

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ADVANCED LIGHTING CONCEPTS LLC,
Petitioner

v.

MATE LLC.,
Patent Owner

Case No. IPR2023-01264

U.S. Patent No. 9,078,310

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,078,310

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PETITIONER'S EXHIBIT LIST

<u>EXHIBIT</u>	<u>DESCRIPTION</u>
Ex. 1001	U.S. Patent No. 9,078,310
Ex. 1002	Declaration of Joseph McAlexander
Ex. 1003	Curriculum Vitae of Joseph McAlexander
Ex. 1004	File Wrapper for U.S. Patent No. 9,078,310
Ex. 1005	U.S. Patent No. 7,902,769 to Shteynberg
Ex. 1006	U.S. Patent Application No. WO2003067934 to Morgan
Ex. 1007	U.S. Patent Application No. US20120323394 A1 to Gandhi
Ex. 1008	March 22, 2023 Case Management Order (Dkt. 35)
Ex. 1009	Time to Trial for the Southern District of California
Ex. 1010	<i>What Is an LED Driver & Which Driver Do I Need?</i> , Ultra LEDs, https://www.ultraleds.co.uk/what-is-led-driver-what-driver-do-i-need (last visited July 29, 2023)
Ex. 1011	Yijie Wang, et al., <i>A Review of LED Drivers and Related Technologies</i> , 64 IEEE TRANSACTIONS ON INDUS. ELECTRONICS 5754, 5754 (July 2017)

I. INTRODUCTION

Petitioner requests *Inter Partes* Review (“IPR”) of claims 1-2, 5-6, 8-13, 16-17, and 19-20 (the “Challenged Claims”) of U.S. Patent No. 9,078,310 (“the ‘310 Patent”).

This petition (IPR2023-01264) is part of a set of **six** petitions, including IPR2023-01257, IPR2023-01266, IPR2023-01258, IPR2023-01265, and IPR2023-01259, which challenge claims of related U.S. Patent Nos. 8,525,446 (“the ‘446 Patent”), 8,957,601 (“the ‘601 Patent”), 9,049,759 (“the ‘759 Patent”), 9,078,310 (“the ‘310 Patent”), 9,320,093 (“the ‘093 Patent”) and 9,591,713 (“the ‘713 Patent”) (collectively, the “Challenged Patents”), respectively. Petitioner requests that the schedule, discovery, and hearing of these six IPRs be combined.

II. MANDATORY NOTICES

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

The sole real party-in-interest is Advanced Lighting Concepts LLC (“Petitioner”).

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

The ‘310 Patent is related to a district court litigation pending in the Southern District of California. mate, LLC (“Patent Owner”) asserted the ‘446 Patent, ‘601 Patent, ‘759 Patent, ‘310 Patent, ‘093 Patent, and ‘713 Patent against Petitioner in:

mate, LLC v. Advanced Lighting Concepts LLC (dba Environmental Lights), 3:22-cv-01095-CAB-DEB (S.D. Cal.).

C. Counsel (37 C.F.R. § 42.8(b)(3)) and Service Information (37 C.F.R. § 42.8(b)(3)-(4))

Petitioner designates Winston O. Huff (Reg. No. 51,825) as lead counsel for this matter and designates Jamil N. Alibhai (*pro hac vice* forthcoming) as backup counsel for this matter.

Postal mailings and hand-deliveries for lead and backup counsel should be addressed to: Winston O. Huff, Munsch Hardt Kopf & Harr, 500 N. Akard, Suite 3800, Dallas, TX 75201 (Telephone: 214.855.7500; Fax: 214.855.7584).

Pursuant to 37 C.F.R. § 42.8(b)(4), Petitioner consents to e-mail service at: EL-mate-IPRs@munsch.com. In compliance with 37 C.F.R. § 42.10(b), a Power of Attorney is filed concurrently herewith.

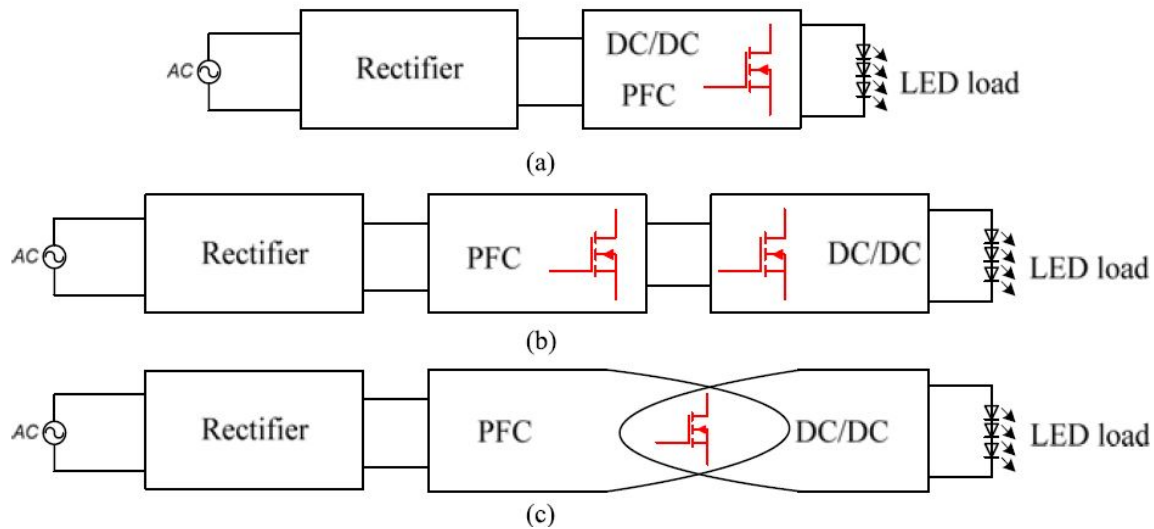
III. CERTIFICATION AND FEES

Petitioner certifies that the ‘310 Patent is available for IPR and that the Petitioner is not barred or estopped from requesting *inter partes* review of claims 1-2, 5-6, 8-9, 11-13, 16-17, and 19-20 of the ‘310 Patent identified in this Petition.

Any additional fees for this IPR may be charged to Deposit Account No. DA505990.

IV. TECHNOLOGY AT ISSUE

The Challenged Patents relate to LED drivers. “LED drivers are devices that regulate and supply the power used to ‘drive’ runs of LED strip lights. Similar to traditional transformers, they convert mains voltage (240v AC) into a lower value (usually 12 or 24v).” *What Is an LED Driver & Which Driver Do I Need?*, ULTRA LEDs, <https://www.ultraleds.co.uk/what-is-led-driver-what-driver-do-i-need> (last visited July 29, 2023) (Ex. 1010). “Generally speaking, the driver circuit plays a significant role in dominating the energy efficiency, which means the system efficiency can be further improved via an appropriate driver circuit. Traditional LED systems are based on single-stage or two-stage LED drivers.” Yijie Wang, et al., *A Review of LED Drivers and Related Technologies*, 64 IEEE TRANSACTIONS ON INDUS. ELECTRONICS 5754, 5754 (July 2017) (Ex. 1011). A single-stage LED driver is a DC/DC converter with a constant output current that can obtain power factor (PF) correction (PFC), while a two-stage system consists of a PFC circuit and a DC/DC converter as shown below. *Id.*



Id. at 5756 fig. 3.

[D]ue to the unique characteristics of LEDs, a current loop is always included in the [DC/DC stage] in order to acquire constant current control. Moreover, in practical applications when several strings of LEDs are adopted, a current balance stage may also be required. The advantage of the above two LED drivers is that they are easy to design with more accurate control. However, one of the drawbacks of single stage converters is the high value of the storage capacitor, which also increases the volume of the driver. As for the two-stage system, more devices are needed, which means the cost is quite high and reliability is relatively low.

Id. at 5754-55.

“In recent years, many integrated-stage topologies are designed for the sake of efficiency and cost.” *Id.* at 5755. “In order to obtain high PF and low total harmonic distortion (THD), a topology which performs PFC characteristics as PFC

stage is usually chosen, and a [DC/DC] stage is selected according to the power level of the system.” *Id.* Due to the integration technology, the PFC stage and DC/DC stage can be simplified into one stage by sharing active power switches and control circuits. Therefore, the cost and size of the system are reduced while ensuring high efficiency, high reliability, and fast output dynamics. *Id.*

V. OVERVIEW OF THE ‘310 PATENT

The ‘310 Patent describes a configurable light emitting diode (LED) driver/dimmer for controlling a set of light fixture loads. Ex. 1001, Abstract. The ‘310 Patent purports to address the considerable challenges faced by lighting companies in adopting SSL technology due to their unfamiliarity and lack of expertise in the driving and dimming requirements for LEDs. Ex. 1001, 1:38-41.

The ‘310 Patent further notes:

With the rapid increase in light emitting diode (LED) efficacies for high powered LEDs, the latest technologies have exceeded incandescent and halogen sources and are now starting to compete with fluorescent, mercury vapour, metal halide, and sodium lighting. In addition to better energy usage, LEDs also have considerable advantages over traditional light sources such as long life, better durability, and improved color generating abilities.

Ex. 1001, 1:20-27.

“In recent years, controllable power sources for Solid State Lighting (SSL) applications have entered the market with integrated features. In addition, digital controllers within power sources have enabled the development of configurable options to provide a wider flexibility of solutions for [SSL] applications.” Ex. 1001, 1:31-36. Finally, the ‘310 Patent states “[t]he ability to dim the light output of LEDs is also important to reduce energy consumption.” Ex. 1001, 1:36-37.

VI. THE ALLEGED INVENTION

The claims of the ‘310 Patent are generally directed to a configurable LED driver for powering a set of light fixture loads. The LED driver of the ‘310 Patent includes a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for controlling the associated light fixture load, and a secondary controller for controlling the set of output current drivers. The driver also includes an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups. Ex. 1001, Abstract.

A. Summary of Prosecution History

The application that issued as the ‘310 Patent (US14/597,788) was filed on January 15, 2015 and is a continuation of U.S. Patent Application No. 13/941,871, filed July 15, 2013, which is itself a continuation of U.S. Patent Application No. 13/059,336, now U.S. Patent No. 8,525,446, filed February 16, 2011, which is a

national stage filing under 35 U.S.C. 371 of International Patent Application PCT/CA2009/001295, filed on September 17, 2009, which claims the benefit of priority of U.S. Provisional Application No. 61/097,963, filed September 18, 2008.

In a Preliminary Amendment, the applicant amended the Abstract to recite that the LED driver includes an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups. Ex. 1004, at 55.

