

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JIAWEI TECHNOLOGY (HK) LTD., JIAWEI TECHNOLOGY (USA) LTD.,
SHENZHEN JIAWEI PHOTOVOLTAIC LIGHTING CO., LTD., ATICO
INTERNATIONAL (ASIA) LTD., ATICO INTERNATIONAL USA, INC.,
CHIEN LUEN INDUSTRIES CO., LTD., INC. (CHIEN LUEN FLORIDA),
CHIEN LUEN INDUSTRIES CO., LTD., INC. (CHIEN LUEN CHINA),
COLEMAN CABLE, LLC, NATURE'S MARK, RITE AID CORP., SMART
SOLAR, INC., AND TEST RITE PRODUCTS CORP.,
Petitioner

v.

SIMON NICHOLAS RICHMOND,
Patent Owner

Case IPR2015-TBD
Patent 7,429,827

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,429,827
(CLAIMS 31–34)**

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I. INTRODUCTION

Jiawei Technology (HK) Ltd.¹, Jiawei Technology (USA) Ltd., and Shenzhen Jiawei Photovoltaic Lighting Co., Ltd., Atico International (Asia) Ltd., and Atico International USA, Inc., Chien Luen Industries Co., Ltd., Inc. (Chien Luen Florida), and Chien Luen Industries Co., Ltd., Inc. (Chien Luen China), Coleman Cable, LLC², Nature's Mark, Rite Aid Corp., Smart Solar, Inc., and Test Rite Products Corp. (collectively "Petitioner") petitions for *inter partes* review under 35 U.S.C. §§ 311–312 and 37 C.F.R. § 42.100–106, 108 of Claims 31–34 of U.S. Patent No. 7,429,827 ("the '827 Patent") (Exhibit 1101). The '827 Patent issued on September 30, 2008, to Richmond. The '827 Patent is purportedly owned by SIMON NICHOLAS RICHMOND ("Patentee").

This petition proposes one ground that matches a ground in IPR2014-00938, but adds claims 31–34 to that ground. This petition uses the same ground to provide substantially different arguments demonstrating that, despite the patent owner's unforeseeable construction of "*continuous color changing cycle*," the prior

¹ Jiawei Technology (HK) Ltd. contests that service was proper in the district court case, but in any event, the earliest possible service for any Jiawei entity listed is in FN 4.

² Coleman Cable, LLC was formerly Coleman Cable, Inc.

art teaches this limitation under any construction. '938 IPR, paper 20 at 17. Under the patent owner's construction, a cycle implies a perceptible pattern that happens and can happen again. *Id.* at 16. The Petitioner could not have foreseen the Board requiring construction of a term that was never in dispute between the parties, and the Board should have instead applied its plain and customary meaning. Therefore, in view of the unanticipated importance of the term "*color changing cycle*," the petitioner asks the Board to consider how the substantially different arguments presented in this petition demonstrate a reasonably likelihood of prevailing on claims 31–34.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Parties-In-Interest (37 C.F.R. § 42.8(b)(1))

Petitioner certifies that the following are real parties-in-interest: Jiawei Technology (HK) Ltd., Jiawei Technology (USA) Ltd., and Shenzhen Jiawei Photovoltaic Lighting Co., Ltd. ("Jiawei"), Ace Hardware Corp. ("Ace"), Atico International (Asia) Ltd., and Atico International USA, Inc. ("Atico"), Chien Luen Industries Co., Ltd., Inc. (Chien Luen Florida), and Chien Luen Industries Co., Ltd., Inc. (Chien Luen China) ("Chien Luen"), Coleman Cable, LLC ("Coleman"), CVS Pharmacy, Inc. ("CVS"), Lowe's Home Centers, LLC ("Lowe's"), Menard, Inc. ("Menards"), Nature's Mark, Orgill, Inc. ("Orgill"), Rite Aid Corp., Smart Solar, Inc. ("Smart Solar"), Test Rite Products Corp., True Value Company ("True

Value”), and Walgreen Co. (“Walgreens”) (collectively “Real Parties-in-Interest³”).

B. Related Matters (37 C.F.R. § 42.8(b)(2))

On March 27, 2013, the purported Patent Owner sued multiple Petitioners in the U.S. District Court for the District of New Jersey alleging infringement of several patents, including the ’827 patent. On May 6, 2013, the purported Patent Owner filed an Amended Complaint alleging infringement of the ’827 patent. The earliest service date of the Amended Complaint served on the Petitioners identified above was June 11, 2013.⁴ This original petition was filed within one year of Petitioner being served a complaint alleging infringement of the ’827 patent. 35 U.S.C. § 315(b); 37 C.F.R. § 42.101(b). The purported Patent Owner identified no

³ Petitioner certifies that the following are real parties-in-interest, such that, the parties have at least been provided a draft of this petition and the opportunity to comment on it prior to filing this petition.

⁴ The service date for each real party-in-interest is identified for the convenience of the Board: June 11, 2013 (Menards, Lowe’s, and Walgreens); June 12, 2013 (Smart Solar); June 13, 2013 (Ace, CVS, Jiawei Technology (USA) Ltd., Orgill, True Value, Chien Luen, and Rite Aid); July 3, 2013 (Coleman); and no service date (Nature’s Mark and Test Rite).

claims for infringement in the Amended Complaint. At the time of this filing, the Court has not issued a Scheduling Order and the purported Patent Owner has served no infringement contentions relative to the '827 patent.

The purported Patent Owner also filed additional lawsuits alleging infringement of the '827 patent in several related judicial matters in the District of New Jersey. *See* Ex. 1108, Related Matters.

The '827 patent is being asserted in these proceedings with two other patents within the same patent family as the '827 patent—namely, U.S. Patent Nos. 7,196,477 and 8,362,700. U.S. Patent No. 7,196,477 (IPR2014-00936) was instituted on all claims and U.S. Patent No. 8,362,700 (IPR2014-00937) was not instituted but a motion for rehearing is pending.

**C. Lead and Back-Up Counsel and Service Information
(37 C.F.R. § 42.8(b)(3–4))**

Petitioner appoints Mark C. Nelson (Reg. No. 43,830) of Dentons US LLP as lead counsel, and appoints Lissi Mojica (Reg. No. 63,421), Kevin Greenleaf (Reg. No. 64,062), and Daniel Valenzuela (Reg. No. 69,027) of Dentons US LLP, as back-up counsel. A Power of Attorney for each Petitioner identified in Section I is on file in IPR2014-00938.

D. Service Information (37 C.F.R. § 42.8(b)(4))

Service of any documents to lead and back-up counsel can be made via hand-delivery to Dentons US LLP, 233 South Wacker Drive, Suite 7800, Chicago,

IL 60606-6306. Petitioner consents to service by email at mark.nelson@dentons.com, lissi.mojica@dentons.com, kevin.greenleaf@dentons.com, daniel.valenzuela@dentons.com, and iptdocketchi@dentons.com.

III. PAYMENT OF FEES

The undersigned submits the fee required by 37 C.F.R. § 42.15(a) for this Petition for *inter partes* review of claims 31–34. The undersigned further authorizes payment for any additional fees that might be due in connection with this Petition to be charged to Deposit Account No 19-3140.

IV. GROUNDS FOR STANDING (§ 42.104(a))

Petitioner certifies that the '827 patent is available for *inter partes* review and that the Petitioner is not barred or estopped from requesting *inter partes* review challenging the claims of the '827 patent on the ground identified in this Petition. Petitioner files an accompanying Motion for Joinder with this petition within the allowed statutory time period.

V. OVERVIEW OF CHALLENGE (§ 42.104(b))

Inter partes review of the '827 patent's challenged claims is requested on the ground for unpatentability listed in the index below.

Ground	Basis	Index of References	Claims Challenged
1	§ 103(a)	Chliwnyj, Wu and Lau	31–34

The petition also relies on the supporting declaration of technical expert Dr. Peter W. Shackle. (Shackle Decl., Ex. 1102.)

VI. OVERVIEW OF THE '827 PATENT

The '827 patent was filed on April 7, 2005, and is a continuation-in-part of U.S. Patent No. 7,196,477 (the "'477 Patent") filed on February 26, 2004. The '827 patent claims foreign priority to an Australian patent application filed on December 23, 2003 (Richmond App. 383, Ex. 1104.)

The Board previously instituted review of claims 24–30 and 35, which are substantially similar to claims 31–34.

VII. PERSON OF ORDINARY SKILL IN THE RELEVANT FIELD AND THE RELEVANT TIMEFRAME

The field for the '827 patent is solar powered lights and more particularly but not exclusively to solar powered lighting that produces a light of varying color. ('827 patent, Ex. 1101, 1:11–13.) Within a given field, the level of ordinary skill in the art is evidenced by the prior art references of record. *See In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (determining the Board did not err in adopting the approach that the level of skill in the art was best determined by the references

of record). With that in mind, as of the earliest effective filing date of the '827 patent claims, a person of ordinary skill in the art typically would have possessed: 1) a graduate degree in electrical or electronics engineering or physics with demonstrable experience in the circuit design, or 2) a bachelor's degree electrical or electronics engineering or physics with at least two years industrial experience and demonstrable experience in the circuit design.

VIII. TECHNICAL FUNDAMENTALS OF THE CLAIMED SUBJECT MATTER

The '827 challenged claims are directed to the interplay between a solar light apparatus and electronic circuitry to produce a varying color changing effect using a plurality of light emitting elements. (Shackle Decl., Ex. 1102, ¶ 75.) The '827 patent discloses electrical components and circuitry to power light sources through solar power and a rechargeable battery to produce varying colors. The lighting device also charges the battery during the day and the battery later powers the light emitting elements to emit light when it detects low ambient light levels. (Shackle Decl., Ex. 1102, ¶ 76.)

IX. PROSECUTION HISTORY

The '827 patent was filed on April 7, 2005, and issued on September 30, 2008. During prosecution, rejections were made based on double-patenting in light of Richmond's '477 patent and certain other references. In an Office Action dated

March 17, 2008, the examiner rejected claims 42–58 on the grounds of non-statutory obviousness-type double patenting as unpatentable over claims of the '477 patent in view of U.S. Patent No. 6,384,570 to Frost. Claims 73–76 were rejected based on double patenting as unpatentable over claims of the '477 patent in view of Frost and in further view of U.S. Patent No. 6,517,217 to Liao. Claims 30–41 and 59–72 were allowed. To traverse these rejections, Richmond canceled the claims so rejected and added new claims (77–85) and filed a terminal disclaimer to render any double-patenting rejection moot. In light of the terminal disclaimer and the cancelation of claims rejected, the examiner issued a notice of allowance on August 7, 2008. (Ex. 1103, '827 File History.)

