Filed on behalf of Wangs Alliance Corporation
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WANGS ALLIANCE CORPORATION D/B/A WAC LIGHTING CO.
Petitioner

v.

Patent Owner of
U.S. Patent No. 6,147,458 to Marcel J. M. Bucks and Engbert B. G. Nijhof et al.

Inter Partes Review Case No. Unassigned

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 6,147,458 UNDER 35 U.S.C. §§ 311-319 AND 37 C.F.R. §§ 42.1-.80, 42.100-.123

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I. MANDATORY NOTICES AND FEES

A. Real Parties-in-Interest

Wangs Alliance Corporation d/b/a WAC Lighting Co. is the real party-in-interest.

B. Related Matters

The following matter may affect or be affected by a decision herein: *Koninklijke Philips N.V. et al. v. Wangs Alliance Corporation*, Case No. 14-cv-12298-DJC (D. Mass.). Additionally, the Patent Owner is suing the Petitioner and/or other parties under one or more of U.S. Patent Nos. 6,013,988; 6,586,890; 6,250,774; 6,561,690; 6,788,011; 7,038,399; 7,352,138; 6,094,014; and 7,262,559, all of which generally relate to light emitting diodes ("LEDs"). On the same week as this petition, the Petitioner is also filing additional petitions for *Inter Partes* Review for six other patents asserted by the Patent Owner against the Petitioner: U.S. Patent Nos. 6,013,988; 6,586,890; 6,250,774; 6,561,690; 7,038,399; and 7,352,138.

C. Counsel

Lead counsel in this case is David Radulescu, Ph.D. (PTO Reg. No. 36,250); backup counsel is Angela Chao (PTO Reg. No. 71,991). Powers of attorney accompany this Petition.

D. Service Information

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E. Payment

Under 37 C.F.R § 42.103(a), the Office is authorized to charge the fee set forth in 37 C.F.R. § 42.15(a) to Deposit Account No. 506352 as well as any additional fees that might be due in connection with this Petition.

II. CERTIFICATION OF GROUNDS FOR STANDING

The Petitioner certifies pursuant to 37 C.F.R § 42.104(a) that the patent for which review is sought is available for *inter partes* review and that the Petitioner is not barred or estopped from requesting an *inter partes* review challenging the patent claims on the grounds identified in this Petition.

III. OVERVIEW OF CHALLENGE AND RELIEF REQUESTED

Pursuant to Rules 42.22(a)(1) and 42.104(b)(1)-(2), the Petitioner challenges claims 1, 15, and 21 of U.S. Patent No. 6,147,458 (the "'458 Patent") (Ex. 1001).

A. Prior Art Patents and Printed Publications

The Petitioner relies upon the patents and printed publications listed in the Table of Exhibits, including:

1. U.S. Patent No. 6,150,771 to Perry, ("Perry" (Ex. 1003)), which is prior art at least under § 102(e).

2. U.S. Patent No. 5,661,645 to Hochstein, ("Hochstein" (Ex. 1004)), which is prior art at least under § 102(e).

B. Grounds for Challenge

The Petitioner requests cancellation of claims 1, 15, and 21 of the '458 Patent ("challenged claims") as unpatentable under 35 U.S.C. § 102(e) and 103. This Petition, supported by the declaration of Robert Neal Tingler ("Tingler Decl." (Ex. 1005)), filed herewith, demonstrates that there is a reasonable likelihood that the Petitioner will prevail with respect to at least one challenged claim and that each challenged claim is not patentable. *See* 35 U.S.C. § 314(a).

Ground 1: Claims 1, 15, and 21 are anticipated by Perry.

Ground 2: Claims 1, 15, and 21 are obvious over Hochstein in view of Perry.

IV. CLAIM CONSTRUCTION

A claim in *inter partes* review is given the "broadest reasonable construction in light of the specification in which it appears." 37 C.F.R. § 42.100(b). The broadest reasonable construction is the broadest reasonable interpretation of the claim language. *See In re Yamamoto*, 740 F.2d 1569, 1571-72 (Fed. Cir. 1984). Any claim term which lacks a definition in the specification is therefore also given a broad interpretation. *In re ICON Health & Fitness, Inc.*, 496 F.3d 1374, 1379 (Fed.

Cir. 2007).[1] Should the Patent Owner contend that the claims have a construction different from their broadest reasonable construction in order to avoid the prior art, the appropriate course is for the Patent Owner to seek to amend the claims to expressly correspond to its contentions in this proceeding. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48756, 48764 (Aug. 14, 2012).

A. "Input filter means" and "input filter"

The "**input filter means**" and "**input filter**" are means-plus-function terms. They relate to the same "input filter means" in the '458 Patent. The use of "means" is presumed to invoke 35 U.S.C. § 112, ¶ 6. MPEP § 2181. Further, the terms include functional language referring to filtering. *See Arrhythmia Research Technology Inc. v. Corazonix Corp.,* 958 F. 2d 1053 (Fed. Cir. 1992) (finding "high pass filter means" to include functional language); *QRG, Ltd. d/b/a Quantum Research Group v. Apple,* 1:05-cv-03408-WMN, Dkt. No 45 at 17 (D. Md. June 7, 2007) (finding "filter means" to include functional language). The "input filter

[1] Petitioner adopts the "broadest reasonable construction" standard as required by the governing regulations. 37 C.F.R. § 42.100(b). Petitioner reserves the right to pursue different constructions in a district court, where a different standard is applicable.

means" performs the function of filtering an input. Tingler Decl. ¶ 26 (Ex. 1005). However, there is no corresponding structure for this claimed function disclosed in the specification. Tingler Decl. ¶ 26 (Ex. 1005). The '458 Patent merely discloses a box diagram labeled "input filter means I," without a corresponding structure in the specification.[2] '458 Patent, Fig. 1, 3:51; 3:56-57; 4:1-3 (Ex. 1001); Tingler Decl. ¶ 26 (Ex. 1005); *see also Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 949-53 (Fed. Cir. 2007) (holding that the term "control means" was indefinite because no sufficient structure was disclosed in a patent where "[t]he only references in the specification to the 'control means' are a box labeled 'Control' in Figure 6 and a statement that the regeneration process of the invention 'may be controlled automatically by known differential pressure, valving and control equipment.'"). Thus, if the PTAB determines that the term "input filter means" is indeed a means-plus-function term, it is not amendable to construction. Tingler Decl. ¶ 26 (Ex. 1005); *see also Space Exploration Technologies Corp. v. Blue Origin LLC*, IPR 2014-01378 at 8-9, Paper No. 6 (PTAB March 3, 2015) (holding that the Board is unable to reach a determination on the reasonable likelihood of the

[2] The Patent Owner has pointed to a rectifier means as an "optional, additional structure" corresponding to "input filter means." Batarseh March 13 Decl. ¶ 8 (Ex. 1006). Yet, there is no rectifier means structure disclosed in the specification or in any of the figures of the '458 Patent.

Petitioner prevailing on the prior art ground asserted in the Petition because a lack of sufficient disclosure of structure under 35 U.S.C. § 112, ¶ 6 rendered the claims "not amendable to construction").

However, the Patent Owner has taken the position that the term "input filter means" is not a means-plus-function terms, but rather "refer to a specific class of structures that a person of ordinary skill in the art would understand in light of the specification." Batarseh March 13 Decl. ¶ 2 (Ex. 1006). While the Petitioner disagrees with the Patent Owner, to the extent the PTAB determines that these are not means-plus-function terms, the broadest reasonable construction for these terms is "**an electric circuit or device which selectively transmits or rejects input signals in one or more intervals of frequencies**." *Wiley Electrical and Electronics Engineering Dictionary* (Steven M. Kaplan, 2004) (definition of "filter") (Ex. 1008); *McGraw-Hill Dictionary of Scientific and Technical Terms* 4th (Sybil P. Parker, 1989) (definition of "filter") (Ex. 1009); Tingler Decl. ¶ 26 (Ex. 1005). The Patent Owner and its expert have relied on this definition of the term from the *Wiley* dictionary. Batarseh Feb. 20 Decl. ¶ 41 (Ex. 1007). The declaration of the Patent Owner's expert, Dr. Batarseh,[3] supports this construction. *Id.*

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[3] Both Batarseh declarations were provided in a district court litigation between Petitioner and Patent Owner, *Koninklijke Philips N.V. et al. v. Wangs Alliance Corporation*, Case No. 14-cv-12298-DJC (D. Mass.).

B. "Leakage current"

The broadest reasonable construction of the term "**leakage current**" is "unnecessary dissipation of power." Tingler Decl. ¶ 27 (Ex. 1005). This construction is supported by the specification of the '458 Patent, which describes "leakage current" as a problem to be eliminated and refers to counteracting "**unnecessary power dissipation**." '458 Patent, 1:13; 1:55-59; 2:19-25; 4:63-65 (Ex. 1001); Tingler Decl. ¶ 27 (Ex. 1005). It is also supported by another patent by the Patent Owner, U.S. Patent No. 6,147,988, by the same inventors directed to resolving the same problem, which identifies a "self-regulating current-conducting network," that is counteracting "unnecessary power dissipation." '988 Patent, 1:36-54, 1:66-2:3 (Ex. 1012); Tingler Decl. ¶ 27 (Ex. 1005). The construction is further supported by a technical dictionary, which defines "leakage current" as "current which flows through **unwanted** paths of a circuit, such as from the output to the input when **not intended**." *Wiley Electrical and Electronics Engineering Dictionary* 285 (Steven M. Kaplan, 2004) (definition of "leakage current") [4] (Ex.

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[4] In the district court litigation between the Patent Owner and the Petition, the Patent Owner and its expert also relied on the *Wiley Electrical and Electronics Engineering Dictionary* in support of their construction for "leakage current." Batarseh Feb. 20 Decl. ¶ 21 (Ex. 1009). However, instead of using the first definition (upon which the Petitioner relies), which conveys that leakage current is

1008) (emphasis added); *McGraw-Hill Dictionary of Scientific and Technical Terms* 4th (Sybil P. Parker, 1989) (definition of "leakage current") (Ex. 1009); Tingler Decl. ¶ 27 (Ex. 1005).

C. "Self-regulating deactivating means for deactivating the means CM" *and* "Self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state"

Claim 1 requires "self-regulating deactivating means for deactivating the means CM" and claim 15 requires "self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state." '458 Patent, Claims 1 and 15 (Ex. 1001).

The "**self-regulating deactivating means for deactivating the means CM**" and "**self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state**" perform the function of **deactivating the means CM**. Tingler Decl. ¶ 28 (Ex. 1005). Under the broadest reasonable construction standard, the corresponding structure for this function is: **a transistor and Zener diode**. '458 Patent, FIG. 2, 4:9-25 (Ex. 1001); Tingler Decl. ¶ 28 (Ex.

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unwanted in the circuit, the Patent Owner selected the *sixth* definition in the dictionary, which does not convey that leakage current is an undesirable phenomenon. The former definition, and not the latter, is more applicable in the context of the '458 Patent, which is directed at resolving the problem of leakage current.

1005). The Patent Owner and its expert have agreed with this construction. Batarseh Feb. 20 Decl. ¶ 53-54 (Ex. 1007).

D. “Means CM for removing a leakage current occurring in the control unit in the non-conducting state, which means include a controlled semiconductor element” *and* “Means CM including a controlled semiconductor element for removing a leakage current occurring in the control unit in the non-conducting state”

Claim 1 requires “**means CM for removing a leakage current occurring in the control unit in the non-conducting state, which means include a controlled semiconductor element**” and claim 15 requires “**means CM including a Controlled semiconductor element for removing a leakage current occurring in the control unit in the non-conducting state**.” ’458 Patent, Claims 1 and 15 (Ex. 1001).

The Patent Owner and its expert have taken the position that these terms, even though drafted in a “means for” format, are not means-plus-function terms. Batarseh Feb. 20 Decl. ¶ 44-45 (Ex. 1007). The Patent Owner’s position is that these terms convey sufficient structure by referring to “a controlled semiconductor element,” which the “means CM” must include. Batarseh Feb. 20 Decl. ¶ 46 (Ex. 1007); *see also TriMed, Inc. v. Stryker Corp.*, 514 F.3d 1256, 1259-60 (Fed. Cir. 2008) (“Sufficient structure exists when the claim language specifies the exact structure that performs the function in question without need to resort to other portions of the specification or extrinsic evidence for an adequate understanding of the structure.”). While the Petitioner disputes this position in the district court litigation under the claim construction standard applicable in that jurisdiction and does not intend to waive that position, under the broadest reasonable construction standard, the terms do include sufficient structure to overcome the presumption that the terms are means-plus-function terms. Tingler Decl. ¶ 29 (Ex. 1005). The broadest reasonable construction of these terms is: “**a circuit, including a controlled semiconductor element, that draws leakage current from the control unit when the control unit is off**.” Tingler Decl. ¶ 29 (Ex. 1005). This construction is supported by the specification. ‘458 Patent, 3:51-4:8 (Ex. 1001); Tingler Decl. ¶ 29 (Ex. 1005). The Patent Owner and its expert agree with this construction. Batarseh Feb. 20 Decl. ¶ 43 (Ex. 1007).

