

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UV ENGINEERING SOLUTIONS LLC,

Petitioner,

v.

TROJAN TECHNOLOGIES GROUP, ULC,

Patent Owner.

Case IPR2023-01015
U.S. Patent No. 8,167,654

**PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. 8,167,654**

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Patent Owner Trojan Technologies Group, ULC (“Trojan” or “Patent Owner”) submits this Preliminary Response in opposition to Petitioner UV Engineering Solutions LLC’s, (“Petitioner”) Petition for *Inter Partes* Review (“IPR”) (“Petition” or “Pet.”) of U.S. Patent No. 8,167,654 (EX1001) (hereinafter “the ’654 Patent”).

I. INTRODUCTION

The Board should deny institution of *inter partes* review of claims 1-5 and 8-24 of the ’654 Patent because the Petition fails to demonstrate a reasonable likelihood of prevailing on any claim on any ground. Petitioner does not and cannot provide any motivation for combining the cited references beyond unsupported conclusory attorney statements. Petitioner does not offer an expert witness or any articulated reasoning for combining the cited references. Petitioner also fails to offer any explanation as to why a person of ordinary skill would have a reasonable expectation of success. Rather, Petitioner, again with no articulated reason for doing so, only reaches its proposed combinations through impermissible hindsight – dissecting the teachings of the references, picking and choosing which teachings to use, while discarding others to arrive at the claimed inventions.

Accordingly, because the cited references do not establish a reasonable likelihood that any of the challenged claims are unpatentable, the board should deny all grounds for instituting the Petition.

II. THE '654 PATENT DESCRIBES A NOVEL AND EFFICIENT SOLUTION TO A COMPLEX, LONGSTANDING PROBLEM

Trojan is the owner of the '654 Patent entitled “Radiation Lamp and Radiation Source Module Incorporating Same.” The '654 Patent was duly issued by the United States Patent and Trademark Office (“PTO” or “Office”) on May 1, 2012 and generally relates to the field of fluid treatment systems, such as water disinfection systems, which rely on radiation source modules, or radiation lamps, for disinfection. EX1001 at 1:18-27.

A. CONVENTIONAL ULTRAVIOLET RADIATION LAMPS FOR FLUID TREATMENT SYSTEMS HAD SIGNIFICANT DRAWBACKS

Conventional ultraviolet radiation lamps for fluid treatment systems have been configured to have all electrical connections disposed at one end of the lamp. EX1001 at 1:62-67. The electrical connectors for such an arrangement “are elongate and are disposed such that the axes of the pins are parallel with the longitudinal axes of radiation lamp” so that they may be pushed directly into the electrical connection “in a direction parallel to the longitudinal axis”. EX1001 at 2:1-7. The specification of the '654 Patent gives several examples of these sorts of conventional lamps, and discusses two of the references relied on by Petitioner, U.S. Patent No. 4,700,101 to Ellner *et al.* (Ellner) (EX1006) and U.S. Patent No. 5,166,527 to Solymar (Solymar) (EX1008), at length, explaining:

In more recent years, it has become conventional to use such ultraviolet lamps configured to have all the electrical

connections disposed at one end of the lamp. See, for example, FIGS. 2-8 of U.S. Pat. No. 4,700,101 [Ellner, et al. (Ellner)] and FIGS. 1,2, and 4 of U.S. Pat. No. 5,166,527 [Solymar].

