

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LUMINEX INTERNATIONAL COMPANY, LTD.,

and MENARD, INC.,

*Petitioners**

v.

SIGNIFY HOLDINGS B.V.,

Patent Owner.

Case IPR2024-00101

U.S. Patent No. 10,299,336

**DECLARATION OF DR. J. GARY EDEN
IN SUPPORT OF PETITIONER'S REPLY**

* Menard, Inc. filed a petition and a motion for joinder in IPR2024-01469 and has been joined as a petitioner in this proceeding.

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UPDATED TABLE OF EXHIBITS

Exhibit No.	Description
1001	USP 10,299,336
1002	USP 7,014,336
1003	USP 10,234,091
1004	Eden Declaration
1005	CCT, Understanding the Basics
1006	USP 9,345,112
1007	FH of '336 Patent
1008	FH of '424 Provisional
1009	USP 9,820,350
1010	'336 Claim Charts
1011	USP 7,178,941
1012	USP 9,801,250
1013	USP 7,192,160
1014	Kay 2023
1015	USP 2,828,393
1016	USP 3,502,825
1017	'941 Patent Assignment
1018	3-17-23 Order setting status conference
1019	10-2-23 Scheduling Order
1020	9-26-23 Joint preliminary pretrial conference report
1021	FH of '062 Application
1022	FH of '141 Application
1023	USP 10,299,335
1024	Messing Declaration
1025	Order Granting Motion to Stay Pending IPR
1026	Signify's 10-25-23 RFPs to Luminex
1028	EH Series DPDT Toggle Switch
1029	Slide Switch 3 Position Locking

UPDATED TABLE OF EXHIBITS

Exhibit No.	Description
1030	USP 9,232,602
1031	3-13-25 Deposition Transcript of Dr. Michael Krames
1032	Globe Patent List
1033	US Publication 2010/0289044
1034	USP 8,933,644
1035	2-20-15 Osram Lightify Starter Kit Review
1036	Philips Lighting Catalogue 2015/16
1037	Advanced Lighting Technologies 2015/2016 LED Lighting Catalog
1038	Krames Teardown, SIGNIFYMNRD0018750
1039	Chromaticity Diagrams
1040	CIE 1931 color space
1041	Blackbody radiation for various temperatures
1042	IES Method for Determining Correlated Color Temperature (CCT) and Distance from the Planckian Locus of Light Sources
1043	Wien's displacement law
1044	Home Depot Website Listing for Globe Product No. 91479
1045	Home Depot Website Listing for Globe Product No. 91477

I. INTRODUCTION AND QUALIFICATIONS

1. I have been retained by Luminex International Company, Ltd. (“Petitioner”) to provide my opinion on the validity of U.S. Patent No. 10,299,336 (“the ’336 Patent,” Ex. 1001).¹

2. My qualifications were set forth in my original declaration. Ex. 1004, 2-7.

3. I explained why the ’336 Patent would have been unpatentable over grounds 1A, 1B, 2, and 3 in my original declaration, including the underlying legal principles. *See* Ex. 1004.

4. I understand from counsel that Patent Owner disagreed with some of my conclusions. Counsel asked me to opine on certain discrete topics, and I do so in the following paragraphs.

II. MATERIALS REVIEWED AND CONSIDERED

5. In forming the opinions in this Declaration, I reviewed the documents listed above in the table of exhibits from the perspective of a person of ordinary skill in the art (“POSA”) in the June 2018 and/or February 2016 timeframe.

¹ I have only been retained by, and am only offering these opinions on behalf of, Luminex. I have not been retained by Menard in this IPR.

III. CLAIMS 1-12 ARE UNPATENTABLE OVER GROUNDS 1A, 1B, AND 2

A. Chaimberg and Halliwell Each Discloses And/Or Renders Obvious The Switch Locations Recited In Claims 1, 7, And 11.

6. A recurring theme in my original declaration was the placement of the Correlated Color Temperature (“CCT”) switch. Ex. 1004, ¶¶ 126-127. I emphasized that the choice of switch location by an illumination or electrical engineer is, in practice, determined by the industrial, commercial, public, or residential application at hand. As an example, for luminaires to be installed in an office building or high-bay commercial building (such as a Walmart or an Amazon shipping facility) that are designed to produce light having one of two “daylight” CCT values (such as 4000 K and 4500 K), the CCT switches are likely to be installed in a junction or driver box or other inaccessible location. The reason, of course, is that accessibility is of low priority for this application. If the decision is made later to change the CCT for employee or customer comfort, technicians will make the change (as opposed to the user or luminaire customer). In a similar vein, luminaires to be installed in other commercial settings, such as a retail store, the CCT switches are also likely to be installed in an inaccessible location to prevent unauthorized individuals from tampering with the CCT value.

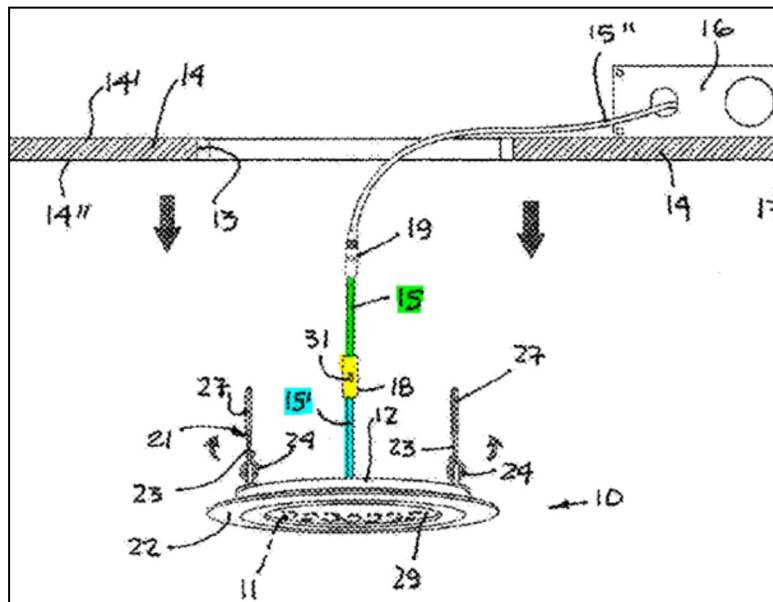
7. In other situations, such as restaurants or residential installations, the CCT switch will often be accessible to luminaire customers because one or more

changes in the CCT value are desired and the customer is willing to make the necessary change. Inserting a switch into the cable linking a junction box or power supply with a luminaire allows a commercial or residential customer to make a CCT change easily and quickly without the assistance (and expense) of an electrician or a technician. The placement of the CCT switch is a matter of design choice that rests with an electrical or illumination engineer and is based on practical considerations such as the location of the luminaire, and the desired level of accessibility.

i. Chaimberg

Claim 1:

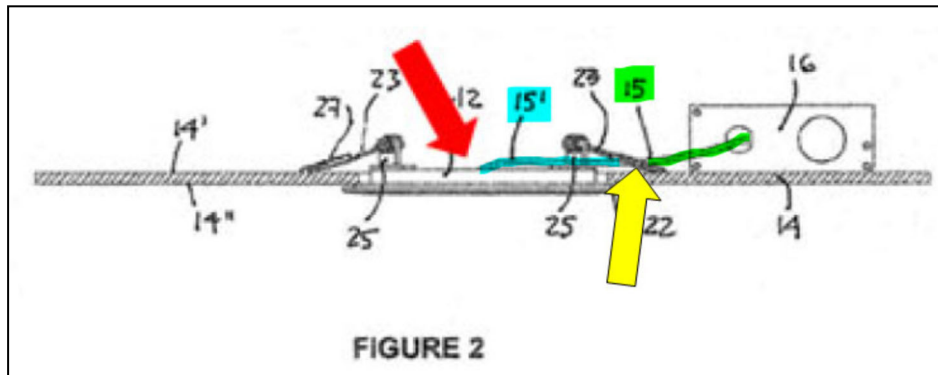
8. Figure 1 of Chaimberg, reproduced below, shows the location of the switch 18, highlighted in yellow, on the cable 15. Ex. 1003, Fig. 1.



Id., Fig. 1 (colors added).

9. Figure 1 shows the LED light fixture removed from its fixture mounting hole. *Id.*, 2:51-57. As seen above in Figure 1, the switch 18 is located above cable portion 15' (blue) and below cable portion 15 (green), remote from the housing 12.

10. Figure 2 shows the LED light fixture mounted in the fixture mounting hole. *Id.*, 2:58-60.



Id., Fig. 2 (annotated and colors added).

11. When the LED light fixture is mounted in the fixture mounting hole, as shown in Figure 2, the switch 18 would be hidden from view behind support 23, as shown by the yellow arrow. Because Figure 1 shows that the switch 18 is located between cable portion 15 and cable portion 15', both of which are located outside housing 12 in both Figures 1 and 2, it is clear that switch 18 is located outside housing 12. In other words, because the cable portions on either side of the switch 18 are located outside the housing 12, so is switch 18. Therefore, Chaimberg discloses that the switch is disposed remotely from the housing as recited in claim 1. As shown in Chaimberg, the switch 18 is situated external to the housing 12. It

is my understanding, therefore, that no dispute exists with regard to the requirement that the switch of Claim 1 must be remote. That is, Chaimberg's switch must be regarded as being remote from the housing 12, even if it is touching the light fixture housing. *See* Ex. 1031, 69:17-20 ("If the switch was as shown here, an external element but touching the light fixture housing ... it would be remote.").

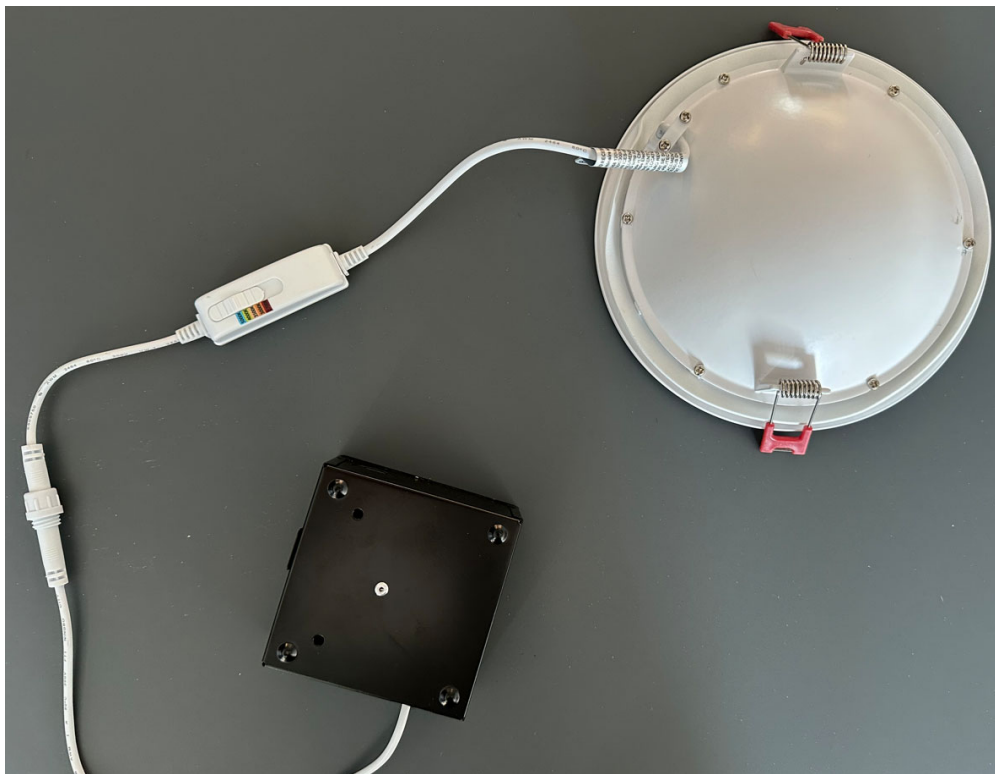
12. Moreover, I disagree with Dr. Krames's suggestion that Chaimberg's switch 18 must be located within the housing upon installation. Even if Figs. 1 and 2 of Chaimberg are assumed to show every important component of the light fixture, then the switch 18 is located a distance from the housing, in the vicinity of 15 in Fig. 2. It is my understanding that Dr. Krames agreed to the statement: If the switch is located at position 15 in Fig. 2, then it is remote. *See* Ex. 1031, 55:2-7 ("position 15, that particular location in figure 2, is remote from the light fixture housing."). Finally, Globe Electric Company, Inc. (the assignee of Chaimberg) manufactures a number of LED Recessed Luminaires (sold through Home Depot) that embody Chaimberg's claims. I have inspected two of these products: Globe Product Nos. 92291 and 91458. Both light fixtures match the description and figures of Chaimberg. Indeed, both products feature a CCT switch inserted into a cable and separated from the luminaire (*i.e.*, remote from the housing), as shown in the images below. Furthermore, the switch offers the selection of five CCT values: 2700 K, 3000 K, 3500 K, 4000 K, and 5000 K. The end of the CCT switch away from the

luminaire housing is electrically connected to cable which connects to the power source.

Globe Product No. 92291

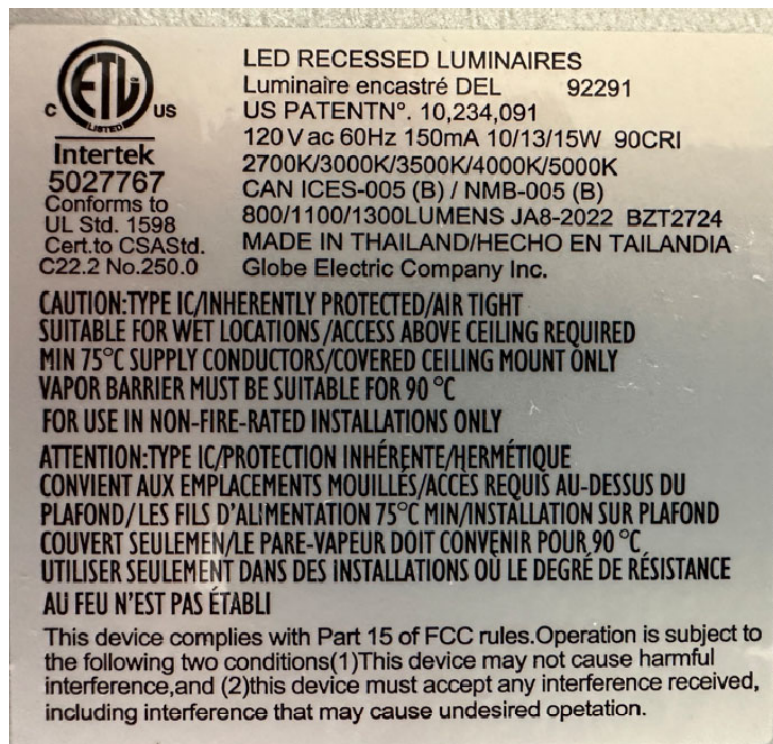
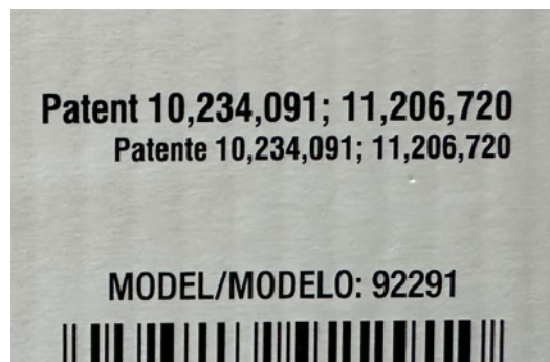


Globe Product No. 91458



13. In fact, the label affixed to the rear of Globe Product No. 92291 (Home Depot SKU 1011 584 884) is marked with the number of the Chaimberg Patent (10,234,091), as shown by the photographs given below. Both products are listed in Globe's patent marking website as practicing the Chaimberg patent. Ex. 1032. As shown below, the back of the luminaire housing for Globe Product No. 92291 is even marked with Chaimberg's patent number.

