This declaration is submitted in support of Petitioner’s Reply to the Patent Owner’s Response. In preparing it I have reviewed the Patent Owner’s Response, the declaration of Dr. Katona (Ex. 2018), and the supplemental declaration of Dr. Katona (Ex. 2025). I have also considered all of the materials referenced in my original declaration. My opinions are based on my education, training, experience in developing and commercializing light sources, the materials I have reviewed, and the knowledge and perspective of a person of ordinary skill in the art (“POSA”) as of the priority date of the ’302 Patent.

4. I apply the same level of ordinary skill in the art, the same understanding of the relevant technology, and the same standards I described in my original declaration (Ex. 1002, ¶¶ 5–77), which I incorporate by reference. My compensation is as stated in my original declaration and does not depend on the outcome of this proceeding. The opinions in my original declaration remain my opinions, and nothing in the Patent Owner’s Response or in Dr. Katona’s declarations has resulted in altering my opinions in any way. This declaration addresses the specific technical points identified below and does not restate the entirety of my original analysis.

II. THE COMBINATION OF EDWARDS AND SADWICK (GROUND 1)

A. A Person of Ordinary Skill Would Have Been Motivated to Use Phosphor-Converted White LEDs in Place of Edwards’ Remote Wavelength Conversion Component

5. Patent Owner and Dr. Katona contend that a POSA would not have combined Edwards with Sadwick because doing so would remove the purported benefits of Edwards’ separate wavelength conversion component, including the use of a single type of LED in both strings, improved spatial uniformity or fill and reduced heat at the LED die. Ex. 2018, ¶¶ 69–72; POR 20–24. I disagree with both the patent Owner and Dr. Katona, and the history of LED development shows clearly that the positions of both are incorrect.

6. As Dr. Katona is undoubtedly aware, the first white LEDs, consisting of a blue LED die coated with a yellow phosphor, was introduced commercially by the Nichia Corp. (Japan) in 1996, well before the priority date. Although the quality of the white light produced by combining yellow light (generated by the yellow phosphor) with blue light emanating from the LED chip (die) left something to be desired, the cost-saving achieved by mixing the phosphor with silicone or epoxy and applying this mixture directly onto the LED die was enormous. Indeed, the literature at that time (and since) universally refers to this development as a “milestone” in commercial lighting. Contrary to the opinions expressed by the Patent Owner and Dr. Katona, all POSAs quickly recognized that this integrated LED structure was the future of white LEDs for many (but not all) applications, but particularly for those white LEDs incorporated into “strings” and other linear arrangements of white LEDs.

7. Consequently, the suggestion that a POSA would not, by the Priority Date, have recognized the benefits of simply introducing the integrated, blue die/phosphor LEDs of Nichia (and other manufacturers) into the lighting structures of Edwards is to do a disservice to the POSA. Any person of average skill in the art, and particularly a person who had worked in the lighting industry before the priority date, would immediately recognize the benefits to commercial and residential lighting, in particular, of phosphor/blue die LEDs with respect to cost

and brightness, for example. The latter is the result of the proximity of the phosphor to the LED's emitting surface.

8. A POSA would have immediately recognized that the cost and manufacturing advantages of these widely-publicized integrated white LEDs outweigh the asserted benefits of Edwards' remote conversion component for the majority of commercial linear fixtures, specifically. At a minimum, a POSA would recognize numerous applications for which integrated phosphor/die LEDs (the industry standard for many years) would be superior to the physical separation of the phosphor(s) from the LED die, and particularly those applications in which manufacturing and product costs are preeminent.

9. As described above and in my original declaration, integrated phosphor/die LEDs dominated the commercial and residential lighting markets (Ex. 1002, ¶¶ 76–77) when Edwards was published and thereafter.

10. Both arrangements, a phosphor in physical proximity to the die (*i.e.*, mixed with silicone or epoxy and applied to the die surface) or a phosphor separated by a short distance from the die, produce white light having a specific color temperature by the same physical mechanism. The light from a blue LED irradiates a phosphor which then converts a portion of the blue light to longer wavelengths (green, yellow, orange, or red), and the combination of the unconverted blue light and the phosphor emission is perceived by the human eye as

white light of a particular correlated color temperature (CCT). The only significant difference between these two design approaches is the physical location of the phosphor, and both have specific advantages. The advantages of positioning the phosphor in close proximity to the blue LED die have already been discussed above, but it should be mentioned that the “remote” positioning of phosphor(s) also has advantages in other applications. One example is an optical device in which it is desired to have each blue LED in an array “address” a single phosphor in a small array of phosphors. Such a situation can be encountered in the design of full-color displays. My point is that a POSA is well aware of the merits of situating a phosphor, or multiple phosphors, directly in contact with a blue LED chip or separating one or more phosphors at a distance from the blue LED chip. This is a design decision best left with the POSA.

