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. IPR2023-01257

U.S. Patent No. 8,525,446

DECLARATION OF JOSEPH C. McALEXANDER IN SUPPORT OF PETITIONER'S PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,525,446 UNDER 35 U.S.C. §§311-319 AND 37 C.F.R. §42.100 ET SEQ.

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INTRODUCTION

1. My name is Joseph C. McAlexander III, President of McAlexander Sound, Inc., located at 101 W. Renner Rd., Suite 350, Richardson, TX 75082. I have been retained by Munsch Hardt Kopf and Harr, Counsel for Advanced Lighting Concepts LLC d/b/a Environmental Lights ("EL") in connection with the above-captioned matter, to provide my analyses and conclusions in this *inter partes* review proceeding before the United States Patent and Trademark Office regarding U.S. Patent No. 8,525,446 ("the '446 Patent").

2. I understand that mate., LLC is the Plaintiff and that EL is the Defendant in a patent infringement case filed in the United States District Court for the Southern District of California, Civil Action No. 3:22-cv-0195-CAB-DEB.

3. I submit this declaration based on my personal knowledge and experience, as well as the materials that I reviewed and considered in formulating my opinions.

QUALIFICATIONS AND EXPERIENCE

4. I am a technical expert in the subject matter areas relevant to the '446 Patent, including the design and testing of LED drivers and dimmers. I am qualified to reach the opinions and conclusions stated in this Declaration. I address my background and qualifications in Section I below and provide additional detail in my CV submitted with this report.

5. I am the Founder and President of McAlexander Sound, Inc., formerly IP Director of CCI and Vice President of EPI Technologies, Inc.

6. I am a Registered Professional Engineer (#79454) in the State of Texas and am also a senior lifetime member of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and, in particular, have joined the Computer, Electron Devices, and Solid-State Circuits societies of IEEE. I hold a Bachelor of Science degree in Electrical Engineering from North Carolina State University and completed 1.5 years of graduate level studies in Neurophysiology at the University of Texas Graduate School of Biomedical Science. I have been associated with the integrated circuit and electronics industry as a designer and consultant for the past 50 years and am a named inventor on 31 U.S. patents and a number of foreign patents, some of which are related to LED systems.

7. My skills and experience are in the areas of circuit design and analysis, device fabrication and assembly, testing, marketing, control system design and analysis, manufacturing operations, software development, management, and respective areas of quality, reliability, and defect/failure analysis. Specifically, I have:

- designed memories, including Dynamic Random Access Memories (DRAMs), Static Random Access Memories (SRAMs), Charge Coupled Devices (CCDs), Shift Registers (SRs), and functional circuits including I/O buffers for address and data, decoders, clocks, sense amplifiers, fault tolerant (incorporating both non-volatile EPROM and random access memory components), parallel-to-serial data paths for video applications,

level shifters, converters, pumps, and logic, as well as wireless communication systems and MEMs;

- managed operations including engineering, training, and quality assurance for device fabrication, assembly, test, analysis, and reliability assessment, as well as manufacturing control, each of which involved both volatile and non-volatile memory; testing, analysis, and control involved use of mechanical calibration and measuring equipment, including optical, scanning e-beam, IR, capacitive, and laser using phase contrast and Fast Fourier Transform (FFT) for High Aspect Ratio Inspection (HARI) applications;

- taught courses in solid-state device physics, integrated circuit design, integrated circuit fabrication, and statistical control; provided expert services, investigating both process and design technologies of various devices (microprocessor and controller, volatile and non-volatile memory, programmable logic, card, tag, module, mixed signal, custom, and other), systems (PC and peripheral, computer, control, laser measurement, switch, architecture, software, and other), and consumer products (medical, TV, telephone, VCR, facsimile, copier, lighting, game, and other); and designed and managed development, testing, and evaluation of memory devices and systems incorporating such devices, including simulation of operation. I have also had experience in programming, erasing, and wearout of electrically programmable and erasable non-volatile memories.

8. Of particular relevance is my experience as an integrated circuit designer, manager, and consultant. I spent nine years designing integrated circuit products at Texas Instruments, Inc., and an additional five years there managing wafer fabrication operations and assembly (packaging), test, and reliability analysis facilities. As such, I participated directly in the strategic design and process decisions required to bring competitive products to market and managed cost and revenue (both projected and actual) associated with those marketed products. I also worked directly with clients regarding product manufacturer-to-customer

integration, implementing direct-ship-to-customer productivity enhancements and establishing and executing product reliability and performance assessment studies. Often, such analyses suggested that certain modifications be made to design, fabrication, or assembly structures or methods, or to product flow and distribution. It was my responsibility to implement selected improvements to achieve the designated goals without negatively impacting the revenue models and time-to-market projections while maintaining and improving product yield and reliability.

9. As a designer and design manager, for example, I developed new, leading edge technology designs from conception to production. As such, my designs were always created in parallel with innovations in design simulation, in wafer processing, and in packaging architecture. I had to develop simulation behavioral models, tested against actual prototype designs, to determine the most appropriate fit between design, process, and assembly to deliver the best product to the market. In each case, my product prototype and production designs worked the first time; and the memory products were widely accepted in the market by major OEM companies.

10. I also worked with consumers evaluating performance of my designs in system applications to better match those designs to the consumers' requirements. New outgoing test methods and algorithm test patterns were designed to improve overall performance and reliability and to provide feedback for design and process

improvements. I thus developed a comprehensive understanding of the key factors, such as design, process, assembly, cost, equipment, facility, personnel resources, and timing necessary to bring a product from conception to market. These factors have continued to be key contributors to the success of products throughout the history of integrated circuits, even to the present.

11. Additionally, I have evaluated and provided expert services related to memory technology, both as standalone components and as components integrated into memory modules and systems, and also process and design technologies of various devices including microprocessors, controllers, memory, and programmable logic. I have also provided expert services related to product procurement and contract purchase order fulfillment according to contract agreement deliverables. I am also knowledgeable of communication control, addressing, and data transfer protocol as it relates to system architecture.

12. Additionally, I have innovations in the areas of LED technology, as embodied in a number of my patents, including LED drivers.

13. Because of my background, education, training, and experience, I am qualified as an expert to opine on the technology and other, related technical factors. A more detailed account of my work experience and other qualifications is listed in my Curriculum Vitae submitted with this Report as Attachment A.

I. METHODOLOGY AND MATERIALS CONSIDERED

14. I understand that this application is a national stage filing under 35 U.S.C. 371 of International Patent Application PCT/CA2009/001295, filed on Sep. 17, 2009, which claims the benefit of priority of U.S. Provisional Application No. 61/097,963, filed September 18, 2008, and that the Patents, all but the '713 Patent, share the same specification. My opinions are based on my technical experience, knowledge, and expertise in the area of LED drivers and dimmers.

15. My opinions expressed herein are also based on my review of the 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"), their respective prosecution histories (including several patents listed within those prosecution histories), extrinsic evidence relating to the technology of the Challenged Patents, prior art references, and other evidence cited in this declaration.