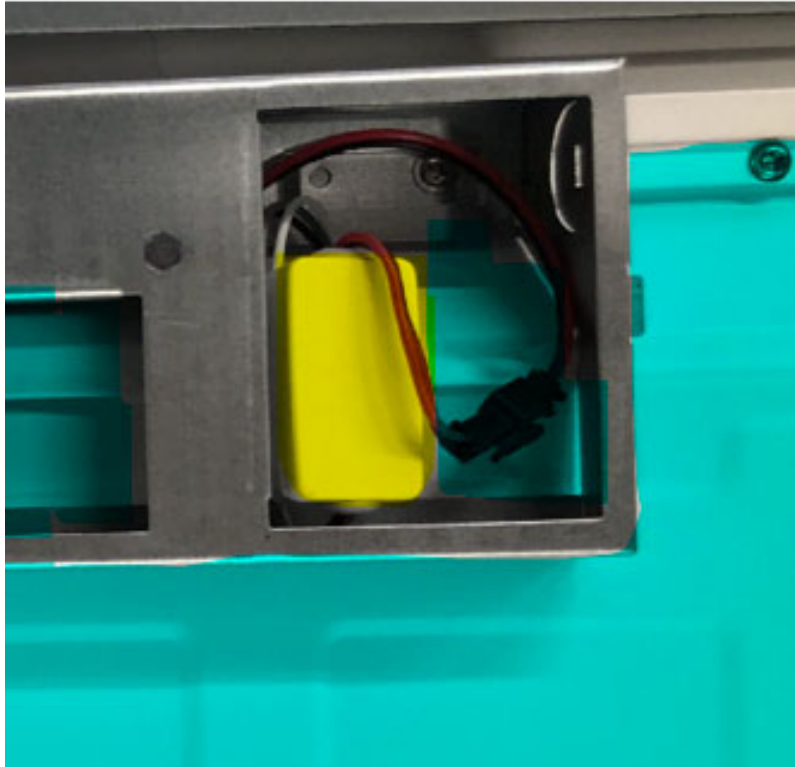
Globe Product No. 92291



14. The fact that Chaimberg's light fixture has been commercialized and the products prominently feature a CCT switch with five positions further confirms my opinion that Chaimberg anticipates and/or renders obvious claim 1. Furthermore, I measured the length of the cable separating the CCT switch from the housing (metal structure shown in the above figure) of Globe Product No. 91458 to be 8", whereas the diameter of the luminaire housing is 5 3/4" (approximately 15 cm), or 7" (approximately 17.8 cm) if one includes the white plastic ring that mounts flush to the ceiling. In either case, the length of the cable positions the CCT switch well outside the luminaire and its mount. However, even if Chaimberg did not anticipate claim 1, it would have been obvious for a POSA to slightly lengthen the piece of cable between the light fixture housing and the switch to ensure that the switch lays just outside of the housing upon installation—which Dr. Krames agrees would practice claim 1. This is precisely what we see with the two Globe Products examined. *See* Ex. 1031, 54:19-55:7. I also note that Globe began selling products embodying Chaimberg at least as early as October 2018 (if not earlier); indeed, one Globe SKU received a Home Depot Innovation award in 2019. *See* Ex. 1044 (Home Depot website listing including Innovation Award for 2019); Ex. 1045 (Home Depot website listing including customer reviews as early as October 2018). This confirms that the implementation of Chaimberg is not new, it was completed around the time Chaimberg was filed.

15. If Chaimberg's switch were mounted on the junction box—which Chaimberg identifies as the usual location—the switch would be remote and therefore invalidate claim 1. Dr. Krames agreed that “[i]f the switch is on driver housing 16 as shown in figures 1 and 2 of Chaimberg, that switch would be remote from the light fixture because the driver housing 16 is remote from Chaimberg's light fixture.” Ex. 1031, 38:20-39:4. In my opinion, therefore, there is no dispute with respect to this statement: Chaimberg further renders claim 1 obvious because a POSA would naturally to locate the switch 18 at the standard location (on/in a junction box)—which Dr. Krames admits would practice claim 1.

16. Finally, I note that even *if* Chaimberg's CCT switch 18 touched or laid upon the housing after installation, it would still be remote, based on Dr. Krames's infringement analysis. Dr. Krames confirmed during his deposition that the installed switch shown below is touching the housing, but this switch is nevertheless remote. Ex. 1031, 69:17-20 (“If the switch was as shown here, an external element but touching the light fixture housing ... it would be remote.”). I have annotated Dr. Krames's “teardown” picture of SKU 348-2107 below, highlighting CCT switch (yellow) and housing (blue).



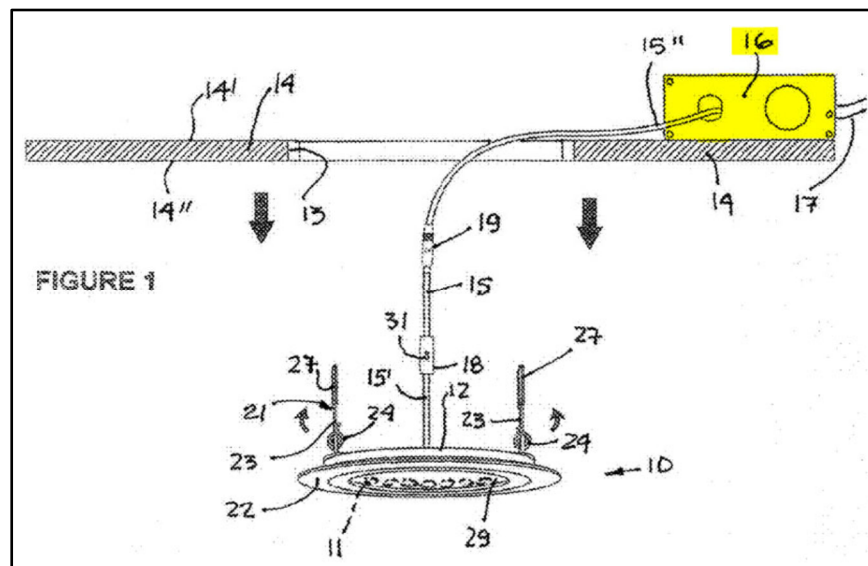
Ex. 1038 (colors added).

17. Like Chaimberg’s switch 18, the switch in Menard SKU 348-2107 is connected to an electrical cable of the luminaire. Ex. 1031, 74:14-17 (“In this case where the [switch] is a separate body that is not physically attached to the light fixture but is just touching it, it’s clearly remote.”). That the cable runs through a junction box in SKU 348-2107 before connecting to the CCT switch makes no difference. In my opinion, one cannot reconcile Dr. Krames’s argument that the CCT switch in SKU 348-2107 is remote, while Chaimberg’s CCT switch 18 is not.

Claim 7:

18. As I explained in my original declaration, a POSA would have understood that Chaimberg’s driver housing 16 functions as a “junction box”

because it is an enclosure, distinct and separated from the luminaire housing, that receives line voltage (“live wire 17”, typically 110-115 VAC). Ex. 1003, 3:24-25, 4:30-32. Because Chaimberg’s “driver circuit 20 is mounted in a driver housing 16,” the driver housing 16 includes an internal space. *Id.* This internal space within the driver housing 16 (highlighted below) constitutes a “second cavity.”



Id., Fig. 1 (color added).

19. Chaimberg explains that inserting the CCT switch 18 in the electrical cable is preferable to locating it on the junction (or driver) box because the former provides easier access to the switch after installation. *Id.*, 1:44-67. Consequently, Chaimberg specifically acknowledges what was well known—namely, locating the switch at the junction box was common in the prior art, but is not a desirable location if one wishes to provide the customer or service personnel ready access to the CCT switch. Inserting a switch into an electrical cable electrically connecting the power

source and the luminaire is a boon for servicing the luminaire or simply changing the CCT value.

20. Chaimberg states correctly that it was known in the art to mount a CCT switch “on the driver housing to select a desired color temperature of the LED light fixture.” *Id.*, 1:49-50. While Chaimberg does not expressly describe locating the switch 18 inside the driver housing—*i.e.*, “within the second cavity” of the junction box, as claimed—a POSA would view the installation of the switch in the driver housing or junction box as being standard for some applications. For example, placing the switch within the junction box will protect the switch from dust, debris, insects, and rodents that are capable of limiting the luminaire lifetime.

21. As I further testified during my deposition, Chaimberg’s preference for locating the CCT switch on the electrical cable rather than on the junction box simply reflects a fundamental engineering principle—every design choice involves tradeoffs. It is my opinion Chaimberg recognizes that, with respect to the location of the CCT switch, there are several tradeoffs such as weighing the possible risk of electrical shock (if the switch is located in a junction box and the customer with no electrical training is determined to change the CCT) against the risk of an accident when a customer or technician changes the CCT value while standing on a ladder. Other tradeoffs concern the cost of purchasing, installing, and maintaining the luminaire and its power supply. In my view, Chaimberg made the correct decision

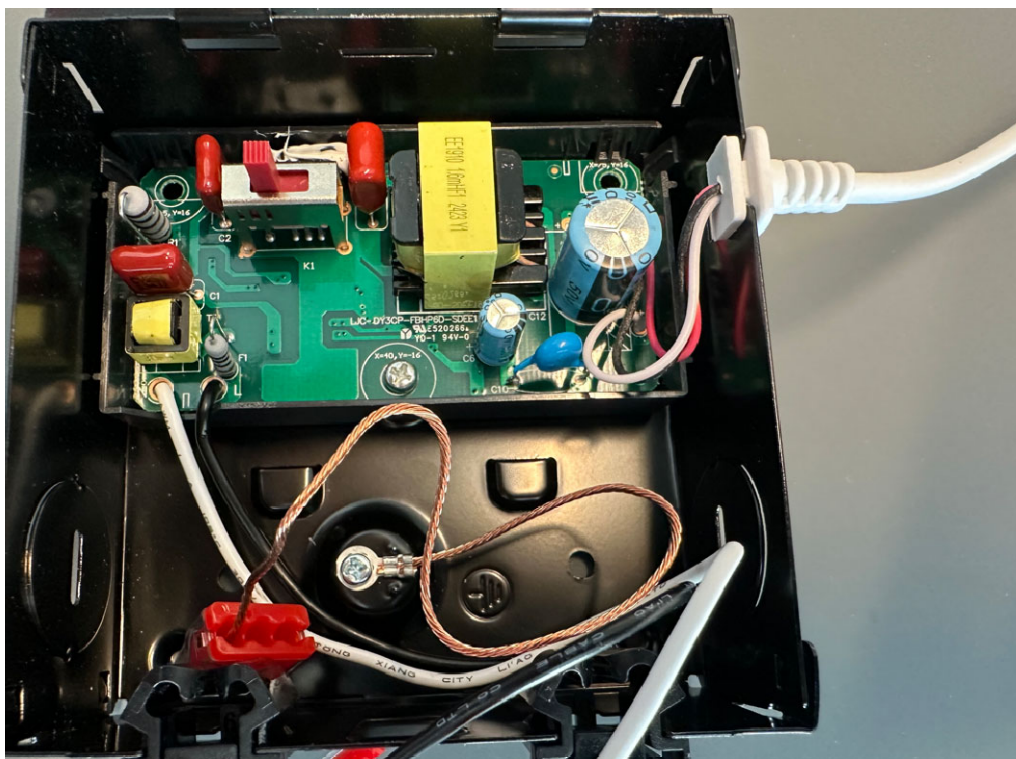
by making the CCT switch accessible to the customer while minimizing the hazard risk. Consequently, in some applications, inserting the switch into the electrical cable delivering power and control signals to the luminaire is valuable in some applications, but limiting access to the switch and other electronics by placing the switch in a junction box or other enclosure in the ceiling is better in other applications. All such decisions are best left with a POSA. The novelty of Chaimberg lies in recognizing the benefit to many customers in having access to the CCT switch.

22. Dr. Krames has agreed with me that Chaimberg discloses: “usually a selector switch is mounted on a driver housing 16 to select the desired color temperature.” Ex. 1031, 36:9-18. In addition, Dr. Krames agreed that a POSA would have understood how to mount a switch in the junction box, and that he “do[es]n’t see the difficulty with” mounting such a switch. Ex. 1031,164:10-12 (agreeing that “a POSA as of 2018 would understand how to physically place a switch within a junction box.”)

23. Further, my analysis of Globe Product No. 92291, which embodies the Chaimberg patent, confirms my opinion that Chaimberg renders obvious claim 7. As I noted above with respect to claim 1, Globe Electric (assignee of Chaimberg) offers a number of products practicing the Chaimberg patent, including Globe Product No. 92291. Globe Product No. 92291 includes its CCT switch inserted into

the cable connecting the junction box to the light housing. However, Globe Product No. 92291 includes a slide switch in the junction box for selecting the lumen output of the luminaire between 800, 110, and 1300 lumens. As shown the photographs below, this switch is mounted within a small metal box (cover removed in the second photo) and onto a printed circuit board (second photo, red actuator). As a POSA would appreciate, the switch is a part of the driver circuitry for the luminaire. Power (110-120 VAC) for the driver enters from the right (red, white, and black jacketed wires) and the cable that travels to the CCT switch and, ultimately, to the luminaire, leaves the PC board (shown in green) at its lower left edge. There, the switch shown in the two photographs below meets the structural requirements of claim 7 and confirms that it would have a been routine for a POSA to move Chaimberg's CCT switch 18 to the junction box—as suggested by Chaimberg itself.

Globe Product No. 92291

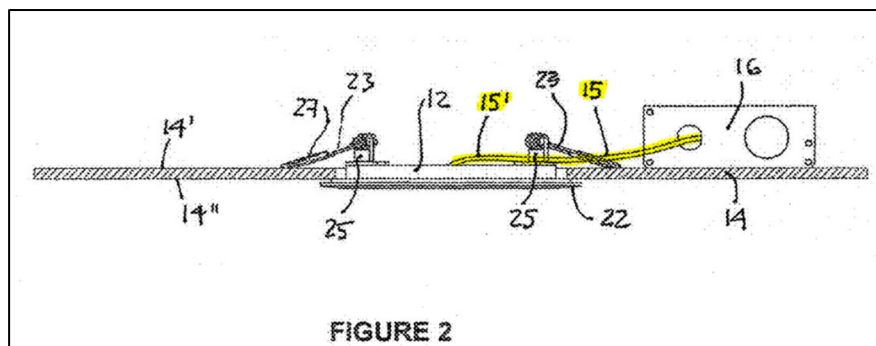


24. Thus, Chaimberg discloses, or at least would have rendered obvious, the condition of Claim 7 that “the switch is disposed within the second cavity” of the junction box. Ex. 1001, 14:67-15:1.

Claim 11:

25. As I explained in my original declaration, Chaimberg’s CCT selector switch 18 “is made accessible and visible by simply withdrawing the light fixture from” the ceiling. Ex. 1003, Abstract. Because the switch is “made accessible and visible by” withdrawing it from the ceiling, the switch is inaccessible when the LED housing is installed in the ceiling. *Id.*

26. Figure 2 is an illustration of Chaimberg’s LED light fixture “mounted in the fixture mounting hole.” *Id.*, 2:58-61, Fig. 2. I have highlighted the cable 15 in Fig. 2 below. Fig. 2 shows that the cable 15 (in which the switch 18 is electrically inserted or “mounted”) lies above the ceiling 14. *Id.*, 4:16-29, Fig. 2. Therefore, Fig. 2 confirms that the switch 18 is inaccessible when the LED light fixture is installed.