11. The fact that on-die phosphor, white LEDs are the predominant light source in commercial and residential lighting is itself strong evidence that Edwards’ remote arrangement is neither necessary nor essential to a high-performance linear lighting fixture. The vast majority of commercial LED luminaires, including troffers, linear strips, downlights, and tubes, are constructed with integrated phosphor/die, white LEDs, and a POSA designing a tunable linear fixture was well aware of the fact that white LEDs of selected CCT values were available off-the-shelf from numerous vendors and were manufactured as high-

volume, commodity products . Therefore, substituting two strings of standard white LEDs , each having a different value of CCT as taught by Sadwick, for Edwards' blue LEDs and remote phosphor is a straightforward design choice that significantly reduces cost and, at the same time, employs fewer custom parts.

12. As discussed above, the principal advantage of placing the phosphor at the die is cost. A separate, integrated wavelength conversion component of the type described by Edwards is a custom optical part that must be designed, fabricated, coated with phosphor, aligned to the LED arrays, and assembled into each fixture. A phosphor-converted white LED, by contrast, is a self-contained commodity component in which the phosphor is already integrated by the LED manufacturer. Building a fixture from commodity white LEDs eliminates the separate conversion component along with its tooling, alignment, and assembly steps. A POSA seeking to manufacture a tunable linear fixture at commercial scale and cost would have been motivated to use the commodity white LEDs of Sadwick for this reason.

13. Dr. Katona states that Edwards has the advantage of both strings using a single type of LED, because color temperature is set by the conversion component, whereas Sadwick requires LEDs of at least two different CCTs that must be “binned” and color-matched. Ex. 2018, ¶ 69. In my opinion, the point Dr. Katona raises is a minor one because all LEDs are routinely binned (*i.e.*, tested and

assigned a “bin” based on emission wavelength or another characteristic) after manufacturing. For LEDs manufactured for the lighting market, individual white LEDs emerging from production are tested for CCT with an instrument known as an integrating sphere and placed into a specific “bin”, assigned by the LED manufacturer for those LEDs having CCT values in a narrow range. Subsequently, a lighting luminaire manufacturer simply orders from the LED manufacturer the LEDs having the desired value of CCT (*i.e.*, the design “spec”). Consequently, procuring warm-white LEDs of one CCT value and cool-white LEDs of another CCT value is routine practice and is exactly what Sadwick describes - namely a string of 2200 K warm white LEDs and a string of 6500 K cool white LEDs. Ex. 1006, ¶ 0194. Therefore, manufacturing lighting luminaires requiring two (or more) values of CCT requires no special manufacturing capability on the part of the manufacturer. Most importantly, the cost ramifications of employing two or more values of LED CCT are insignificant, and do not offset the savings from eliminating the custom conversion component.

14. The asserted benefit that the remote phosphor improves spatial uniformity and “fill,” and reduces the appearance of individual LED “points,” is a quality-of-light consideration that is routinely addressed in commercial fixtures by a simple diffuser or the spacing between the LEDs. Most interior linear luminaires already include a diffuser or lens, and a diffuser placed over a string of white LEDs

produces spatially uniform light without the need for remote phosphor. The remote conversion component is, therefore, not necessary for generating light having spatial uniformity acceptable in many residential and commercial applications such as high-bay lighting.

15. Dr. Katona expresses the opinion that placing the phosphor at the die increases the thermal load at the LED because of conversion and Stokes losses, whereas a remote phosphor removes the heat from the die. Ex. 2018, ¶ 71. It is true that the removal of heat from an LED is made a bit more challenging by the positioning of the phosphor/silicone or epoxy mixture on the top (emitting) face of the LED die. However, it must be remembered that this (typically) dome-shaped mixture is quite small and presents only a minor perturbation for the thermal engineering of the LED. The truth of this statement is attested to by the enormous commercial success of mounting white LEDs on standard heat sinks so that heat is removed primarily through the bottom face of the LED die. Other steps that have been taken to efficiently remove heat from white LEDs include mounting the LEDs on a metal-core printed circuit board or other substrate such as polycrystalline alumina and spacing the LEDs appropriately along the linear array. In short, the issue posed by Dr. Katona has proven to not be an impediment at all in the design and low-cost manufacturing of white LEDs. One indicator of the success of the manufacturing community in solving this and many other issues is

that, as mentioned earlier, the phosphor for each white LED is embedded in either silicone or epoxy. The low melting points of both of these transparent “hosts” are well known. The fact that these phosphor/polymer domes do not melt in commercial operation is a testimony to the success of the industrial engineering of white LEDs at low cost. It is also a tribute to thermal engineers who have solved much greater thermal challenges in commercial light source manufacturing such as the removal of heat from arrays of semiconductor lasers. Thus, while the thermal benefit of Edwards’ remote arrangement is a convenience, it is far from a necessity and its loss does not prevent a POSA from building a successful lighting fixture with phosphor/die, white LEDs.

16. Accordingly, for these reasons a POSA would both be motivated to combine Sadwick with Edwards and have a reasonable expectation of success.