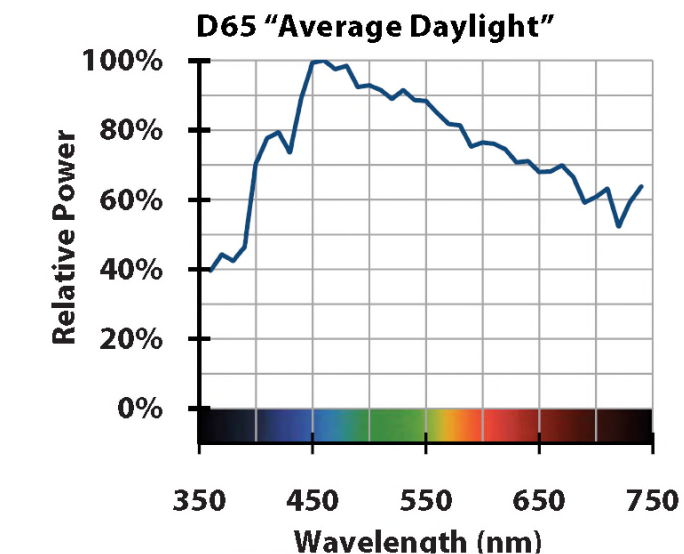
X. STATE OF THE ART RELATIVE TO THE '827 PATENT

The '827 patent is broadly directed to a lighting device having a lens, rechargeable battery, solar cell, and circuitry to produce light of varying color. ('827 Patent, 1:39–59.) The '827 patent allegedly attempts to overcome disadvantages of well-known in the art light emitting diodes system that produce variable color by producing uniform desired color when desired and the ease of adjusting the various light functions. ('827 Patent, 1:17–20.) The '827 patent admits “the invention of LED systems to produce variable color” is well known prior art. ('827 Patent, 1:17–18.) The Patent Owner also admits that using solar-powered lights using rechargeable batteries is also well known in the art. ('827

Patent, 1:20–25.) The prior art teaches using a plurality of different colored LEDs and ramping and/or controlling power to the light sources to vary intensity and frequency to create color varying and color changing cycles; discloses switches that allow a user to select a desired color and power the circuitry on and off; and teaches circuitry with programs in memory to produce a multitude of desired lighting patterns. Together the prior art renders obvious all of the challenged claims of the '827 patent.

A. Technical Background

Light is one of many forms of electromagnetic radiation, which is controlled by its frequency. (Shackle Decl., Ex. 1102, ¶¶ 40–41.) The light spectrum spans from deepest red color having a wavelength of around 780 nm to the deepest violet color having a wavelength of around 400 nm. (Shackle Decl., Ex. 1102, ¶¶ 43–44.) Figure A shows a spectrum of visible sunlight. Note there is light at every wavelength. (Shackle Decl., Ex. 1102, ¶ 43.)



The human eye only perceives three primary colors. All other colors are made up from combinations of these wavelengths. A fluorescent lamp can emit the

primary colors of red, green and blue, plus some yellow. The human eye perceives this combination as white light. With solid state (LED) lighting, LEDs that are respectively red, green, and blue can be combined in specific proportions and are interpreted by the human eye as white light. (Shackle Decl., Ex. 1102, ¶ 44.)

Dr. Shackle's declaration contains a figure showing the overlap of primary colors red, blue and green light, including creating white light by adding the three colors together. (Shackle Decl., Ex. 1102, ¶ 45.) To create varying color that can cover a spectrum of colors, one or more of the LEDs is varied in intensity, and the human eye perceives a varying color. (Shackle Decl., Ex. 1102, ¶ 46.)

A continuous color changing cycle or varying color can be done by simply switching each of three LEDs (*e.g.*, Red, Green, and Blue) on or off, which can produce a matrix of seven colors. For example, if Red and Blue are switched on and Green is off, then the resulting color is Magenta; if Red and Green are both switched on and Blue is off, then the resulting color is yellow; if Red, Blue and Green are all switched on, then the resulting color is white, etc. To produce over seven colors, each LED must be able to be driven to change in brightness or intensity, not just switched on or off. (Shackle Decl., Ex. 1102, ¶ 47.)

Using pulse width modulation (PWM) for varying color and producing continuous color changing cycles was well known in the prior art and can be used to produce a spectrum of colors. Dowling, filed March 13, 2001 and issued June

20, 2006, states, “[t]he ’038 patent discloses LED control through a technique known as Pulse-Width Modulation (PWM). This technique can provide, through pulses of varying width, a way to control the intensity of the LED's as seen by the eye. Other techniques are also available for controlling the brightness of LED's and may be used with the invention. By mixing several hues of LED's, many colors can be produced that span a wide gamut of the visible spectrum. Additionally, by varying the relative intensity of LED's over time, a variety of color-changing and intensity varying effects can be produced. Other techniques for controlling the intensity of one or more LEDs are known in the art, and may be usefully employed with the systems described herein. In an embodiment, the processor 2 is a Microchip PIC processor 25 12C672 that controls LEDs through PWM, and the LEDs 4 are red, green and blue.” U.S. Patent No. 7,064,498 at 6:1-26; (Shackle Decl., Ex. 1102, ¶ 48.)

The human eye cannot perceive rapid variations in intensity above 200 Hz, essentially no one can detect the fluctuation by directly looking at it. The width of each pulse is varied; this is called pulse width modulation. When pulse width modulation is done, the human eye perceives a light that grows bright and dim, depending on the width of the pulse, even though electronic instruments may record that the peak of each pulse is actually the same. A pulse width modulator is commonly used to control the LED's intensity. A color spectrum is achieved by

continuously varying the level of power to each LED. The result is a mixture of colors; for example, if additive primary colors, *i.e.*, red, blue and green light are used, that combination can produce color changes across the color spectrum. (Shackle Decl., Ex. 1102, ¶¶ 51-53.)

A light sensitive switch comprises at a minimum a) a light responsive element that can be a photodiode, phototransistor, photovoltaic cells, or any other circuit element that changes some parameter of its circuit characteristics in response to light and b) a power switch that operates to activate or deactivate a circuit in response to a signal from the light responsive element. The light sensitive is not required to be a mechanical switch. (Shackle Decl., Ex. 1102, ¶ 58.)

B. Background of the Technology

Solar powered lights produce light using stored energy obtained from sunlight. Solar lights may involve a combination of elements such as a photovoltaic cell; a rechargeable battery; a lamp and ambient light sensing control circuitry, used to determine when to turn the lamp on; and lighting circuitry often using integrated circuits, to determine which colors and patterns to display. (Shackle Decl., Ex. 1102, ¶ 61.)

A first key ingredient for solar powered lighting is a compact, lightweight rechargeable battery. Nickel metal hydride batteries were first released in 1989 and were soon improved upon by the lithium ion battery, which first became available

in 1991. *See, e.g.*, U.S. Patent No. 5,062,028 to Frost, issued October 1991 (describing a solar lamp on a ground stake powered by rechargeable nickel metal hydride batteries). (Shackle Decl., Ex. 1102, ¶ 62.)

A second key ingredient for solar powered lighting is the availability and effectiveness of photovoltaic cells. By the year 2000, a relatively small solar cell could generate enough power in one day to keep a discharge lamp operating for several hours during the night. (Shackle Decl., Ex. 1102, ¶ 63.)

Early attempts at making a solar powered light used a lead acid battery, as described by Doss in U.S. Patent No. 4,841,416, filed in March 1988 and issued in June 1989. This product used a 12V incandescent lamp. Also with an incandescent lamp but now with a battery the shape and size of a nickel metal hydride battery is the invention described by Frost in U.S. Patent No. 5,062,028, which was filed in August 1989 and issued in October 1991. (Shackle Decl., Ex. 1102, ¶ 64.)

The next technology leap to affect the business of solar powered lighting was the improvement of LED lamp efficacy. LED devices had been around since 1962, but in the 1960s and 1970s, they were only bright enough to make indicator lights and low powered displays such as on calculators. However with continual R&D, in the time interval from 1965 to 1990, the light output per LED that could be obtained had increased 1000 times so that during the 1990s, it was now possible to make a useful luminaire with an efficacy already many times that of an

incandescent lamp, and outputs of several lumens could be produced from an LED lamp. (Shackle Decl., Ex. 1102, ¶ 66.)

In 1999, another technology line was evolving as engineers were realizing it was possible to switch LEDs on and off so rapidly (say 1000 times /sec) that the human eye would detect a steady light with a brightness corresponding to the fraction of time the LED was switched on. By operating a red, a blue, and a green LED simultaneously and out of phase, any desired color or a color spectrum changing over time could be synthesized as taught in Morrison, U.S. Patent No. 6,241,362 filed July 19, 1999 (Ex. 1114). This could be accomplished by using an inexpensive microcontroller, for example, the Phillips 51LPC family has three PWM outputs that can output pulses with a width under program control. (Shackle Decl., Ex. 1102, ¶ 68.)

C. Summary of the Prior Art

The prior art references relied upon disclose a lighting device that produces varying color recited in the challenged claims. The references comprise Exhibits 1105–1107.

1. U.S. Patent No. 5,924,784 (“Chliwnyj”) (Ex. 1105)

Chliwnyj was filed on August 15, 1996, issued on July 20, 1999 and is prior art under 35 U.S.C. § 102(b). Chliwnyj discloses an “microprocessor-based electronic light pattern apparatus” using solar cells, a rechargeable battery, a

plurality of colored lamps, and an integrated circuit including a pulse width modulator to drive the plurality of different colored LEDs to produce a varying color and “relaxing light pattern.” (Chliwnyj, Ex. 1105, claim 45.) The PWM drives the intensity of LEDs to go up and down in a sinusoidal cycle or pattern—the sinusoidal cycle or pattern defined by intensity values in a sine wave table stored in a circular buffer. (*Id.*, 6:63–7:6.) Increasing or decreasing the rate of traversing the sine wave table results in similar changes in frequency of the intensity sine wave of the LEDs. The illumination device is suitable for outdoor areas such as memorial site, *e.g.*, a garden environment. (Chliwnyj, Ex. 1105, Background of the Invention.) (Shackle Decl., Ex. 1102, ¶ 89.)