E. “Detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto” *and* “Detection means for detecting a defective converter or semiconductor light source connected thereto”

Claim 1 requires “**detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto**” and claim 15 requires “**detection means for detecting a defective converter or semiconductor light source connected thereto**.” ’458 Patent, Claims 1 and 15 (Ex. 1001).

The “**detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto”** and "**detection means for detecting a defective converter or semiconductor light source connected thereto**" perform the function of **detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto**. Tingler Decl. ¶ 30 (Ex. 1005). Under the broadest reasonable construction standard, the corresponding structure for this function is: **a Zener diode**. '458 Patent, FIG. 2, 4:16-5:19 (Ex. 1001); Tingler Decl. ¶ 30 (Ex. 1005). The Patent Owner and its expert have agreed with a similar construction. Batarseh Feb. 20 Decl. ¶ 58-59 (Ex. 1007).

V. OVERVIEW OF THE '458 PATENT

A. Background

The '458 patent explains that a signaling light in an existing traffic signal system is often controlled by means of a control unit which includes a solid state relay. It is a general property of solid-state relays that a leakage current occurs in the non-conducting state of the relay when the relay drives a semiconductor light source. Tingler Decl. ¶ 18-19 (Ex. 1005).

B. Summary of Alleged Invention of the '458 Patent

The '458 Patent is purportedly directed to solving certain problems associated with retrofitting existing signaling lights, such as traffic lights, with the capability of operating with LEDs instead of incandescent lamps. '458 Patent, 1:22-32 (Ex. 1001); Tingler Decl. ¶ 18-19 (Ex. 1005). Among such problems is leakage current that occurs in the non-conducting state of the relay in the signaling lights. '458

Patent, 1:32-41 (Ex. 1001); Tingler Decl. ¶ 19 (Ex. 1005). Leakage current that occurs in signaling lights using incandescent lamps does not cause problems because there is typically not sufficient power to light up such lamps during the off state. Tingler Decl. ¶ 19 (Ex. 1005). However, in signaling lights using LEDs, leakage current may undesirably cause LEDs to light up when the circuit is in a non-conducting or "off" state. Tingler Decl. ¶ 19 (Ex. 1005).

The '458 Patent purports to relate to a circuit arrangement for operating a semiconductor light source. '458 Patent, Abstract (Ex. 1001); Tingler Decl. ¶ 19-20 (Ex. 1005). More specifically, the '458 Patent purports that the circuit arrangement of the alleged invention includes connection terminals (A and B) for connection to a control unit (VB), input filter means (I), a means CM (CM) for counteracting the leakage current, a converter with a control circuit (III), and output terminals (C and D) for connecting the semiconductor light source (LB). '458 Patent, Fig. 1, 1:11-2:62 (Ex. 1001); Tingler Decl. ¶ 21-22 (Ex. 1005).

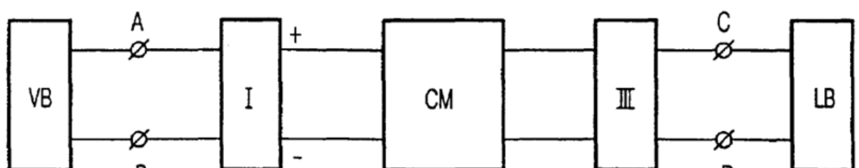


FIG. 1

The ’458 Patent purports that the objective of the alleged invention – that is, removing leakage current and detecting LED load failures – is achieved by the means CM, a self-regulating deactivating means for deactivating the means CM when the control unit (VB) is in a non-conducting state, and a detection means for detecting a defective converter or semiconductor light source. ’458 Patent, Fig. 1, 2:5-25 (Ex. 1001); Tingler Decl. ¶ 24 (Ex. 1005). This is purported to counteract unnecessary power dissipation. ’458 Patent, 2:18-25 (Ex. 1001); Tingler Decl. ¶ 24 (Ex. 1005).

C. Prosecution History

The ’458 Patent stems from European Patent Office application No. 98202215, filed on July 1, 1998. During the prosecution of the ’458 Patent, original claims 1-14 were rejected as anticipated under 35 U.S.C. § 102(e) by U.S. Patent No. 5,646,484 to Sharma (“Sharma”). PH 3/2/00 Office Action (Ex. 1002). Upon an amendment following the rejection, claims 1-14 were allowed. PH 8/26/99 Office Action (Ex. 1002). U.S. Patent No. 5,661,645 to Hochstein (“Hochstein”) was cited by the patentee during prosecution and is cited on the ’458 patent as prior art. U.S. Patent No. 6,150,771 to Perry (“Perry”) was not cited during prosecution of the ’458 patent.

VI. OVERVIEW OF THE PRIMARY PRIOR ART REFERENCES

A. Summary of the Prior Art

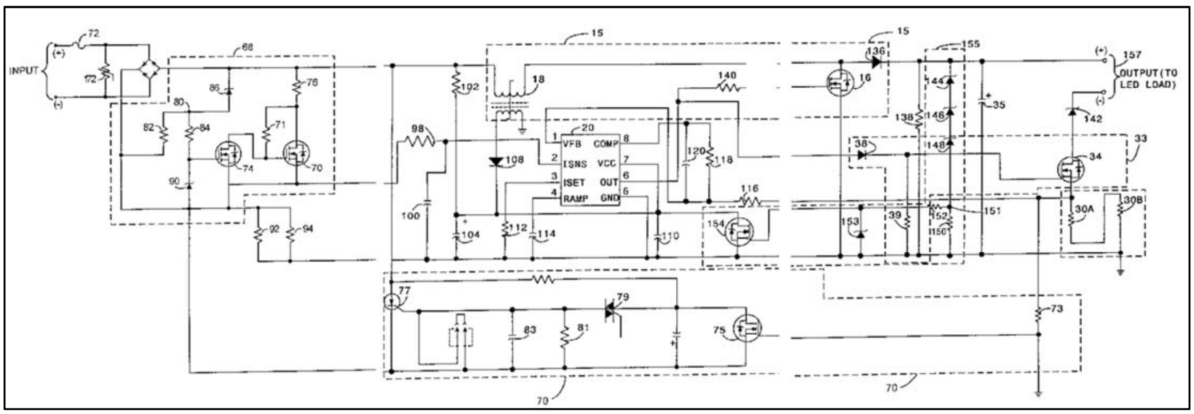
As shown below, there is nothing new or non-obvious in the Patent Owner's claims. The claimed circuit arrangement for operating a semiconductor light source was well known. Tingler Decl. ¶ 25, 58-59 (Ex. 1005).

B. References Are Not Cumulative

Perry and Hochstein have in common that they disclose the concept behind the patent – using a means CM to counteract leakage current. Perry cites to Hochstein on its face. However, they should not be considered cumulative because their focus and type of disclosure are different. While Perry and Hochstein are directed to resolving the same problem for traffic signals using LEDs, they differ in that Perry discloses a more complex power supply including the addition of a detection means for detecting an LED load failure. Additionally, a most appropriate prior art reference may not be apparent until it is known if and how the Patent Owner intends to respond, whether the Patent Owner will seek to amend claims, and whether the Patent Owner will argue for independent patentability of dependent claims, and which ones.

C. Overview of Perry (Ex. 1003)

U.S. Patent No. 6,150,771 to Perry ("Perry"), filed on Jun. 11, 1997, is a prior art reference to the '458 patent under 35 U.S.C. § 102(e). Perry discloses a circuit for interfacing between the controller and LEDs in a traffic light signal. Perry discloses that LEDs are used as replacements for the incandescent lamps typically used in traffic lights because LEDs offer greater power efficiency and have a longer life span. However, when turned off, leakage current in the relay continues to flow through the system and LEDs may appear to remain lit due to leakage current. To solve this problem, Perry discloses a circuit that, among other things, eliminates leakage current by grounding it when the circuit is turned off. Tingler Decl. ¶ 50-51 (Ex. 1005).

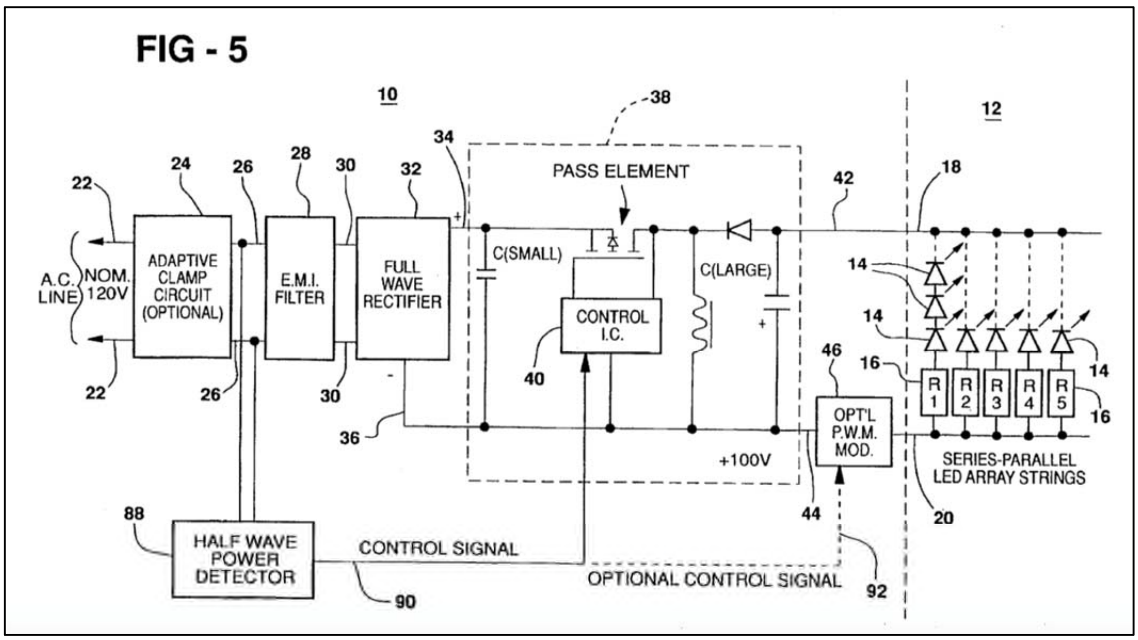


Figures 11A-11C of Perry

D. Overview of Hochstein (Ex. 1004)

U.S. Patent No. 5,661,645 to Hochstein, filed on Jun. 27, 1996, is a prior art reference to the ’458 Patent under 35 U.S.C. § 102(e). Like the ’458 Patent, Hochstein discloses a circuit that supplies a regulated DC voltage to an LED array. Hochstein discusses a problem peculiar to signals that are switched by means of solid state relays being the leakage current that can flow through the load when the solid state switch or relay is in the off state. Hochstein further discusses that this phenomenon is common to the switches that are commonly employed in traffic signal controllers and that these problems surface when relatively low power loads (such as LEDs) are connected to these same controllers. Tingler Decl. ¶ 53-55 (Ex. 1005).

Hochstein solves this problem by using an adaptive clamp circuit that assumes voltages lower than a certain value (typically 40 volts) are due to leakage currents through the solid state control relay. Upon detecting a low voltage, the adaptive clamp circuit will load the power lines with a resistor to draw current and force the leakage voltage down to 10 volts. Tingler Decl. ¶ 56-57 (Ex. 1005).



VII. SPECIFIC GROUNDS FOR PETITION

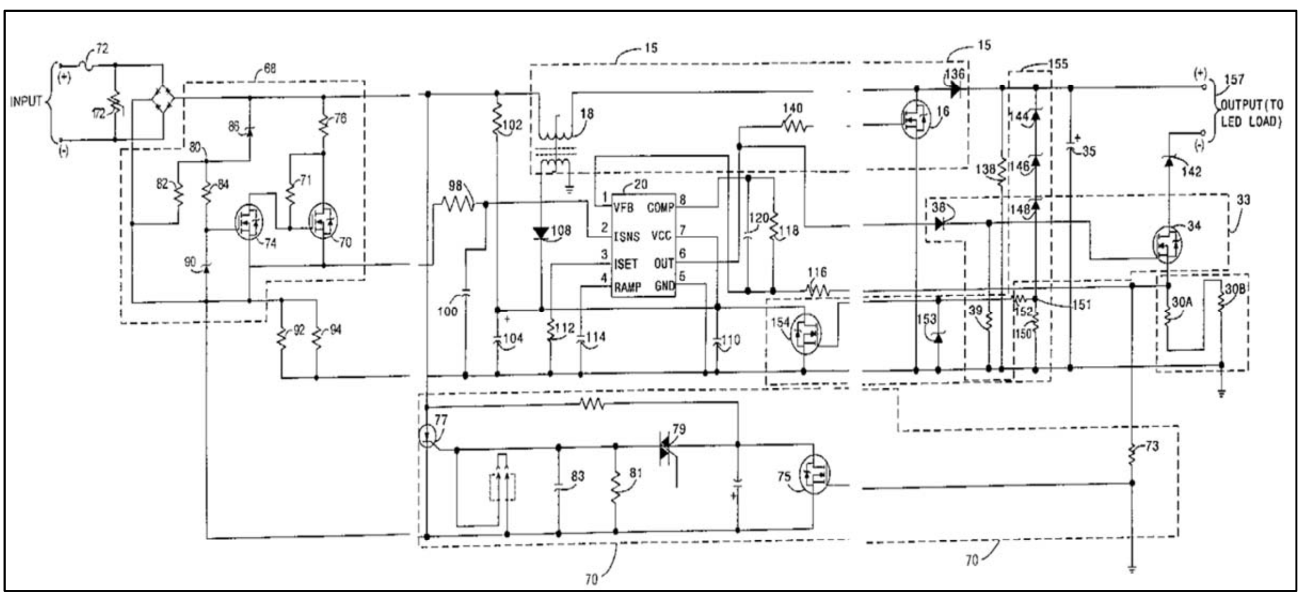
Pursuant to Rule 42.104(b)(4)-(5), the below section, and as confirmed in the Declaration of Robert Neal Tingler (Ex. 1005), demonstrate in detail how the prior art discloses each and every limitation of the claims of the '458 Patent, and how those claims are rendered obvious by the prior art.