17. The Patent Owner correctly notes that Edwards and Sadwick employ electronic circuits for providing electrical current to strings of LEDs, several of which differ. POR 24–25. However, the Patent Owner is incorrect in suggesting that attempts by a POSA to combine Edwards and Sadwick would lack a reasonable expectation of success, at least partially because of a difference in driving circuits chosen by Edwards and Sadwick.

18. However, the Patent Owner appears to have overlooked at least one of the approaches Edwards presents for providing current to two or more LED arrays.

For example, Figs. 5 and 6 of Edwards are concerned with resistive networks for “splitting” the electrical current provided by a voltage or current source. In the parlance of electrical engineering, such circuits are generally known as “current dividers”. In Fig. 7, however, Edwards introduces an alternative embodiment where the current divider circuit based on pulse width modulation (PWM) which is an electronic method for delivering current to a load (one or more strings of LEDs) in current pulses of adjustable temporal width. This alternative approach is similar to Sadwick’s and would teach a POSA that the driver circuits of Sadwick and Edwards are easily interchangeable. It is, therefore, difficult to understand Dr. Katona’s reluctance to combine Edwards and Sadwick. Accordingly, this is another reason that a POSA would have a reasonable expectation of success in combining Edwards and Sadwick.

19. Several of the statements made by Dr. Katona must be challenged, of which only a few are discussed here. On p. 20 of his Supplemental Report, for example, Dr. Katona states (in reference to Fig. 5 of Edwards):

“I also note that the circuit of Fig. 5 is inefficient because both of the potentiometers 33 and 31 convert at least a portion of the input power to heat.”

20. This is an astounding statement. One of the foundational principles of engineering is that *every* optical, electronic, and mechanical device or system devised in the history of technology “convert[s] at least a portion of the input

power to heat.” This is why internal combustion machines, electric motors, and a myriad of technological systems require air or water cooling. A more recent example is the data centers being established throughout the United States and the enormous amount of water required for cooling. Every LED ever made in the past, or in existence today, dissipates heat and all POSAs are acutely aware of the imperative for the rapid and efficient removal of power from the device. No device or system has an efficiency of 100%, and I am confident that Dr. Katona is well aware of this fundamental truth in engineering, physics, and technology.

21. Additionally, while I also believe that it would be obvious and straightforward to modify Edwards to use Sadwick’s driver circuit, one could substitute Sadwick’s commodity white LEDs for Edwards’ blue LEDs and remote conversion component without also adopting Sadwick’s particular current-control circuit. Edwards’ own color temperature control, in which the relative drive currents to the two LED strings are varied to set the CCT, operates the same way whether the strings are blue LEDs with a remote phosphor or phosphor-converted white LEDs. Ex. 1005, 13:35–42; 14:10–19. A POSA replacing the LEDs could retain Edwards’ control approach and would have a reasonable expectation of success, because both references set a target CCT by mixing light from a warm string and a cool string.

B. Edwards' Color Temperature Switch and Sadwick's Current Splitter Each Couple Current to the First Plurality of LEDs, the Second Plurality of LEDs, or Both

22. Dr. Katona states that Edwards' variable resistor 31 is "always in contact with both LED strings 21a and 21b" and that current is therefore "continually coupled to both," so that Edwards purportedly cannot couple current to only the first plurality or only the second plurality as the claim's "or both" language permits. Ex. 2025, ¶¶ 56–57; POR 29–30. This opinion overlooks Edwards' express disclosure that the drive current to a set of LEDs may be reduced to zero, that is, turned off.

23. Edwards describes setting the CCT by adjusting the relative drive currents I_A and I_B to the first and second LED arrays, and it describes the limiting case in which an entire set of LEDs is turned off. Edwards states that "the CCT of the emission product may correspond to a cool bluish white color when the entirety of the plurality of LEDs is turned on and shift towards a warm yellowish white color as the second set of LEDs ... are turned off." Ex. 1005, 12:6–20. When the color temperature control is moved to either end of its range, the current to one of the two strings is reduced to zero and the entire available current is delivered to the other string. A POSA would understand that at that setting current is coupled to only the first plurality of LEDs, with the second turned off, or to only the second plurality, with the first turned off, and that at intermediate settings current is

coupled to both. Edwards therefore couples current to the first plurality, the second plurality, or both, which is the full range recited by the claim. Ex. 1005, 12:6–20; 13:35–42.

24. That the resistor 31 remains physically connected to both branches of the circuit does not change this analysis. The limitation is concerned with whether current is coupled to a given plurality of LEDs, not with whether a conductor is physically present. A string of LEDs carrying zero current is not being driven and emits no light, regardless of whether a wire remains attached to it. Edwards’ own description of “turning off” a set of LEDs confirms that the circuit delivers current to one string only when the other is off. Ex. 1005, 12:6–20. Coupling current to “both” pluralities, the remaining alternative recited by the claim, occurs at every intermediate setting of the control. The variable resistor 31 thus performs precisely the coupling recited by the claim. Ex. 1005, 14:10–19.