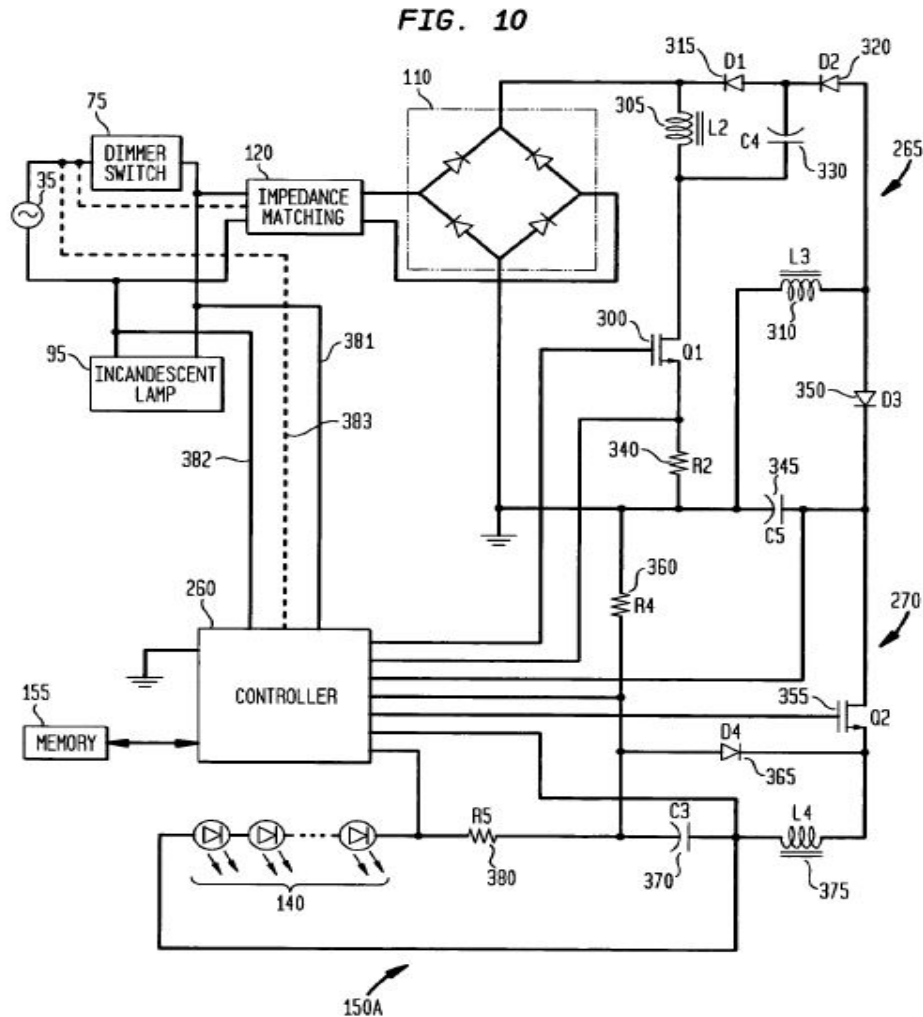
A Notice of Allowability was mailed on May 11, 2015, allowing claims 1-20. Ex. 1004, at 22-27. In the Notice, the Examiner provided that the prior art did not disclose a configurable light emitting diode (LED) driver for powering a set of light fixture loads that included an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups. Ex. 1004, at 27. For the reasons provided below, a LED driver containing an apparatus for mapping output current drivers to dimming zones and for mapping output channels into groups was known in the prior art.

VII. OVERVIEW OF THE PRIOR ART

The challenged claims are anticipated by or are obvious over the following prior art.

A. Shteynberg (Ex. 1005)

U.S. Patent No. 7,902,769 (“Shteynberg”) was filed on January 19, 2007, and claims priority to provisional application No. 60/760,157 filed on January 20, 2006. Shteynberg was issued on March 8, 2011, and is prior art to the ‘446 Patent under pre-AIA § 102(a). Shteynberg teaches a system, apparatus, and method for supplying power to solid state lighting devices, such as for providing power to light emitting diodes (“LEDs”) and LEDs integrated with digital controllers or processors. Ex. 1005, 1:19-22, figs. 7, 8, & 10.



Ex. 1005, fig. 10.

As illustrated in Figure 10 of Shteynberg,

[T]he switching power supply 150A is coupled via impedance matching circuit 120 to a phase modulation module/dimmer, such as a dimmer switch 75, and is intended to operate in the second mode of operation mentioned above. The switching power supply 150A is implemented in two stages, an AC/DC converter 265 and a buck converter 270. The AC/DC converter 265 is utilized to provide a high

input impedance, thereby eliminating the high input capacitance that the single stage approaches have (and which can cause triacs of dimmers to misfire, as previously mentioned). This first stage will convert a relatively poor, phased modulated AC voltage into a manageable DC voltage, while the second stage (buck converter 270) will perform LED driving using current PWM, through switching transistor 355 (Q2).

The quadratic AC/DC converter 265 portion of switching power supply 150A is connected to the dimmer switch 75 via an impedance matching circuit 120. The AC/DC converter 265 comprises major elements such as switch Q1 (300), inductors L2 (305) and L3 (310), capacitors C4 (330) and C5 (345), diodes D1 (315) and D2 (320), and current sense resistor R2 (340). Buck converter 270 portion of switching power supply 150A generally comprises a switching transistor Q2 (355) (for dimming), inductor L4 (375), capacitor C3 (370), and current sense resistor R4 (360). The switching power supply 150A also comprises controller 260, which provides the functionality of the controller 160 previously discussed, and the additional functionality discussed below.

Ex. 1005, 13:61-14:21.

As examined above,

[T]he controller 260 may determine V_{RMS} using measurements from connections to the output of dimmer switch 75 on lines 381 and 382; may determine $V_{NOMINAL}$ using measurements from connections to the output of dimmer switch 75 on lines 381 and 382, using measurements

from connections to the AC line voltage 35 on lines 382 and 383 (dashed line), or using stored parameter values. The controller 260 correspondingly adjusts the duty cycle of the pulse-width modulation of current provided to the LEDs 140 through switching transistor 355 (Q2).

Ex. 1005, 14:22-31.

Importantly, Shteynberg discloses:

[A] “controller” or “processor” 160, 260 may be any type of controller or processor, and may be embodied as one or more controllers 160, 260, adapted to perform the functionality discussed in the ‘759 Patent specifically Shteynberg discloses that a controller 160, 260 may include use of a single integrated circuit (“IC”), or may include use of a plurality of integrated circuits or other components connected, arranged or grouped together, such as controllers, microprocessors, digital signal processors (“DSPs”), parallel processors, multiple core processors, custom ICs, application specific integrated circuits (“ASICs”), field programmable gate arrays (“FPGAs”), adaptive computing ICs, associated memory (such as RAM, DRAM, and ROM), and other ICs and components. As a consequence, as used herein, the term controller (or processor) should be understood to equivalently mean and include a single IC, or arrangement of custom ICs, ASICs, processors, microprocessors, controllers, FPGAs, adaptive computing ICs, or some other grouping of integrated circuits which perform the functions discussed below, with associated memory, such as microprocessor

memory or additional RAM, DRAM, SDRAM, SRAM, MRAM, ROM, FLASH, EPROM or E²PROM.

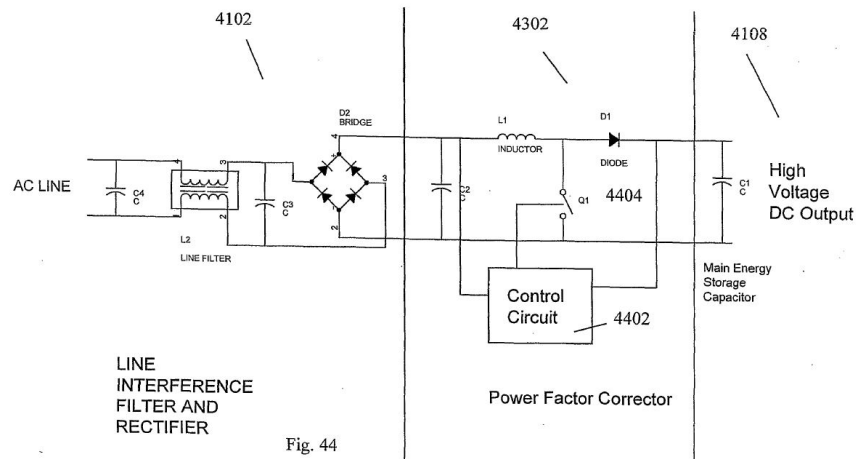
Ex. 1005, 18:8-29, 39-49.

B. Morgan (Ex. 1006)

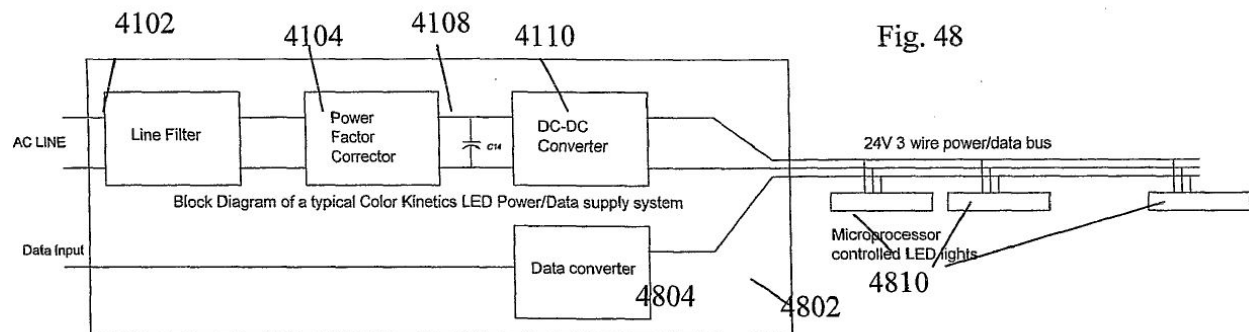
WIPO (PCT) Application No. WO2003067934 A2 (“Morgan”) was filed on July 8, 2005, and claims priority to the following U.S. Provisional Applications: Serial No. 60/354,692, filed February 6, 2002, entitled “LED Based Lighting Systems”; Serial No. 60/401,964, filed August 8, 2002, entitled “LED Based Lighting Systems”; Serial No. 60/401,965, filed August 8, 2002, entitled “Methods and Apparatus for Controlling Addressable Systems;” and Serial No. 60/415,897, filed October 3, 2002, entitled “Methods and Apparatus for Illuminating Environments.” Morgan is prior art to the ‘310 Patent under pre-AIA § 102(b). It teaches:

Methods and systems disclosed herein include lighting systems that include a platform, circuit board wherein the circuit board comprises at least one circuit; an illumination source, LED, plurality of LEDs; multi-colored LEDs, wherein the illumination source is associated with the platform, wherein the illumination source is mounted on the circuit board; wherein the illumination source is associated with the at least one circuit, wire, bus, conductor, or plurality of conductors, wherein the foregoing comprises at least one data conductor and at least one power conductor, wherein the wire is electrically associated with the circuit through an insulation displacement system.

Ex. 1006, 7:8-15.



Ex. 1006, fig. 44.



Ex. 1006, fig. 48.

C. Gandhi (Ex. 1007)

U.S. Patent Application No. US20120323394 (“Gandhi”) was filed on May 7, 2012, and was published on December 20, 2012. Gandhi is prior art to the ‘310 Patent under pre-AIA § 102(b). Gandhi discloses:

[L]ighting systems based on light-emitting devices and more specifically to a method and apparatus of controlling one or more light-

emitting diodes (LED) clusters or triplets in order to provide a display of different colors as perceived by a person, and still more precisely, to effect various colors and display patterns from an array of LEDs based on high-low DC logical methods of signaling.