16. More specifically, for this work, I have been asked to review the '446 Patent including the specification and claims and the '446 Patent's prosecution history (file history). In developing my opinions related to the '446 Patent, I have considered the materials cited herein, including those items itemized in the Exhibit Table below.

EXHIBIT	DESCRIPTION
Ex. 1001	U.S. Patent No. 8,525,446
Ex. 1004	File Wrapper for U.S. Patent No. 8,525,446
Ex. 1005	U.S. Patent 7,902,769 to Shteynberg
Ex. 1006	U.S. Patent Application No. US20060022214A1 to Morgan

17. This declaration contains my opinions with respect to the subject matter of this proceeding and with the understandings as set forth herein. I specifically reserve the right to formulate and offer additional or supplemental opinions based on any additional information, depositions, discovery, or evidence that may be provided or derived, future court rulings, or agreements between the parties, to the extent permitted by the Board.

II. OVERVIEW OF LEGAL STANDARDS

18. I do not have any formal legal training, and I am not an attorney. EL's counsel has informed me of certain legal principles that I applied in my analysis. Those legal principles are summarized below.

19. I understand that patent claims are presumed valid and cannot be invalidated unless there is a showing the preponderance of the evidence demonstrates that the claim is invalid.

20. The following section summarizes the law as I have been instructed to apply it in formulating and rendering my opinions found later in this declaration. I

understand that, in an *inter partes* review proceeding, patent claims may be deemed unpatentable if it is shown that they were anticipated or rendered obvious in view of the prior art. I understand that prior art in an *inter partes* review is limited to patents or printed publications that predate the priority date of the patent at issue. .

A. Person of Ordinary Skill in the Art

21. I was asked to provide my opinion as a person of skill in the art as it relates to the '446 Patent during the period leading up to the earliest claimed priority date. I considered several factors, including the types of problems encountered in the art, the solutions to those problems, the pace of innovation in the field, the sophistication of the technology, and the education level of active workers in the field. I provide that level below in Section V.

B. Anticipation

22. I understand that, when determining whether a claim is anticipated, it is based on underlying factual issues including the content of the prior art and the level of ordinary skill in the art. I further understand that, for a single reference to anticipate a claim, the four corners of that document describes every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation.

23. I understand that invalidity for anticipation requires that "[t]he identical invention must be shown in as complete detail as contained in the patent claim." *TF3 Ltd v. Tre Milano, LLC*, 894 F.3d 1366, 1374 (Fed. Cir. 2018).

C. Obviousness

24. I understand that when determining whether a claim is "obvious," the analysis is based on underlying factual issues including the content of the prior art and the level of ordinary skill in the art. I further understand that for a single reference or a combination of references to render the claimed invention obvious, a POSITA must have been able to arrive at the claims by modifying or combining the references.

25. I have further been informed and understand that a claim is unpatentable as obvious if the difference between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a POSITA at the time the invention was made.

26. I also have been informed and understand that the combination of familiar elements according to known methods is obvious when it does no more than yield predictable results. However, I further understand that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. I understand that to prove a claim would have been obvious, one must demonstrate that a POSITA would have

been motivated to combine or modify the prior art to achieve the claimed invention, while having a reasonable expectation of success in doing so.

27. I further understand that a claim may be obvious if common sense directs one to combine multiple prior art references or add missing features to reproduce the alleged invention recited in the claims. I also understand that if a POSITA could implement a predictable variation, then the claim is likely unpatentable. For the same reason, if a technique has been used to improve one device and a POSITA would recognize that it would improve similar devices in the same way, then using the technique is obvious. I further understand that a claim can be obvious if it combines old elements with no change to their respective functions, or alters prior art by merely substituting one element for another known in the field to yield a predictable result.

D. Claim Construction

28. I have been advised that "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 in the '446 Patent should be construed in accordance

with its ordinary and customary meaning for the purposes of resolving the issues raised in the Petition.

29. I have followed these principles in my analysis throughout this declaration.

III. LEVEL OF ORDINARY SKILL IN THE ART

30. In determining the characteristics of a person of ordinary skill in the art at the time of the claimed invention, several things should be considered, including the factors discussed below, as well as (1) the levels of education and experience of the inventor and other persons actively working in the relevant field; (2) the types of problems encountered in the field; (3) prior art solutions to these problems; (4) the rapidity in which innovations are made; and (5) the sophistication of the relevant technology.

31. All of the opinions that I provide herein are provided through the lens of a person having ordinary skill at the relevant time (prior to 2006, which I understand is the priority date claimed by the ‘446 Patent). In my opinion, a person having ordinary skill in the art (“POSITA”) at the time of the alleged invention would have had at least a bachelor’s degree in electrical engineering, computer science, or a related field and significant experience with power regulation devices, like LED drivers and dimmers.

32. I am prepared to testify as an expert in this field and also as someone who had at least the knowledge of a POSITA, and someone who worked with other POSITAs at the time of the alleged invention.

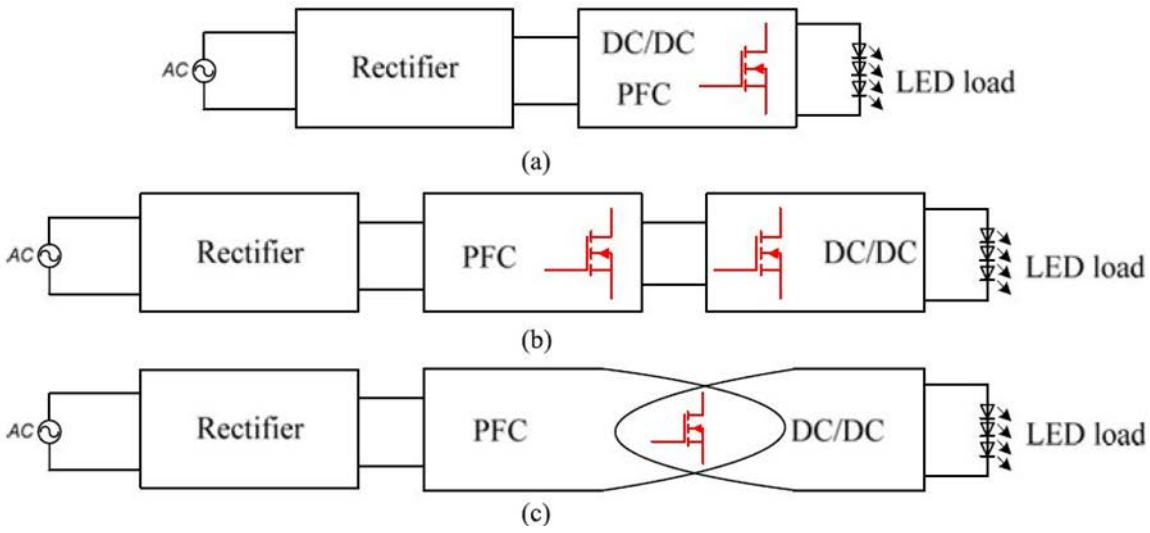
IV. TECHNICAL BACKGROUND AND THE '446 PATENT

A. Background of the Relevant Technology

33. 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).

34. "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).