Id., Fig. 2 (color added).

27. Thus, Chaimberg's switch 18 is a switch that "is inaccessible when the housing is installed" as claimed. Ex. 1001, 15:16-17.

i. Halliwell

Claim 1:

28. As I explained in my original declaration, Halliwell explicitly discloses that its LED lighting device could employ a remote switch 40 that "may be configured to allow a user to toggle through two or more operating color temperatures." Ex. 1012, 1:60-67, 17:56-60. Therefore, Halliwell discloses a switch "disposed remotely from the housing." Ex. 1001, 14:40.

Claim 7:

29. Additionally, Halliwell discloses that the remote switch 40 could be "a wall switch, remote control, mobile computing device, and/or the like," or even a "junction box mounted toggle switch." Ex. 1012., 1:60-67, 17:39-42. A POSA would have, therefore, understood that Halliwell discloses a CCT switch that could be mounted in the junction box, *i.e.* disposed within the cavity of the junction box. This situation is quite common in electrical circuits and those supplying power to electrical systems such as lighting. Thus, Halliwell's remote switch 40 serves well as the junction box mounted switch as claimed in claim 7.

Claim 11:

30. As discussed above, Halliwell discloses a remotely located CCT switch that is a “junction box mounted toggle switch.” Ex. 1012, 17:39-42. A POSA would also have understood that, because the CCT switch is mounted in the junction box (which would have been mounted in the ceiling), it would have been inaccessible to the user because junction boxes are generally installed in “drop” ceilings or behind drywall. Moreover, Halliwell discloses that “a user may select a desired operating light aspects or qualities (*e.g.*, color temperature...) for the ... LED lighting device before the ... LED lighting device is installed” in a ceiling, confirming that the switch will be inaccessible after the LED lighting device is installed. Ex. 1012, 4:31-35.

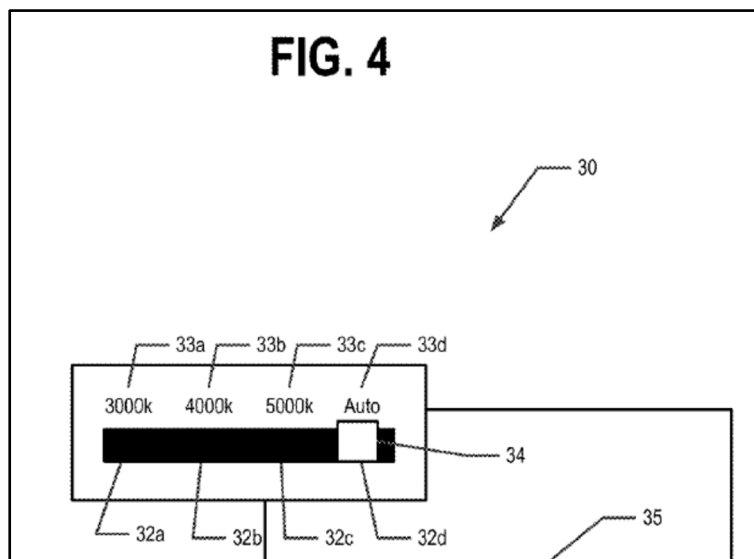
31. Thus, Halliwell discloses a luminaire “wherein the switch is inaccessible when the housing is installed.” Ex. 1001, 15:16-17.

B. The Other Disputed Limitations Of Ground 1A Are Likewise Disclosed In the Prior Art And/Or Rendered Obvious

Claim 1:

32. As I explained in my original declaration, Halliwell’s remote CCT switch “has a plurality of positions, wherein each position of the plurality of positions of the switch corresponds to a discrete correlated color temperature (CCT).” Ex. 1001, 14:41-44.

33. Halliwell expressly discloses that remote switch 40 includes a “remote selector 44 [that] may be a slide ... button,” like that shown in Fig. 4, thus confirming to a POSA that the remote switch 40 could be implemented as the slide switch illustrated in Fig. 4. Ex. 1012, 18:31-32. The exemplary slide switch shown in Fig. 4 includes four positions that “correspond to set operating color temperature modes with each position corresponding to a particular set operating color temperature,” where 3000 K, 4000 K, and 5000 K are indicated specifically on the switch. *Id.*, 12:10-15, 13:4-15, Fig. 4. These CCT values, shown in Fig. 4, are discrete.



Ex. 1012, Fig. 4 (cropped).

34. To the extent that the “auto” position in the switch 30 of Fig. 4 overlaps with the three other CCTs, Halliwell discloses that the switch could be modified to accommodate multiple CCT values, “as appropriate for the application.” *Id.*, 7:61-67.

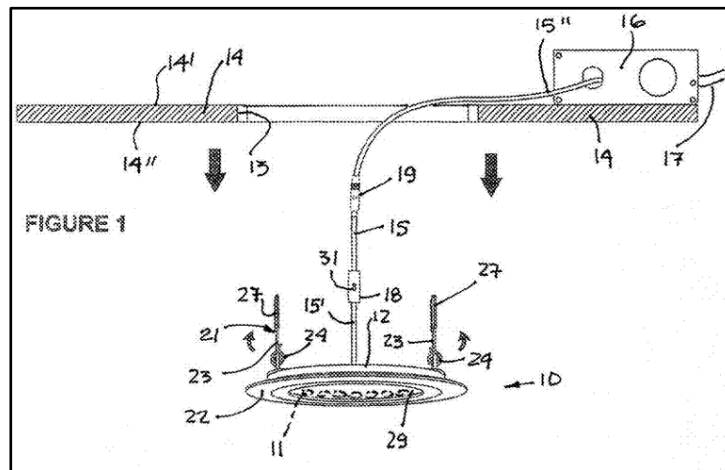
35. Thus, Halliwell's remote CCT switch is a switch "wherein the switch has a plurality of positions, wherein each position of the plurality of positions of the switch corresponds to a discrete correlated color temperature (CCT)." Ex. 1001, 14:4-44.

Claim 7:

36. Chaimberg discloses or renders obvious "the second end of the electrical cable is coupled to the switch."

37. The first end of Chaimberg's cable 15 is coupled to the LEDs 11 (i.e., "coupled to the at least one electrical component," as claimed). Because "coupling" is not a term of art, I will refer to "coupling" as an electrical connection. This is supported by the '336 Patent's text in Ex. 1001, 11:67-12:4 which clearly equates "coupling features" with standard electrical connectors such as terminals or pins (*see also Id.*, 9:66-10:4). Indeed, "electrical connector 629" is mentioned in Column 10 (line 9). Therefore, connecting the remaining (second) end of the electrical cable to the switch and then connecting the other side (electrical terminal) of the switch to the power source is necessary to have a complete circuit. In my opinion, Chaimberg need not be explicit concerning the details of how these connections were made or how the electrical circuit functions. Each of these basic principles and standard practice in industry are taught to freshmen and sophomore students in electrical engineering through lectures coupled with laboratory ("hands on") courses.

38. I understand from counsel that Patent Owner argues Chaimberg's design receives power from "live wire" 17 (again, not a term of art) and not cable 15. Chaimberg does explain that live wire 17 provides line voltage to driver circuit 20, which is mounted in driver housing 16 (i.e. the junction box), but live wire 17 is not directly powering LEDs 11. As shown in the Fig. 1 below, cable 15 connects driver circuit 20 to LEDs 11. Indeed, all LED luminaires *that run on AC power* require that the AC input power (e.g., (110-120 VAC, 60 Hz) from the power company) must first be converted in a power supply to a DC voltage—which could be performed in the luminaire housing by the LED driver. No LED luminaire can be driven **directly** by AC power because the LEDs require only a few volts DC for their operation – 120 V of AC power will destroy diodes.



Id., Fig. 1.

39. Therefore, when the switch 18 is disposed in the junction box, the switch 18 must be connected to the second end of the electrical cable so that switch 18 can control the flow of electrical current to the respective sets of LEDs.

C. The Combination of Chaimberg and Roberge

i. A POSA would have been motivated to combine Chaimberg and Roberge with a Reasonable Expectation of Success

40. As I explained in my original declaration, Chaimberg and Roberge both disclose applying LEDs of multiple color temperatures to the generation of white light having a variety of color temperatures (CCTs), and both references employ any of a wide range of switches to change the CCT value of the emitted light.

41. Chaimberg repeatedly states that its luminaire includes “at least two sets of LED’s of different correlated color temperatures.” *See, e.g.*, Ex. 1003, Abstract, 1:8-15, 2:30-33. In considering Chaimberg, therefore, one skilled in the art would have understood that the luminaire could include additional LEDs having CCT values other than those explicitly discussed in Chaimberg (3000 K and 5000 K).

42. For example, a POSA would have recognized the advantages of including additional LEDs having CCT values of 3500 K and 2700 K because these are of particular value for residential and restaurant lighting. It is well known in the lighting industry that “warm” lighting (*i.e.*, CCT values below approximately 3500 K) is highly valued by customers, and particularly those in the Americas and Europe.

This is the reason that many restaurants in North America (and elsewhere) lower both the intensity and CCT value of the lighting after dusk each evening. Moreover, as the '336 Patent itself acknowledges, 2700 K is a common CCT for traditional incandescent bulbs with which consumers would have been familiar. Ex. 1001, 1:36-38.

43. Therefore, a POSA would have recognized the advantages of introducing additional CCT values to those available with a luminaire, and it would have been obvious to use a switch with additional switch positions corresponding to each CCT value. A wide variety of switches able to accommodate more positions have long been available.

44. Similarly, Roberge discloses a number of switches so as to generate “white light having a variety of color temperatures.” Ex. 1011, 7:45-46. For example, Fig. 34i of Roberge presents “a dial [that] allows a user to select one or more colors or color temperatures from a scale 3414... [which can] include different color temperatures of white light.” *Id.*, 42:51-54. A POSA would have understood that the additional CCT values available with Roberge’s rotary switch would expand the capability of Chaimberg’s slide switch, thereby enabling Chaimberg to produce white light having CCT values beyond those discussed in the specification (3000 K, 4000 K, and 5000 K).

45. I understand from counsel that Patent Owner argues that Roberge's CCT switch is not intended to be accessible for further configuration after device installation. I disagree. Roberge does not insist that the CCT switch of Fig. 34i is inaccessible after device installation. Rather, Roberge simply recognizes that "it *may* [emphasis added] be desirable to limit user control" in some applications. *Id.*, 42:39-40. Of course, Roberge is correct, and the decision as to whether the CCT switch is accessible or not is normally left to a POSA who will inevitably consult with the customer. A POSA would also have understood Roberge's switch to provide a simple and effective means for selecting among the different available CCTs in Chaimberg.

46. For the reasons cited above, the motivation to combine Chaimberg and Roberge is strong.

47. As I further explained in my original declaration, from a technical perspective, modifying Chaimberg to incorporate additional CCT values is a straightforward adjustment that is well within the skill of a POSA. This is merely a matter of a design choice in selecting a switch with additional positions, and such switches were readily available at the time of the '336 Patent. Anyone skilled in the art would be familiar with the wide range of switches commercially-available.

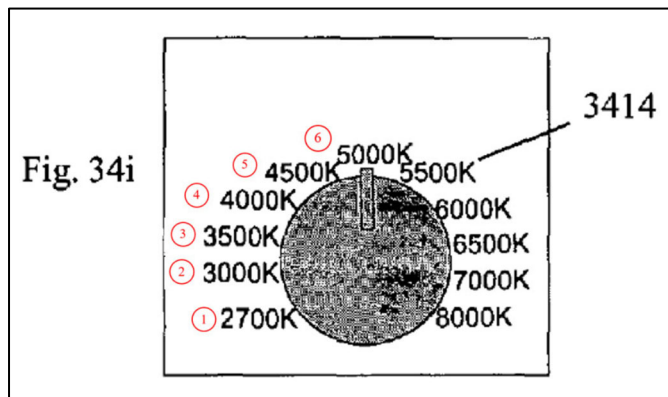
ii. Claims 4 and 5 are obvious over Chaimberg alone or Chaimberg in view of Roberge

48. As explained above and in my original declaration, Chaimberg's luminaire could easily accommodate LEDs with additional CCT values other than the ones explicitly discussed in Chaimberg (3000 K and 5000 K). Specifically, Chaimberg's luminaire could accommodate LEDs with CCT values of 2700 K and 3500 K, both of which are commonly available in commercial products and familiar to consumers, as acknowledged by the '336 Patent itself and Dr. Krames. Ex. 1001, 1:36-38. In fact, as acknowledged in his deposition, Dr. Krames has previously represented to the UPSTO in 2009 that "[a] color temperature of between 2700 and 3000K is considered the most pleasing for living spaces since it is the most flattering for skin tones and clothing. Cool light is considered to be 3600 to 5500 Kelvin, typical for an office that uses fluorescents bulbs." Ex. 1031, 92:4-12 (quoting Ex. 1033, ¶ 0006).

49. It would have been straightforward and obvious for a POSA to purchase a switch 18 having at least two additional positions to accommodate the two additional CCT values. Both slide and rotary switches will readily accommodate five switch positions or more. Such switches were not only disclosed in Roberge, they were also readily available for purchase off-the-shelf. Thus, as discussed above, a POSA would have been motivated to adopt one of the switches described

in Roberge, such as the rotary (“dial”) switch of Fig. 34i, in Chaimberg’s LED luminaire.

50. For convenience, the first five positions in Roberge’s rotary switch of Fig. 34i are numbered in the annotated version below:



Ex. 1011, Fig. 34i (annotated).

51. Accordingly, Roberge’s CCT switch “comprises a first position, a second position, a third position, a fourth position, and a fifth position.” Ex. 1001, 14:50-52.

52. While Roberge’s fifth position corresponds to the generation of light having a CCT value of 4500 K, and the sixth position corresponds to 5000 K, it would have been obvious for a POSA to include any other CCT values required by the application at hand. Indeed, Roberge discloses that the eleven temperatures are exemplary and the “designer can specify a particular setting.” Ex.1011, 42:51-65. Therefore, Roberge’s switch, illustrated in Fig. 34i, is a switch wherein “the first position of the switch corresponds to 2700 Kelvin (K) output by the one or more

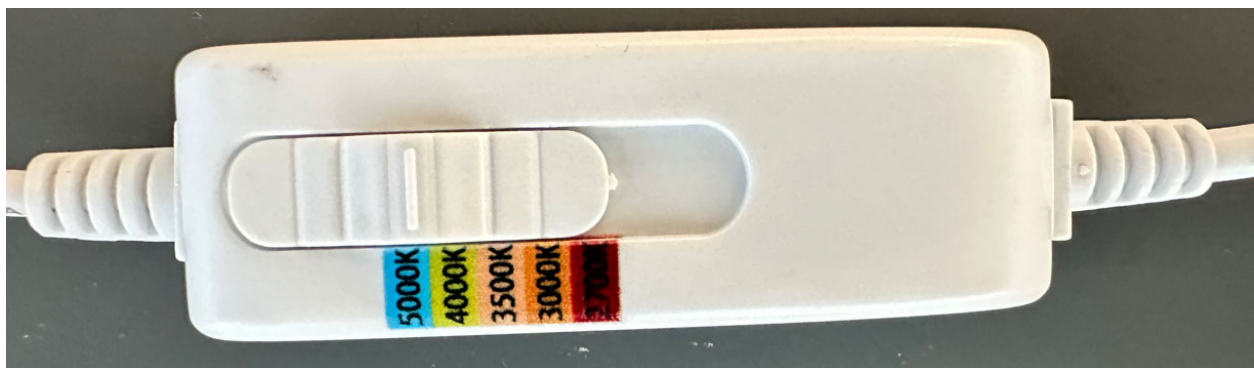
light sources, wherein the second position of the switch corresponds to 3000 K output by the one or more light sources, wherein the third position of the switch corresponds to 3500 K output by the one or more light sources, wherein the fourth position of the switch corresponds to 4000 K output by the one or more light sources, and wherein the fifth position of the switch corresponds to 5000 K output by the one or more light sources.” Ex. 1001, 14:53-62.