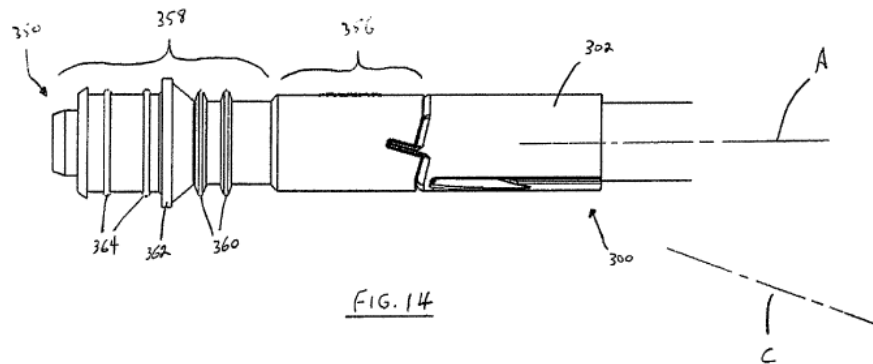
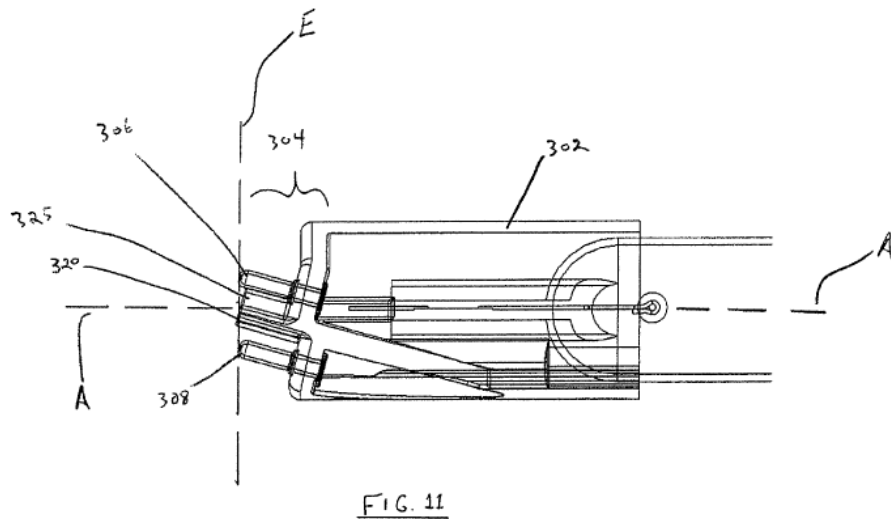
As can be seen from the conventional radiation lamps taught by Ellner and Solymar, the electrical connection pins are elongate and are disposed such that the axes of the pins are parallel with the longitudinal axes of radiation lamp. In other words, the electrical connection is made by pushing an end cap or other connection base on to the pins in a direction parallel to the longitudinal axis of the radiation lamp.

EX1001 at 1:62-2:7.

The '654 Patent specification goes on to explain: “The problem with this approach is that in many applications, the radiation lamp is immersed in a flow of water and turbulence created within that water treatment system invariably imparts a vibratory motion to the lamps which frequently results in lamps being vibrated or shaken loose of its electrical connection base or socket thereby causing the lamps to be rendered completely or intermittently inoperative” resulting in insufficient disinfection. EX1001at 2:8-17. Attempts to address this problem in conventional radiation lamps relied on “relatively complicated mechanical connection (*e.g.*, a so-called ‘push-and-twist’ connection) to secure the lamp to the connection base.” EX1001 at 2:19-21. These approaches gave “rise to a higher incidents of lamp breakage and other damage to the module by field personal.” EX1001 at 2:23-29.

B. THE '654 PATENT PROVIDES AN ELEGANT AND EFFICIENT SOLUTION TO PROBLEMS CREATED BY CONVENTIONAL ULTRAVIOLET RADIATION LAMP DESIGNS

In addressing the above-mentioned problems with conventional radiation lamps, the '654 Patent uses a novel approach whereby the electrical connectors are maintained at one end of the lamp and yet the lamps cannot be disengaged “in a direction parallel to the longitudinal axis” as represented by line A of FIGs. 11 and 14 of the '654 Patent, below. EX1001 at 2:1-7, 5:27-37.



In contrast to the arrangement of conventional radiation lamps, including Ellner and Solymar, the lamps as claimed by the '654 Patent must be “disengaged by relative movement thereof in the direction of line C.” EX1001 at 1:62-2:7, 5:27-37, Fig. 14. None of the references relied on by Petitioner, Ellner, Titchener, nor Solymar, identify this problem, or solve or suggest solving this problem in the manner the '654 Patent solves this problem.