25. Patent Owner additionally argues that Sadwick’s current splitter “never couples both banks ... at the same time” because it is time-divided, alternately lighting one bank and then the other, and he reads “or both” to require current at the two pluralities at the same instant. POR 31. I disagree with that reading of how the circuit functions. Sadwick’s 2-channel current splitter rapidly alternates current between the two banks of LEDs, and the rate of alternation is

high enough that an observer perceives steady, continuous light from each bank.

Ex. 1006, ¶ 0194.

26. A POSA would understand that, over any time interval relevant to operation of the luminaire, meaning any interval long enough to perceive light, the time-division splitter delivers current to both banks of LEDs. The splitter switches between the two banks many times within each such interval, so that within the interval each bank receives a share of the current set by the duty cycle. Ex. 1006, ¶ 0194. The net effect is that current is apportioned between, and supplied to, both pluralities of LEDs, producing a blended CCT between the warm white and cool white values. Ex. 1006, ¶ 0194. By selecting the duty cycle, the same circuit can also deliver current to only one bank, at a 100 percent duty cycle to that bank, or to both banks at any intermediate duty cycle. Sadwick's splitter therefore couples current to the first plurality, the second plurality, or both. A requirement of literally simultaneous, instantaneous current in both strings would not reflect how a POSA evaluates a time-multiplexed LED drive, in which the perceived and time-averaged light output is what matters.

C. A Second Edwards Fixture Connected in Series Necessarily Produces the Same Color Temperatures as the First Fixture (Element 1[h])

27. Dr. Katona states that “[t]hat fixtures can be connected in series does not mean that they will have matching color temperatures,” and that Edwards is

“silent on matching the color temperature between adjacent connected linear lights.” Ex. 2018, ¶¶ 89–90; POR 33. I disagree. A POSA would understand that two Edwards linear lamps 1300, connected in series, necessarily produce light at the same first and second color temperatures, because those color temperatures are fixed by the internal construction of each lamp and not by the lamp’s length.

28. In Edwards, the CCT produced by a string of LEDs is determined by the emission wavelength of the LEDs and the composition of the corresponding region of the wavelength conversion component, that is, the phosphor or phosphor mixture and its concentration. Ex. 1005, 11:1–18; 6:8–21. Edwards states that the CCT of the emission product is a combination of the CCT contributions of the light generated by the LEDs and of the first and second regions of the conversion component. Ex. 1005, 11:13–18. None of these quantities, namely the LED wavelength, the phosphor composition, and the phosphor concentration, depends on how long the lamp is. A one-foot lamp and a six-foot lamp built to the same design contain different numbers of the same LED-and-phosphor units arranged along the linear body, and each unit produces the same CCT in the short lamp as in the long lamp.

29. Edwards discloses a single internal construction for its linear lamp 1300, comprising the body 1301, the LED arrays, and the wavelength conversion component, and then states that “[i]ndividual linear lamps 1300 may range from 1

foot to 6 feet in length.” Ex. 1005, 15:46–60. A POSA would understand that lamps of different lengths made to that same construction use the same LED arrays and the same wavelength conversion component, and therefore produce light at the same first and second color temperatures. The “third light having the first color temperature” and the “fourth light having the second color temperature” recited for the additional fixture in element 1[h] correspond, respectively, to the first and second color temperatures of the first fixture. Ex. 1005, 15:46–60; 11:1–18.

30. As a practical matter, a POSA connecting linear lamps in series to illuminate a continuous run would require that the connected lamps match in color temperature, because a visible mismatch between adjacent fixtures in the same run would be objectionable. The straightforward way to achieve a match, and the way a POSA would adopt, is to use lamps of the same internal construction, with the same LED arrays and the same conversion component, which is what Edwards discloses. Connecting a one-foot and a six-foot lamp of the same construction yields matched color temperatures by design. Dr. Katona’s concern that mismatched fixtures “will look mismatched and off-putting” (Ex. 2018, ¶ 89) is therefore a reason a POSA would understand matching color temperatures to be present.

D. Edwards Discloses Coupling A Linear Fixture To An Additional Linear Fixture Of A Different Length Differing By A Scale Factor (Elements 1[h], 10[i], And 18[m])

31. Patent Owner argues that Edwards does not teach connecting linear lamps of different lengths, asserting that it is “equally possible to use two lamps of the same length.” POR 32–33. I disagree. In my opinion, Edwards discloses connecting linear lamps of different lengths in series, and a person of ordinary skill in the art (“POSA”) reading Edwards would understand it to disclose a linear lamp configured to electrically couple to an additional lamp of a different length, as elements 1[h], 10[i], and 18[m] require.

32. Edwards discloses a linear lamp 1300 with an electrical connector and a complementary socket that couple lamps in series. Edwards states that the case 1307 “may further comprise an electrical connector 1309 (e.g., plug) extending past the length of the body 1301 on one end, and a recessed complimentary socket ... configured to receive a connector on another end,” and that “[t]his allows several linear lamps 1300 to be connected in series to cover a desired area. Individual linear lamps 1300 may range from 1 foot to 6 feet in length.” Ex. 1005, 15:46–60. In a single passage, Edwards discloses a connector that couples lamps in series, that the connected lamps are available in a range of lengths from one to six feet, and that the purpose of connecting them is to cover a desired area.

