UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

APUTURE IMAGING INDUSTRIES CO., LTD.,

Petitioner,

v.

ROTOLIGHT LIMITED,

Patent Owner.

_____

Case No.: IPR2024-01424
U.S. Patent No. 10,197,257

_____

DECLARATION OF P. MORGAN PATTISON, PhD
IN SUPPORT OF PETITION FOR *INTER PARTES*
REVIEW OF U.S. PATENT NO. 10,197,257

TABLE OF CONTENTS

I, P. Morgan Pattison, PhD, hereby declare as follows:

I. INTRODUCTION

A. Engagement

1. I have been retained by Aputure Imaging Industries Co., LTD. to offer technical analysis and opinions relating to U.S. Patent No. 10,197,257 (Ex. 1001) (the "'257 Patent") and certain prior art references relating to its subject matter.

2. As far as I am aware, I have no financial interest in the Petitioner, Patent Owner, the '257 Patent, or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis at my standard consulting rate. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

3. I have been informed that the '257 Patent was challenged by Arnold & Richter Cine Technik GmbH & Co. Betriebs KG ("ARRI") in 2021-2022. I have reviewed the September 3, 2021 and September 9, 2022 declarations submitted by Michael Wood in which he opined that the claims of the '257 Patent are invalid based on Pohlert. I agree with Mr. Wood's conclusions regarding whether these claims are anticipated and/or obvious.

4. I submit this Declaration in order to present my opinions on '257 Patent and its relation to the prior art.

B. Background and Qualifications

5. I received my B.S. in Electrical Engineering, Electronic Devices and Materials from the University of California, San Diego, in 1996. From there, I worked as a laser test engineer at Cymer Laser in San Diego. During my time there, I tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products.

6. After working at Cymer Laser, I attended the University of California, Santa Barbara and received my M.S. in Electrical Engineering, Electronics and Photonics in 2003 and my Ph.D. Materials Science, Electronic and Photonic Materials in 2006.

7. In early 2006, I started working as a project manager for the U.S. Department of Energy where I managed DOE funded R&D projects in energy efficient LED and OLED based lighting technologies, so called solid state lighting (SSL). In this capacity I identified priority R&D areas to achieve the maximum energy savings, I managed R&D funding solicitations, and I managed DOE funded R&D projects covering all aspects of LED and OLED lighting technology including, light emitting devices (LEDs and OLEDs), power supplies, optics, integrated fixtures, lighting controls, and lighting applications.

8. In 2007, I founded and am still currently the President of Solid State Lighting Services, Inc. Part of the services we offer include providing technical, strategic, and market expertise in the areas of LEDs, OLEDs, lighting, displays, and optoelectronic materials and devices. We also provide services related to LED and lighting product failure and reliability evaluation. I have worked at Solid State Lighting Services, Inc. for almost 17 years.

9. Further details regarding my qualifications are included in my CV, which is attached hereto as Appendix A and incorporated by reference as if set forth in its entirety herein.

II. UNDERSTANDING OF THE GOVERNING LAW

A. Invalidity by Anticipation

10. I understand that invalidity of a patent claim may be established under the legal doctrine of anticipation. A determination that a claimed invention is anticipated requires a showing that each and every element of the claim is disclosed in a single prior art reference, either expressly or inherently, or that the claimed invention was previously known or embodied in a single prior art device, product, or method. Additional references may be relied upon in limited circumstances, to explain terminology in the anticipating reference, to show that the anticipating reference is enabling, or to show that a characteristic not disclosed expressly in the reference is nonetheless disclosed inherently.

11. I understand that under the doctrine of inherency, if a structure in the prior art necessarily functions in accordance with the limitations of a patent claim, the claim is anticipated. This doctrine also applies to inherent properties and inherent uses. For instance, if a claim to a new method recites the same steps as those disclosed in a prior art method using the same compound, then the new use is not patentable, and any benefit achieved by the claimed method will be considered to naturally flow from the prior method, even if that benefit was not recognized at the time the prior method was disclosed.

12. I understand that whether a reference is available as "prior art" is determined in accordance with 35 U.S.C. §102, which sets forth a number of subsections that define "prior art," or knowledge that is deemed to be within the public domain for purposes of ascertaining novelty.

13. A patent claim is invalid for anticipation under (post-AIA) §102(a) when:

> (1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention; or
>
> (2) the claimed invention was described in a patent issued under 35 U.S.C. § 151, or in an application for patent published or deemed published under 35 U.S.C. § 122(b), in which the patent or application,

as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

14. Thus, a timely publication printed in any country, or a timely public use, sale, or offer for sale will invalidate a patent claim under 35 U.S.C. § 102(a)(1).

B. Invalidity by Obviousness

15. I understand that obviousness is analyzed from the perspective of a person of ordinary skill in the art (a "POSITA") at the time the alleged invention was made. I also understand that a POSITA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

16. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art, and in light of the general knowledge in the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

17. I understand that obviousness can be established by combining or modifying disclosures to the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to

combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

18. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known opinions within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

19. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness include failure of others, copying, unexpected results, information that "teaches away" from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that in order for objective indicia of non-obviousness to be applicable, the indicia must have some

sort of nexus to the subject matter in the claim that was known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged.

20. Finally, I understand that Patent Examiners at the U.S. Patent and Trademark Office ("USPTO") rely upon certain exemplary rationales in review patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is a list of exemplary rationales relied upon by Patent Examiners at the USPTO:

(A) Combining prior art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of a known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try"- Choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives

or other market forces if the variations are predictable to one of ordinary skill in the art; and

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

C. Materials Relied on in Forming My Opinions

21. In forming my opinions expressed in this declaration, I have relied on my own knowledge, experience, and expertise, as well as the knowledge of a POSITA in the relevant timeframe. In addition, I have reviewed and relied upon the following list of materials, and any other cited reference, in this declaration:

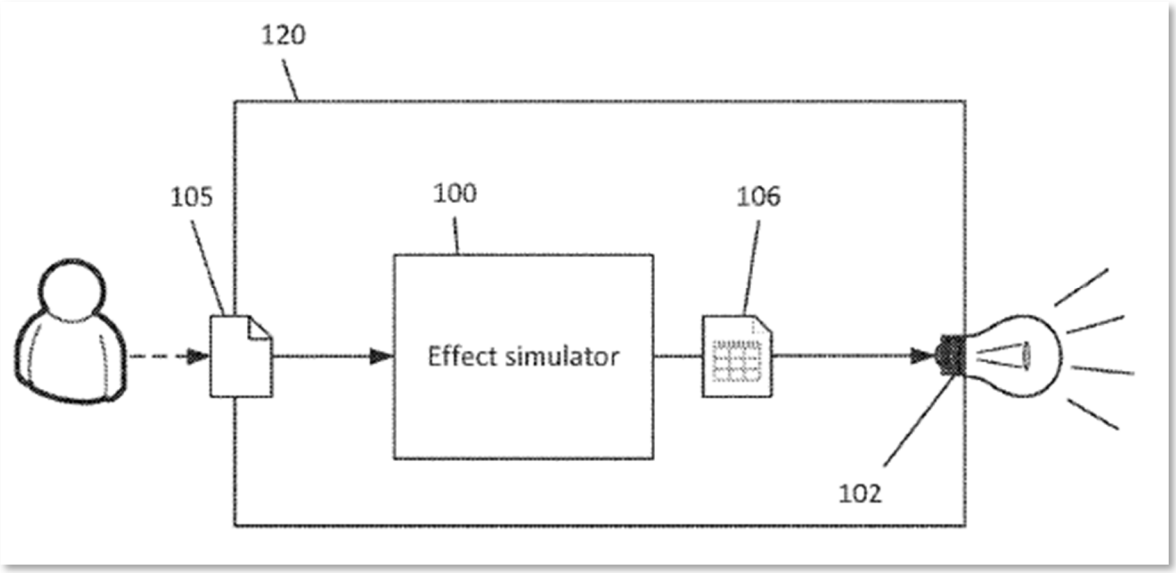
- U.S. Patent No. 10,197,257 to Gammons *et al.* (EX1001);
- Prosecution History of the '257 Patent (EX1002);
- U.S. Patent Application Publication No. 2005/0275626 to Mueller *et al*. ("Mueller") (EX1004);
- U.S. Patent No. 7,686,471 to Reichow ("Reichow") (EX1010)
- U.S. Patent Application Publication No. 2012/0044374 to Pohlert *et al.* ("Pohlert") (EX1011); and
- Declaration of Mike Wood submitted in connection with IPR2021-01496 ("Wood Decl.").

III. BACKGROUND OF THE '257 PATENT AND LIGHTING EFFECT TECHNOLOGY

A. The '257 Patent

22. Independent Claims 1, 15, and 20 of the '257 Patent recite a method, controller, and computer program, respectively, for "produc[ing] a user customisable lighting effect" having at least one of a random "brightness," "duration," or "interval." The independent claims recite two basic elements: (1) calculate a "time varying lighting value" based on a simulation parameter that (a) characterizes a user customizable lighting effect for use in videography, broadcasting, cinematography, studio filming, and location filming and (b) includes a parameter related to at least one of a random brightness, duration, or interval; and (2) output the "time varying lighting value" to a lighting device, so as to generate the user-selected lighting effect.

23. Figure 2 of the '257 Patent is a schematic diagram of a lighting system:



EX1001, Figure 2.

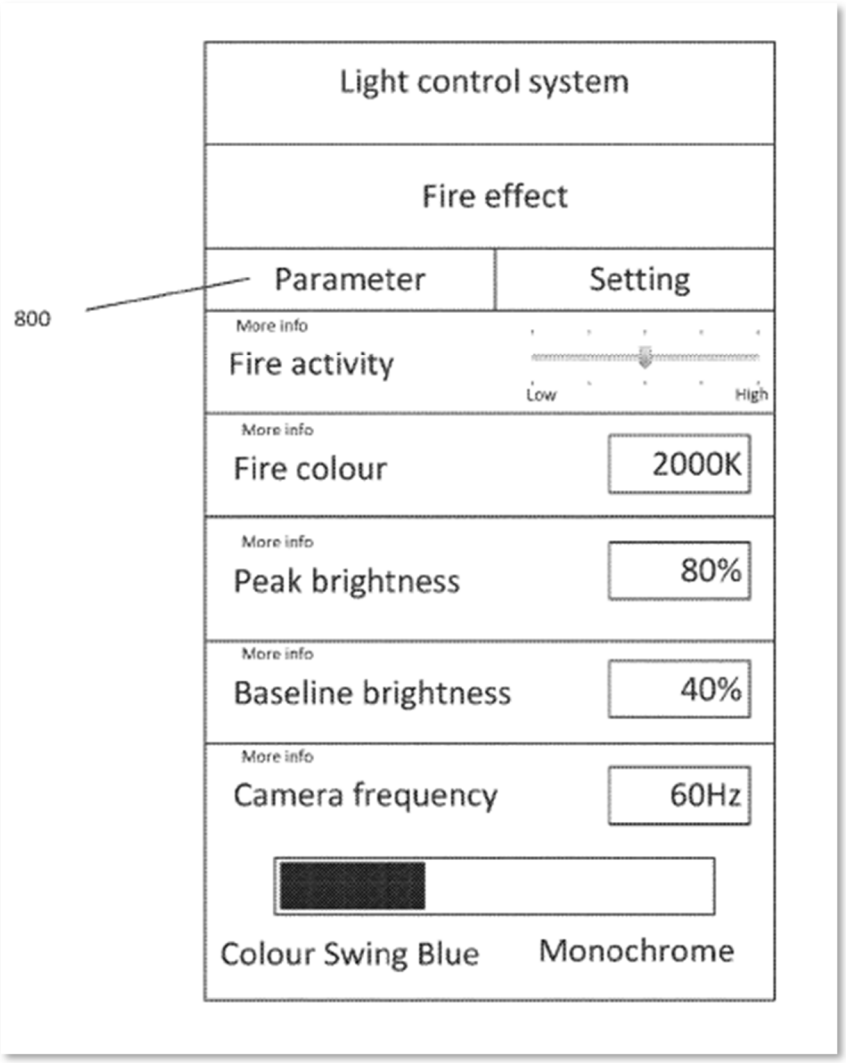
24. Figure 2 depicts a single studio lamp device (120) with an effect simulator (100) and a light (102) integrated therein. EX1001, 5:58-60. Figure 2 also depicts

- an input interface (105), including a control panel for user input of parameters for simulating a lighting effect; and
- data (106) used to modulate light 102 such that the desired lighting effect is produced.

Id., 5:54-55, 6:1-5. Though it is not depicted in Figure 2, the ’257 Patent also discloses, “[a] microcontroller or other computing unit [that] is integrated in the lamp device **120** for performing calculations.” *Id.*, 5:65-67.

25. Using Figure 2 as a reference, the ’257 Patent describes how users can make selections of desired lighting effects on user interface 105. *Id.*, 6:1-8, 6:43-7:44. Depending on the desired effect, “simulation parameters,” such as “brightness,” “duration,” “colour,” and “frequency,” can be adjusted to customize the effect. *Id.*, 3:47-62; 6:44-7:12, 8:8-21; Fig. 6. These simulation parameters may be random or user-selected and are used by the “effect simulator” to calculate the data 106, or “time varying lighting values,” that characterize the lighting effect and are used to produce it on lighting device 102. *Id.*, 7:25-44, 8:14-48.

26. One example of a randomized effect that the ’257 Patent describes is “fire.” *Id.*, 6:43-63, 8:14-25, 9:51-65. Parameters, like color, minimum/maximum brightness, and fire activity, can be used to modify the effect. *Id.* Following these parameters, the effect will produce randomized sparks, or flicker. *Id.*



EX1001, Figure 6.

27. The ’257 Patent includes 21 claims, three of which are independent. Claim 1 recites:

> 1. A method for controlling a lighting device to produce a user customisable lighting effect, the method comprising:
>
> calculating, using an effect simulator, a time varying lighting value based on at least one simulation parameter; wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming; wherein said at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval; said simulation parameter depending on the user customisable lighting effect being simulated; and
>
> outputting, from said effect simulator, said time varying lighting value thereby to simulate the user customisable lighting effect.

Id., Cols. 11:54-12:3. Claim 15 recites:

> 15. A controller adapted to control at least one lighting device to produce a user customisable lighting effect, the controller comprising:
>
> an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter; wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming; wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval; said simulation parameter depending on the user customisable lighting effect being simulated; and
>
> wherein an output of the effect simulator is adapted to control a lighting device according to the calculated variation of lighting over time.

Id., Cols. 12:57-13:8. Claim 20 recites:

> 20. A computer program comprising software code for controlling a lighting device to produce a user customisable lighting effect, the computer program adapted to perform, when executed, the steps of:
>
> calculating using an effect simulator a time varying lighting value based on at least one simulation parameter; wherein said at least one simulation parameter for characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming; wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval; said simulation parameter depending on the user customisable lighting effect being simulated; and
>
> outputting, from said effect simulator, said time varying lighting value thereby to simulate the user customisable lighting effect.

Id., 14:1-18. The ’257 Patent also describes a number of variants that correspond to dependent Claims 2-14, 16-19, and 21.

B. Prosecution History of the ’257 Patent

28. From my understanding, the ’257 Patent issued on February 5, 2019, from U.S. Patent Application No. 15/820,469 (the “’469 Application”). The ’469 Application is a continuation of U.S. Patent Application No. 15/481,460, and claims priority to U.S. Provisional Patent Application No. 62/319,809, filed April 8, 2016. In an Office Action dated February 21, 2018, the Examiner, in addition to rejecting the original claims as indefinite, rejected original claims 1-20 as anticipated by

US2008/0129226, published June 5, 2008 ("Dewitt"). The Examiner found that Dewitt discloses a lighting device for producing a range of user-customizable light effects for videography, adapted to (1) calculate a "time varying light value," based on a simulation parameter having at least one of random brightness, duration, or interval, and (2) output the value to a light to simulate the effect.

29. In response, the Applicant amended the independent claims and argued Dewitt teaches only a simulated "tea light" candle but does not teach simulation parameters characterizing a user customizable light effect selected from a range of different user customizable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming as recited in the amended claims. The '257 Patent subsequently issued on February 5, 2019.

30. The '257 Patent claims priority to a provisional patent application filed on April 8, 2016. EX1001, Cover. I have assumed, for purposes of this Declaration, that the '257 Patent is entitled to this Critical Date of April 8, 2016.

C. Entertainment Lighting Effects Systems

31. Starting in the late 1990's and continuing today, LED technology enabled a dramatic shift in the levels of control achievable with lighting technology. LEDs can emit light at a range of colors, can be integrated with optical down-converters to generate different hues of white light, and can be modulated (turned off and on and dimmed) very rapidly. These capabilities of LED lighting technology

enable the generation of innumerable effects by combining lighting colors with their modulation. Colors from the different LEDs can be combined to create different perceived colors and the LEDs can be modulated to generate changes in color over time which can then be used to simulate the light emitted from all sorts of natural and man-made phenomena. The control of the LEDs to achieve these effects boils down to controlling the drive current for the different color LEDs.

32. Many of these effects were not possible with previous lighting technologies since previous lighting technologies have limitations on the colors they can be engineered to emit, and they cannot be modulated as rapidly or as readily as LED technology.

33. The lighting effects described in the ‘257 Patent have long been used in the film, broadcast, and T.V. industry since before the advent of LEDs. Directors and producers have desired to provide a realistic a lighting arrangement so that the audience is fully drawn into the plot of the movie or program. Warm, dynamic light from a fire or light effects reflected from water help complete the illusion for the viewers.

34. Using LEDs for lighting effects has been commonplace due to their better efficiency, easier controls, and faster response times. LEDs were also available in multiple colors, so colored gels and filters weren’t required, and a single LED luminaire could perform many different tasks.

35. Many options, including LED lighting, were available for lighting effects generation in the film industry at the time of the earliest claimed date of the ’257 Patent. Luminaires were capable of producing effects and could be controlled either locally, through a control panel on the luminaire, or remotely through a data connection, such as the industry standard DMX-512 control protocol. Multiple luminaires could be connected to coordinate effects, such as showing lightning bursts from different directions or movement of light. All these systems and techniques were in common use at the time of the ‘257 Patent.

IV. CLAIM CONSTRUCTION AND POSITA DEFINITION

A. Claim Construction

36. It is my understanding that claims in an *inter partes* review are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.

37. I have analyzed the patentability of Claims 1-21 in the ’257 Patent based on their ordinary and customary meaning, unless otherwise stated below.

B. Definition of a Person of Ordinary Skill in the Art

38. A POSITA in the field of the ’257 Patent, as of April 8, 2016, would have had a good working knowledge of electrical engineering and entertainment lighting systems, controls, and effects. He or she would have gained this through an

undergraduate degree in electrical engineering or a comparable field as well as some experience in the field of entertainment lighting systems. The more education one has, the less experience needed to attain an ordinary level of skill. Similarly, more experience in the field may serve as a substitute for formal education.

V. THE LIMITATIONS OF CLAIMS 1–21 OF THE ’257 ARE DISCLOSED IN OR TAUGHT BY THE PRIOR ART

39. I have been asked to provide an analysis as to whether the elements of Claims 1-21 of the ’257 Patent (the “Challenged Claims”) are disclosed in two prior art references or combinations of references: (a) Pohlert, and/or (b) Mueller in view of Reichow (EX1010).

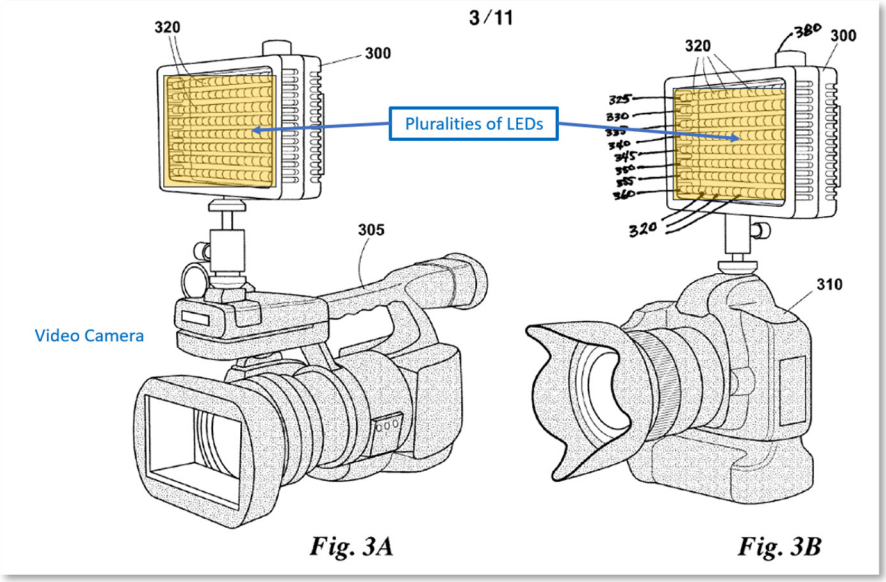
40. My analysis of these prior art references relative to the elements of the Challenged Claims—specifically, how and where the prior art references disclose or teach the limitations of the Challenged Claims—is provided below. The citations that I have included are not intended to provide an exhaustive list, but rather provides examples of how the references disclose or teach the elements of these claims.

A. Ground I: Pohlert Anticipates or Renders Obvious Claims 1-21

1. Overview of Pohlert

41. I have reviewed Pohlert. EX1011. I understand Pohlert to have published on February 23, 2012, which is before the claimed priority date of the ’257 Patent. My review of the ’257 Patent’s File history shows that Pohlert was not considered during prosecution of the ’257 Patent.

42. Pohlert discloses a "lighting and effects generation system" that includes LED lamps in a lighting frame with a connected and dedicated "power controller." EX1011, [0051], [0057]. The power controller includes (1) a user interface to select and customize lighting effects, including lighting patterns based on "pseudo-random" sequences of strobing and flashing groups of LEDs; (2) an "effects generator" that generates selected effects; and (3) switches that convert the generated effects into power control signals output to the LEDs.



EX1011, Figures 3A-3B (annotated). Pohlert also depicts and describes the components power controllers described therein:

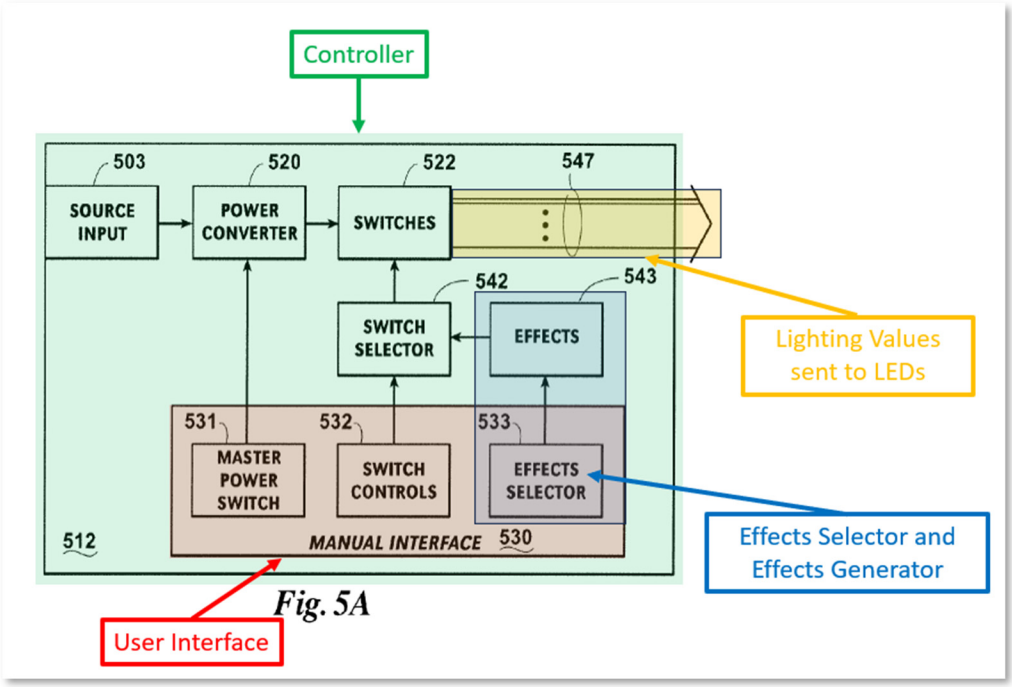


Fig. 5A

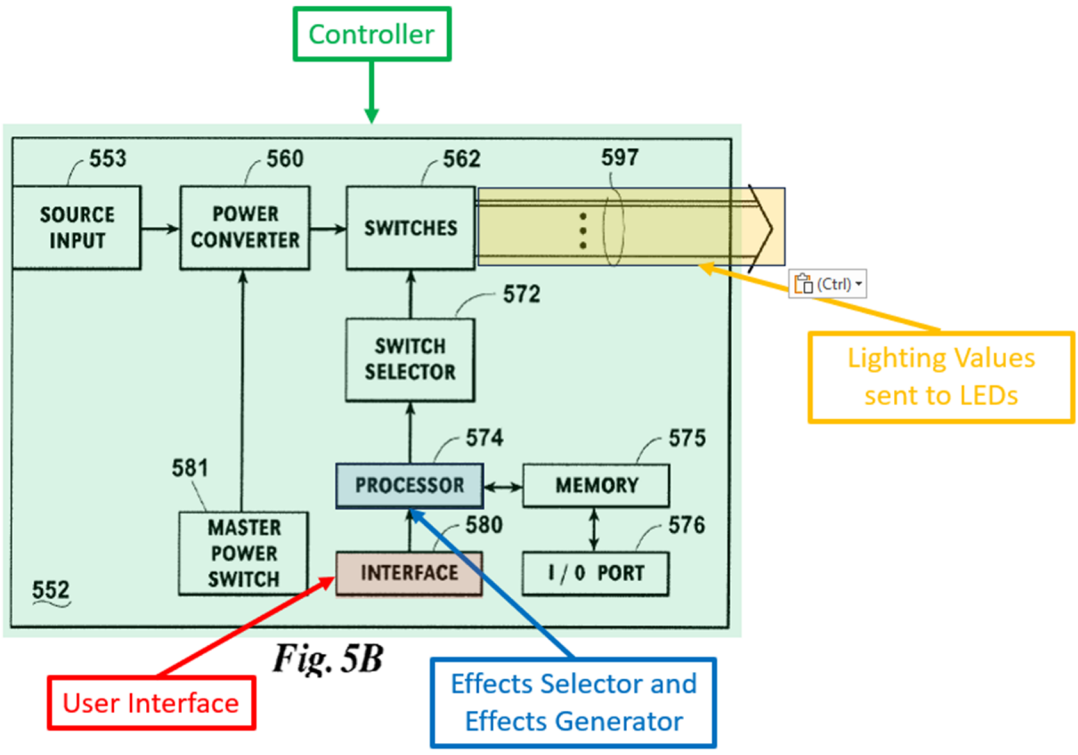


Fig. 5B

Id., Figures 5A-5B (annotated).