C. THE CHALLENGED INDEPENDENT CLAIMS

Challenged independent claims 1, 23, and 24 of the '654 Patent recite:

1. A lamp device having a longitudinal axis, and comprising:
a first elongate electrical connector and a second elongate electrical connector, the first elongate electrical connector and the second elongate electrical connector being aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis, each of the first elongate electrical connector and the second elongate connector configured to form an oblique angle with respect to the longitudinal axis, ends of all of the electrical connectors of the lamp device being in substantial alignment along a plane orthogonal to the longitudinal axis.
23. A lamp device having a longitudinal axis, and comprising:
a first elongate electrical connector and a second elongate electrical connector, the first elongate electrical connector and the second elongate electrical connector being aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis, each of the first elongate electrical connector and the second elongate connector configured to form an oblique angle with respect to the longitudinal axis, none of the elongate electrical connectors of the lamp device being staggered with respect to the longitudinal axis.
24. A lamp device having a longitudinal axis, and comprising:

a first pair of elongate electrical connectors and a second pair of elongate electrical connectors, the first pair of elongate electrical connectors and the pair of elongate electrical connectors being aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis, each of the elongate electrical connectors configured to form an oblique angle with respect to the longitudinal axis, ends of all of the electrical connectors being in substantial alignment along a plane orthogonal to the longitudinal axis.

While multiple embodiments are disclosed in the '654 Patent, the embodiments of independent claims 1, 23, and 24 are represented by the Figures 9-14 of the '654 Patent.

III. PERSON OF ORDINARY SKILL IN THE ART

A person having ordinary skill in the art ("POSITA") at the time of the invention of the '654 Patent would have had a bachelor's degree in electrical engineering, mechanical engineering, or of a similar field, and at least four to six years of professional experience, or its equivalent, in the manufacture of ultraviolet radiation lamps for fluid treatment systems or similar devices. Petitioner's proposed POSITA with knowledge only of mechanical engineering and lamps is technically deficient because some knowledge of fluid treatment systems and electro-mechanical interactions is necessary given the challenging, immersed-in-water environment in which these UV wastewater treatment systems and lamps operate. Lamp failure in this environment can result in electric shock as well as lack of disinfection that could impair the health of the people living in the municipalities that rely on these UV water treatment systems for their drinking water. However,

even applying a lesser skill level as proposed by Petitioner, the inventions of the '654 Patent would not have been obvious.

IV. CLAIM CONSTRUCTION

In an *inter partes* review claim terms are construed based on their ordinary and customary meaning. 37 C.F.R. § 42.100(b). Further, the Board always should construe claims to sustain their validity, if possible. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1327 (Fed. Cir. 2005). The specification is the “best source for understanding a technical term,” to be supplemented, “as needed, by the prosecution history.” *Id.* at 1315. For the purposes of this Preliminary Response, for all claim terms, Trojan requests that the Board adopt the ordinary and customary meaning of the claim terms as understood by one of ordinary skill in the art. If trial is instituted, however, and to the extent deemed necessary to resolve any dispute, Trojan reserves the right to propose more specific constructions of one or more claim terms.

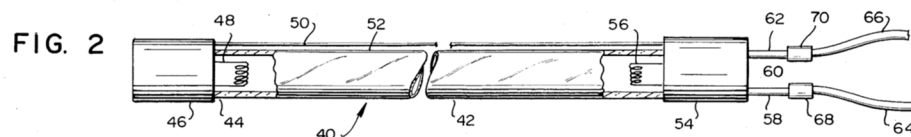
V. SUMMARY OF REFERENCES RELIED ON BY PETITIONER

Petitioner’s ground 1 asserts that claims 1-5, 8-19, 23, and 24 are unpatentable under pre-AIA 35 U.S.C. § 103 based on Ellner in view of Titchener. Ground 2 asserts that claims 20-22 are unpatentable under pre-AIA 35 U.S.C. § 103 based on Ellner in view of Titchener and Solymar. As conceded by Petitioner, Titchener and Solymar were cited during the prosecution of the '654 Patent. Pet., 8, 39. Ellner, as discussed in Section II, is described at length in the specification of the '654 Patent.

