

QUASAR SCIENCE LLC v. COLT INTERNATIONAL CLOTHING, INC. d/b/a COLT LED

IPR2023-00613 and 614: Petitioner's Demonstratives

JULY 11, 2024

Demonstrative – Not Evidence

Limited Issues To Address Because Patent Owner Concedes All Elements of Claim 1 Were Known

- Patent Owner concedes that the “**the individual elements in claim 1 were known.**” Sur-Reply, 1.*
- Patent Owner contends that although the prior art teaches the “1000 lumens”, the prior art fails to disclose unclaimed limitations regarding lumen loss and thermal loss. *Id.*
- Patent Owner’s arguments are not commensurate with the scope of the claims.

*All citations herein are to IPR2023-613 unless otherwise noted.

Petitioner's Roadmap: 4 Topics

1. **1000 Lumens:** Petitioner Established the Obviousness of The Challenged Claims Including Claim Limitations Regarding 1000 Lumens.
2. **Alleged Thermal Issues:** alleged thermal issues are not recited in the challenged claims and not discussed in the '582 patent.
3. **Motivation:** a POSITA would have been motivated to make the proposed combinations and with a reasonable expectation of success.
4. **Secondary Considerations:** Patent Owner's secondary considerations arguments are insufficient and unpersuasive.

A low-angle, upward-looking perspective of several modern skyscrapers. The buildings are characterized by repetitive horizontal window patterns and are arranged in a way that creates a sense of height and scale. The sky is a clear, vibrant blue, punctuated by soft, white cumulus clouds. The overall composition is symmetrical and geometric, emphasizing the architectural lines of the buildings.

#1: 1000 Lumen Limitation

'582 Patent: Claim 1

Patent Owner Contests Only One Claim Element

582 Patent, claim 1.

1. An LED light system configured for providing broad-spectrum white light suitable for a commercial image recording, in a form factor of a fluorescent light tube lamp, the LED light system comprising:

- a. a housing having ends and including a support structure in a form of an elongated and narrow surface having a top side and a bottom side;
- b. a plurality of first LEDs mounted on the top side of the support structure and configured to emit broad-spectrum white light in a first predetermined Kelvin temperature range of cool white light;
- c. a plurality of second LEDs mounted on the top side of the support structure and configured to emit broad-spectrum white light in a second predetermined Kelvin temperature range of warm white light;
- d. electronic circuitry mounted to the support structure including an LED driver circuit configured for selectively electronically switching between driving either (i) the first LEDs, to provide light while the second LEDs are off; or (ii) the second LEDs, to provide light while the first LEDs are off, wherein the first and second predetermined Kelvin temperature ranges are nonoverlapping, and including a printed circuit board mounted to the support structure for carrying electrical power from a connection to the LED driver circuit and then to the first and second LEDs; and

'582 Patent: Claim 1

Patent Owner Contests Only One Claim Element

[Claim 1, continued:]

582 Patent, claim 1.

- f. wherein the housing and cover together have a linear form factor of a fluorescent light tube lamp having a diameter of no greater than approximately 41 mm,
- g. wherein the LED light system is configured for receiving input power to be provided to the LED driver circuit to selectively light the first or second LEDs, and
- h. wherein the first and second LEDs are disposed in a plurality of rows distributed along the length of the top side of the support structure to emit light, when selectively lit by the LED driver circuit, along the length of the top side of the support structure,
- i. wherein the light is diffused by the cover and is suitable for the commercial image recording both when the emitted light from the LED light system is in the first temperature range of cool white light and when the emitted light from the LED light system is in the second temperature range of warm white light,
- j. wherein the light emitted from the LED light system is said suitable for the commercial image recording when said emitted light: (i) is at least 1000 lumens when the first LEDs are lit and is also at least 1000 lumens when the second LEDs are lit; (ii) is broad-spectrum white light having a color deviation corresponding to less than five points of green and less than five points of magenta (5M, 5G) of color compensation (CC), and (iii) has a color rendering index of light emitted from each of the first LEDs or each of the second LEDs, whichever respective plurality of first or second LEDs is lit, that is greater than 90.

Only Claim Element Contested by Patent Owner Is Satisfied by the Proposed Comb.

- Patent Owner doesn't argue that the prior art doesn't disclose 1000 lumens but that Petitioner failed to account for “**known losses**” from LEDs in determining the light system output. Reply, 2.
- Patent Owner did not cross-examine Mr. Holmes and does not allege his calculations are inaccurate, just that Mr. Holmes failed to account for certain known losses. POR, 15-22; Reply, 5.
- As Patent Owner concedes, lumen losses were well known to those of skill in the art and were accounted for in the teachings of the prior art. Reply, 5-6.