2. U.S. Patent Application Publication No. US 2003/0201874 A1 (“Wu”) (Ex. 1106)

Wu was filed on April 24, 2002, published on October 30, 2003 and is prior art under 35 U.S.C. § 102(e). Wu specifically discloses a device with an illumination function using solar energy to illuminate a light emitting element. The device is suitable for outdoor areas such as courtyards and parks and scenic environments. (Wu, Ex. 1106, Background of the Invention.) (Shackle Decl., Ex. 1102, ¶ 90.)

3. U.S. Patent No. 6,431,719 (“Lau”) (Ex. 1107)

Lau was filed on September 22, 2000, issued on August 13, 2002 and is prior art under 35 U.S.C. § 102(b). Lau is a night light that contains an array of

differently colored light emitting diodes used to entertain and soothe the viewer. Lau teaches that the night light can output a display of dynamic light that can be frozen in a desired light pattern. (Lau, Ex. 1107, Background of the Invention.) (Shackle Decl., Ex. 1102, ¶ 91.)

XI. CLAIM CONSTRUCTION PURSUANT TO 37 C.F.R. § 42.104(B)(3)

Per the claim construction standard for an *inter partes* review, Petitioner bases this petition upon the broadest reasonable interpretation of the claim language. Solely for purposes of the proceeding, under the broadest reasonable interpretation standard, Petitioner proposes that all claims should be entitled to their plain and ordinary meaning, except for the limitations addressed below.

A. *Lamp*

The term “*lamp*” is in independent claim 32. The claim states “*circuit having at least two lamps of different colours*” and is construed to mean, “an electrical device, the primary purpose of which is to create light of a single color, and which is physically connected to a source of electricity.” (Shackle Decl., Ex. 1102, ¶ 82.)

B. *Varying colour/color*

The term “*varying colour*” is in independent claim 32. For purposes of this proceeding, the petitioner adopts the construction previously adopted by the Board: “perceptible changing of color over time.” IPR2014-00936 at 8; (*see also* Shackle

Decl., Ex. 1102, ¶ 83.)

C. *Switch being accessible by a user*

The term “*switch being accessible by a user*” is in independent claim 27 and dependent claim 33. The term is construed to mean, “the switch is accessible to the user without substantial effort, tools, or destruction.” Therefore, a switch need not be exposed and the user can disassemble the device, *e.g.*, remove a few screws, unscrew a lens, etc., to gain access to the switch. (Shackle Decl., Ex. 1102, ¶ 88.)

D. *Continuous color changing cycle*

The term “*continuous color changing cycle*” is in independent claim 32 and dependent claim 31. Petitioner cannot be sure how the Board will define this claim limitation because, despite stating, “A ‘cycle’ implies some pattern or scheme; some phenomenon that happens and can happen again,” the Board stated, “we did not adopt any construction of the term by Patent Owner.” IPR20014-00938, paper 20 at 16, and paper 27 at 3. The Board’s decision that the relied-upon prior art does not teach a “*color changing cycle*” without clearly defining it places the petitioner in the difficult situation of applying the prior art three possible constructions.

The broadest reasonable construction of “*continuous color changing cycle*” is “a series of perceptible changes of color over time, with or without repetition.”

First, the petitioner’s construction is consistent with the patent owner’s admission, that “*varying color*” and “*color changing cycle*” “mean[] substantially

the same thing.” Ex. 1109 at 24. Therefore, the constructions of the two terms should be substantially the same, with the difference, if any, lying with the word “cycle.”

The '827 patent does not define explicitly the term “cycle” in the specification. Instead, the '827 patent merely mentions the term “cycle[]” once, stating, “[t]he light device 10 displays a constantly changing lighting effect that cycles through the light spectrum by ramping up and ramping down the intensity of light displayed by the LEDs 34A, 34B, and 34C.” 7:15–18 (emphasis added). Here, the '827 patent requires “constantly changing” the lighting effect—the opposite of “happens and can happen again” in the same way each time. The statement in the '827 patent, “cycles through the light spectrum,” does not set forth a clear, deliberate, and precise choice of a single definition. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998) (patent owner can be its own lexicographer it defines a term “with reasonable clarity, deliberateness, and precision.”) Similarly, claims 31 and 32 mandate that the light patterns must “vary” instead of “happen and can happen again.” The claims do not require repeating the same variations of intensity or frequency over consecutive cycles, even if one definition “implies” it.

The petitioner also agrees with the following analysis in IPR2014-00877, which analyzed a similar situation where a patent did not define the word “cycle”:

Furthermore, one general dictionary includes a definition of ‘cycle’ as ‘a set of things that a machine does as part of a process,’ providing an example of such a cycle for a household product without reference to repetition of events. Ex. [1110]. Both this definition and the ’688 patent’s disclosure are, thus, consistent with the construction proposed by Petitioner.

Accordingly, for purposes of this decision, we adopt Petitioner’s proposed construction for ‘cycle’ as ‘a series of events, with or without repetition.’

Paper 10 at 6–7 (emphasis added). Therefore, for purposes of this proceeding, the broadest reasonable interpretation of “*color changing cycle*” combines the constructions of “*varying color*” and “*cycle,*” i.e., “a series of perceptible changes of color over time, with or without repetition.” (Shackle Decl., Ex. 1102, ¶ 84.)

Second, in IPR2014-00938 (’938 IPR), the patent owner proposed the following construction: “ramping up and ramping down intensity of light emitted over time in a series of changing colors that repeats by said at least two light sources.” ’938 IPR, paper 19 at 12; *see also* Ex. 1111 cited at Ex. 2011 in IPR2014-00937 (emphasis added to show unforeseeably imported limitation.) The only basis the patent owner has for adding a repetition requirement to the construction is a new cherry-picked definition that is inconsistent with another, broader definition that the patent owner relied on in litigation. Ex. 1112 at 34–35 (FN 23). As explained above, this is not the broadest reasonable interpretation

because broader definitions exist in reputable dictionaries and persons of ordinary skill in the art would have understood that cycles can repeat, but do not have to. (Shackle Decl., Ex. 1102, ¶ 85.)

Third, at the time of filing this petition, the Board chose not to construe “*color changing cycle*,” but said the following: “A ‘cycle’ implies some pattern or scheme; some phenomenon that happens and can happen again” and “Chliwnyj admonishes prior art lights that have a perceptible ‘pattern’ in the overall flame effect, instead seeking to simulate a ‘natural random process.’ Ex. [1105], 2:1–19, 41–51” ’938 IPR, paper 20 at 7 and 16 (emphasis added); *see also*, ex. 1113 (Board’s dictionary definition of cycle.) The Board stated, “the term ‘cycle’ implied some pattern, and that the prior art to which Petitioner cited admonishes patterns [and] the form of repetition, if any, implied by the term ‘cycle,’ was not germane.” ’938 IPR, paper 27 at 3. Therefore, the Board seems to agree that the word “*cycle*” is a series of events, with or without repetition. The Board also seems to believe that a cycle requires “some pattern or scheme,” but the Board gave no rationale for using these words, and the petitioner cannot locate any as the ’827 patent does not use these words and no definition of record used those words. Petitioner believes that the Board, based on the evidence before it at the time, believed that the broadest reasonable interpretation of “*color changing cycle*” is “a

pattern or scheme of perceptible changes of color over time, with or without repetition.” (Shackle Decl., Ex. 1102, ¶ 86.)

In summary, the petitioner will demonstrate how the prior art teaches a “*color changing cycle*” under each construction:

Petitioner’s BRI	Patent Owner’s BRI	Assumed Board’s BRI
a series of perceptible changes of color over time, with or without repetition.	ramping up and ramping down intensity of light emitted over time in a series of changing colors that repeats by said at least two light sources. ’938 IPR, paper 19 at 12.	a pattern or scheme of perceptible changes of color over time, with or without repetition.

(*See also*, Shackle Decl., Ex. 1102, ¶¶ 84–87.)

XII. UNPATENTABILITY GROUND

The references reviewed below render the claimed subject matter unpatentable under 35 U.S.C. § 103. As detailed below, the Petitioner has a reasonable likelihood of prevailing as to each of the following ground of unpatentability. Throughout the ground, the figures are annotated to identify elements of the claims in the prior art and emphasis is added to the evidence to support the challenge.

**A. Ground 1: Chliwnyj in view of Wu and Lau Renders
Obvious Claims 31–34**

U.S. Patent No. 7,429,827	Chliwnyj in view of Wu and Lau
[27.0]⁵ A lighting device to produce light of varying colour, said device including:	[27.0] <u>Chliwnyj</u> discloses an electronic light pattern device to produce light of varying colour. “45. A microprocessor-based <u>electronic light pattern apparatus</u>, comprising: ... a microprocessor for processing instructions and data representing output values for signal drivers to drive lighting devices in a <u>relaxing light pattern</u> to generate a plurality of output signals; ... microprocessor-based computer instruction programs and stored data cooperatively operating in and with said microprocessor to process data representing output values for signal drivers to drive a lighting device in a <u>relaxing light pattern</u>” (Chliwnyj, Ex. 1105, Claim 45 (emphasis added).) “The preferred embodiment has a plurality of lighting elements in a plurality of colors which are modulated in intensity by a control circuit with a stored program. The control program includes stored amplitude waveforms for the generation of a realistic flame simulation. The program further contains random elements to keep the flame constantly changing.” (Chliwnyj, Ex. 1105, Abstract). “The turning on and turn off of the LEDs, caused by a pulse width modulation of an LED current, tends to broaden the spectrum of the LEDs. This leads to an increased apparent brightness of the flame. Super Brite™ light emitting diodes

⁵ Claim 31 depends from claim 27, and therefore includes all limitations of Claim 27.

(Super Brite™ LEDs), which may be supplied by high power AlInGaP amber and reddish-range LED lamps, have a wider spectrum than other LEDs. Super Brite™ LEDs may also enhance the flame motion due to color changes.” (Chliwnyj, Ex. 1105, 5:18–25).