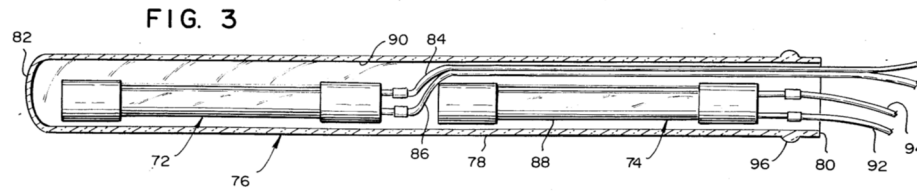
A. ELLNER

Both of Petitioner's grounds rely on Ellner to support an assertion of obviousness under 35 U.S.C. § 103. The Petition asserts that Ellner discloses ultraviolet lamps in water purification systems. Ellner does not disclose, much less propose any solutions, to problems solved by the '654 Patent, such as decreasing or eliminating connection problems caused from water turbulence that can shake and/or vibrate the lamp. Rather, Ellner is directed to an ultraviolet light source with an extended length, which permits the water contact chamber to be longer thereby increases the water purification capability of the chamber. EX1006 at 1:5-32. Ellner accomplishes this by providing an ultraviolet lamp that requires electrical connections at one end. EX1006 at 1:37-39.

By way of example, Figure 2 of Ellner shows the ultraviolet lamp where one end has terminal pins that are connected to wires by means of connectors. *Id.* at 3:34-35, Fig. 2. The wires then may be connected to an electric power source. *Id.* at 3:35-37, Fig. 2. To extend the length of the lamps, Ellner taught that two or more of these ultraviolet lamps could be inserted into a quartz jacket. *Id.* at 3:38-41, 3:62-66, Fig 3.



EX1006, Fig. 2



EX1006, Fig. 3.

The second ultraviolet lamp has extended wires connected to the terminal pins, which are longer than those connected to the first ultraviolet lamp, such that both sets of wires extend out of the open end of the quartz jacket and can be connected to electrical power sources. *Id.* at 3:38-55, Fig. 3.

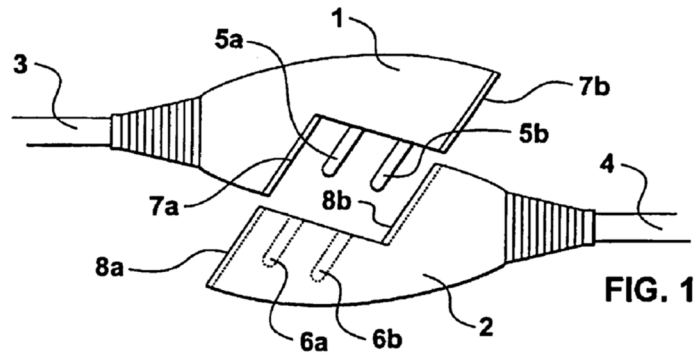
Petitioner attempts to argue that Ellner discloses embodiments of an ultraviolet light that operate more like a conventional plug and base unit where the terminal pins are connected directly to a power source via the base unit. However, the embodiment on which Petitioner purports to rely (Figures 6-8), is disclosed as being similar to the embodiment in Figures 4-5, which in turn, are disclosed as “generally similar to the ultraviolet lamp 40 of Fig. 2”. *Id.* 4:20-25. Because Ellner’s Figure 2 requires that the lamp be connected to a power source via wires that are connected to the terminal pins and then extend out of the quartz jacket, all other embodiments would be understood to also require extended wires. The terminal pins do not extend beyond the quartz jacket and therefore the lamps of Ellner could not be connected to a power source without the extended wires.

The '654 Patent specification explains Ellner was a single-sided connection design that caused a problem to be solved by the inventions of the '654 Patent. EX1001 at 2:8-17 (“The problem with this approach is that in many applications, the radiation lamp is immersed in a flow of water and turbulence is created within that water treatment system invariably imparts a vibratory motion to the lamps which frequently results in lamps being vibrated or shaken loose of its electrical connection base or socket thereby causing the lamps to be rendered completely or intermittently inoperative.”). Notably Ellner does not mention or recognize this problem, much less suggest a solution to this problem.