53. Further, my analysis of Globe Product Nos. 92291 and 91458, which embody the Chaimberg patent, confirms my opinion that Chaimberg alone or in view of Roberge renders obvious both claims 4 and 5 of the '336 Patent. As discussed above, both products include remote CCT switches. Moreover, mentioned earlier, both product's CCT switches include five positions corresponding to CCT values of: 2700 K, 3000 K, 3500 K, 4000 K, and 5000 K, as required by claims 4 and 5.

Globe Product No. 92291



Globe Product No. 91458



54. Thus, these products confirm that it would have routine (and quite easy) for a POSA to modify Chaimberg's CCT switch with five positions: 2700K, 3000K, 3500K, 4000K, and 5000K CCT.

IV. CLAIMS 13-20 ARE UNPATENTABLE OVER GROUNDS 1A, 1B, 2, AND 3

A. Claims 13, 15, and 16 have a priority date no earlier than June 21, 2018

55. As I explained in my original declaration, claims 13, 15, and 16 have a priority date no earlier than June 21, 2018, and they are not entitled to the 2016 priority date of provisional application No. 62/297,424 (the “’424 Provisional”).

56. Claim 13 requires a CCT switch that comprises “at least one first coupling feature disposed on the body, wherein the at least one first coupling feature is configured to electrically couple to an electrical cable of the luminaire.” Ex. 1001, 15:25-27. However, I am unable to find any description of these features in the ’424 Provisional.

57. The ’424 Provisional states that an “[e]lectrical wiring (not illustrated) extends through a wiring aperture 103 in the housing 105”:

The illustrated example luminaire 100 of Figure 1 comprises a circular housing 105 with a protruding rim 100 that extends circumferentially about the housing 105. When the luminaire 100 is installed in a ceiling aperture, the rim 100 circumscribes and covers the edge of the ceiling aperture for aesthetics, for support, and for blocking of debris from above the ceiling. Hanger clips 102 hold the luminaire 100 in place in installation. Electrical wiring (not illustrated) extends through a wiring aperture 103 in the housing 105.

Ex. 1008, 4:19-25 (color added).

58. However, a POSA would not have understood the ’424 Provisional’s “[e]lectrical wiring (not illustrated)” to be claim 13’s “electrical cable of the

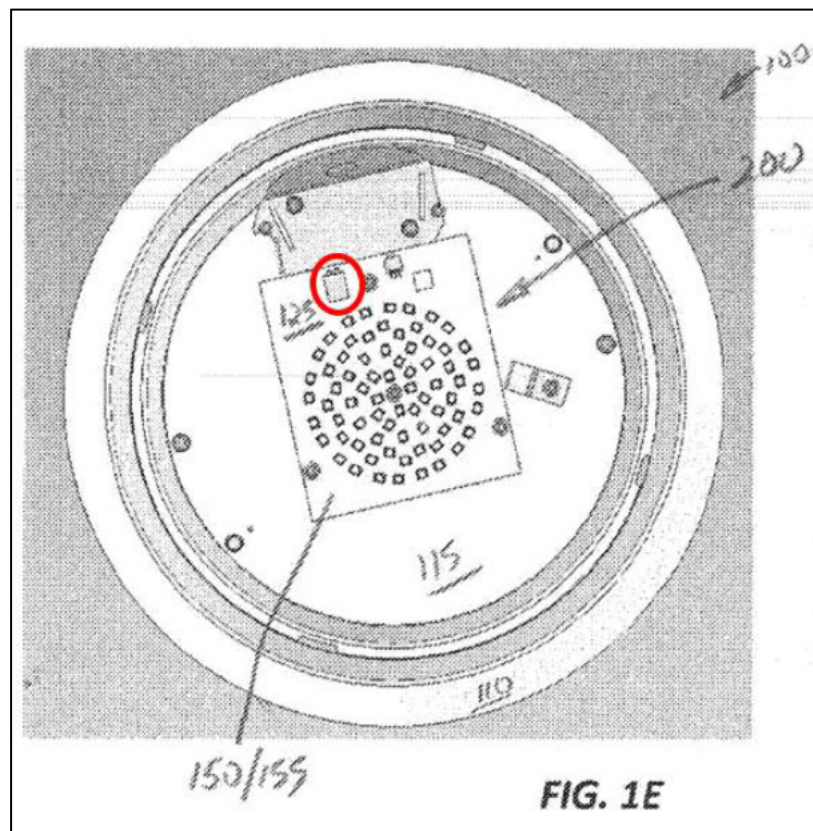
luminaire” because the ’424 Provisional does not contain any description of the “electrical wiring.” *Id.*, Ex. 1001, 15:26-27. It mentions “electrical wiring” only once and does not provide sufficient description for a POSA to understand whether it satisfies the features of claim 13. The ’424 Provisional neither illustrates the electrical wiring, nor suggests otherwise that the electrical wiring is the electrical cable *of the luminaire*.

59. In fact, the “[e]lectrical wiring (not illustrated)” of the ’424 Provisional need not be an electrical cable *of the luminaire*, as required to satisfy claim 13. As I testified during my deposition, it is possible to hard wire a luminaire inside one’s house wiring without a cable *of the luminaire*. Ex. 2030, 91:12-16. Therefore, the ’424 Provisional’s isolated mention of “[e]lectrical wiring (not illustrated)” does not provide written description support for claim 13’s “electrical cable of the luminaire.”

60. Further, the ’424 Provisional does not describe the substrate 125 as receiving power via an electrical cable, and in fact, no such electrical cable is necessary to power the substrate 125. As I confirmed during my deposition, a luminaire, such as seasonal LED decorations, can be powered by a battery. Ex. 2030, 89:8-15. Battery-powered luminaires were well-known at the time of the ’424 Provisional, and at least some of these battery-powered luminaires did not utilize an electrical cable for powering their substrates. Rather, they received power via batteries, *i.e.*, DC power supplies, not via electrical cables.

61. The '424 Provisional specifically describes and depicts its luminaire as being powered via a “DC power supply 205”—e.g., a battery. Ex. 1008, 019:7-10 (“The circuit 200 comprises a DC power supply 205 for supplying electrical energy that the circuit 200 delivers to the light emitting diodes 150, 155.”), Figs. 2, 4. In fact, the '424 Provisional never refers to the use of AC power (e.g., from a wall outlet or directly from the “14/2” cable typical of most house wiring) or any type of electrical cable for powering the substrate or the light fixture more generally.

62. I understand from counsel that the Patent Owner argues that the '424 Provisional discloses a receptacle, identified in Figure 1E below, for receiving power from an electrical cable. However, I see no such disclosure in the '424 Provisional.



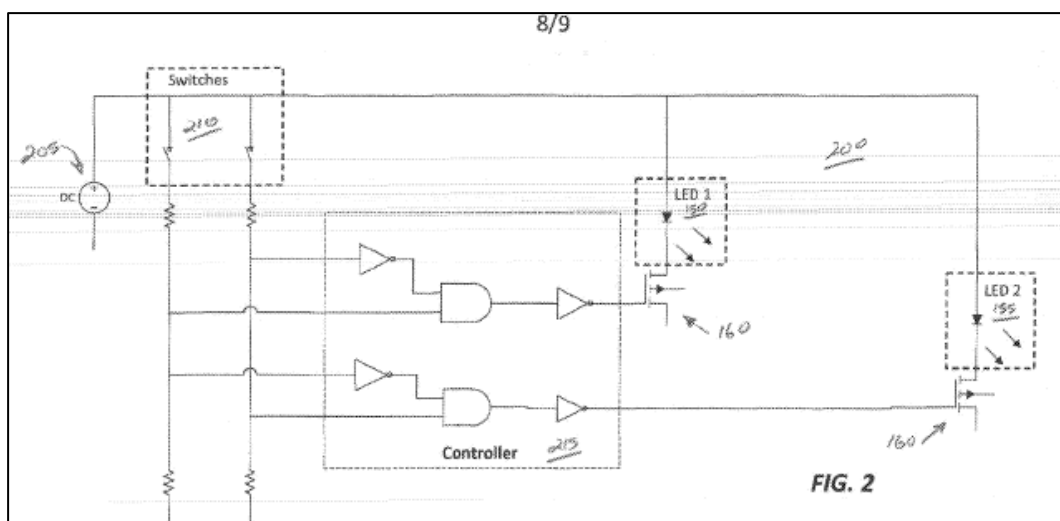
Ex. 1008, 35 (annotated).

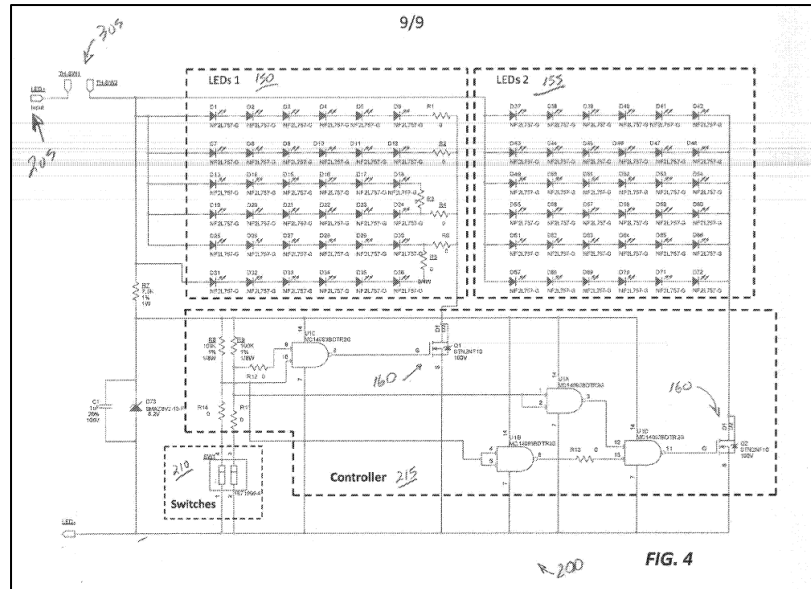
63. A POSA would not have understood the unlabeled symbol of Figure 1E as being a power receptacle (or, indeed, a receptacle of any kind) because there is no description of any kind in the '424 Provisional that addresses this symbol (and others). Therefore, the symbol in Fig. 1E pointed out by the red circle is unlabeled in the '424 Provisional and no description of any kind is provided.

64. Likewise, Figures 2 and 4 of the '424 Provisional are schematic diagrams, and not physical representations of the luminaire.

65. It is my understanding Dr. Krames agreed in his deposition that Fig. 4 is not intended to depict any actual “physical manifestation[s]” or “physical description[s]” of an electrical circuit or system. The symbols shown in schematic diagrams for resistors, LEDs, operational amplifiers, DC power supplies, etc. – there are symbols. We agree, therefore - “[t]he symbol is a symbol” and nothing more.

Ex. 1031, 102:10-22.





Ex. 1008, 039-040.

The symbol is a symbol. I just like -- onto the right you see what looks like a Zener diode, for example, in the very far right. So these symbols are indicative of how the circuit works. This is not an integrated circuit routing layout, which would be the physical manifestation of this controller, nor is it a print circuit board layout which would be a physical description of the full assembly; for example, of the driver.

This is the way that an electrical engineering, the function of such a controller, is described.

Ex. 1031, 102:10-22.

66. These diagrams illustrate functional relationships between the components rather than exact physical placement or structure of those components. As I explained at my deposition, Fig. 4 is a schematic diagram that does not say anything about physical positions. For example, Dr. Krames and I agree that the line between the switches 210 and the DC power supply 205 could represent an electrical connection via a thin layer of metal disposed on the substrate 125—i.e., a circuit

trace, not an electrical cable. Therefore, any alleged electrical cable connecting the switches 210 to the power supply 205 need not be an “electrical cable of the luminaire,” as established above. It is also my understanding that Dr. Krames agreed with me on another matter at his deposition, stating that “[w]ires in a circuit schematic generally indicate an electrical connection for current flow. The current flow can be carried through various topologies. It could be a wire. It could be a circuit trace on a printed circuit board.” Ex. 1031, 101:12-21.

67. The '424 Provisional also does not provide any description for “the range of positions [that] comprises a first position, a second position, a third position, a fourth position, and a fifth position” as required by claim 16. Ex. 1001, 16:11-13. The '424 Provisional describes switches 210 as having only four positions. For example, the table shown in Figure 3 of the '424 Provisional shows two switches have four possible positions:

Switch 1	Switch 2	LED 1 3,000 K	LED 2 4,000K	Resulting Color Temp
On	Off	On	On	3,500 K
Off	On	On	On	3,500 K
On	On	On	Off	3,000 K
Off	Off	Off	On	4,000 K

300
4

FIG. 3

Ex. 1008, Fig. 3.

68. I see no description in the '424 Provisional of any other switches having more than two positions each (“on” and “off”). The only switches described in the

'424 Provisional are the simplest switches available, known as single-pole, single-throw (SPST) switches or, more commonly, on-off switches such as those in house table lights or floor lamps. Therefore, claims 13, 14, and 16 are not entitled to the 2016 priority date of the '424 Provisional.

69. I understand from counsel that Patent Owner characterized my deposition as confirming that the '424 Provisional demonstrates possession and enablement of claim 13. I disagree. I simply recognized the overbreadth of claim 13, which recites common switch features like “a body” and “at least one first coupling feature.” I testified that all switches, including the '424 Provisional's DIP switches 210, include a body and at least one coupling feature. Ex. 2030, 223:24-226:8. However, even if the '424 Provisional's DIP switches have coupling features, they are not described as being electrically coupled to an electrical cable of the luminaire. The '424 Provisional's “electrical wiring” is never described in relation to switches 210, so a POSA would not understand the '424 Provisional as providing description for the electrical coupling. As I explained above, I see absolutely no description of electrical coupling between the switch and an electrical cable of the luminaire in the '424 Provisional.

i. Dr. Krames's Own Patents Confirm That Claims 13, 15, and 16 Are Not Entitled to the Filing Date of the '424 Provisional And Would Have Been Obvious to a POSA

70. Dr. Krames and Signify allege that the invention of claim 13 is coupling a well-known simple mechanical switch (a switch so well-known that it need not be described in the specification) to a cable of a luminaire in order to control CCT. Ex. 1031, 117:16-118:8. Dr. Krames is not giving the lighting industry, or himself, the credit that both deserve. Indeed, one of Dr. Krames' own patents confirms that he was in possession of an LED lighting device "that can output a few specific spectra and be controlled by a simple mechanical switch." Ex. 1034, 26:15-17; Ex. 1031, 127:14-22. Dr. Krames's '644 Patent (filed two years before the '424 Provisional) describes an LED lighting device having two sets of LEDs "with different CCTs", one emitting "cool white (~5000K)" and the second emitting "warm white (~3000K)". Depending on the position of the "simple mechanical switch", Dr. Krames' "lighting device" emitted light having a CCT value of ~3000 K, ~4000 K, or ~5000 K. Ex. 1034, 26:15-52; Ex. 1031, 128:5-10. Thus, contrary to the position of the Petitioner and Dr. Krames, using a simple mechanical switch to adjust the CCT of a light fixture was known in the lighting industry and a POSA for years prior to the filing of the '424 Provisional. As shown below, Dr. Krames's '644 Patent describes using a mechanical switch to blend the light of different CCT values in almost exactly the same way as the '424 Provisional.