33. The connector 1309 and complementary socket disclosed by Edwards are not specific to any particular lamp length. The same connector mates the end of one lamp to the end of the next regardless of the length of either lamp. Edwards therefore discloses a linear lamp that is “configured to electrically couple to an additional linear LED lighting apparatus having a second length different than the first length,” because the disclosed connector couples a lamp of one of the available lengths to a lamp of any other available length. Ex. 1005, 15:46–60.

34. A POSA reading Edwards’ disclosure that lamps “rang[ing] from 1 foot to 6 feet” are “connected in series to cover a desired area” would understand Edwards to disclose connecting lamps of different lengths. The lengths of real areas to be covered are, as a general matter, not whole-number multiples of any single available lamp length. To cover a desired area end to end with lamps drawn from the disclosed one-to-six-foot range, the lamps connected in series will in general be of different lengths, because a single repeated length spans only those areas that happen to be an exact multiple of that length. Edwards’ disclosure of a range of available lengths, connected in series to cover a desired area, is thus a disclosure of connecting lamps of different lengths. If Edwards intended that only a single length ever be connected, there would be no reason for Edwards to disclose lamps in a range of lengths. Ex. 1005, 15:53–60.

35. Dr. Katona asserts that “in most general lighting applications a desired area can be covered with only 4ft linear lamps connected in series.” Ex. 2018, ¶ 88. That is correct only for the subset of areas whose length is an exact multiple of four feet. Edwards is not limited to four-foot lamps; it expressly discloses lamps “rang[ing] from 1 foot to 6 feet.” Ex. 1005, 15:58–60. For an area that is not a multiple of four feet, the four-foot lamps Dr. Katona describes would leave a gap or an overhang at the end of the run, and Edwards’ disclosure of lamps in a one-to-six-foot range supplies the shorter lamp needed to complete the run. Dr. Katona’s further statement that lamps of differing length are connected “when very specific lighting effects are desired” (Ex. 2018, ¶ 88) confirms that Edwards’ disclosure encompasses connecting lamps of different lengths.

36. Two lamps of different lengths connected by Edwards’ connector differ in length by a scale factor equal to the ratio of their lengths. For example, a six-foot lamp connected to a four-foot lamp differ by a scale factor of 1.5, and a six-foot lamp connected to a two-foot lamp differ by a scale factor of three. Edwards’ disclosure of connecting lamps selected from a one-to-six-foot range in series to cover a desired area therefore discloses coupling an additional fixture “having a second length different than the first length by a scale factor,” as recited in elements 1[h], 10[i], and 18[m].

III. THE COMBINATION OF EDWARDS, SADWICK, AND JESWANI (GROUND 2)

A. The Discrete, Labeled Switch Positions Disclosed by Jeswani Provide Practical Convenience to the User

37. Dr. Katona and Patent Owner argue that substituting the multi-position switches of Jeswani for Edwards' continuously variable resistor 31 would "provide less precise control of the relative currents between the two LED strings, so it would actually be a less useful circuit," and that a POSA may prefer a circuit with a "compact potentiometer" over physical switches. Ex. 2025, ¶¶ 62–63; POR 42. In my opinion this has the trade-off backwards for the use at issue, and it overlooks the practical advantages of discrete, preset color temperature settings.

38. A continuously variable control, such as Edwards' potentiometer, allows a setting to be placed anywhere along its range, but it does not itself indicate which setting corresponds to a particular color temperature, and it does not allow the user to return reliably to a specific CCT. Discrete, labeled positions of the kind disclosed by Jeswani solve both problems. Jeswani discloses a CCT switch with selectable positions labeled with specific color temperatures, such as 3000 K, 3500 K, and 4000 K. Ex. 1007, 11:23–45; Fig. 1B. A user selecting a labeled position obtains a known, repeatable color temperature directly, without judging an unmarked dial position by eye and without re-tuning the fixture each time. For most general lighting uses, in which the user wants a standard color

temperature rather than an arbitrary intermediate value, this repeatability and labeling is more useful, not less.

39. The asserted loss of “precise” intermediate settings is of little practical consequence for selecting color temperature. Commercial color-tunable fixtures are commonly offered with a small number of preset CCT values corresponding to the color temperatures users actually request, for example 2700 K, 3000 K, 3500 K, 4000 K, and 5000 K. A POSA would recognize that providing those standard values as discrete, labeled positions matches the way these products are specified and used, and that the ability to set a non-standard CCT between the presets is rarely needed. Jeswani’s switches also achieve the same coupling that Edwards’ control achieves. As Jeswani describes, the end positions energize one string or the other, and an intermediate position mixes light from both strings. Ex. 1007, 11:23–45. The discrete switch therefore provides the same coupling to the first plurality, the second plurality, or both, while adding the convenience of repeatable presets.