'582 & '895 Patents Are Silent On Lumen Losses as They Were Known to POSITA

- Patent Owner provides a long list of possible lumen losses that would need to be considered, including “**Diffusion losses,**” “**CRI losses,**” “**Green index rating losses,**” “**Color temperature losses,**” “**Thermal droop losses,**” “**Current droop losses,**” and “**Driver/circuitry losses,**” yet these losses are also not addressed or accounted for in the '582 patent or the '895 patent. Reply, 3.
- Patent Owner and its expert Dr. Allen concede that these were “**known losses**” and even “inherent” to LED design. POR, 18; Ex. 2080, ¶¶18-21.
- Dr. Holmes testified that these lumen reducing penalties were not mentioned in the '582 patent because a POSITA would have accounted for such “**known losses**” in its LED light design. Ex-1049-Holmes, ¶¶22-27.

LED Tubes Emitting Light at Greater Than 1000 Lumens Were Well Known in the Art

- The 582 Patent background admits that a prior art T8 size LED tube, called the Durosite™, achieved an output of 1500 lumens at 17 watts.” Reply, 4; Ex-1049-Holmes, ¶¶24-25.
- The provisional application for the 582 Patent discloses “additional prior art Durosite™ devices, all of which have a lumen output of at least 1450 lumens, as set forth in the figure from the provisional application reproduced below.” Reply, 4; Ex-1049-Holmes, ¶¶24-25 (citing Ex-2123, 5).

Warm White:	3700 Kelvin; ~ 1450 lumens	- Yellowish Light
Natural White:	4500 Kelvin; ~ 1500 lumens	- Natural White Light
Daylight White:	5500 Kelvin; ~ 1550 lumens	- Pure White
Cool White:	7000 Kelvin; ~ 1600 lumens	- Bluish Light

613 & 614 IPRs Ground 2 Teaches Emitting Light at Greater Than 1000 Lumens

- Holmes testified that a “POSITA armed with the teachings of Hasnain would know that even assuming using LEDs capable of emitting 70 lumens per watt, an LED based lamp having an elongated forty-four inch long and one-inch-wide circuit board would be able to produce **1,540 lumens from just 22 watts, and up to 3,080 lumens at 44 watts.**” Pet., 62-63; Ex-1003, ¶490; Reply 5.
- Thus, Petitioner’s proposed combination would generate 1,540 lumens at 22 watts, 54% greater than the claimed amount of 1000 lumens, and would generate 3,080 lumens at 44 watts, 208% greater than the claimed amount of 1000 lumens. Reply, 5.

Patent Owner cannot differentiate the prior art based on undisclosed and unclaimed limitations

- Patent Owner argues that “[m]erely because the ‘582 Patent does not mention losses does not mean Petitioner can ignore them.” Sur-Reply, 4.
- Petitioner does not ignore the losses but relies upon a POSITA’s ability to account for such known losses, as disclosed in the recited prior art. Reply, 5-7.
 - Patent Owner concedes that these known losses depend on the LED’s specifications, amount of power to driver current per LED, the LED p-n junction temperature, and other factors. POR, 17. Thus, Patent Owner concedes that these are design specific considerations that a POSITA would consider in designing each particular LED light. Reply, 3-4; Ex-1049-Holmes, ¶¶22-27.

613 & 614 IPRs Ground 2 Teaches Emitting Light at Greater Than 1000 Lumens

- Holmes testified that “achieving the desired lumen output is a mere design consideration and can be achieved by selecting the right type of LEDs and number of LEDs and applying the appropriate power to the device.” Ex-1049, ¶23.
- In the POR, Dr. Allen said that a 35% reduction would be needed. Ex-2080, ¶24.
 - Even assuming Dr. Allen’s 35% reduction is accurate (it is not), the lumen output of the prior art combination proposed by Petitioner is well above 1000 lumens. Reply, 6.

613 & 614 IPRs Ground 1 Also Teaches Emitting Light Greater Than 1000 Lumens

- “Kit discloses LEDs can achieve at least 1,200 lumens, and gives an example of a four-foot LED device that outputs 1,040 lumens” Pet. 33.
 - Mr. Holmes concluded that “even discounting the lumen yield for high CRI, the output would have been well over 1000 lumens and capable of well over 42 watts while maintaining a greater than 90 CRI.” Ex-1003, ¶158.
 - Holmes identifies, a POSITA would have accounted for “**lumen yield for high CRI,**” in addition to the numerous other design considerations known to a POSITA, when designing an LED to meet certain specifications. *Id.*; Ex-1049- Holmes, ¶¶29-31.