'424 Provisional, 2:9-16	'644 Patent, 26:43-52
The power supply can utilize a switching scheme that can turn each group of light emitting diodes on and off to change the color temperature of the luminaire. For example, the luminaire can comprise a 3,000 K group of light emitting diodes and a 4,000 K group of light emitting diodes. When only the 3,000 K group is on, the luminaire can deliver 3,000 K illumination. When only the 4,000 K group is on, the luminaire can deliver 4,000 K illumination. When the 3,000 K group and the 4,000 K group are both on, the luminaire can deliver 3,500 K illumination.	For instance, in a given embodiment, about 10 watts of power are consumed by the lamp. LED1 4142 has a CCT of 3000K. LED2 4144 has a CCT of 5000K. In position A, only LED1 receives power [yielding a CCT of 3000K]. In position B, LEDs 1 and 2 receive power yielding a CCT between 3000K and 5000K [e.g., 4000K]. In position C, only LED 2 receives power [yielding a CCT of 5000K]. In all [switch] positions, a similar amount of light is emitted because the same amount of power is driven through the LEDs. In position B, the balance of power feeding LEDs 1 and 2 can be tuned to achieve a desired spectrum[of CCT].

71. While Dr. Krames's '644 Patent does not explicitly state that the switch is "electrically coupled" to a cable of the luminaire, it would have been obvious to a POSA. Indeed, Dr. Krames asserts that the '424 Provisional's passing reference to a cable is sufficient to provide written description for claim 13.

72. Petitioner may argue that Dr. Krames's device is distinguishable from the '424 Provisional because the embodiment covers a "lamp" not a luminaire. Not so. If so, such an assertion would be incorrect. Strictly speaking, "luminaire" refers to the housing and electronics for a lamp as well as the lamp itself. In practice, the terms "lamp" and "luminaire" are typically synonymous.

73. Moreover, while I disagree with Patent Owner's and Dr. Krames's interpretation of the breadth of claim 13 of the '336 Patent, in applying Patent Owner's framing, broadly requires that the switch be coupled to an electrical cable of the luminaire. In Patent Owner's view, there are no requirements on where or how the switch is electrically coupled, or restrictions on the number of intermediaries permitted. Thus, under Patent Owner's interpretation, if the lamp of Dr. Krames's '644 Patent were used in a luminaire with a simple mechanical switch for controlling power supplied to the luminaire, then under Dr. Krames's own position it would be electrically coupled to a cable of the luminaire.

74. In sum, the focus of Dr. Krames '644 Patent -namely, the blending of the light from several sets of LEDs so as to produce light having one of several CCT values - would have been in a POSA's toolbox as of February 2016.

ii. Roberge And DuCharme Disclosed The Use of DIP Switches To Control CCT Of LED Luminaires

75. As discussed in my earlier report, several prior art references described the use of a variety of mechanical switches (*including DIP switches*) to control the CCT value of the light emitted by LED luminaires.

76. For example, in 2004, as Dr. Krames acknowledges, Roberge discloses a number of CCT switches that can serve to select the CCT value of the spectra emitted by LED lighting devices. Ex. 1031, 81:19-82:1. Roberge further discloses that its lighting devices can take a number of shapes and forms, including luminaires.

Ex. 1031, 86:13-87:17, 88:4-7. In fact, “FIG. 34g shows a dipswitch 3410, which can be[] used to set simple modes of a lighting unit 102” including “color temperature.” Ex. 1011, 42:25-38 (“In various embodiments the slides, switches, dials, dipswitches and the like can be used to control a wide range of variables, such as color, color temperature ...”); *see also* Ex. 1031, 83:2-5. Roberge goes on to explain that “[a] given lighting unit 102[—like that discussed with respect to the dipswitch of FIG. 34g—may be arranged] in a variety of housings 800” (Ex. 1011, 15:35-43), and “the housing 800 may be a ... luminaire, lamp, system or other product.” Ex. 1011, 17:54-56; Ex. 1031, 87:12-17. Thus, Roberge disclosed the use of dipswitches to control the CCT of the light produced by a luminaire more than a decade before the filing of the ’424 Provisional.

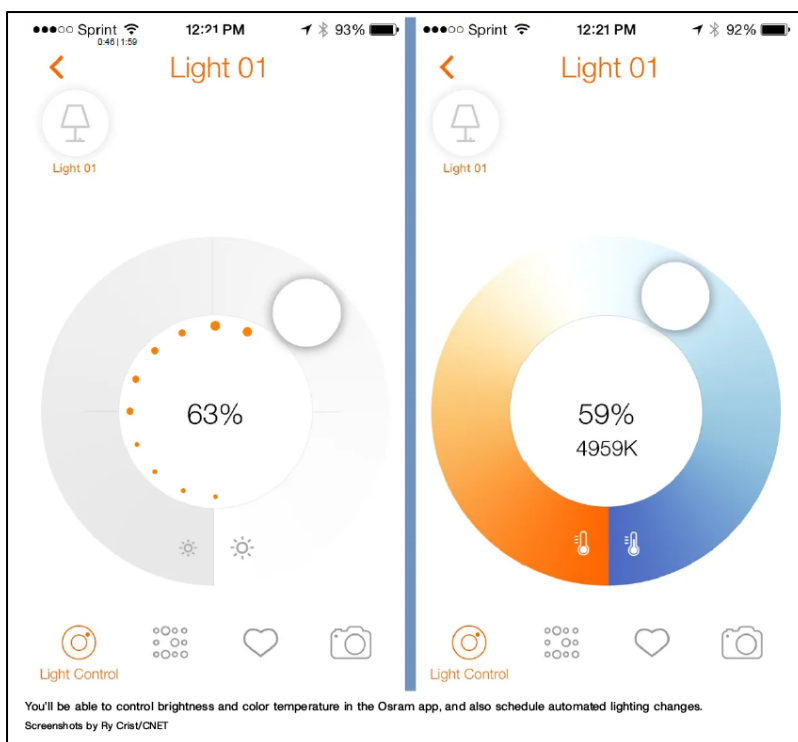
77. As another example, in 2000, Fig. 29 of Ducharme disclosed a “lighting fixture [*i.e.* luminaire that] may also comprise a program control switch (2512). This switch may be a selector switch for selecting the color temperature” of the luminaire. Ex. 1002, 29:4-13 (“For example, the switch may have multiple settings for different colors. Position ‘one’ may cause the LED system to produce 3200K white light, position ‘two’ may cause 4000K white light, position ‘three’ may be for blue light and a fourth position may be to allow the system to receive external signals for color or other illumination control.”) Ex. 1031, 148:18-149:2. Ducharme even states that this CCT switch can be mounted on the circuit board along with LEDs 1155, in the

same manner as described by the '336 Patent nearly two decades later. Ex. 1002, Fig. 29; Ex. 1031,150:17-151:14.

iii. CCT Adjustable Luminaires And Lamps Were On the Market Before The Alleged Invention of The '424 Provisional

78. I also note that the disclosure of CCT-adjustable LED lighting devices were not limited to patents or publications. Indeed, a number of products were on the market before the '424 Provisional was filed. In fact, Dr. Krames agreed that these products were more technologically advanced than the “very simple and limited” product disclosed in the '424 Provisional. Ex. 1031, 144:16-145:8.

79. First, several companies (including Philips) offered smart LED light bulbs that offered the ability to select a CCT value. As Dr. Krames acknowledged, these lights were more sophisticated than the simple technology allegedly claimed in the '336 Patent. Ex. 1031, 144:16-145:8; 145:22-146:3 (if you want to limit the choices [of CCT] here, you need to streamline the design.”). For example, as shown below, these devices used smart phones to wirelessly tune the CCT of the spectra emitted by the LED lighting device across a range of CCT values. These LED lamp/luminaire products offered considerable flexibility, unlike the embodiments of the '336 Patent. As one example shown below, users of an Osram smart LED lighting device were able to remotely vary both the CCT value of the light emitted by the LED lighting device with a cell phone and the brightness.



Ex. 1035, 012; *see also* Ex. 1031, 180:23-182:11.

80. Simply put, “tunable” CCT technology had long passed the “technology” of the ‘336 Patent which employs simple mechanical switches to vary the CCT, as claimed in the ‘336 Patent. Indeed, as noted above, DuCharme, Chaimberg, and Dr. Krames himself—to name just a few—had already been using simple mechanical switches to adjust the CCT of light emitted by LED lighting systems for years and, in some cases, decades.

81. Like the patents discussed above, the existing products were not limited to LED lamps. A decade ago, both Cree and Philips were offering integrated LED luminaires with adjustable CCT output, as shown below. For example, at least as early as April 2015, Philips (Signify’s predecessor) was offering LED luminaires

with “Tunable White” light. Ex. 1036, 128 (advertising in 2015 that users will “enjoy natural white light adjustable to the preferred atmosphere, thanks to its state-of-the-art Power LEDs.”) Philips offered numerous Pendant style lights with the Tunable White feature, offering CCT values of 2500 K, 2700 K, 3100 K, and 3450 K as described by the promotional material reproduced below.



Tunable White

A simple key lets you choose between four different white light colour temperatures (3450, 3100, 2700, 2500 Kelvin) on selected fittings.

69049/48 Pendant Light




69049/48 PENDANT LIGHT	
Colour/Finish	Aluminium
IP Rating	IP20
Light Source	LED Integrated 3x7.5W
Light Colour Temp	4000K (Tunable)
Dimensions (mm)	959 x 115 x 255
Shortcode	69049/48/86
Barcode/EAN	8717943742660
Trade Price	5782.57

Id., 128-129.

82. Similarly, in 2015 Cree also offered CCT-selectable LED luminaires. In particular, Cree luminaire’s “with Cree SmartCast Technology offer[ed] field-adjustable color temperatures that enable simplified specification, ordering and installation to provide a new level of configuration options.” Ex. 1037, 076.

83. Again, illumination engineers would have had these well-known products in their toolbox while reviewing the prior art in 2016 or 2018. Thus, this

broad array of commercially-available LED lamps and luminaires with selectable (“tunable”) CCT confirms that the claims of the ’336 Patent would have been obvious to anyone skilled in the art, particularly in view of Chaimberg alone, Chaimberg + Roberge, Halliwell, and/or Reiff.

B. Chaimberg, Halliwell, and Reiff Each Discloses and/or Renders Obvious The Claimed “Body” And “At Least One Coupling Feature” Of Claim 13

84. As I explained in my original declaration, Chaimberg, Halliwell, and Reiff each discloses and/or renders obvious the claimed “body” and “coupling feature.”

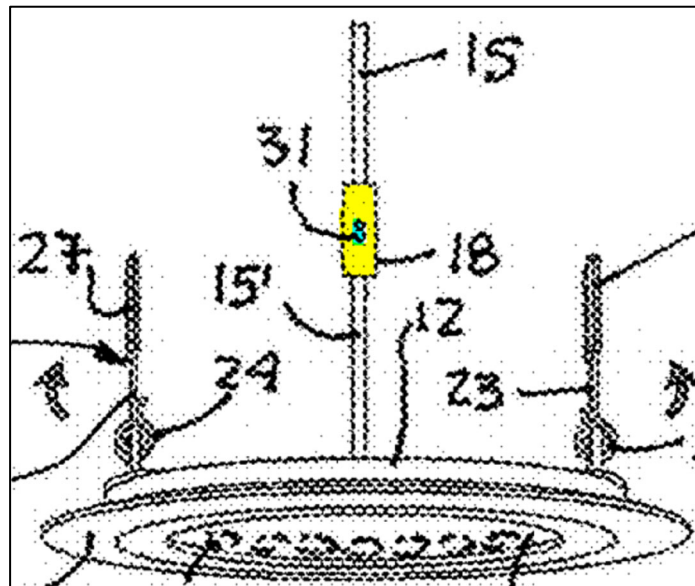
85. I preface the following paragraphs by reiterating what I testified during my deposition: Any switch that has ever been devised has a “body,” and every switch also has basic parts, one of which are electrical connectors, which the ’336 Patent refers to as “coupling feature.” A body is simply a structure of the switch on which other switch features are disposed, such as the ’336 Patent’s claimed “actuator” and “coupling feature.” A switch body is inherent to every switch, even though it is rarely labeled. This omission is not because the switch lacks a body, but because the concept is so well known that an explicit label is not necessary. Similarly, any switch that is a part of a circuit must include electrical connections (coupling features) for connecting to the cable or the other circuit components. In the absence of even a single connection (such as those shown in Fig. 4), the circuit is said to be

an “open” circuit and does not function. Additional labeling is regarded by a POSA as unnecessary and undesirable.

i. Chaimberg

86. As I explained in my original declaration, Chaimberg discloses and/or renders obvious claim 13’s “body” and “coupling feature.”

87. Chaimberg’s CCT “switch 18 is a toggle switch provided with a slide button 31.” Ex. 1003, 4:34-37. Thus, the switch 18 has a body on which the slide button 31 is located. Fig. 1 below shows the CCT switch 18 and slide button 31. Switch 18 is highlighted in yellow, the slide button 31 is highlighted in blue, and the perimeter of the switch “body” is represented by the dashed rectangular box.

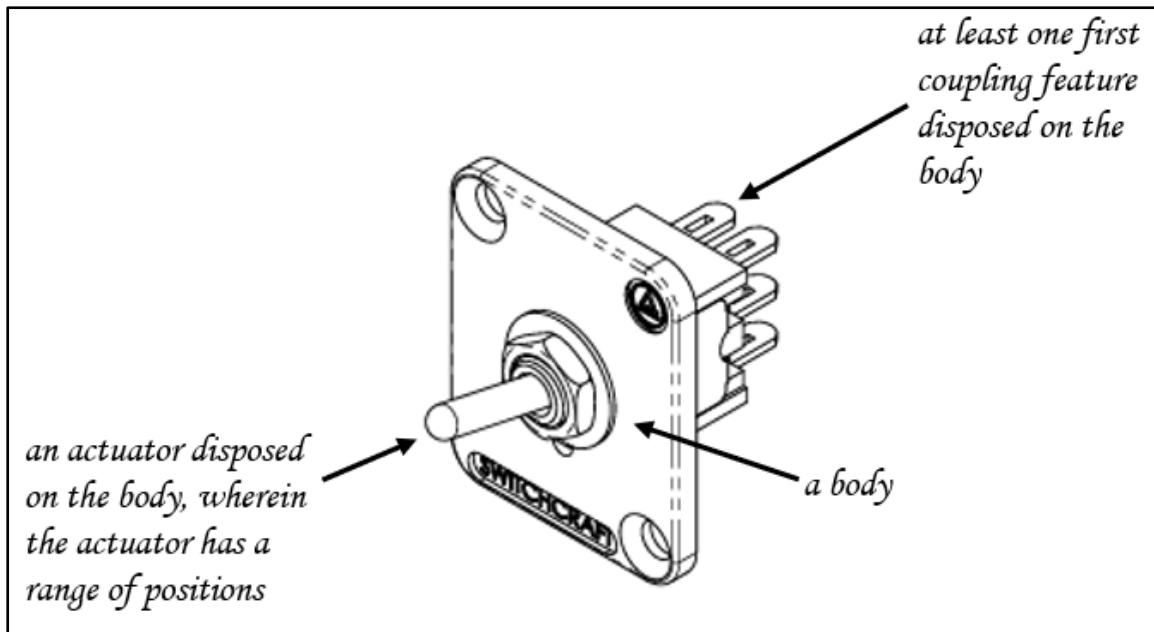


Id., Fig. 1 (cropped and colors added).