2. Claim 1

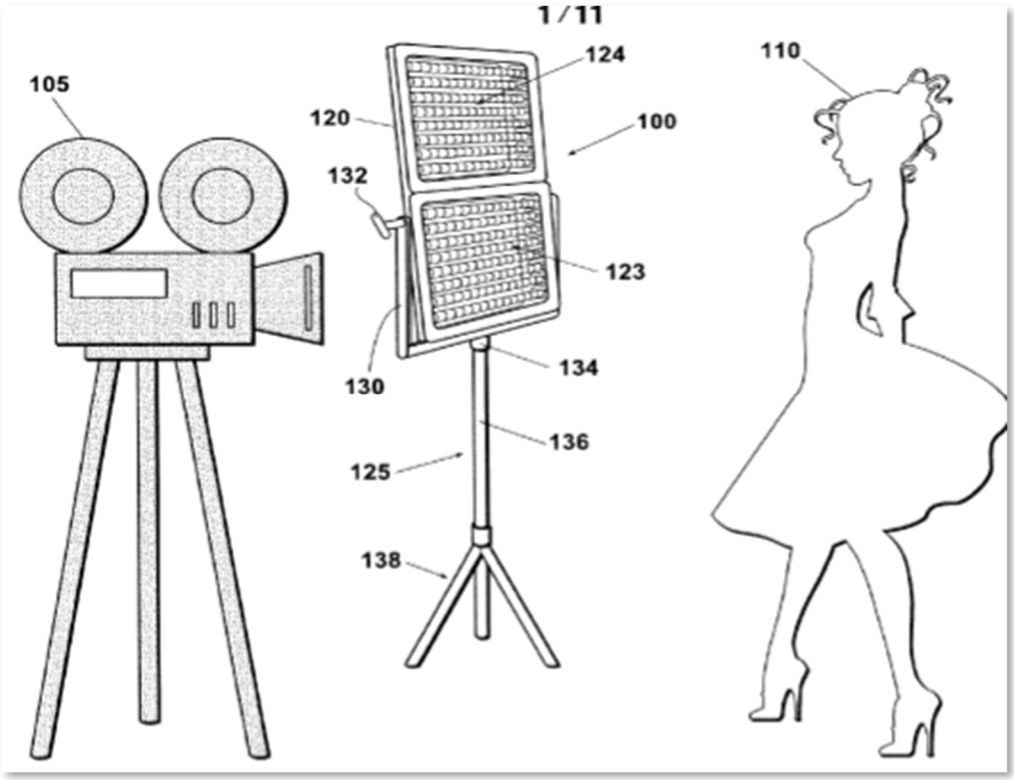
a. Claim Element 1p

43. The preamble of Claim 1, designated Claim Element 1p herein, recites "A method for controlling a lighting device to produce a user customizable lighting effect, the method comprising:" EX1001, 11:54-55.

44. It is my understanding that a patent claim's preamble does not limit the scope of the claim except in limited circumstances. If the preamble of Claim 1 is not limiting, then it does not impact the validity of Claim 1. For the purposes of this declaration, I assume that the preamble of Claim 1, and the preambles of independent Claims 15 and 20, are limiting and must be considered for the purposes of evaluating the validity of these claims.

45. Regardless, Pohlert discloses Claim Element 1p.

46. Pohlert discloses a method for controlling a lighting system with LED "light panels" controlled by a power controller permitting users to select and modify lighting effects, such as patterns of strobing, flashing, and dimming and brightening the lights. EX1011, Abstract, [0020], [[0050], [0063], [0067], [0103]. The method can be used for "photography, film, television, and other applications." *Id.*, [0003]. Figure 1 illustrates use of the lighting system with a video camera that may be "a motion picture type camera." *Id.*, [0052].



Id., Figure 1.

47. Therefore, Pohlert discloses Claim Element 1p.

b. Claim Element 1a

48. Claim Element 1a recites "calculating, using an effect simulator, a time varying lighting value based on at least one simulation parameter;" EX1001, 11:56-58.

49. Pohlert discloses Claim Element 1a.

50. The '257 Patent describes the "effect simulator" as a component that "creates data 106 characterising a lighting effect." EX1001, 7:45-50; *see also id.*, 5:51-55. Further, it describes the "time varying lighting value" as data or signals that

contain brightness or color values that vary over time to produce desired effect. EX1001, 8:36-48; 8:55-57.

51. Pohlert discloses an "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs to generate desired light output. *Id.* These power control signals provide time-varying signals for "controlling the intensities" of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]. These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration, frequency, whether a sequence will be pseudo-random,[1] and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

[1] In this context, a pseudo-random sequence is not a sequence of random numbers, but a sequence of numbers bound by limitations of the application and, possibly, with calculations performed on the random numbers.

52. A user may select a strobing effect implemented by the controller generating a time-varying oscillating signal and applying the signal to control intensities of the LEDs. *See* EX1011, [0062]. That user can adjust the oscillator frequency parameter of the strobing effect "via a knob, switch, or other selection means as part of the effect selector" in the user interface. EX1011, [0062]. Adjusting the oscillation frequency in this way causes the controller to calculate and create a new output time-varying power control signal, changing frequency of the strobing.

53. Pohlert also discloses generating light effect patterns where light segments are strobed, flashed, or dimmed in sequences, requiring the controller to calculate signals that are time varying, as some lights are on and some off at different times to generate patterns. *Id.*, [0063], [0067]. The brightness and frequency of these patterns are customized by user-selected parameters, including the brightness of different groups of light elements during the pattern and whether the sequences are pseudo-random. *Id.*, [0063], [0067]. Patterns with a sequence in time like this requires that the LEDs are controlled by signals that are "time varying." In other words, at different times in the sequence some LEDs will be on, some off.

54. The "effects selector" and "effects generator" or "processor" of Figures 5A and 5B of Pohlert calculate data signals that are converted to power control signals supplied to the LEDs based on parameters including brightness, duration, or sequence that allow the output from the LEDs to "simulate" the desired lighting

effect or pattern. EX1011, [0059], [0061], [0065]-[0067]. The Pohlert controllers generate lighting values, in the form of control signals, that are provided to appropriate switches to control power to the wires supplying power to light elements. *Id.*

55. Therefore, Pohlert discloses Claim Element 1a.

c. Claim Element 1b

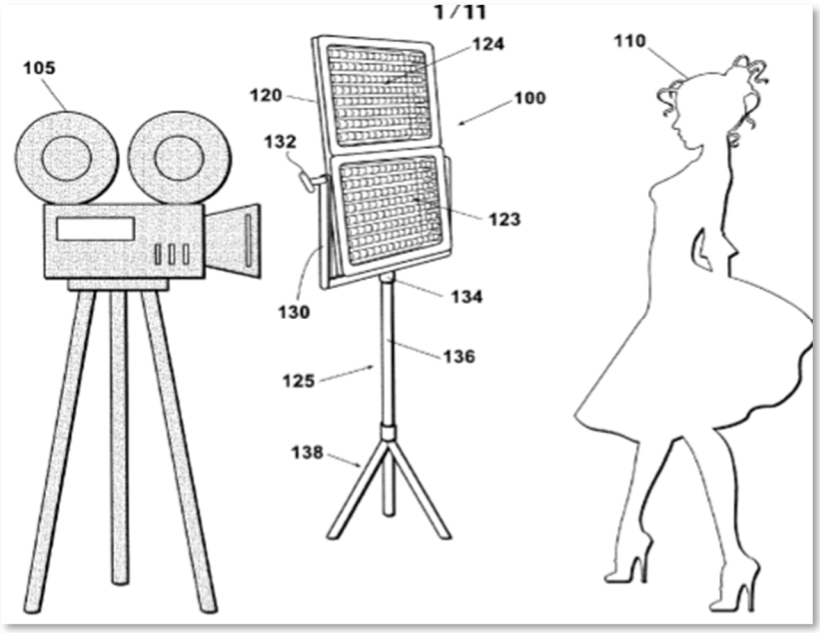
56. Claim Element 1b recites "wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 11:58-63.

57. Pohlert discloses Claim Element 1b.

58. Users can select from a range of effects through an interface on the controller, such effects including patterns and pattern sequences, strobing, flashing, and dimming and brightening. *Id.*, [0057]-[0059], [0061], [0063], [0067], Figures 2, 5A, 5B. Users can customize these effects by selecting and adjusting different simulation parameters. *See supra* Claim Element 1a. These parameters characterize the selected effect in that the effect generated in Pohlert is dependent on and reflective of these parameters. *Id.*, [0057]-[0059], [0061], [0063], [0067].

59. Moreover, these simulation parameters include selections for brightness, duration, frequency, whether a sequence will be pseudo-random, and color. EX1011, [0051], [0061]-[0063], [0066]–[0067], [0089]–[0091]. For example, a user can customize the desired lighting pattern by choosing from, and adjusting, the combinations of parameters that make up the pattern, including predetermined strobing and flashing sequences, pseudo-random strobing and flashing sequences, and dimming and brightening of different light elements. *Id.*

60. The lighting effects created based on these parameters are used to provide lighting for photography, film, television, and other applications. EX1011, [0003], [0005]. Pohlert discloses that its lighting system and effects, based on the selected and customized parameters, are used to provide lighting in "photography, film, television, and other applications." *Id.*, [0003]. Pohlert also acknowledges that lighting systems are "an integral part of the film and photography industries," providing essential proper illumination "when filming movies, television shows, or commercials, when shooting video clips, or when taking still photographs." *Id.*, [0005]. Figure 1 also illustrates the system used in conjunction with a video camera. *See id.*, Figure 1.



Id., Figure 1.

61. Therefore, Pohlert discloses Claim Element 1b.

d. Claim Element 1c

62. Claim Element 1c recites "wherein said at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 11:63-65.

63. Pohlert discloses Claim Element 1c.

64. The user-selected lighting effect patters can be modified by selecting from a number of parameters that will make up the effect, including:

> [1] strobing or flashing different groups of light segments . . . in a pre-defined sequence (which may be a pseudo-random sequence, if desired), [2] strobing or flashing different light elements . . . of the light segments . . . in a predefined (or pseudo-random) sequence, [3] gradually dimming or brightening light segments . . . (individually, in groups, or collectively), or [4] various combinations of these effects.

EX10011, [0063]; *see also id.*, [0067]. As acknowledged by the '257 Patent, a "pseudo-random parameter" is considered "to be equivalent to a truly random parameter." EX1001, Col. 7:30-34. Further, a POSITA would likewise recognize that a pseudo-random sequence will generate random flashes and strobes of light, with, for example, an algorithm generating outputs that will determine how the random sequence will be made up of different strobes and flashes of light at the different groups of LED light elements.

65. Selecting to strobe or flash different light elements, or groups of light elements, in a pseudo-random sequence includes "random brightness" (the intensity of the overall strobe or flash), "random duration" (how long a strobe or flash lasts), and "random intervals" (time between strobes or flashes). EX1011, [0063], [0067]. Pseudo-random sequences are a series of random strobes and flashes, one after another, with the time between strobes or flashes, and the group of light elements used, being random. A POSITA would thus understand that such a pseudo-random sequence could include random brightness, duration, and intervals.

66. For example, the brightness of the sequence, and each step of the sequence, will be random, as it will depend on which LED elements and groups of elements are randomly selected to be activated at any time (the more elements activated, the greater the brightness). Additionally, a POSITA would recognize that such a pseudo-random sequence of flashes and strobes includes random durations

and intervals for those flashes and strobes as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light patterns, or consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *See* EX1011, [0063], [0067]; *see also id.*, [0059] ("The switch controls 532 could have a first setting to select all of the light segments … thereby illuminating all 320 light elements, a second setting to select every other light segments 325, 335, 345 and 355, and a third setting to select every fourth of light segment 325, 340, 360, thus providing options of 100%, 50% and 25% total light output."). In the pseudo-random sequences, where Pohlert expressly states that different groups of light element segments are flashed in pseudo-random sequences *id.*, [0063], [0064], the brightness of the light output will necessarily be random as it would depend on which of the groups are activated at any time. If the pseudo-random sequence randomly activates, for example, every fourth light segment, then all light segments, then every other light segment, then the brightness would randomly change from 25% total light output, to 100% light output, to 50% light output.

67. A POSITA would have recognized that such a pseudo-random sequence of flashes and strobes includes random durations and intervals for those flashes and strobes, as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light pattern, or

consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *Id.*; see also *id.*, [0063], [0067]. Pohlert acknowledges that the sequences can be predetermined or pseudo-random, and a POSITA would understand that the difference between the two is that the flashes in the pseudo-random sequence would have inconsistent, or random, duration and interval, so as to not appear as a set and fixed repeating pattern of flashes.

68. Therefore, Pohlert discloses Claim Element 1c.

e. Claim Element 1d

69. Claim Element 1d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 11:65-67.

70. Pohlert discloses Claim Element 1d.

71. The simulation parameters of Pohlert depend on the customizable lighting effects selected by the user through the interface. Parameters of dimming or brightening different groups of light elements and selecting whether the pattern is sequences will be pseudo-random, depend on a user first selecting to generate a pattern effect on the user interface. EX1011, [0063], [0067]. Similarly, the simulation parameter related to "frequency" of an oscillation signal depends on the user selecting to simulate a strobing effect. *Id.*, [0061]-0063], [0066]-[0067]. That is, the adjustment parameter for the frequency of strobing is directly related to a user selecting to produce a strobing effect.

72. A POSITA would understand that selecting a strobing effect, the parameter of frequency must depend on the user's selection of the strobing effect since changing parameters that are unrelated to the selected effect would confuse a user and be undesirable.

73. Therefore, Pohlert discloses Claim Element 1d.

f. Claim Element 1e

74. Claim Element 1e recites "outputting, from said effect simulator, said time varying lighting value thereby to stimulate the user customisable lighting effect." EX1001, 12:1-3.

75. Pohlert discloses Claim Element 1e.

76. The power controller of Pohlert sends control signals through wires supplying power to light elements, causing the light elements to simulate the selected effect. Pohlert discloses an "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs

to generate desired light output. *Id.* These power control signals provide time-varying signals for "controlling the intensities" of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]; *see also* EX1001, 8:36-48 (the lighting effect simulator provides data or signals "in the form of brightness and/or colour values that vary over time. In order to cause the light 102 to produce the desired effect"), 8:55-57 ("This provides the ability for the lighting to produce light of any visible colour by varying the relative intensities of the different LEDs."). These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration, frequency, whether a sequence will be pseudo-random, and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

77. Further, the output from the effects selector and effects generator or processor and switches in the controllers shown in Figures 5A and 5B of Pohlert are provided to the LED lamps through a cable or wires:

> The power converter 520 is preferably connected to a plurality of switches 522 . . . each switch controlling power delivered by the power converter 520 to one of the wires 547 output by the power controller 512. . . . The switch selector 542 would then convert each knob setting to a set of control signals to the appropriate switches 522, which in turn would control power to the wires 547 supplying power to the light segments.

EX1011, [0058]-[0059].

78. Pohlert therefor discloses Claim Element 1e.

3. Claim 2

79. Claim 2 recites "The method according to claim 1 wherein the random brightness comprises a random peak brightness." EX1001, 12:4-5.

80. It is my opinion that Pohlert anticipates Claim 2.

81. Pohlert discloses strobing and flashing all, different groups of, or individual light elements in a pseudo-random sequence. *See supra* Claim Element 1c. The peak brightness generated during the sequence would change as the different groups of light segments are randomly flashed or strobed. Again, Pohlert discloses that a pseudorandom sequence includes strobing or flashing all, or different groups of, light elements. EX1011, [0063], [0067]. As different groups of light elements may contain differing numbers of light elements turning randomly on and off, each activated light grouping has a different, random peak brightness.

82. Different combinations of groups of light elements may be selected, and the total light output would change depending on which groups are selected.

> The switch controls 532 could have a first setting to select all of the light segments . . . thereby illuminating all 320 light elements, a second setting to select every other light segments 325, 335, 345 and 355, and a third setting to select every fourth of light segment 325, 340, 360, thus providing options of 100%, 50% and 25% total light output.

EX1011, [0059].

83. Thus, in pseudo-random sequences, when all light segments are selected, there would be 100% total light output (*i.e.*, brightness). *Id.* This maximum

light output decreases to 50% if every other light segment is randomly selected and to 25% if every fourth light segment is randomly selected. *Id.*, [0059], [0063], [0067]. Depending on how many light segments are activated at any given time in the pseudo-random sequence, the peak brightness generated randomly changes.

4. Claim 3

84. Claim 3 recites "The method according to claim 1 wherein the random interval comprises at least one of a random interval between flashes, a random interval between groups of flashes, and a random frequency." EX1001, 12:6-9.

85. It is my opinion that Pohlert anticipates Claim 3.

86. The random interval can be a pseudo-random strobing or flashing sequence. EX1011, [0063], [0067]; *see also supra* Claim Element 1c. When a sequence of strobes and flashes is pseudo-random, the interval, or time between strobes or flashes and groups thereof changes in a random manner. As I explained earlier, a sequence of strobes or flashes is a series of strobes and flashes following one after another. When this sequence is pseudo-random, the interval, or time between strobes or flashes and groups thereof, changes in a random manner (as opposed to a consistent, non-random sequence, where the interval between strobes and flashes and groups thereof would be uniform). Pohlert implements the pseudo-random sequences by controlling "all or different groups" of the light elements, causing random intervals between flashes and groups of flashes as different groups

of elements are randomly turned on and off. EX1011, [0063], [0067]. With a random interval between flashes or groups of flashes, the frequency is also random.

87. For example, Pohlert further discloses that the processor in the controller of Figure 5B may make use of one or more electronic timers to provide timing between on and off events of the pseudo-random sequence. *Id.*, [0067]. Claim 3 recites a random interval between flashes and a random frequency as two of its options. These are linked requirements, as it is the interval between flashes plus the duration of the flash that determine the flash frequency. Thus, a change to either the interval between flashes or the flash duration must also alter the flash frequency.

5. Claim 4

88. Claim 4 recites "The method according to any claim 1 wherein the random duration comprises at least one of a random ramp-up time to peak brightness, a random fade-down time from peak brightness, and a random number of pulses." EX1001, 12:10-13.

89. It is my opinion that Pohlert anticipates Claim 4.

90. The random sequences can be pseudo-random strobing or flashing sequences. EX1011, [0063], [0067]; *see supra* Claim Element 1c. These sequences are generated by controlling all or different groups of light elements, causing a random number of pulses, depending on when each of the different groups is turned on and off. EX1011, [0063], [0067]. For example, if the lighting elements are divided

into four groups, then the number of pulses will randomly change depending on when the groups are randomly turned on and off with respect to each other. Pohlert's random sequence of flashes thus includes a random number of pulses making up the sequence. If three of the four groups are activated then this will generate three pulses of light in a 10 second time period. The randomness with which the groups of light segments are activated in a given time period means that the number of pulses of light output will also be random. Accordingly, a random sequence of flashes, having a random number of steps in the sequence to generate those flashes, includes a random number of pulses making up the sequence. *Id.*

91. Pohlert also discloses that patters may be generated using combinations of effects, including combinations of pseudo-random sequences of flashing and strobing the LEDs and gradually dimming or brightening the same LEDs. EX1011, [0063], [0067]. A POSITA would recognize that gradually dimming and brightening the LEDs, as they are flashed or strobed in a pseudo-random sequence, would cause the time when the peak brightness of the random sequence is reached to shift. Thus, the ramp up to the peak brightness and ramp down from peak brightness would be random and would also change randomly with the dimming and brightening of the random sequences.

6. Claim 5

92. Claim 5 recites

> The method according to claim 1 wherein said at least one simulation parameter is random within predefined boundaries and wherein the predefined boundaries comprise at least one of an upper and lower duration; a number of flashes in a burst; an interval between bursts; an amplitude; and a ramp-up or fade-down time.

EX1001, 12:14-19.

93. It is my opinion that Pohlert anticipates Claim 5.

94. Pohlert's simulation parameters include pseudo-random sequences of flashes or strobing. EX1011, [0063], [0067]. These sequences are applied within "predefined boundaries" of the patterns, and within predefined boundaries of the capabilities of the lighting elements.

95. Pohlert discloses predefined boundaries for the "amplitude" of the light produced in its pseudo-random sequences. EX1011, [0059], [0063], [0067]. The pseudo-random sequences can include flashing or strobing different combinations of groups of LEDs. *Id.*, [0063], [0067]. The amplitude of the light in a pattern will depend on the number of groups of LEDs activated at any given time. *Id.*, [0059]. (indicating a 100% total light output (or amplitude) when all groups of LEDs are activated at the same time, a 50% total light output when only every other group is activated, and a 25% total light output when only every fourth group is activated). Thus, the amplitude output in the pseudo-random sequences is random within the boundaries of how many LEDs or groups of LEDs are activated at any given time.

96. With respect to predefined boundaries of the lighting elements, the upper and lower "duration" and the "interval" between flashes are linked to and determined by the frequency of the oscillation used to generate the flashes or strobing. This frequency has predefined upper and lower boundaries determined by the LEDs and the power supply driving circuitry as well as practical limitations where very high frequency operation is unperceived and very low frequency is too slow to be of interest. As understood by a POSITA, the boundaries are determined by the limitations of the circuitry and LEDs, with a lower duration boundary being how long the circuitry and LEDs can make a flash last, and an upper duration boundary being how short they can make a flash. Further, the physical properties of the lighting device are related to the effect being simulated, and here the LEDs have a predefined minimum output of zero, when the LED is off, and a predefined maximum output when the LED is on, which is limited by the physical capabilities of the specific LED and power supply.

7. Claim 6

97. Claim 6 recites "The method according to claim 1 wherein the at least one of: a random brightness; a random duration; and a random interval is determined in dependence on one or more user-selectable simulation parameters." EX1001, 12:20-23.

98. It is my opinion that Pohlert anticipates Claim 6.

99. The simulation parameters can include random brightness, duration, and intervals in pseudo-random sequences of strobes and flashes. *See supra* Claim Elements 1a-1d. These random parameters are determined based on user selections through an interface. EX1011, [0063], [0067]; *see also infra* Claim 8.

100. Specifically, the "[p]attern generation may be accomplished by, e.g., manual selection from a number of predefined patterns, or else through an interface allowing different pattern sequencing." EX1011, [0063]. Based on the user interface selections to implement random sequences, the controller generates patterns by "strobing or flashing different groups of light segments" in "pseudo-random sequences." *Id.* Users can also select combinations of effects that include pseudo-random sequences, along with gradually dimming or brightening light segments individually, in groups, or collectively. *Id.* These combinations, including random sequences, thus depend on the user selections of such combinations of effects.

8. Claim 7

101. Claim 7 recites

> The method according to claim 1, wherein the simulation parameter is related to one or more of: a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation period.

EX1001, 12:24-29.

102. It is my opinion that Pohlert anticipates Claim 7.

103. The simulation parameter is related to at least "a brightness." *Id.* Pohlert discloses the parameter of using pseudo-random sequences of strobing and flashing light elements, either individually, in groups, or collectively. EX1011, [0063], [0067]. Depending on how many elements are activated at any given time during the sequence, the brightness levels will vary. *Id.* For example, as mentioned above, if all light elements are activated, the brightness will be higher than if only every other group of light elements is activated. The simulation parameter of generating pseudo-random sequences of strobes and flashes is therefore related to the brightness of the light that will be output during generation of the pseudo-random sequence. Thus, Pohlert discloses the simulation parameter is related to at least brightness. *See supra* Claim Element 1c, Claims 2, 4.

104. Further, the effects used to generate a pattern can include "combinations" of pseudo-random sequences and gradually dimming and brightening. EX1011, [0063], [0067]. This additional parameter of gradually dimming or brightening the light elements in the overall light pattern effect is related to at least brightness, rate of brightness increase/decrease, and brightness fluctuation period. Gradually brightening or dimming the light elements causes the lights elements to "ramp up," or "increase" in brightness to a peak value, from which they then "decrease" in brightness to zero output or another minimal value before being

activated again. *See supra* Claim 4. The time period between the increase and decrease in brightness of the overall light output is a "brightness fluctuation period."

105. Moreover, the LEDs may be of differing colors, as selective combinations of red, green, and blue LEDs can be used to "generate virtually any desired color." EX1011, [0084]. Thus, the simulation parameters used to generate patterns or sequences may be related to "color fluctuation periods," as light element groups may be different colors in different steps in the sequences or patterns, generating different color fluctuation in time. *Id.*, [0063], [0067].

9. Claim 8

106. Claim 8 recites "The method according to claim 1 further comprising receiving a user input of one or more user-selectable simulation parameters and adapting the simulation in dependence on the one or more user-selectable simulation parameters." EX1001, 12:30-33.

107. It is my opinion that Pohlert anticipates Claim 8.

108. The power controllers of Pohlert include an interface, which receives user input selections of parameters, in choosing and adjusting combinations of effects, including patterns, strobing, flashing, and dimming and brightening. EX1011, [0059], [0066]-[0067], Figures 5A, 5B. A "manual interface 530 is provided to allow operation of the switches 522 according to manual selection. The manual interface 530 may include a master power switch 531, switch controls 532,

and, optionally, an effects selector 533. The switch controls 532 may include an individual manual switch, button or other selection means for each individual switch provided in the set of switches 522, or else may comprise a control mechanism (such as knob or reduced number of manual switches, buttons or other selection means) for selecting groups of switches 522 according to predesignated arrangements." *Id.*, [0059].