A. Ground 1: Claims 1, 15, and 21 Are Anticipated by Perry

1. Independent Claims 1 and 15

(a) ***The preamble (1)*: "circuit arrangement for operating a semiconductor light source" and *The preamble (15)*: "circuit for operating a semiconductor light source comprising"**

Figure 11A and the corresponding description of Perry discloses a circuit arrangement for operating a semiconductor light source. Perry, Figs. 11A-11C (Ex. 1003); Tingler Decl. ¶ 68 (Ex. 1005). The disclosed circuit arrangement includes input terminals, an input filter, a full wave rectifier, a converter, and output terminals. Perry, Figs. 11A-11C (Ex. 1003); Tingler Decl. ¶ 68 (Ex. 1005). Figures 11A and 12 also disclose that the circuit arrangement (disclosed by Perry as the interface circuit) is connected to a semiconductor light source (LED load 36). Perry, Figs. 11A-11C, 12 (Ex. 1003); Tingler Decl. ¶ 68 (Ex. 1005).



Figures 11A-C of Perry

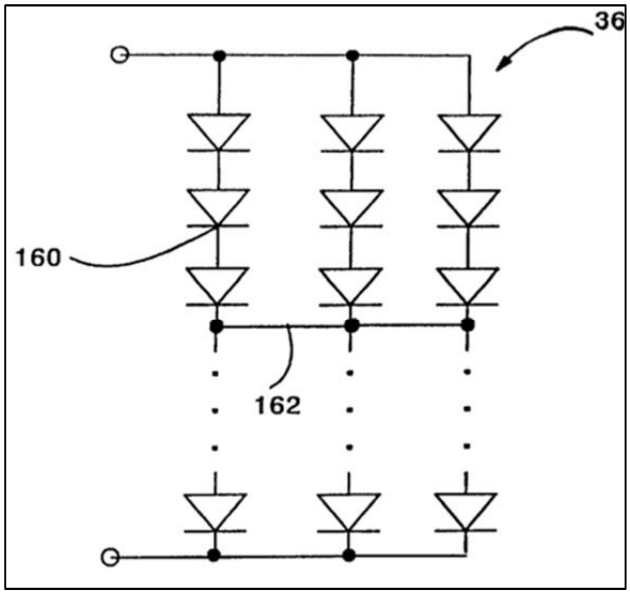


Figure 12 of Perry

(b) *Limitation (1A)*: "connection terminals for connecting a control unit" and *Limitation (15A)*: "input terminals for connection to a control unit"

Figure 11A and the corresponding description in Perry discloses input terminals, i.e. connection terminals, (INPUT). Perry, Fig. 11A (Ex. 1003); Tingler Decl. ¶ 70 (Ex. 1005). Perry discloses that the input terminals connect the outputs of a control unit (load switch 62) to the circuit arrangement, as shown by the connection of the control unit (load switch 62) to the smart switch 68 (which includes the means CM of the circuit arrangement, discussed below) in Figure 9. Perry, 3:50-51, Fig. 9, Fig. 11A (Ex. 1003); Tingler Decl. ¶ 70 (Ex. 1005).

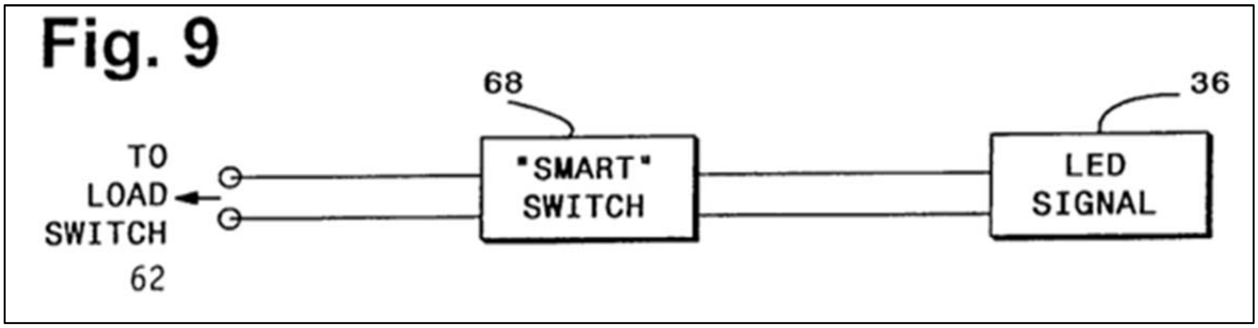


Figure 9 of Perry

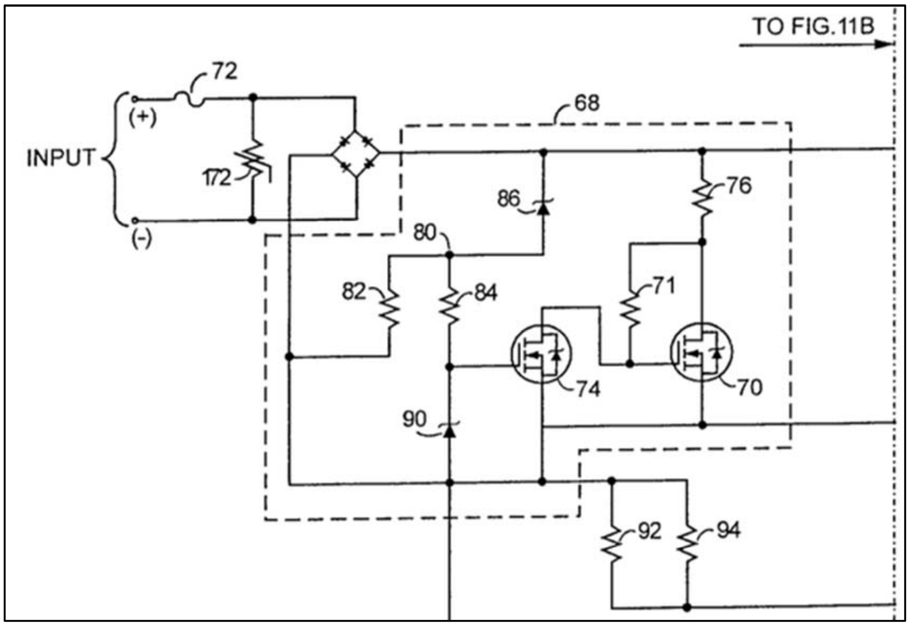


Figure 11A of Perry

(c) *Limitation (1B)*: "input filter means" and *Limitation (15B)*: "an input filter coupled to the input terminals"

As discussed above, "input filter means" is a means-plus-function term, with the function of filtering an input, but the '458 Patent does not disclose a sufficient corresponding structure for this function, merely an empty box labeled "input filter means I." '458 Patent, Fig. 1, 3:51; 3:56-57; 4:1-3 (Ex. 1001); Tingler Decl. ¶ 72 (Ex. 1005).

However, in the event PTAB determines that "input filter means" is not a means-plus-function term, but rather construes it broadly as "an electric circuit or device which selectively transmits or rejects input signals in one or more intervals of frequencies," Perry discloses such input filter means coupled to the input terminals (INPUT) as MOV 172. Perry, Fig. 11A, 9:59-10:3 (Ex. 1003); Tingler Decl. ¶ 73 (Ex. 1005). According to Perry, "MOV 172 can react to over voltage situations in a few nanoseconds to absorb an energy spike of up to 42 joules. . . .Thus, in the case of short term spikes, MOV 172 acts as a clamp to protect the remaining circuitry." Perry, Fig. 11A, 9:59-10:3 (Ex. 1003); Tingler Decl. ¶ 73 (Ex. 1005). The Patent Owner's expert concurred that "[i]n the context of power supplies, input filters may be used, for example, to reduce the amount of conducted electromagnetic interference." Batarseh March 13 Decl. ¶ 2 (Ex. 1006).

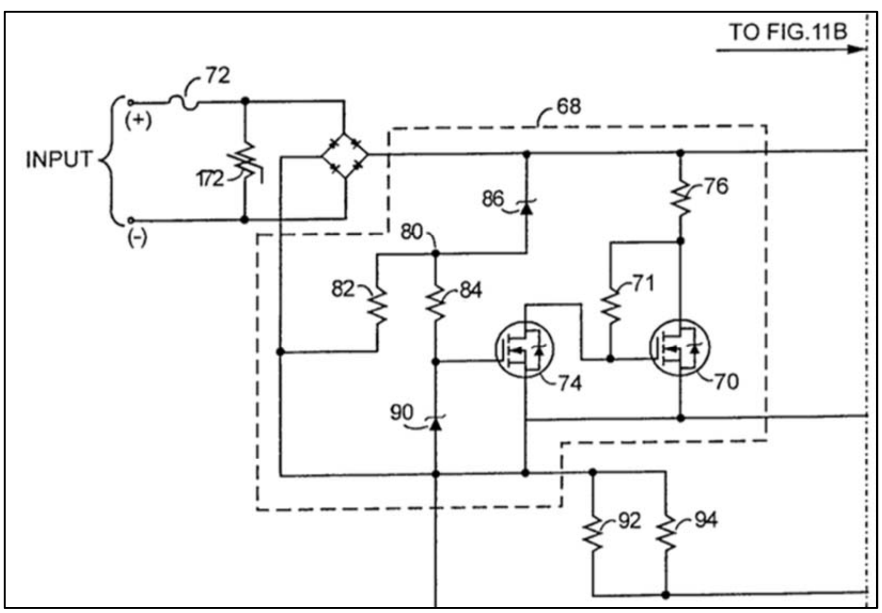
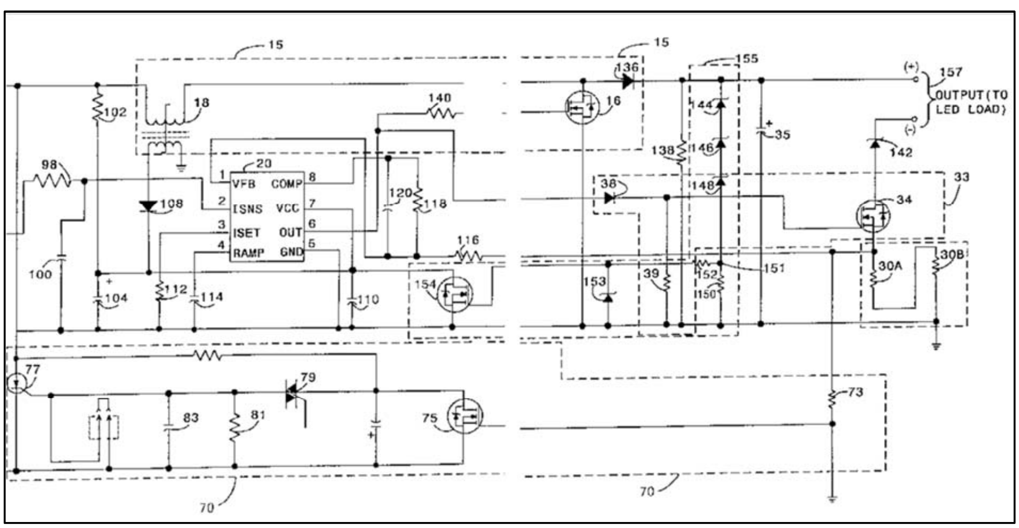


Figure 11A of Perry

(d) *Limitation (1C)*: "a converter having a control circuit" and *Limitation (15C)*: "a converter including a control circuit"

Figures 11B-C and the corresponding description in Perry disclose a converter having a control circuit as the zero current switching boost circuit ("boost circuit") 15 having the power factor correction integrated circuit ("IC") 20. Perry, Figs. 11B-C, 5:39-53 (Ex. 1003); Tingler Decl. ¶ 75 (Ex. 1005). The zero current switching boost circuit 15 and IC 20 operate by switching the inductor 18 to create output voltages that are higher than the input voltages. Perry, 5:39-53 (Ex. 1003); Tingler Decl. ¶ 75 (Ex. 1005). In order to regulate the output power, an error signal—a comparison between the output and input power—is fed back to a transistor switch circuit 16 to control its duty cycle via the control circuit (IC 20). *Id.* The control circuit (IC 20) triggers the next pulse to the switch 16 when it detects a zero current crossing. *Id.*



Figures 11B-C of Perry

(e) *Limitation (1D)*: "output terminals for connecting the semiconductor light source" and *Limitation (15D)*: "output terminals for connection to the semiconductor light source in order to energize the semiconductor light source

Figures 11C and 12 and the corresponding description in Perry disclose output terminals for connecting the semiconductor light source, as output terminals at the output 157 of the boost circuit 15 that allow the circuit arrangement to connect to the semiconductor light source (LED load 36). Perry, Fig. 11C, Fig. 12, 9:37-46 (Ex. 1003); Tingler Decl. ¶ 77 (Ex. 1005).