35. A single-stage LED driver is a DC/DC converter with 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.

36. [D]ue to the unique characteristics of LEDs, a current loop is always included in the [DC/DC stage] 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.

37. "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 circuit. Therefore, cost and size of the system is reduced while ensuring high efficiency, high reliability, and fast output dynamics. *Id.*

B. Overview of the '446 Patent

38. The '446 Patent describes a configurable light-emitting diode (LED) driver/dimmer for controlling a set of light fixture loads. Ex. 1001, Abstract. The '446 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, 1:35-38.

39. The '446 Patent further notes that "[w]ith the rapid increase in [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, 1:17-24.

40. "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.

41. Finally, the '446 Patent states "[t]he ability to dim the light output of LEDs is also important to reduce energy consumption." Ex. 1001, 1:36-37.

C. The Alleged Invention

42. The claims of the '446 are generally directed to a configurable LED driver for controlling a set of light fixture loads. More specifically, LED driver/dimmer of the '446 Patent includes a power circuit; a primary digital controller for controlling the power circuit; 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; a secondary digital controller for controlling the set of output current drivers; wherein the secondary controller transmits LED control information to control outputs of the set of output current drivers; and wherein the secondary digital controller provides digital feedback control information to the primary digital controller. Ex. 1001, Abstract.

D. Summary of Prosecution History

43. The application that issued as the '446 Patent (US13/059,336) was filed on March 22, 2011, and was 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. Ex. 1001, Cover page.

44. Several claims were rejected as being anticipated or obvious in view of (1) U.S. Patent Application No. 2008/0018261 ("Kastner") and (2) the combination of Kastner and U.S. Application No. 2008/0025028 ("Gloisten"). Ex. 1004 at 96

45. Claim 1 was amended to include the subject matter of original Claim 2 and to remove the phrase "wherein the secondary controller provides feedback control information to the primary controller" which was added to new Claim 21. Claim 3 was amended to replace the expression "dynamic control of the" with the expression "configuration of." Claims 4, 6, 7, and 16 were amended to remove the word "digital". Finally, Claims 4, 14, 16, and 17 were amended to change their claim dependency. Ex. 1004 at 84.

46. On May 9, 2013, the USPTO issued a Notice of Allowance allowing pending claims 1, 3, 4, and 6-23. In the Notice, the Examiner noted that the prior art does not disclose a configurable light emitting diode (LED) driver/dimmer further comprising a power circuit including an inrush current limit; a DC/DC converter, a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter; a regulated output voltage bus connected to the DC/DC converter; and at least one power limit connected to the output voltage bus. Ex. 1004 at 51-52.

47. For the reasons discussed below, each of the purportedly inventive elements of the claimed LED driver were known in the prior art at least since 2006.

E. Overview of the Prior Art

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

49. 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. Ex. 1005, Cover Page. Shteynberg was issued on March 8, 2011, and is prior art to the '446 Patent under pre-AIA § 102(a). Ex. 1005, Cover Page. 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, fig. 7, 8, and 10.

50. More specifically, Shteynberg discloses that the invention allows "for solid state lighting, such as LEDs, to be utilized with the currently existing lighting infrastructure and to be controlled by any of a variety of switches, such as phase modulating dimmer switches, which would otherwise cause significant operation problems for conventional switching power supplies or current regulators. The exemplary embodiments further allow for sophisticated control of the output

brightness or intensity of such solid state lighting, and may be implemented using fewer and comparatively lower cost components." Ex. 1005, 1:46-57.

51. U.S. Patent Application No. US20060022214 ("Morgan") was filed on July 8, 2005, and claims priority to Application No. 60/586,939, filed July 8, 2004, entitled "Integrated LED Systems and Methods;" and to Ser. No. 60/588,090, filed July 15, 2004, entitled "LED Package Methods and Systems." Morgan was published on February 2, 2006. Morgan is prior art to the '759 Patent under pre-AIA § 102(b). Morgan teaches a method for providing a light source including providing at least one LED in an LED die and packaging the LED die with a submount, wherein the submount incorporates an electronic component for controlling the LED, wherein the electronic component facilitates control of at least one of the intensity and the apparent intensity of the LED die. Ex. 1007, 1[0014].

V. SUMMARY OF MY OPINIONS

52. Having reviewed the '446 Patent and the prior art discussed herein, I have formed the following opinions:

- U.S. Patent No. 7,902,769 to Shteynberg ("Shteynberg") discloses all limitations of claims 1, 13, 15, and 21 and these claims are anticipated by Shteynberg.
- The combination of Shteynberg and U.S. Patent Application No. 2006/0022214 to ("Morgan") discloses all limitations of claims 2, 3, 5, and 7, and these claims are rendered obvious by this combination.

- I have attached a chart showing the prior art teaches the limitations of each claim. Ex. A.

A. Opinions

1. Ground 1: Shteynberg anticipates Claims 1, 13, 15 and 21

53. Independent claims 1 and 21 and dependent claims 13 and 15 of the ‘446 Patent are anticipated by Shteynberg under 35 U.S.C. § 102. In reaching this conclusion, I provide the opinions as one of ordinary skill in the art below.

54. A power circuit generally is any circuit used to carry electricity that operate s, provides power to, a load. Everything about the Power Distribution Board Manufacturing, February 22, 2022. *Everything About Power Distribution Board Manufacturing*, Das & Co. (Feb. 22, 2022), available at https://www.dasnko.net/blog/post/1670466/electrical-power-distribution-panel-board-in-kolkata#:~:text=A%20power%20circuit%20is%20any,electricity%20that%20o perates%20a%20load.

55. Similarly, a power converter processes and controls the flow of electrical energy by supplying voltages and currents in a form that is optimally suited for user loads, in this case to provide variable brightness levels for solid-state lighting. Petrocelli, R. (2015). “One-Quadrant Switched-Mode Power Converters.” Bailey, *Proceedings of the CAS–CERN Accelerator School: RF for Accelerators*, CAS–CERN ACCELERATOR SCH. (2012), at 15, available at https://cdsweb.cern.ch/record/1231364.

56. In my opinion, the power converter of Shteynberg is analogous to the power circuit of the ‘446 Patent because both the power converter and power circuit are designed to carry electricity to supply a load, in this case a LED load. Therefore, Shteynberg discloses a power circuit.

57. Inrush current occurs when a device is turned on and, during the initial stage, a huge amount of current rushes into the circuit. *Sourav Gupta*, *Inrush Current – Causes, Effects Protection Circuits and Design Techniques*, Cir. Dig. (Nov. 27, 2019), https://circuitdigest.com/tutorial/inrush-current-causes-effects-protection-circuits-and-design-techniques. An inrush current limiter is a component used to limit inrush current to avoid gradual damage to components and avoid blowing fuses or tripping circuit breakers. 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 ‘446 Patent because the resistor when used as described limits current to an amount that is proportional to the amount of the resistance. *Id*.

58. A buck converter or step-down converter is a DC-to-DC converter that steps down voltage (while stepping up current) from its input (supply) to its output (load). *What is a Buck Converter?*, CircuitBread (Nov. 12, 2020), https://www.circuitbread.com/ee-faq/what-is-a-buck-converter. It would be readily understood that the buck converter of Shteynberg is equivalent to the DC/DC converter disclosed in the ‘446 Patent.