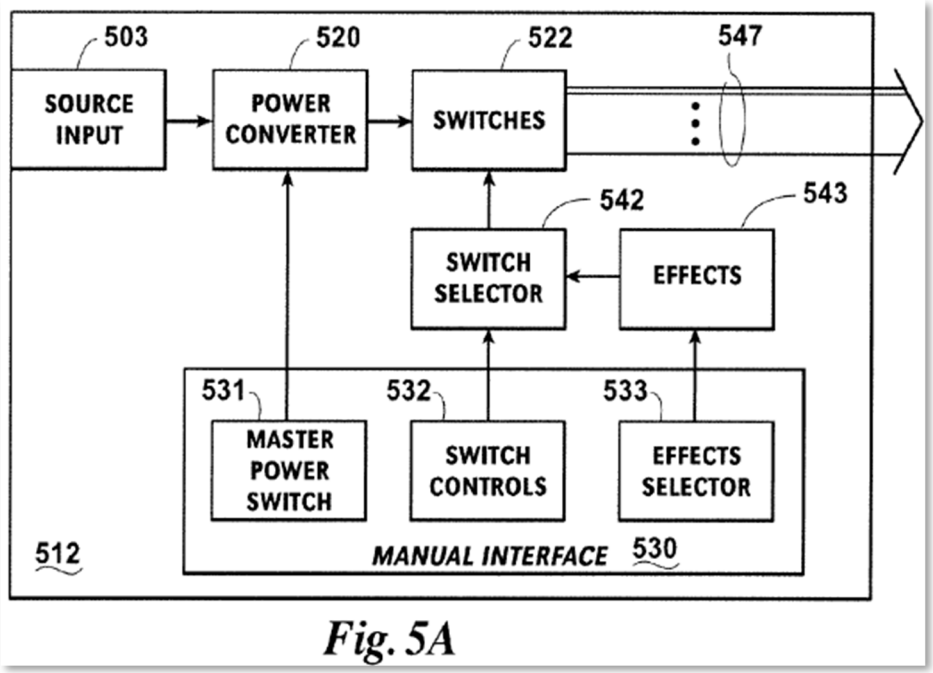


Fig. 5A

109. In the Figure 5A controller, a

> manual interface 530 is provided to allow operation of the switches 522 according to manual selection. The manual interface 530 may include a master power switch 531, switch controls 532, and, optionally, an effects selector 533. The switch controls 532 may include an individual manual switch, button or other selection means for each individual switch provided in the set of switches 522, or else may comprise a control mechanism (such as knob or reduced number of manual switches, buttons or other selection means) for selecting groups of switches 522 according to predesignated arrangements.

Id., [0059]. Through this Figure 5A interface, selections made by the user are sent to an effects generator, which provides "the ability to create various lighting effects, such as, e.g., dimming, strobing pulsation, or pattern generation." *Id.*, [0061]. The controller can accomplish selected pattern generation by "manual selection from a number of predefined patterns, or else through an interface allowing different pattern sequencing. *Id.*, [0063]. The patterns users can select include

> strobing or flashing different groups of light segments . . . in a predefined sequence (which may be a pseudo-random sequence, if desired), strobing or flashing different light elements 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects.

Id.

110. Similarly, the Figure 5B controller includes "an interface 580 . . . for programming or otherwise interface with the processor 574, or manually selecting various lighting effects options through selectable knobs, switches or other selection means, as generally explained previously with respect to FIG. 5A." *Id.*, [0066].

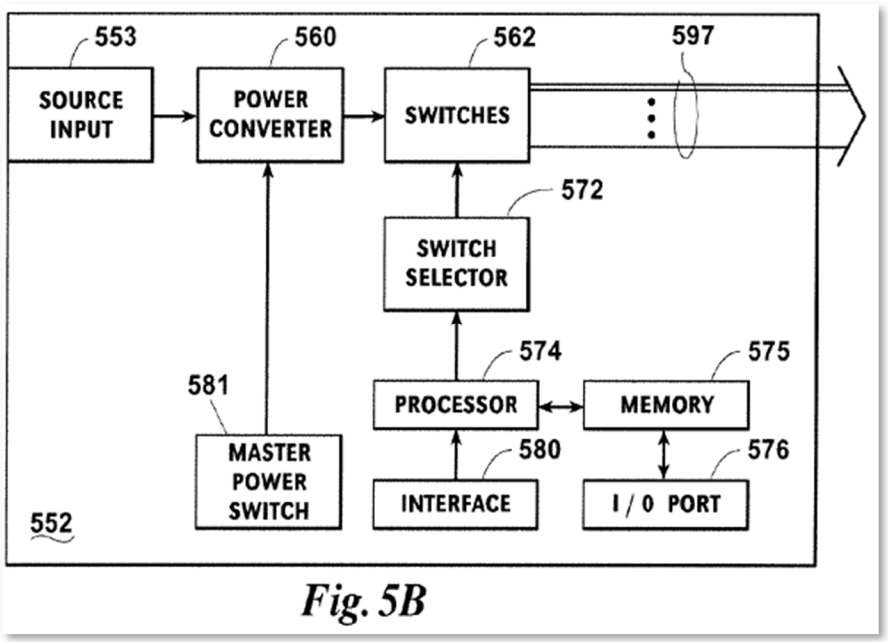


Fig. 5B

Id., Figure 5B.

111. Selections made through the Figure 5B interface are converted to instructions for the processor, which instructions "provide for various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example." *Id.*, [0067]. The programming instructions

> may provide that the switches 562 are turned on and off according to designated sequences, thus allowing the capability of pattern generation via the processor 574. Patterns may include, for example, strobing or flashing all or different groups of light segments . . . in a predefined (or pseudo-random) sequence, strobing or flashing different low power lamps 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening the light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects is contemplated.

Id.

112. The desired effect patters are therefore adapted based on the user-selected effects and parameters.

10. Claim 9

113. Claim 9 recites "The method according to claim 1 wherein the simulation parameter comprises at least one of: a maximum brightness; a minimum brightness; a colour; and a trigger." EX1001, 12:34-36.

114. It is my opinion that Pohlert anticipates Claim 9.

115. Pohlert discloses the effect parameters can include maximum and minimum brightness, color, and a trigger. EX1011, [0061]-[0067], [0084]-[0091].

116. With respect to a maximum brightness and minimum brightness, Pohlert discloses users can selectively dim or brighten the light elements. *Id.*, [0061], [0063]-[0065], [0067].

> [The] effects generator 543 may provide the ability to create various lighting effects, such as, e.g., dimming strobing, pulsation, or pattern generation. The effects selector 543 may affect all of the switches 522 simultaneously, or else may affect individual switches or groups of switches 522, depending upon the desired complexity of the lighting effects. Dimming may be accomplished, for example, through a manual control knob or multi-position switch on the effects selector 533.

Id., [0061].

117. Pohlert further discloses that a "dimmer switch" may be provided to allow users to "control the light output." *Id.*, [0064]. By adjusting the dimmer switch, users may select the maximum for the lighting elements producing the effect.

Similarly, selecting the number of switches that will be affected controls the minimum brightness, with the potential minimum brightness increasing as more switches (and thus groups of light elements) are selected. *Id.*

118. Moreover, the pattern generation effects can include "gradually dimming or brightening" the light segments. *Id.*, [0063], [0067]. Gradually dimming light elements involves adjusting the brightness level from a higher level to a lower level, with the ultimate lowest level of brightness produced by the dimming being a "minimum brightness." Similarly, brightening involves increasing the brightness to a "maximum brightness." *Id.*

119. With respect to "a colour," the user-selected effects can include a color parameter. For example, bi-color LEDs may be used, allowing users to adjust the output color and color temperature of the apparatus. EX1011, [0086]. Pohlert explains that

> Because the two different colors of LEDs (e.g., daylight and tungsten) can be controlled separately . . . and because these particular LEDs, or other similar complementary colors, do not have significant color shifts when dimmed, it would be relatively straightforward to adjust (e.g., cross-fade, cross-dim) between the two colors and, for example, provide a variety of natural light illumination effects for various types of common film stock.

Id., [0092]; *see also id.*, [0086]-[0091].

120. As is well known, color temperature is a way to describe the appearance of light output from the light source. It is an indication of how "cool" or "warm" the

light will appear and is measured in degrees Kelvin (K). For example, a "cool" light may be a neutral white light or have a slight blue tint to the white light. A "warm" white light, on the other hand, may have a more yellow-white appearance. Sometimes, "warm" white lights are seen as softer, and "cool" white lights are seen as more bright, crisp, and vibrant. Pohlert describes that users input "intensity control" and "ratio control" adjustments through "manual control knobs, dials, switches, or other such means, or alternatively may be embodied as a digital keypad, a set of digital buttons, or the like" on a user interface. *Id.*, [0088]; *see also id.*, [0089]–[0092]. The "intensity control" and "ratio control" adjustments are received by "intensity control circuits" and "ratio control circuits" in the controller, which then modifies the power supply to the different LEDs to generate the desired color and color temperature. *Id.*, [0089]; *see also id.*, [0090]–[0091].

121. With respect to "a trigger," the parameters can include triggers that activate switch controls to send power signals to the light elements to start the pattern generation output from the light elements. *Id.*, [0059], [0065]-[0067]. Pohlert discloses selecting, through the processor in the Figure 5B controller, "programming instructions" that indicate the start and stop times for the selected patters, sequences, and effects that result in outputs of control signals to vary the lighting values and simulate the desired effects. *Id.*, [0066]-[0067]. Pohlert specifies that the "power controller 552 includes a processor 574 which may be programmed to provide

various lighting effects by manipulating the switch selector 572 (for example, by changing values in registers which control the on/off states of the switches 562)." *Id.*; *see also infra* Claim 12. Pohlert also discloses that "slave flashes" can be triggered by RF, infrared, or optical signals such as flashes generated by LEDs directly connected to the controller. EX1011, [0022]. Pohlert states its system, which include the power controllers, is "particularly well suited for use with such optical, IR, or RF slave flash systems. *Id.*, [0023].

11. Claim 10

122. Claim 10 recites "The method according to claim 1 wherein the simulation iterates through repeated cycles of calculating a time varying lighting value based on at least one random simulation parameter and simulating the user customisable lighting effect." EX1001, 12:37-41.

123. It is my opinion that Pohlert anticipates Claim 10.

124. The pattern generation may include implementation of various combinations of patterns and sequences that include pseudo-random sequences of strobing and flashing. EX1011, [0063], [0067]; *see also supra* Claim Elements 1b-1d. In particular, "programming instructions may provide that the switches 562 are turned on and off according to designated sequences, thus allowing the capability of pattern generation via the processor 574." *Id.*, [0067]. These programming instructions, which provide for control of the switches according to designated

sequences, cycle through calculations of the time varying lighting values needed for each different pattern and the different sequences within a pattern. *Id.*

12. Claim 11

125. Claim 11 recites

> The method according to claim 1 wherein the user customisable lighting effect is designed to mimic at least one of fire flickering; police light; television; lightning flashing; electrical sparking; fireworks; a neon flickering sign; a gunshot; welding; a scan; a propeller; a (nuclear) explosion; a wormhole; paparazzi flashes; flashes (strobe).

EX1001, 12:42-47.

126. It is my opinion that Pohlert anticipates Claim 11.

127. Pohlert's effects and patterns include:

> strobing or flashing different groups of light segments . . . in predefined sequence (which may be a pseudo-random sequence, if desired), strobing or flashing different light elements 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening light segments 325-360 (individually, in groups, or collectively), or various combinations of these effects.

Id., [0063]; *see also id.*, [0062], [0067].

128. Thus, Pohlert explicitly discloses "flashes (strobe)."

129. Moreover, a POSITA would understand the pattern generation and sequences, EX1011, [0063], [0067], [0081], can produce additional claimed effects, such as mimicking lightning, welding, and sparking. For example, the pseudo-random sequences of flashes or strobes result in irregularly timed light, which a POSITA would understand can produce random flashes of light simulating lightning,

welding, and sparking effects. These random strobe flashes of light would appear as random flashes of lightning in the distance when used for filming an outdoor scene with dark sky. In generating an effect to look like lightning, welding, or sparking/short circuit, too regular a timing looks artificial, and more like an ordinary strobing light. Accordingly, the random flashes in the pseudo-random sequences generate the described effects. Different color LEDs in different groups can be controlled through the effects generator. A strobing light that alternates between red and blue simulates a police car light. *Id.*, [0088]; *see also id.*, [0063], [0067], [0089]–[0092].

13. Claim 12

130. Claim 12 recites "The method according to claim 1, further comprising selecting a definition of a trigger event, said trigger event initiating said output of the time varying lighting value thereby to simulate the user customisable lighting effect." EX1001, 12:48-51.

131. It is my opinion that Pohlert anticipates Claim 12.

132. The '257 Patent indicates a "trigger" is simply something "to start the effect running" and can be a manual trigger or a remote signal. EX1001, 6:52-54, 9:43-45. Pohlert discloses selecting, through the Figure 5B controller processor, programming instructions that indicate the start and stop time of selected patterns, sequences, and effects that result in outputs of control signals to vary the lighting

values and simulate the desired effects. EX1011, [0066]-[0067]. The "power controller 522 includes a processor 574 which may be programmed to provide various lighting effects by manipulating the switch selector 572 (for example, by changing values in registers which control the on/off states of the switches 562)." *Id.*

133. Pohlert also discloses the "processor 574 may make use of one or more electronic timers to provide timing between on and off events. The programming instructions may provide that the switches 562 are turned on and off according to designated sequences, thus allowing the capability of pattern generation via the processor 574." *Id.*, [0067]. Controlling power to the wires supplying power to the light elements causes the light elements to initiate output of light.

134. The manual interface (530) in the Figure 5A controller also provides for defined trigger events to start illumination of the lighting elements. *Id.*, [0059]. For example, users turning a knob or pressing a switch on the user interface (*e.g.*, via the effects generator or effects selector) implements switch controls to initiate and control illumination of the different groups of light elements. *Id.*

135. Pohlert also discloses additional trigger events. For example, "[t]o accomplish dimming, the processor 574 may be programmed select binary-encoded values to load into registers of the switch selector 572, which in turn select a variable resistance value which controls the output from each individual or group of switches 562." *Id.*, [0067]. Similarly, "[t]o accomplish strobing, the processor 574 may be

programmed to turn the switches 562 on and off according to a predesignated pattern dictate by the programming instructions." *Id.* The instructions to select resistance values, or turn on and off the switches, to accomplish dimming and strobing are triggers that initiate the generation of those desired effects.

136. Further, Pohlert discloses slave flashes that can be controlled by radio frequency, infrared, and optical signals (including flashes from the LEDs controlled by the power controller). EX1011, [0022]-[0023]. These may be "optical slave flashes" that are "triggered by light," including light pulses from another device. *Id.*, [0023]. The lighting and effect generation system is "particularly suited for use with such" optical slave flashes. *Id.* When an optical slave flash is used with the lighting system, the power controller in the lighting system would case the LEDs to produce the light pulse that triggers the optical slave flashes.

14. Claim 13

137. Claim 13 recites "The method according to claim 1, further comprising storing the at least one simulation parameter corresponding to said user customisable lighting effect." EX1001, 12:52-54.

138. It is my opinion that Pohlert anticipates Claim 13.

139. Pohlert discloses a memory storing programming instructions, including the simulation parameters for the varying power control signals sent to the LED elements to implement the user-selected effects. EX1011, [0066]-[0067].

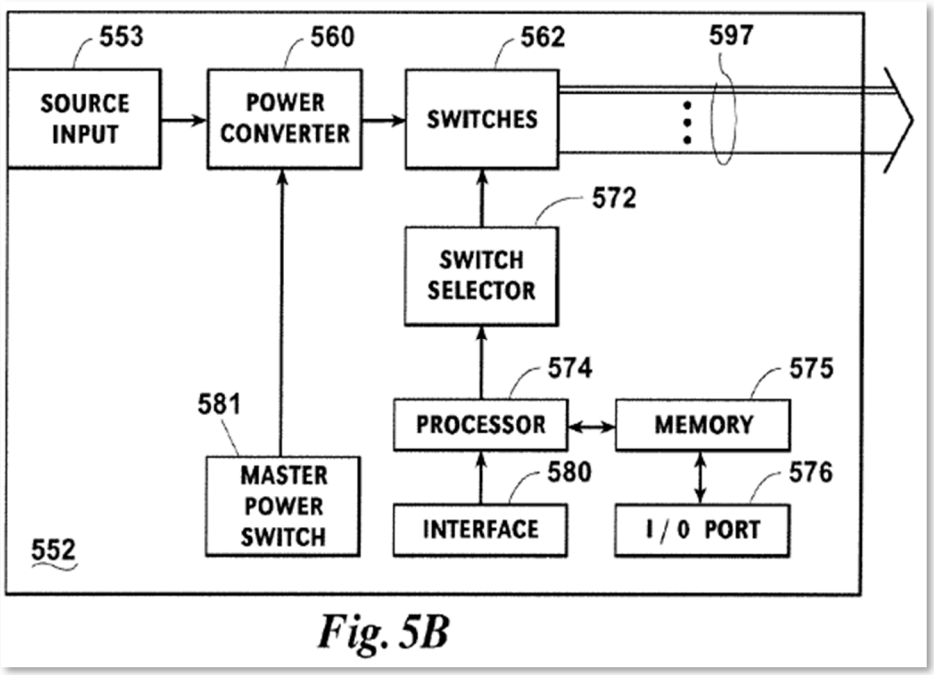


Fig. 5B

Id., Figure 5B. The Figure 5B controller processor interfaces with a memory, and

> reads instructions from the memory 575 and executes them in a conventional manner. The instructions will generally cause the processor to control the switch selector by, e.g., setting various digital values in registers whose output control the switches 562. The programming instructions may also provide for various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example.

Id., [0067].

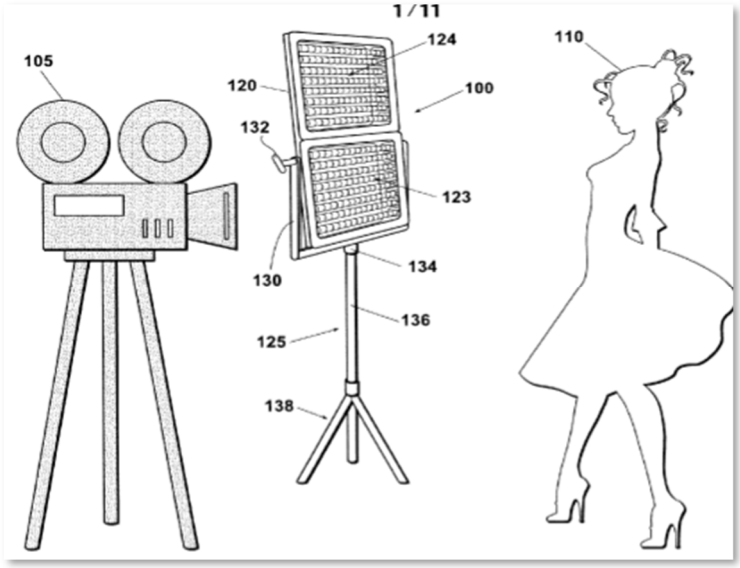
15. Claim 14

140. Claim 14 recites "The method according to claim 1 comprising controlling a plurality of lights in dependence on the output." EX1001, 12:55-56.

141. It is my opinion that Pohlert anticipates Claim 14.

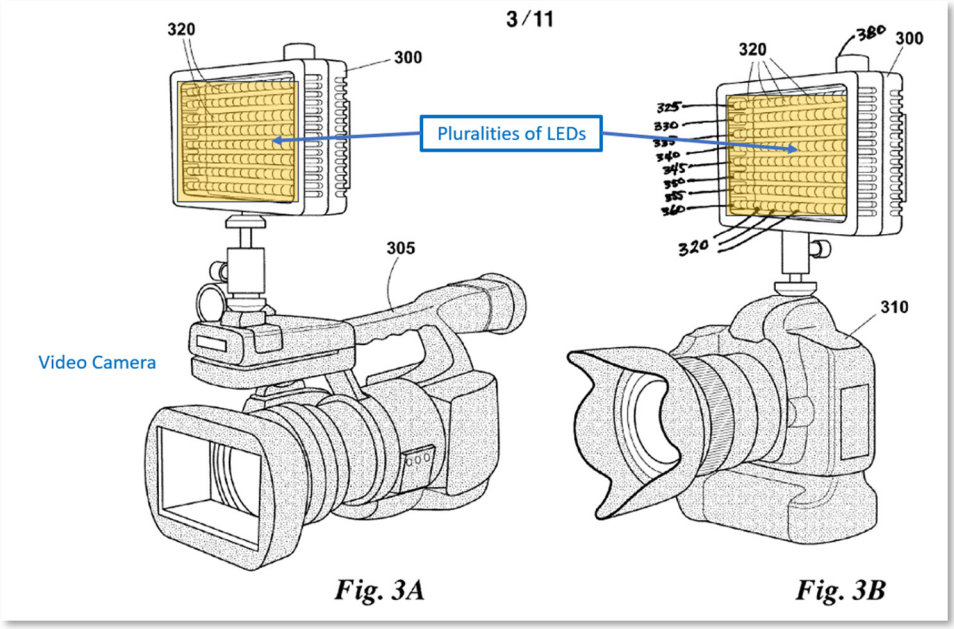
142. Pohlert's power controller can control a plurality of groups of LEDs, which may be included as lamp elements in an arrangement on a panel or frame, and

the power controller controls "the intensities of various lamp elements, either collectively, individually, or in designated groups, and, in some embodiments, through pre-programmed patterns. EX1011, [0050]; *see also id.*, [0053], [0059], [0067]. Further, the shown LED or group of LEDs controlled together is a "lighting device."



Id., Figure 1.

143. The system may include "multiple panel light sections 123, 124," *id.*, [0053], and the lighting arrangements are controlled by the controller to produce effects using multiple light segments. *Id.*, [0059].



Id., Figures 3A, 3B (annotated). For example, the Figure 5B controller

> may be programmed to turn the switches 562 on and off according to a predesignated pattern dictated by the programming instructions . . . . As mentioned before, patterns may include, for example, strobing or flashing all or different groups of light segments 325-360 (given the example of FIG. 3) in a predefined (or pseudo-random) sequence, strobing or flashing different low power lamps 320 of the light segments 325-360 in a predefined (or pseudo-random) sequence, gradually dimming or brightening the light segments 325-260 (individually, in groups, or collectively), or various combinations of these effects is contemplated.

Id., [0067].

144. Pohlert further discloses slave flashes that can be controlled by radio frequency, infrared, and optical signals (including flashes from LEDs controlled by the controller. *Id.*, [0022]-[0023]. These may be "optical slave flashes" that are "triggered by light," including light pulses from another device. *Id.*, [0023]. Pohlert notes that its lighting system is "particularly suited for use with such" optical slave

flashes. *Id.* In such situation, the power controller in the system would cause the LEDs to produce the light pulse that triggers the optical slave flashes, thereby controlling the slave flashes. When the power controller causes the LEDs to which it is directly connected, through the power cable, to flash, any slave flashes in the vicinity that register that flash caused by control signals from the power controller would be triggered, producing their own flashes of light. The slave flashes are thus also a "lighting device" triggered by the LEDs controlled by the controller to produce desired lighting effects.

16. Claim 15

145. It is my opinion that Pohlert anticipates Claim 15.

a. Claim Element 15p

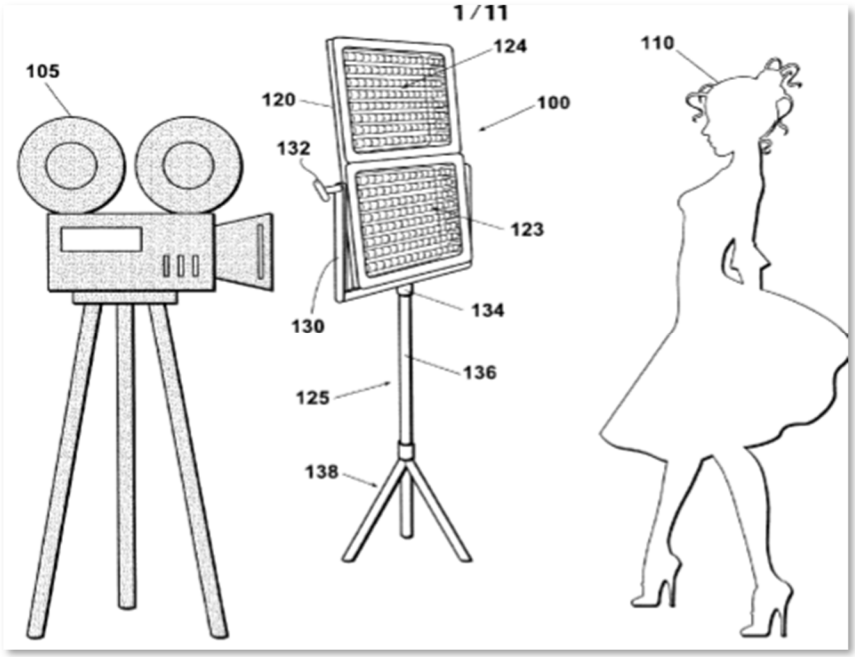
146. The preamble of Claim 15, designated Claim 15p herein, recites "A controller adapted to control at least one lighting device to produce a user customisable lighting effect, the controller comprising:" EX1004, 12:57-59.

147. For purposes of this Declaration, I assume that the preamble of Claim 15 is limiting and must be considered for the purposes of evaluating the validity of the claims.

148. Regardless, Pohlert discloses Claim Element 15p.

149. Pohlert discloses a controller permitting users to select and modify lighting effects, such as patterns of strobing, flashing, and dimming and brightening

the lights. EX1011, Abstract, [0020], [[0050], [0063], [0067], [0103]. The method can be used for "photography, film, television, and other applications." *Id.*, [0003]. Figure 1 illustrates use of the lighting system with a video camera that may be "a motion picture type camera." *Id.*, [0052].



Id., Figure 1.

150. Therefore, Pohlert discloses Claim Element 15p.

b. Claim Element 15a

151. Claim Element 15 a recites "an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter;" EX1001, 12:60-62.

152. Pohlert discloses Claim Element 15a.

153. The ’257 Patent describes the “effect simulator” as a component that “creates data 106 characterising a lighting effect.” EX1001, 7:45-50; *see also id.*, 5:51-55. Further, it describes the “time varying lighting value” as data or signals that contain brightness or color values that vary over time to produce desired effect. EX1001, 8:36-48; 8:55-57.