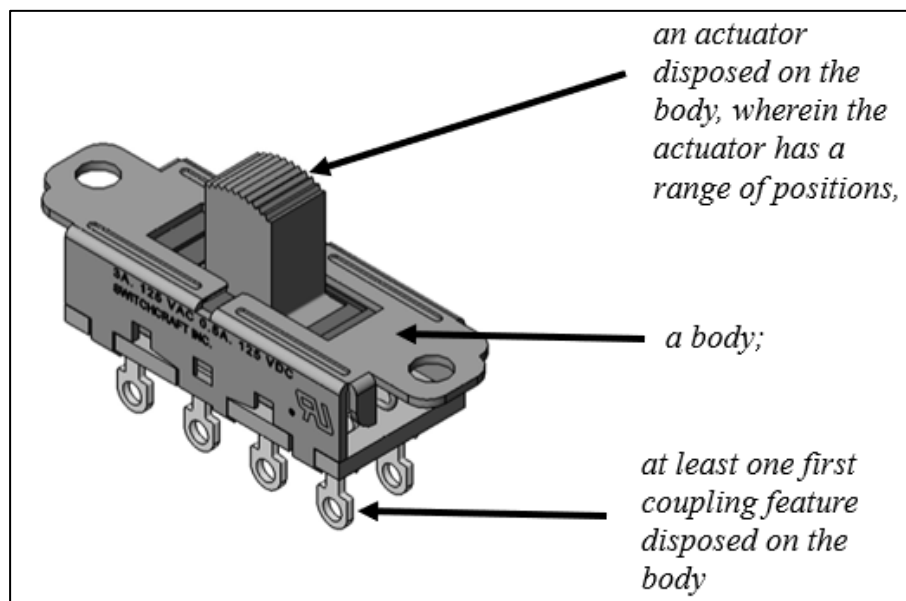
88. As I further testified during my deposition, a POSA also would have understood switch 18 as including the claimed “coupling feature disposed on the

body, wherein the at least one first coupling feature is configured to electrically couple to an electrical cable of the luminaire.” Ex. 1001, 15:25-28. Chaimberg states that the “switch 18 is mounted on the cable 15 adjacent to the LED light fixture housing 12.” Ex. 1003, 3:49-51. Figure 1 above shows switch 18 between two sections of the cable 15, so a POSA would understand that there must be an interconnect, or “coupling feature,” for electrically coupling the switch 18 to the upstream and downstream sections of the cable. Therefore, Chaimberg requires a coupling of switch 18 to cable 15, or “mounting” of switch 18 onto cable 15 by any of the methods by which a switch is electrically connected to a cable or any conductor—namely, terminal connections, wire pair, pin or tab soldering, compression fittings, etc.

89. Additionally, it was well known in the art at the time of the '336 Patent that a toggle switch, such as Chaimberg's switch 18, includes both a “body” and “at least one first coupling feature disposed on the body.” Ex. 1001, 15:24-26. For example, the figures below show a typical three-position toggle and a slide switch from Switchcraft that was readily available for purchase off the shelf at the time of the '336 Patent:



Ex. 1028 (annotated).



Ex. 1029 (annotated).

90. As shown in the figures above, three-position toggle switches included a body and at least one coupling feature disposed on the body. Moreover, I understand that in Dr. Krames's Deposition, he confirmed that standard slide

switches (and other similar mechanical switches) included the claimed (a) body, (b) at least one first coupling feature disposed on the body, and (c) an actuator disposed on the body, wherein the actuator has a range of positions. *See* Ex. 1031, 155:21-156:20.

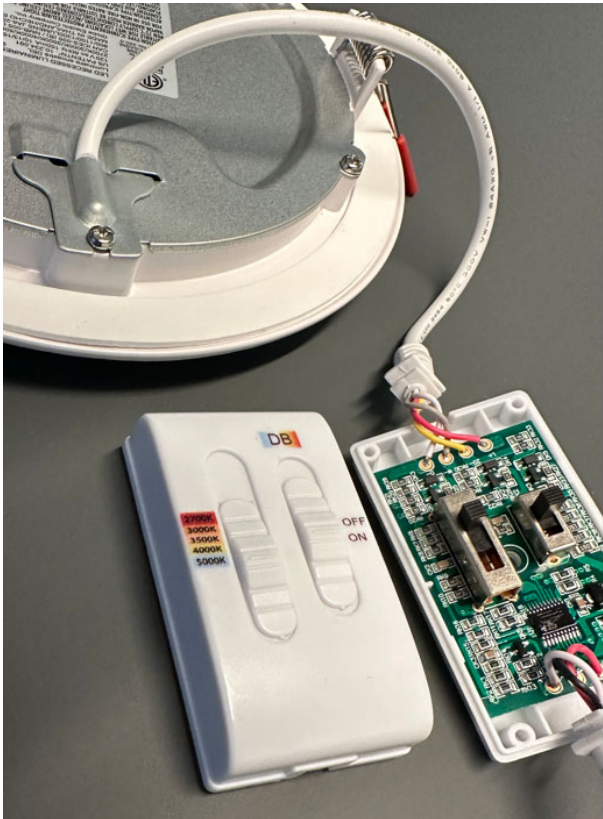
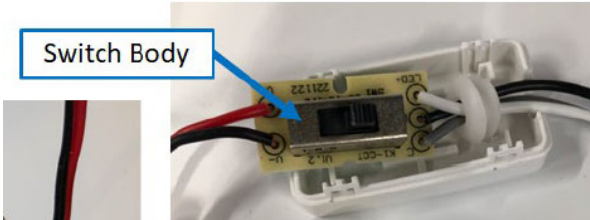
91. I understand from counsel that the Patent Owner argues that switch 18 could be wireless, and hence lack coupling features. I disagree. Chaimberg's switch 18 is described as "a toggle switch provided with a slide button 31 having two conducting arms 32 and 33 and displaceable to three switch positions." Ex. 1003, 4:35-37, Fig. 3. The slide button indicates that Chaimberg intended for the user to manually move the switch button using their finger. A toggle switch requires a user to manually move the actuator for switching to occur, so Chaimberg did not intend to communicate a wireless switch. Fig. 3 additionally shows that conductor arms 32 and 33 bridge different contact points based on slide button 31, thus controllably directing current to each of the LEDs. Dr. Krames's comments during his deposition indicate his opinion that Fig. 3 is deficient. Ex. 1031, 78:8-14. However, as I iterated in my original declaration, Chaimberg is not explicit concerning basic aspects of electrical circuits that would have been known to undergraduate students in electrical engineering. Ex. 1004, ¶ 128. A POSA would certainly know something as rudimentary as where a mains voltage is supplied in a driver circuit. Thus, to the extent Chaimberg Fig. 3 includes any deficiencies, it is of no

consequence. Indeed, Dr. Krames himself had patents that incorporated this well-known method of CCT tuning in 2004 and 2014. A POSA would have had the knowledge of such references when reviewing Chaimberg years later in 2018.

92. Additionally, I see no description in Chaimberg that indicates an intention to implement a wireless switch. For example, there is no description of a wireless receiver and transmitter which would be required for the switch to wirelessly communicate with the luminaire. In fact, as seen above in Figure 1, Chaimberg's electrical cable 15 is "secured at a far end ... to a driver circuit" and is "secured at [the other] end" to "the light housing 12 and has wires therein secured to the two sets of LED's to supply driving current to each of the sets." Ex. 1003, 3:18-23. The switch 18 is a toggle switch "mounted in the cable" to control the flow of electrical current to the respective sets of LEDs. *See, e.g.*, Ex. 1003, 4:30-5:10. Chaimberg explains that the switch 18 has conductor arms 32, 33 that move based on the position of the slide button 31 to enable current to be controllably directed to Chaimberg's 3000 K and 5000 K LEDs for achieving a desired CCT. Given this arrangement, with the switch 18 including conductor arms 32, 33 for controllably steering current to different sets of LEDs, a POSA would have understood Chaimberg's switch 18 as being a wired, in-line switch with "at least one first coupling feature disposed on the body, wherein the at least one first coupling feature

is configured to electrically couple to an electrical cable of the luminaire.” Ex. 1001, 15:25-27.

93. Further, my analysis of Globe Product Nos. 92291 and 91458, which embody Chaimberg, confirms my opinion that Chaimberg alone, or in view of Roberge, renders obvious claims 13, 15, and 16 of the '336 Patent. As discussed above, both products include CCT switches. Moreover, as shown below, the CCT switch in Globe Product No. 92291 is structurally similar to the switch of Menard SKU 348-2107 that Dr. Krames referenced in his declaration. Ex. 2031, ¶ 154. In particular, Globe Product No. 92291 employs a slide switch mounted onto a PC board, precisely as described in the '336 Patent. The switch of Globe Product No. 92291 is, as shown earlier and below, a standard slide switch—which Dr. Krames, the '336 Patent specification, and I agree includes a body, an actuator disposed on the body, and one or more [electrical] coupling features disposed on the body. *See* Ex. 1031, 155:21-156:20.

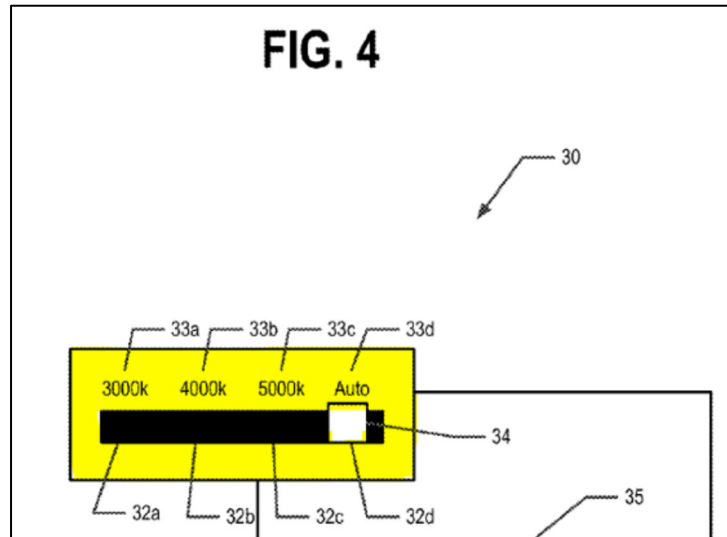
Globe Product SKU No. 92291	Ex. 2031, ¶ 154 (annotation in original)
	

94. The switch of Globe Product No. 92291 confirms what a POSA would have known from reviewing Chaimberg – namely, that Chaimberg discloses (and/or renders obvious) a CCT switch electrically coupled to a cable of the luminaire. Indeed, Chaimberg’s switch is inserted into the cable in a manner similar to that shown in the ’336 Patent..

ii. Halliwell

95. Halliwell discloses and/or renders obvious the “body” and “at least one first coupling feature” limitations of claim 13. Ex. 1001, 15:24-26.

96. The exemplary CCT switch 30 shown in Fig. 4 includes a body, highlighted below in yellow, on which switch selector 34 is mounted:

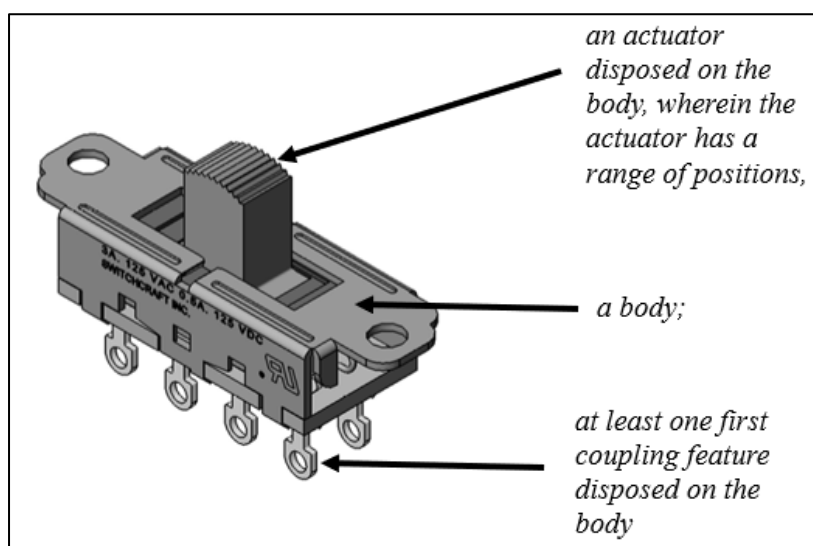


Ex. 1012, 9 (cropped and color added).

97. I understand from counsel that Patent Owner argues that switch 30 does not have a body because it is integrated into the lighting device housing. I disagree. I find no description in Halliwell suggesting that switch 30 is integrated into the housing, or that switch 30's indicators are located directly on the device housing. In fact, Halliwell repeatedly describes switch 30 as being "mounted" on the device. A POSA would understand that mounting a switch on a device entails simply disposing the switch, along with its body, on the device. Mounting does not mean that parts of a switch are removed from the switch body and directly integrated onto another device. Mounting simply refers to affixing or disposing a switch, with its body, onto

another structure. A switch, once mounted on another device, remains a distinct and independent component with its body intact.

98. Further, Halliwell describes the switch 30 of Figure 4 as a slide switch. A POSA would have understood a slide switch to include a body. For example, the figure below shows a typical three-position slide switch from Switchcraft that was readily available for purchase off the shelf at the time of the '336 Patent:



Ex. 1029 (annotated).

99. As shown in the figure above, it was well known that a slide switch includes a body with an actuator and at least one coupling feature disposed on the body. Additionally, the other types of switches disclosed in Halliwell, such as a toggle switch or a dial switch, were also known by a POSA to include a body with an actuator and at least one coupling feature disposed on the body. *See, e.g., Ex. 1012, 17:39-42, 18:28-31.*

100. Halliwell also discloses that the “electrical components of the LED lighting device 20 (e.g., the driver circuitry 19, switch control unit 35, and/or the like) may be configured to be directly wired to line voltage (e.g., through a junction box) or may be configured to be connected to line voltage through a power cord comprising a two- or three- prong polarized plug.” Ex. 1012, 7:8-19. A POSA would have understood well that when the “electrical components” are “directly wired to line voltage” as disclosed in Halliwell, the LED luminaire would necessarily include an electrical cable that electrically connects (“couples”) the luminaire and junction box. *Id.* If the CCT switch is mounted in the junction box as described by Halliwell, and the “electrical components” are “directly wired to line voltage” as disclosed in Halliwell, the “junction box mounted” CCT switch would necessarily be electrically connected to the electrical cable. *Id.*

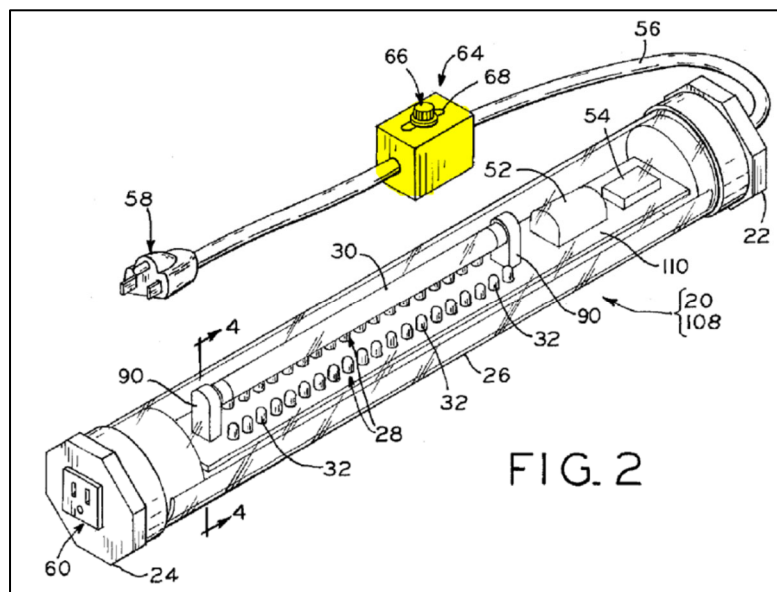
101. I understand from counsel that Patent Owner argues that Halliwell uses some other cable that is not a cable of the luminaire. I disagree. The connection to line voltage as described in Halliwell is established by using an electrical cable of the luminaire. As I testified during my deposition, it is common for a luminaire to have its own electrical cable that can be plugged in or connected to a power source, such that Halliwell at least renders obvious the claimed “electrical cable of the luminaire.