“The controlling program comprises stored instructions for generating the amplitude modulated time waveforms for controlling the current to the lighting elements. Pulse Width modulation (PWM) may be performed in either hardware or program code, provided that sufficient microprocessor “bandwidth” may be available to perform the program-code operations. Drivers provide the necessary drive current for the respective lighting element.” (Chliwnyj, Ex. 1105, 5:34–41).

“As shown in FIG. 2, a combination of flame-simulation circuitry and program-coded power management may incorporate photovoltaic panels 16, charging circuits 18, and rechargeable batteries 17. Microprocessor 1 may control pulse width modulator 19 which in turn drives LEDs 20 to create a realistic simulated flame. This results in a simulated flame for use, for example, in cemeteries as a memorial marker. With sufficient power generating capacity the flame may run day and night, creating in effect an “eternal flame.” (Chliwnyj, Ex. 1105, 5:63–6:4).

Figure 2 is a function block diagram of a solar-powered flame-simulation circuitry. Figure 2 discloses a Pulse Width Modulator to control each LED to produce a varying color.

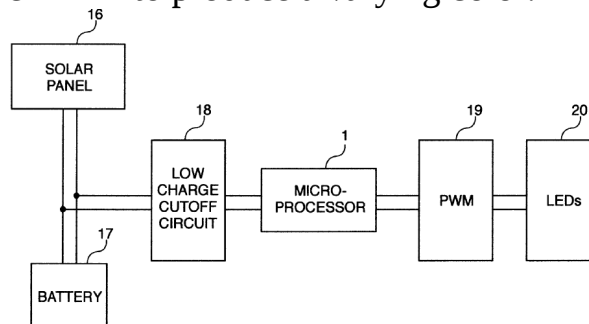
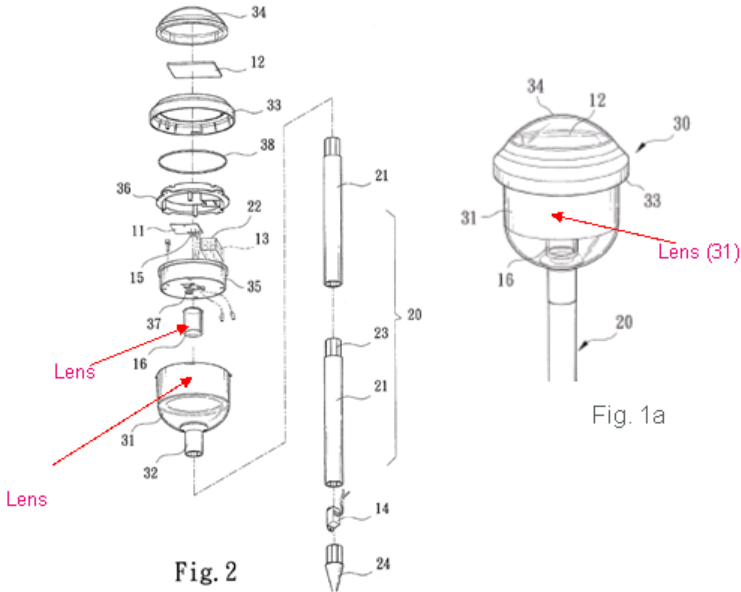


Figure 2

(Shackle Decl., Ex. 1102, ¶¶ 96-101).

[27.1] a lens,	[27.1] Wu discloses a lens generally enclosing a chamber. See Figures 1a and 2.  (Wu, Ex. 1106 at Figs. 1a and 2.) and (Shackle Decl., Ex. 1102, ¶¶ 102-03.)
[27.2] a circuit having at least two lamps of different colours to produce a varying colour,	[27.2] Chliwnyj discloses a circuit including at least two lamps of different colours to produce a desired colour. “A microprocessor-based simulated electronic flame in its best mode uses multiple LEDs as controlled lighting elements to give the appearance of flame motion, typically when viewed through a diffuser. The plurality of controlled lights allow the simulated flame motion. Additionally, the use of a plurality of colors also enhances the effect of flame motion.” (Chliwnyj, Ex. 1005, 5:11–17). “FIG. 1 shows a functional block diagram of a microprocessor-based prototype circuit comprising a flame simulation circuitry. The device 8 initially consisted of a set of five Super Brite™ LEDs 7a, 7b, 7c, 7d, and 7e (LEDs 7a–e) in 2 or 3 different colors. The Super Brite™ LEDs may be supplied by High Power AlInGaP Amber and Reddish-orange Lamps from Hewlett Packard. Also known as Super Brite™, or Ultra Brite™, the LEDs are high efficiency LEDs and are known to be available in

red, amber, and yellow colors. However, light-emitting diodes are generally available in a number of suitable colors from many different manufacturers.” (Chliwnyj, Ex. 1005, 6:25–36).

See Figures 1 and 2.

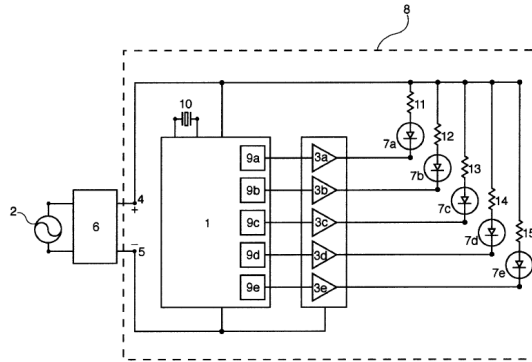


Figure 1

Figure 2 discloses a Pulse Width Modulator to control each LED to produce a varying color.

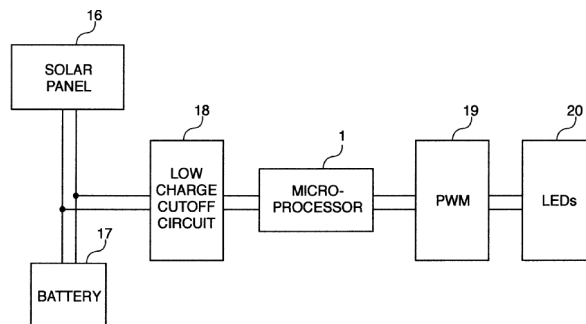


Figure 2

(Shackle Decl., Ex. 1002, ¶¶ 104-09.)

[27.3] said lamps being mounted to direct light through said lens,

[27.3] **Wu** discloses the lamps being mounted to direct light through said lens.

Figure 4 discloses light emitting elements (lamps) 15 mounted to direct light through the lens 31.

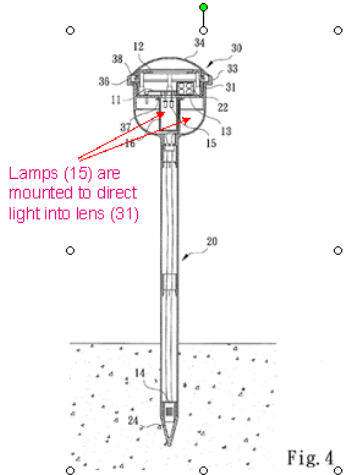
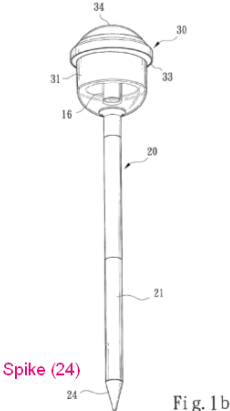
	 (Wu, Ex. 1106, Fig. 4.) and (Shackle Decl., Ex. 1102, ¶¶ 110-11.)
[27.4] connections for at least one rechargeable battery to power said circuit,	[27.4] Chliwnyj discloses connections for at least one rechargeable battery to power the circuit. “Another specific embodiment is the combination of an in-ground memorial with a solar-powered memorial. An in-ground memorial is commonly found placed in-ground at a cemetery with its memorial face visible and even with the ground. Preferably built of bronze or granite, the memorial 56 may have solar panels 54a—b exposed with an eternal flame combination of LEDs and diffuser 55 built into the monument 56. The electronics and batteries are hidden in the unit. A bronze ring 57 is provided for replacing or removal of rechargeable batteries from the top on a periodic basis. FIG. 7 is a drawing of a solar powered “eternal flame” combined with a flush memorial.” (Chliwnyj, Ex. 1105, 12:20–31) (emphasis added). See Figure 7.

	Figure 7 (Shackle Decl., Ex. 1102, ¶ 112–13.)
[27.5] a solar cell mounted so as to be exposed to light and operatively associated with said connections to charge said battery,	See Claim 27.4.
[27.6] and a user operated switch operable to control said circuit, with said switch being accessible by a user thereby enabling said user to manipulate said switch to control delivery of power to said lamps; and	[27.6] Chliwnyj discloses a user operated switch operable to control said circuit, with said switch being accessible by a user thereby enabling said user to manipulate said switch to control delivery of power to said lamps. Chliwnyj discloses a switch operated to control delivery of electric power from the battery to operate said circuit. “A plurality of rechargeable batteries 28a–d, for example, AA rechargeable batteries, may be housed in a battery holder 35 and connected through a switch to the circuit card 29, all of which may be located inside the hollow base 27.” (Chliwnyj, Ex. 1105, 10:66–11:3) (emphasis added). (Shackle Decl., Ex. 1102, ¶¶ 114-15.)

[27.7] a spike for positioning said connections above a ground surface.	[27.7] Wu discloses a spike for positioning said connections above a ground surface. Figure 2 discloses a spike for positioning said connections above a ground surface.  (Wu, Ex. 1106 at Fig. 1b) and (Shackle Decl., Ex. 1102, ¶¶ 116-17.)
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For claim 31, **Chliwnyj** discloses an “electronic light pattern apparatus” (claim 45) having a circuit that includes a light sub-circuit connected to said lamps (*e.g.*, FIGs 1 and 2) to deliver power thereto, wherein said light sub-circuit varies said power to each of said lamps so as to vary both intensity of light emitted (*e.g.*, “modulating the intensity” (Chliwnyj, Ex. 1105, 3:9–11)) and frequency of changes to said intensity (*e.g.*, “run the individual sinusoid at different frequencies” (*Id.* at 7:24-25)) (Shackle Decl., Ex. 1102, ¶ 118–20, 122, 130.).

Figures 1 and 2 disclose a circuit that comprises a microprocessor and pulse width modulator that, in conjunction with the circular buffer, delivers power to the lamps and varies the intensity or frequency of power to each LED. (6:63–7:6 and Shackle Decl., Ex. 1102, ¶ 162.)