154. Pohlert discloses an “effects selector” and “effects generator” (Figure 5A) or “processor” (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the “effects selector” and “effects generator” (Figure 5A) or “processor” (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs to generate desired light output. *Id.* These power control signals provide time-varying signals for “controlling the intensities” of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]. *See e.g.*, EX1001, 8:36-48 (the lighting effect simulator provides data or signals “in the form of brightness and/or colour values that vary over time. In order to cause the light 102 to produce the desired effect), 8:55-57 (“This provides the ability for the lighting to produce light of any visible colour by varying the relative

intensities of the different LEDs."). These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration, frequency, whether a sequence will be pseudo-random, and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

155. A user may select a strobing effect implemented by the controller generating a time-varying oscillating signal and applying the signal to control intensities of the LEDs. *See* EX1011, [0062]. That user can adjust the oscillator frequency parameter of the strobing effect "via a knob, switch, or other selection means as part of the effect selector" in the user interface. EX1011, [0062]. Adjusting the oscillation frequency in this way causes the controller to calculate and create a new output time-varying power control signal, changing frequency of the strobing.

156. Pohlert also discloses generating light effect patterns where light segments are strobed, flashed, or dimmed in sequences, requiring the controller to calculate signals that are time varying, as some lights are on and some off at different times to generate patterns. *Id.*, [0063], [0067]. The brightness and frequency of these patterns are customized by user-selected parameters, including the brightness of different groups of light elements during the pattern and whether the sequences are pseudo-random. *Id.*, [0063], [0067]. Patterns with a sequence in time like this requires that the LEDs are controlled by signals that are "time varying." In other words, at different times in the sequence some LEDs will be on, some off.

157. The "effects selector" and "effects generator" or "processor" of Figures 5A and 5B of Pohlert calculate data signals that are converted to power control signals supplied to the LEDs based on parameters including brightness, duration, or sequence that allow the output from the LEDs to "simulate" the desired lighting effect or pattern. EX1011, [0059], [0061], [0065]-[0067]. The Pohlert controllers generate lighting values, in the form of control signals, that are provided to appropriate switches to control power to the wires supplying power to light elements. *Id.*

158. Therefore, Pohlert discloses Claim Element 15a.

c. Claim Element 15b

159. Claim Element 15b recites "wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 12:62-67.

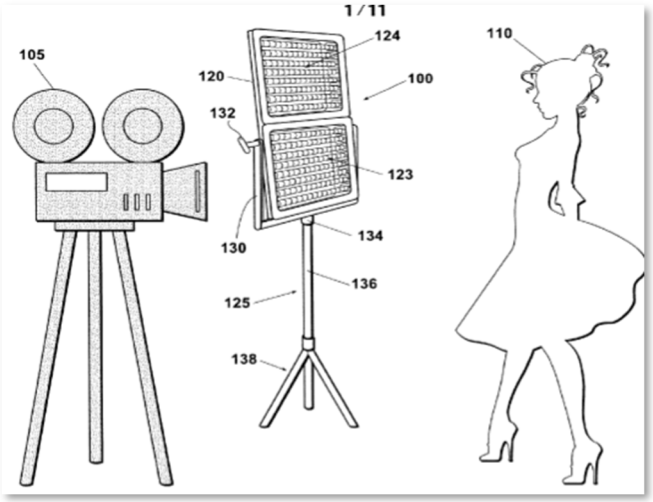
160. Pohlert discloses Claim Element 15b.

161. Users can select from a range of effects through an interface on the controller, such effects including patterns and pattern sequences, strobing, flashing, and dimming and brightening. *Id.*, [0057]-[0059], [0061], [0063], [0067], Figures 2, 5A, 5B. Users can customize these effects by selecting and adjusting different

simulation parameters. *See supra* Claim Element 1a. These parameters characterize the selected effect in that the effect generated in Pohlert is dependent on and reflective of these parameters. *Id.*, [0057]-[0059], [0061], [0063], [0067].)

162. Moreover, these simulation parameters include selections for brightness, duration, frequency, whether a sequence will be pseudo-random, and color. EX1011, [0051], [0061]-[0063], [0066]–[0067], [0089]–[0091]. For example, a user can customize the desired lighting pattern by choosing from, and adjusting, the combinations of parameters that make up the pattern, including predetermined strobing and flashing sequences, pseudo-random strobing and flashing sequences, and dimming and brightening of different light elements. *Id.*

163. The lighting effects created based on these parameters are used to provide lighting for photography, film, television, and other applications. EX1011, [0003], [0005]. Pohlert discloses that its lighting system and effects, based on the selected and customized parameters, are used to provide lighting in "photography, film, television, and other applications." *Id.*, [0003]. Pohlert also acknowledges that lighting systems are "an integral part of the film and photography industries," providing essential proper illumination "when filming movies, television shows, or commercials, when shooting video clips, or when taking still photographs." *Id.*, [0005]. Figure 1 also illustrates the system used in conjunction with a video camera. *See id.*, Figure 1.



Id., Figure 1.

164. Therefore, Pohlert discloses Claim Element 15b.

d. Claim Element 15c

165. Claim Element 15c recites "wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 12:67-13:2.

166. Pohlert discloses Claim Element 15c.

167. The user-selected lighting effect patters can be modified by selecting from a number of parameters that will make up the effect, including:

> [1] strobing or flashing different groups of light segments . . . in a pre-defined sequence (which may be a pseudo-random sequence, if desired), [2] strobing or flashing different light elements . . . of the light segments . . . in a predefined (or pseudo-random) sequence, [3] gradually dimming or brightening light segments . . . (individually, in groups, or collectively), or [4] various combinations of these effects.

EX10011, [0063]; *see also id.*, [0067]. As acknowledged by the '257 Patent, a "pseudo-random parameter" is considered "to be equivalent to a truly random parameter." EX1001, Col. 7:30-34. Further, a POSITA would likewise recognize that a pseudo-random sequence will generate random flashes and strobes of light, with, for example, an algorithm generating outputs that will determine how the random sequence will be made up of different strobes and flashes of light at the different groups of LED light elements.

168. Selecting to strobe or flash different light elements, or groups of light elements, in a pseudo-random sequence includes "random brightness" (the intensity of the overall strobe or flash), "random duration" (how long a strobe or flash lasts), and "random intervals" (time between strobes or flashes). EX1011, [0063], [0067]. Pseudo-random sequences are a series of random strobes and flashes, one after another, with the time between strobes or flashes, and the group of light elements used, being random. A POSITA would thus understand that such a pseudo-random sequence could include random brightness, duration, and intervals.

169. For example, the brightness of the sequence, and each step of the sequence, will be random, as it will depend on which LED elements and groups of elements are randomly selected to be activated at any time (the more elements activated, the greater the brightness). Additionally, a POSITA would recognize that such a pseudo-random sequence of flashes and strobes includes random durations

and intervals for those flashes and strobes as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light patterns, or consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *See* EX1011, [0063], [0067]; *see also id.*, [0059] ("The switch controls 532 could have a first setting to select all of the light segments … thereby illuminating all 320 light elements, a second setting to select every other light segments 325, 335, 345 and 355, and a third setting to select every fourth of light segment 325, 340, 360, thus providing options of 100%, 50% and 25% total light output."). In the pseudo-random sequences, where Pohlert expressly states that different groups of light element segments are flashed in pseudo-random sequences *id.*, [0063], [0064], the brightness of the light output will necessarily be random as it would depend on which of the groups are activated at any time. If the pseudo-random sequence randomly activates, for example, every fourth light segment, then all light segments, then every other light segment, then the brightness would randomly change from 25% total light output, to 100% light output, to 50% light output.

170. A POSITA would have recognized that such a pseudo-random sequence of flashes and strobes includes random durations and intervals for those flashes and strobes, as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light pattern, or

consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *Id.*; see also *id.*, [0063], [0067]. Pohlert acknowledges that the sequences can be predetermined or pseudo-random, and a POSITA would understand that the difference between the two is that the flashes in the pseudo-random sequence would have inconsistent, or random, duration and interval, so as to not appear as a set and fixed repeating pattern of flashes.

171. Therefore, Pohlert discloses Claim Element 15c.

e. Claim Element 15d

172. Claim Element 15d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 13:2-4.

173. Pohlert discloses Claim Element 15d.

174. The simulation parameters of Pohlert depend on the customizable lighting effects selected by the user through the interface. Parameters of dimming or brightening different groups of light elements and selecting whether the pattern is sequences will be pseudo-random, depend on a user first selecting to generate a pattern effect on the user interface. EX1011, [0063], [0067]. Similarly, the simulation parameter related to "frequency" of an oscillation signal depends on the user selecting to simulate a strobing effect. *Id.*, [0061]-0063], [0066]-[0067]. That is, the adjustment parameter for the frequency of strobing is directly related to a user selecting to produce a strobing effect.

175. A POSITA would understand that selecting a strobing effect, the parameter of frequency must depend on the user's selection of the strobing effect since changing parameters that are unrelated to the selected effect would confuse a user and be undesirable.

176. Therefore, Pohlert discloses Claim Element 15d.

f. Claim Element 15e

177. Claim Element 15e recites "wherein an output of the effect simulator is adapted to control a lighting device according to the calculated variation of lighting over time." EX1001, 13:6-8.

178. Pohlert discloses Claim Element 15e.

179. The power controller of Pohlert sends control signals through wires supplying power to light elements, causing the light elements to simulate the selected effect. Pohlert discloses an "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs

to generate desired light output. *Id.* These power control signals provide time-varying signals for "controlling the intensities" of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]; *see also* EX1001, 8:36-48 (the lighting effect simulator provides data or signals "in the form of brightness and/or colour values that vary over time. In order to cause the light 102 to produce the desired effect"), 8:55-57 ("This provides the ability for the lighting to produce light of any visible colour by varying the relative intensities of the different LEDs."). These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration, frequency, whether a sequence will be pseudo-random, and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

180. Further, the output from the effects selector and effects generator or processor and switches in the controllers shown in Figures 5A and 5B of Pohlert are provided to the LED lamps through a cable or wires:

> The power converter 520 is preferably connected to a plurality of switches 522 . . . each switch controlling power delivered by the power converter 520 to one of the wires 547 output by the power controller 512. . . . The switch selector 542 would then convert each knob setting to a set of control signals to the appropriate switches 522, which in turn would control power to the wires 547 supplying power to the light segments.

EX1011, [0058]-[0059].

181. Pohlert therefor discloses Claim Element 15e.

17. Claim 16

182. Claim 16 recites "The controller according to claim 15, wherein the controller comprises a wired or wireless communication interface adapted for communication with one or more lighting devices." EX1001, 13:9-12

183. It is my opinion that Pohlert anticipates Claim 16.

184. The controllers include a wired interface connecting to the lighting devices, wherein the wired connection communicates power control signals to the lighting devices. EX1011, [0058]. In "the lighting assemblies shown in FIGS. 3A and 3B, the LEDs or other low power lamps 205 . . . may be powered by a power source 210 controlled by a power controller 212 such as is generally shown in FIG. 2." *Id.*, [0057]. Pohlert states that the power controller "outputs a plurality of power wires 541 preferably through a cable (e.g., cable 213 shown in FIG. 2) for connection to the lighting frame 202," with the lighting frame including the light elements. *Id.*

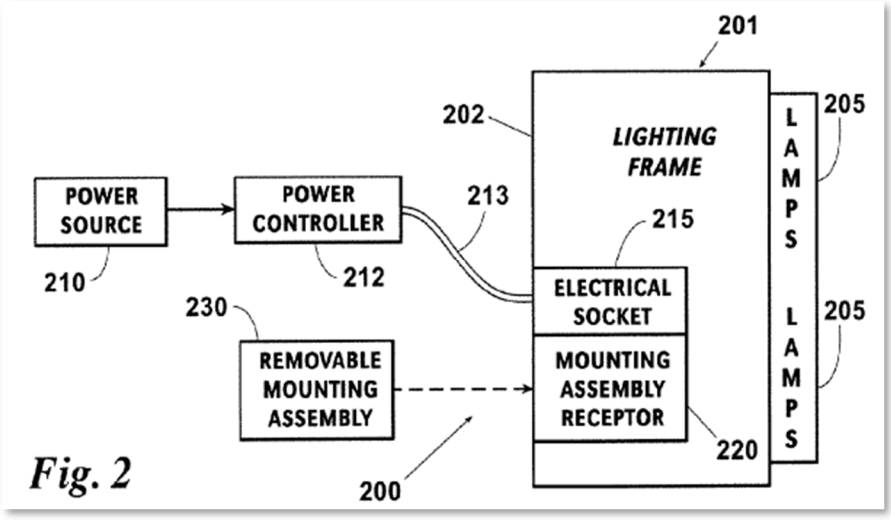


Fig. 2

Id., Figure 2.

The controller shown in Figure 2 can be either the controller shown in Figure 5A or Figure 5B. *Id.*, [0058]. In the Figure 5A controller, the output from the controller would "control power to the wires 547 supplying power to the light segments." *Id.*, [0059].

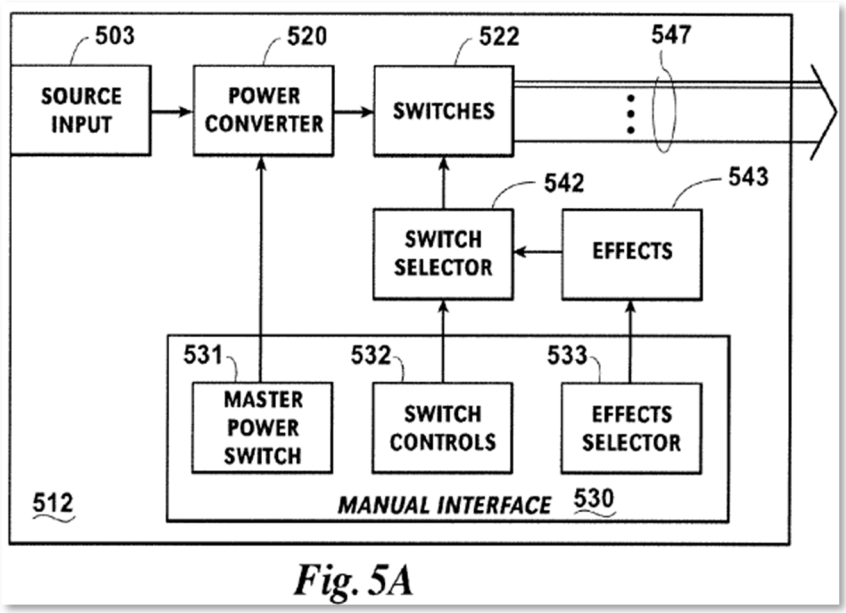


Fig. 5A

Id., Figure 5A.

185. The Figure 5B power controller similarly included an output for "providing power to individual wires 597 which are conveyed, preferably by cable, to the lighting frame assembly 201 of the lighting effects system 200." *Id.*, [0065].

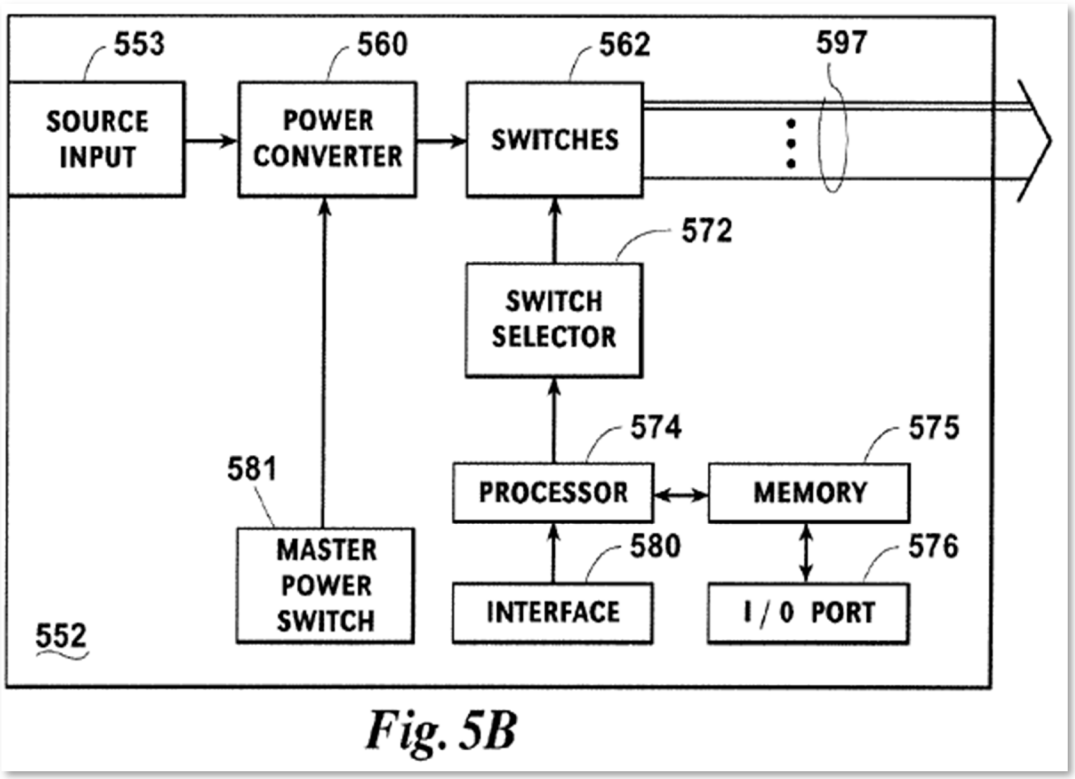


Fig. 5B

Id., Figure 5B.

186. Pohlert also discloses a wireless communication interface. The Figure 5B controller includes an "I/O port" that may be wireless (*e.g.*, infrared) for obtaining digital information. EX1011, [0066]. Moreover, the slave flashes can be controlled by RF, infrared, or optical signals (such as flashes generated by LEDs directly connected to the controller). *Id.*, [0022]. Pohlert states its lighting system is "particularly well suited for use with such optical, IR or slave flash systems. *Id.*, [0023].

187. A POSITA would have understood the Figure 5B power controller, having an infrared I/O port, could generate the exact infrared signals Pohlert

mentions trigger the external slave flash units. A POSITA would have understood that the I/O port could receive (input) and generate (output) infrared signals, and would have been motivated to use the wireless IR I/O port in the power controller to communicate with the slave flashes, so that she or he could coordinate and control all lights being used from one controller. *Id.* Further, a POSITA would have understood that the infrared I/O port is a wireless communication interface.

18. Claim 17

188. Claim 17 recites "The controller according to claim 15, wherein the controller comprises an input interface adapted to receive a user input." EX1001, 13:13-15.

189. It is my opinion that Pohlert anticipates Claim 17.

190. The Figure 5A-5B controllers include an input user interface to receive user inputs. *See supra* Claim 8.

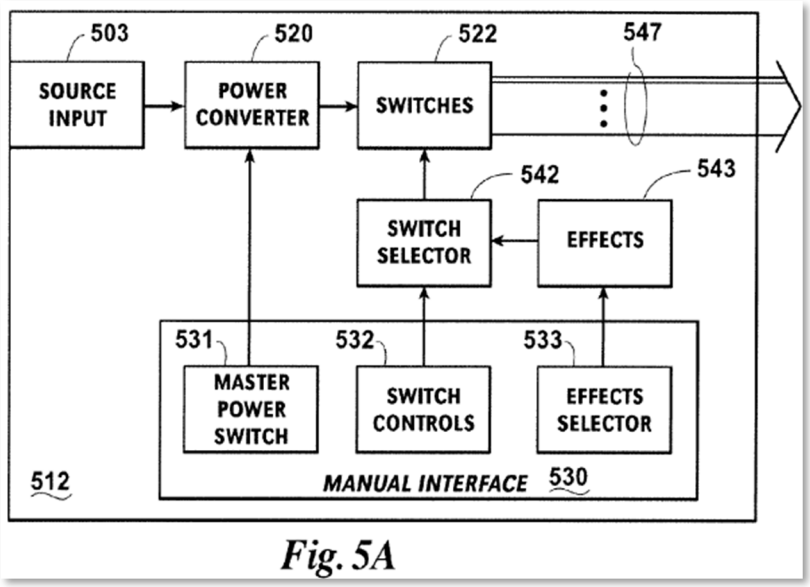


Fig. 5A

EX1011, Figure 5A.

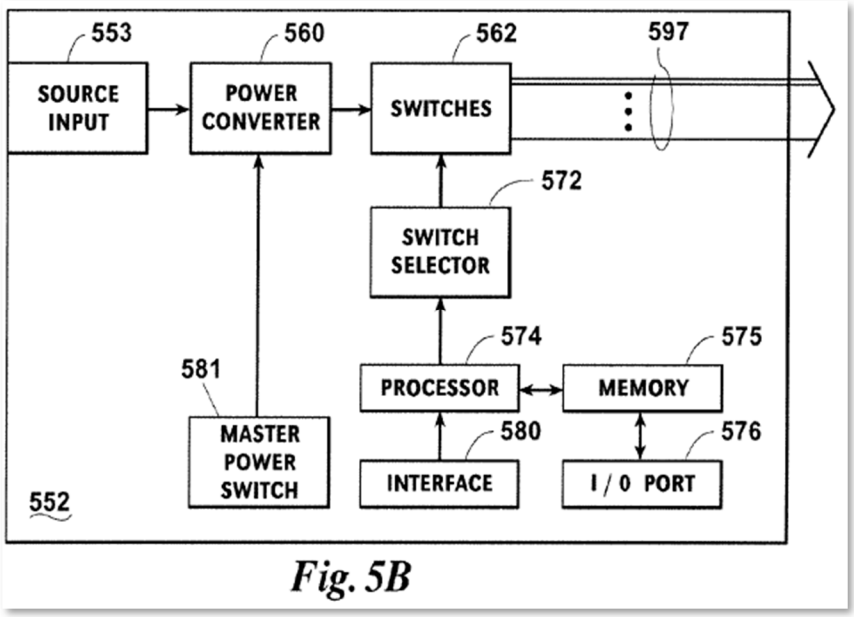


Fig. 5B

Id., Figure 5B.

191. The source input 503 and 553 are configured to receive user input and are included with the power controller 552.

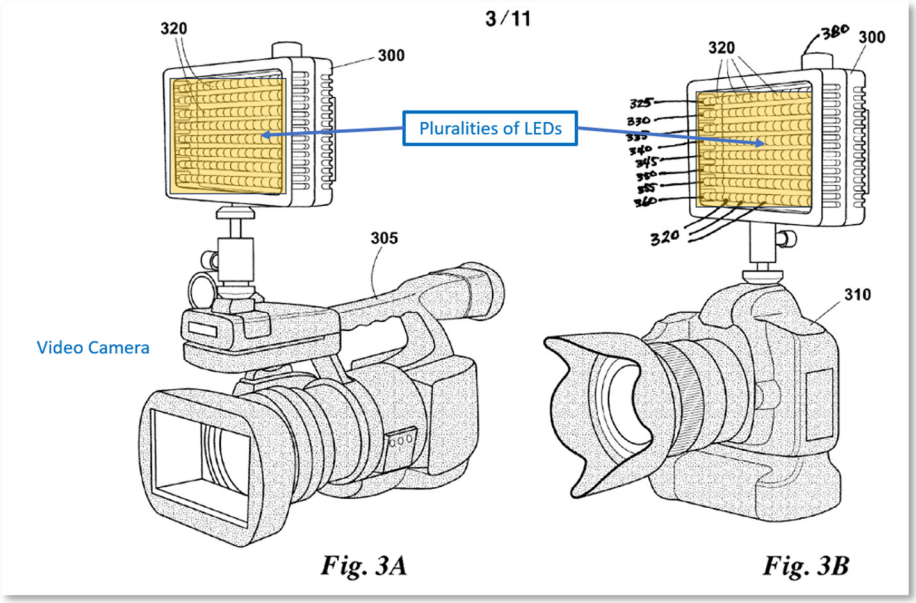
19. Claim 18

192. Claim 18 recites "A lighting system comprising the controller according to claim 15 and at least one lighting device; said lighting device comprising at least one light emitting diode." EX1001, 13:17-19.

193. It is my opinion that Pohlert anticipates Claim 18.

194. Pohlert discloses a lighting system comprising the controller according to claim 15, *see supra* Claim 15, and lamp elements including multiple light emitting diodes (LEDs), such as the plurality of lamp segments 320 shown in Figures 3A and

3B, and that these can be "red, green, and blue LEDs." EX1011, [0057], [0081], [0084]. Pohlert also discloses the lamp elements may comprise "high output LEDs" that "are available in white as well as colors such as green, blue, red, amber, and cyan. *Id.*, [0111].



Id., Figures 3A, 3B (annotated).