Ex. 1007, 1[0002].

VIII. CLAIM CONSTRUCTION

“In an *inter partes* review proceeding, a claim of a patent . . . shall be construed using the same claim construction standard that would be used to construe the claim in a civil action . . . , including construing the claim in accordance with the ordinary and customary meaning of such claim as is understood by” a person of ordinary skill in the art (“POSITA”). 37 C.F.R. § 42.100(b). Each claim term challenged by this Petition should be construed in accordance with its ordinary and customary meaning for purposes of resolving the issues raised in this Petition.

IX. GROUNDS FOR PETITION

A. Ground 1: Shteynberg anticipates claims 1-2, 8, 10-13, and 16-17

Independent claim 1 and dependent claims 2, 10-13 and 16-17 of the ‘310 Patent are anticipated by Shteynberg under 35 U.S.C. § 102.

1. Claim 1

a. 1[p] – A configurable light emitting diode (LED) driver for powering a set of light fixture loads comprising:

To the extent that the Board finds that the preamble is limiting, Shteynberg discloses “[i]n accordance with the present invention, therefore, an LED driver circuit is provided which is compatible for operation with the existing lighting infrastructure, such as dimmer switches, and may be coupled directly to and controlled by such dimmer switches.” Ex. 1005, 8:9-13. Shteynberg thus discloses a configurable LED driver/dimmer for powering a set of light fixture loads.

b. 1(a) – a power circuit including:

Shteynberg discloses a power circuit of the ‘310 Patent. For example, claim 28 of Shteynberg discloses “[a] power converter for providing variable brightness levels for solid state lighting, the power converter couplable to a phase-modulating switch which is couplable to an AC line voltage.” Ex. 1005, 22:26-29. A power circuit generally is any circuit used to carry electricity that operates a load. Ex. 1002 ¶ 54. As demonstrated by the above excerpt, the power converter carries electricity from the AC line voltage to provide variable brightness levels for solid state lighting. As such, a POSITA would readily understand that the power converter of Shteynberg is analogous to the power circuit of the ‘310 Patent. *Id.* ¶¶ 54-55.

c. 1(b) – an inrush current limit;

Shteynberg discloses the inrush current limit of the '310 Patent. For example, Shteynberg, when discussing FIG. 5, discloses:

For example, as illustrated in FIG. 5, a switching off-line LED driver 90 typically includes a full wave rectifier 20 with a capacitive filter 15, which allows current to flow to the filter capacitor (C) 15, when the input Voltage is greater than the Voltage across the capacitor. The inrush current to the capacitor is limited by the resistance in series with the capacitor. Under normal operating conditions, there may be a Negative Temperature Coefficient resistor (NTC) or thermistor in series with the capacitor to minimize inrush current during initial charging.

Ex. 1005, 3:42-51.

A POSITA would readily understand that using a resistor in series with a capacitor to limit inrush current as described in Shteynberg is analogous to the inrush current limit of the '310 Patent. Ex. 1002 ¶ 56. Therefore, Shteynberg discloses an inrush current limit.

d. 1(c) – an apparatus for power factor correction and DC/DC conversion; and

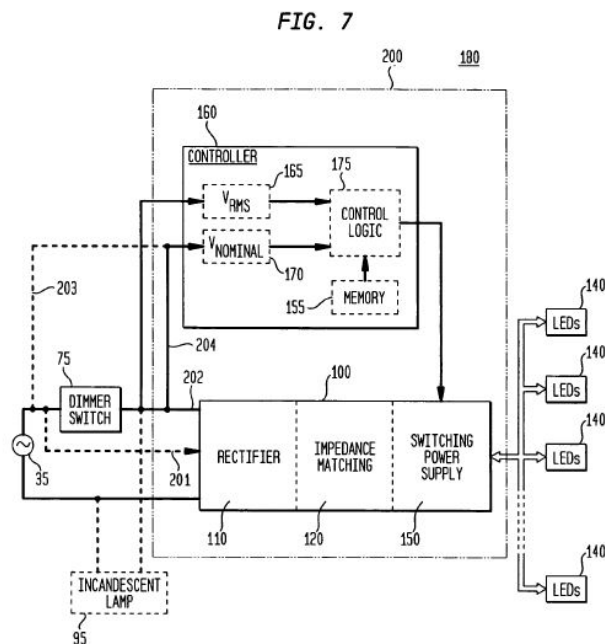
Shteynberg discloses an apparatus for power factor correction and DC/DC conversion. For example, Shteynberg discloses:

[T]he current regulator 100 comprises a rectifier 10, an impedance

matching circuit 120, and a switching power supply (or driver) 130.

FIG. 7 is a block diagram of an exemplary second embodiment of a current regulator (or converter) 200 in accordance with the teachings of the present invention.

Ex. 1005, 8:65-9:5.



Ex. 1005, fig. 7.

Shteynberg further discloses:

The current regulator 200 also provides power to one or more LEDs 140, which also may be an array or multiple arrays of LEDs 140 or any type or color, with the regulator 200 and LEDs 140 forming a system 180. The current regulator 200 may be coupled directly to a dimmer switch 75 (line 202) for receiving a phase-modulated AC voltage derived from the AC line voltage (35), and may operate in parallel with

an incandescent lamp 95, under the common control of the dimmer switch 75.

Ex. 1005, 9:9-17.

Further, Shteynberg teaches “[t]he switching power supply 150A is implemented in two stages, an AC/DC converter 265 and a buck converter 270.” Ex. 1005, 13:65-67. Finally, Shteynberg discloses the LED driver “has built-in capability to deliver power factor correction without additional power components.”

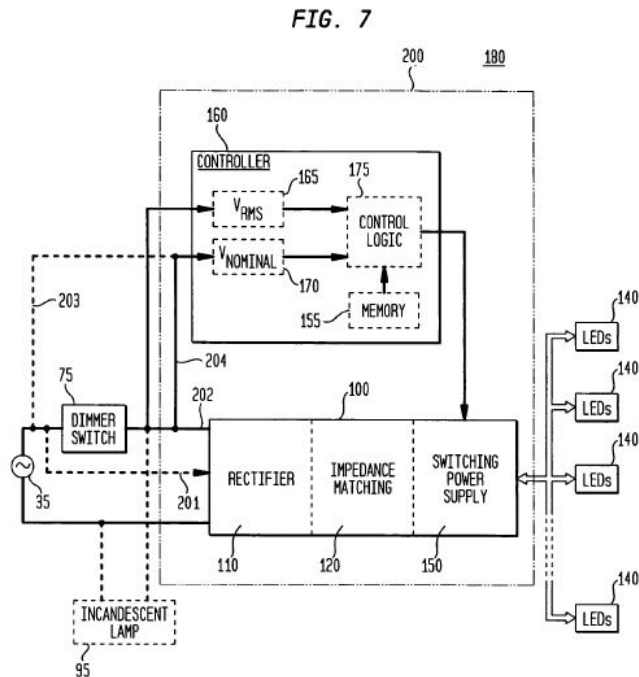
Ex. 1005, 16:61-63.

First, as discussed above, a POSITA would understand that the buck converter 270 is equivalent to the DC/DC converter of the ‘310 Patent. Ex. 1002 ¶ 57. Shteynberg not only discloses a DC/DC conversion, but it also discloses the apparatus has built in power factor correction boost capabilities. Ex. 1005, 16:61-63. As such, Shteynberg discloses an apparatus for power factor correction (PFC) boost and the DC/DC conversion as required by claim 1 of the ‘310 Patent.

- e. **1(d) – a regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion;**

Shteynberg discloses the regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion of the ‘310 Patent. “The current regulator 200 comprises a rectifier 110, an impedance matching circuit

120, a switching power supply (or driver) 150, and further includes a controller 160 coupled to receive an output from the dimmer switch 75.” Ex. 1005, 9:5-9.

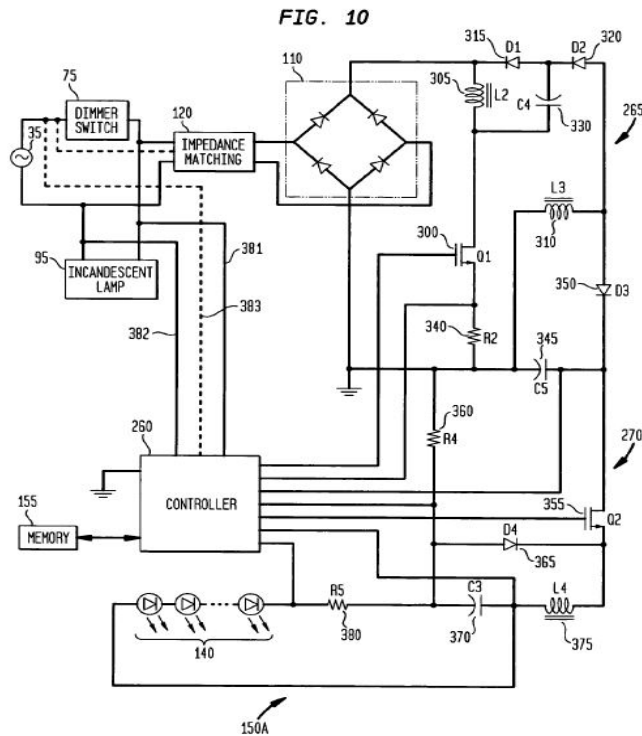


Ex. 1005, fig. 7.

Shteynberg further discloses:

The switching power supply 150A is implemented in two stages, an AC/DC converter 265 and a buck converter 270. . . . This first stage will convert a relatively poor, phased modulated AC voltage into a manageable DC voltage, while the second stage (buck converter 270) will perform LED driving using current PWM, through switching transistor 355 (Q2).

Ex. 1005, 13:65-14:8.



Ex. 1005, 13:61-14:8 & fig. 10.

Finally, Shteynberg discloses:

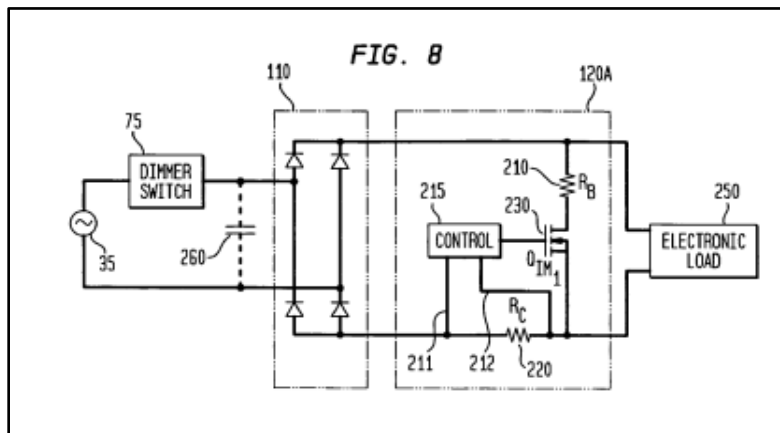
The proposed power stage 265 of the converter 100, 200 has the following features making it compatible with the phase modulated input voltage: . . . (3) it uses a relatively small, low filtering capacitor for low frequency ripple, or can allow this ripple to be comparatively high (with filtering in the second stage 270), so smaller and/or a non-electrolytic capacitor may be used (such as a film or ceramic capacitor), decreasing costs and extending the life of the driver; [and] (4) it has built-in capability to deliver power factor correction without additional power components.