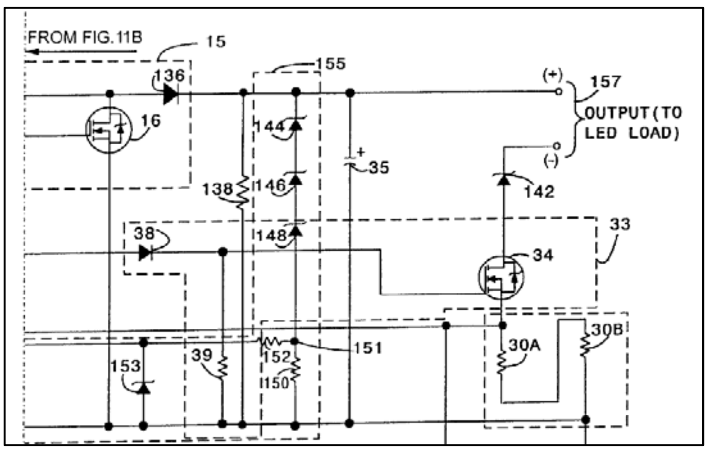


Figure 11C of Perry

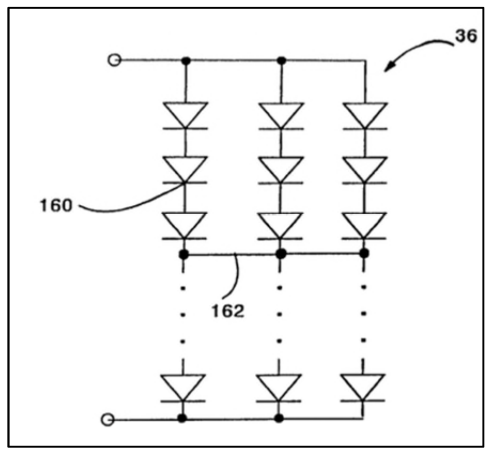
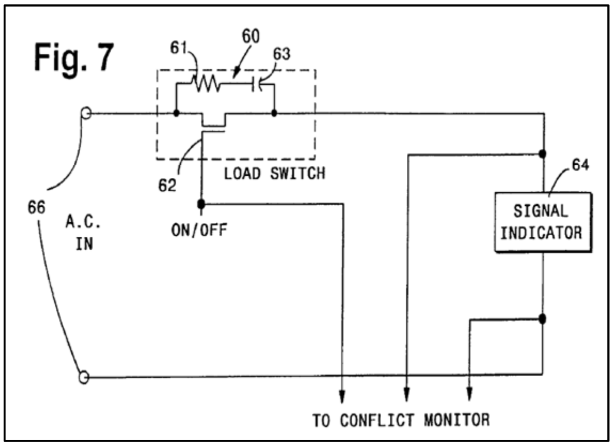


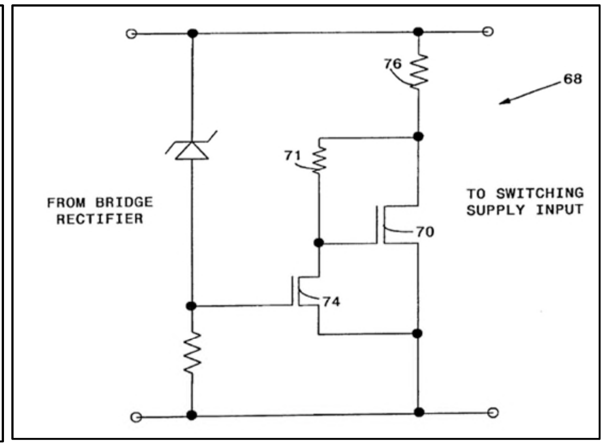
Figure 12 of Perry

(f) *Limitation (1E)*: "means CM for removing a leakage current occurring in the control unit in the non-conducting state, which means include a controlled semiconductor element" and *Limitation (15E)*: "means CM including a controlled semiconductor element for removing a leakage current occurring in the control unit in the non-conducting state, said means CM having an input coupled to the input filter and an output coupled to the converter

As discussed above, the broadest reasonable construction for these limitations is "a circuit, including a controlled semiconductor element, that draws leakage current from the control unit when the control unit is off." Tingler Decl. ¶ 79 (Ex. 1005).

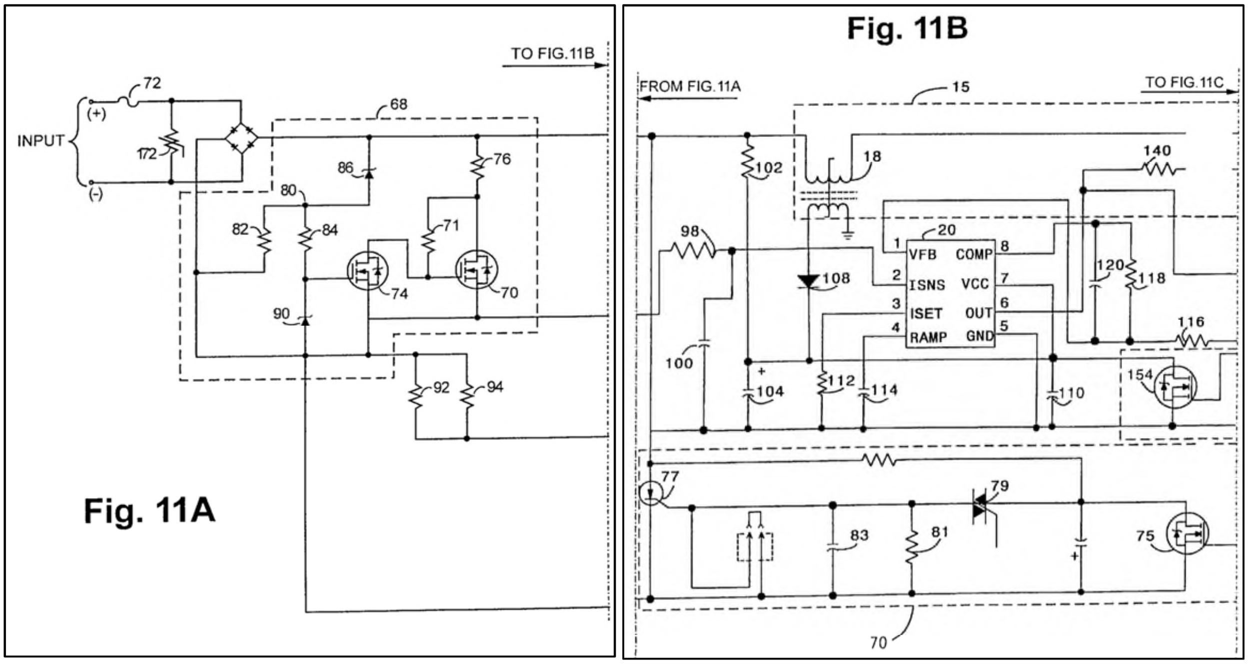
Figures 7 and 8 and the corresponding description in Perry disclose a means CM for removing a leakage current occurring in the control unit in the non-conducting state, including a controlled semiconductor element. Perry, Figs. 7-8 (Ex. 1003); Tingler Decl. ¶ 79 (Ex. 1005). Perry discloses means CM as switching circuit 68. Perry, Fig. 8 (Ex. 1003); Tingler Decl. ¶ 80 (Ex. 1005). The switching circuit 68 (the means CM) short circuits incoming current from load switch 62 (the control unit) that is below a certain value to indicate full signal light turn off, or opens up to indicate full signal light turn on when the current exceeds this value. Perry, Fig. 8, 7:12-26, 7:58-62 (Ex. 1003); Tingler Decl. ¶ 80 (Ex. 1005). This is accomplished by biasing the gate of transistor 70 (the "controlled semiconductor element") up via resistor 71 to keep in it the "on" state for small currents—i.e. when the signal is off. *Id.* When the switching circuit 68 detects a small current (controlled by Zener diode 86 in Figure 11A), the leakage current will be sent through transistor 70 to ground. *Id.*





Figures 7 and 8 of Perry

Claim element 15E also requires that the means CM have an input coupled to the input filter and an output coupled to the converter. As shown in Figures 11A-B, the means CM (switching circuit 68) is coupled to the input filter (MOV 172). The output of the means CM (switching circuit 68) is coupled to the converter (boost converter 15). Perry, Figs. 11A-B (Ex. 1003); Tingler Decl. ¶ 81 (Ex. 1005).



Figures 11A and 11B of Perry

(g) *Limitation (1F)*: "self-regulating deactivating means for deactivating the means CM" and *Limitation (15F)*: "self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state"

As discussed above, the "the self-regulating deactivating means for deactivating the means CM" and "the self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state" perform the function of deactivating the means CM. Tingler Decl. ¶ 84 (Ex. 1005). The corresponding structure is a transistor and a Zener diode. Tingler Decl. ¶ 84 (Ex. 1005).

According to Perry, the means CM (switching circuit 68) is deactivated by the self-regulating deactivating means (consisting of diode 86 and transistor 74) when the converter (zero switching boost circuit 15 and IC 20) is switched on. Perry, 7:62-8:6 (Ex. 1003); Tingler Decl. ¶ 85 (Ex. 1005). Switching on the converter causes the current passing through transistor 70 and resistor 76 to rise. Perry, 7:20-26 (Ex. 1003); Tingler Decl. ¶ 85 (Ex. 1005). When the current passing through transistor 70 and resistor 76 exceeds a predetermined value (controlled by the breakdown voltage of Zener diode 86), the gate of transistor 74 is brought positive. *Id.* This turns on transistor 74, which pulls the gate of transistor 70 down to ground, turning transistor 70 off and effectively removing the switching circuit from the rest of the circuit arrangement thereby deactivating the means CM. *Id.* The structure of the means for deactivating the means CM is shown in Figures 8 and 11A of Perry and comprises transistor 74 and Zener diode 86. Perry, Fig. 8, Fig. 11A (Ex. 1003); Tingler Decl. ¶ 85 (Ex. 1005).

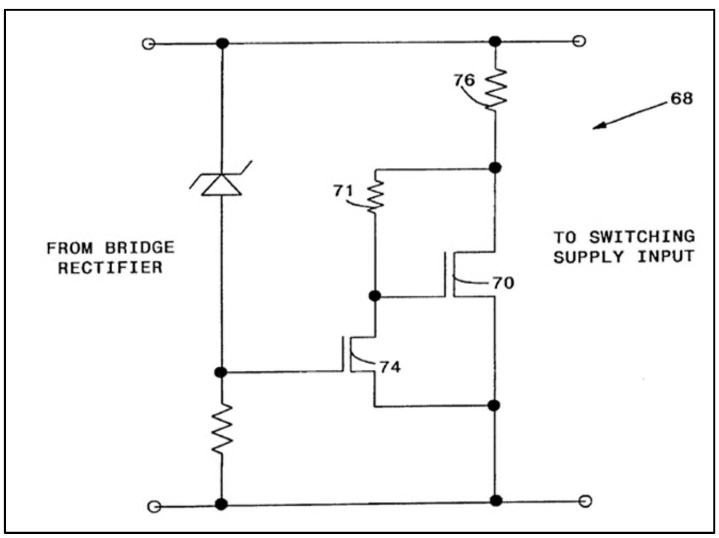


Figure 8 of Perry

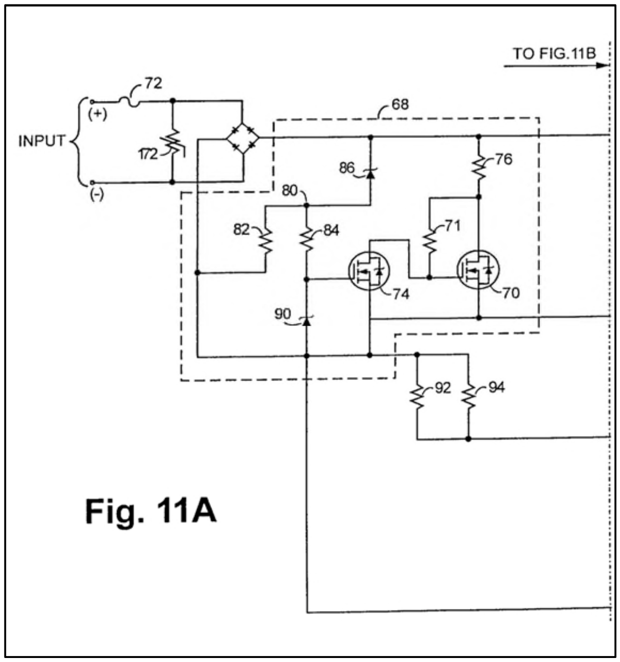


Figure 11A of Perry

(h) *Limitation (1G)*: "detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto" and *Limitation (15G)*: "detection means for detecting a defective converter or semiconductor light source connected thereto."

As discussed above, the "detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto" and "detection means for detecting a defective converter or semiconductor light source connected thereto" perform the function of detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto. Tingler Decl. ¶ 88 (Ex. 1005). The corresponding structure is a transistor and a Zener diode. Tingler Decl. ¶ 88 (Ex. 1005).