59. The switching power supply (150) that provides a regulated output voltage connected to the rectifier (110) with impedance matching network (120) and switching power supply (buck converter) (150), as disclosed in Shteynberg is the equivalent of the regulated output voltage bus of the ‘446 patent because the switching power supply takes the rectified voltage from rectifier 110 and provides current to the LEDs 140.

60. Further, a POSITA would understand that controlling the switching power supply 150 and modifying the brightness (or intensity) provided by the LEDs 140 is equivalent to establishing a power limit because the brightness level is determined by limiting power to the LED. 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 is equivalent to the regulated output voltage bus.

61. Controller 160, disclosed in Shteynberg, is equivalent to the primary controller required by the ‘446 Patent. Additionally, controller 260, disclosed in Shteynberg, is the secondary controller required by the ‘446 Patent. Shteynberg describes the use of multiple controllers (processors) capable of performing discrete functions in its circuit design. From this disclosure, it is readily understood that one controller can serve as the primary controller capable of performing a certain function; and another controller can serve as the secondary controller capable of

performing a separate function. A POSITA would recognize that Shteynberg's disclosure that controller 260 can be one more controller makes it distinct from controller 160. Further, a POSITA would understand that Shteynberg's disclosure that controller 260 is programmed to control the switching power supply 150 and correspondingly modify the brightness of the LEDs 140 is equivalent to controller the set of output current drivers.

62. Claim 13 of the '446 Patent requires the LED driver/dimmer of claim 1 wherein the light fixture load is one of an Organic LED (OLED) load or an LED load. An electronic load is a device which takes electrical energy. *Electrical Load*, CIRCUIT GLOBE (June 13, 2019), https://circuitglobe.com/electrical-load.html. A load converts electricity into heat, light, or motion. *Types of Electrical Loads*, SCIENCING, (April 30, 2018) https://sciencing.com/types-electrical-loads-8367034.html. In this way, an LED can be an electronic load. With respect to Claim 13, it is my opinion the electronic load 250 and LEDs 140 of Shteynberg are equivalent to the LED load of the '446 Patent.

63. Claim 15 of the '446 Patent requires that the primary and secondary controllers of the LED driver/dimmer of claim 1 be digital controllers. A digital controller is a system that can be used for controlling closed-loop feedback systems. The controller implements algebraic algorithms such as filters and compensatory to

regulate, correct, or change the behavior of the controlled system. Edmund Lai PhD, Beng, in Practical Digital Signal Processing, 2003.

64. With respect to Claim 15, a POSITA would understand that controllers, such as 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, and other ICs and components disclosed in the Shteynberg are digital because they each operate using a binary system as opposed to having to modify specific components as with analog controllers.

65. Claim 21 of the '446 Patent is anticipated by Shteynberg. Ex. 1005, Cover Page. My opinions with respect to power circuit, inrush current limit, DC-to-DC conversion, and power limit are the same with respect to claims 1 and 21. *See* ¶¶ 54-59 above.

66. The rectifier (110) that provides a regulated output voltage connected with impedance matching network (120) and switching power supply (buck converter)(150), as disclosed in Shteynberg, is the equivalent of the regulated output voltage bus of the '446 Patent. Further, controlling the switching power supply 150 and modifying the brightness (or intensity) provided by the LEDs 140 is equivalent to establishing a power limit. 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.

2. Ground 2: Shteynberg in view of Morgan renders Claims 2, 3, 5, and 7 Obvious

67. Claims 2, 3, 5, and 7 of the ‘446 Patent are rendered obvious under 35 U.S.C. § 103 by Shteynberg in view of Morgan.

a. Claim 2

68. Claim 2 depends from independent claim 1. The additional limitations of claim 2 are disclosed by Morgan. Claim 2 states “the LED driver/dimmer of claim 1 further comprises a set of in-circuit serial programming (ICSP) ports, each of the set of ICSP ports associated with one of the set of output current drivers for configuration of output current drivers.” Ex. 1001, 10:63-67.

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. *What is In-Circuit Serial Programming?*, Learning About Electronics, http://www.learningaboutelectronics.com/Articles/In-circuit-serial-programming.php (last visited Aug. 2, 2023). ICSPs also allow firmware updates to be delivered to the on-chip memory of microcontrollers and related processors without requiring specialist programming circuitry on the circuit board and

simplifies design work. *Id*. With respect to Claim 2, a POSITA would understand that at least the serial ports and Ethernet facilitates disclosed in Morgan is equivalent to the in-circuit serial programming (ICSP) ports disclosed in the '446 Patent. *Id*.

70. Further, a POSITA would understand that the delivery of instructions using serial ports and Ethernet facilities to control illumination, as described in Morgan is equivalent to using an ICSP port to control the output current required in Claim 2.

71. In my opinion, the Shteynberg-Morgan combination thus discloses "[t]he LED driver/dimmer of claim 1 further comprising a set of in-circuit serial programming (ICSP) ports associated with one of the set of output current drivers for configuration of output current drivers and renders claim 2 obvious.

b. Claim 3

72. Claim 3 depends from independent claim 1. The additional limitations of claim 3 are disclosed by Morgan. Claim 3 of the '446 Patent states that "the LED driver/dimmer of claim 1 further comprising a communication interface for receiving data from an external transmitter and for transmitting the data to the secondary controller." Ex. 1001, 11:1-4.

73. A communication interface is any wireless or wired technology that is used to connect devices to one another, such as the Internet, remote servers, etc. Vlasios Tsiatsis, INTERNET OF THINGS (2d ed. 2019). With respect to claim 3,

Morgan discloses that "the lighting unit 102 may include a physical data interface 4904 for receiving data, such as from another lighting unit 102, from a signal source 8400, from a user interface 4902, or from a control facility 3500. Referring to FIG. 32, the lighting unit 102 may include one or more communication ports 4904 to facilitate coupling of the lighting unit 102 to any of a variety of other devices." Ex. 1006, 25[0379]. A POSITA would understand that the communication port can be used to transmit data to the secondary controller because, as discussed above, communication interfaces such as the communication port of Morgan are used to connect one device (a user interface) to another controller for controlling output to the LEDs.

74. It is my opinion that a POSITA would understand that the LED driver of Shteynberg could be modified to add the communication interface disclosed in Morgan and render claim 3 obvious.

c. Claim 5

75. Claim 5 depends from independent claim 1. The additional limitations of claim 5 are disclosed by Morgan. Claim 5 of the '446 Patent states that "[t]he LED driver/dimmer of claim 3 wherein the communication interface is either DMX512A, 0-10 Vdc analog control, Zigbee wireless or Remote Device Management (RDM) compatible." Ex. 1001, 11:7-10.

76. Zigbee is a standards-based wireless technology developed to enable low-cost, low-power wireless machine-to-machine and internet of things (IoT) networks. *Definition: Zigbee*, TECHTARGET (JUNE 2017), https://www.techtarget.com/iotagenda/definition/ZigBee#:~:text=Zigbee%20is%20a%20standards%2Dbased,and%20is%20an%20open%20standard. Additionally, DMX512A is a communication protocol used to remotely control lighting dimmers and intelligent fixtures. It is designed to provide a common communications standard between these lighting devices regardless of the manufacturer. *DMX512A Protocol*, LUMENETIX (June 28, 2017).