Ex. 1005, 16:50-65.

A POSITA would recognize that the rectifier (110) provides a regulated output voltage connected with impedance matching network (120) and switching power supply (buck converter) (150) would understand that the switching power supply 150 disclosed in Shteynberg is the equivalent of the regulated output voltage bus of the '310 Patent. Ex. 1002 ¶ 59. Similarly, as discussed above, a POSITA would understand that the buck converter 270 is equivalent to the DC/DC converter of the '310 Patent. *Id.* ¶ 57. Further, the switching power supply 150 is connected to the buck converter 270. Ex. 1005, 13:65-67. As such, Shteynberg discloses a regulated output voltage bus connected to the DC/DC converter as required by claim 1 of the '310 Patent.

f. 1(e) – a primary controller for controlling the power circuit;

Shteynberg discloses the primary controller of the '759 patent. Specifically, Shteynberg discloses “the controller 160 (and 260, FIG. 10) is programmed, adapted or configured to emulate the brightness or intensity control provided by the dimmer switch 75, to control the switching power supply 150 and correspondingly modify the brightness (or intensity) provided by the LEDs 140.” Ex. 1005, 9:13-26. Shteynberg further discloses “the control block 215 (e.g., controller 160, 260) may be coupled (lines 211, 212) to detect or otherwise receive feedback of the voltage across current sense resistor 220.” Ex. 1005, 10:57-61.



Ex. 1005, fig. 8.

A POSITA would understand that the controller disclosed in Shteynberg is equivalent to the primary controller required by the '310 Patent. Ex. 1002 ¶ 60. As such, Shteynberg discloses the primary controller for controlling the power circuit required by claim 1 of the '310 Patent.

- g. 1(f) – a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for powering the connected light fixture load; and**

Shteynberg discloses a set of output current drives connected to one of the set of light fixture loads for powering the connected light fixture load. For example, Shteynberg discloses:

LED driver circuits and LEDs [(i.e., light fixture loads)] will be wired within existing lighting infrastructure, such as replacing an incandescent bulb (placed within an Edison socket) or replacing an incandescent lamp, with wiring to existing switches, such as dimmer switches. In a second phase, existing switching connections may be re-wired, allowing LED driver circuits to be co-located in the same

junction or wall box as the switches, but wired directly to the AC line voltage, with existing switching (such as dimmers) generating only a control signal to regulate LED brightness.

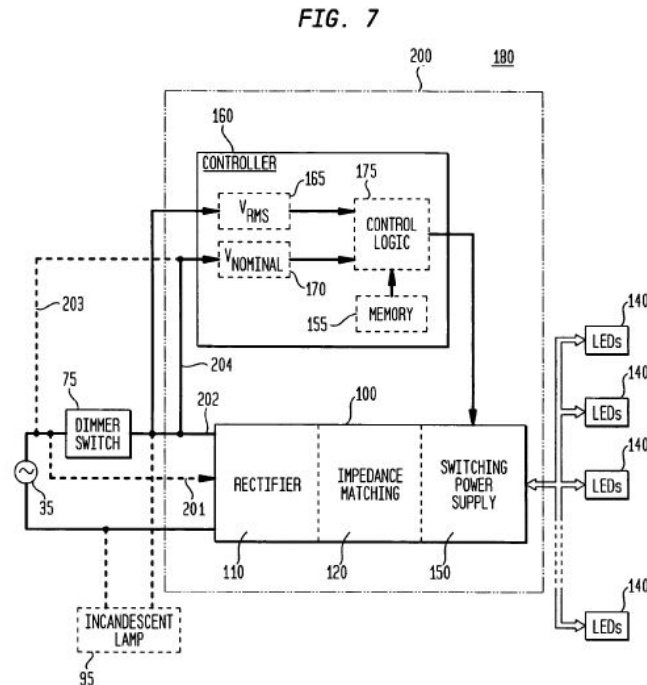
Ex. 1005, 8:20-29.

Shteynberg discloses a set of output current drivers for controlling the LED brightness. Ex. 1002 ¶ 61. As such, Shteynberg discloses a set of output current drivers connected to one of the set of light fixture loads for powering the connected light fixture load.

- h. 1(g) – an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups.**

Shteynberg discloses an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups. For example, Shteynberg discloses “the controller 160 (and 260, FIG. 10) is programmed, adapted or configured to emulate the brightness or intensity control provided by the dimmer switch 75, to control the switching power supply 150 and correspondingly modify the brightness (or intensity) provided by the LEDs 140.”

Ex. 1005, 9:21-26.



Ex. 1005, fig. 7.

Shteynberg further discloses:

A controller (or processor) (such as controller 160, 260), with its associated memory, may be adapted or configured (via programming, FPGA interconnection, or hard-wiring) to perform the methodology of the invention, as discussed below. For example, the methodology may be programmed and stored, in a controller 160,260 with its associated memory (and/or memory 155) and other equivalent components, as a set of program instructions or other code (or equivalent configuration or other program) for Subsequent execution when the processor is operative (i.e., powered on and functioning).

Ex. 1005, 18:29-39.

As discussed above, Shteynberg discloses output current drivers. A POSITA would understand, as discussed above, that controller 160 can be programmed with a set of instructions or other code to map current drivers to dimming zones and map output channels into groups. Ex. 1002 ¶ 61. As such, Shteynberg discloses the apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups as required by claim 1 of the ‘310 Patent.

2. Claim 2

Claim 2 depends from independent claim 1, for the reasons discussed and incorporated herein. *Supra* Section IX.A.1. Claim 1 of the ‘310 Patent requires “[t]he LED driver of claim 1 wherein the apparatus for mapping comprises: a secondary controller; and a port for mapping the output channels into groups.” Ex. 1001, 10:62-65. The additional limitations of claim 2 are disclosed by Shteynberg.

Shteynberg discloses:

[The] “controller” or “processor” 160, 260 may be any type of controller or processor, and may be embodied as **one or more controllers** 160, 260, adapted to perform the functionality discussed herein. As the term controller or processor is used herein, a controller 160, 260 may include use of a single integrated circuit (“IC”), or may include use of a plurality of integrated circuits or other components connected, arranged or grouped together, such as **controllers**, microprocessors, digital signal processors (“DSPs”), parallel

processors, multiple core processors, custom ICs, application specific integrated circuits (“ASICs”), field programmable gate arrays (“FPGAs”), adaptive computing ICs, associated memory (such as RAM, DRAM and ROM), and other ICs and components.

Ex. 1005, 18:8-21 (emphasis added).

Shteynberg further discloses:

A **controller** (or processor) (such as controller 160, **260**), with its associated memory, ***may be adapted or configured (via programming, FPGA interconnection, or hard-wiring)*** to perform the methodology of the invention, as discussed below. For example, the methodology may be programmed and stored, in a controller 160, 260 with its associated memory (and/or memory 155) and other equivalent components, as a set of program instructions or other code (or equivalent configuration or other program) for subsequent execution when the processor is operative (i.e., powered on and functioning).

Ex. 1005, 18:8-21 (emphasis added).

A POSITA would understand that Shteynberg’s disclosure of one or more controllers that there is a secondary controller when at least two controllers are implemented. Ex. 1002 ¶ 64. Additionally, a POSITA would understand from the above disclosure that the controllers can be programmed either via programming or hard-wiring which would require a port for connecting the programming device. Ex. 1002 ¶¶ 59-60. Therefore, Shteynberg discloses a secondary controller; and a port

for mapping the output channels into groups. As such, claim 10 is anticipated by Shteynberg.

3. Claim 8

Claim 8 depends from dependent claim 2 which depends from independent claim 1, for the reasons discussed and incorporated herein. *Supra* Section IX.A.1. Claim 8 of the '310 Patent further includes a “communication interface for receiving data from an external transmitter.” Ex. 1001, 11:8-10. The additional limitation of claim 8 is disclosed by Shteynberg.

Shteynberg discloses:

A **controller** (or processor) (such as controller 160, **260**), with its associated memory, ***may be adapted or configured (via programming, FPGA interconnection, or hard-wiring)*** to perform the methodology of the invention, as discussed below. For example, the methodology may be programmed and stored, in a controller 160, 260 with its associated memory (and/or memory 155) and other equivalent components, as a set of program instructions or other code (or equivalent configuration or other program) for subsequent execution when the processor is operative (i.e., powered on and functioning).

Ex. 1005, 18:8-21 (emphasis added).

A POSITA would understand from the above disclosure that Shteynberg discloses a communication interface because a communication interface would be required for at least to make the hard-wired connection described above. Ex. 1002

¶ 73. Therefore, Shteynberg discloses a communication interface for receiving data from an external transmitter. As such, claim 8 is anticipated by Shteynberg.

4. Claim 10

Claim 10 depends from dependent claim 8. Claims 1-2 and 8 are anticipated for the reasons discussed and incorporated herein. *Supra* Sections IX.A.1-3. Claim 10 of the ‘310 Patent requires an auxiliary flyback converter to provide power to the primary controller, the secondary controller, and the communication interface. The additional limitation of claim 10 is disclosed by Shteynberg.

Shteynberg discloses:

The current regulator 200 also provides power to one or more LEDs 140, which also may be an array or multiple arrays of LEDs 140 or any type or color, with the regulator 200 and LEDs 140 forming a system 180. The current regulator 200 may be coupled directly to a dimmer switch 75 (line 202) for receiving a phase-modulated AC voltage derived from the AC line voltage (35), and may operate in parallel with an incandescent lamp 95, under the common control of the dimmer switch 75.

Ex. 1005, 9:9-17.

Further, Shteynberg teaches “[t]he switching power supply 150A is implemented in two stages, an AC/DC converter 265 and a buck converter 270.” Ex. 1005, 13:65-67. Finally, Shteynberg discloses the LED driver has a “built-in

capability to deliver power factor correction without additional power components.”

Ex. 1005, 16:61-63.

First, as discussed above, a POSITA would understand that the buck converter 270 is equivalent to the DC/DC converter of the ‘310 Patent. Ex. 1002 ¶ 61. Additionally, a POSITA would understand that a flyback converter is essentially a buck converter that is isolated by using a transformer as the storage inductor. *Id.* A POSITA would know that a flyback converter has buck-boost functionality and could be easily modified to work in the ‘310 Patent. *Id.* As such, Shteynberg discloses a flyback converter to provide power to the primary controller, the secondary controller, and the communication interface as required by claim 10 of the ‘310 Patent.

5. Claim 11

Claim 11 depends from dependent claim 10. Claim 10 depends on claims 1-2 and 8, which are anticipated for the reasons discussed and incorporated herein. *Supra* Sections IX.A.1-3. Claim 11 of the ‘310 Patent requires that the primary and secondary controllers of the LED driver/dimmer of claim 1 be digital controllers. The additional limitation of claim 11 is disclosed by Shteynberg.