Perry discloses a detection means for detecting an incorrect functioning of the converter or of the semiconductor light source. According to Perry, Figure 11B discloses a detection means (failure circuit 70), which detects whether semiconductor light source (LED load 36) fails. Perry, 7:46-53; Fig. 10, Fig. 11B (Ex. 1003); Tingler Decl. ¶ 87-89 (Ex. 1005). In this situation, the failure circuit 70, senses the drop in output current due to the LED signal failure. *Id.* If the output current drops by at least 50% for several seconds, transistor 75 is turned off, causing SCR 77 through silicon bilateral switch 79 to latch and permanently blow fuse 72. Perry, 8:12-23 (Ex. 1003); Tingler Decl. ¶ 89 (Ex. 1005). The blown fuse 72 then permanently indicates a failed signal to the conflict monitor, i.e., infinite input impedance. Perry, 7:51-53 (Ex. 1003); Tingler Decl. ¶ 89 (Ex. 1005).

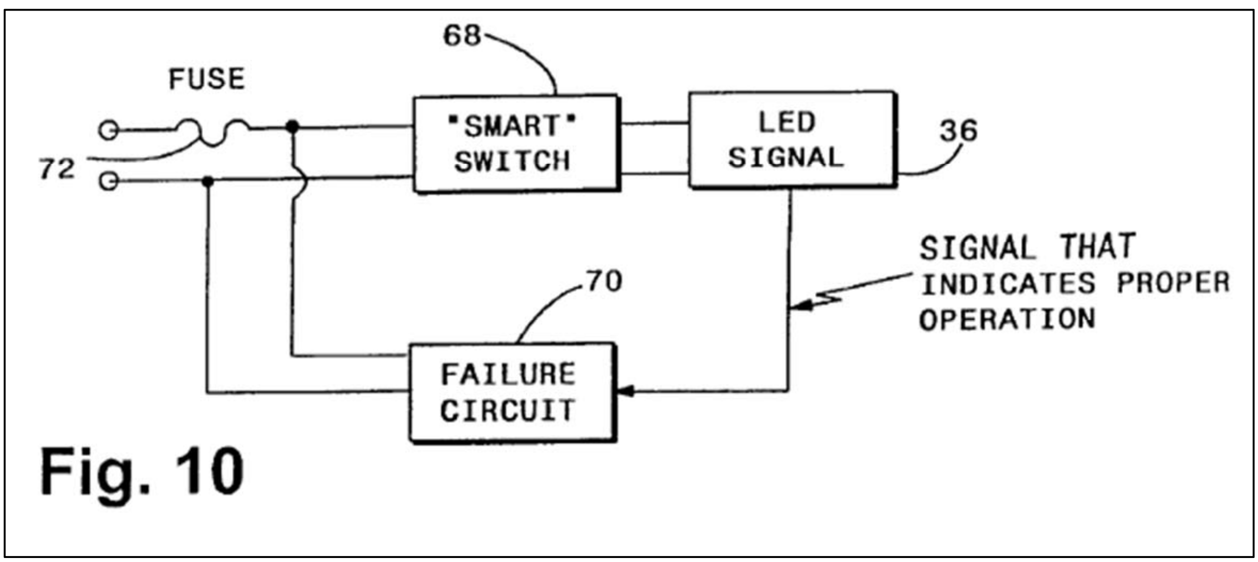


Figure 10 of Perry

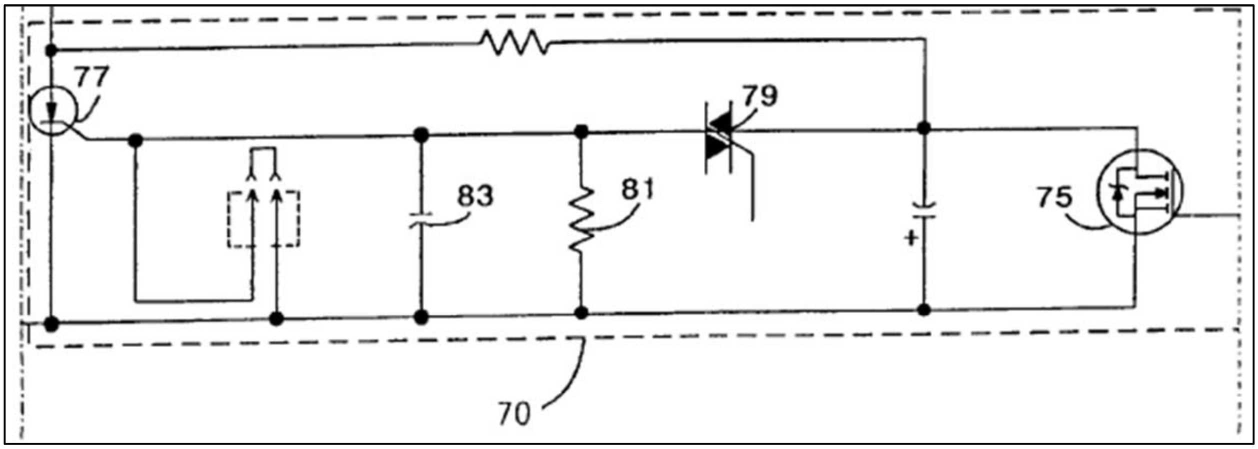
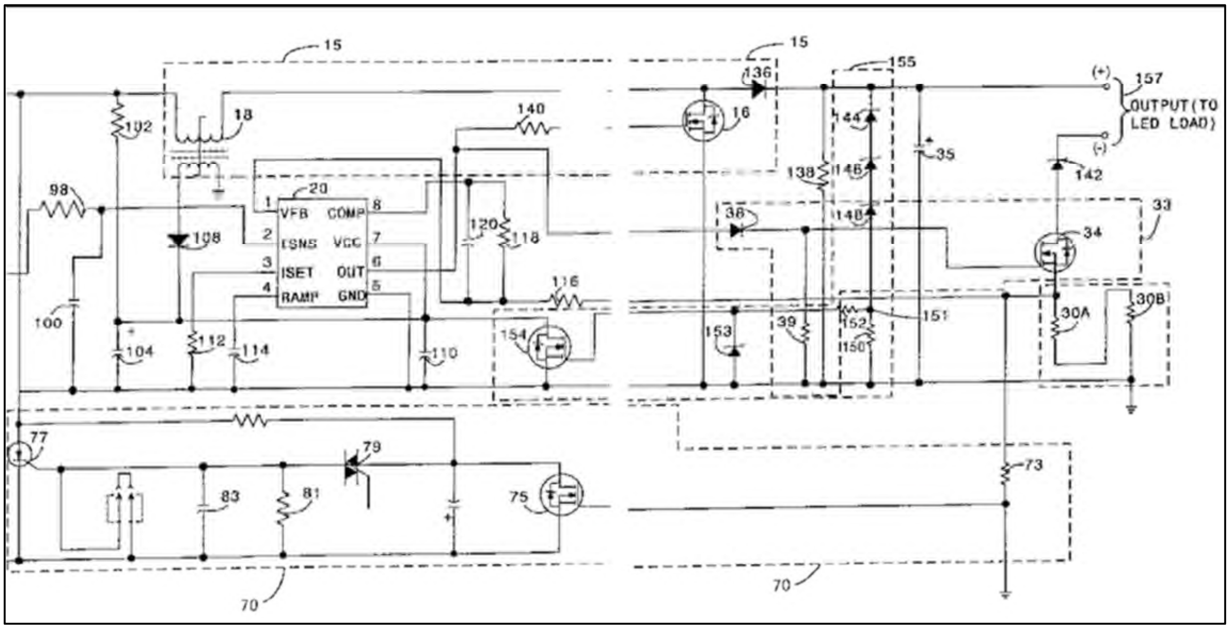


Figure 11B of Perry (showing detail of failure circuit 70)

2. Dependent Claim 21: "An operating circuit as claimed in claim 15 wherein the semiconductor light source comprises one or[] more light emitting diodes and the converter includes a switching transistor"

The semiconductor light source disclosed in Perry includes light emitting diodes. Perry, Fig. 12, 3:56-57, 9:37-40 (Ex. 1003); Tingler Decl. ¶ 90 (Ex. 1005). In addition, the converter (boost converter 15) disclosed in Perry includes a switching transistor (transistor switch 16). Perry, Figs. 11B-C (Ex. 1003); Tingler Decl. ¶ 90 (Ex. 1005). The converter disclosed in Perry uses an output derived error signal to control the duty cycle of transistor switch 16, which switches an inductor 18. Perry, 3:39-43, Fig. 11B (Ex. 1003); Tingler Decl. ¶ 90 (Ex. 1005).



Figures 11B-11C of Perry

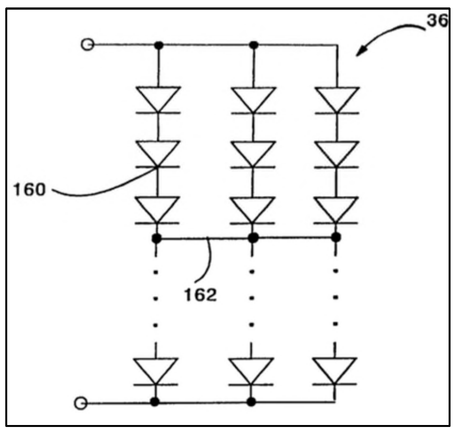


Figure 12 of Perry

B. Ground 2: Claims 1, 15, and 21 Are Obvious over Hochstein in View of Perry

1. Independent Claims 1 and 15

(a) ***The preamble (1)*: "circuit arrangement for operating a semiconductor light source" and *The preamble (15)*: "circuit for operating a semiconductor light source comprising"**

Figure 5 and the corresponding description in Hochstein disclose a circuit arrangement for operating a semiconductor light source. The disclosed "circuit arrangement" includes input terminals, an adaptive clamp circuit, an EMI input filter, a full wave rectifier, a buck/boost converter, and output terminals. Hochstein, Fig. 5 (Ex. 1004); Tingler Decl. ¶ 97 (Ex. 1005). Figure 5 also discloses that the circuit arrangement (power supply 10) is connected to an array of LEDs—i.e., the "semiconductor light source." Hochstein describes the circuit arrangement as an "apparatus for supplying regulated voltage d.c. electrical power to an LED array." Hochstein, 3:18-19 (Ex. 1004); Tingler Decl. ¶ 97 (Ex. 1005).

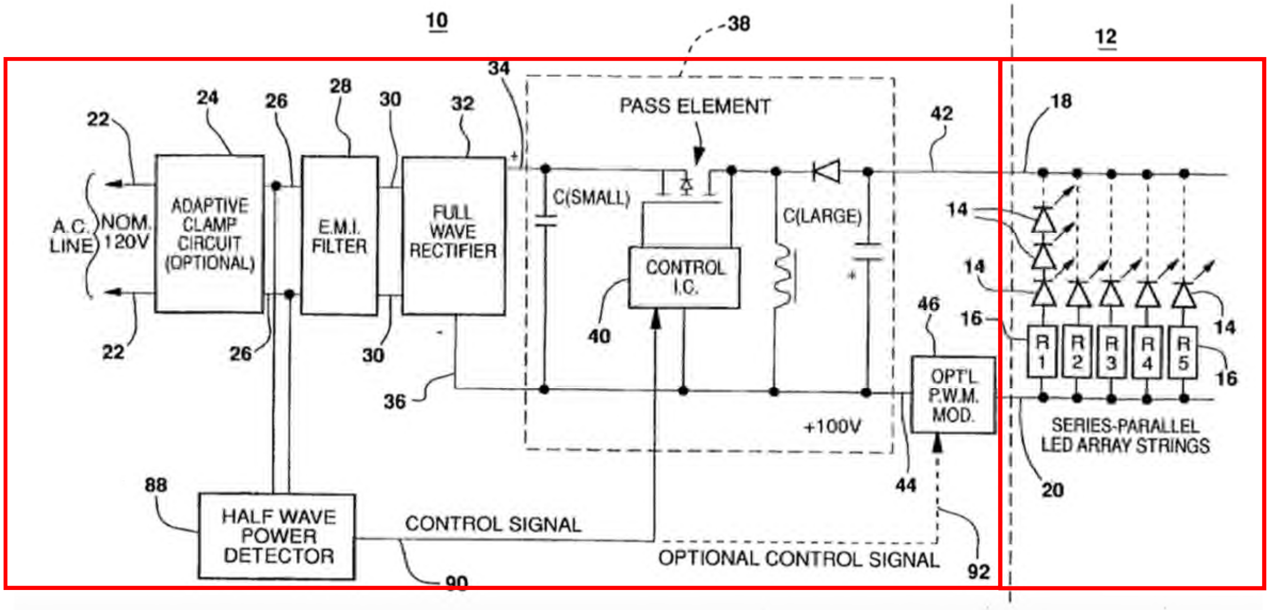


Figure 5 of Hochstein

(b) *Limitation (1A)*: "connection terminals for connecting a control unit" and *Limitation (15A)*: "input terminals for connection to a control unit"

Figure 7 in Hochstein discloses connection terminals for connecting a control unit, as power input lines 22. Hochstein, Fig. 7 (Ex. 1004); Tingler Decl. ¶ 99 (Ex. 1005). Hochstein further discloses that power input lines 22 are to be connected to a control unit (traffic signal controller 84) and that the control unit (traffic signal controller 84) is present on the A.C. input lines. Hochstein, 5:11-29 (Ex. 1004); Tingler Decl. ¶ 99 (Ex. 1005). The control unit (traffic signal controller 84) is used to control voltage and current to the semiconductor light source (LED array 12). Hochstein, 10:36-49, 10:62-66 (Ex. 1004); Tingler Decl. ¶ 99 (Ex. 1005).