Chliwnyj further teaches that, while the lamps may operate at different frequencies, they “have an overall controlled pattern,” (4:11–12), and further that each light may operate at the same frequency if each lamp uses the same prescaler, which controls the frequency of the lamps. (7:24-25). Whether the lights operate on the same frequency or not, they will still produce a pattern. Therefore, Chliwnyj teaches using a sinusoidal wave/pattern to ramp up and down the intensity of light emitted over time in a series of changing colors to produce a flame pattern. (Shackle Decl., Ex. 1102, ¶¶ 163–165 (discussing how Chliwnyj and Morrison (ex. 1114) demonstrate that it was known to program Chliwnyj to cycle different LEDs on the same frequency and out of phase, just as Lau teaches).)

While Chliwnyj states it does not rely “on any apparently repetitive pattern,” this does not mean that it never repeats cycles or patterns, or that it does not teach “patterns,” only that any repetition is not apparent. Chliwnyj at 4:32 (emphasis added); *see also*, 7:36–39 (“The general object and purpose of the present invention is to provide ... changing flame patterns [that] differ from simply repetitive flickering”) (emphasis added). Petitioner believes that Chliwnyj taught repeating cycles, but relies on Lau to demonstrate that it would have been obvious, and Chliwnyj does not teach away from a combination with Lau. (’938 IPR, paper 27 at 4–5 (citing *In re Gurley*, 27 F.3d 551, 552–553 (Fed. Cir. 1994))). Chliwnyj

indeed teaches that such devices were well known. *See e.g.*, 1:65–2:18. (Shackle Decl., Ex. 1102, ¶ 84.)

Lau teaches one example of a light pattern device that expressly repeats patterns. (Lau, Ex. 1107, 1:33–44 “...the cycle repeating over a cycle period...,” 3:13–23 “... a pattern of light output by array 30 occurs and then starts to repeat...,” and 3:36–44 “... continuously changing color patterns. ... whereupon the cycle will repeat.”) As explained below in the rationale to combine, to the extent that Chliwnyj fails to teach a “*color changing cycle*” because it expresses a preference for inserting occasional random cycles, it would have been obvious to one of ordinary skill in the art to take the color changing cycles of Chliwnyj and have the cycles continuously repeat without any random aspects, as taught and suggested by Lau. Such repetition would have been obvious to one of ordinary skill in the art, as Chliwnyj acknowledges that such systems existed and inserting occasional random cycles or patterns between periods of stillness or repetition is an improvement over well-known art that repeats cycles. Thus, if a user wanted to have a repeating “*color changing cycle*” with no changes, they would have looked to Lau. (Shackle Decl., Ex. 1102, ¶ 136–38, 140, 167–70.)

[31] The lighting device of claim 27, wherein said circuit	[31] “45. A microprocessor-based <u>electronic light pattern apparatus</u> , comprising: ... a microprocessor for processing instructions and data representing output values for signal drivers to drive lighting devices in <u>a relaxing light pattern</u> to generate a plurality of output signals;
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includes a light sub-circuit connected to said lamps to deliver power thereto, wherein said light sub-circuit varies said power to each of said lamps so as to vary both intensity of light emitted and frequency of changes to said intensity to produce a continuous color changing cycle.

... microprocessor-based computer instruction programs and stored data cooperatively operating in and with said microprocessor to process data representing output values for signal drivers to drive a lighting device in a relaxing light pattern” (Chliwnyj, Ex. 1105, Claim 45 (emphasis added).)

“FIG. 1 shows a functional block diagram of a microprocessor-based prototype circuit comprising a flame simulation circuitry. The device 8 initially consisted of a set of five Super Brite™ LEDs 7a, 7b, 7c, 7d, and 7e (LEDs 7a–e) in 2 or 3 different colors. . . . However, light-emitting diodes are generally available in a number of suitable colors from many different manufacturers.” (Chliwnyj, Ex. 1105, 6:23-36.)

“The LEDs may be driven by **drivers** 3a, 3b, 3c, 3d, and 3e, each of which boost the current drive capability of the respective one of five PWM modulator outputs 9a, 9b, 9c, 9d, and 9e of the microprocessor. Each of resistors 11, 12, 13, 14, and 15 are coupled with the respective one of LEDs 7a–e, which resistors limit the currents through LEDs 7a–e.” (Chliwnyj, Ex. 1105, 6:37-42 and Figure 1.) (emphasis added).

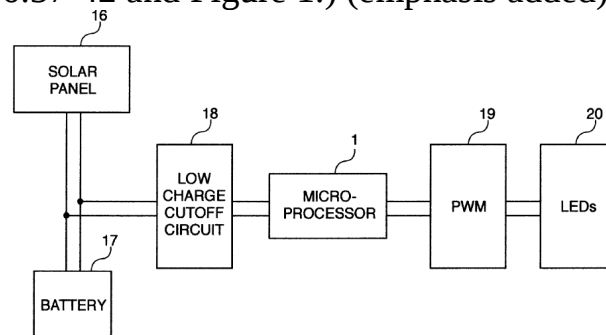


Figure 2

See also Fig. 2 block diagram.

“Sinusoidal wave values were initially used as fundamental excitation values for each of LEDs 7a–e. As shown in FIG. 12, the **program code may use a table 21 of stored sine wave values, which** table 21 is **indexed** (see index 22) at varying rates **to generate differing period waveforms for each of LEDs 7a-e.** For each of LEDs a **circular buffer pointer 26** may be used to

access the sine table 21. Additionally **the data structure for each of LEDs may have a pointer to the start of the current waveform table and the end of the table so that the circular buffer pointer 26 may wrap to the beginning of the stored waveform when it gets to the end.**" (Chliwnyj, Ex. 1105, 6:63-7:6.)

"Another object of the present invention is to provide a flame simulation by **modulating the intensity** of the Super Brite™ light emitting diodes." (Chliwnyj, Ex. 1105, 3:9-11.) (emphasis added).

"The use of PWM is an economical and a very low-power approach to controlling current in electronic circuits. **The use of PWM also yields a wide range of apparent and continuous brightness levels.**" (Chliwnyj, Ex. 1105, 3:16-21.) (emphasis added).

"To run the individual sinusoid at different frequencies a prescaler is used." (Chliwnyj, Ex. 1105, 7:24-25.) (emphasis added).

"Different parts of the flame may be varied at different frequencies." (Chliwnyj, Ex. 1105, 4:10-11.)

"The **controlling program comprises stored instructions** for generating the **amplitude modulated time waveforms** for controlling the current to the lighting elements. **Pulse Width modulation (PWM) may be performed** in either hardware or **program code**, provided that sufficient microprocessor 'bandwidth' may be available to perform the program-code operations." (Chliwnyj, Ex. 1105, 5:34-41.) (emphasis added).

"A significant advantage of the invention is **the smooth change in the frequency of modulation of a single LED with time.** Like a real flame the **change in frequency is continuous** and not abrupt. The modulation of a LED is accomplished by indexing through a stored sine wave table with a pointer as described above. At the end of a full cycle of the stored waveform the change requested flag is checked to see if a change is pending. If so the divisor for the counter for stepping through the waveform is incremented or decremented as required. The pointer is updated.

	This has the net effect of having the slowly modulated LEDs change smoothly in frequency over time. Since the LEDs which are being modulated faster, cycle through the stored single cycle of the waveform faster, they change quickly from one frequency to the requested frequency. Once the desired frequency is attained, the change requested flag for that LED is reset.” (Chliwnyj, Ex. 1105, 7:55–8:4.) (emphasis added). “As shown in FIG. 12, the prototyped flame simulation is table driven. <u>Each LED has a code structure associated with it</u> that contains all the data for the specific state of the LED and the simulation. Limits for how fast or how slow the sinusoid should be allowed to go for a LED are in the table [frequency]. The maximum allowed brightness and minimum allowed brightness for the individual LED are also in the table [intensity] for a particular state.” (Chliwnyj, Ex. 1105, 8:43-50.) (emphasis added). “The start-up code specifically starts the simulation in a known state so that the phases of the individual sinusoids are different to prevent the LEDs from all starting out in phase.” (Chliwnyj, Ex. 1105, 8:51-55.) (emphasis added). (Shackle Decl., Ex. 1002, ¶¶ 118–34.) <u>Lau</u> teaches a “<i>color changing cycle</i>” as repeating light patterns, such as those disclosed by Chliwnyj. Figure 2 discloses a circuit that comprises a microcontroller and LED driver(s) that to power the lamps and vary the intensity of each LED. (Shackle Decl., Ex. 1102, ¶ 136.)
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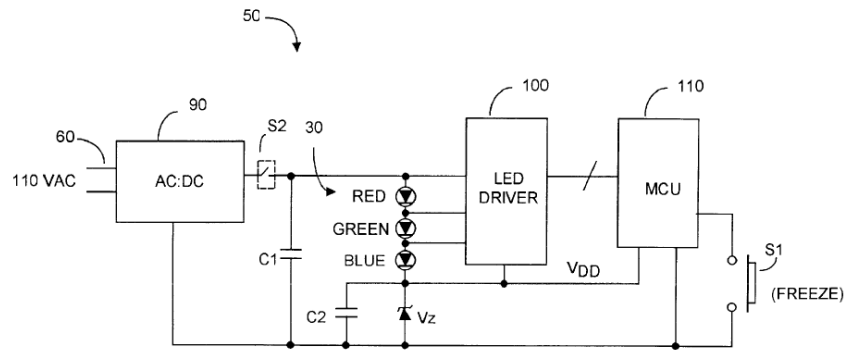


FIG. 2

“The housing contains an **array of differently colored, preferably light emitting diode**. Light sources that can **dynamically output different patterns of differently colored light in response to drive signals**. A microcontroller executes a **sequence of instructions causing the controller to output different sequences of signals** that are coupled to a driver unit that drives the light sources. The result is that **the array dynamically produces different patterns of differently colored light.**” (Lau, Ex. 1107, Abstract.) (emphasis added).