Shteynberg discloses:

[The] “controller” or “processor” 160, 260 may be any type of controller or processor, and may be embodied as *one or more*

controllers 160, 260, adapted to perform the functionality discussed herein. As the term controller or processor is used herein, a controller 160, 260 may include use of a single integrated circuit (“IC”), or may include use of a plurality of integrated circuits or other components connected, arranged or grouped together, such as **controllers**, microprocessors, digital signal processors (“DSPs”), parallel processors, multiple core processors, custom ICs, application specific integrated circuits (“ASICs”), field programmable gate arrays (“FPGAs”), adaptive computing ICs, associated memory (such as RAM, DRAM and ROM), and other ICs and components.

Ex. 1005, 18:8-21 (emphasis added).

Finally, Shteynberg discloses:

the present invention in general is related to power conversion, and more specifically, to a system, apparatus and method for supplying power to solid state lighting devices, such as for providing power to light emitting diodes (“LEDs”) and LEDs integrated with ***digital controllers or processors***.

Ex. 1005, 1:18-22 (emphasis added).

A POSITA would understand that the categories of controllers/processors described above are digital because they each process data as a sequence of discrete values. Ex. 1002 ¶ 71. Therefore, Shteynberg discloses the primary and secondary controllers are digital controllers. As such, claim 11 is anticipated by Shteynberg.

6. Claim 12

Claim 12 depends from independent claim 1. Shteynberg anticipates claim 1 for the reasons discussed above and incorporated herein. *Supra* Section IX.A.1. Claim 12 discloses the LED driver/dimmer of claim 1 wherein the light fixture load is one of an organic LED (OLED) load or an LED load. Ex. 1001, 11:23-24. The additional limitation of claim 12 is disclosed by Shteynberg.

Shteynberg discloses “the ‘electronic’ load 250, for example, is a system 105, 180, such as a current regulator (or converter) 100, 200 coupled to LEDs 140.” Ex. 1005, 10:45-47. Because Shteynberg discloses the light fixture load is one of an organic LED (OLED) load or an LED load, claim 12 is anticipated by Shteynberg. Ex. 1002 ¶ 62.

7. Claim 13

Claim 13 depends from dependent claim 12. Shteynberg anticipates claims 1 and 12 for the reasons discussed above and incorporated herein. *Supra* Sections IX.A.1, 3. Claim 13 of the ‘310 Patent requires that the primary and secondary controllers of the LED driver/dimmer of claim 1 be digital controllers. Ex. 1001, 11:25-26. The additional limitation of claim 13 is disclosed by Shteynberg.

Shteynberg discloses:

[T]he “controller” or “processor” 160, 260 may be any type of controller or processor, and may be embodied as one or more

controllers 160, 260, adapted to perform the functionality discussed herein. As the term controller or processor is used herein, a controller 160, 260 may include use of a single integrated circuit (“IC”), or may include use of a plurality of integrated circuits or other components connected, arranged or grouped together, such as controllers, microprocessors, digital signal processors (“DSPs”), parallel processors, multiple core processors, custom ICs, application specific integrated circuits (“ASICs”), field programmable gate arrays (“FPGAs”), adaptive computing ICs, associated memory (such as RAM, DRAM and ROM), and other ICs and components. As a consequence, as used herein, the term controller (or processor) should be understood to equivalently mean and include a single IC, or arrangement of custom ICs, ASICs, processors, microprocessors, controllers, FPGAs, adaptive computing ICs, or some other grouping of integrated circuits which perform the functions discussed below, with associated memory, such as microprocessor memory or additional RAM, DRAM, SDRAM, SRAM, MRAM, ROM, FLASH, EPROM or E²PROM.

Ex. 1005, 18:11-29.

Shteynberg also discloses:

the present invention in general is related to power conversion, and more specifically, to a system, apparatus and method for supplying power to solid state lighting devices, such as for providing power to light emitting diodes (“LEDs”) and LEDs integrated with *digital controllers or processors*.

Ex. 1005, 1:18-22 (emphasis added).

A POSITA would understand that the categories of controllers/processors described above are digital because they each process data as a sequence of discrete values. Ex. 1002 ¶ 71. Therefore, Shteynberg discloses the primary and secondary controllers are digital controllers. As such, claim 13 is anticipated by Shteynberg.

8. Claim 16

Claim 16 depends from independent claim 1. Shteynberg anticipates claim 1 for the reasons discussed above and incorporated herein. *Supra* Section IX.A.1. Claim 16 discloses the LED driver/dimmer of claim 1 further comprising a DC/DC converter and a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter. Ex. 1001, 12:6-10. Shteynberg explains:

For example, as illustrated in FIG. 5, a switching off-line LED driver 90 typically includes a full wave rectifier 20 with a capacitive filter 15, which allows current to flow to the filter capacitor (C_{FILT}) 15, when the input voltage is greater than the voltage across the capacitor. The inrush current to the capacitor is limited by the resistance in series with the capacitor. Under normal operating conditions, there may be a Negative Temperature Coefficient resistor (NTC) or thermistor in series with the capacitor to minimize inrush current during initial charging.

Ex. 1005, 3:42-51. Shteynberg further discloses:

As illustrated, the current regulator 100 comprises a rectifier 10, an impedance matching circuit 120, and a switching power supply (or

driver) 130. . . . FIG. 7 is a block diagram of an exemplary second embodiment of a current regulator (or converter) 200 in accordance with the teachings of the present invention.

Ex. 1005, 8:65-9:5. Still further, Shteynberg discloses:

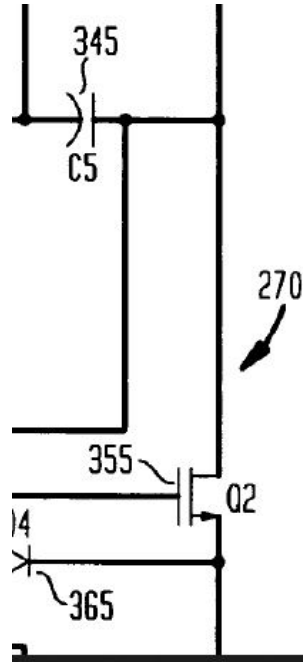
The current regulator 200 may be coupled directly to a dimmer switch 75 (line 202) for receiving a phase-modulated AC voltage derived from the AC line voltage (35), and may operate in parallel with an incandescent lamp 95, under the common control of the dimmer switch 75.

Ex. 1005, 9:13-17. Shteynberg also discloses “[t]he switching power supply 150A is implemented in two stages, an AC/DC converter 265 and a buck converter 270.”

Ex. 1005, 13:61-14:8. The LED Driver of Shteynberg has the “built-in capability to deliver power factor correction without additional power components,” and “it has a small size, fewer components, comparatively lower cost, and high efficiency.” Ex. 1005, 16:61-65.

First, as discussed above, a POSITA would understand that the buck converter 270 is equivalent to the DC/DC converter of the ‘310 Patent. Ex. 1002 ¶ 57. Shteynberg not only discloses a power factor correction boost, but it also discloses the power factor boost is connected (built-in) to the buck (DC/DC) converter and the inrush current limit. Ex. 1005, 16:61-63. Additionally, as discussed above (and as

shown in Figure 10), Shteynberg discloses the inrush current limiter (capacitor 345) is directly connected to the DC/DC converter. Ex. 1005, 14:11-18.



Ex. 1005, fig. 10.

Therefore, Shteynberg discloses a DC/DC converter (the buck converter); and a power factor correction (PFC) boost connected to the inrush current limit (the current regulator) and the DC/DC converter (270). As such, claim 16 is anticipated by Shteynberg.

9. Claim 17

Claim 17 depends from dependent claim 16. Shteynberg anticipates for the reasons discussed above and incorporated herein. *Supra* Section IX.A.1. Claim 17 of the '310 Patent requires at least one power limit connected to the regulated output voltage bus. The additional limitation of claim 17 is disclosed by Shteynberg.

Shteynberg discloses “the controller 160 (and 260, FIG. 10) is programmed, adapted or configured to emulate the brightness or intensity control provided by the dimmer switch 75, to control the switching power supply 150 and correspondingly modify the brightness (or intensity) provided by the LEDs 140.” Ex. 1005, 9:13-26. A POSITA would understand that the programming of the controller to emulate brightness or intensity is analogous to a power limit connected to a regulated output voltage bus. Ex. 1002 ¶ 58. A POSITA would further understand that the controller is programmed to limit power provided by the dimmer switch and is connected to the switching power supply 150, which as discussed above is equivalent to the regulated output voltage bus. *Id.* As such, Shteynberg discloses at least one power limit connected to the output voltage bus required by claim 1 of the ‘759 patent.

B. Ground 2: Morgan anticipates claims 1-2, 5, 8, 10-12, and 16

Independent claim 1 and dependent claims 2, 5, 10-12, and 16 of the ‘310 Patent are anticipated by Morgan under 35 U.S.C. § 102.

1. Claim 1

a. 1[p] - A configurable light emitting diode (LED) driver for powering a set of light fixture loads comprising:

To the extent that the Board finds that the preamble is limiting, Morgan discloses:

Methods and systems disclosed herein include a lighting system that includes one or more of various configurations of LEDs, including an

LED, an LED color controllable system, two LEDs, two rows of LEDs, two rows of multicolored LEDs, or LEDs 5 associated with a platform; an addressable controller; an optic, such as an extruded optic, polycarbonate optic, double lobe optic, upper and lower lobe, translucent, transparent, wherein the optic comprises platform guides.

Ex. 1006, 8:27.

Morgan thus discloses a configurable light emitting diode (LED) driver/dimmer for powering a set of light fixture loads.

b. 1(a) – a power circuit including:

Morgan discloses a power circuit of the ‘310 Patent. For example, Morgan discloses “Fig. 43 shows another power supply arrangement with an integrated PFC and DC-DC converter 4302.” Ex. 1006, 122:1-2. A power circuit generally is any circuit used to carry electricity that operates a load. Ex. 1002 ¶ 54. As demonstrated by the above excerpt, the power supply arrangement carries electricity from the AC line voltage to provide variable brightness levels for solid state lighting. *Supra* Section IX.A.1.b. A POSITA would understand that the power supply arrangement is analogous to the power circuit of the ‘310 Patent. *Id.* ¶¶ 54-55. Therefore, Morgan discloses a power circuit.

c. 1(b) – an inrush current limit;

Morgan discloses the inrush current limit of the ‘310 Patent. For example, Morgan discloses:

Again, a control circuit is shown that measures and responds to the output to provide a feedback system to adjust and regulate the output in real-time to maintain voltage levels. The current in the inductor 4504 is rapidly charged and then discharged through diode D3 4508 through control of switch Q2 4510 is typical of such circuits. A small output capacitor 4512 is appended to the output to provide additional energy storage and minimize output ripple.

Ex. 1006, 122:17-22.

A POSITA would recognize that Morgan's disclosure of a control circuit that adjusts and regulates the output in response to a power measurement is equivalent to limiting the inrush current. Ex. 1002 ¶ 63.