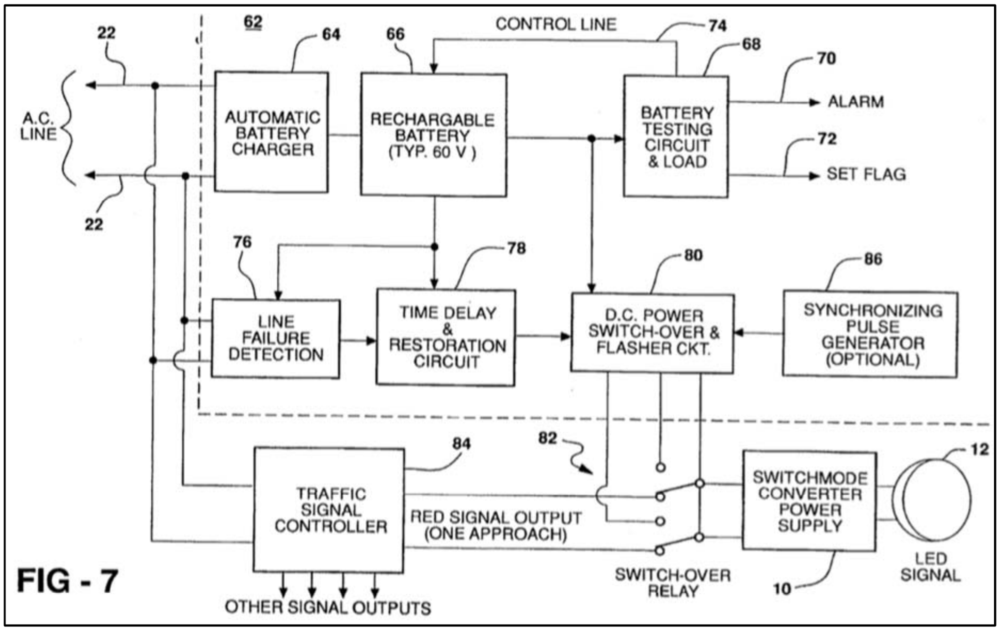


Figure 7 of Hochstein

(c) *Limitation (1B)*: "input filter means" and *Limitation (15B)*: "an input filter coupled to the input terminals"

As discussed above, "input filter means" is a means-plus-function term, with the function of filtering an input, but the '458 Patent does not disclose a sufficient corresponding structure for this function, merely an empty box labeled "input filter means I." '458 Patent, Fig. 1, 3:51; 3:56-57; 4:1-3 (Ex. 1001); Tingler Decl. ¶ 101 (Ex. 1005).

However, in the event PTAB determines that "input filter means" is not a means-plus-function term, but rather construes it broadly as "an electric circuit or device which selectively transmits or rejects input signals in one or more intervals of frequencies," Hochstein discloses such input filter means coupled to the connection terminals as electromagnetic interference ("EMI") filter 28. Tingler

Decl. ¶ 102 (Ex. 1005). The Patent Owner's expert concurred that "[i]n the context of power supplies, input filters may be used, for example, to reduce the amount of conducted electromagnetic interference ("EMI")." Batarseh March 13 Decl. ¶ 2 (Ex. 1006). Hochstein discloses that the input filter means (EMI filter 28) keeps conducted interference from feeding back into the power lines where it might cause problems to other circuitry on the line. Hochstein, Fig. 5, 5:33-36 (Ex. 1004); Tingler Decl. ¶ 102 (Ex. 1005).

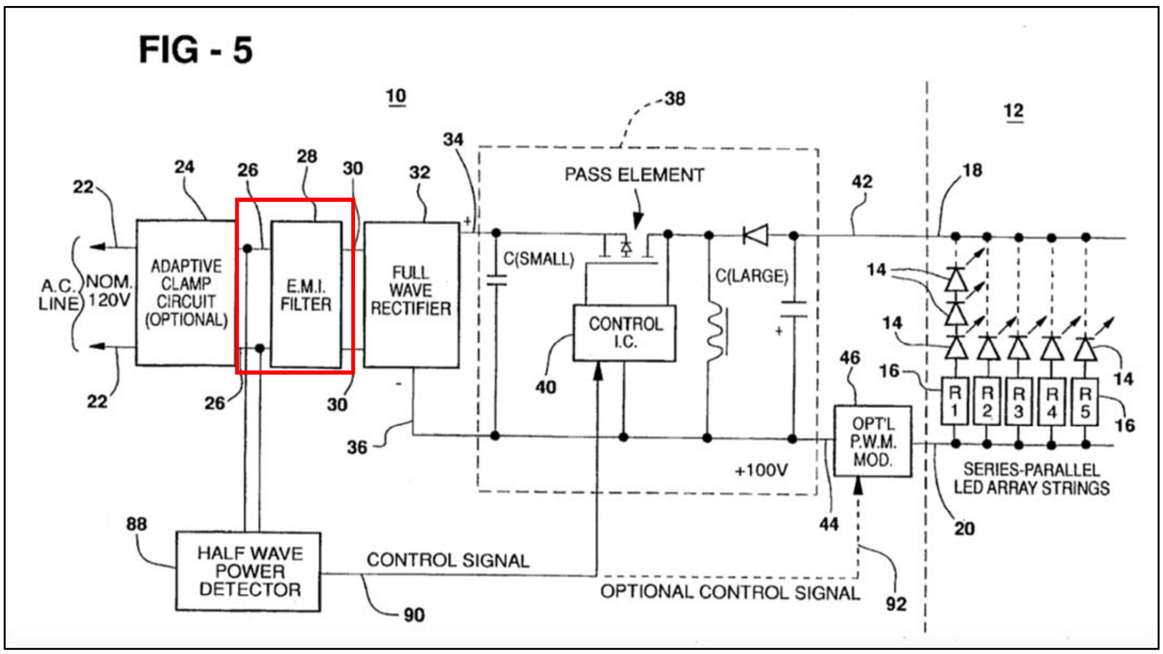


Figure 5 of Hochstein

Perry also discloses an input filter as MOV 172. Perry, Figure 11A, Col. 9:59-10:3 (Ex. 1003); Tingler Decl. ¶ 103 (Ex. 1005). The input filter (MOV 172) as shown in Figure 11A is coupled to the input terminals (INPUT). Perry, Figure 11A (Ex. 1003); Tingler Decl. ¶ 103 (Ex. 1005). According to Perry, "MOV 172 can react to over voltage situations in a few nanoseconds to absorb an energy spike of up to 42 joules. . . . Thus, in the case of short term spikes, MOV 172 acts as a clamp to protect the remaining circuitry." Perry, Col. 9:59-10:3 (Ex. 1003); Tingler Decl. ¶ 103 (Ex. 1005).

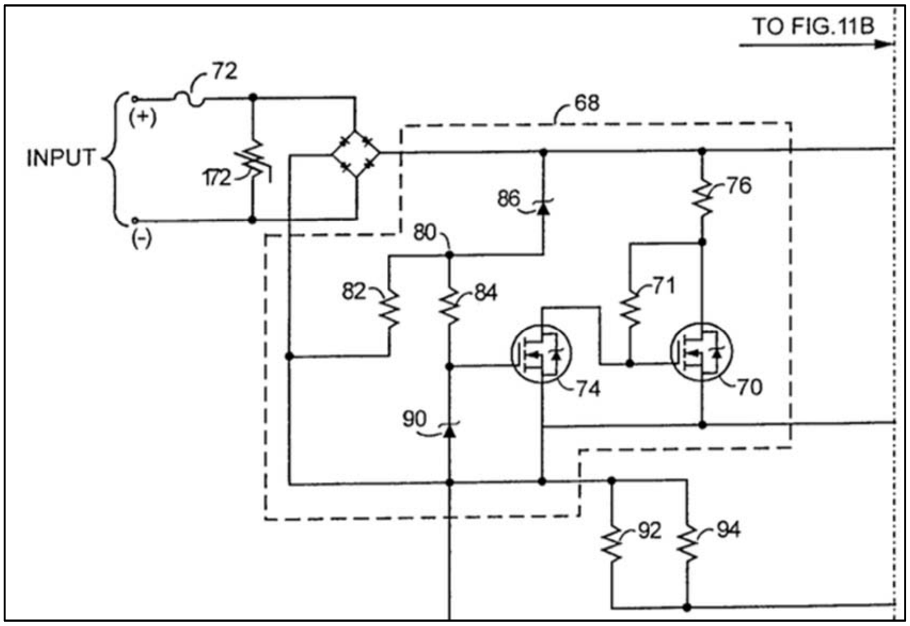


Figure 11A of Perry

(d) *Limitation (1C)*: "a converter having a control circuit" and *Limitation (15C)*: "a converter including a control circuit"

Figure 5 and the corresponding description in Hochstein discloses a converter having a control circuit, as switchmode boost/buck converter 38, including control I.C. 40. Hochstein, Fig. 5 (Ex. 1004); Tingler Decl. ¶ 105 (Ex. 1005). The converter 38 operates to generate regulated DC voltage that illuminates the LED array. Hochstein, 3:23-32 (Ex. 1004); Tingler Decl. ¶ 105 (Ex. 1005). The converter 38 includes a power factor correction (PFC) integrated circuit (IC) controller 40 that allows current to charge a storage capacitor C(LARGE) only when in phase with the input, rectified AC voltage thereby keeping the power factor close to unity. Hochstein, 5:43-50 (Ex. 1004); Tingler Decl. ¶ 105 (Ex. 1005). The control IC 40 also provides voltage regulation in the switch mode buck/boost converter 38 by monitoring the output voltage and adjusting the high frequency on-off switching period of the pass element commensurate with the monitored voltage. Hochstein, 5:43-54 (Ex. 1004); Tingler Decl. ¶ 105 (Ex. 1005).

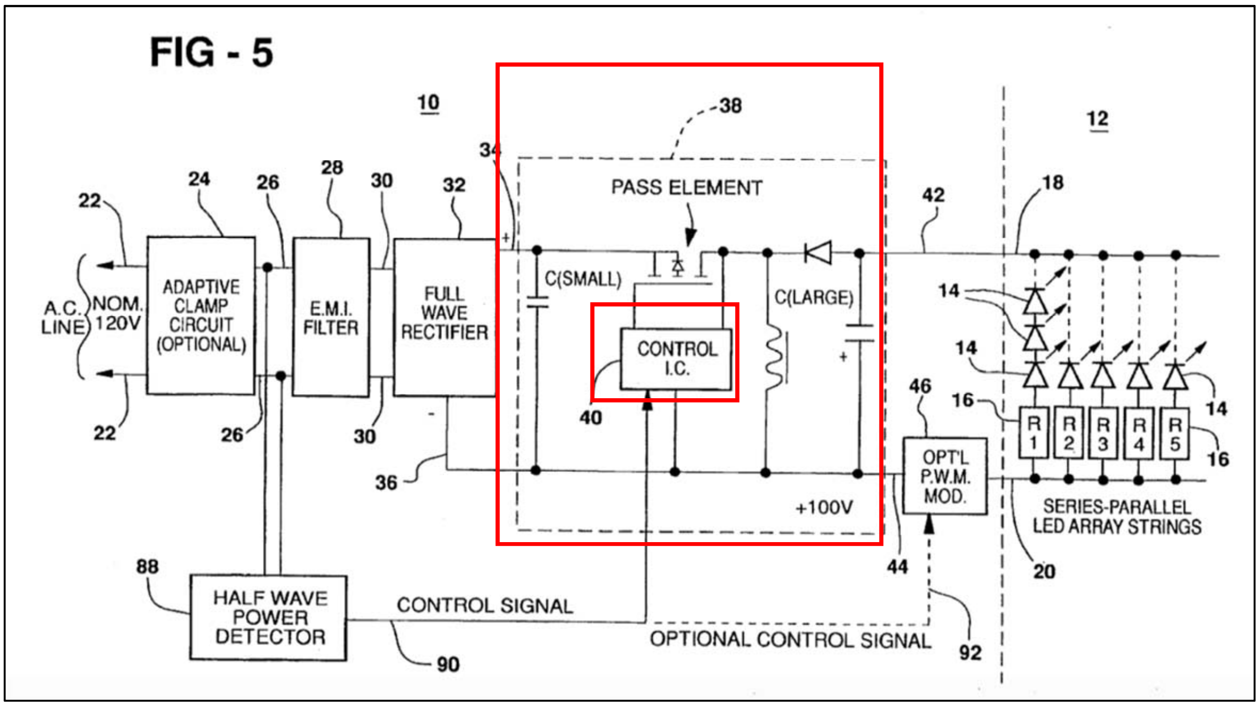


Figure 5 of Hochstein

(e) *Limitation (1D)*: "output terminals for connecting the semiconductor light source" and *Limitation (15D)*: "output terminals for connection to the semiconductor light source in order to energize the semiconductor light source

Figure 5 and the corresponding description in Hochstein discloses output terminals for connection to the semiconductor light source, as output terminals (42 and 44) at the output of the converter 38 that allow the circuit arrangement to connect to the semiconductor light source (LED array 12) in order to turn the LEDs on. Hochstein, Fig. 5, 5:66-6:1 (Ex. 1004) ("The output voltage from the P.F.C. switch mode converter 38 is either fed directly to the LED array 12 or alternatively through the P.W.M. modulator 46."); Tingler Decl. ¶ 107 (Ex. 1005).