B. TITCHENER

Petitioner relies on Titchener as prior art to support an assertion of obviousness under 35 U.S.C. § 103 for both grounds of the Petition. Titchener was cited during prosecution of the '654 Patent. Pet., 8. Titchener is not directed to ultraviolet lamps or the electrical connections for ultraviolet lamps. Rather, Titchener is directed to a connector pair, which can be used, for example, to detachably connect two ends of cables, cords, optical fibers or hosts. EX1007 at 1:9-15, 2:23-25. Titchener purports to attempt to solve a problem with connector pairs whereby they can unplug easily when a pulling force is exerted on the two ends. EX1007 at 1:21-24. In particular, Titchener relies on electrical connectors that

extend from a side of a cable in an oblique manner in a backwards facing or reverse arrangement, to prevent separation upon a pulling force. EX1007 at 2:35-41.



EX1007, Fig. 1.

However, there is no teaching in Titchener that the same configuration could be applied to ultraviolet lamps immersed in water for water treatment purposes or any other water immersed electrical application. Titchener also does not teach the connection configurations claimed by the '654 Patent, where the electrical connectors are aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis that are additionally in substantial alignment along a plane orthogonal to the longitudinal axis. In fact, as explained in greater detail below, Titchener teaches away from the electrical connectors being aligned in this manner because the Titchener connector design connects at the side.

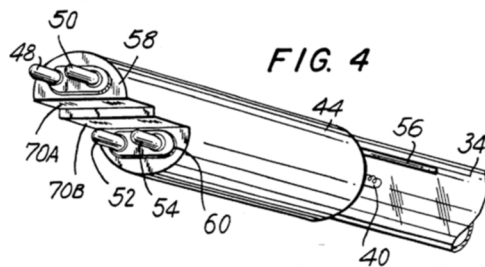
The Petition does not present Titchener in any different fashion than that previously considered during the prosecution of the '654 Patent.

C. SOLYMAR

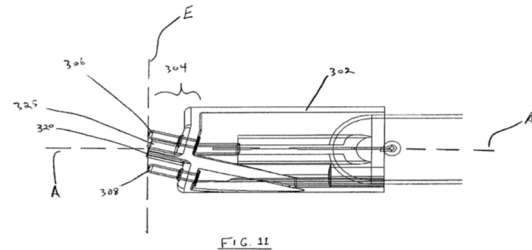
Ground 2 of the Petition further relies on Solymar as prior art to support an assertion of obviousness under 35 U.S.C. § 103. Like Titchener, Solymar was considered during the prosecution of the '654 Patent. Pet., 39. Additionally, similar to Ellner, Solymar is discussed by Trojan in the specification of the '654 Patent as teaching a single-sided connection that creates the problem solved by the inventions of the '654 Patent. EX1001 at 1:62-67, 2:8-17; EX1008 at 2:5-7 (“Both pairs of pins are mounted on, and extend outwardly along the longitudinal axis of, one of the end caps.”).

Petitioner relies on Solymar for teaching a connector having peaks and valleys. Pet., 40. However, the peaks and valleys of Solymar only result in offsetting the ends of the electrical connectors therein in stepped fashion to resist electrical arcing between the pairs of pins. EX1008 at 1:31-37, 1:47-48. Solymar prevents the electrical arcing when “[t]he planes of the end wall portions are spaced apart by predetermined spacing larger than said predetermined distance in order to still further prevent electrical arcing between the pairs of pins exteriorly of the arc tube.” EX1008 at 2:17-29; *See also* 4:22-30. In other words, Solymar relies on the ends of its electrical connection being misaligned in a stepped fashion via the additional peaks and valleys to prevent electrical arcing. Contrary to Petitioner’s arguments, Solymar does not support an arrangement where ends of all of the

electrical connectors are in substantial alignment along a plane orthogonal to the longitudinal axis, as claimed.



Solymar (EX1008), Fig. 4.



The '654 Patent (EX1001), Fig. 11

VI. PETITIONER FAILED TO ESTABLISH A REASONABLE LIKELIHOOD THAT ANY CLAIM IS UNPATENTABLE

Petitioner has failed to demonstrate a reasonable likelihood that any of the challenged claims are unpatentable. 37 C.F.R. § 42.108(c).