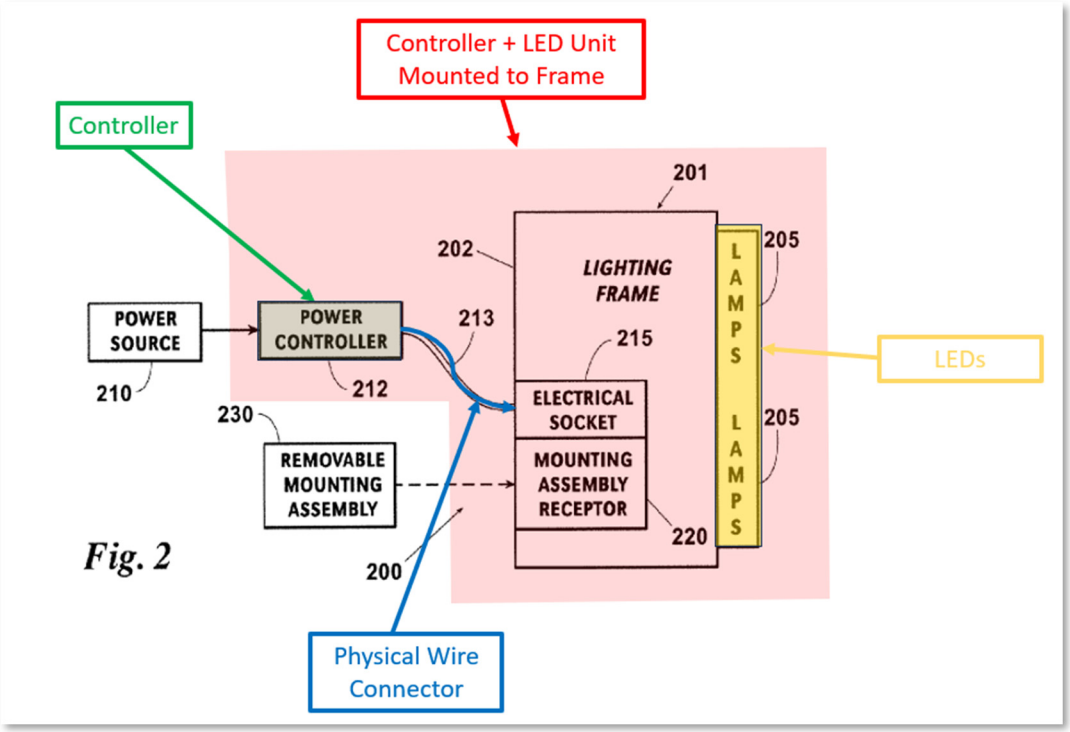
20. Claim 19

195. Claim 19 recites "The lighting system according to claim 18 wherein said controller and said lighting device are integrated in a combined unit." EX1001, 13:20-22.

196. It is my opinion that Pohlert anticipates Claim 19.

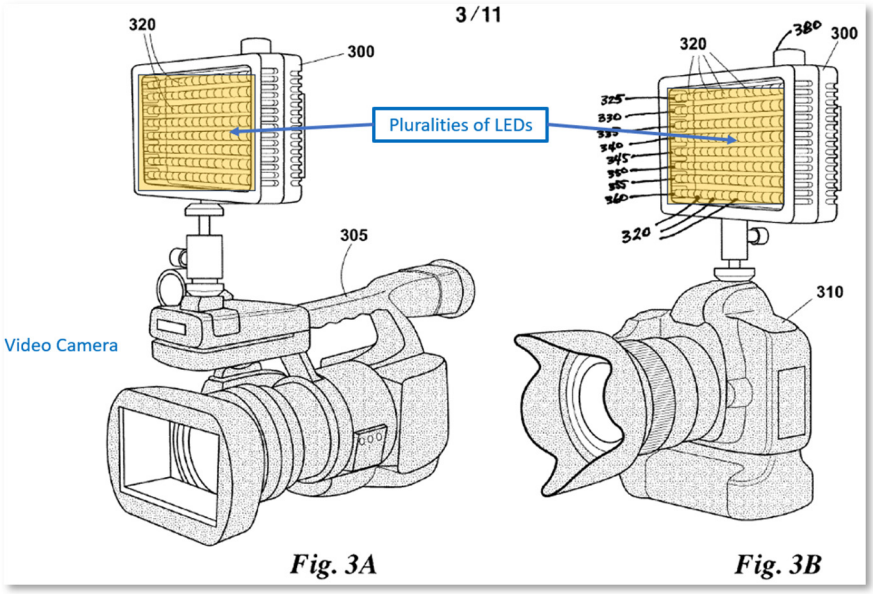
197. The lighting system includes a power controller and LED lamps physically connected and combined into one device. EX1011, [0020], [0050]-

[0051]. The power controller can be physically connected by a cable to the lighting elements on the lighting frame, making them one combined unit.



Id., Figure 2 (annotated).

198. The power source (210) in Figure 2 above may be "a battery having sufficient current to drive the LEDs." *Id.*, [0057]. Where a battery is used, "the light panel and self-contained battery unit functions as an integrated lighting apparatus." *Id.*, [0018]. Similarly, as shown in Figures 3A-3B below, the lighting system may be a stand-alone unit mounted to a video or photography camera.



Id., Figures 3A-B (annotated). The LEDs and controller may also be mounted to a camera frame and may be "provided in the form of a kit, with one or more light panel, self-contained batter unit, compact stand, connecting cable(s), adapter(s), lenses or color gels, and so on, being provided in a single package to allow flexibility and versatility to use in the field." *Id.*, [0024], [0050].

199. Further, Pohlert explains:

> [i]t is contemplated that the lighting and effects generator of the present disclosure could, due to its size and weight, be transported quickly and easily by a photographer to a location and rapidly setup to produce a lighting and effects system which provides continuous source of illumination for modeling and video capture as well as pulse, flash or strobe boost illumination for still photography. Such a system capable of being battery powered would not require cabling and thus could be used in crowded areas without a concern of someone tripping over cables. A portable and therefor spontaneous battery powered, cordless, LED studio can be set up at any desired location.

Id., [0094].

200. Pohlert states that the "lighting apparatus comprises a light panel, having a panel frame, and a plurality of LEDs or other light elements secured to the panel frame" and further explains "[t]he lighting apparatus may include an effects generator . . . ." A POSITA would understand the described light panel and effects generator as being part of a single lighting apparatus.

21. Claim 20

201. It is my opinion that Pohlert anticipates Claim 20

a. Claim Element 20p

202. The preamble of Claim 20, designated Claim Element 20p herein, recites "A computer program comprising software code for controlling a lighting device to produce a user customisable lighting effect, the computer program adapted to perform, when executed, the steps of:" EX1001, 14:1-4.

203. For purposes of this Declaration, I assume the preamble of Claim 20 is limiting and must be considered for purposes of evaluating the validity of the claims.

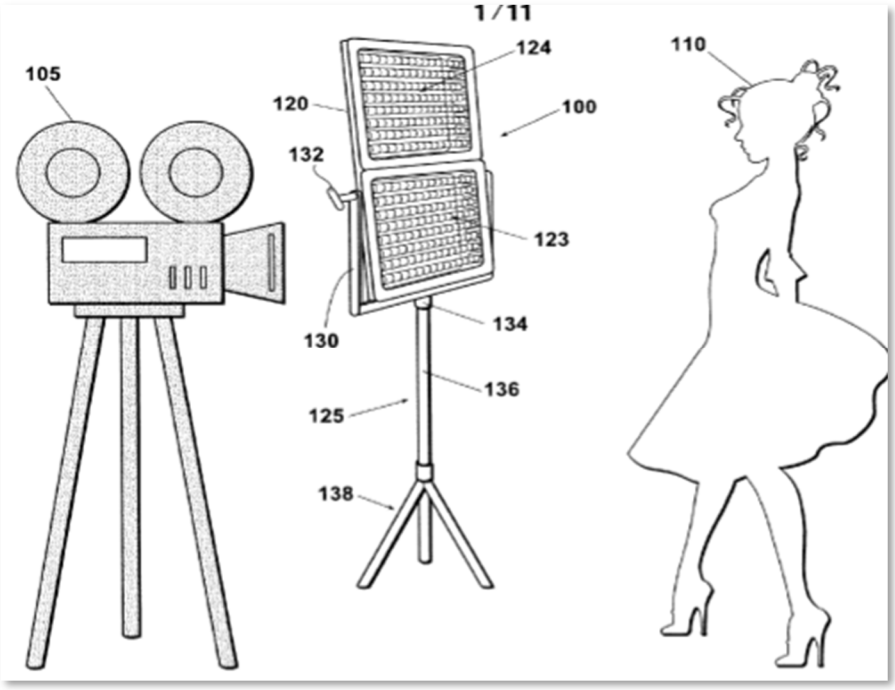
204. Regardless, Pohlert discloses Claim Element 20p

205. As discussed above in the context of Claim 1, Pohlert expressly discloses the method can be performed on a "controller" of "software program."

206. A controller performs the method for controlling the lighting elements. EX1011, Figures 5A, 5B [0057]-[0067]. The Figure 5B controller implements a software program in the form of "programming instructions," read and implemented

by the processor to customize and produce selected effects. EX1011, [0066]-[0067]. Pohlert notes how "programming instructions" executed by the processor in the Figure 5B controller "provide for various lighting effects, such as dimming, strobing, pulsation, or pattern generation, for example." (Id., [0067].) Thus, it is the programming instructions, executed by the processor, that perform the method steps recited in both Claims 1 and 20.

207. Pohlert further discloses a method for controlling a lighting system with LED "light panels" controlled by a power controller permitting users to select and modify lighting effects, such as patterns of strobing, flashing, and dimming and brightening the lights. EX1011, Abstract, [0020], [[0050], [0063], [0067], [0103]. The method can be used for "photography, film, television, and other applications." *Id.*, [0003]. Figure 1 illustrates use of the lighting system with a video camera that may be "a motion picture type camera." *Id.*, [0052].



Id., Figure 1.

208. Therefore, Pohlert discloses Claim Element 20p.

a. Claim Element 20a

209. Claim Element 20a recites "calculating using an effect simulator a time varying lighting value based on at least one simulation parameter;" EX1001, 14:5-6.

210. Pohlert discloses Claim Element 20a.

211. The '257 Patent describes the "effect simulator" as a component that "creates data 106 characterising a lighting effect." EX1001, 7:45-50; *see also id.*, 5:51-55. Further, it describes the "time varying lighting value" as data or signals that

contain brightness or color values that vary over time to produce desired effect. EX1001, 8:36-48; 8:55-57.

212. Pohlert discloses an "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs to generate desired light output. *Id.* These power control signals provide time-varying signals for "controlling the intensities" of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]. *See e.g.*, EX1001, 8:36-48 (the lighting effect simulator provides data or signals "in the form of brightness and/or colour values that vary over time. In order to cause the light 102 to produce the desired effect), 8:55-57 ("This provides the ability for the lighting to produce light of any visible colour by varying the relative intensities of the different LEDs."). These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration,

frequency, whether a sequence will be pseudo-random, and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

213. A user may select a strobing effect implemented by the controller generating a time-varying oscillating signal and applying the signal to control intensities of the LEDs. *See* EX1011, [0062]. That user can adjust the oscillator frequency parameter of the strobing effect "via a knob, switch, or other selection means as part of the effect selector" in the user interface. EX1011, [0062]. Adjusting the oscillation frequency in this way causes the controller to calculate and create a new output time-varying power control signal, changing frequency of the strobing.

214. Pohlert also discloses generating light effect patterns where light segments are strobed, flashed, or dimmed in sequences, requiring the controller to calculate signals that are time varying, as some lights are on and some off at different times to generate patterns. *Id.*, [0063], [0067]. The brightness and frequency of these patterns are customized by user-selected parameters, including the brightness of different groups of light elements during the pattern and whether the sequences are pseudo-random. *Id.*, [0063], [0067]. Patterns with a sequence in time like this requires that the LEDs are controlled by signals that are "time varying." In other words, at different times in the sequence some LEDs will be on, some off.

215. The "effects selector" and "effects generator" or "processor" of Figures 5A and 5B of Pohlert calculate data signals that are converted to power control

signals supplied to the LEDs based on parameters including brightness, duration, or sequence that allow the output from the LEDs to "simulate" the desired lighting effect or pattern. EX1011, [0059], [0061], [0065]-[0067]. The Pohlert controllers generate lighting values, in the form of control signals, that are provided to appropriate switches to control power to the wires supplying power to light elements. *Id.*

216. Therefore, Pohlert discloses Claim Element 20a.

c. Claim Element 20b

217. Claim Element 20b recites "wherein said at least one simulation parameter for characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 14:7-12.

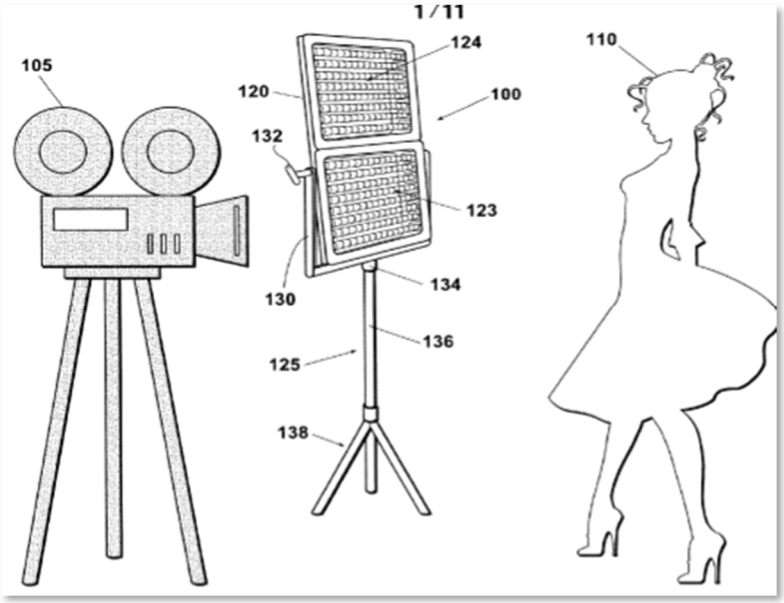
218. Pohlert discloses Claim Element 20b.

219. Users can select from a range of effects through an interface on the controller, such effects including patterns and pattern sequences, strobing, flashing, and dimming and brightening. *Id.*, [0057]-[0059], [0061], [0063], [0067], Figures 2, 5A, 5B. Users can customize these effects by selecting and adjusting different simulation parameters. *See supra* Claim Element 1a. These parameters characterize

the selected effect in that the effect generated in Pohlert is dependent on and reflective of these parameters. *Id.*, [0057]-[0059], [0061], [0063], [0067].)

220. Moreover, these simulation parameters include selections for brightness, duration, frequency, whether a sequence will be pseudo-random, and color. EX1011, [0051], [0061]-[0063], [0066]–[0067], [0089]–[0091]. For example, a user can customize the desired lighting pattern by choosing from, and adjusting, the combinations of parameters that make up the pattern, including predetermined strobing and flashing sequences, pseudo-random strobing and flashing sequences, and dimming and brightening of different light elements. *Id.*

221. The lighting effects created based on these parameters are used to provide lighting for photography, film, television, and other applications. EX1011, [0003], [0005]. Pohlert discloses that its lighting system and effects, based on the selected and customized parameters, are used to provide lighting in "photography, film, television, and other applications." *Id.*, [0003]. Pohlert also acknowledges that lighting systems are "an integral part of the film and photography industries," providing essential proper illumination "when filming movies, television shows, or commercials, when shooting video clips, or when taking still photographs." *Id.*, [0005]. Figure 1 also illustrates the system used in conjunction with a video camera. *See id.*, Figure 1.



Id., Figure 1.

222. Therefore, Pohlert discloses Claim Element 20b.

d. Claim Element 20c

223. Claim Element 20c recites "wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 14:12-14.

224. Pohlert discloses Claim Element 20c.

225. The user-selected lighting effect patters can be modified by selecting from a number of parameters that will make up the effect, including:

> [1] strobing or flashing different groups of light segments . . . in a pre-defined sequence (which may be a pseudo-random sequence, if desired), [2] strobing or flashing different light elements . . . of the light segments . . . in a predefined (or pseudo-random) sequence, [3] gradually dimming or brightening light segments . . . (individually, in groups, or collectively), or [4] various combinations of these effects.

EX10011, [0063]; *see also id.*, [0067]. As acknowledged by the '257 Patent, a "pseudo-random parameter" is considered "to be equivalent to a truly random parameter." EX1001, Col. 7:30-34. Further, a POSITA would likewise recognize that a pseudo-random sequence will generate random flashes and strobes of light, with, for example, an algorithm generating outputs that will determine how the random sequence will be made up of different strobes and flashes of light at the different groups of LED light elements.

226. Selecting to strobe or flash different light elements, or groups of light elements, in a pseudo-random sequence includes "random brightness" (the intensity of the overall strobe or flash), "random duration" (how long a strobe or flash lasts), and "random intervals" (time between strobes or flashes). EX1011, [0063], [0067]. Pseudo-random sequences are a series of random strobes and flashes, one after another, with the time between strobes or flashes, and the group of light elements used, being random. A POSITA would thus understand that such a pseudo-random sequence could include random brightness, duration, and intervals.

227. For example, the brightness of the sequence, and each step of the sequence, will be random, as it will depend on which LED elements and groups of elements are randomly selected to be activated at any time (the more elements activated, the greater the brightness). Additionally, a POSITA would recognize that such a pseudo-random sequence of flashes and strobes includes random durations

and intervals for those flashes and strobes as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light patterns, or consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *See* EX1011, [0063], [0067]; *see also id.*, [0059] ("The switch controls 532 could have a first setting to select all of the light segments … thereby illuminating all 320 light elements, a second setting to select every other light segments 325, 335, 345 and 355, and a third setting to select every fourth of light segment 325, 340, 360, thus providing options of 100%, 50% and 25% total light output."). In the pseudo-random sequences, where Pohlert expressly states that different groups of light element segments are flashed in pseudo-random sequences *id.*, [0063], [0064], the brightness of the light output will necessarily be random as it would depend on which of the groups are activated at any time. If the pseudo-random sequence randomly activates, for example, every fourth light segment, then all light segments, then every other light segment, then the brightness would randomly change from 25% total light output, to 100% light output, to 50% light output.

228. A POSITA would have recognized that such a pseudo-random sequence of flashes and strobes includes random durations and intervals for those flashes and strobes, as opposed to the gradual dimming and brightening that may also be selected as part of the combinations of parameters making up the desired light pattern, or

consistently flashing or strobing the same elements or groups of elements in a consistent sequence of set interval and duration. *Id.*; see also *id.*, [0063], [0067]. Pohlert acknowledges that the sequences can be predetermined or pseudo-random, and a POSITA would understand that the difference between the two is that the flashes in the pseudo-random sequence would have inconsistent, or random, duration and interval, so as to not appear as a set and fixed repeating pattern of flashes.

229. Therefore, Pohlert discloses Claim Element 20c.

e. Claim Element 20d

230. Claim Element 20d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 14:14-16.

231. Pohlert discloses Claim Element 20d.

232. The simulation parameters of Pohlert depend on the customizable lighting effects selected by the user through the interface. Parameters of dimming or brightening different groups of light elements and selecting whether the pattern is sequences will be pseudo-random, depend on a user first selecting to generate a pattern effect on the user interface. EX1011, [0063], [0067]. Similarly, the simulation parameter related to "frequency" of an oscillation signal depends on the user selecting to simulate a strobing effect. *Id.*, [0061]-0063], [0066]-[0067]. That is, the adjustment parameter for the frequency of strobing is directly related to a user selecting to produce a strobing effect.

233. A POSITA would understand that selecting a strobing effect, the parameter of frequency must depend on the user's selection of the strobing effect since changing parameters that are unrelated to the selected effect would confuse a user and be undesirable.

234. Therefore, Pohlert discloses Claim Element 20d.

f. Claim Element 20e

235. Claim Element 20e recites "outputting, from said effect simulator, said time varying lighting value thereby to simulate the user customisable lighting effect." EX1001, 14:17-19.

236. Pohlert discloses Claim Element 20e.

237. The power controller of Pohlert sends control signals through wires supplying power to light elements, causing the light elements to simulate the selected effect. Pohlert discloses an "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) in the power controller that calculates time varying lighting values in the form of data signals characterizing the desire lighting effect. EX1011, [0059], [0061]-[0062], [0065]-[0067]. The outputs from the "effects selector" and "effects generator" (Figure 5A) or "processor" (Figure 5B) are data and signals characterizing the desired lighting effect, which are converted to power control signals supplied to the LEDs to generate the desired light output. *Id.*, [0059], [0061], [0065]-[0067]. These data are converted to power control signals supplied to LEDs

to generate desired light output. *Id.* These power control signals provide time-varying signals for "controlling the intensities" of the LEDs to generate the desired light output effects. EX1011, [50]-[51], [0059], [0061]-[0062], [0065]-[0067]; *see also* EX1001, 8:36-48 (the lighting effect simulator provides data or signals "in the form of brightness and/or colour values that vary over time. In order to cause the light 102 to produce the desired effect"), 8:55-57 ("This provides the ability for the lighting to produce light of any visible colour by varying the relative intensities of the different LEDs."). These power control signals are also based on user-selected parameters for desired lighting effects, including brightness, duration, frequency, whether a sequence will be pseudo-random, and color. *Id.*, [0051], [0061]-[0067], [0089]-[0091].

238. Further, the output from the effects selector and effects generator or processor and switches in the controllers shown in Figures 5A and 5B of Pohlert are provided to the LED lamps through a cable or wires:

> The power converter 520 is preferably connected to a plurality of switches 522 . . . each switch controlling power delivered by the power converter 520 to one of the wires 547 output by the power controller 512. . . . The switch selector 542 would then convert each knob setting to a set of control signals to the appropriate switches 522, which in turn would control power to the wires 547 supplying power to the light segments.

EX1011, [0058]-[0059].

239. Pohlert therefor discloses Claim Element 20e.

22. Claim 21

240. Claim 21 recites "The method according to claim 13, further comprising recalling said stored at least one simulation parameter from a memory." EX1001, 14:19-21.

241. It is my opinion that Pohlert anticipates Claim 21.

242. Pohlert discloses a memory storing programming instructions, including the simulation parameters for the varying power control signals sent to the LED elements to implement the user-selected effects. EX1011, [0066]–[0067].

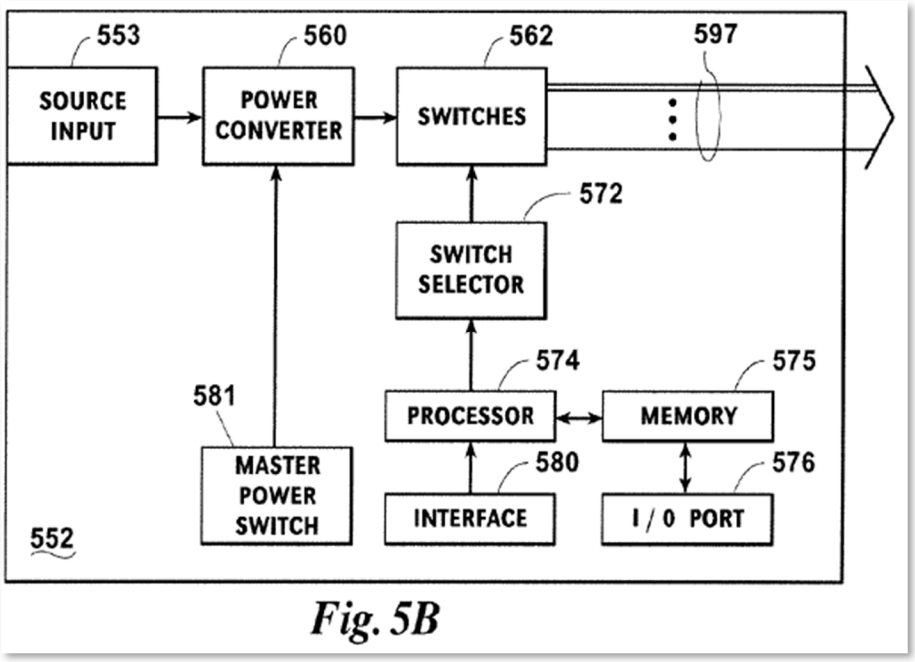


Fig. 5B

Id., Figure 5B. The Figure 5B controller processor interfaces with a memory, and

> reads instructions from the memory 575 and executes them in a conventional manner. The instructions will generally cause the processor to control the switch selector by, e.g., setting various digital values in registers whose output control the switches 562. The programming instructions may also provide for various lighting effects,

such as dimming, strobing, pulsation, or pattern generation, for example.

Id., [0067].

B. Ground 2 – Mueller in view of Reichow renders Claims 1-21 obvious.

1. Overview of Mueller

243. U.S. Patent Application Publication 2005/0275626 to Mueller et al., titled "Entertainment Lighting System" was filed on March 2, 2005, and published on December 15, 2005. Mueller is therefore prior art to the '257 Patent at least under 35 U.S.C. §102(a).

244. Mueller describes the creation and modification of coordinated lighting effects in real time. In doing so, Mueller describes a processor 102 that is configured to output one or more control signals to drive light sources 104 to generate various intensities of light from each light source 104. EX1004, [0168]. The processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources 104 so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects. Id., [0170]. Mueller further explains that the processor's control of one or more of the light sources 104 could be based, at least in part, on user signals provided through an interface 118. *Id.*, [0183]. Such user signals could be user-selectable settings or functions, including, but not limited to, generally controlling the light output of the

lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, and setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182].

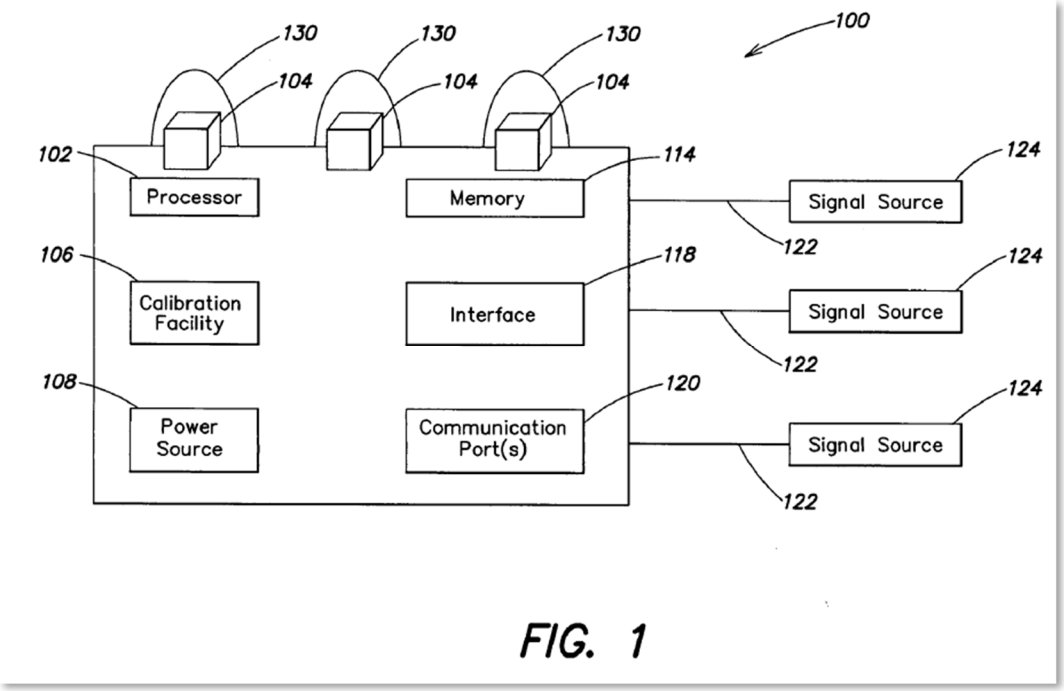


FIG. 1

Id., Figure 1.