“In the preferred embodiment, LED array 30 includes three separate LEDs: a red LED, a green LED, and a blue LED, so labeled in FIG. 2. **Each LED may be driven independently of each other LED by an appropriate logic high or low state provided by an LED driver 100.** In the preferred so embodiment, the three differently colored LEDs are series connected, and the voltage at the bottom of the series stack is established by a Zener diode V_z , whose relatively constant voltage V_{DD} is provided as operating potential to LED driver 100 and to a microcontroller unit (MCU) 110. **MCU 110 preferably is programmed** by burning one or more mask layers to carry out a set of instructions that have the effect of controlling LED driver 100 to drive the LED array 30 in a desired sequence of light patterns. **LED drivers and MCU units are well known to those skilled in the art of circuit design**, and further details are therefor deemed unnecessary.” (Lau, Ex. 1107, 2: 45–60.) (emphasis added).

“Preferably the light array comprises **several differently colored light emitting diodes (LEDs) that are driven by electronics** within the housing such that the array output, as viewed through the light diffuser, is a **dynamically changing pattern of light.** **The displayed light patterns vary smoothly and continuously from monochrome to different color combinations of light, with the cycle repeating over a cycle period that may be sixty seconds or so in length.** Preferably the electronics includes a microcontroller unit that executes a sequence of instructions causing a light driver unit to switch on various of the light emitters during various portions of a pattern cycle.” (Lau, Ex. 1107, 1:33–44) (emphasis added).

“For example, under control of MCU 110, **LED driver 100 may cause only the blue LED to be on, or to be on for some fraction of a cycle period. Alternatively only the green or the red LED might be on for some fraction of a cycle period, e.g., a typically several second period over which a pattern of light output by array 30 occurs and then starts to repeat.** It is understood that MCU 110 may cause LED driver 100 to switch more than one LED on simultaneously, and indeed duty cycle to each LED may differ. For example, one might drive the red LED with a higher duty cycle than the green and blue LEDs such that red is the predominant color as **viewed through diffuser 40 by a user.**” (Lau, Ex. 1107, 3:13–23) (emphasis added).

“Thus, **a viewer seeing night light 10 is treated to a pastel of smoothly and continuously changing color patterns.** The light display may start out with a deep blue color that gradually becomes bluish-purple, then a lavender pink color that gradually becomes a red-orange color. The red-orange color gradually becomes a deep red-pink color that gradually becomes a light purple color that gradually becomes a blue color, and then back to a deep blue color, whereupon the cycle will repeat.” (Lau, Ex. 1107, 3:36–44) (emphasis added).

“The visual effect is both pleasing and comforting, and may promote sleep including promoting sleep for young children. Sufficient light is output to serve the purpose of a night light, yet

	the output light is not a monotonous flashlight-like monotone but a dynamic kaleidoscope of colors that gradually and pleasingly changes in appearance.” (Lau, Ex. 1107, 3:45–50) (emphasis added). “5. The night light of claim 1, further including a light 40 diffuser, attachable to said housing, through which at least some light emitted by said array is viewable by a user.” (Lau, Ex. 1105, 4:38–40.) (Shackle Decl., Ex. 1102, ¶¶ 135–42 and 164–67). <i>See also</i> Claim 32.4.
[32.0] A lighting device to produce light of varying color, said device including:	[32.0] <u>Chliwnyj</u> discloses an electronic light pattern device to produce light of varying colour. “45. A microprocessor-based <u>electronic light pattern apparatus</u>, comprising: ... a microprocessor for processing instructions and data representing output values for signal drivers to drive lighting devices in a <u>relaxing light pattern</u> to generate a plurality of output signals; ... microprocessor-based computer instruction programs and stored data cooperatively operating in and with said microprocessor to process data representing output values for signal drivers to drive a lighting device in a <u>relaxing light pattern</u>” (Chliwnyj, Ex. 1105, Claim 45 (emphasis added).) “The preferred embodiment has a plurality of lighting elements in a plurality of colors which are modulated in intensity by a control circuit with a stored program. The control program includes stored amplitude waveforms for the generation of a realistic flame simulation. The program further contains random elements to keep the flame constantly changing.” (Chliwnyj, Ex. 1105, Abstract). “The turning on and turn off of the LEDs, caused by a pulse width modulation of an LED current, tends to broaden the spectrum of the LEDs. This leads to an increased apparent brightness of the

flame. Super Brite™ light emitting diodes (Super Brite™ LEDs), which may be supplied by high power AlInGaP amber and reddish-range LED lamps, have a wider spectrum than other LEDs. Super Brite™ LEDs may also enhance the flame motion due to color changes.” (Chliwnyj, Ex. 1105, 5:18–25).

“The controlling program comprises stored instructions for generating the amplitude modulated time waveforms for controlling the current to the lighting elements. Pulse Width modulation (PWM) may be performed in either hardware or program code, provided that sufficient microprocessor “bandwidth” may be available to perform the program-code operations. Drivers provide the necessary drive current for the respective lighting element.” (Chliwnyj, Ex. 1105, 5:34–41).

“As shown in FIG. 2, a combination of flame-simulation circuitry and program-coded power management may incorporate photovoltaic panels 16, charging circuits 18, and rechargeable batteries 17. Microprocessor 1 may control pulse width modulator 19 which in turn drives LEDs 20 to create a realistic simulated flame. This results in a simulated flame for use, for example, in cemeteries as a memorial marker. With sufficient power generating capacity the flame may run day and night, creating in effect an “eternal flame.” (Chliwnyj, Ex. 1105, 5:63–6:4).

Figure 2 is a function block diagram of a solar-powered flame-simulation circuitry. Figure 2 discloses a Pulse Width Modulator to control each LED to produce a varying color.

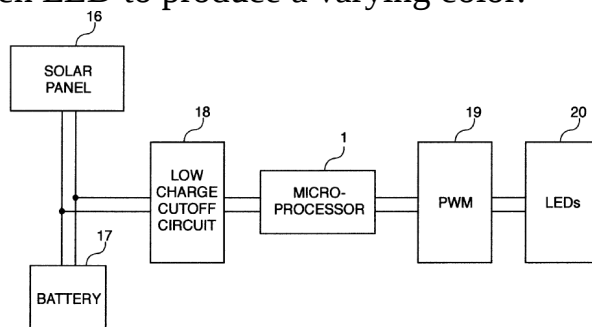
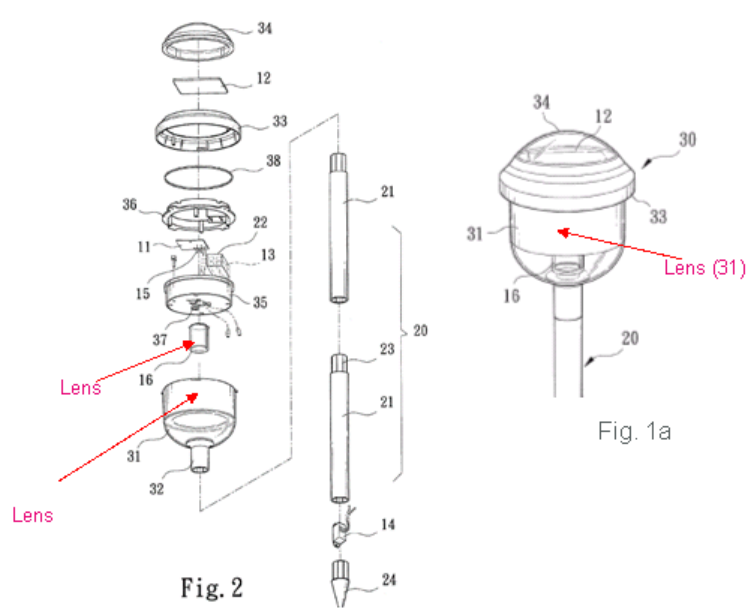


Figure 2

(Shackle Decl., Ex. 1102, ¶¶ 96-101).

[32.1] a

[32.1] **Wu** discloses a lens generally enclosing a chamber.

lens;	See Figures 1a and 2.  (Wu, Ex. 1106 at Figs. 1a and 2.) and (Shackle Decl., Ex. 1102, ¶¶ 102-03.)
[32.2] a circuit having at least two lamps of different colors mounted to direct light through said lens,	[32.2] Chliwnyj discloses a circuit having at least two lamps of different colors. “A microprocessor-based simulated electronic flame in its best mode uses multiple LEDs as controlled lighting elements to give the appearance of flame motion, typically when viewed through a diffuser. The plurality of controlled lights allow the simulated flame motion. Additionally, the use of a plurality of colors also enhances the effect of flame motion.” (Chliwnyj, Ex. 1005, 5:11–17). “FIG. 1 shows a functional block diagram of a microprocessor-based prototype circuit comprising a flame simulation circuitry. The device 8 initially consisted of a set of five Super Brite™ LEDs 7a, 7b, 7c, 7d, and 7e (LEDs 7a–e) in 2 or 3 different colors. The Super Brite™ LEDs may be supplied by High Power AlInGaP Amber and Reddish-orange Lamps from Hewlett Packard. Also known as Super Brite™, or Ultra Brite™, the LEDs are high efficiency LEDs and are known to be available in red, amber, and yellow colors. However, light-emitting diodes are

generally available in a number of suitable colors from many different manufacturers.” (Chliwnyj, Ex. 1005, 6:25–36).

See Figures 1 and 2.

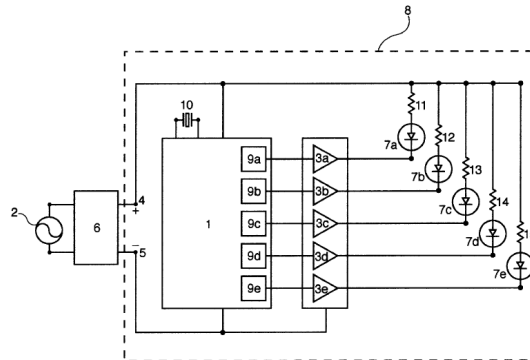


Figure 1

Figure 2 discloses a Pulse Width Modulator to control each LED to produce a varying color.