102. To clarify my position on “electrical coupling,” the claimed electrical coupling does not require a direct connection. I testified as such during my deposition, and clarified that there can be intervening components between the switch and the cable such as sections of wire or other conductive elements. Ex. 2030, 87:15-88:5.

iii. Reiff

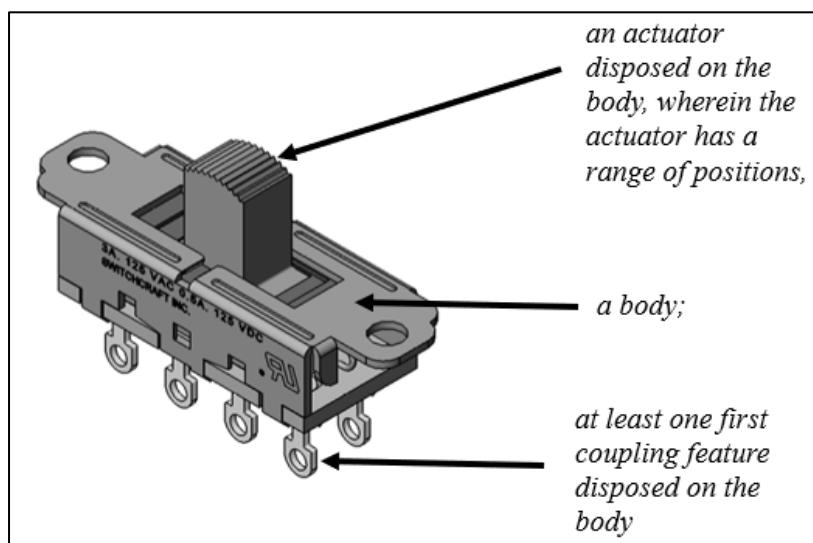
103. As I explained in my original declaration, Reiff discloses the claimed “body” and “coupling feature.”

104. Reiff’s light device includes “a control box 64 which *includes a switch* [emphasis added]... for ... selecting between the different light sources.” Ex. 1013, 4:28-36. The “switch 66 ... is a stepped dimmer switch linearly slidable in slot 68 to select light source 28.” *Id.* The control box, including the switch, has been highlighted in yellow in Fig. 2 below:



Ex. 1013, Fig. 2 (color added).

105. Based on Reiff's description, a POSA would have understood switch 66 to be a slide switch. As explained above, at the time of the purported invention, a POSA understood slide switches as including both a "body" and "coupling feature." Indeed, such switches were readily available for purchase off the shelf.



Ex. 1029 (annotated).

106. I understand from counsel that Patent Owner characterized my deposition testimony as stating that Reiff's switch does not have a body, which is inconsistent with my original declaration. However, that is not what I said. I simply clarified that the yellow-highlighted portion of Figure 2 above represents the control box, which includes the switch—exactly as stated in my original declaration and as Reiff itself describes. Ex. 2023, 138:15-25. My testimony simply clarified that control box 64 itself is not the switch; it includes the switch body for switch 66.

107. I understand that in his declaration, Dr. Krames opined that Reiff could be electrically coupled to a battery and wireless transmitter so that it would not need a “coupling feature” to “electrically couple to an electrical cable of the luminaire.” Ex. 1001, 15:25-27. However, Reiff neither mentions nor hints at a battery or a wireless transmitter. Reiff describes its switch as an “in line” switch located between two sections of an electrical cable. Ex. 1013, 1:8-10. A POSA would have understood that in line switches are not wireless, and that they include a coupling feature configured to electrically couple to an electrical cable of the luminaire. Reiff’s description would lead a POSA to understand that switch 66 includes coupling features, such as spade lugs, for electrically coupling to upstream and downstream sections of cable 56. This enables the switch 66 to receive “conventional 120-volt power” from “a conventional electrical outlet” and appropriately direct electrical current to a desired light source (e.g., the fluorescent or LED light source). Ex. 1013, 4:16-19.

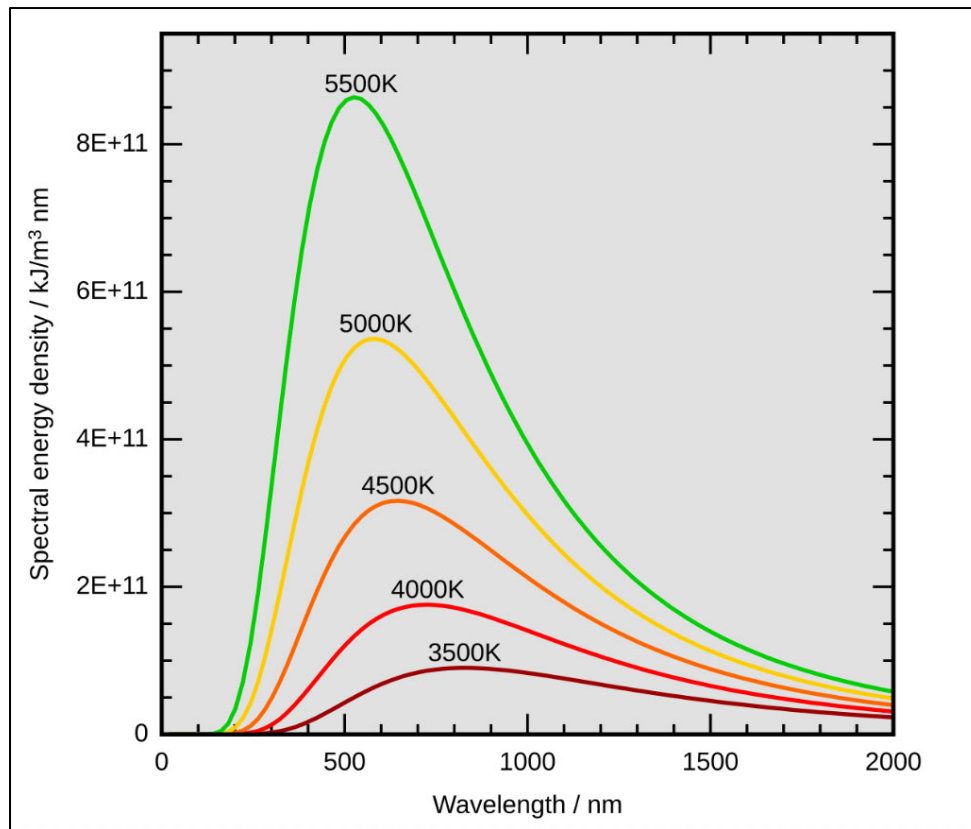
C. Reiff’s Switch Is A CCT Switch

108. As I explained in my original declaration, Reiff’s light fixture includes a fluorescent light source 30 and an LED light source 32, each of which emits a different spectrum of light. Because Reiff’s light sources 30, 32 emit light having different spectra and, as discussed in the paragraphs to follow, both sources are associated with specific values of the CCT, employing Reiff’s switch 64 to select

between the two sources satisfies the '336 patent language requiring the CCT switch to enable a selection of CCT.

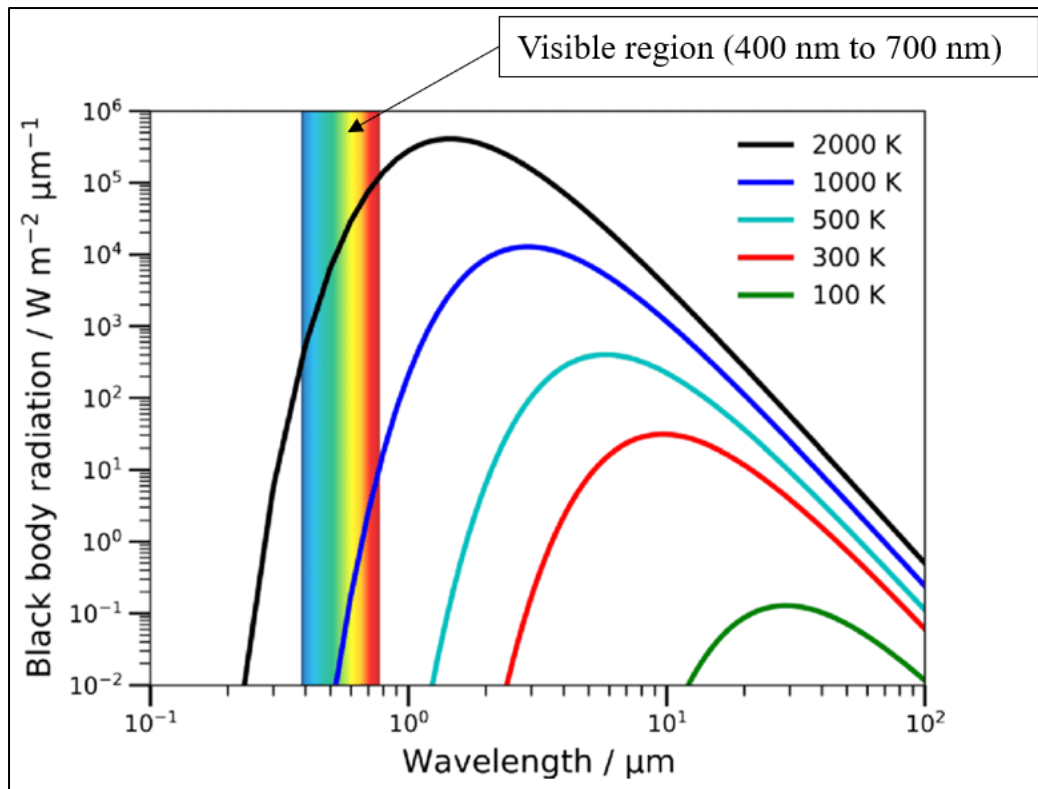
109. I understand from counsel that Patent Owner argues that Reiff does not offer CCT selection because it refers to red and blue light sources, and that a POSA would not understand CCT to describe saturated or monochromatic colors. This position, adopted by both the Patent Owner and Dr. Krames, is incorrect. A brief background on CCT is warranted.

110. The concept of CCT to describe the spectrum of light emitted by a lamp or luminaire had its origin in describing the light emitted by the Sun. This concept is based on the spectrum of light produced by a “blackbody radiator” such as the Sun, glowing embers in a fire, or a tungsten filament in an incandescent light bulb. Planck’s equation predicts the full spectrum (from infrared to ultraviolet) produced by a blackbody radiator having a specific temperature, known as the blackbody temperature (T) which is expressed in degrees Kelvin (K). The graph below shows the spectra of a “Planckian radiator” for different values of T , ranging from 3500 K to 5500 K . Any emitter of light whose spectrum matches, or closely approximates, the form of the spectra shown below (*i.e.*, as described by Planck’s equation) is known as a Planckian radiator. CCT is a way of describing that spectrum. The CCT is “correlated,” or intertwined, with the Planckian spectrum. CCT, therefore, has little or no meaning apart from its associated Planckian spectrum.



Ex. 1043, 1.

111. For color temperatures in the 3500 K to 5500 K interval shown above, much of the light emitted by a Planckian radiator is emitted in the visible region, i.e., 400 nm to 700 nm. As a reference point, blue and red lights have wavelengths in the ranges of approximately 420-480 nm and 610-700 nm, respectively. Outside of the 3500 K to 5000 K interval, as shown in the figure below, only the 2000 K Planckian radiator produces significant light in the visible region. The 1000 K Planckian radiator produces more red light than yellow, and it produces almost no blue light. Note, too, that the vertical axis (“y-axis”) of the graph is logarithmic, and so, much more red light is produced than is yellow light.

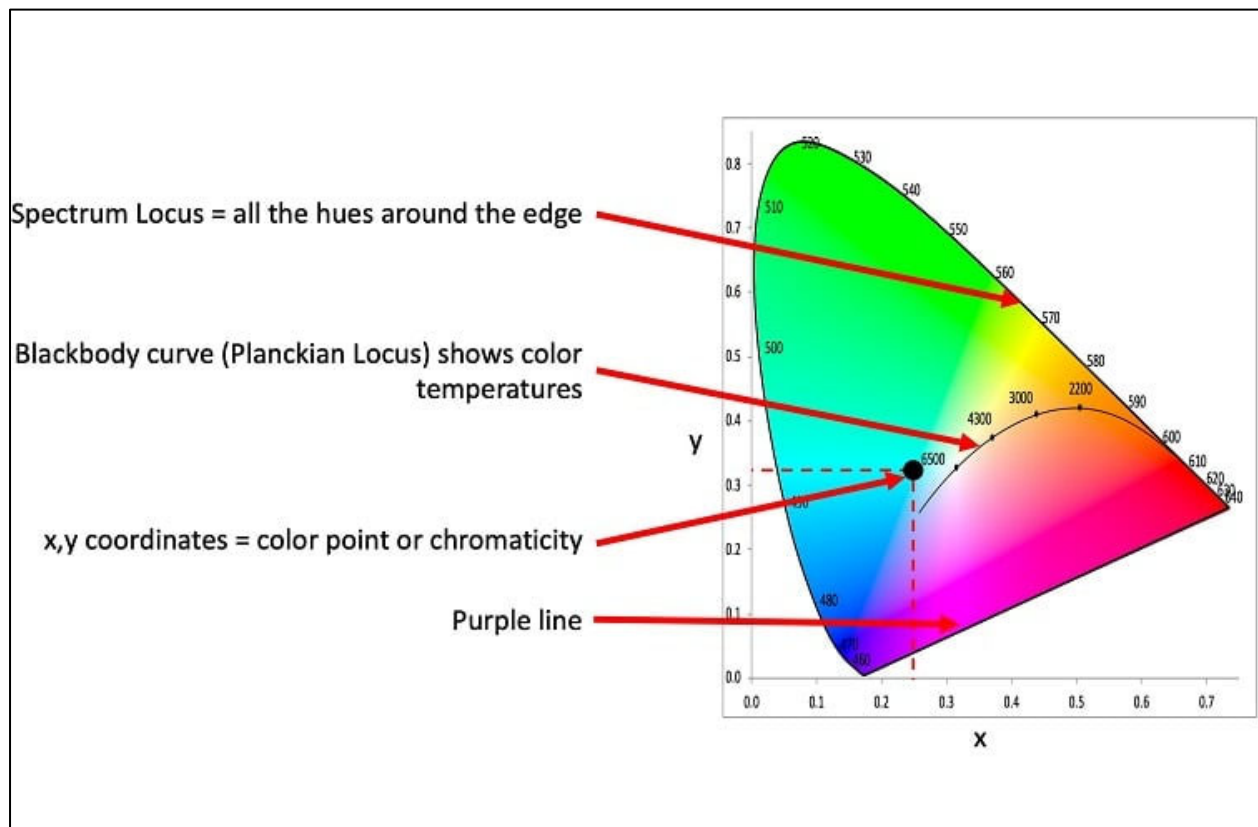


Ex. 1041, 1127 (annotated).