40. Patent Owner’s argument that a POSA may prefer “a compact potentiometer” does not establish that a POSA would decline to use Jeswani’s switches; it establishes only that more than one option exists. Both Edwards and Jeswani provide user controls for brightness and CCT, and a POSA choosing between a continuous dial and a set of labeled preset positions would choose based on the desired user experience. Jeswani shows that its switches can be mounted

compactly, seated in receptacles in the lamp housing and flush with its surface. Ex. 1007, Figs. 1A–1B. A POSA seeking simple, repeatable, labeled CCT selection on the fixture would have been motivated to use Jeswani’s discrete switch design, and would have had a reasonable expectation of success because adding preset switch positions to a current-steering control of the kind in Edwards uses only well-known switch components.

IV. THE COMBINATION OF MAY AND JESWANI (GROUND 3)

A. A Person of Ordinary Skill Would Have Been Motivated to Add Jeswani’s On-Fixture Controls to May’s Lighting System

41. Dr. Katona and Patent Owner argue a POSA would not add Jeswani’s on-fixture switches to May because May is directed to networked, Power-over-Ethernet (PoE) control, because May addresses power and network interruptions in other ways through a UPS module and a default condition, and because reaching ceiling-mounted fixtures to adjust a switch would be impractical. Ex. 2018, ¶¶ 116–132; POR 44–51. In my opinion, on-fixture manual controls supplement, rather than replace, May’s networked control, and a POSA would have recognized several technical reasons to provide them.

42. The proposed combination places Jeswani’s brightness and CCT controls on the housing of May’s lamp and routes their settings to May’s existing control module as an additional source of control input. May’s control module continues to receive illumination control packets over Ethernet, continues to drive

the LED strings through its driver sub-circuits, and continues to provide the PoE, networking, and UPS functions that May describes. Ex. 1008, ¶¶ 0222, 0231. The on-fixture controls are an added input path. Adding them does not disable or remove the networked path.

43. On-fixture manual controls provide function that networked control alone does not. They allow a fixture to be set and checked locally during installation and commissioning, before the network is configured or addressed. They allow a single fixture to be operated, tested, or overridden locally by an installer or technician without access to the central management system. They allow the fixture to be used where no network controller is present or where the network is temporarily unavailable. These are ordinary, recognized reasons to provide a local control in addition to a networked one, and they do not depend on the failure scenarios that Dr. Katona addresses.

44. May confirms that manual switch inputs are useful within its own system. May describes networking manually-operated light switches into the system, upon activation of which the processor signals the power control module to turn an LED array on or off. Ex. 1008, ¶ 0215. May thus already contemplates that a manually-operated switch can serve as an input that the control electronics act upon. A POSA reading May would understand that providing such a manual input

at the fixture itself, in the form of Jeswani's brightness and CCT switches, is consistent with, and a small extension of, what May already discloses.

45. Jeswani is not limited to local control. Jeswani discloses that its downlight may be controlled both by switches on the housing and remotely, including by a remotely mounted dimming wall switch and by a communication module supporting wired or wireless protocols such as Ethernet, Wi-Fi, Bluetooth, or Zigbee. Ex. 1007, 9:47-58; 14:32-59; 15:1-12. Jeswani therefore teaches a POSA that on-fixture controls and remote or networked control are complementary and may coexist on the same fixture. That teaching directly supports adding Jeswani's on-fixture controls to the networked system of May.

46. Dr. Katona argues that accommodating the local switches would require the control module to execute additional code and would thereby change May's principle of operation. Ex. 2018, ¶¶ 125-132. Accepting an additional control input does not change how May's control module operates. The control module is already a programmable device that receives instructions and sets the drive currents to the LED strings accordingly. Ex. 1008, ¶¶ 0222, 0231, 0233. Whether an instruction originates from an Ethernet packet or from the position of an on-fixture switch, the control module performs the same function. It sets the brightness and CCT of the lamp by adjusting the currents to the LED strings. Adding a switch input is a routine addition of a known type of input to a

programmable controller and does not alter the PoE, networking, or UPS operation that May describes.

47. Dr. Katona's concern that a user would have to reach a ceiling-mounted fixture to operate a switch (Ex. 2018, ¶¶ 120, 122) does not negate the value of on-fixture controls. Many linear LED fixtures are installed where they are accessible, including in retail displays, under-cabinet and cove installations, work surfaces, and accessible drop-ceiling grids, and even ceiling fixtures are accessible during installation and maintenance. On-fixture controls are most often used at installation and commissioning, when the installer is already at the fixture. In any event, the on-fixture control is an additional option, and its presence does not prevent the user from continuing to use May's networked control for routine operation. That one control path is convenient for some situations does not make the other control path useless for the situations I describe.

B. May's Control Module Outputs a Plurality of Currents and Couples Current to the First Plurality of LEDs, the Second Plurality of LEDs, or Both (Elements 1[d], 1[f], 1[g])

48. Patent Owner and Dr. Katona argue that May cannot meet these limitations because each of May's driver sub-circuits independently drives one LED string, so that "one current output by one driver sub-circuit will never be provided to two LED emitter strings." Ex. 2018, ¶¶ 139–142; POR 52–56. This

argument depends on reading the claimed “driver circuit” to be a single sub-circuit. That is not how May’s circuit is built, and it is not what the claim requires.