245. Mueller discloses a number of alternative embodiments utilizing the general concepts disclosed therein in a variety of specific devices and settings. A POSITA would understand that the concepts discussed in the context of each of these embodiments are applicable to Mueller's other embodiments. Generally, employing these concepts across Mueller's embodiments would require only the alteration or addition of software code, a concept with which a POSITA would be familiar. A

POSITA would thus be motivated, where required, to combine the teachings of Mueller's various embodiments with those of other embodiments.

2. Overview of Reichow

246. U.S. Patent No. 7,686,471 to Reichow ("Reichow") titled "Standalone Flame Simulator" was filed on Nov. 10, 2006, published on May 15, 2008, and issued on March 30, 2010. Reichow is therefore prior art to the '257 Patent at least under 35 U.S.C. § 102(a).

Reichow describes an apparatus for simulating flames using fabric flame sheets or elements. The apparatus includes a fan or blower for producing a volume of air flow and two or more flame elements positioned in the fan air flow. First and second light sources, such as high-powered light emitting diodes (LEDs), are provided to produce light beams having two differing colors such as an amber beam and an orange/red beam. The light beams are directed so as to mix or cross on or near the flame elements when the flame elements extend outward from their mounting location into the fan air flow. Each of the LEDs has a brightness level that can be tuned or adjusted by a controller, which may be manual or may be automated to modify the brightness level of at least one of the LEDs and typically both LEDs during the operation of the flame simulator.

3. Motivation to Combine

247. Mueller describes the control of an entertainment lighting system using an interface, controller, and effect simulator. Mueller also describes how a user might select and customize a particular effect to be simulated, how the systems described therein receives data relating to the customized effect, and converts the received data into lighting signals that are then sent to light sources to produce the customized effect. Mueller provides less detail regarding the combinations of particular colors, timing, and brightness of each effect that the systems described therein are capable of generating. For instance, Mueller discloses that the systems described therein can simulate the light from a fire. EX1004, [0215], [0221]. But Mueller does not disclose the particular colors, intensities, and timings associated with simulating such an effect.

248. But Reichow does describe how one might use lighting effects to simulate the light of a flame in greater detail. A POSITA seeking to program such an effect into the systems of Mueller, would look to other art, like Reichow, to determine the manner in which such effects are generated, particularly effects that require flickering or strobing of lighting elements.

4. Claim 1

249. It is my opinion that Mueller in view of Reichow renders Claim 1 obvious.

a. Claim Element 1p

250. The preamble of Claim 1, designated Claim Element 1p herein, recites "A method for controlling a lighting device to produce a user customizable lighting effect, the method comprising:". EX1001, 11:54-55.

251. For the purposes of this declaration, I assume that the preamble of Claim 1, and the preambles of independent Claims 15 and 20, are limiting and must be considered for the purposes of evaluating the validity of these claims.

252. Mueller teaches Claim Element 1p.

253. In one embodiment, Mueller describes a processor 102 of the lighting unit 100. Processor 102, "controls one or more of the light source 104". *Id.*, [0183] ("In one implementation, the processor 102 of the lighting unit 100 monitors the interface 118 and ***controls one or more of the light sources 104***." (emphasis added)).

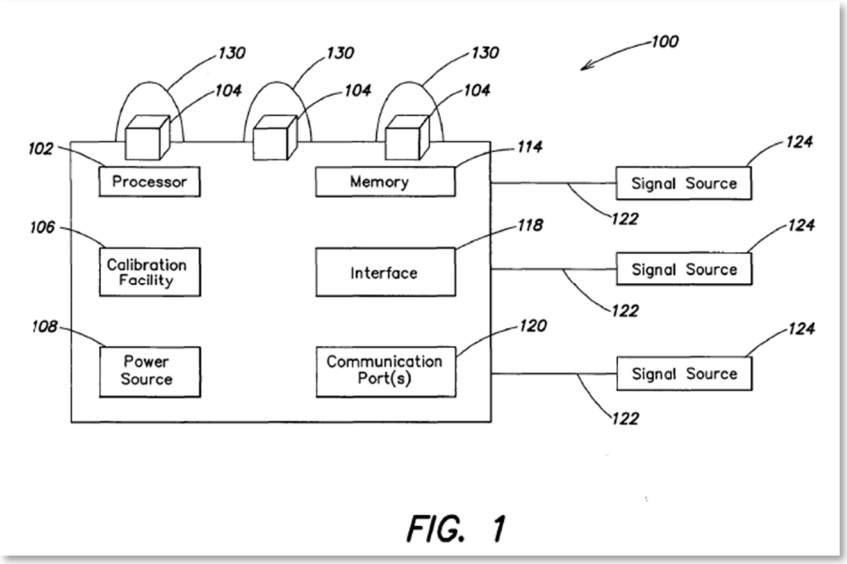


FIG. 1

Id., Figure 1. Mueller explains that processor 102 controls lightning unit 100, and

individual light sources 104, integrated in that unit. *Id.*, [0182]-[0183]. Mueller further explains that this control is "based at least in part on signals, such as user signals, provided through [an] interface 118[,]" *id.*, [0183], and includes the ability to produce user customizable lightning effects. Specifically, Mueller describes this control as "generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, [and] changing and/or selecting various parameters of selected lighting effects . . . ." *Id.*, [0182].

254. In a second embodiment comprising a networked lighting system 200 made up of multiple lighting units 100, Mueller describes lighting unit controller (LUC) 208, which controls lighting unit(s) 100. EX1004, [0199] ("As shown in FIG. 2A, the lighting system 200 may include one or more lighting unit controllers ('LUCs') 208, wherein each LUC 208 is responsible for communicating with and generally controlling one or more lighting units 100 coupled to it.").

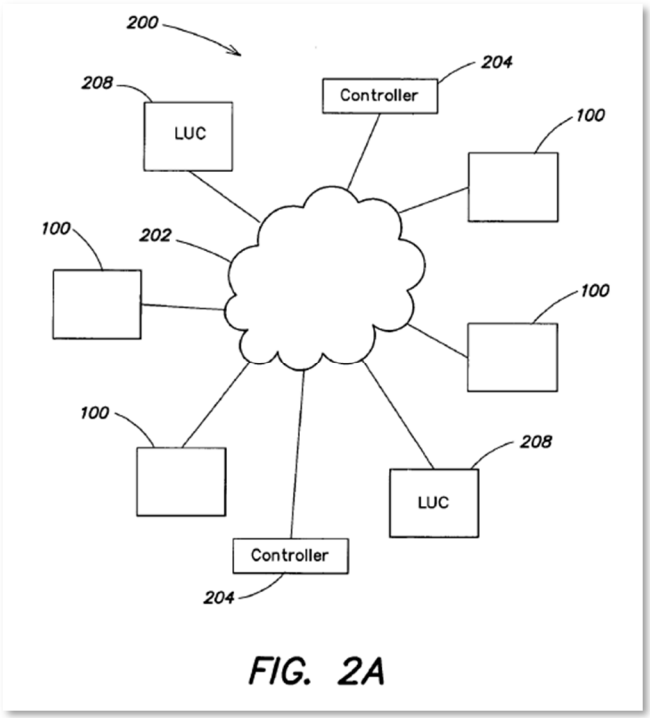


FIG. 2A

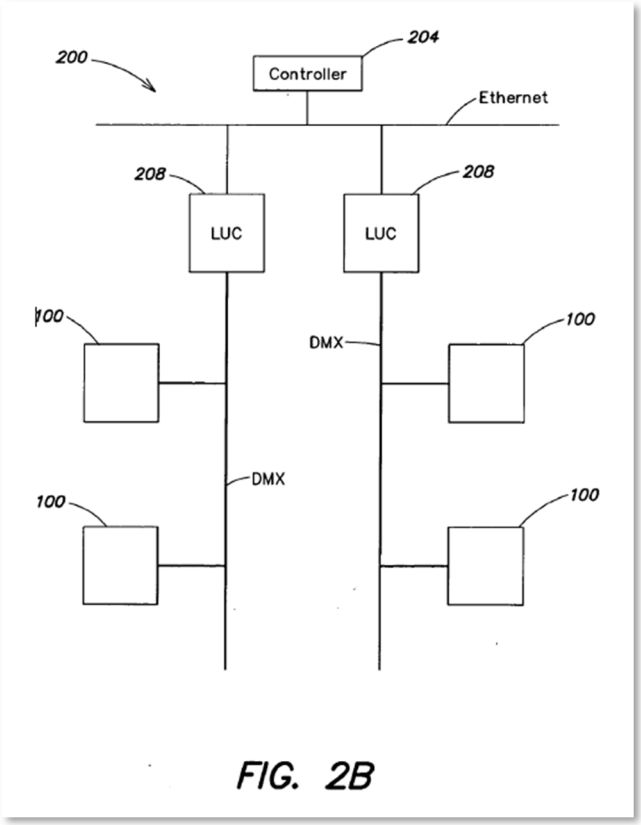


FIG. 2B

Id., Figures 2A, 2B.

255. Mueller explains that LUC 208's control of lightning units 100 includes enabling each lighting unit 100 to produce user customizable lightning effects. One example Mueller discloses is the generation a "rainbow chase" in response to user input: "The user may provide a simple instruction to the central controller 204 to accomplish this, and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a 'rainbow chase' (appearance of a propagating rainbow of colors)." *Id.*, [0202]. Other such effects include fires and explosions. *Id.*, [0221].

256. Mueller further explains that such lighting effects produced by lighting unit 100 are user customizable. A user may, for instance, select from a range of different lighting effects, *Id.*, [0215], and "[a]ny of the effects can be specified with parameters, such as frequencies, wavelengths, wave widths, peak-to-peak measurements, velocities, inertia, friction, speed, width, spin, vectors, and the like." *Id.*, [0225].

257. Mueller describes "methods and systems for managing control instructions for a plurality of light systems." EX1004, [0025]. Specifically, Mueller discloses lightning unit 100 is controlled by a processor 102 that "may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170].

258. Mueller explains that control of the lightning unit 100 includes producing user customizable lightning effects. For instance, Mueller describes "controlling the light output of lighting unit 100, ***changing and/or selecting various pre-programmed lighting effects*** to be generated by the lighting unit, [and] ***changing and/or selecting various parameters of selected lighting effects*** . . . ." *Id.*, [0182] (emphasis added).

b. Claim Element 1a

259. Claim Element 1a recites "calculating, using an effect simulator, a time varying lighting value based on at least one simulation parameter;" EX1001, 11:56-58.

260. Mueller teaches Claim Element 1a.

261. Mueller describes an effect simulator that performs calculations, namely processor 102. EX1004, [0168]. Specifically, Mueller explains that processor 102 can calculates a time varying lighting value: "the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170]. Mueller makes clear that this calculation is made in response to user input, including input relating to parameters on which the lighting value is based, received by processor 102, which determines (*i.e.*, "calculates") lighting values reflecting these

inputs, and sends these values to light sources 104 to produce the desired effects. *Id.*, [0170], [0182]-[0183].

262. In connection with a number of additional embodiments, Mueller discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

> The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time,*** ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200."

Id., [0215] (emphasis added).

> By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.

Id., [0242].

263. In connection with additional embodiments, Mueller discusses the use of software, algorithms, and the like to calculate time varying lighting values. *See, e.g.*, *id.*, [0063], [0064], [0170], [0172], [0178], [0205]-[0207], [0211], [0220], [0302], [0303]. A POSITA would have understood that such software or algorithms would provide processor 102 with the ability to calculate these dynamic lighting

values.

264. In view of these disclosures, a POSITA would have understood that Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a simulation parameter in the manner disclosed in multiple these multiple embodiments of Mueller. For example, the processor 102 could be programmed to calculate (as used in connection with the '257 patent) a time-varying effect of displaying a selected color of light.

265. Therefore, Mueller teaches Claim Element 1a.

c. Claim Element 1b

266. Claim Element 1b recites "wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 11:58-63.

267. Mueller teaches Claim Element 1b.

268. Mueller discloses that the user customizable lighting effect based, at least in part, on a simulation parameter, can be selected from a range of pre-programmed, customizable lighting effects. EX1004, [0182].

269. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including "a film studio, [and] a video studio." EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

270. Further, little to no changes would need to be made to the lighting unit 100 or the lighting system 200 in order to use the disclosed effects for videography, broadcast, cinematography, studio filming, and/or location filming.

d. Claim Element 1c

271. Claim Element 1c recites "wherein said at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 11:63-65.

272. Mueller in view of Reichow teaches Claim Element 1c.

273. Reichow, which, like Mueller, uses lights in connection with simulating a flame effect, discloses simulation parameters of a random brightness, a random duration, and a random interval.

274. Regarding random brightness, Reichow uses a controller to "run a flame simulation routine that determines a cyclical pattern ***or*** random timing ***or random brightness levels***." EX1010, 3:13-15 (emphasis added). As the simulated fire of Reichow is described as appearing to flicker, *id.*, 9:9-12, it includes random

brightness levels between the background and flickering colors—rather than consistent brightness levels, which would create a strobe rather than flicker effect.

275. Regarding random duration and random interval, that LEDs described in Reichow "are caused to flash or be turned on/off at regular ***or random intervals*** to illuminate flame elements[,]" and can be controlled "to alter the brightness of the two or more flame simulation routines to alter the brightness of the two or more LEDs on a regular ***or random time schedule*** . . . ." EX1010, 3:13-15, 4:59-62. Absent such random duration an intervals, the effect would not be a "random flicker," and would instead be a consistent strobing between background and flickering colors.

e. Claim Element 1d

276. Claim Element 1d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 11:65-67.

277. Mueller teaches Claim Element 1d.

278. As explained above, Mueller discloses the selection of user customizable lighting effects to be simulated. *See supra* Claim Elements 1p, 1b. Mueller also teaches that a user of the systems described therein may customize those lighting effects by changing one or more simulation parameters. *See supra* Claim Element 1p. A POSITA would understand that the simulation parameter(s) for the pre-programmed lighting effects of Mueller, EX1004, [0182], are dependent on

the specific pre-programmed lighting effects selected for simulation. If the effects were not dependent, then a random undesired effect would play, thus, confusing the user. A POSITA would understand that presenting simulation parameters unrelated to the lighting effect to be simulated would only create confusion and would limit the available parameters to be adjusted to only those relevant to the selected effect. This is particularly true because Mueller specifically discloses contexts in which adjustable effect parameters are limited to those relevant to a selected effect. *See, e.g.*, *id.*, [0305] ("***a user can select a sparkle effect*** 5050 from the pull-down menu of the type filed 4058, in which case ***the parameters pane 4074 shows parameters appropriate for a sparkle effect***." (emphasis added).

f. Claim Element 1e

279. Claim Element 1e recites "outputting, from said effect simulator, said time varying lighting value thereby to stimulate the user customisable lighting effect." EX1001, 12:1-3.

280. Mueller teaches Claim element 1e.

281. Mueller describes the outputting a time varying lighting value to simulate a selected lighting effect, as it explains that "processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller further discloses that "the processor 102 may be particularly configured (e.g.,

programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or ***time-varying (dynamic) multi-color (or multi-color temperature) lighting effects***." *Id.*, [0170] (emphasis added).

282. Mueller also explains that LUC 208 "is responsible for communicating with and generally controlling one or more lighting units 100[,]" *id.*, EX1004, [0199], by "generat[ing] the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100." *Id.*, [0202].

5. Claim 2

283. Claim 2 recites "The method according to claim 1 wherein the random brightness comprises a random peak brightness." EX1001, 12:4-5.

284. It is my opinion that Mueller in view of Reichow renders Claim 2 obvious.

285. As explained above, Reichow teaches the simulation parameter of random brightness. *See supra* Claim Element 1c. Given that Reichow describes the generation of a flickering effect, this "flicker" characteristic indicates it includes random brightness levels for the background and flickering colors—rather than consistent brightness levels, which would create a strobe rather than flicker effect. Whichever brightness level is the highest would be the "random peak brightness."

6. Claim 3

286. Claim 3 recites "The method according to claim 1 wherein the random interval comprises at least one of a random interval between flashes, a random interval between groups of flashes, and a random frequency." EX1001, 12:6-9.

287. It is my opinion that Mueller in view of Reichow renders Claim 3 obvious.

288. Reichow discloses the simulation parameter of random interval. *See supra* Claim Element 1c. Given that the simulated flame of Reichow is described as appearing to flicker, such flickering indicates a "random interval" of time between each flash of light. Absent such random interval the effect would not be consistent strobing rather than a flicker effect. Moreover, in implementing the random flickering, Reichow inherently discloses a random frequency, as the interval between flashes randomly changes.

7. Claim 4

289. Claim 4 recites "The method according to any claim 1 wherein the random duration comprises at least one of a random ramp-up time to peak brightness, a random fade-down time from peak brightness, and a random number of pulses." EX1001, 12:10-13.

290. It is my opinion that Mueller in view of Reichow renders Claim 4 obvious.

291. The flame simulation effect described in Reichow has at least a random number of pulses. As explained above, Reichow discloses random interval, random duration, and random frequency. *See supra* Claim Element 1c, Claim 3; *see also* EX1010, 3:13-15 (describing lights in the apparatus of Reichow that "are caused to flash or be turned on/off at regular ***or random intervals*** to illuminate flame elements"). Absent such random intervals, durations, and frequencies, the effect of Reichow could not achieve a flicker effect but would instead result in consistent strobing. Achieving this flickering effect would necessarily also include a random number of pulses for any unit of time, as the interval between each pulse, and the length of each pulse, is random.

8. Claim 5

[5] The method according to claim 1 wherein said at least one simulation parameter is random within predefined boundaries and wherein the predefined boundaries comprise at least one of an upper and lower duration; a number of flashes in burst; an interval between bursts; an amplitude, and a ramp-up or fade-down time.

292. Claim 5 recites

> The method according to claim 1 wherein said at least one simulation parameter is random within predefined boundaries and wherein the predefined boundaries comprise at least one of an upper and lower duration; a number of flashes in a burst; an interval between bursts; an amplitude; and a ramp-up or fade-down time.

EX1001, 12:14-19.

293. It is my opinion that Mueller in view of Reichow renders Claim 5 obvious.

294. Reichow discloses an upper and lower bounds of brightness amplitude. For example, Reichow describes that the controller adjusts LEDs by using a random number generator to randomly select among a number of wash up and down subroutines for one or both of the LEDs, with the wash up and down subroutines setting the upper and lower boundaries for brightness. EX1010, 8:3-7.

295. Moreover, Reichow discloses that the simulation parameter of "a random brightness" is within predefined boundaries as it describes that the brightness level is within "a range of brightness levels." *Id.*, 3:13-17. Specifically, Reichow explains "the controller may run a flame simulation routine that ***determines*** a cyclical pattern or random timing and ***brightness levels***, and the controller responds to ***move the brightness level*** of one or both the LEDs concurrently or separately ***through a range of brightness levels.***" *Id.* (emphasis added).

296. Further, Mueller discloses "a user may specify an explosion lighting effect. The desired effect may be an initial bright white light in a corner of a room with light traveling away from the corner (possibly with changing color) at a specified speed and in a specified direction." EX1004, [0207]. The explosion effect

would benefit from Reichow's random ramping to better simulate the variedness of an explosion, thus, motivating the combination.

297. A POSITA would have been motivated to include these features of Reichow to change the strobing and explosion effects or create a flame effect with Mueller system. For example, the processor 102 could be programmed to cause the lighting sources to display the determined random brightness.

9. Claim 6

298. Claim 6 recites "The method according to claim 1 wherein the at least one of: a random brightness; a random duration; and a random interval is determined in dependence on one or more user-selectable simulation parameters." EX1001, 12:20-23.

299. It is my opinion that Mueller in view of Reichow renders Claim 6 obvious.

300. The flame simulation effect of Reichow is based on parameters including random brightness, duration, and interval. *See supra* Claim Element 1c.

301. The selection of random brightness is based on user selections. Reichow describes that the simulation parameter of a random brightness is determined in dependence on user-selectable range of brightness level. EX1010, 3:10-17. For example, Reichow explains that

> [t]he controller may be manual or it may be automated to modify the brightness level of at least one of the LEDs and typically both LEDs

> during the operation of flame simulation. For example, the controller may run a flame simulation routine that determines a cyclical pattern or random timing and ***brightness levels***, and the controller responds to ***move the brightness level*** of one or both the LEDs concurrently or separately ***through a range of brightness levels***.

Id., 3:10-17 (emphasis added).

302. The selection of random interval and duration, as opposed to regularly timed intervals and durations, are also based on user selections, as the controller of Reichow "run[s] a flame simulation routine that determines a cyclical pattern or random timing . . . ." *Id.*, 3:13-15.

10. Claim 7

303. Claim 7 recites

> The method according to claim 1, wherein the simulation parameter is related to one or more of: a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation period.

EX1001, 12:24-29.

304. It is my opinion that Mueller in view of Reichow renders Claim 7 obvious.

305. Reichow discloses a user-selected simulation parameter related to brightness: "Each of the LEDs may be manually tuned to have a particularl brightness level or may be controlled by a programmable controller that acts to

automatically wash or move the LEDs' brightness levels through a range of brightness levels." EX1010, 2:32-35.

306. Moreover, a POSITA would understand that Mueller describes that the simulation parameters relating to timing are related to a rate of increase of brightness, a rate of decrease of brightness, as it describes a "rate of decay". EX1004, [0305]. Specifically, Mueller explains that "a user can select a sparkle effect 5050 from the pull-down menu of the type field 4058, in which case the parameters pane 4074 shows parameters appropriate for a sparkle effect. The parameters include ***timing parameters, such as the rate of decay***, set in a field 5052." EX1004, (emphasis added).

307. A POSITA would understand that Mueller describes that the simulation parameters concerning timing are related to a rate of change of colour and a colour fluctuation period, as it describes parameters such as "the time per color in a field", "the fade time in a field". *Id.*, [0303]. Further, A POSITA would understand that the timing parameters, such as the rate of decay, could be programmed to the processor 102 to cause the lighting sources 104 to display lighting effects according to the simulation parameters.

11. Claim 8

308. Claim 8 recites "The method according to claim 1 further comprising receiving a user input of one or more user-selectable simulation parameters and

adapting the simulation in dependence on the one or more user-selectable simulation parameters." EX1001, 12:30-33.

309. Mueller in view of Reichow renders Claim 8 obvious.

310. Mueller makes clear that the interface 118 of lighting unit 100 permits a user to select simulation parameters and adapt the simulation in dependence on those parameters:

> The lighting unit 100 may include one or more interfaces 118 that are provided to facilitate any of a number of user-selectable settings or functions (e.g., generally controlling the light out put of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit[and] changing and/or selecting various parameters of selected lighting effects . . . .)

EX1004, [0182].

311. Mueller also describes user input comprising the selection of many simulation parameters, as "***the user can set various parameters, including*** those related to timing, such as the time per color in a field, the fade time in a field, the number of colors that appear randomly before a cycle is created in a field, and the light-to-light offset in a field." EX1004, [0303] (emphasis added). In another example, Mueller describes a user selecting simulation parameters for a sparkle effect, which is a lighting effect, i.e., selecting "from the pull-down menu of the type field 4058, in which case the parameters pane shows parameters appropriate for a sparkle effect." *Id.*, at [0305], *see also id.*, [0306]-[0311] (describing selection of simulation parameters for a variety of lighting effects).

312. Mueller explains that the simulation is adapted depending on the user selectable simulation parameters, as simulation parameters for a sparkle effect is selected, the simulated lighting effect would be a sparkle effect. *Id.*, [0305].

313. A POSITA would understand that any of the disclosed effects could be programmed into the processor 102. Further, the interface 118 is configured to receive input of one or more selectable parameters and change the simulation based on the input. For example, the pull-down menu can change a parameter of the sparkle effect.

12. Claim 9

314. Claim 9 recites "The method according to claim 1 wherein the simulation parameter comprises at least one of: a maximum brightness; a minimum brightness; a colour; and a trigger." EX1001, 12:34-36.

315. It is my opinion that Mueller in view of Reichow renders Claim 9 obvious.

316. Reichow discloses an upper and lower bounds of brightness amplitude as simulation parameters. For example, Reichow explains that the controller adjusts LEDs by using a random number generator to randomly select among a number of wash up and down subroutines for one or both of the LEDs, with the wash up and down subroutines setting "the ***upper and lower bounds for brightness***". EX1010, at 8:3-7.

317. Reichow also discloses the simulation parameter of color: "[T]he brightness and ***resulting color preferably should be tunable*** or settable to approximate a color and brightness of a flame being imitated. *Id.*, 5:61-63 (emphasis added).

13. Claim 10

318. Claim 10 recites "The method according to claim 1 wherein the simulation iterates through repeated cycles of calculating a time varying lighting value based on at least one random simulation parameter and simulating the user customisable lighting effect." EX1001, 12:37-41.

319. It is my opinion that Mueller in view of Reichow renders Claim 10 obvious.

320. Mueller discloses repeated cycles of calculating information by a central controller. In particular, Mueller describes a central controller carrying out an algorithm "performed on information that is collected" and "accomplished every time the image is refreshed or every time this section of the image is refreshed or at other times." EX1004, [0218]. Here, the information received is the simulation parameter, time varying lighting value could be the calculated and selected "maximum information", "minimum information", "first quartile of the information", "third quartile of the information", "most used information", "integral of the information". *Id.* Mueller further explains that such calculation is to better

simulate user customizable lighting effect, as "this step may be completed to ***level the effect of the lighting system in response to information received***. For example, the information in one refresh cycle may change the information in the map several times and the effect may be viewed best when the projected light takes on one value in a given refresh cycle." *Id.*

321. A POSITA would understand that the algorithm could be easily programmed into the processor 102 to change the time varying element, i.e., the information which can be brightness or other effect, based on random values or randomly generated effects, *see* EX1004, [0207], to simulate the user's specified effect. In addition, the random elements of Reichow could also be incorporated in this feature to change how the time varying value is calculated and create variety in the effects simulated on the lighting sources 104.