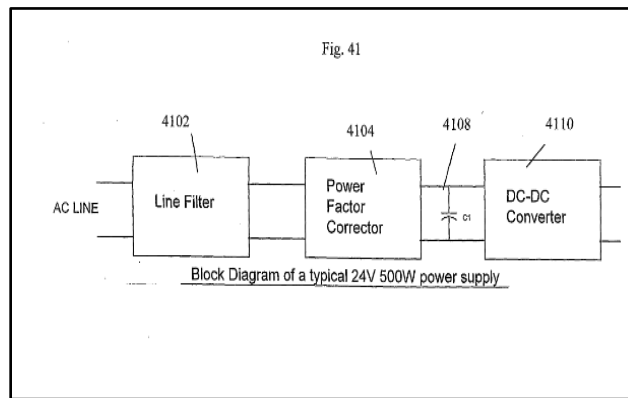
Therefore, Morgan discloses an inrush current limit.

d. 1(c) – an apparatus for power factor correction (PFC) boost and the DC/DC conversion;

Morgan discloses the apparatus for power factor correction (PFC) boost and the DC/DC conversion of the '310 Patent. For example, Morgan discloses:

Fig. 41 shows a typical low voltage switching power supply that incorporates a line filter 4102, power factor correction (PFC) facility 4104, a capacitor 4108 and a DC-DC converter 4110. The line filter provides general rectification and filtering of the high voltage AC input.

Ex. 1006, 121:16-19.



Ex. 1006, fig. 41.

Morgan not only discloses a power factor correction boost, but it also discloses the power factor boost is connected (“incorporates”) to the DC/DC converter. Ex. 1006, fig. 41, 121:16-19. As such, Morgan discloses the apparatus for power factor correction (PFC) boost and the DC/DC conversion as required by claim 1 of the ‘310 Patent.

- e. **1(d) – a regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion;**

Morgan discloses a regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion of the ‘310 Patent. As discussed above, Morgan discloses the apparatus for power factor correction (PFC) boost and the DC/DC conversion. *Supra* Section IX.A.1.d. Morgan further discloses:

Fig. 45 continues Fig. 44 to the output stage. Element 4108 is duplicated to show the overlap. The output of the high voltage DC output is then fed into the DC-DC converter as shown by a representative circuit

diagram. Again, a control circuit is shown that measures and responds to the output to provide a feedback system to adjust and regulate the output in real-time to maintain voltage levels. The current in the inductor 4504 is rapidly charged and then discharged through diode D3 4508 through control of switch Q2 4510 is typical of such circuits. A small output capacitor 4512 is appended to the output to provide additional energy storage and minimize output ripple.

Ex. 1006, 122:15-22.

A POSITA would understand that the line filter (4102) of Morgan regulates the output voltage and is connected with PFC (4104) and DC/DC converter (4110).

Ex. 1002 ¶ 64. As such, Morgan discloses a regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion of the ‘310 Patent.

f. 1(e) – a primary controller for controlling the power circuit;

Morgan discloses the primary controller of the ‘310 Patent. Specifically, Morgan discloses:

As discussed further below in connection with Fig. 13, such a “binary” determination of power either being consumed or not consumed by the collection of lighting units coupled to the LUC facilitates an identifier determination/learning algorithm (e.g., that may be performed by the LUC processor 1102 or the central controller 202) according to one embodiment of the invention. In other aspects, the power sensing module 1114 and the processor 1102 may be adapted to determine, at

least approximately, and actual power drawn by the lighting units at any given time.

Ex. 1006, 50:2-11.

The LUC processor or central controller of Morgan can be a primary controller. As such, Morgan discloses the primary controller for controlling the power circuit required by claim 1 of the '310 Patent.

- g. 1(f) – a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for powering the connected light fixture load; and**

Morgan discloses a set of output current drivers connected to one of the set of light fixture loads for controlling the associated light fixture load.

For example, Morgan discloses:

As shown in Fig. 1, the lighting unit 100 also may include a processor 102 that is configured to output one or more control signals to drive the light sources 104A, 104B, 104C, and 104D so as to generate various intensities of light from the light sources. For example, in one implementation, the processor 102 may be configured to output at least one control signal for each light source so as to independently control the intensity of light generated by each light source. Some examples of control signals that may be generated by the processor to control the light sources include but are not limited to, pulse modulated signals, pulse width modulated signals (PWM), pulse amplitude modulated signals (PAM), pulse displacement modulated signals, analog control signals (e.g., current control signals, voltage control signals),

combinations and/or modulations of the foregoing signals, or other control signals. In one aspect, the processor 102 may control other dedicated circuitry (not shown in Fig. 1), which in turn controls the light sources so as to vary their respective intensities.

Ex. 1006, 23:4-16.

Morgan further discloses:

Fig. 11 shows a block diagram of a portion of a generic LUC 208 that includes a LUC processor 1102 and a power sensing module 1114. As indicated in Fig. 11, the power sensing module 1114 may be coupled to a power supply input connection 1112 and may in turn provide power to one or more lighting units coupled to the LUC via a power output connection 1110. The power sensing module 1114 also may provide one or more output signals 1116 to the processor 1102, and the processor, in turn, may communicate to the central controller 202 information relating to power sensing, via the connection 1108.

Ex. 1006, 49:21-29.

A POSITA would understand that the power sensing module coupled to a power supply input connection to provide power to the one or more lighting units via a power output connection is analogous to a set of output current drivers connected to a set of light fixture loads. Ex. 1002 ¶ 60. As such, Morgan discloses a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for powering the connected light fixture load.

- h. 1(g) – an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups.**

Morgan discloses an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups. For example, Morgan discloses:

These illumination sources may be associated with addressable controllers that require setting when incorporated as a part of the network or have preprogrammed lighting control programs to be selected, modified, or generated. A programming device according to the principles of the present invention may be used to program the address or perform other functions as described herein, in these illumination sources as well.

Ex. 1006, 126:23-27.

A POSITA would understand the addressable controller of Morgan is equivalent to the apparatus for mapping. Ex. 1002 ¶ 75. Specifically, a POSITA would understand that an addressable controller for LEDs allows you to control individual LEDs or groups of LEDs. *Id.* A specific LED or specific part of an LED strip or LED array can be controlled. *Id.* In this way, the controller is addressable. *Id.* As such, Morgan discloses an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups as required by claim 1 of the '310 Patent.

2. Claim 2

Claim 2 depends from independent claim 1. Morgan anticipates claim 1 for the reasons discussed above and incorporated herein. *Supra* Section IX.B.1. Claim 2 discloses a secondary controller and a port for mapping the output channels into groups. The additional limitation of claim 2 is disclosed by Morgan.

Morgan discloses the secondary controller of the '310 Patent. Specifically, Morgan explains:

As discussed further below in connection with Fig. 13, such a “binary” determination of power either being consumed or not consumed by the collection of lighting units coupled to the LUC facilitates an identifier determination/learning algorithm (e.g., that may be performed by the LUC processor 1102 or the central controller 202) according to one embodiment of the invention. In other aspects, the power sensing module 1114 and the processor 1102 may be adapted to determine, at least approximately, and actual power drawn by the lighting units at any given time.

Ex. 1006, 50:2-8. A POSITA would know that the LUC processor or central controller of Morgan can be a secondary controller. Ex. 1002 ¶ 71.

Morgan further discloses:

The lighting unit 100 may also include a communication port 120 adapted to communicate with a programming device. The communication port may be adapted to receive data through wired or

wireless transmission In an embodiment of the invention, information received through the communication port 120 may relate to address information and the lighting unit 100 may be adapted to receive and then store the address information in the memory 114.

Ex. 1006, 33:1-21.

Finally, Morgan discloses “the lighting unit 100 may be adapted to select a given lighting program, modify a parameter of a lighting program, or otherwise make a selection or modification or generate certain lighting control signals based on the data received from a programming device.” Ex. 1006, 33:23-26.

A POSITA would understand that the address information received through the communication port 120 and the lighting unit’s ability to generate certain lighting control signals based on the data received from a programming device is equivalent to using a controller and a port to map output current into groups to produce a desired lighting effect. Ex. 1002 ¶ 68. As such, Morgan discloses the secondary controller and a port for mapping the output channels into groups required by claim 2 of the ‘310 Patent.

3. Claim 5

Claim 5 depends from dependent claim 2. Morgan anticipates claims 1 and 2 for the reasons discussed above and incorporated herein. *Supra* Sections IX.B.1-2. Claim 5 of the ‘310 Patent requires that the port is an in-circuit serial programming

(ICSP) port. Ex. 1001, 11:3-4. The additional limitation of claim 5 is disclosed by Morgan.

Morgan discloses:

[T]he lighting unit 100 may also include a communication port 120 adapted to communicate with a programming device. The communication port may be adapted to receive data through wired or wireless transmission.

Ex. 1006, 33:5-7.

Further, Morgan discloses:

[T]he lighting unit 100 may be adapted to select a given lighting program, modify a parameter of a lighting program, or otherwise make a selection or modification or generate certain lighting control signals based on the data received from a programming device.

Ex. 1006, 33:23-26.

A POSITA would understand that the programming device is an in-circuit serial port (ICSP). Ex. 1002 ¶ 69. In-circuit serial programming (ICSP) is the ability of some programmable logic devices, microcontrollers, chipsets, and other embedded devices to be programmed while installed in a complete system, rather than requiring the chip to be programmed prior to installing it into the system. *Id.* The receipt of lighting control instructions by the programming device is equivalent to the ICSP port of the '310 Patent. *Id.* ¶ 69-70. Therefore, Morgan discloses the

communication port is an in-circuit serial programming (ICSP) port. As such, claim 5 is anticipated by Morgan.

4. Claim 8

Claim 8 depends from dependent claim 2 which depends from independent claim 1. Morgan anticipates claims 1-2 for the reasons discussed and incorporated herein. *Supra* Section IX.A.1. Claim 8 of the '310 Patent further includes a "communication interface for receiving data from an external transmitter." Ex. 1001, 11:8-10. The additional limitation of claim 8 is disclosed by Morgan.

For example, Morgan discloses:

A lights/interfaces pane lists lighting units or *lighting unit interfaces* that are capable of being managed by the management tool. Interfaces may include power/data supplies (PDS) 1758 for one or more lighting systems, DMX interfaces, DALI interfaces, interfaces for individual lighting units, interfaces for a tile lighting unit, or other suitable interfaces.

Ex. 1007, 31[0433] (emphasis added).

A POSITA would understand that the lighting unit interfaces (e.g., DMX interfaces) of Morgan are equivalent to the communication interface for receiving data from an external transmitter of the '310 Patent. Ex. 1002 ¶¶ 71-73. Therefore, Morgan discloses an interface for receiving data from an external transmitter and anticipates claim 8.

5. Claim 10

Claim 10 depends from dependent claim 8. Claim 8 depends on claims 1-2, which are all anticipated by Morgan for the reasons discussed and incorporated herein. *Supra* Sections IX.B.1-2, 4. Claim 10 of the '310 Patent requires an auxiliary flyback converter to provide power to the primary controller, the secondary controller, and the communication interface. The additional limitation of claim 10 is disclosed by Morgan.

Morgan discloses:

Fig. 41 shows a typical low voltage switching power supply that incorporates a line filter 4102, power factor correction (PFC) facility 4104, a capacitor 4108 and a DC-DC converter 4110. The line filter provides general rectification and filtering of the high voltage AC input.