49. In May, the relevant driver circuit is the control module 1132 as a whole, which includes the parallel driver sub-circuits within it. May describes that the control module “include[s] circuitry to isolate power and data delivered via a network cable,” that “[t]he power is converted to a voltage sufficient to drive the LED emitters,” and that “the power directed to individual strings of LED emitters is governed by one or more parallel driver sub-circuits of the control module.” Ex. 1008, ¶ 0222. The control module thus receives a single supply of power at its input, converts it, and then distributes and apportions that power to the individual LED strings through its parallel driver sub-circuits. The driver sub-circuits are components within the control module, not separate driver circuits.

50. Because the power entering the control module is divided among the parallel driver sub-circuits, the current supplied at the input of the control module is coupled, through those sub-circuits, to the LED strings. May expressly describes driving both strings at once: “If drive currents are provided to both strings of emitters of each board, the lamp will produce light having a CCT somewhere between 4500 K and 6500 K, depending on the relative magnitude of the drive current of each LED emitter string.” Ex. 1008, ¶ 0231. May also describes driving only one string, stating that if a drive current is provided only to the second emitter

string the lamp produces light of about 6500 K, and if a drive current is provided only to the first emitter string the lamp produces light of about 4500 K. Ex. 1008, ¶ 0231. The control module therefore couples current to the first plurality, the second plurality, or both, which is the range recited by the claim.

51. The claim recites a driver circuit “configured to output a plurality of currents” (element 1[d]) and a switch that causes “the one of the plurality of currents to couple to the first plurality of LEDs, the second plurality of LEDs, or both” (element 1[g]). It does not require that a single wire or a single sub-circuit carry current to two strings simultaneously. May’s control module, taken as the driver circuit, outputs a plurality of currents through its parallel sub-circuits and couples those currents to the first string, the second string, or both, exactly as recited. Ex. 1008, ¶¶ 0222, 0231. Dr. Katona’s own description confirms this. He states that “the control module 1132 ... determines the appropriate drive current to provide to each LED emitter string” and “specifies two currents to be provided to two corresponding LED emitter strings.” Ex. 2018, ¶ 142. That is the function of a driver circuit that outputs a plurality of currents and couples them to the first plurality, the second plurality, or both.

52. Adding Jeswani’s switch does not change May’s circuit. In the proposed combination, Jeswani’s CCT switch supplies an input to May’s control module that specifies the desired color temperature, and the control module then

sets the drive currents to the two strings accordingly, as May already describes.

Adding Jeswani's switch as an input does not require connecting two strings to one sub-circuit and does not modify the internal sub-circuit architecture of May's control module. The coupling of current to the first plurality, the second plurality, or both is performed by May's control module in the manner May discloses, and Jeswani's switch simply selects which of those outcomes the control module produces. Ex. 1008, ¶ 0231.

C. A Second May Fixture Connected in Series Necessarily Produces the Same Color Temperatures as the First Fixture (Element 1[h])

53. Dr. Katona argues that May does not teach connecting fixtures of different lengths with matching color temperatures, and that if two connected fixtures had different color temperatures the pair would look mismatched. Ex. 2018, ¶¶ 143–145; POR 57–58. As with Edwards, the color temperatures produced by a May lamp are fixed by the construction of its emitter boards and not by the length of the lamp, so two connected May lamps of the same design necessarily produce the same color temperatures.

54. In May, each lamp produces its two color temperatures using emitter boards that carry a first string of LED emitters of one color temperature, about 4500 K, and a second string of LED emitters of another color temperature, about 6500 K. Ex. 1008, ¶ 0231. The color temperature of each string is a property of the

LED emitters on the board, not of the overall length of the lamp. May describes its lamps in standardized nominal lengths of about 2, 3, 4, 6, and 8 feet. Ex. 1008, claim 40; ¶¶ 0204–0205. A POSA would understand that lamps of different nominal lengths built to the same design use the same emitter board configuration, with the same first and second strings of LED emitters in the same color temperature ranges, and that a shorter lamp simply has fewer emitter pairs along a shorter board.

55. Because the color temperatures are set by the emitter strings and not by the length, a two-foot May lamp and a four-foot or eight-foot May lamp of the same design produce light at the same first and second color temperatures. When two such lamps of different lengths are connected in series, the additional lamp produces “a third light having the first color temperature” and “a fourth light having the second color temperature” that match the color temperatures of the first lamp, as element 1[h] recites. Ex. 1008, ¶ 0231. A POSA arranging connected lamps to provide continuous, uniform illumination would select lamps of the same emitter design so that the color temperatures match along the run, which is the straightforward and expected practice. The possibility of a visible mismatch identified by Dr. Katona is therefore a reason a POSA would use matched lamps, not a reason the limitation is unmet.