A. LEGAL STANDARD FOR OBVIOUSNESS UNDER 35 U.S.C. § 103

A claim is unpatentable for obviousness under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (i) the scope and content of the prior art; (ii) differences between the prior art and the claims; (iii) the level of ordinary skill in the pertinent art; and (iv) where in

evidence, secondary considerations. *Cisco Sys., Inc. v. Constellation Techs. LLC*, IPR2014-01179, Paper 7 at 10 (P.T.A.B. Feb. 4, 2015), (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)). “To satisfy its burden of proving obviousness, a petitioner cannot employ merely conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support a legal conclusion of obviousness.” *In Re: Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380-81 (Fed. Cir. 2016). The “factual inquiry” into the reasons for “combin[ing] references must be thorough and searching, and the need for specificity pervades.” *In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (internal quotations and citations omitted). “[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” MPEP § 2141, § 2143 (quoting *KSR*, 550 U.S. at 418). Moreover, “an obviousness determination requires not only the existence of a motivation to combine elements from different prior art references, but also that a skilled artisan would have perceived a reasonable expectation of success in making the invention via that combination.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

Failure of a Petitioner to support a proper determination of obviousness, or failure to support sufficient motivation is grounds for the Board denying institution of the petition. *Volkswagen Grp. of Am., Inc. v. Velocity Patent LLC*, IPR2015-

00276, Paper 8 at 13 (P.T.A.B. Jun. 1, 2015). In *Volkswagen*, Petitioner’s rationale for combining references relied on arguments of counsel rather than expert testimony. *Id.* In denying institution of the challenged claims, the Board found Petitioner’s position to be premised on a handful of conclusory assertions, which failed to provide any explanation of how or why the teachings from the cited references would be combined to account for all of the features of the challenged claims. *Id.*

In *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9 at 13, (P.T.A.B. Oct. 15, 2018), the PTAB denied institution of an IPR for lack of reasons to substitute compositions in one reference with those of another. The Board noted that “it is Petitioner’s burden to demonstrate ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” (quoting *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–1368 (Fed. Cir. 2016)). *Id.* The Board further noted that the mere assertions provided in a declaration did not give adequate support for the modifications proposed or their likelihood of success. In *Nautilus Hyosung Inc. v. Diebold Self-service Systems division of Diebold*, IPR2016-00633, Paper 9 at 21 (P.T.A.B. Aug. 22, 2016), the Board again denied institution, cautioning that “[a]n assertion that something *could be* done does not articulate a reason why

something *would* be done by one of ordinary skill in the art at the time of the invention and, therefore, raises a specter of impermissible hindsight bias in an obviousness analysis.”

B. EVERY GROUND OF THE PETITION IS FATAL FLAWED BECAUSE PETITIONER FAILS TO MEET ITS BURDEN TO ESTABLISH MOTIVATION TO COMBINE THE CITED REFERENCES AND REASONABLE EXPECTATION OF SUCCESS

Contrary to Petitioner’s arguments, its proposed combinations of references would not be a “simple substitution,” but a complete *volte face* of what the references independently teach. Petitioner offers no motivation to combine the cited references and offers no explanation as to why a POSITA would have reasonable expectation of success that the combination would work. In fact, the words “motivation” and “expectation of success” appear nowhere in the Petition. The Petitioner’s failure to explain how and why a POSITA would have combined the prior art to arrive at the challenged inventions should be fatal to the Petition. *Volkswagen Group of America, Inc. v. Velocity Patent LLC*, IPR2015-00276, Paper 8 at 11-14 (P.T.A.B. June 1, 2015), (denying institution where “Petitioner’s rationale for combining [the cited references] is premised on a handful of conclusory assertions by counsel, unsupported by testimony of an expert witness.”); *Cisco Sys., Inc. v. Constellation Techs. LLC*, IPR2014-01179 (P.T.A.B. Feb. 4, 2015), Paper 7 at 13-16 (denying institution when petitioner fails to provide sufficient reasoning for combining cited

prior art); *Google Inc. v. EveryMD.com LLC*, IPR2014-00347 Paper 9 at 20-27 (same) (P.T.A.B. May 22, 2014); *Gracenote, Inc. v. Iceberg Indus. LLC*, IPR2013-00551, Paper 6 at 31-33 (same) (P.T.A.B. Feb. 28, 2014).