77. Examples of DMX connectors are provided below

FIGURE 1: DMX512A CONNECTORS – RJ45 AND 5-PIN XLR

Michael Pearce, *DMX512A*, MICROCHIP TECHNOLOGY INC. (2014).

78. With respect to Claim 5, a POSITA would understand that the USB ports, serial ports, Ethernet facilities, wires, routers, switches, hubs, access points, buses, multi-function ports, intelligent sockets, intelligent cables, flash and USB memory devices, file players, and other facilities for handling data transfers

disclosed in Morgan are either DMX512A or Remote Device Management (RDM) compatible. Thus, the Shteynberg-Morgan combination renders claim 5 obvious.

d. Claim 7

79. Claim 7 depends from independent claim 1. The additional limitations of claim 7 are disclosed by Morgan. Claim 7 of the '446 Patent states that "[t]he LED driver/dimmer of claim 1 further comprising a housing portion for housing the components of the driver." Ex. 1001, 11:14-15.

80. With respect to Claim 7, a POSITA would understand that the LED driver of Shteynberg would need the housing described in Morgan to protect its internal circuitry. The Shteynberg-Morgan combination thus discloses that the LED driver/dimmer of claim 1 further comprises a housing portion for housing the components of the driver and renders claim 7 obvious.

VI. MOTIVATION TO COMBINE SHTEYNBERG AND MORGAN

81. In my opinion, a POSITA would have been motivated to combine the teachings of Shteynberg and Morgan because both references are in the same field of endeavor—namely, configurable LED drivers capable of varying luminesce in solid state lighting. The '446 Patent defines its "Technical Field" as a "novel LED Driver/dimmer for solid state lighting applications." Ex. 1001, 1:39-40.

82. Like the '446 Patent, Shteynberg and Morgan are directed to powering and controlling solid state lighting applications. Shteynberg discloses that its "Field

of the Invention" is in general related to power conversion and more specifically, to a system, apparatus and method for supplying power to solid state lighting devices, such as providing power to light emitting diodes ("LEDs") and LEDs integrated with digital controllers or processors. Ex. 1006, 1:18-22. Similarly, Morgan discloses that its systems and methods "that include an LED die integrated in an LED package with a submount that includes an electronic component for controlling the light emitted by the LED die. The electronic component integrated in the submount may include drive hardware, a network interface, memory, a processor, a switch-mode power supply, a power facility, or another type of electronic component." Ex. 1006, 1[0012].

83. Moreover, Shteynberg and Morgan are analogous to the '446 Patent because they are each reasonably pertinent to the technical problem allegedly addressed by the claimed invention. For example, the '446 Patent describes that a novel LED Driver/dimmer is needed to address the lack of expertise by lighting companies in the driving and dimming requirements for LEDs. Ex. 1001, 1:34-37. Similarly, Shteynberg discloses that "a need remains for an LED driver circuit which can operate consistently with a typical or standard dimmer switch of the existing lighting infrastructure and avoid the problems discussed above (including perceptible LED flicker), while providing the environmental and energy-saving benefits of LED lighting. Ex. 1005, 25:29. Morgan likewise discloses "that LED

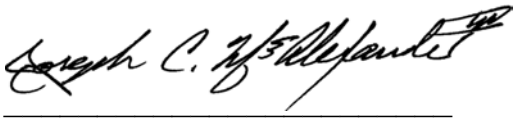
packages have been developed that include an LED die and a submount that includes a diode, such as an ESD diode. However, current LED packages require manufacturers to develop and implement many separate electronic components in order to power the LED dies and to control the light coming from the LED dies. A need exists to simplify the challenges of powering and controlling LED packages. Power supplies, used in LED lighting systems have often been based on power supplies for conventional lighting systems or other electronic devices, leading to problems of inefficiency, lack of reliability and lack of longevity. Accordingly, a need exists for power supplies designed and optimized for LED lighting systems." Ex. 1006, 1[0005]-[0006].

84. Finally, a POSITA, would have had a reasonable expectation of success in making this modification. The LED Driver components described in Shteynberg and Morgan were well-known at the time ("A wide variety of off-line LED drivers are known. For example, a capacitive drop off-line LED driver from On Semiconductor (Application Note AND8146/D) is a non-isolated driver with low efficiency, is limited to deliver relatively low power, and at most can deliver a constant current to the LED with no temperature compensation, no dimming arrangements, and no voltage or current protection for the LED."). Ex. 1005, 1:26-33.

85. As such, a POSITA would have recognized it would have been straightforward to modify the LED driver of Shteynberg to include Morgan's set of in-circuit serial programming (ICSP) ports, external transmitters, communication interfaces (DMX512A, 0-10 Vdc analog control, Zigbee wireless or Remote Device Management (RDM) compatible) in order to increase the programmable nature of the LED drive from external source. A POSITA would have further recognized that it would have been straightforward to modify the LED driver of Shteynberg to Morgan's housings to protect the internal circuitry, any mechanical interfaces and the heat dissipation facilitates.

86. Therefore, a POSITA would be motivated to combine Shteynberg with Morgan.

I declare under penalty of perjury that the foregoing is true and accurate.



Joseph C. McAlexander III

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Prior Art to U.S. Patent No. 8,525,446

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
1[p] – A configurable light emitting diode (LED) driver/dimmer for controlling a set of light fixture loads comprising	"[A] current regulator (power converter) for providing variable power to solid state lighting, such as LEDs, in which the current regulator couplable through a phase-modulating switch to an AC line Voltage." Shteynberg, 4:62-65, fig. 6-7, 10. "[A]n 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." Shteynberg, 8:10-13. "[A]n LED driver circuit is provided which is couplable directly to an AC line voltage while nonetheless adapted to be controlled by a standard dimmer switch." Shteynberg, 8:15-17.	

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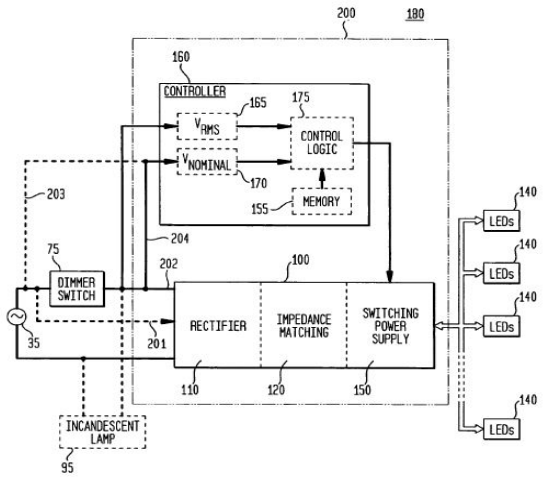
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	FIG. 7  (Shteynberg, fig. 7). "A controller or processor 160, 260 may be any type of controller or processor, and may be embodied as one or more controllers 160, 260, adapted to perform the functionality discussed herein." Shteynberg, 18:8-11.	
1(a) – a power circuit including	"A power converter for providing variable brightness levels for solid state lighting, the power converter couplable to a phase-	