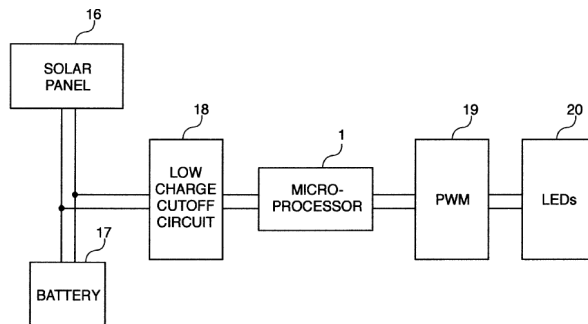
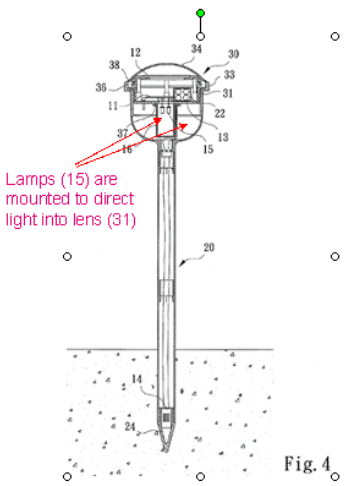


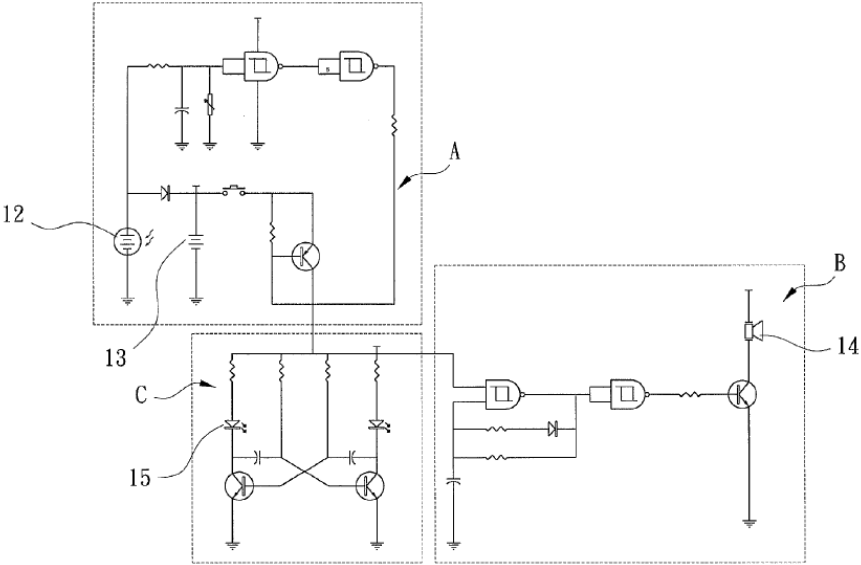
Figure 2

(Shackle Decl., Ex. 1002, ¶¶ 104-09.)

Wu discloses the lamps being mounted to direct light through said lens.

Figure 4 discloses light emitting elements (lamps) 15 mounted to direct light through the lens 31.

	 Fig. 4
[32.3] an activation sub-circuit to provide power to said lamps only at low light levels, and	(Wu, Ex. 1106, Fig. 4.) and (Shackle Decl., Ex. 1102, ¶¶ 110-11.) [32.3] Wu discloses an activation sub-circuit to provide power to said lamps only at low light levels. “Referring to FIG. 4, when in using of the present invention, it needs only to insert the present invention into the soil firmly, when it is irradiated by the sun light in the daytime, by transparency of the transparent hood 34 mounted on the housing 30, the solar-energy powered electricity generating element 12 generates power by irradiation of the sun light, the electric energy is stored in the rechargeable battery 13 ready for use by the buzzer 14 and the light emitting element 15.” (Wu, Ex. 1106, ¶ 148). Figure 3 shows a circuit using 2-input NAND Gates with a Schmitt trigger that turns off the LEDs when the photovoltaic cell 12 is receiving sunlight. When sunlight is present, the NAND gate receives a high input that is converted to a low at the output of the 2-input NAND gate. This low output serves as the input to the second NAND gate and is converted to a high output. The high output is connected to the base of a PNP transistor that holds it in an off state. When the photovoltaic cell 12 is not receiving sunlight, the operation is reversed and the transistor is on thereby providing power to the LEDs. (Shackle Decl., Ex. 1102, ¶ 149.) Figure 3 at (A) discloses a light sensitive switch.

	 Fig. 3 (Wu, Ex. 1106 at Fig. 3.) and (Shackle Decl., Ex. 1102, ¶¶ 147–150.)
[32.4] a light sub-circuit to independently control delivery of power to each of said lamps so as to vary intensity of light emitted over time to produce a continuous color changing cycle,	See Claims 27 and 31.
[32.5] connections for at least one rechargeable battery to power said circuit, and	See Claim 27.4.
[32.6] at least one solar cell mounted so as to be exposed to light and operatively associated with said connections to charge said battery; and	See Claim 27.5.
[32.7] a spike for positioning said connections above a ground surface.	See Claim 27.7.
[33] The lighting device of claim 32, further comprising at least one user operated switch operable to control said	[33] Chliwnyj discloses lighting device, further comprising at least one user operated switch operable to control said circuit, with said switch being accessible by said user thereby enabling said user to manipulate said switch to control delivery of power to said lamps. Chliwnyj discloses an accessible switch operated to control delivery of electric power from the battery to operate said circuit. “A plurality of rechargeable batteries 28a—d, for example, AA rechargeable batteries, may be housed in a battery holder 35

circuit, with said switch being accessible by said user thereby enabling said user to manipulate said switch to control delivery of power to said lamps.	and connected through a switch to the circuit card 29 , all of which may be located inside the hollow base 27.” (Chliwnyj, Ex. 1105, 10:66–11:3) (emphasis added). (Shackle Decl., Ex. 1102, ¶¶ 155-56.)	
[34] The lighting device of claim 32, wherein said light sub-circuit further independently controls delivery of power to each of said lamps so as to vary frequency changes to said intensity.		See Claims 27 and 31.

Rationale to Combine: Chliwnyj and Wu both teach solar power light pattern devices. The Patent Owner admitted that lighting devices that produce a variable color were well known in the art. (’827 Patent, 1:17–18.) Chliwnyj teaches a variable color lighting device placed on or in the ground having “a plurality of lighting elements in a plurality of colors which are modulated in intensity by a control circuit with a stored program.” (Chliwnyj, Ex. 1105, Abstract and 12:20–22.) The process of varying color using a microprocessor and pulse width modulator in Chliwnyj provides for a greater visual affect in the form of a simulated flame motion. See claim charts above describing claims 27.0 and 27.2. While Chliwnyj does not expressly teach a lighting device utilizing a stake, it was well known to utilize solar staked/spiked lighting devices that placed the light

above ground level, as shown by Wu. See Claims 27.7 and 32.7. (Shackle Decl., Ex. 1102, ¶ 158.)

Wu discloses a similar solar lighting device, with a stake for going in the ground, that can provide multiple colors. (Wu, Ex. 1106, ¶ 22.) It would have been obvious to one of ordinary skill in the art at the time of the invention to provide Chliwnyj with the spike of Wu, thereby providing the device of Chliwnyj with a spike to place the lighting device in the ground as taught and suggested by Wu. Furthermore, it would have been obvious for one of ordinary skill in the art at the time of the invention to provide the device of Chliwnyj with a spike to place the lighting device in the ground to provide light at an elevated position relative to the ground, as taught by Wu. Elevated lighting enhances that safety and reduces potential injuries. The elevated lighting illuminates an area to expose any obstacles or turns in a path thereby reducing or preventing potential injuries. The elevated lighting device can also enhance the security of the area as well. Well lit areas keeps prowlers away. Therefore, it would have been obvious to one of ordinary skill in the art to look to the combination of Chliwnyj and Wu to provide the predictable results of having a solar lighting device with circuitry that varies color and a lighting device that utilizes a spike for placing it above ground. (Shackle Decl., Ex. 1102, ¶ 159.)

It was also well known in the lighting industry at the time of the invention to include ambient light detectors in outdoor solar lighting products to preserve power and only provide illumination when it can be most readily visible, as shown by, among other references, Wu. *See* Claim 32.3. Wu teaches a solar powered lighting device having a light sensitive switch for operating at low light levels. *See* Claim 32.3. Therefore, it would have been obvious to modify Chliwnyj's circuit to incorporate a light sensitive switch so the lights run only during the night to achieve the predictable result of preserving energy. (Shackle Decl., Ex. 1102, ¶ 160.)

Chliwnyj and Lau are electronic light pattern devices with similar circuitry. Varying or changing color using a microprocessor and pulse width modulator in Chliwnyj provides for a greater visual affect in the form of a simulated flame motion and a greater visual affect of realizing the spectrum of colors. *See* claim charts analyzing 27.0 and 27.2. Figures 1 and 2 of Chliwnyj disclose the circuitry used to power the LEDs. The circuit includes a microprocessor, a PWM and LED drivers for the plurality of LEDs. Chliwnyj describes color changing by describing the operation of the program code. *See* claim chart for Claim 31. Chliwnyj describes how to cycle through the sine waves for n LEDs using a "circular buffer pointer" that endlessly wraps the sine wave table index until told otherwise. (Chliwnyj, Ex. 1105, 6:63–7:35.) One of skill in the art would have known at the

time of the invention that a “circular buffer, cyclic buffer or ring buffer” is a data structure that uses a single, fixed size buffer as if it were connected end-to-end. Hence, the index of sine waves will continue in an endless loop until the program parameters are changed to indicate otherwise. (Chliwnyj, Ex. 1105, 7:55–8:4.) Chliwnyj allows both modulating the intensity of the LEDs and changing the “prescaler” parameter for the sine wave frequency controls used to vary the individual frequency of multiple LEDs to produce a continuous *color changing cycle*. One of ordinary skill in the art would have known that although Chliwnyj allows randomization because it is interesting, one could choose not to set the “change requested flag,” which would mean cycles would repeat until it was set. Furthermore, each LED could be set to vary its intensity at the same frequency, out of phase with other LEDs, to produce a color changing pattern. (Chliwnyj, Ex. 1105, 8:51–53) and (Shackle Decl., Ex. 1102, ¶¶ 164–65 (discussing how Chliwnyj and Morrison (Ex. 1114) demonstrate that it was known to program Chliwnyj to cycle different LEDs on the same frequency and out of phase, just as Lau teaches).) While Chliwnyj suggests that repetition is less desirable, it does not mean that doing so was not obvious because Chliwnyj, at a minimum, said it was well known, and Lau’s light pattern device did repeat patterns or cycles. Further, with no randomization selected, the circular buffer of Chliwnyj would continue to wrap end-to-end of the sine wave table thereby creating a continuous color

changing cycle that repeats over time. Hence, the parameters for randomization are optional, and one of skill in the art would have known at the time of the invention how to set the randomization based on the desired pattern, *e.g.*, a cyclic repeating color changing pattern. (Shackle Decl., Ex. 1102, ¶¶ 161–64.) Petitioner believes that Chliwnyj teaches repeating cycles, but relies on Lau to demonstrate that it would have been obvious to repeat cycles, and Chliwnyj does not teach away from a combination with Lau. ’938 IPR, paper 27 at 4–5 (citing *In re Gurley*, 27 F.3d 551, 552–553 (Fed. Cir. 1994)). Chliwnyj indeed teaches that such devices were well known. *See e.g.*, 1:65–2:18. (Shackle Decl., Ex. 1102, ¶ 84, 161–65.)