Ex. 1006, 121:16-19

A POSITA would understand that a flyback converter is a type of DC/DC converter and is equivalent to the DC/DC converter of the '310 Patent. Ex. 1002 ¶ 61. Additionally, a POSITA would understand that the DC-DC converter of Morgan could easily be a flyback converter. *Id.* As such, Morgan discloses a flyback converter to provide power to the primary controller, the secondary controller, and the communication interface as required by claim 10 of the '310 Patent.

6. Claim 11

Claim 11 depends from dependent claim 10. Claim 10 depends on claims 1-2, which are anticipated, and claim 8, which is obvious, for the reasons discussed and incorporated herein. *Supra* Sections IX.A.1, B.2; *infra* Section IX.C.2. Claim 11 discloses the primary and secondary controllers are digital controllers. The additional limitation of claim 11 is disclosed by Morgan.

For example, Morgan discloses:

The terms “processor” or “controller” are used herein interchangeably to describe various apparatus relating to the operation of one or more light sources. A processor or controller can be implemented in numerous ways, such as with dedicated hardware, using one or more microprocessors that are programmed using software (e.g., microcode or firmware) to perform the various functions discussed herein, or as a combination of dedicated hardware to perform some functions and programmed microprocessors and associated circuitry to perform other functions.

Ex. 1006, 14:13-19.

Morgan further discloses:

As discussed further below in connection with Fig. 13, such a “binary” determination of power either being consumed or not consumed by the collection of lighting units coupled to the LUC facilitates an identifier determination/learning algorithm (e.g., that may be performed by the LUC processor 1102 or the central controller 202) according to one

embodiment of the invention. In other aspects, the power sensing module 1114 and the processor 1102 may be adapted to determine, at least approximately, and actual power drawn by the lighting units at any given time.

Ex. 1006, 50:2-8.

A POSITA would readily understand that the addressable controller, LUC processor, or central controller can interchangeably serve as the primary and secondary controllers. Ex. 1002 ¶ 71. A POSITA would further understand that the addressable controller, LUC processor, or central controller are digital because they each process data as a sequence of discrete values. *Id.* Therefore, Morgan discloses the primary and secondary controllers are digital controllers. As such, claim 11 is anticipated by Morgan.

7. Claim 12

Claim 12 depends from independent claim 1. Morgan anticipates claim 1 for the reasons discussed above and incorporated herein. *Supra* Section IX.B.1. Claim 12 of the '310 Patent requires that the light fixture load is one of an Organic LED (OLED) load or an LED load. Ex. 1001, 11:23-24. The additional limitation of claim 12 is disclosed by Morgan.

Morgan discloses:

Another embodiment of the invention is directed to an apparatus for use in a lighting system including at least one LED light source and at least

one other controllable device. The apparatus comprises at least one controller having at least first and second output ports to couple the at least one controller to at least the at least one LED light source and the at least one other controllable device

Ex. 1006, 67:24-28.

A POSITA would understand that the LED light source disclosed in Morgan is equivalent to the LED load of the ‘310 Patent. Ex. 1002 ¶ 62. Therefore, Morgan discloses the light fixture load is one of an Organic LED (OLED) load or an LED load. As such, claim 12 is anticipated by Morgan.

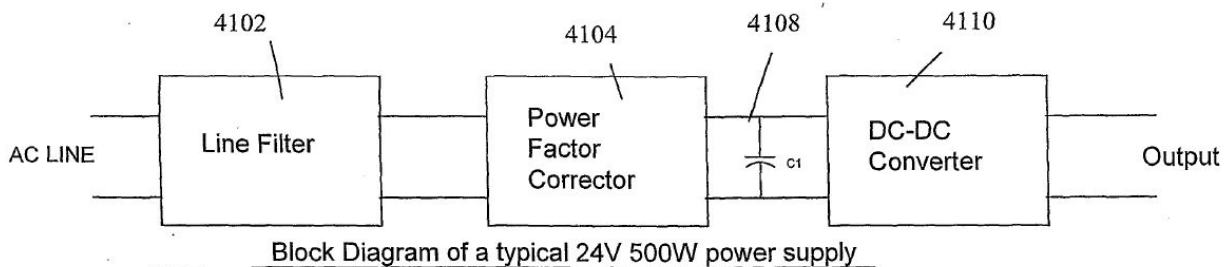
8. Claim 16

Claim 16 depends from independent claim 1. Morgan anticipates claim 1 for the reasons discussed above and incorporated herein. *Supra* Section IX.B.1. Claim 16 of the ‘310 Patent requires that the apparatus for power factor correction and DC/DC conversion further include a DC/DC converter and a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter. Ex. 1001, 12:6-10. The additional limitation of claim 16 is disclosed by Morgan.

As discussed above, Morgan discloses an inrush current limit and an apparatus for power factor correction, and DC/DC converter. *Supra* Section IX.B.1.d. Morgan further discloses “[i]n embodiments the power factor correction includes an energy storage capacitor and a DCDC converter.” Ex. 1006, 6:17-19.

Morgan further discloses “Fig. 41 shows a typical low voltage switching power supply that incorporates a line filter 4102, power factor correction (PFC) facility 4104, a capacitor 4108 and a DC-DC converter 4110. The line filter provides general rectification and filtering of the high voltage AC input.” Ex. 1006, 121:16-19.

Fig. 41



Ex. 1006, fig. 41.

A POSITA would understand that the built capability of the power stage to deliver power factor correction is analogous to the power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter. Ex. 1002 ¶ 56. Therefore, Morgan discloses the apparatus for power factor correction and DC/DC converter further comprises a DC/DC converter and a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter. As such, claim 16 is anticipated by Morgan.

C. Ground 3: Shteynberg view of Gandhi renders claims 6, 8-9, and 19-20 obvious

Claims 6, 8-9, and 19-20 of the ‘310 Patent are rendered obvious under 35 U.S.C. § 103 by Shteynberg in view of Gandhi. Shteynberg anticipates independent claim 1 for the reasons discussed above and incorporated here. *Supra* Section IX.A.1.

1. Claim 6

Claim 6 depends from independent claim 1. Claim 1 is anticipated for the reasons discussed above and incorporated herein. *Supra* Section IX.A.1. The additional limitations of claim 6 are disclosed by Gandhi.

Claim 6 of the ‘310 Patent discloses a “communication interface for receiving data from an external transmitter.” Ex. 1001, 11:5-7. Like the ‘310 Patent, Gandhi discloses receiving data from an external transmitter and for transmitting data to the secondary controller. For example, Gandhi describes:

The H-bridge 243 supplies power to the slaves through a connector J3 and maybe a line driver for the signal for the universal asynchronous receiver/transmitter (UART) microchip, U3, of the microcontroller 242. Other H-bridge topologies are envisioned where the common arrangement includes four binary position switches. In the example of FIG. 4F, an H-bridge circuit may be built around a part such as MC33887 that, in this example, may be driven by a CD4049 CMOS IC using a complimentary output data signal as an input from a

microcontroller 242 port pin.

Ex. 1007, 4[0043].

Gandhi further discloses:

FIG. 6C illustrates exemplary circuitry comprising an integrated circuit U22, connector J11, capacitors C24, C25, C26, and C27, functioning as a computer interface 130 control that may be attached to the master 101 (FIG. 1) and that may provide for a WINDOWS™-based graphic user interface (GUI) environment. Via the GUI, the user may program one or more modes into the master control unit 101.

Ex. 1007, 5[0050].

A POSITA would understand that Gandhi's disclosure of using a complimentary output data signal (such as from computer interface 130) as an input from a microcontroller 242 port pin is analogous to a communication interface for receiving data from an external transmitter, rendering claim 6 obvious. Ex. 1002 ¶ 72.

2. Claim 8

Claim 8 depends from dependent claim 2. Claims 1 and 2 are anticipated for the reasons discussed above and incorporated herein. *Supra* Sections IX.A.1-2. The additional limitations of claim 8 are disclosed by Gandhi.

Claim 8 of the '310 Patent discloses a “communication interface for receiving data from an external transmitter.” Ex. 1001, 11:11-13. Like the '310 Patent, Gandhi discloses receiving data from an external transmitter. For example, Gandhi provides:

The H-bridge 243 supplies power to the slaves through a connector J3 and maybe a line driver for the signal for the universal asynchronous receiver/transmitter (UART) microchip, U3, of the microcontroller 242. Other H-bridge topologies are envisioned where the common arrangement includes four binary position switches. In the example of FIG. 4F, an H-bridge circuit may be built around a part such as MC33887 that, in this example, may be driven by a CD4049 CMOS IC using a complimentary output data signal as an input from a microcontroller 242 port pin.

Ex. 1007, 4[0043].

Gandhi further discloses:

FIG. 6C illustrates exemplary circuitry comprising an integrated circuit U22, connector J11, capacitors C24, C25, C26, and C27, functioning as a computer interface 130 control that may be attached to the master 101 (FIG. 1) and that may provide for a WINDOWS™-based graphic user interface (GUI) environment. Via the GUI, the user may program one or more modes into the master control unit 101.

Ex. 1007, 5[0050].

A POSITA would understand that Gandhi's disclosure of using a complimentary output data signal (such as from computer interface 130) as an input

from a microcontroller 242 port pin is analogous to a communication interface for receiving data from an external transmitter, rendering claim 8 obvious. Ex. 1002 ¶ 73.

3. Claim 9

Claim 9 depends from dependent claim 8. Claims 1, 2, and 8 are anticipated for the reasons discussed above and incorporated herein. *Supra* Sections IX.A.1-3. The additional limitations of claim 9 are disclosed by Gandhi.

Claim 9 of the ‘310 Patent requires “[t]he communication interface includes a universal asynchronous receiver/transmitter (UART) to transmit data to the secondary controller.” Ex. 1001, 11:14-16. Like the ‘310 Patent, Gandhi discloses a communication interface includes a universal asynchronous receiver/transmitter (UART) to transmit data to the secondary controller. For example, Gandhi discloses:

As depicted by the example in FIG. 6B, two I/O pins of the master 101, particularly two I/O pins of the microcontroller UART, U3, may be used for this connection to the GUI interface (FIGS. 1B and 1C). FIG. 6C illustrates that the microprocessor may be programmed to function as a UART and may be implemented in a program that may communicate to the computer user interface through port pins. An integrated circuit, such as a level converter, may be used to interface the UART signals to the com port, e.g., the IEEE RS232 C port, of the PC.

Ex. 1007, 5[0050].

A POSITA would understand that the LED driver of Shteynberg containing a secondary controller could be readily modified to include the level converter, which may be used to interface the UART signals to the com port, e.g., the IEEE RS232 C port, of the PC of Gandhi. Ex. 1002 ¶ 74. The Shteynberg-Gandhi combination discloses “[t]he communication interface includes a universal asynchronous receiver/transmitter (UART) to transmit data to the secondary controller.” Ex. 1001, 11:14-16. Thus, the Shteynberg-Gandhi combination renders claim 9 obvious.