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Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	modulating switch which is couplable to an AC line voltage." Shteynberg, 22:26-29.	
1(b) – an inrush current limit	"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." Shteynberg, 3:42-51.	
1(c) - a DC/DC converter	"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	

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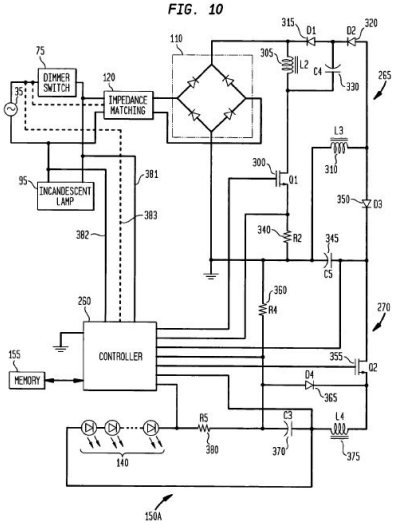
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	dimmers to misfire, as previously mentioned). This first stage will convert a relatively poor, phased modulated AC voltage into a manageable DC voltage, while the second stage (buck converter 270) will perform LED driving using current PWM, through switching transistor 355 (Q2)." Shteynberg, 13:65-14:8. FIG. 10  Shteynberg, fig. 10.	

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Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
1(d) - a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter	"[T]he current regulator 100 comprises a rectifier 10, an impedance matching circuit 120, and a switching power supply (or driver) 130." Shteynberg, 8:65-67. "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. 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." Shteynberg, 9:3-9.	

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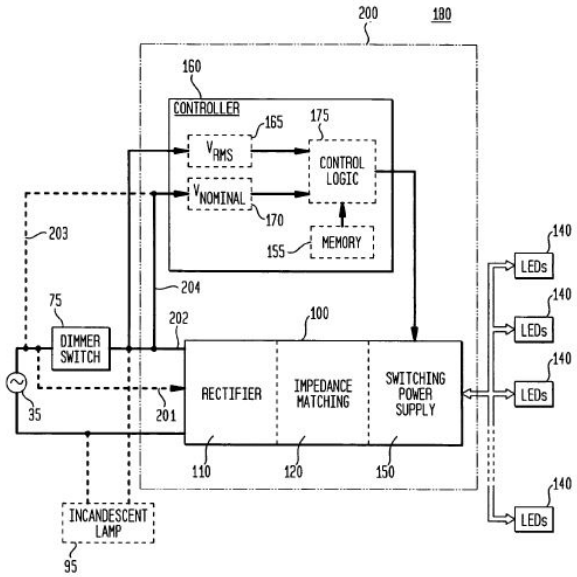
Prior Art to U.S. Patent No. 8,525,446

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	FIG. 7  Shteynberg, fig. 7. "[M]aking it compatible with the phase modulated input voltage." Shteynberg, 16:50-52. "[B]uilt-in capability to deliver power factor correction without additional power components." Shteynberg, 16:61-65.	

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Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	"The second stage of the switching power supply 150, converter 270, however, continues to operate and provide LEDs 140 with a regulated current (i.e., operates continuously, during both Ta and β time intervals). As mentioned above, when capacitor C5 (345) has a sufficient capacitance value, it has sufficient stored energy to continue to provide PWM current to LEDs 140, with the PWM also controlled by controller 260 through switch Q2 (355) . . . ." Shteynberg, 14:60-15:1.	
1(e) - a regulated output voltage bus connected to the DC/DC converter	"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." Shteynberg, 9:5-9. "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	

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U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	(buck converter 270) will perform LED driving using current PWM, through switching transistor 355 (Q2).” Shteynberg, 13:65-14:8. “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.” Shteynberg, 16:50-63.	
1(f) – at least one power limit connected to the output voltage bus	“FIG. 10 is a circuit diagram of an exemplary embodiment of a switching power supply 150A for a current regulator (or converter) 100, 200 in accordance with the teachings of the present invention.” Shteynberg, 13:34-37.	

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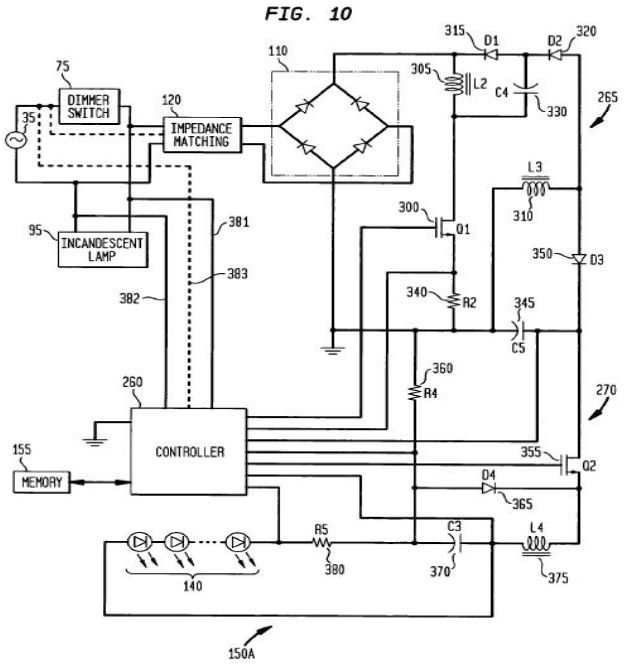
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	 Shteynberg, fig. 10. "[T]he controller 160 (and 260, FIG. 10) is programmed, adapted or configured to emulate the brightness or intensity control provided by the dimmer switch 75, to control the switching	

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Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	power supply 150 and correspondingly modify the brightness (or intensity) provided by the LEDs 140." Shteynberg, 9:21-26.	
1(g) – a primary controller for controlling the power circuit	"[T]he 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." Shteynberg, 9:21-26. "[T]he 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." Shteynberg, 10:57-59.	

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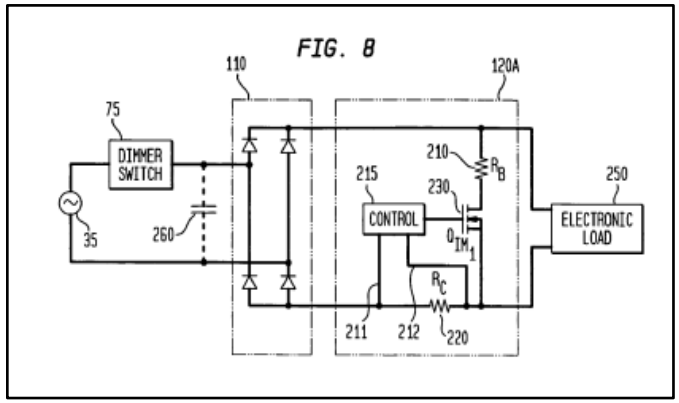
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	 Shteynberg, fig. 8.	
1(h) - a set of output current drivers, each of the set of output current drivers connected to one of the set of light fixture loads for controlling the associated light fixture load	"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	