Newman v. Quigg Is Instructive

- Patent Owner argues that “[i]nventors need not know or set forth how or why the invention works.” Sur-Reply, 4 (citing *Newman v. Quigg*, 877 F.2d 1575, 1581 (Fed.Cir. 1989)).
 - Cited for the first time in Patent Owner’s Sur-Reply. Sur-Reply, 4.
- In *Newman*, the Federal Circuit affirmed the unpatentability determination by the lower court, as the claimed device was akin to a perpetual motion machine and the inventor failed to satisfy 101 and 112. *Id.* at 1582.
- *Newman* held the following: “While it is not a requirement of patentability that an inventor correctly set forth, or even know, how or why the invention works . . . **neither is the patent applicant relieved of the requirement of teaching how to achieve the claimed result**, even if the theory of operation is not correctly explained or even understood.” *Id.* at 1582.

A low-angle, upward-looking perspective of several modern skyscrapers. The buildings are characterized by repetitive horizontal window patterns and are arranged in a way that creates a sense of height and enclosure. The sky is a clear, vibrant blue, punctuated by soft, white cumulus clouds. The overall composition is symmetrical and emphasizes the verticality of the architecture.

#2: Alleged Thermal Concerns

Alleged Thermal Issues Are Not Recited in the Challenged Claims or Disclosed in the Patents

- Patent Owner dedicates a significant portion of its briefing in the Patent Owner Response (16 pages) and the Patent Owner Sur-Reply (9 pages) to addressing alleged “**thermal issues**.” POR, 22-37; Sur-Reply, 14-22.
- However, like the lumen loss issues, neither patent has any disclosure of thermal issues. Reply, 8.
- Patent Owner’s declarant Mr. Fisher concedes:
 - “Q: So you would agree that the '582 patent does not provide any disclosure about overcoming thermal issues?
 - **A: I would agree. And I was wrong.**” Ex-1043, 195:13-16.

Alleged Thermal Concerns Were Well Known to a POSITA Engaged in LED Light Design

- “[A]s confirmed by Patent Owner’s declarants [] and Mr. Holmes, these thermal concerns were well known by a POSITA.” Ex-1049-Holmes, ¶¶33-40; Ex-1039-Allen, 89:10-90:22.

- Patent Owner’s expert Dr. Allen testified that:

“I am confident that a POSITA would understand that since this inventor has achieved it and [he] has told us that the method that he used to achieve it was **selecting high performance LEDs, providing an aluminum housing** and solving the thermal issues, as a POSITA I would have **high confidence that I could reproduce that result.** I don’t need all the detail guidance.” Ex-1039 at 90:16-23.

- Prior art taught **aluminum housing**. Pet., 65 (citing Ex-1005, 11:54-12:2).

Alleged Thermal Concerns Were Well Known to a POSITA Engaged in LED Light Design

- As to the **selection of high-performance LEDs**, this is not recited in the Challenged Claims and Mr. Macias, the inventor, confirmed that he simply ordered the LEDs from a manufacturer. Ex-1047, 321:7-16.
 - Also, the 582 Patent discloses that “[t]o create the LED lamps, in each of the above examples, **LEDs in the desired color ranges are selected which provide at least about 1000 lumens.**” Reply, 15.
- Patent Owner counters that in “2013 binning wasn’t that specific” (Sur-Reply, 3).
- Mr. Macias conceded that he simply continued asking the LED manufacturer for new batches of LEDs until they were satisfactory. Ex-1047, 238:24-242:9 (explaining he would keep asking for batches of LEDs until they met the standard commercial image recording specifications).

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#3: Motivation

Patent Owner Concedes All Claim 1 Elements Were Known and Petition Establishes a Motivation

- When questioned during cross-examination as to which claim limitations were not taught by the prior art LED tubes, Patent Owner's declarants only rebuttal was that they were not bi-color LED tubes, i.e. a single tube providing both tungsten light and daylight. Ex-1043-Fisher, 115:14-16 ("So Mac Tech was monochromatic so their tube was either daylight or tungsten, they did not do bicolor."); Ex-1045-Silva, 88:11-12; Ex-2041-Csernecky, ¶12; Ex-1025, 89:4-91:11; Ex-1049-Holmes, ¶¶12-13.
- Yet, as exhibited in the prior art relied upon in Grounds 1-2, including Kit, Ducharme, and Katzir, bi-color LED tubes were already known. Pet. 23-24, 55-56.