112. This graph thus confirms that Planckian radiators having CCT values of 1000 K or lower do, indeed, emit **red** light. Therefore, it is quite straightforward for a POSA to choose red LEDs having an emission spectrum correlated with CCTs between 800 K and 1000 K.

113. I reiterate an important point here: The color temperature T is inextricably linked to spectra – such as those above – given by Planck’s equation. As noted above, such light emitters are known as Planckian radiators. The temperature T has little meaning if separated from the spectral profile (shape) given by Planck.

114. Further, the diagram shown below is known as a chromaticity diagram which portrays, within the “horseshoe-shaped” diagram, the entire gamut of colors available to the human eye. The visible light produced by a lamp or luminaire can be categorized by the chromaticity coordinates x and y which are on the axes of the graph below. That is, the light produced by any light source can be uniquely described by the chromaticity coordinates. Notice that the three-digit numbers around the perimeter of the “horseshoe” represent the wavelength of light at that point of the diagram. Notice also on the right that the Planckian locus extends past 610 nm (*red*) and, on the left, the Planckian locus continues (although unlabeled) into the deep-*blue* region.

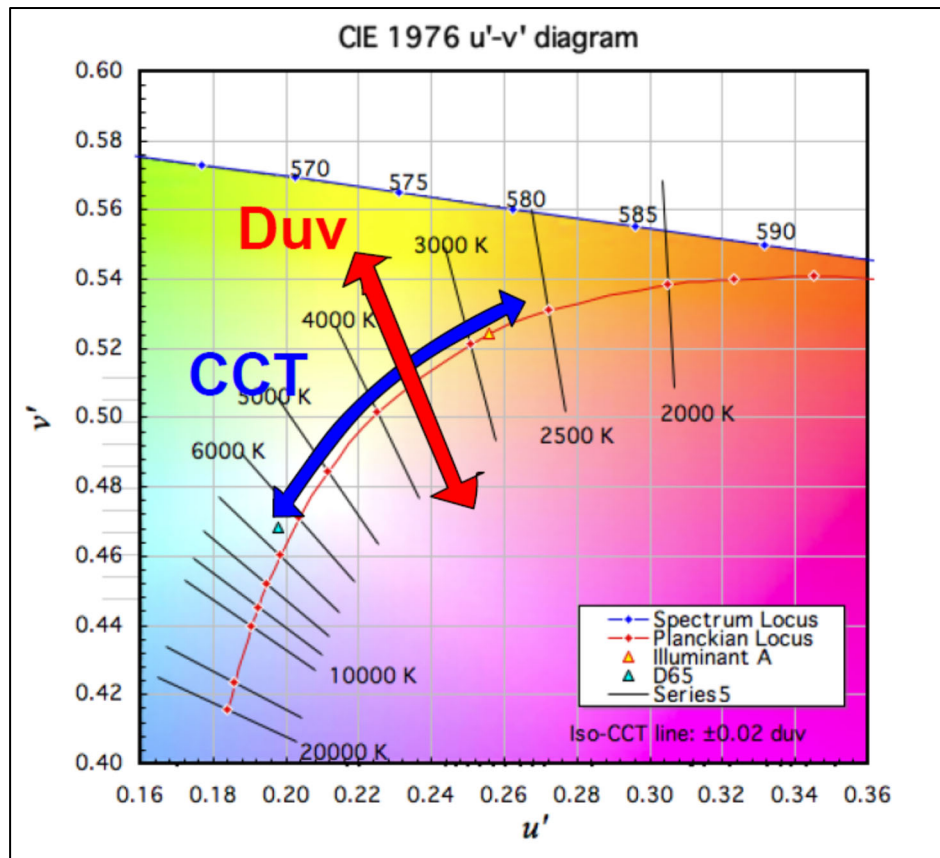


Ex. 1039, 2.

115. As labeled in the chromaticity diagram above, the black curve is known as the Planckian locus. This curve gives the x,y coordinates and the “CCT values” for a select group of lamps and luminaires – namely, Planckian radiators that emit the spectrum calculated by Planck. As explained with respect to the earlier two figures above, only those lamps and luminaires emitting light having spectra closely approximating or matching the blackbody (Planckian) spectra will be characterized by a CCT value as shown in this chromaticity diagram. For those lamps having chromaticity coordinates lying off the Planckian locus, the CCT has little or no meaning because, like blackbody temperatures, the CCT is “correlated,” or intertwined, with the Planckian spectrum. The CCT, therefore, has little or no meaning apart from its associated Planckian spectrum.

116. At this point, two summary comments should be made. The first of these is that Planckian radiators lie *only* on the black curve in the above diagram. Therefore, virtually all of the spectra and color combinations that lamps are capable of creating cannot be described by the CCT, but only by the lamp’s chromaticity coordinates. That is, Planckian radiators occupy only a minute portion of the chromaticity diagram and many applications of lighting will have coordinates that are far removed from the small region occupied by the Planckian locus. The second comment is that only a portion of the Planckian locus represents lamps emitting

white light. One only has to consider the CCT values of commercially-available lamps and luminaires, which typically range from 2700 K to 5000 K. Notice in the figure immediately above that lamps having CCT values below 2000 K are associated with lamps emitting orange light. Also, as discussed previously, a Planckian radiator having a CCT of approximately 1000 K or less will emit mostly red light in the visible region. Therefore, the concept of CCT is *narrow* in the sense that a lamp's chromaticity coordinates must lie on, or quite close to, the Planckian locus. However, the concept of CCT is also *broad* in the sense that a Planckian radiator can also emit red light almost entirely (neglecting the infrared light that cannot be seen) if T is 1000 K or less, or blue light almost entirely if T is 10,000 – 15,000 K or beyond. This is clearly illustrated in the CIE chromaticity diagram cited by Dr. Krames himself at ¶123 of his declaration.



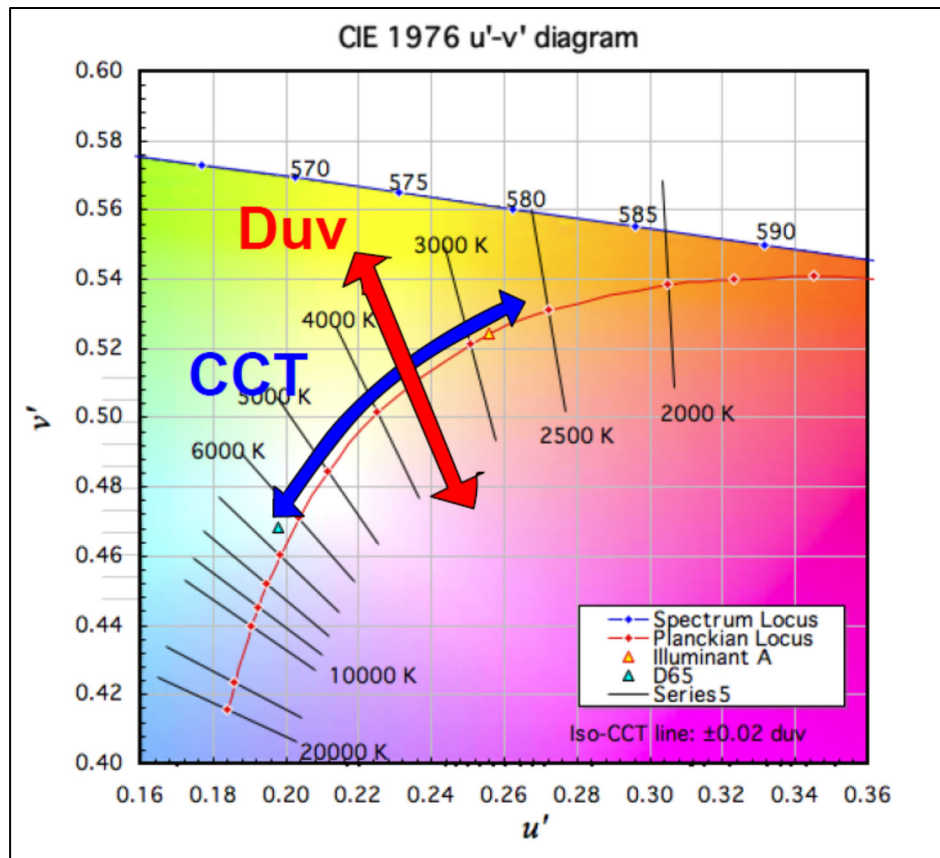
Ex. 2031, ¶ 123.

117. In short, a CCT value for a lamp is meaningful only if the spectrum emitted by that lamp is described by chromaticity coordinates (x,y or u,v) that lie on the Planckian locus, or are exceedingly close.

118. Dr. Krames's comment that a POSA would have readily understood that "two different colors do not necessarily correspond to two different correlated color temperatures" is both incorrect and a classic *non sequitur* because, as described above, only the (x,y) or (u,v) chromaticity coordinates accurately describe the "color" produced by a lamp that lies off the Planckian locus. Ex. 2031, ¶126. In contrast, CCT values are defined to represent only the spectrum emitted by lamps

whose coordinates lie on the Planckian locus or (to quote Taru Oksala, whom Dr. Krames cites to at ¶126) “at least very close to it.” *Id.* Consequently, CCT values given by the Planckian locus have little or no relation to the subjective “colors” of the “yellowish-green” and “pinkish-purple” lamps described by Dr. Krames and Taru Oksala. Ex. 2031, 70-72. *This issue is the very core of the confusion Patent Owner and Dr. Krames describe that inevitably results from attempts to assign a CCT value to lamps having chromaticity coordinates lying off the Planckian locus.*

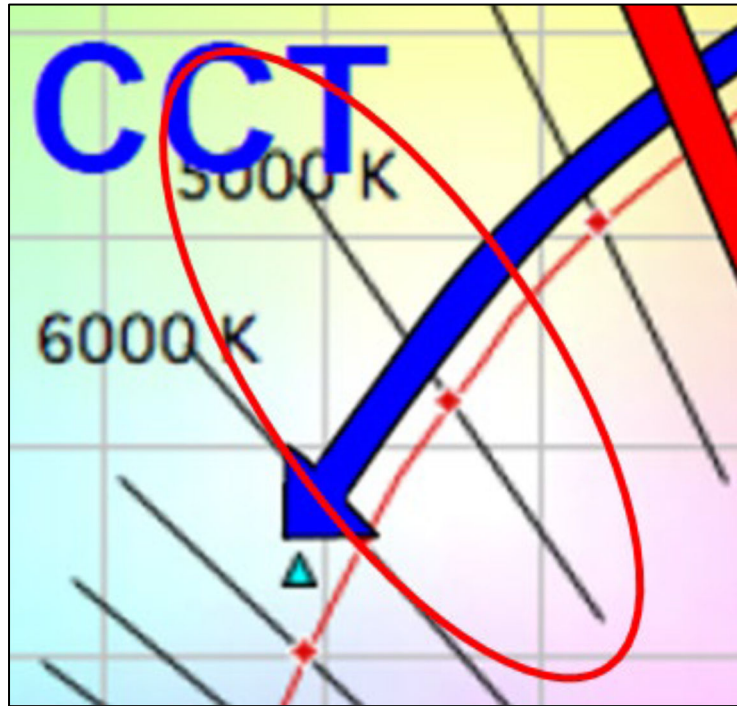
119. Additionally, the annotated CIE chromaticity diagram given by Dr. Krames (at 71), and the discussion that follows, illustrates the use of D_{UV} , and consequently, the incorrect conclusions that can easily be reached. The graph cited by Dr. Krames, reproduced from a 2011 conference, is given below:



Ex. 2031, ¶123.

120. This CIE 1976 diagram presented by Dr. Krames indicates correctly (with the blue arrow) that the CCT value for any lamp having chromaticity lying on the Planckian locus (the red curve) is determined by the Planckian locus alone. However, the figure also shows the D_{UV} value for a given lamp (represented by the red arrow) which Patent Owner and Dr. Krames *incorrectly* represent as CCT values. According to the Illumination Engineering Society, the organization responsible for setting national standards regarding key metrics of light sources, “it has been increasingly common to *augment* CCT with distance from the Planckian locus (D_{UV} or Duv).” Ex. 1042, 9. Therefore, the D_{UV} value represents the distance of a lamp’s

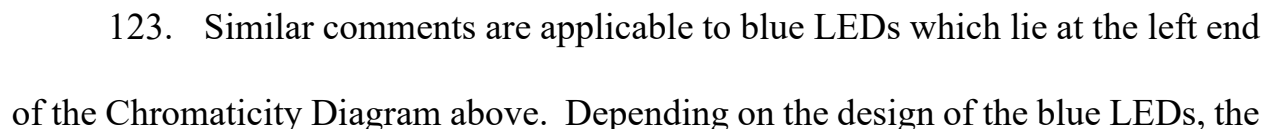
chromaticity coordinates to a point on the Planckian locus, and not CCT, as Dr. Krames incorrectly opines. It follows that the D_{UV} line that Dr. Krames highlighted (reproduced below), as allegedly showing that “every point [on] that line corresponds to [the same] CCT value” is incorrect. Ex. 2031, 73.



Ex. 2031, ¶123 (cropped and annotated).

121. Accordingly, contrary to Dr. Krames’s assertion, the CIE 1976 diagram above is not illustrating that different colors having the same CCT. It is simply illustrating what I explained above: CCT has little or no meaning apart from its associated Planckian spectrum. The lines that Dr. Krames relies on are not indicating CCT; they are indicating a completely different measure— D_{UV} .

Ex. 1040, 12.



LED spectrum will closely match Planckian spectra having CCT values extending from approximately 15000 K to beyond 25000 K.

124. In summary, the fact that Reiff does not specifically mention CCT is of no consequence. I am not a lawyer but my understanding is that it is only necessary for Reiff to meet all of the limitations of a given claim. Reiff has certainly done that.

125. I also note that Reiff uses the term “color” in referring to white light and not “monochromatic colors” only. For example, Reiff describes an LED that “emits a first color, red or white for example,” showing that Reiff’s use of the term “color” encompasses white light. Ex. 1013, 3:67-4:3. Claim 1 of Reiff recites that “said light colors are selected from the group consisting of white, red, green, blue, infrared, and ultraviolet light.” *Id.*, 6:43-45, 7:45-58. Reiff’s repeated inclusion of “white” within the selectable light “colors” demonstrates that Reiff does not limit “color” to monochromatic or saturated colors. Consequently, Reiff’s use of “colors” must not be interpreted as excluding light spectra that lie along the Planckian locus and are, therefore, characterized by a specific value of CCT. As discussed earlier, Planckian spectra can also be approximated closely by “monochromatic” spectra. This statement is particularly true in the red spectral region, as pointed out above.

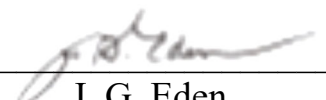
126. Thus, Reiff’s disclosure of selecting between light sources with different “colors” encompasses selecting between the fluorescent light source 30

(which produces white light from the primary colors) and the blue or red LED light source 32, all of which can be described by specific and different CCT values.

V. DECLARATION

127. I declare that all statements made herein on 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.

Dated: March 24, 2025

By: 
J. G. Eden