D. May Renders Obvious Coupling A Linear Fixture To An Additional Linear Fixture Of A Different Length Differing By A Scale Factor (Elements 1[h], 10[i], And 18[m])

56. Dr. Katona argues that May does not suggest connecting fixtures of different lengths, because the example in May's Figure 22 uses identical four-foot lamps, and that a POSA would not be motivated to connect lamps of different lengths. Ex. 2018, ¶¶ 143–146; POR 57–58. I disagree. In my opinion, it would have been obvious to a POSA, in view of May, to couple a May lamp of one length to a May lamp of a different length, and a POSA would have been motivated to do so in order to span spaces whose dimensions are not multiples of a single lamp length. Unlike Edwards, which I address above as disclosing this feature, my opinion as to May is that the feature would have been obvious.

57. May discloses linear LED lamps in standardized nominal lengths of about 2, 3, 4, 6, and 8 feet, and discloses connecting multiple lamps end to end in series. Ex. 1008, claim 40; ¶¶ 0190–0191, 0204. May describes lamps “arranged end-to-end in series along a channel” of a ceiling grid and networked to one another by jumper cables, and states that “additional lamps may be similarly mounted ... and connected to each other.” Ex. 1008, ¶ 0190. May also teaches arranging the lamps “as desired to provide efficient lighting that meets the characteristics and needs of each particular application,” and that lamp placement “is not confined by the location of existing fixtures.” Ex. 1008, ¶ 0193. May thus

discloses lamps in a range of standard lengths and the means to connect any of them in series, but does not expressly state that two connected lamps are of different lengths.

58. It would have been obvious to a POSA to connect May lamps of different lengths, because spanning the spaces May is designed to illuminate generally requires it. The lengths of real spaces are, as a general matter, not whole-number multiples of any single available lamp length. To span such a space end to end using lamps drawn from May's standard set of 2, 3, 4, 6, and 8 feet, a POSA must in general combine lamps of more than one length, because a single repeated length spans only those runs that happen to be an exact multiple of that length. For example, an eleven-foot run cannot be spanned by any whole number of equal-length May lamps, because eleven is not a multiple of 2, 3, 4, 6, or 8, but it is readily spanned by an eight-foot lamp and a three-foot lamp. A POSA would likewise span an eighteen-foot run with two eight-foot lamps and a two-foot lamp, and a ten-foot run with a six-foot lamp and a four-foot lamp.

59. A POSA also had a practical reason to span a run with a small number of longer lamps plus a shorter lamp for the remainder, rather than with many short lamps of a single length, because using fewer, longer fixtures reduces the number of fixtures, the number of connections between them, and the installation labor. Ex. 1008, ¶ 0204. Following May's own instruction to arrange the lamps "as desired"

to meet “the needs of each particular application” (Ex. 1008, ¶ 0193), a POSA would therefore have been motivated to combine lamps of different lengths to span spaces whose dimensions are not multiples of a single length.

60. Dr. Katona relies on May’s Figure 22 example, in which a thirty-by-twenty-foot room is illuminated by fifteen four-foot lamps, to argue that May connects only same-length lamps. Ex. 2018, ¶ 144. Figure 22 is one illustrative example, and the dimensions in that example, rows of twenty feet, happen to be exact multiples of four feet, so that five four-foot lamps span each row. Ex. 1008, ¶ 0193. May presents Figure 22 as one arrangement, not as a limitation, and expressly states that the lamps may be arranged “as desired” to meet “the needs of each particular application.” Ex. 1008, ¶ 0193. A POSA would not have read the single example of Figure 22 to discourage connecting lamps of different lengths in applications whose dimensions are not multiples of a single length.

61. Dr. Katona acknowledges that May’s “replacement linear LED lamps ... could be of different lengths.” Ex. 2018, ¶ 145. Connecting May lamps of different lengths uses the same standardized lengths and the same series jumper-cable connection that May already discloses for connecting same-length lamps. Ex. 1008, ¶¶ 0190–0191, 0204. A POSA would therefore have been able to connect May lamps of different lengths with a reasonable expectation of success, and would have been motivated to do so to span spaces whose dimensions are not

multiples of a single lamp length. The two connected lengths differ by a scale factor equal to the ratio of their lengths; for example, an eight-foot lamp and a four-foot lamp differ by a scale factor of two. This renders obvious coupling an additional fixture “having a second length different than the first length by a scale factor,” as recited in elements 1[h], 10[i], and 18[m].

62. This modular approach, in which fixtures are produced in a few standard lengths and combined to fit spaces of different sizes, was the conventional way the field accommodated varying installation dimensions.

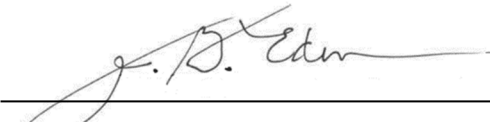
V. CONCLUSION

63. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

64. I hereby 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 1001 of Title 18 of the United States
Code.

Date: July 13, 2026



J. Gary Eden