Patent Owner Concedes All Claim 1 Elements Were Known and Petition Establishes a Motivation

- Patent Owner concedes that “[t]he individual elements in claim 1 were known, but not in combination.” Sur-Reply, 1
- Yet, Patent Owner’s Declarant Mr. Baxter confirmed on cross-examination that, before the time of the invention, the bi-color LED tube was known:
 - “Q. You go on to say that: ‘Litepanels had the technical capability to build, No. 2, two colored models, e.g. single tubes containing both 5600 cool white and 3200 K warm white LEDs, collectively, bi-color.’”
 - A. Yes.
 - Q. In view of that statement --
 - A. **Yes. We perfected bi-color, and we certainly had the ability to make the tube. . .**”
Ex-1042, 86:6-7.5.

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#4: Secondary Considerations

Products Identified by Patent Owner Include Many Unclaimed Features

- Patent Owner advertises its Colt Bi-Color LED tube as having (1) “no pulse width modulation,” (2) “power run[ing] through a semi-conductor controlled rectifier (SCR),” (3) “constant voltage,” and (4) “Dimmable to 1%.” Ex-1061, 1.



Bi-Color LED Tubes	
SIZES AVAILABLE (WATTS)	PRODUCT DESCRIPTION
1' (13.75 W)	✓ Patented Technology
2' (27.5 W)	✓ Intended for all uses that formerly required fluorescent tubes in either Daylight or Tungsten color temperatures.
4' (55 W)	✓ No pulse width modulation. Power runs through a semi-conductor controlled rectifier (SCR); constant voltage.
8' (110 W)	✓ 97+ CRI. Dimmable to 1%.

- None of these four features are in the claims. Reply, 19.

Products Identified by Patent Owner Include Many Unclaimed Features

Colt LED Tubes

Colt LED Tube Benefits

97+ CRI | Best in Class

Dimmable to 1% Flicker Free

Constant Voltage | No Pulse Width Modulation

Patented Technology # 9719642

No Complicated Electrical | Grounding on Board

Patent Owner's own brochures describe these features as the “**Benefits**” of the Colt LED Tubes. Reply, 19.

- Ex-1060, 1-2.

Marketed Features Materially Impact Functionality of Patent Owner Bi-Color LED Tube

- In *Fox Factory, Inc.*, the Federal Circuit held that the Board erroneously presumed a nexus when “there are one or more features not claimed by the [] patent that materially impact the functionality of the [commercial] products.” Reply, 19, (citing 944 F.3d at 1376).
- Similarly, Mr. Holmes’s un rebutted testimony states that the unclaimed features marketed for the Colt Bi-Color LED Tube would materially impact the functionality of the tube. Ex-1049-Holmes, ¶¶60-62.

No Credible Evidence of Copying

- **Mr. Zhang (Patent Owner's declarant)**

- Not presented for questioning
- Says he met Mr. Ray Gonzales in the declaration relied on by Patent Owner (Ex. 2036) but two months later testified he never met Mr. Gonzales (Ex. 2079)
- In another proceeding, Inventor Mr. Macias testified that “**Zhang's Declaration was false.**”
 - *Laysion, LLC v. Macias*, No. B319551, California Court of Appeals, Second District, Third Division, Jul 28, 2023 at 3 (Ex. 1038, 3)
- Clear that the Board cannot reasonably rely on any evidence from Mr. Zhang in this proceeding.

- **Ray Gonzales (Petitioner's declarant)**

- Sworn testimony submitted in this proceeding (Ex. 1059)
- Mr. Gonzales testified he has never met Mr. Zhang, and he “never asked Mr. Zhang or anyone else to duplicate a Colt bi-color tube.”
- Unrefuted: not cross-examined by Patent Owner

Reply, 21-24.

Patent Owner Fails to Establish a Long-Felt Need

- Patent Owner did not provide evidence that demonstrates both that a demand existed for the claimed invention, and that others tried but failed to satisfy that demand. Reply, 24; *Amazon.com, Inc. v. Personalized Media Communications, LLC*, IPR2014-01531, Paper 55 (PTAB Apr. 1, 2016).
- Patent Owner argues that “Colt’s Bicolor LED Tubes Were an Instant Success.” POR, 67. Yet, Mr. Baxter testified on cross-examination that Colt’s LED Bi-Color tubes “are not really used that much in the industry.” Ex-1042, 98:9-92:2.