Like Chliwnyj, Lau also teaches a lighting device that produces varying color and a continuously changing color through driving the LEDs to vary in intensity using the “duty cycle, amplitude, and repetition of an on-portion of a drive signal.” (Lau, Ex. 1107, Claim 5.) Similar to Chliwnyj, Lau uses a Microcontroller and LED drivers to produce a continuous color changing cycle. One of skill in the art at the time of the invention would be familiar with either circuitry. Therefore, both Chliwnyj and Lau are lighting devices with similar circuitry, *e.g.*, microprocessor vs. microcontroller, used to achieve a similar result. Microprocessor and microcontrollers are essentially the same, and are commonly used interchangeably. Generally, a microcontroller is a microprocessor that also has internal program memory, data memory, and other peripheral circuitry,

whereas a microprocessor may have program and data memory stored externally. (Shackle Decl., Ex. 1102, ¶ 166.)

Lau discloses continuous color changing cycles using additive primary colors of light, red, blue and green. Instead of describing in program code, Lau focuses less on the program code and solely on the result. Lau explicitly describes the continuous color changing cycles with statements such as “displayed light patterns vary smoothly and continuously from monochrome to different color combinations of light, with the cycle repeating over a cycle period that may be sixty seconds or so in length” **and**

a viewer seeing night light 10 is treated to a pastel of smoothly and continuously changing color patterns. The light display may start out with a deep blue color that gradually becomes bluish-purple, then a lavender pink color that gradually becomes a red-orange color. The red-orange color gradually becomes a deep red-pink color that gradually becomes a light purple color that gradually becomes a blue color, and then back to a deep blue color, **whereupon the cycle will repeat.**

(Lau, Ex. 1107, 1:33–44 and 3:36–44) To incorporate repeating cycles, a person of ordinary skill in the art at the time of the invention would understand that Chliwnyj’s circuitry could be programmed to carry out a set of instructions to repeat a pattern of colors continuously and repeatedly, inserting no random cycles. The person of ordinary skill in the art would have accomplished this simply by

either removing the code for random cycles or writing a few lines of code that would reset the change requested flag such that the pattern would never change. Also, a person of ordinary skill could allow the program code for the stored sine wave table that indexed through the LEDs to wrap when it reached the end to create a repeated cycle, which Chliwnyj teaches. Chliwnyj provides a commonly known data structure, a circular buffer, to perfect this endless repetition. One of skill in the art would have known at the time of the invention how to program in C. Unless a change is made to the sine wave variables, the circular buffer will continue to repeat the same data (waveform) without overwriting with any new data. While Chliwnyj allegedly did not find repetition as interesting as randomization, Repeating cycles was known in the art at the time of the invention. *See In re Gurley*, 27 F. 3d 551, 552–553 (Fed. Cir. 1994) (finding a known or obvious device “does not become patentable simply because it has been described as somewhat inferior to some other product for the same use [and the prior art] teaches that [the device] is usable and has been used for [the same] purpose”); *see also Celeritas Techs. Ltd. V. Rockwell Int’l Corp.*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522–23 (Fed. Cir. 1998) (holding that the prior art taught a limitation even though it said one method was “less than optimal”). (Shackle Decl., Ex. 1102, ¶ 135–142 and 167–68.)

Chliwnyj and Lau state similar objectives for the inventions. One of Lau's stated objectives was to produce a light to give a "visual effect [that] is both pleasing and comforting, and may promote sleep including promoting sleep for young children. Sufficient light is output to serve the purpose of a night light, yet the output light is not a monotonous flashlight-like monotone but a dynamic kaleidoscope of colors that gradually and pleasingly changes in appearance." (Lau, Ex. 1107, 3:45–50.) Similarly, Chliwnyj's objective was to achieve "very pleasing, soothing, and almost mesmerizing visual effects." (Chliwnyj, Ex. 1105, 2:51-52.) One would be motivated to look to Lau for designing a lighting device that had the same objective as Chliwnyj. One would be motivated to program Chliwnyj with the option to produce a symbolic flame that was pleasing and comforting and could be any color pattern(s). One of skill in the art would have known at the time of the invention that the circuitry taught in Chliwnyj allows for a plurality of LEDs that can be any available (*e.g.*, amber, red, blue, green, yellow, etc.) and the circuit can be programmed to present a myriad of color patterns, *e.g.*, pastel colors or another favorite color palette of the person in remembrance. ("A pastel of smoothly and continuously changing color patterns. The light display may start out with a deep blue color that gradually becomes bluish-purple, then a lavender pink color that gradually becomes a red-orange color. The red-orange color gradually becomes a deep red-pink color that gradually becomes a light purple color that gradually

becomes a blue color, and then back to a deep blue color, whereupon the cycle will repeat.”) (Lau, Ex. 1107, 3:36-44.) The “eternal flame” is just a symbolic gesture of remembrance, so one would know it need not be confined to a specific color pattern(s). As a symbolic flame, so there are no limitations (except for the bandwidth of the electronics) on the color(s) realized or pattern(s) one could program the circuitry to achieve. Therefore, it would have been obvious to modify the program control in Chliwnyj to produce repeating continuous color changing cycles. (Shackle Decl., Ex. 1102, ¶¶ 169-70.)

Chliwnyj teaches an AC powered light and a solar powered light, and Lau teaches an AC powered light. The circuits disclosed in each have a microprocessor or microcontroller and electronics to drive the LEDs either through a pulse width modulator and LED drivers or just simply LED drivers. Although, Lau is not a solar device, one of ordinary skill in the art would have known that the circuitry used Lau to achieve the color changing can perform on either solar battery power or AC power. Chliwnyj teaches that the circuitry in Lau plus additional circuitry can run on solar battery power. Therefore, one of skill in the art at the time of the invention would have been motivated to use the teachings by Lau to combine with Chliwnyj. (Shackle Decl., Ex. 1102, ¶ 171.)

Solar light pattern devices, such as those taught in Chliwynj, Wu and Lau, are easily manufactured into hundreds or thousands of designs having

characteristics easily interchangeable as a matter of design choice. Further, one could have substituted Lau's "*color changing cycle*" for Chliwnyj sometimes random cycles to achieve a repetitive, non-random pattern that will lull someone to sleep as taught and suggested by Lau. (Shackle Decl., Ex. 1102, ¶ 172.)

XIII. THE ARGUMENTS AND PRIOR ART PRESENTED IN THIS PETITION ARE NOT SUBSTANTIALLY SIMILAR TO THOSE IN THE '938 IPR

In the '983 IPR, the patent owner unforeseeably mischaracterized Chliwnyj as only teaching random cycles, instead of what it actually teaches, which is **repeating**, still, stable "cycles" or patterns and **occasionally** inserting low-frequency random events. The mischaracterization was unforeseeable because the '827 patent says nothing about excluding random cycles, and indeed seems to state the contrary, as cycles must "*vary*" and "*constantly change*." '827 patent, claims 31 and 32, and 7:15–18. The requirement for repetition was even more unforeseeable because in litigation the patent owner used an inconsistent, broader definition that does not require repetition. Ex. 1112 at 34 (FN 23).

In view of the unforeseeable definition of "*cycle*," Petitioner now proposes using the same ground as in the '938 IPR, but applied to different claims using substantially different arguments demonstrating the pervasiveness of repeating light patterns. It would be unjust for the Board to allow the patent owner to make inconsistent statements in litigation and the Patent Office such that the petitioner

cannot rely on the just, speedy, and inexpensive proceedings that the Board offers. Therefore, the Board should not summarily deny this petition under 35 U.S.C. § 325(d), as this petition raises substantially different arguments demonstrating the unpatentability of claims 31–34, even under a narrow claim construction. Further, the petitioner respectfully requests that Board grant the request for joinder that accompanies this petition and join this petition with the '938 IPR, in the interest of justice.

XIV. CONCLUSION

Petitioners submit that the evidence demonstrates a reasonable likelihood that claims 31–34 of the '827 Patent are unpatentable as obvious in view of the cited prior art. Petitioner therefore requests that the Board grant *inter partes* review of claims 31–34 of the '827 Patent.

Respectfully submitted,

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Dated: __January 16, 2015_____

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XV. APPENDIX OF EXHIBITS

Exhibit No.	Description	Identifier
Ex. 1101	U.S. Patent No. 7,429,827	'827 Patent
Ex. 1102	Declaration of Dr. Peter W. Shackle	Shackle Decl.
Ex. 1103	File History of U.S. Patent No. 7,429,827	'827 File History
Ex. 1104	Richmond AU Patent Application No. 2003271383	Richmond App. 383
Ex. 1105	U.S. Patent No. 5,924,784	Chliwnyj
Ex. 1106	U.S. Patent Pub. No. US 2003/0201874 A1	Wu
Ex. 1107	U.S. Patent No. 6,431,719	Lau
Ex. 1108	Related Matters	Related Matters
Ex. 1109	Richmond Reply Markman Brief	
Ex. 1110	Definition of cycle, ex. 3002 from IPR2014- 00877	
Ex. 1111	Ex. 2011 from '937 IPR	

Exhibit No.	Description	Identifier
Ex. 1112	Richmond Opening Markman Brief	
Ex. 1113	Ex. 3005 – Board’s definition of “cycle” from ’938 IPR	
Ex. 1114	U.S. patent no. 6,241,362 to Morrison	Morrison

CERTIFICATE OF SERVICE

Under 37 C.F.R. §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on January 16, 2015, a copy of the PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,429,827 and exhibits were served on the Attorney of record in U.S. Patent No. 7,429,827 via FedEx Priority Overnight at the correspondence address of record for the subject patent as follows:

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Respectfully submitted,

Dated: __January 16, 2015_____

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