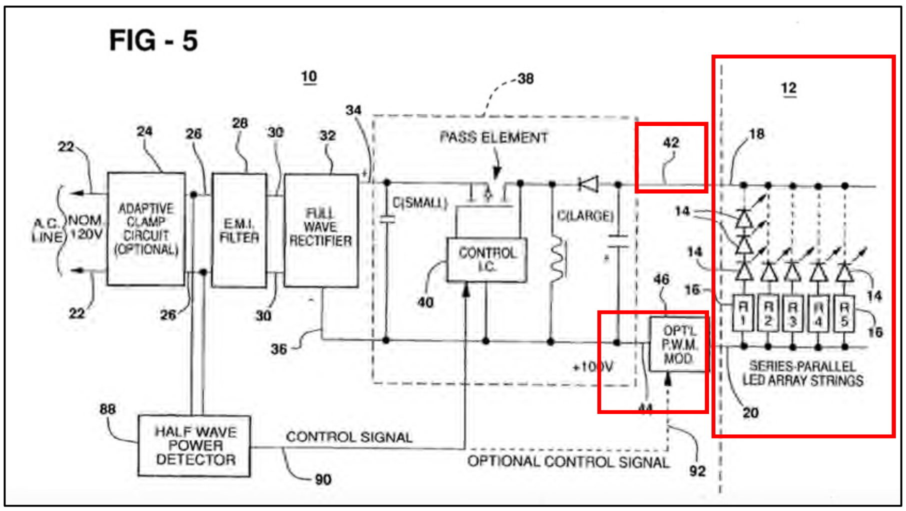


Figure 5 of Hochstein

(f) ***Limitation (1E)*: "means CM for removing a leakage current occurring in the control unit in the non-conducting state, which means include a controlled semiconductor element" and *Limitation (15E)*: "means CM including a controlled semiconductor element for removing a leakage current occurring in the control unit in the non-conducting state, said means CM having an input coupled to the input filter and an output coupled to the converter**

The broadest reasonable construction for these limitations is "a circuit, including a controlled semiconductor element, that draws leakage current from the control unit when the control unit is off." Tingler Decl. ¶ 109 (Ex. 1005).

Figure 5 in Hochstein discloses a means CM for removing a leakage current occurring in the control unit in the non-conducting state, which means include a controlled semiconductor element. Hochstein, Fig. 5 (Ex. 1004); Tingler Decl. ¶ 110 (Ex. 1005). The means CM—the controlled load means 50 (part of adaptive clamp circuit 24)—drains off leakage current when the control unit is in a nonconducting state. Hochstein, 7:51-8:1 (Ex. 1004); Tingler Decl. ¶ 110 (Ex. 1005). The adaptive clamp circuit 24 works by using the sensing transistor Q1 and the Zener diode D5 (sensing circuit) to determine whether the line voltage is below a certain magnitude (typically 40 volts)—i.e., in a nonconducting state. Hochstein, Fig. 6, 7:51-8:1 (Ex. 1004); Tingler Decl. ¶ 110 (Ex. 1005). In that case, Zener diode D5 will not conduct and the transistor Q2 (the controlled semiconductor element) is turned on to place the load resistor 60 on the power lines 22 causing the leakage voltage to drop below 10 volts, thereby draining off a leakage current. Hochstein, 7:53-8:1, 12:9-26 (Ex. 1004); Tingler Decl. ¶ 110 (Ex. 1005).

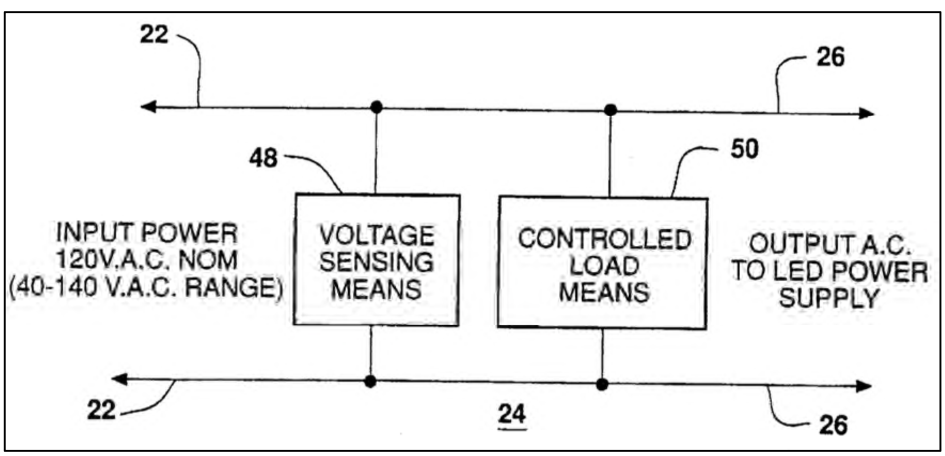


Figure 6A of Hochstein

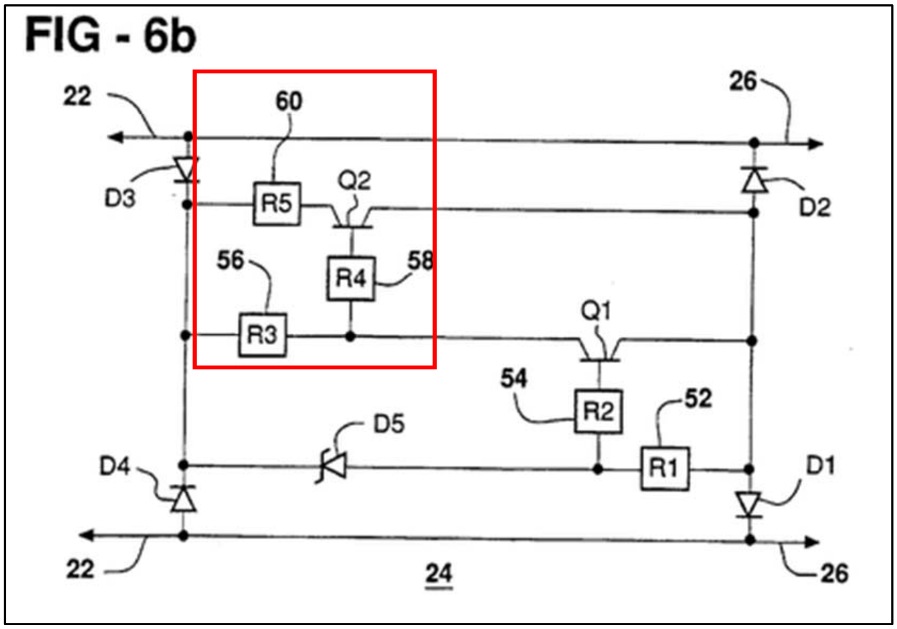
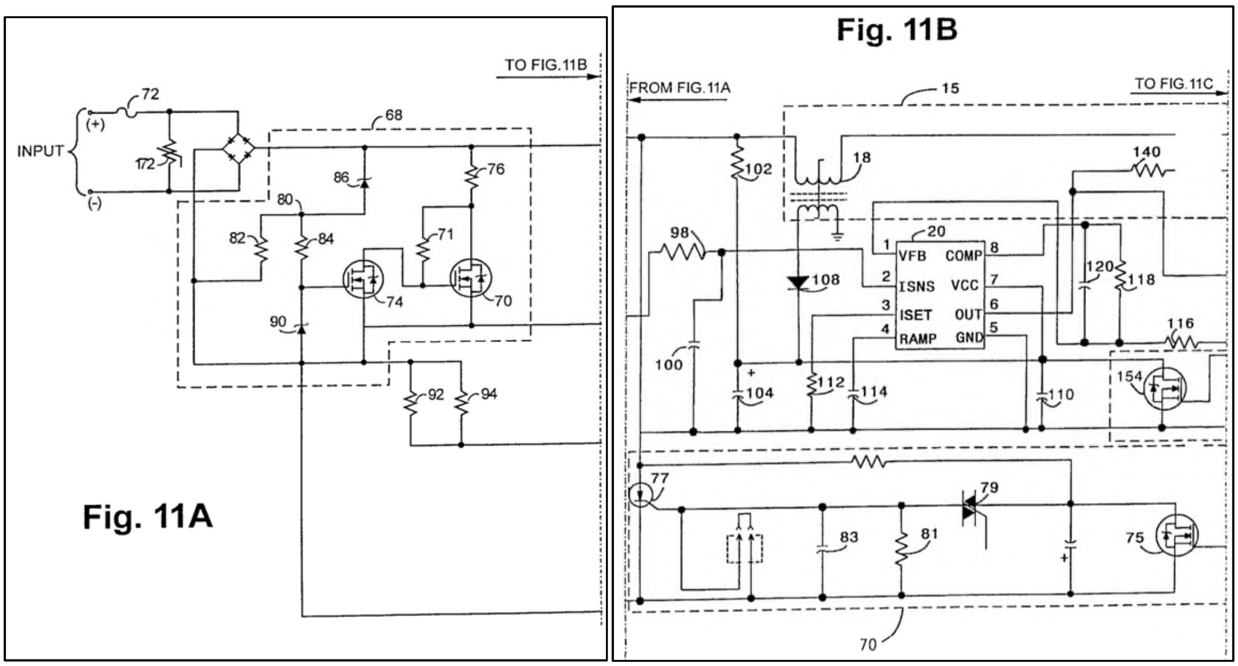


Figure 6B of Hochstein

Claim limitation 15E also requires that the means CM have an input coupled to the input filter and an output coupled to the converter. While Hochstein discloses that the *input* of the means CM (controlled load 50) is coupled to the input terminal 22 and the *output* of the means CM (controlled load means 50) is coupled to the input filter, Perry discloses that the *input* of the means CM (switching circuit 68) is coupled to the input filter (MOV 172) and the *output* of the means CM (switching circuit 68) is coupled to the converter (zero current switching boost circuit and IC 20). Perry, Figs. 11A-B (Ex. 1003); Tingler Decl. ¶ 111 (Ex. 1005). Additionally, the output of the means CM (switching circuit 68) in Perry is coupled to the converter (boost converter 15 and IC 20). Perry, Figs. 11A-B (Ex. 1003); Tingler Decl. ¶ 111 (Ex. 1005). Because both Perry and Hochstein perform the same function of driving an LED load and removing leakage current using a similar circuit arrangement, it would have been an obvious design choice to a person of ordinary skill in the art at the time to couple the EMI filter of Hochstein to the input of the means CM. Tingler Decl. ¶ 111 (Ex. 1005).



Figures 11A and 11B of Perry

In any event, while the components in Figure 5 of Hochstein are illustrated in a particular order, they are all coupled ***to the same node*** on the power input lines 22. Hochstein, Fig. 6 (Ex. 1004) (showing detail of the adaptive clamp circuit 24 and disclosing that node 22 and node 26 of power input lines 22 are common); Tingler Decl. ¶ 112 (Ex. 1005). Therefore, a person of ordinary skill in the art would have understood at the time Hochstein was filed that Figure 5 may be redrawn to show the input of the adaptive clamp circuit (including the means CM, i.e., controlled load means 50) to be coupled to the input filter (EMI filter 28) and the output of the adaptive clamp circuit to be coupled to the converter, without changing the actual circuit disclosed in the Hochstein. Tingler Decl. ¶ 112 (Ex. 1005).

(g) *Limitation (1F)*: "self-regulating deactivating means for deactivating the means CM" and *Limitation (15F)*: "self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state"

As discussed above, the "the self-regulating deactivating means for deactivating the means CM" and "the self-regulating deactivating means for deactivating the means CM when the control unit is in a conductive state" perform the function of deactivating the means CM. The corresponding structure is a transistor and a Zener diode. Tingler Decl. ¶ 115 (Ex. 1005).

Hochstein discloses a self-regulating deactivating means for deactivating the means CM as voltage sensing means 48 (part of adaptive clamp circuit 24)—— shown as a block diagram in Figure 6a and in detail in Figure 6b. Hochstein teaches that the adaptive clamp circuit works as follows: if the Zener diode D5 does not conduct (in the presence of leakage current), the transistor Q2 is turned on to place the load resistor 60 the power lines 22 causing the leakage voltage to drop below 10 volts. Hochstein, 7:51-8:3 (Ex. 1004); Tingler Decl. ¶ 116 (Ex. 1005). Whenever the traffic signal controller relay "closes," the line voltage appearing at the input to the adaptive clamping circuit 24 rises to 120 volts (the control unit is in the conducting state) and the sensing circuit (Q1 and D5) turns off the controlling transistor Q2, removing the resistor 60 from the circuit to prevent unnecessary dissipation of power. *Id*. The structure of the means for deactivating the means CM is shown in Figure 6B of Hochstein and includes transistor Q1 and Zener diode D5. Tingler Decl. ¶ 116 (Ex. 1005).