4. Claim 19

Claim 19 depends from independent claim 1. Claim 1 is anticipated for the reasons discussed above and incorporated herein. *Supra* Section IX.A.1. The additional limitations of claim 19 are disclosed by Gandhi.

Claim 19 of the ‘310 Patent discloses the LED driver of claim 1 further includes a load controller; a current source; and a current sense. Ex. 1001, 12:17-21. Like the ‘310 Patent, Gandhi discloses a load controller, current source, and current sense.

For example, Gandhi discloses:

FIG. 11A is an exemplary LED driver circuit 920 where this driver circuit 920 comprising integrated circuit elements U1111, U1112, and U1113, may provide a constant current drive to the LEDs which is turned on and off at a faster rate, i.e., flicker rate, and the duty cycle of the PWM cycle that determines the intensity of the PWM frequency

may be selected such that the flicker is not noticeable due to the persistence of the human eye, for example. The PWM output from the slave microcontroller U30 is fed to the LED drivers 920 using transistors Q4, Q3, and Q2 for red, green, and blue LEDs respectively. The LED driver chip ZXLD1362 from ZETEX™ functions as a buck mode switching regulator. The LED current is sensed by using R1113, R1112, and R1111 for red, green, and blue LEDs respectively. Voltage developed across this resistor is fed back to the LED driver for current regulation. Accordingly, it is possible in some embodiments of the present invention to set the LED current by changing the value of the sense resistor using the relationship:

$$I_{out} = (0.1/R_{sense}) \text{ Amps (1)} \quad [\text{Eq. 1}]$$

Ex. 1007, 6[0057].

A POSITA would recognize that slave microcontroller U30 is a load controller, that integrated circuit elements U1111, U1112, and U1113 serve as a current source, and that R1113, R1112, and R1111 serve as the current sense. Ex. 1002 ¶ 78. Given Shteynberg and Gandhi's shared desire to control current to LEDs, a POSITA would know that the LED driver of Shteynberg could be modified to include the aforementioned circuit components of Gandhi.

The Shteynberg-Gandhi combination thus discloses the LED driver of claim 1 further comprises a load controller, a current source, and a current sense. Accordingly, the Shteynberg-Gandhi combination renders claim 19 obvious.

5. Claim 20

Claim 20 depends from dependent claim 19. Claims 1 and 19 are anticipated for the reasons discussed above and incorporated herein. *Supra* Sections IX.A.1., C.5. The additional limitations of claim 20 are disclosed by Gandhi.

Claim 20 of the ‘310 Patent discloses the load controller comprises a signal generator. Ex. 1001, 12:22-23. Like the ‘310 Patent, Gandhi discloses a signal generator. For example, Gandhi describes that “via pin 17 (ref no. 331) of the integrated circuit, U3 of the microcontroller 242 (FIG. 4A), a signal may be processed via the inverter circuitry 330 comprising resistors R15, R16, and R17, and further comprising inverters U8A, U8B, and U8C.” Ex. 1007, 3[0043].

The Shteynberg-Gandhi combination thus discloses the load controller comprises a signal generator and renders claim 20 obvious.

D. Motivation to Combine Shteynberg and Gandhi

A POSITA would have been motivated to combine Shteynberg and Gandhi for several reasons. *See* Ex. 1002 ¶ 79-84.

First, Shteynberg and Gandhi are analogous art to the ‘310 Patent because they are in the same field of endeavor—namely, LED Drivers. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). The ‘310 Patent defines its “Technical Field” as a “novel LED Driver/dimmer for solid state lighting applications.” Ex. 1001, 1:42-43. Like the ‘310 Patent, Shteynberg and Gandhi are directed to powering and

controlling solid state lighting applications. Ex. 1005, 1:18-22; Ex. 1007, 1[0004]; *supra* Sections IX.A, C.

Moreover, for the reasons provided above, Shteynberg and Gandhi are analogous to the ‘310 Patent because they are reasonably pertinent to the technical problem allegedly addressed by the claimed invention. *In re Bigio*, 381 F.3d at 1325.

Finally, a POSITA would have had a reasonable expectation of success in making this modification. The LED Driver components described in Shteynberg and Gandhi were well-known at the time. Ex. 1002 ¶ 83. As such, it would also have been straightforward for a POSITA to modify the LED driver of Shteynberg to include Gandhi’s communication interface, load controller, current source, and current sense, and that such a system would work.

E. The Board Should Not Discretionarily Deny Institution

The PTAB should not exercise its discretion to deny review where, as here, the Petition is strong on the merits. *See, e.g., Apple Inc. v. RFCyber Corp.*, No. IPR2022-00412, Paper 11, at 33-34 (P.T.A.B. July 21, 2022); Interim Procedure for Discretionary Denials In AIA Post Grant Proceedings With Parallel District Court Litigation (Discretionary Denial Memorandum), USPTO Dir.’s Memorandum 9 (June 21, 2022).

Apple Inc. v. Fintiv, Inc., No. IPR2020-00019, Paper 11 (P.T.A.B. Mar. 20, 2020), articulated an additional standard, under which the PTAB may decline to

institute IPR based on a number of factors (“*Fintiv* factors”) related to the existence of a parallel district court proceeding on the same challenged patents. The PTAB considers the following non-exclusive *Fintiv* factors:

- (1) whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
- (2) proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
- (3) investment in the parallel proceeding by the court and the parties;
- (4) overlap between issues raised in the petition and in the parallel proceeding;
- (5) whether the petitioner and the defendant in the parallel proceeding are the same party; and
- (6) other circumstances that impact the Board’s exercise of discretion, including the merits.

Id. In this instance, the stage of the parallel district court litigation does not support denying institution based on the *Fintiv* factors.

1. Factor 1: Whether the Court Granted a Stay

Neither party has requested a stay in this case, nor has one been ordered by the District Court. Factor 1 is, therefore, neutral because no party has requested a stay (yet).

2. Factor 2: Proximity of Trial Date

Factor 2 favors institution or is neutral. *Intel Corp. v. PACT XPP Schweiz AG*, No. IPR2020-00542, Paper 11, at 14 (P.T.A.B. Sept. 9, 2020); Discretionary Denial

Memorandum 8 (explaining that when other factors weigh against denial or are neutral, proximity to trial should not alone control). The U.S. District Court for the Southern District of California issued a scheduling order on March 22, 2023, setting a final pretrial conference on August 22, 2024. Ex. 1008. Based on the most recent statistics showing a median time from filing to trial in a civil proceeding to be 46 months, disposition of this case can occur as late as April 2026, which will be 17 months after the Final Written Decision. Ex. 1009.

3. Factor 3: Investment in Parallel Proceedings

Factor 3 favors institution. The district court litigation is still in its early stages where discovery has just begun, but no claim construction briefs have been filed.

4. Factor 4: Overlap of Issues

Factor 4 favors institution because the Final Written Decision here will likely trigger estoppel. Additionally, in the district court litigation, all of mate's asserted claims are subject to Advanced Lighting Concepts's IPRs.

5. Factor 5: Whether Petitioner and Defendant are the Same Party

Factor 5 is neutral because "[a]ll parties to this proceeding are included in the related [] proceeding." *Cast Lighting, LLC v. Wangs Alliance Corp.*, PGR2021-00012, Paper 12, at 36 (P.T.A.B. June 7, 2021).

6. Factor 6: Other Circumstances

Factor 6 favors institution and is dispositive under the Discretionary Denial Memorandum because the unpatentability challenges here are compelling and rely on references that were not before the Office. Additionally, Advanced Lighting Concepts's IPRs are the only challenges to the Asserted Patents that have been before the Board, which favors institution. And, there is a strong public interest against "leaving bad patents enforceable," which also favors institution. *Thryv, Inc. v. Click-To-Call Techs., LP*, 140 S. Ct. 1367, 1374 (2020).

Because all *Fintiv* factors favor institution or are neutral, Advanced Lighting Concepts respectfully requests that the Board decline to discretionarily deny review.

X. CONCLUSION

Trial should be instituted, and the Challenged Claims should be canceled as unpatentable.

Dated: August 4, 2023

Respectfully submitted,

By: / Winston O. Huff /

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**ATTORNEYS FOR PETITIONER
ADVANCED LIGHTING CONCEPTS
LLC**

U.S. PATENT NO. 9,078,310 – LISTING OF CHALLENGED CLAIMS

<u>CLAIM NO.</u>	<u>CLAIM ELEMENTS</u>
1[p]	1. A configurable light emitting diode (LED) driver/dimmer for power a set of light fixture loads comprising:
1[a]	a power circuit including:
1[b]	an inrush current limit;
1[c]	an apparatus for power factor correction and DC/DC conversion, and
1[d]	a regulated output voltage bus connected to the apparatus for power factor correction and DC/DC conversion;
1[e]	a primary controller for controlling the power circuit;
1[f]	a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for powering the connected light fixture load; and
1[g]	an apparatus for mapping the set of output current drivers to various dimming zones and for mapping output channels into groups.
2	The LED driver of claim 1 wherein the apparatus for mapping comprises: a secondary controller; and a port for mapping the output channels into groups.
5	The LED driver of claim 2 wherein the port is an in-circuit serial programming (ICSP) port.
6	The LED driver of claim 1 further comprising a communication interface for receiving data from an external transmitter.
8	The LED driver of claim 2 further comprising a communication interface for receiving data from an external transmitter

<u>CLAIM NO.</u>	<u>CLAIM ELEMENTS</u>
9	The LED driver of claim 8 wherein the communication interface includes a universal asynchronous receiver/transmitter (UART) to transmit data to the secondary controller.
10	The LED driver of claim 8 further comprising an auxiliary flyback converter to provide power to the primary controller, the secondary controller, and the communication interface.
11	The LED driver of claim 10 wherein the primary and secondary controllers are digital controllers.
12	The LED driver of claim 1 wherein the light fixture load is one of an Organic LED (OLED) load or an LED load.
13	The LED driver of claim 12 wherein the primary and secondary controllers are digital controllers.
16	The LED driver of claim 1 wherein the apparatus for power factor correction and DC/DC conversion comprises: a DC/DC converter; and a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter.
17	The LED driver of claim 16 further comprising at least one power limit connected to the regulated output voltage bus.
19	The LED driver of claim 1 wherein each of the set of output current drivers comprises: a load controller; a current source; and a current sense.
20	The LED driver of claim 19 wherein the load controller comprises a signal generator.

CERTIFICATION OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Petition includes 11,959 words, as counted by Microsoft Word, and is therefore in compliance with the 14,000-word limit established by 37 C.F.R. 42.24(a)(1)(i). Accordingly, pursuant to 37 C.F.R. 42.24(d), lead counsel for the Petitioner hereby certifies that this Petition complies with the type-volume limits established for a petition requesting IPR.

Dated: August 4, 2023

Respectfully Submitted,

/ Winston O. Huff /

Winston O. Huff (Reg. No. 51, 825)

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. 42.6(4) and 42.105, lead counsel for Petitioners hereby certifies that on August 4, 2023, copies of this Petition, Power of Attorney, and all supporting exhibits were sent via Federal Express to the correspondence address of record for the '310 Patent:

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A courtesy copy of this Petition and supporting exhibits was also served via email on Patent Owner's counsel of record in the district court litigation.

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