14. Claim 11

322. Claim 11 recites

> The method according to claim 1 wherein the user customisable lighting effect is designed to mimic at least one of fire flickering; police light; television; lightning flashing; electrical sparking; fireworks; a neon flickering sign; a gunshot; welding; a scan; a propeller; a (nuclear) explosion; a wormhole; paparazzi flashes; flashes (strobe).

EX1001, 12:42-47.

323. It is my opinion that Mueller in view of Reichow renders Claim 11 obvious.

324. Mueller discloses a user customizable lighting effect, such as an explosion effect. For example, Mueller describes that "designer can program the fire or ***explosion effect*** on a computer". EX1004, [0221] (emphasis added). In another example, Mueller describes that "the program may be configured, for example to generate an array of lighting effects such as. . .***flashing effects***. . .***a flare streaking across a room***. . .***a plume from an explosion***". *Id.* [0215] (emphasis added).

325. A POSITA would understand the processor 102 could be programmed to simulate the above effects or other lighting effects with little or no modifications to the lighting unit 100 to achieve more options for a user that wishes to simulate certain lighting effects.

15. Claim 12

326. Claim 12 recites "The method according to claim 1, further comprising selecting a definition of a trigger event, said trigger event initiating said output of the time varying lighting value thereby to simulate the user customisable lighting effect." EX1001, 12:48-51.

327. It is my opinion that Mueller in view of Reichow renders Claim 12 obvious.

328. Mueller discloses that a button 6352 may be a trigger event, and a user may select a button 6352 to press on, thereby simulate the user customizable lighting effect, i.e., a particular show. Specifically, Mueller discloses "the user interface may

be a keypad 6350, with one or more buttons 6352 for triggering shows. ***Each button 6352 might trigger a different show***, or a given sequence of buttons might trigger a particular show, so that a simple push-button interface can trigger many different shows". EX1004, [0322] (emphasis added).

329. A POSITA would understand that the buttons that are triggers for initiating the output of the time varying lighting value to simulate the effect could easily be included within the interface 118 to allow a user to trigger using buttons the included effects for displaying by the lighting sources 104.

330. Reichow also discloses trigger events, including detection of motion by a motion sensor and detection of predetermined light levels detected by a light sensor. EX1010, 8:28-34.

16. Claim 13

331. Claim 13 recites "The method according to claim 1, further comprising storing the at least one simulation parameter corresponding to said user customisable lighting effect." EX1001, 12:52-54.

332. It is my opinion that Mueller in view of Reichow renders Claims 13 obvious.

333. Mueller describes, associated with the processor disclosed therein, "one or more storage media generically referred to . . . as 'memory[.]'" EX1004, [0064]. "[T]he storage media may be encoded with one or more programs that, when

executed on one or more processors, perform at least some of the functions discussed herein." *Id.* Mueller describes such functions as including, "generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting ***various parameters of selected lighting effects***, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

334. Mueller further provides that

> [t]he lighting unit 100 also may include a ***memory*** 114 to ***store*** various information. For example, the memory 114 may be employed to ***store one or more lighting programs*** for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation . . . .

Id. (emphasis added).

335. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: "the lighting control interface allows for the storage and downloading of new functions and new parameter settings." EX1004, [0380] (emphasis added).

336. In view of the disclosure by Mueller that the storage of lighting effects and the user-selected parameters associated therewith is carried out by memory,

EX1004, [0064], a POSITA would understand that such storage of user input simulation parameters must be in memory for fast execution by processor 102. A POSITA would also understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for "user modification and implementation" of lighting effects. EX1004, [0380].

17. Claim 14

337. Claim 14 recites "The method according to claim 1 comprising controlling a plurality of lights in dependence on the output." EX1001, 12:55-56.

338. It is my opinion that Mueller in view of Reichow renders Claim 14 obvious.

339. Mueller describes controlling a plurality of LEDs to produce a user desired output. EX1004, [0171]. In particular, Mueller describes that "the lighting unit 100 may include ***a wide variety of colors of LEDs*** in various combinations . . . . Such combinations of ***differently colored LEDs in the lighting unit 100*** can facilitate accurate reproduction of a ***host of desirable spectrums of lighting conditions.***" *Id.* (emphasis added).

340. In addition, Mueller describes "[a]dditionally, it should be appreciated that one or more of the light sources 104 may include one or more LEDs that are adapted to generate radiation having any of a variety of spectra (i.e., wavelengths or wavelength bands)." *Id.*, [0169]. Mueller also discloses the LEDS have various spectra such as "various visible colors (including essentially white light), various color temperatures of white light, ultraviolet, or infrared. LEDs having a variety of spectral bandwidths (e.g., narrow band, broader band) may be employed in various implementations of the lighting unit 100." *Id.*

18. Claim 15

341. It is my opinion that Mueller in view of Reichow renders Claim 15 obvious.

a. Claim Element 15p

342. The preamble of Claim 15, designated Claim 15p herein, recites "A controller adapted to control at least one lighting device to produce a user customisable lighting effect, the controller comprising:" EX1004, 12:57-59.

343. For purposes of this Declaration, I assume that the preamble of Claim 15 is limiting and must be considered for the purposes of evaluating the validity of the claims.

344. Regardless, Mueller teaches Claim Element 15p.

345. In one embodiment, Mueller describes a controller, processor 102, of

the lighting unit 100. Processor 102, "controls one or more of the light source 104". *Id.*, [0183] ("In one implementation, the processor 102 of the lighting unit 100 monitors the interface 118 and ***controls one or more of the light sources 104***." (emphasis added)).

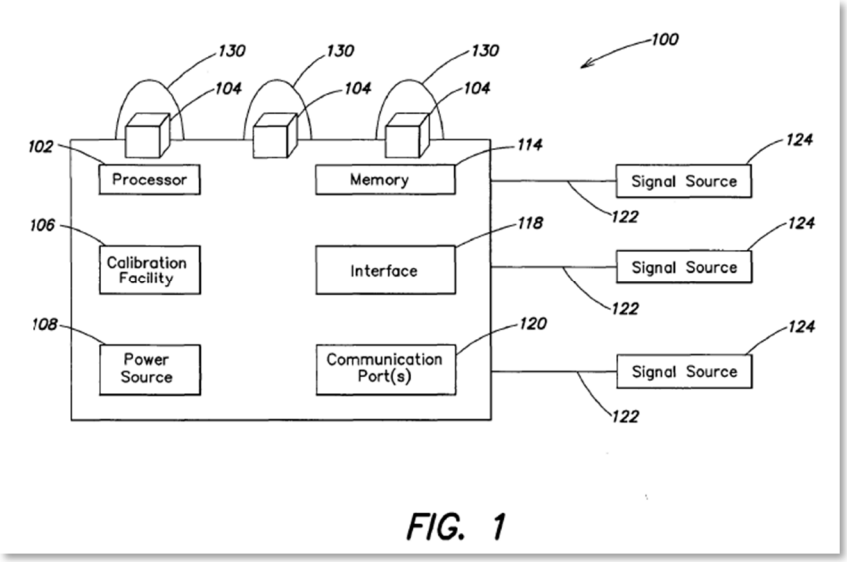


FIG. 1

Id., Figure 1. Mueller explains that processor 102 controls lightning unit 100, and individual light sources 104, integrated in that unit. *Id.*, [0182]-[0183]. Mueller further explains that this control is "based at least in part on signals, such as user signals, provided through [an] interface 118[,]" *id.*, [0183], and includes the ability to produce user customizable lightning effects. Specifically, Mueller describes this control as "generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, [and] changing and/or selecting various parameters of selected lighting effects . . . ." *Id.*, [0182].

346. In a second embodiment comprising a networked lighting system 200 made up of multiple lighting units 100, Mueller describes lighting unit controller (LUC) 208, which controls lighting unit(s) 100. EX1004, [0199] ("As shown in FIG. 2A, the lighting system 200 may include one or more lighting unit controllers ('LUCs') 208, wherein each LUC 208 is responsible for communicating with and generally controlling one or more lighting units 100 coupled to it.").

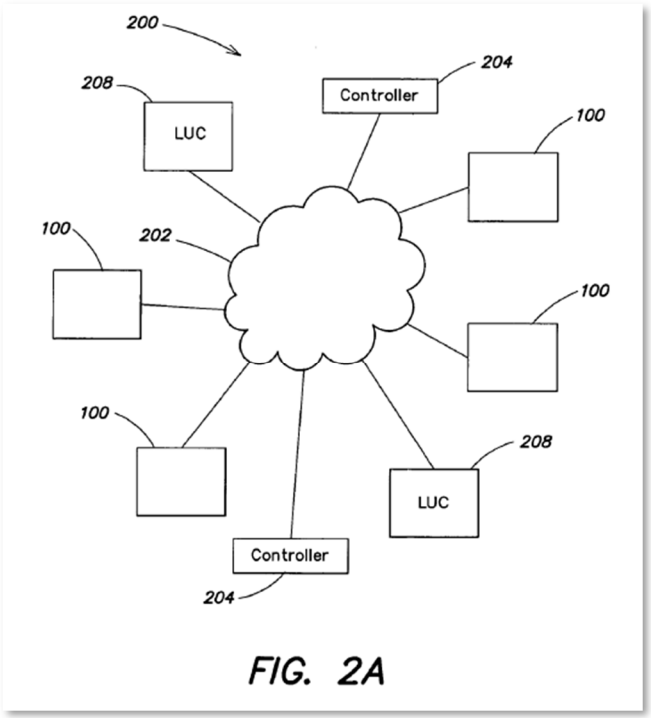


FIG. 2A

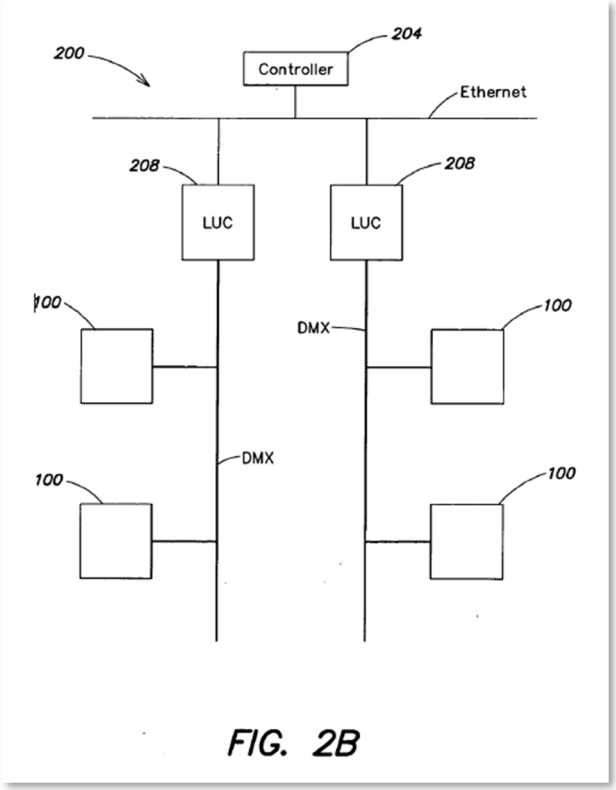


FIG. 2B

Id., Figures 2A, 2B.

347. Mueller explains that LUC 208's control of lightning units 100 includes enabling each lighting unit 100 to produce user customizable lightning effects. One example Mueller discloses is the generation a "rainbow chase" in response to user input: "The user may provide a simple instruction to the central controller 204 to accomplish this, and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a 'rainbow chase' (appearance of a propagating rainbow of colors)." *Id.*, [0202]. Other such effects include fires and explosions. *Id.*, [0221].

348. Mueller further explains that such lighting effects produced by lighting

unit 100 are user customizable. A user may, for instance, select from a range of different lighting effects, *Id.*, [0215], and "[a]ny of the effects can be specified with parameters, such as frequencies, wavelengths, wave widths, peak-to-peak measurements, velocities, inertia, friction, speed, width, spin, vectors, and the like." *Id.*, [0225].

349. Mueller describes "methods and systems for managing control instructions for a plurality of light systems." EX1004, [0025]. Specifically, Mueller discloses lightning unit 100 is controlled by a processor 102 that "may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170].

350. Mueller explains that control of the lightning unit 100 includes producing user customizable lightning effects. For instance, Mueller describes "controlling the light output of lighting unit 100, ***changing and/or selecting various pre-programmed lighting effects*** to be generated by the lighting unit, [and] ***changing and/or selecting various parameters of selected lighting effects*** . . . ." *Id.*, [0182] (emphasis added).

b. Claim Element 15a

351. Claim Element 15 a recites "an effect simulator adapted to calculate a time varying lighting value based on at least one simulation parameter;" EX1001, 12:60-62.

352. Mueller teaches Claim Element 15a.

353. Mueller describes an effect simulator that performs calculations, namely processor 102. EX1004, [0168]. Specifically, Mueller explains that processor 102 can calculates a time varying lighting value: "the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170]. Mueller makes clear that this calculation is made in response to user input, including input relating to parameters on which the lighting value is based, received by processor 102, which determines (*i.e.*, "calculates") lighting values reflecting these inputs, and sends these values to light sources 104 to produce the desired effects. *Id.*, [0170], [0182]-[0183].

354. In connection with a number of additional embodiments, Mueller discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

> The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects,

> flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time,*** ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200."

Id., [0215] (emphasis added).

> By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.

Id., [0242].

355. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0217]-[0218]. Mueller also describes an algorithm for altering the image information. *Id.* "The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information."

356. A POSITA would have understood that the parameters used to calculate information and are applied to the object with the lighting system could include a time varying value to change the information that is used to apply a

lighting effect to an object. It would have been obvious to use this embodiment of Mueller to calculate a time varying value to produce lighting effects using Mueller's lighting system 200 including a lighting unit 100.

357. In view of these disclosures, a POSITA would have understood that Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a simulation parameter in the manner disclosed in multiple these multiple embodiments of Mueller. For example, the processor 102 could be programmed to calculate (as used in connection with the '257 patent) a time-varying effect of displaying a selected color of light.

358. Therefore, Mueller teaches Claim Element 15a.

c. Claim Element 15b

359. Claim Element 15b recites "wherein said at least one simulation parameter characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 12:62-67.

360. Muller teaches Claim Element 1b.

361. Mueller discloses that the user customizable lighting effect based, at least in part, on a simulation parameter, can be selected from a range of pre-programmed, customizable lighting effects. EX1004, [0182].

362. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including "a film studio, [and] a video studio." EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

363. Further, little to no changes would need to be made to the lighting unit 100 or the lighting system 200 in order to use the disclosed effects for videography, broadcast, cinematography, studio filming, and/or location filming.

d. Claim Element 15c

364. Claim Element 15c recites "wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 12:67-13:2.

365. Mueller in view of Reichow teaches Claim Element 15c.

366. Reichow, within the same field of art as Mueller, discloses a simulation parameter of a random interval. For example, Reichow describes that "the realism of the fire may be even further improved by providing one or more LEDs or other light sources that are caused to flash or be turned on/off at regular or ***random***

intervals to illuminate flame elements so as to cause pops or sparks in the ***flame simulator***." EX1010, 4:62-67.

367. Reichow also teaches simulation parameters of random duration (timing) and brightness: "the controller may run a flame simulation routine that determines a cyclical pattern or ***random*** timing and ***brightness*** levels." *Id.*, 3:13-15 (emphasis added). In another example, Reichow describes that "an LED controller that runs one or more flame simulation routines to alter the brightness of the two or more flame simulation routines to ***alter the brightness of the two or more LEDs on a*** regular or ***random time schedule***, which produces a ***varying brightness of the flames*** found in real fires." EX1010, 4:59-62 (emphasis added).

368. Mueller also teaches that a timing parameter can be of a random duration and or a random interval, as Mueller describes that "the user can set various parameters, including those related to timing, such as . . . the number of colors that appear ***randomly*** before a cycle is created in a field." EX1004, [0303] (emphasis added). As the colors appear randomly, that means the duration of each color's appearance is random, so is the interval between color appearances. A POSITA would understand this effect could be easily integrated into the embodiment of the lighting unit 100 with little to no modifications. The processor 102 can be programmed to cause the lighting sources 104 to display the random color effects.

369. A POSITA would understand that Mueller discloses random brightness as it describes that colors appear randomly (Mueller at [0303]) and that brightness could change during a lighting effect (Mueller at [0209] ("where a lighting effect calls for a particular section of a room to change in hue, saturation or brightness, control signals may be provided to direct one or more lighting units. . ."), which suggests that color could appear at random time with random brightness.

370. A POSITA would understand that the random effects of Reichow could be integrated as well with Mueller through little programming of the processor 102 to cause the lighting sources 104 to turn off and on at random intervals. A POSITA would have been motivated to make the combination to cause the lighting unit 100 to simulate fire effects or explosions as described in Mueller. *See* EX1004, [0207].

e. Claim Element 15d

371. Claim Element 15d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 13:2-4.

372. It is my opinion that Mueller teaches Claim Element 15d.

373. As explained above, Mueller discloses the selection of user customizable lighting effects to be simulated. *See supra* Claim Elements 15p, 15b. Mueller also teaches that a user of the systems described therein may customize those lighting effects by changing one or more simulation parameters. *See supra* Claim Element 15p. A POSITA would understand that the simulation parameter(s)

for the pre-programmed lighting effects of Mueller, EX1004, [0182], are dependent on the specific pre-programmed lighting effects selected for simulation. If the effects were not dependent, then a random undesired effect would play, thus, confusing the user. A POSITA would understand that presenting simulation parameters unrelated to the lighting effect to be simulated would only create confusion and would limit the available parameters to be adjusted to only those relevant to the selected effect. This is particularly true because Mueller specifically discloses contexts in which adjustable effect parameters are limited to those relevant to a selected effect. *See, e.g.*, *id.*, [0305] ("***a user can select a sparkle effect*** 5050 from the pull-down menu of the type filed 4058, in which case ***the parameters pane 4074 shows parameters appropriate for a sparkle effect***." (emphasis added).

f. Claim Element 15e

374. Claim Element 15e recites "wherein an output of the effect simulator is adapted to control a lighting device according to the calculated variation of lighting over time." EX1001, 13:6-8.

375. Mueller teaches Claim Element 15e.

376. Mueller describes the outputting a time varying lighting value to simulate a selected lighting effect, as it explains that "processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller

further discloses that "the processor 102 may be particularly configured (e.g., programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or ***time-varying (dynamic) multi-color (or multi-color temperature) lighting effects***." *Id.*, [0170] (emphasis added).

377. Mueller also explains that LUC 208 "is responsible for communicating with and generally controlling one or more lighting units 100[,]" *id.*, EX1004, [0199], by "generat[ing] the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100." *Id.*, [0202].

19. Claim 16

378. Claim 16 recites "The controller according to claim 15, wherein the controller comprises a wired or wireless communication interface adapted for communication with one or more lighting devices." EX1001, 13:9-12

379. It is my opinion that Mueller in view of Reichow renders Claim 16 obvious.

380. Mueller discloses "communication ports 120" which are interfaces for communication with other lighting devices. EX1004, [0190] ("the lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a variety of other devices. . .the communication port 120 may include an interface for any suitable wired or wireless communications.")

20. Claim 17

381. Claim 17 recites "The controller according to claim 15, wherein the controller comprises an input interface adapted to receive a user input." EX1001, 13:13-15.

382. It is my opinion that Mueller in view of Reichow renders Claim 17 obvious.

383. Mueller describes an input interface, namely "one or more interfaces 118" that are adapted to receive a user input facilitating "any of a number of user-selectable settings or functions." EX1004, [0182]. A POSITA would understand he interface 118 connects to the processor 102 and provides any received user input to the processor 102.

21. Claim 18

384. Claim 18 recites "A lighting system comprising the controller according to claim 15 and at least one lighting device; said lighting device comprising at least one light emitting diode." EX1001, 13:17-19.

385. It is my opinion that Mueller in view of Reichow renders Claim 18 obvious.

386. Mueller discloses that lighting unit 100 comprises one or more light sources 104, and that those light sources 104 may be light emitting diodes (LEDs).

EX1004, [0167]. A POSITA would understand the light sources 104 as a lighting device with an LED.

387. Further, it should be appreciated that one or more of the light sources 104 may include one or more LEDs that are adapted to generate radiation having any of a variety of spectra (i.e., wavelengths or wavelength bands)." *Id.*, [0169]. Mueller also discloses the LEDs have various spectra such as "various visible colors (including essentially white light), various color temperatures of white light, ultraviolet, or infrared. LEDs having a variety of spectral bandwidths (e.g., narrow band, broader band) may be employed in various implementations of the lighting unit 100." *Id.*

22. Claim 19

388. Claim 19 recites "The lighting system according to claim 18 wherein said controller and said lighting device are integrated in a combined unit." EX1001, 13:20-22.

389. It is my opinion that Mueller in view of Reichow renders Claim 19 obvious.

390. Mueller describes that the controller (i.e., processor 102), input interface 118, memory 114, and light sources 104 are integrated in a combined unit: lighting unit 100. EX1004, [0168], Figure 1.

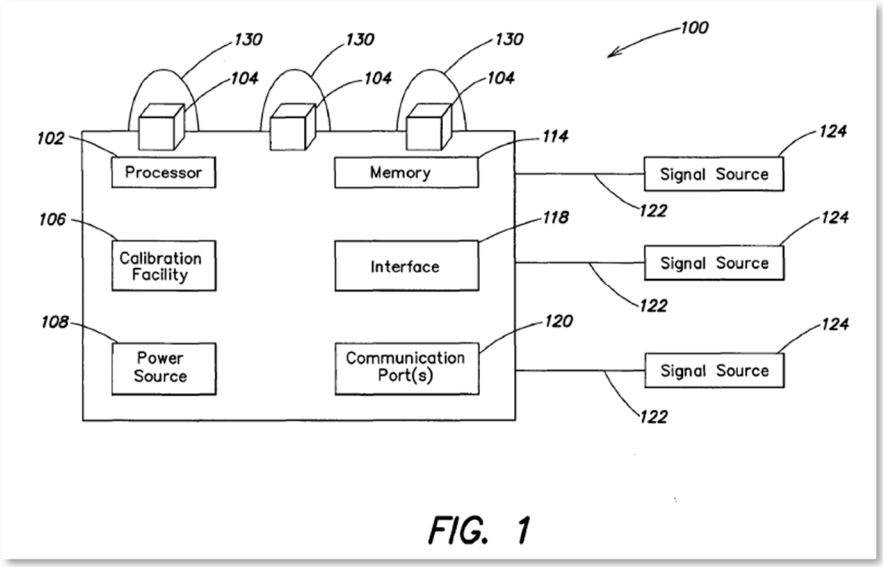


FIG. 1

Id., Figure 1.

391. A POSITA would understand the lighting unit 100 includes all of the shown components in an integrated combined unit as seen in FIG. 1. This design would be advantageous for a more modular design so the lighting unit 100 could be easily transported.

23. Claim 20

392. It is my opinion that Mueller in view of Reichow renders Claim 20 obvious.

a. Claim Element 20p

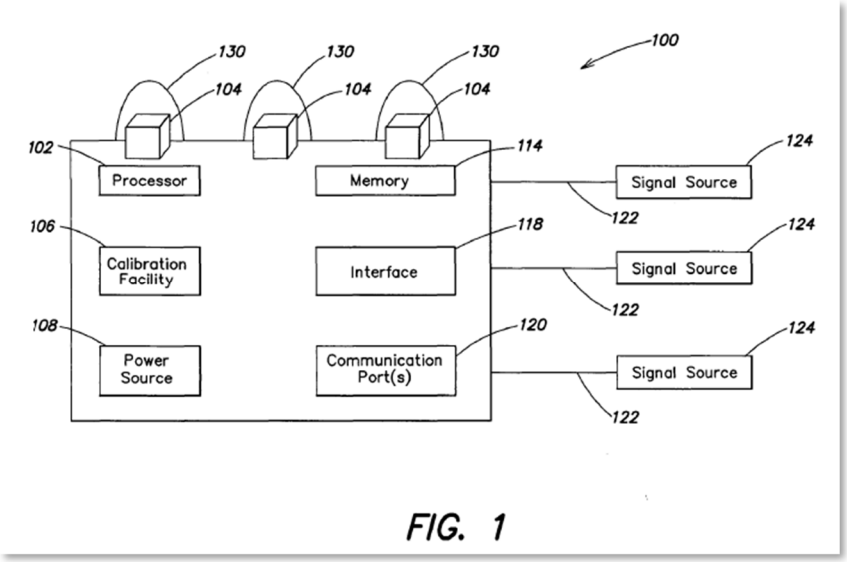
393. The preamble of Claim 20, designated Claim Element 20p herein, recites "A computer program comprising software code for controlling a lighting device to produce a user customisable lighting effect, the computer program adapted to perform, when executed, the steps of:" EX1001, 14:1-4.

394. For purposes of this Declaration, I assume the preamble of Claim 20 is limiting and must be considered for purposes of evaluating the validity of the claims.

395. Regardless, Mueller teaches Claim Element 20p.

396. Mueller discloses the methods disclosed therein can be performed by a "software program" as in Claim 20. Mueller discloses that, "[i]n some implementations [of the methods and systems described therein], the storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein." EX1004, [0064]. Mueller further provides that "[t]he terms 'program' and 'computer program' are used herein in a generic sense to refer to any type of computer code (e.g., high or low level software, microcode, and so on) that can be employed to control operation of a processor." (*Id.*) A POSITA would thus understand that the control of lighting systems and methods disclosed in Mueller is via the processor's execution of software code.

397. In one embodiment, Mueller describes a processor 102 of the lighting unit 100. Processor 102, "controls one or more of the light source 104". *Id.*, [0183] ("In one implementation, the processor 102 of the lighting unit 100 monitors the interface 118 and ***controls one or more of the light sources 104***." (emphasis added)).



Id., Figure 1. Mueller explains that processor 102 controls lightning unit 100, and individual light sources 104, integrated in that unit. *Id.*, [0182]-[0183]. Mueller further explains that this control is "based at least in part on signals, such as user signals, provided through [an] interface 118[,]" *id.*, [0183], and includes the ability to produce user customizable lightning effects. Specifically, Mueller describes this control as "generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, [and] changing and/or selecting various parameters of selected lighting effects . . . ." *Id.*, [0182].