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	control signal to regulate LED brightness." Shteynberg, 8:20-29.	
1(i) - a secondary controller for controlling the set of output current drivers	"[I]s 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." Shteynberg, 9:22-26. "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,	

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	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 E^2PROM." Shteynberg, 18:11-29. "[T]he controller 160, 260 may be implemented as an arrangement of controllers, microprocessors, DSPs and/or ASICs, collectively referred to as a 'controller', which are respectively programmed, designed, adapted or configured to implement the methodology of the invention, in conjunction with a memory 155." Shteynberg, 18:43-49.	
1(j) - wherein the secondary controller transmits LED	"[T]he controller 160 (and 260, FIG. 10) is programmed, adapted or configured to emulate the brightness or intensity control provided by	

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
control information to control outputs of the set of output current drivers	the dimmer switch 75, to control the switching power supply 150 and correspondingly modify the brightness (or intensity) provided by the LEDs 140." Shteynberg, 9:21-26. "[A] control signal such as a control voltage from control block 215, impedance matching circuit 120A can insert extra or additional current for the dimmer switch 75 to turn on the triac 80 and sustain an on-state when the load current is insufficient. The control signal may be provided from a variety of sources, such as from a controller 160, 260 (not separately illustrated). Such a control signal, for example, may be derived from a detected voltage across current sense resistor 220, as an indicator of the load current. For example, 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." Shteynberg, 10:48-59.	
2 - The LED driver/dimmer of claim 1 further		"In embodiments involving complex control, the physical data interface 4904 may include suitable hardware for

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Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
comprising: a set of in-circuit serial programming (ICSP) ports, each of the set of ICSP ports associated with one of the set of output current drivers for configuration of output current drivers.		handling data transmissions, such as USB ports, serial ports, Ethernet facilities, wires, routers, switches, hubs, access points, buses, multi-function ports, intelligent sockets, intelligent cables, flash and USB memory devices, file players, and other facilities for handling data transfers." Morgan, 7[0194].
3 - The LED driver/dimmer of claim 1 further comprising a communication interface for receiving data from an external transmitter and for transmitting the data to the		"In embodiments the control facility 3500 may respond to an external system 8800. The external system 8800 may be a computer system, an automation system, a security system, an entertainment system, an audio system, a video system, a personal computer, a laptop computer, a handheld computer, or any of a wide variety of other systems that are capable of generating control signals." Morgan, 7[0198].

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Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
secondary controller.		"The control interface 4900 may include a network interface 4902, such as for handling network signals according to any desired network protocol, such as DMX, Ethernet, TCP/IP, DALI, 802.11 and other wireless protocols, and linear addressing protocols, among many others. In embodiments the network interface 4902 may support multiple protocols for the same lighting unit 102." Morgan, 7[0193].
5 - The LED driver/dimmer of claim 3 wherein the communication interface is either DMX512A. 0-10 Vdc analog control, Zigbee wireless or Remote Device Management (RDM) compatible.		"In embodiments involving complex control, the physical data interface 4904 may include suitable hardware for handling data transmissions, such as USB ports, serial ports, Ethernet facilities, wires, routers, switches, hubs, access points, buses, multi-function ports, intelligent sockets, intelligent cables, flash and USB memory devices, file players, and other facilities for handling data transfers." Morgan, 7[0194].
7 - The LED driver/dimmer of		"A given lighting unit 102 may have any one of a variety of mounting arrangements

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Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
claim 1 further comprising a housing portion for housing the components of the driver.		for the light source(s) in a variety of housings 800. Housings 800 may include enclosures, platforms, boards, mountings, and many other form factors, including forms designed for other purposes. Housings 800 may be made of any material, such as metals, alloys, plastics, polymers, and many others." Morgan, 12[0254].
13 - The LED driver/dimmer of claim 1 wherein the light fixture load is one of an Organic LED (OLED) load or an LED load.	"[T]he 'electronic' load 250, for example, is a system 105, 180, such as a current regulator (or converter) 100, 200 coupled to LEDs 140." Shteynberg, 10:45-47. "The current regulator 100 provides power to one or more LEDs 140, which may be an array or multiple arrays of LEDs 140 or any type or color, with the regulator 100 and LEDs 140 forming a system 105." Shteynberg, 8:54-57.	

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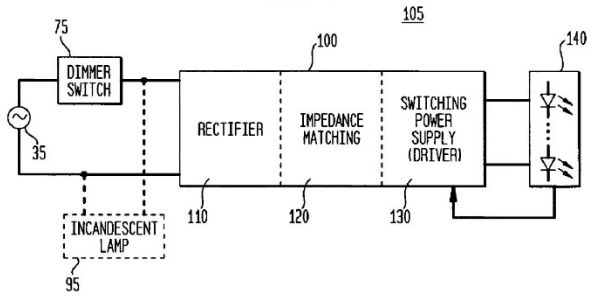
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	FIG. 6  Shteynberg, 8:54-57, fig. 6.	
15 - The LED driver/dimmer of claim 1 wherein the primary and secondary controllers are digital controllers.	"[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,	

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	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." Shteynberg, 18:8-21.	
21[p] - A power circuit for a configurable light-emitted diode (LED) driver, the power circuit comprising:	"[A] current regulator (power converter) for providing variable power to solid state lighting, such as LEDs, in which the current regulator couplable through a phase-modulating switch to an AC line Voltage." Shteynberg, 4:62-65, fig. 6-7, 10. "[A]n 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." Shteynberg, 8:10-13. "[A]n LED driver circuit is provided which is couplable directly to an AC line voltage while	

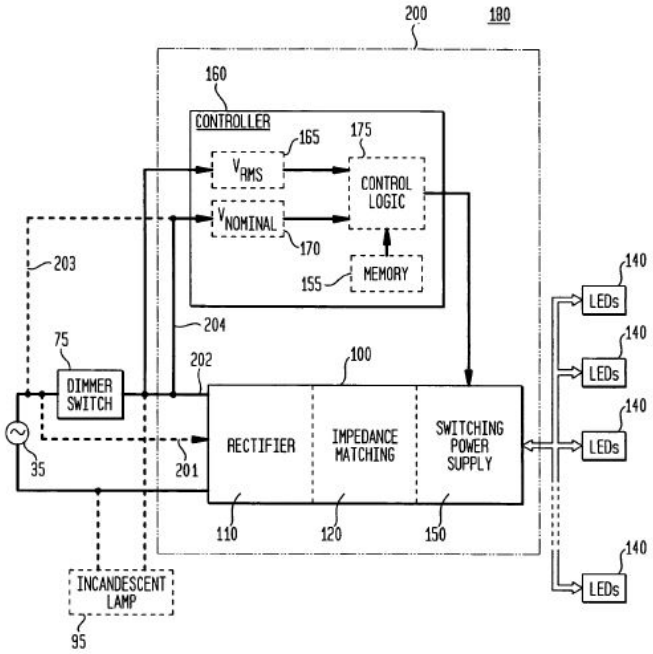
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	nonetheless adapted to be controlled by a standard dimmer switch." Shteynberg, 8:15-17. FIG. 7  Shteynberg, fig. 7. "A controller or processor 160, 260 may be any type of controller or processor, and may be	

Exhibit A
Prior Art to U.S. Patent No. 8,525,446

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	embodied as one or more controllers 160, 260, adapted to perform the functionality discussed herein." Shteynberg, 18:8-11. "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." Shteynberg, 22:26-29.	
21(b) - an inrush current limit	"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." Shteynberg, 3:42-51.	