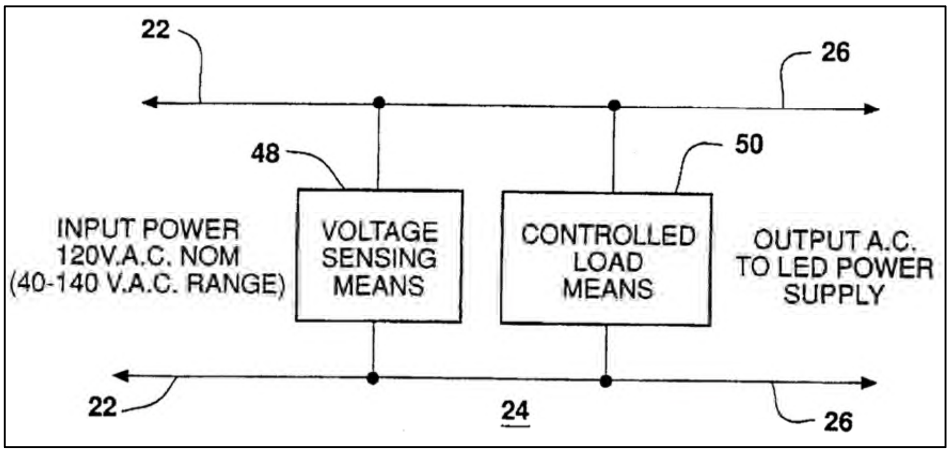


Figure 6A of Hochstein

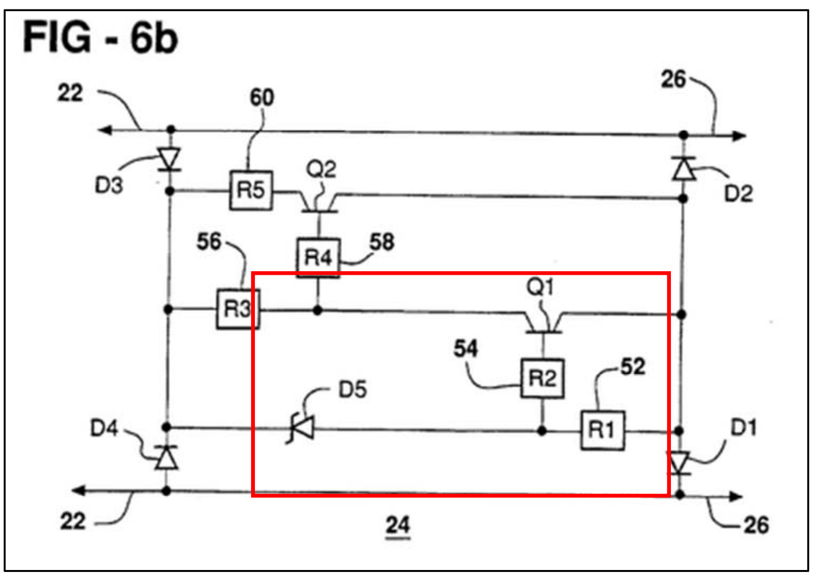


Figure 6B of Hochstein

(h) *Limitation (1G)*: "detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto" and *Limitation (15G)*: "detection means for detecting a defective converter or semiconductor light source connected thereto."

While Hochstein discusses the problem of having and LED load failure and various prior art solutions, (Hochstein, 1:27-46 (Ex. 1004), it is silent about a detection means. Tingler Decl. ¶ 118 (Ex. 1005). Given that Perry discloses a solution to the problem acknowledged in Hochstein, a person of ordinary skill would be motivated to combine these two references that are directed to solve the same problems in the same field. Tingler Decl. ¶ 118 (Ex. 1005). It would be obvious for a person of ordinary skill in the art to combine the teachings in Perry, including regarding detecting means, and with the system disclosed in Hochstein. Tingler Decl. ¶ 118 (Ex. 1005).

Perry discloses detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto and detection means for detecting a defective converter or semiconductor light source connected thereto. Tingler Decl. ¶ 119 (Ex. 1005).

As discussed above, the "detection means for detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto" and "detection means for detecting a defective converter or semiconductor light source connected thereto" perform the function of detecting an incorrect functioning of the converter or of the semiconductor light source connected thereto. Tingler Decl. ¶ 120 (Ex. 1005). The corresponding structure is a transistor and a Zener diode. Tingler Decl. ¶ 120 (Ex. 1005).

According to Perry, Figure 11B and the corresponding description discloses a detection means (failure circuit 70), which detects whether semiconductor light source (LED load 36) fails. Hochstein, 7:46-53, Fig. 10, Fig. 11B (Ex. 1004); Tingler Decl. ¶ 121 (Ex. 1005). In this situation, the failure circuit 70, senses the drop in output current due to the LED signal failure. *Id.* If the output current drops by at least 50% for several seconds, transistor 75 is turned off, causing SCR 77 through silicon bilateral switch 79 to latch and permanently blow fuse 72. Hochstein, 8:12-23 (Ex. 1004); Tingler Decl. ¶ 121 (Ex. 1005). The blown fuse 72 then permanently indicates a failed signal to the conflict monitor, i.e., infinite input impedance. Hochstein, 7:51-53 (Ex. 1004); Tingler Decl. ¶ 121 (Ex. 1005).

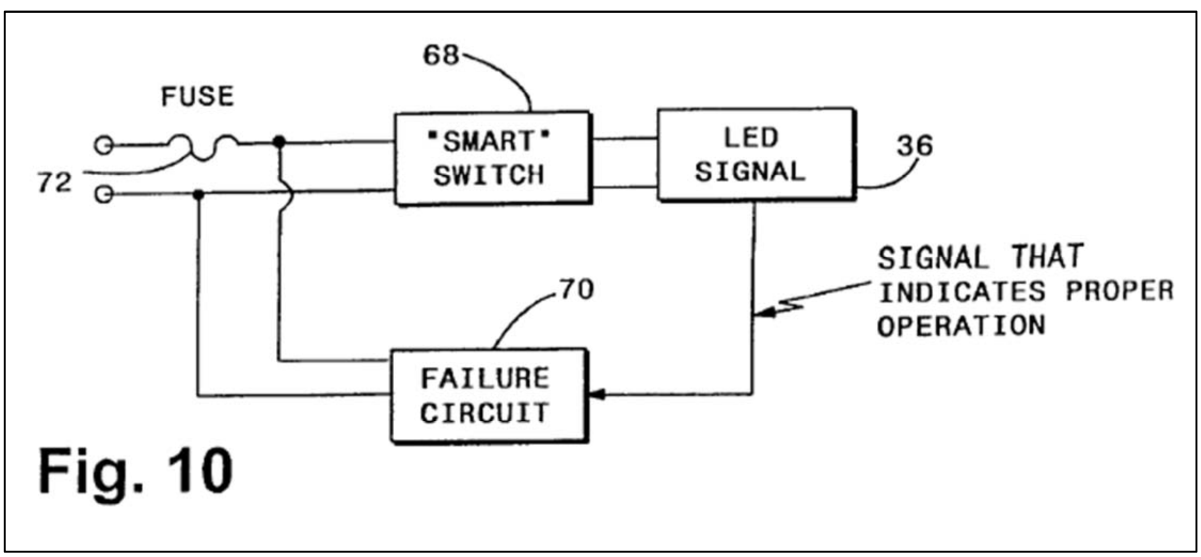


Figure 10 of Perry

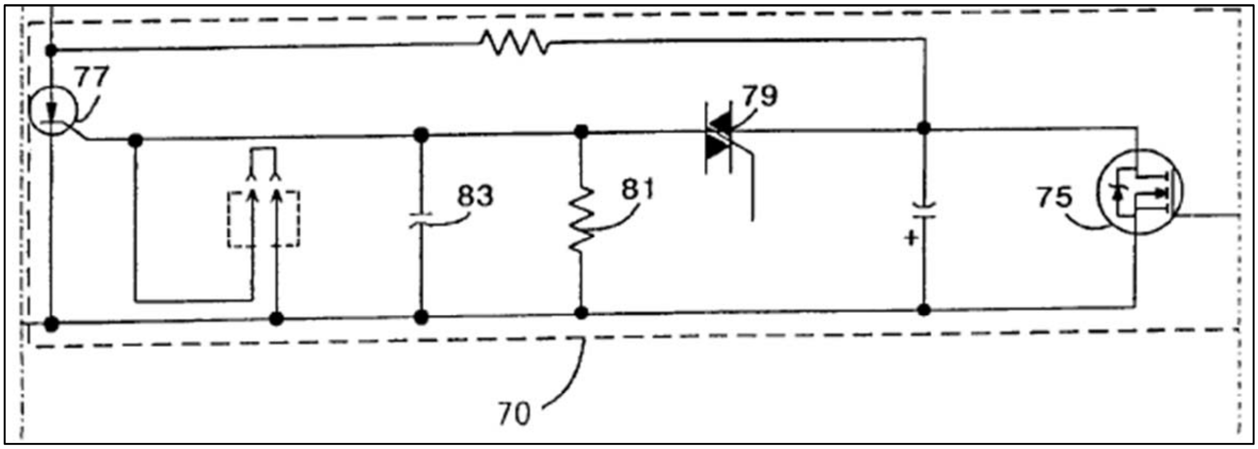


Figure 11B of Perry (showing detail of failure circuit 70)

Because Hochstein and Perry disclose the same problem of semiconductor light source failure, a PHOSITA would have been motivated to combine the detection means disclosed in Perry with the circuit disclosed in Hochstein in order to solve the problem of semiconductor light source failure. Tingler Decl. ¶ 122 (Ex. 1005). Moreover, Perry cites to Hochstein on its face, providing more reason to combine the teachings of the two references. Perry, Page 2 (Ex. 1003); Tingler Decl. ¶ 122 (Ex. 1005). Accordingly, it would have been obvious for a person of ordinary skill in the art use the detection means of Perry in order to solve the LED load failure problem discussed in Hochstein by simply coupling the detection means (failure circuit 70) disclosed in Perry to the input and output lines of the circuit disclosed in Hochstein with minimal modification. Tingler Decl. ¶ 122 (Ex. 1005).

2. Dependent Claim 21: "An operating circuit as claimed in claim 15 wherein the semiconductor light source comprises one or[] more light emitting diodes and the converter includes a switching transistor"

The semiconductor light source disclosed by Hochstein comprises one ore more LEDs. Hochstein, Fig. 5, Abstract (Ex. 1004) ("An apparatus (10) for supplying regulated voltage d.c. electrical power to an LED array (12)"); Tingler Decl. ¶ 123 (Ex. 1005). Moreover, the converter (buck/boost switchmode converter 38) disclosed in Hochstein includes a switching transistor (Pass Element). Hochstein, Fig. 5 (Ex. 1004); Tingler Decl. ¶ 123 (Ex. 1005). The switching transistor (Pass Element) has a high frequency on-off switching period that is controlled by the control circuit of the converter (control IC 40), discussed above. Hochstein, 5:43-54 (Ex. 1004); Tingler Decl. ¶ 123 (Ex. 1005).

VIII. CONCLUSION

Based on the foregoing, Claims 1, 15, and 21 of the '458 Patent recite subject matter that is unpatentable. The Petitioner requests institution of an *inter partes* review to cancel these claims.

RESPECTFULLY SUBMITTED,
RADULESCU LLP

Date: May 28, 2015

/s/ *David C. Radulescu*
David C. Radulescu, Ph.D.
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Attachment A:

CERTIFICATE OF SERVICE ON PATENT OWNER UNDER 37 C.F.R. §§ 42.6(e) and 42.105

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105, the undersigned certifies that on May 28, 2015, a complete and entire copy of this Petition was served via EXPRESS MAIL®, postage prepaid, to the Patent Owner by serving the following parties:

Philips Intellectual Property & Standards
P.O. Box 3001
Briarcliff Manor, NY 10510
Patent owner's correspondence address of record

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Date: May 28, 2015

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Attachment B: Appendix of Exhibits

Exhibit	Description
Ex. 1001	U.S. Patent No. 6,147,458 to Bucks
Ex. 1002	File History of U.S. Patent No. 6,147,458 to Bucks
Ex. 1003	U.S. Patent No. 6,150,771 to Perry
Ex. 1004	U.S. Patent No. 5,661,645 to Hochstein
Ex. 1005	Declaration of Robert Neal Tingler
Ex. 1006	Declaration of Dr. Batarseh (March 13, 2015)
Ex. 1007	Declaration of Dr. Batarseh (February 20, 2015)
Ex. 1008	Kaplan, Steven M., *Wiley Electrical and Electronics Engineering Dictionary* (definitions of "filter" and "leakage current") (2004)
Ex. 1009	Parker, Sybil P., *McGraw-Hill Dictionary of Scientific and Technical Terms, 4th Ed.* (definitions of "filter" and "leakage current") (1989)
Ex. 1010	*Transient Suppression Devices and Principles*, Littelfuse (January 1998)
Ex. 1011	U.S. Patent No. 5,818,705 to Faulk
Ex. 1012	U.S. Patent No. 6,013,988 to Bucks
Ex. 1013	Curriculum Vitae of Robert Neal Tingler