398. In a second embodiment comprising a networked lighting system 200 made up of multiple lighting units 100, Mueller describes lighting unit controller (LUC) 208, which controls lighting unit(s) 100. EX1004, [0199] ("As shown in FIG. 2A, the lighting system 200 may include one or more lighting unit controllers

('LUCs') 208, wherein each LUC 208 is responsible for communicating with and generally controlling one or more lighting units 100 coupled to it.").

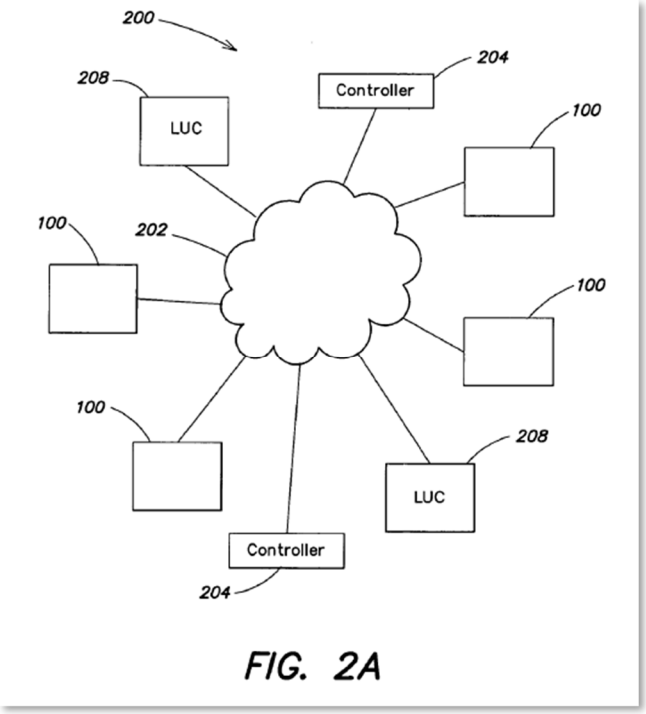


FIG. 2A

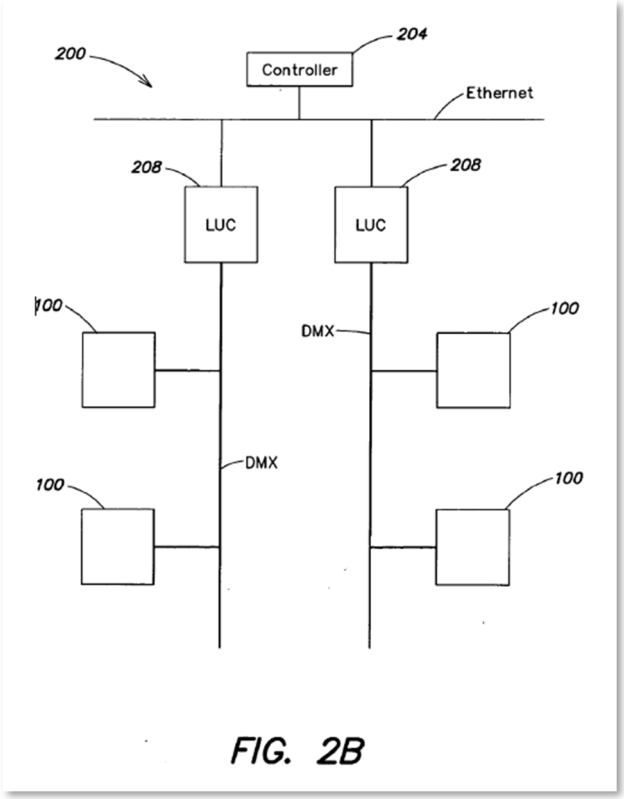


FIG. 2B

Id., Figures 2A, 2B.

399. Mueller explains that LUC 208's control of lightning units 100 includes enabling each lighting unit 100 to produce user customizable lightning effects. One example Mueller discloses is the generation a "rainbow chase" in response to user input: "The user may provide a simple instruction to the central controller 204 to accomplish this, and in turn the central controller 204 may communicate over the Ethernet network to one or more LUCs 208 and provide a high level command to generate a 'rainbow chase' (appearance of a propagating rainbow of colors)." *Id.*, [0202]. Other such effects include fires and explosions. *Id.*, [0221].

400. Mueller further explains that such lighting effects produced by lighting unit 100 are user customizable. A user may, for instance, select from a range of different lighting effects, *Id.*, [0215], and "[a]ny of the effects can be specified with parameters, such as frequencies, wavelengths, wave widths, peak-to-peak measurements, velocities, inertia, friction, speed, width, spin, vectors, and the like." *Id.*, [0225].

401. Mueller describes "methods and systems for managing control instructions for a plurality of light systems." EX1004, [0025]. Specifically, Mueller discloses lightning unit 100 is controlled by a processor 102 that "may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170].

402. Mueller explains that control of the lightning unit 100 includes producing user customizable lightning effects. For instance, Mueller describes "controlling the light output of lighting unit 100, ***changing and/or selecting various pre-programmed lighting effects*** to be generated by the lighting unit, [and] ***changing and/or selecting various parameters of selected lighting effects*** . . . ." *Id.*, [0182] (emphasis added).

b. Claim Element 20a

403. Claim Element 20a recites "calculating using an effect simulator a time varying lighting value based on at least one simulation parameter;" EX1001, 14:5-6.

404. Mueller teaches Claim Element 20a.

405. Mueller describes an effect simulator that performs calculations, namely processor 102. EX1004, [0168]. Specifically, Mueller explains that processor 102 can calculates a time varying lighting value: "the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects." *Id.*, [0170]. Mueller makes clear that this calculation is made in response to user input, including input relating to parameters on which the lighting value is based, received by processor 102, which determines (*i.e.*, "calculates") lighting values reflecting these inputs, and sends these values to light sources 104 to produce the desired effects. *Id.*, [0170], [0182]-[0183].

406. In connection with a number of additional embodiments, Mueller discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

> The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects,

> flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time,*** ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200."

Id., [0215] (emphasis added).

> By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.

Id., [0242].

407. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0217]-[0218]. Mueller also describes an algorithm for altering the image information. *Id.* "The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information."

408. A POSITA would have understood that the parameters used to calculate information and are applied to the object with the lighting system could include a time varying value to change the information that is used to apply a

lighting effect to an object. It would have been obvious to use this embodiment of Mueller to calculate a time varying value to produce lighting effects using Mueller's lighting system 200 including a lighting unit 100.

409. In view of these disclosures, a POSITA would have understood that Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a simulation parameter in the manner disclosed in multiple these multiple embodiments of Mueller. For example, the processor 102 could be programmed to calculate (as used in connection with the '257 patent) a time-varying effect of displaying a selected color of light.

410. Therefore, Mueller teaches Claim Element 20a.

c. Claim Element 20b

411. Claim Element 20b recites "wherein said at least one simulation parameter for characterises a user customisable lighting effect selected from a range of different user customisable lighting effects for at least one of: videography, broadcasting, cinematography, studio filming, and location filming;" EX1001, 14:7-12.

412. Mueller teaches Claim Element 20b.

413. Mueller discloses that the user customizable lighting effect based, at least in part, on a simulation parameter, can be selected from a range of pre-programmed, customizable lighting effects. EX1004, [0182].

414. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including "a film studio, [and] a video studio." EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

415. Further, little to no changes would need to be made to the lighting unit 100 or the lighting system 200 in order to use the disclosed effects for videography, broadcast, cinematography, studio filming, and/or location filming.

d. Claim Element 20c

416. Claim Element 20c recites "wherein the at least one simulation parameter is at least one of: a random brightness; a random duration; and a random interval;" EX1001, 14:12-14.

417. Mueller in view of Reichow teaches Claim Element 20c.

418. Reichow, within the same field of art as Mueller, discloses a simulation parameter of a random interval. For example, Reichow describes that "the realism of the fire may be even further improved by providing one or more LEDs or other light sources that are caused to flash or be turned on/off at regular or ***random***

intervals to illuminate flame elements so as to cause pops or sparks in the ***flame simulator***." EX1010, 4:62-67.

419. Reichow also teaches simulation parameters of random duration (timing) and brightness: "the controller may run a flame simulation routine that determines a cyclical pattern or ***random*** timing and ***brightness*** levels." *Id.*, 3:13-15 (emphasis added). In another example, Reichow describes that "an LED controller that runs one or more flame simulation routines to alter the brightness of the two or more flame simulation routines to ***alter the brightness of the two or more LEDs on a*** regular or ***random time schedule***, which produces a ***varying brightness of the flames*** found in real fires." EX1010, 4:59-62 (emphasis added).

420. Mueller also teaches that a timing parameter can be of a random duration and or a random interval, as Mueller describes that "the user can set various parameters, including those related to timing, such as . . . the number of colors that appear ***randomly*** before a cycle is created in a field." EX1004, [0303] (emphasis added). As the colors appear randomly, that means the duration of each color's appearance is random, so is the interval between color appearances. A POSITA would understand this effect could be easily integrated into the embodiment of the lighting unit 100 with little to no modifications. The processor 102 can be programmed to cause the lighting sources 104 to display the random color effects.

421. A POSITA would understand that Mueller discloses random brightness as it describes that colors appear randomly (Mueller at [0303]) and that brightness could change during a lighting effect (Mueller at [0209] ("where a lighting effect calls for a particular section of a room to change in hue, saturation or brightness, control signals may be provided to direct one or more lighting units. . ."), which suggests that color could appear at random time with random brightness.

422. A POSITA would understand that the random effects of Reichow could be integrated as well with Mueller through little programming of the processor 102 to cause the lighting sources 104 to turn off and on at random intervals. A POSITA would have been motivated to make the combination to cause the lighting unit 100 to simulate fire effects or explosions as described in Mueller. *See* EX1004, [0207].

e. Claim Element 20d

423. Claim Element 20d recites "said simulation parameter depending on the user customisable lighting effect being simulated; and" EX1001, 14:14-16.

424. Mueller teaches Claim Element 20d.

425. As explained above, Mueller discloses the selection of user customizable lighting effects to be simulated. *See supra* Claim Elements 1p, 1b. Mueller also teaches that a user of the systems described therein may customize those lighting effects by changing one or more simulation parameters. *See supra* Claim Element 1p. A POSITA would understand that the simulation parameter(s) for

the pre-programmed lighting effects of Mueller, EX1004, [0182], are dependent on the specific pre-programmed lighting effects selected for simulation. If the effects were not dependent, then a random undesired effect would play, thus, confusing the user. A POSITA would understand that presenting simulation parameters unrelated to the lighting effect to be simulated would only create confusion and would limit the available parameters to be adjusted to only those relevant to the selected effect. This is particularly true because Mueller specifically discloses contexts in which adjustable effect parameters are limited to those relevant to a selected effect. *See, e.g.*, *id.*, [0305] ("***a user can select a sparkle effect*** 5050 from the pull-down menu of the type filed 4058, in which case ***the parameters pane 4074 shows parameters appropriate for a sparkle effect***." (emphasis added).

f. Claim Element 20e

426. Claim Element 20e recites "outputting, from said effect simulator, said time varying lighting value thereby to simulate the user customisable lighting effect." EX1001, 14:17-19.

427. Mueller teaches Claim Element 1e.

428. Mueller describes the outputting a time varying lighting value to simulate a selected lighting effect, as it explains that "processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller

further discloses that "the processor 102 may be particularly configured (e.g., programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or ***time-varying (dynamic) multi-color (or multi-color temperature) lighting effects***." *Id.*, [0170] (emphasis added).

429. Mueller also explains that LUC 208 "is responsible for communicating with and generally controlling one or more lighting units 100[,]" *id.*, EX1004, [0199], by "generat[ing] the appropriate lighting control signals which it then communicates . . . to one or more lighting units 100." *Id.*, [0202].

24. Claim 21

[21] The method according to claim 13, further comprising recalling said stored at least one simulation parameter from a memory.

430. Claim 21 recites "The method according to claim 13, further comprising recalling said stored at least one simulation parameter from a memory." EX1001, 14:19-21.

431. It is my opinion Mueller in view of Reichow renders Claim 21 obvious.

432. Mueller describes, associated with the processor disclosed therein, "one or more storage media generically referred to . . . as 'memory[.]'" EX1004, [0064]. "[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein." *Id.* Mueller describes such functions as including, "generally controlling the

light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting ***various parameters of selected lighting effects***, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

433. Mueller further provides that

> [t]he lighting unit 100 also may include a ***memory*** 114 to ***store*** various information. For example, the memory 114 may be employed to ***store one or more lighting programs*** for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation . . . .

Id. (emphasis added).

434. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: "the lighting control interface allows for the storage and downloading of new functions and new parameter settings." EX1004, [0380] (emphasis added).

435. In view of the disclosure by Mueller that the storage of lighting effects and the user-selected parameters associated therewith is carried out by memory, EX1004, [0064], a POSITA would understand that such storage of user input simulation parameters must be in memory for fast execution by processor 102. A

POSITA would also understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for "user modification and implementation" of lighting effects. EX1004, [0380].

CERTIFICATION

I reserve the right to supplement my opinions as appropriate if the Patent Owner alleges or offers any purported evidence of any secondary considerations of non-obviousness.

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 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.

Executed this 16th day of September, 2024

Respectfully submitted,

APPENDIX A

P. Morgan Pattison
morgan@sslsinc.com
(805)217-3878

Experience

Solid State Lighting Services, Inc. **November 2007 - Present**
Founder/President- Provide technical, strategic, and market expertise in the areas of LEDs, OLEDs, Lighting, Solid State Lighting (SSL), displays, and optoelectronic materials and devices. LED device, lighting, and materials product development. Horticultural lighting research and strategy. Light pollution measurement, evaluation, and mitigation. LED and lighting product failure and reliability evaluation. Manage research on human and animal physiological responses to light. Scout and evaluate new technologies for investment.

U.S. Department of Energy **January 2006 – November 2007**
National Energy Technology Laboratory, Morgantown WV
Project Manager- Managed DOE funded R&D projects in SSL including LED and OLED lighting technologies. Managed solicitation and selection of new funded R&D projects. Identified priority areas of research necessary for advancement of SSL efficiency, performance, and price.

University of California, Santa Barbara **September 2000 – January 2006**
Graduate Student Researcher- Doctoral thesis research under Professor Shuji Nakamura (Nobel Prize in Physics 2014) on GaN based micro-cavity light emitting diodes. Research included: epitaxial structure design and growth by MOCVD, semiconductor process development, materials characterization, and electro-optical device characterization. Additional areas of research included UV LEDs, vertical cavity surface emitting laser (VCSEL), and edge emitting laser diodes.

Cymer Laser, San Diego **November 1996 – May 2000**
Laser Test Engineer- Tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products. Testing included optical characterization and full system troubleshooting. Test development of new electrical and optical test methodologies to improve test cycle, Labview automation of test procedures, and development of test documentation.

Education

Ph.D. Materials Science, Electronic and Photonic Materials
University of California, Santa Barbara, 2006
Thesis: *Fabrication and Characterization of Gallium Nitride Based Micro-Cavity LEDs*
M.S. Electrical Engineering, Electronics and Photonics
University of California, Santa Barbara, 2003
B.S. Electrical Engineering, Electronic Devices and Materials
University of California, San Diego, 1996

Expertise

Optoelectronic materials and devices, lighting, LED, OLED, UV-LEDs, Germicidal UV application, R&D and technology evaluation, μLED-LED-OLED-Quantum Dot display technology, medical lighting, SSL product evaluation and selection, LED lighting product development, R&D Management, technology roadmapping, technical meeting moderation, technical writing, IP evaluation, trial expert witness, lighting color evaluation and selection, advanced lighting performance evaluation, Energy Star LED lighting testing, photometric characterization and testing, R&D Management, Federal R&D funding processes, R&D Proposal review and evaluation, ESCO contracts and performance measurement & verification (M&V), horticultural lighting, wildlife responses to light, human physiological responses to light

Accreditations, Affiliations, and Professional Societies

Fellow - Illuminating Engineering Society (IES)
Chair – Outdoor Nighttime Environments (ONE) Committee
Voting Member – IES Horticultural Lighting Committee
Oregon State University, Civil and Construction Engineering, Courtesy Faculty
Lighting Certified (LC) by National Council on Qualifications for Lighting Professionals
Member - International Society of Horticultural Scientists (ISHS)
Member – International Dark-Sky Association (IDA)
Member – International Society for Optics and Photonics (SPIE)
Member – American Society of Agricultural and Biological Engineers (ASABE)
Project Management Professional (PMP) *Lapsed,* Project Management Institute (2006)
U.S. Government Contracting Officer's Representative (COR) (2006)

Leadership

Senior Technical and Strategic Advisor to DOE SSL R&D Program
Lead writer of DOE SSL R&D Opportunities, R&D Plan, and Multi-Year Program Plan
Technical content supervisor of annual DOE SSL R&D Workshops
Manage organization of DOE SSL topical R&D meetings on: LED devices and materials, OLEDs, luminaire integration, roadway lighting, germicidal ultraviolet (UV) LEDs, human physiological responses to light, domesticated and wild animal responses to light, roadway and area lighting, and horticultural lighting
New business creation/development –*Action Spectrum, Ultra-Yield Solutions, Guidance LED, Zuli, Canvas, Intellilight/Next, SSLS, Inc., Diel Lighting Science, Blue Laser Fusion*
Scientific Advisory Board member to *GLASE (Greenhouse Lighting and System Engineering)*, NYSERDA funded controlled environment agriculture R&D program
Technical Advisory Committee of Resource Innovation Institute
Advisory Board Member of *Phosphor Global Summit* annual meeting
Advisor to *Cyclotron Road* – Clean Technology Incubator at Lawrence Berkeley National Lab
Project sponsor for Senior Design Course at UCSB (2011-2012)

1. Design and development of spectro-goniophotometer
2. Design and development of smartphone light controller (co-founder and original board member of resulting company renamed *Zuli*)

Designed, fabricated, and characterized world's first gallium nitride microcavity LED

Fabricated and characterized world's first gallium nitride semipolar LED

Publications

Minimizing Ecological Impacts of Marine Energy Lighting. Reilly, C. E., Larson, J., Amerson, A. M., Staines, G. J., Haxel, J. H., & Pattison, P. M. (2022). *Journal of Marine Science and Engineering*, *10*(3), 354.

Department of Energy SSL Manufacturing Status and Opportunities (2022)

Photon Efficacy in Horticulture. Kusuma, P, Pattison, PM, Bugbee, B. (2021) Chapter 7 in *Plant Factory: Basics, Applications and Advances*

A Review of Human Physiological Responses to Light: Implications for the Development of Integrative Lighting Solutions. Vetter, C, Pattison, PM, Houser, K, Herf, M, Phillips, AJK, Wright, KP, Skene, DJ, Brainard, GC, Boivin, DB, Glickman, G. (2021) *Leukos*

DOE 2020 LED Manufacturing Supply Chain. Lee, K, Nubbe, V, Rego, B, Hansen, M, Pattison, M. *U.S. DOE Lighting R&D Program.* July 2021.

Recommended Practice: Horticultural Lighting, An American National Standard. ANSI/IES RP-45-21. *Illuminating Engineering Society*. June 2021.

Energy Savings Potential of SSL in Agricultural Applications. Lee, K, Elliott, C, and Pattison, PM. *U.S. DOE Lighting R&D Program.* June 2020.

From physics to fixtures to food: current and potential LED efficacy. Kusuma, P, Pattison, PM, and Bugbee, B. (2020) *Horticultural Research.* 7, 56.

What's next for LEDs. Pattison, PM (2019) *Electroindustry.* March/April 2019.

Building the evidence outside the lab. Pattison, PM (2018) *Lighting Design & Application.* December

LEDs for photons, physiology and food. Pattison, PM, Tsao, JY, Brainard, GC, Bugbee, B. (2018) *Nature.* 563, 493-499.

LEDs for Horticulture: More than Meets the Eye. Pattison, PM. (2018) *Lighting Design & Application.* August.

LED lighting efficacy: Status and directions. Pattison, PM, Hansen, M, Tsao, JY. (2018) *Comptes Rendus Physique.* 19, 134-145.

Energy Savings Potential of SSL in Horticultural Applications. Stober, K, Lee, K, Yamada, M, and Pattison, PM. *U.S. DOE Lighting R&D Program.* December 2017.

Department of Energy Solid State Lighting R&D Opportunities/Plan, *lead author* (2022, 2019, 2018, 2017, 2016, 2015)

Light-emitting diode technology status and directions: opportunities for horticultural lighting. Pattison, PM, Tsao, JY, Krames, MR. (2016) *Acta Horticulturae*. 1134, 413-426.

Status of SSL Product Development and Future Trends for General Illumination. Katona TM, Pattison PM, Paolini S. (2016) *Annual Review of Chemical and Biomolecular Engineering* 7 (1).

The Blue LED Nobel Prize: Historical context, current scientific understanding, human benefit. Tsao, J, Han, J, Haitz, R, Pattison, PM. (2015) *Annalen der Physik* 527, No. 5–6, A53–A61.

Department of Energy SSL R&D Multi-Year Program Plan (2008-2014)

Department of Energy SSL Manufacturing Roadmap (2009-2014)

Gallium nitride based microcavity light emitting diodes with 2 lambda effective cavity thickness. Pattison, P. M., David, A., Sharma, R., Weisbuch, C., DenBaars, S., & Nakamura, S. (2007). *Appl. Phys. Lett*, *90*, 031111.

First-moment analysis of polarized light emission from InGaN/GaN light-emitting diodes prepared on semipolar planes. Masui, H., Baker, T. J., Sharma, R., Pattison, P. M., Iza, M., Zhong, H., Nakamura, S., & DenBaars, S. P. (2006). *Japanese journal of applied physics*, *45*(9L), L904.

Gallium nitride based micro-cavity light emitting diodes emitting at 498 nm. Pattison, P. M., Sharma, R., David, A., Waki, I., Weisbuch, C., & Nakamura, S. (2006). *Physica Status Solidi (a)*, *203*(7), 1783-1786.

Demonstration of a semipolar (10 (1) over-bar (3) over-bar) InGaN/GaN green light emitting diode. Sharma, R., Pattison, P. M., Masui, H., Farrell, R. M., Baker, T. J., Haskell, B. A., Wu, F., DenBaars, S.P., Speck, J.S., & Nakamura, S. (2005). *Applied Physics Letters*, *87*(23).

Micro cavity effect in GaN-based light-emitting diodes formed by laser lift-off and etch-back technique. Fujii, T., David, A., Schwach, C., Pattison, P. M., Sharma, R., Fujito, K., Margalith, T., DenBaars, S.P., Weisbuch, C., & Nakamura, S. (2004). *Japanese journal of applied physics*, *43*(3B), L411.

292 nm AlGaN single-quantum well light emitting diodes grown on transparent AlN base. Hanlon, A., Pattison, P. M., Kaeding, J. F., Sharma, R., Fini, P., & Nakamura, S. (2003). *Japanese journal of applied physics*, *42*(6B), L628.

Higher efficiency InGaN laser diodes with an improved quantum well capping configuration. Hansen, M., Piprek, J., Pattison, P. M., Speck, J. S., Nakamura, S., & DenBaars, S. P. (2002). *Applied physics letters*, *81*(22), 4275-4277.

Presentations

U.S. Fish & Wildlife Service Light Pollution & Bird Collisions expert panel, Workshop on Disorder in Semiconductor Physics and Devices 2024, University of Cincinnati IRIS 2023 Working Group, IES Raleigh Section "Horticultural Lighting – A Growing Opportunity", IES Street and Area Lighting Conference 2022, National Park Service Science and Technology – Skyglow Measurements at Channel Islands National Park 2022, UCSB Nitride Seminar 2022, International SSL Alliance 2021 General Assembly, The Limits of Food Production – Vertical Farming 2021, Horticann 2020, U.C. Davis Energy and Efficiency Institute, California Energy Administration, 2020 DOE Lighting R&D Workshop, Charleston Catholic High School STEM Seminar, East Tennessee State University Physics and Astronomy Seminar, IES Rocky Mountain Section – CU Boulder, 2019 DOE SSL R&D Workshop, Harvard ES-173 Guest Lecture, U.S. DOE Building Technologies Office Brown Bag Seminar, U.C. Santa Barbara Nitrides Seminar 2018, Phosphor Global Summit 2018, West Virginia State University – Biology Seminar, East Tennessee State University Entrepreneur Club 2018, IES Aviation

Lighting Committee Meeting 2017 (Best Technical Paper), ICCEA Panama 2017, NCERA 101 Controlled Environment Agriculture meeting, DOE SSL R&D Workshop 2017, The College of New Jersey Physics Colloquium, DOE SSL R&D Workshop 2017, NREL 2016, Harvard University Engineering Seminar, LightSym 2016, DOE SSL R&D Workshop 2016, DOE SSL Technology development Workshop 2015, DOE SSL R&D Workshop 2015, IDTechX Internet of Things Applications, Phosphor Global Summit 2014, International Conference on Nitride Semiconductors 2013, IES Illuminate Philadelphia 2012, Strategies in Light 2012, Energy Efficiency Expo 2011, Tennessee Association of Physical Plant Administrators 2011, East Tennessee State University Faculty Development Sustainability Seminar 2011, LED Discovery 2010, Think Tomorrow Today 2008, International Conference on Nitride Semiconductors 2005, International Symposium on Blue Lasers and Light Emitting Diodes 2004, Fall Materials Research Society 2001.

Patents

Technique for growth and fabrication of semipolar (Ga, Al, In, B) N thin films, heterostructures, and devices. #9793435, #9231376, #8686466, #7846757, #10529892

Lighting unit having lighting strips with lighting elements and a remote luminescent material. #8491165

Lighting unit with heat dissipating chimney #8360607

Lighting unit with indirect light source #8684566 B2

System for monitor and control of equipment. #9432210

Semiconductor light emitting device #8227820, #8643036

Etching technique for the fabrication of thin (Al, In, Ga) N layers. #7795146

Semiconductor micro-cavity light emitting diode. Application # 11/510,240 (abandoned), WO2007025122