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Prior Art to U.S. Patent No. 8,525,446

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
21(c) – a DC/DC converter	"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)." Shteynberg, 13:65-14:8.	

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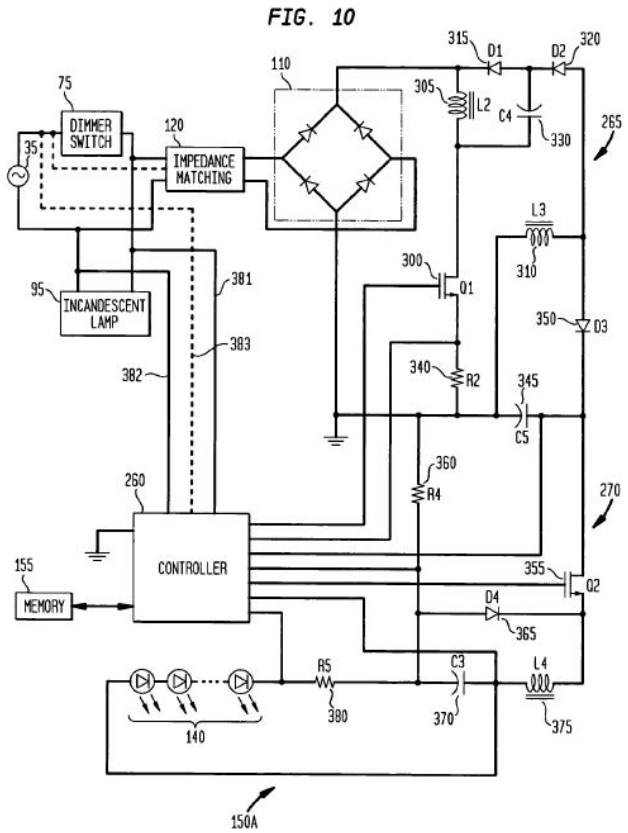
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	 Shteynberg, fig. 10.	

Exhibit A

Prior Art to U.S. Patent No. 8,525,446

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
21(d) – a power factor correction (PFC) boost connected to the inrush current limit and the DC/DC converter	"[T]he current regulator 100 comprises a rectifier 10, an impedance matching circuit 120, and a switching power supply (or driver) 130." Shteynberg, 8:65-67. "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. 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." Shteynberg, 9:3-9.	

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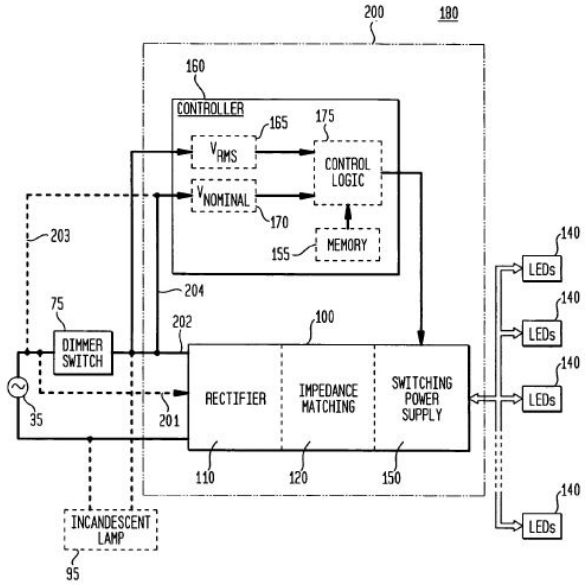
Prior Art to U.S. Patent No. 8,525,446

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	FIG. 7  Shteynberg, fig. 7. "[M]aking it compatible with the phase modulated input voltage." Shteynberg, 16:50-52.	

Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	"[B]uilt-in capability to deliver power factor correction without additional power components." Shteynberg, 16:61-65. "The second stage of the switching power supply 150, converter 270, however, continues to operate and provide LEDs 140 with a regulated current (i.e., operates continuously, during both Td and β time intervals). As mentioned above, when capacitor C5 (345) has a sufficient capacitance value, it has sufficient stored energy to continue to provide PWM current to LEDs 140, with the PWM also controlled by controller 260 through switch Q2 (355) . . . ." Shteynberg, 14:60-15:1.	
21(e) – a regulated output voltage bus connected to the DC/DC converter	"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." Shteynberg, 9:5-9. "The switching power supply 150A is implemented in two stages, an AC/DC	

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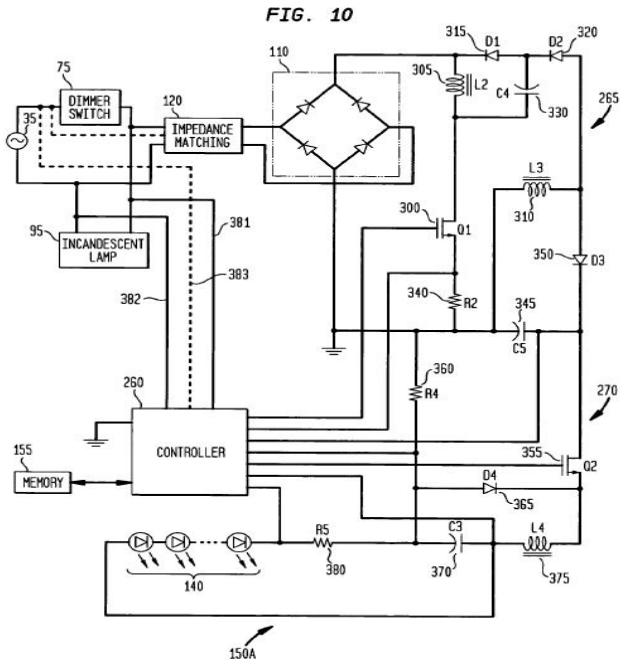
Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	converter 265 and a buck converter 270. . . . This first stage will convert a relatively poor, phased modulated AC voltage into a manageable DC voltage, while the second stage (buck converter 270) will perform LED driving using current PWM, through switching transistor 355 (Q2)." Shteynberg, 13:65-14:8. "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." Shteynberg, 16:50-63.	
21(f) - at least one power limit	"FIG. 10 is a circuit diagram of an exemplary embodiment of a switching power supply 150A	

Claims	Prior Art References	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
connected to the output voltage bus	for a current regulator (or converter) 100, 200 in accordance with the teachings of the present invention." Shteynberg, 13:34-37.  Shteynberg, fig. 10.	

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Claims	**Prior Art References**	
U.S. Patent No. 8,525,446	**U.S. Patent No. 7,902,769 to Shteynberg**	**U.S. Patent Application No. US20060022214 to Morgan**
	"[T]he 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 modifying the brightness (or intensity) provided by the LEDs 140." Shteynberg, 9:21-26.	