To satisfy the motivation requirement Petitioner was required to show more than mere existence of the '654 Patent's elements in the prior art. *KSR*, 550 U.S. at 418. Additionally, the rationale for combining references was required to be predicated on more than conclusory statements litigation-induced statements from patent counsel. *Cisco*, IPR2014-001179, Paper 7 at 13-16 (denying institution where petitioners rationale for combining references "is predicated on conclusory statements"); *Volkswagen*, IPR2015-00276, Paper 8 at 11-14 (same).

Here, Petitioner does not address any rationale for combining references beyond conclusory statements by counsel. Petitioner only offers unexplained attorney characterizations of certain portions of the cited references. There is no support offered by an expert witness and no articulated reasoning with rationale as to why the teachings of the cited references might be combined to arrive at the claimed inventions of the '654 Patent in a way that accounts for all features of the challenged claims. *See KSR*, 550 U.S. at 418. Such unsupported conclusions are legally inadequate. *Cisco*, IPR2014-001179, Paper 7 at 13-16; *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

Further, Petitioner relies on the '654 Patent's own disclosures as an impetus for its combination of Ellner and Titchener. This is impermissible hindsight. Specifically, after discussing the disclosures in the Background of the Invention of the '654 Patent, Petitioner concludes "[l]ike the '654 Patent, Ellner is directed to providing an ultraviolet light source that is rugged and reliable, for example for use in high wastewater flow rates" and "[l]ike the '654 Patent, Titchener prevents the loosening of electrical connections". Pet., 8-9. But nothing in Titchener suggests using its design in high water flow rate environments. Nor does Titchener suggest divorcing the angled plug aspect of its design from the rest of its design, moving it from the side to the end and reversing its orientation, and using it in the wastewater environment. Such design modifications only come from hindsight using the '654 Patent disclosure. "It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to use that which the inventor taught against its teacher." *In re Lee*, 277 F.3d 1338, 1344 (Fed. Cir. 2002) (internal quotations omitted); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) ("To imbue one of ordinary skill in the art with knowledge of the invention in suit...is to fall victim to the insidious effect of a hindsight syndrome").

1. One of Ordinary Skill in the Art Would Not Have Been
Motivated to Combine Ellner and Titchener

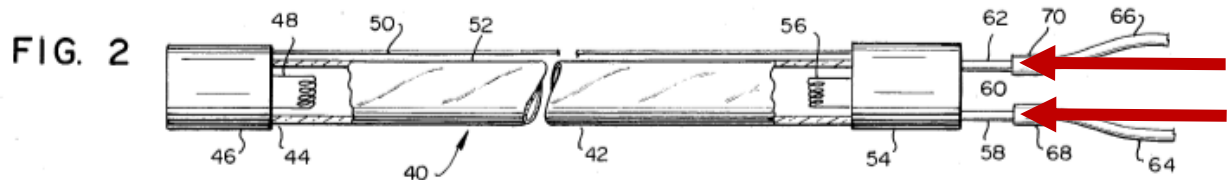
Petitioner attempts to combine Ellner and Titchener for its obviousness challenge to claims 1-5, 8-19, 23 and 24. Petitioner offers nothing more than unexplained characterizations of the prior art supported only by the following conclusory attorney statements:

- “Such a modification would be a simple substitution of one known element (i.e., angled connectors 5a and 5b of Titchener) for another (i.e., non-angled terminal pins 126, 128, 130, and 132 of Ellner) to obtain predictable results.” Pet., 12-13.
- “Such a modification would also be applying a known technique (i.e., use of angled connectors) to a known device ready for improvement (any embodiment of Ellner) to yield predictable results.” Pet., 13.

There is no explanation of what motivation a POSITA would have to combine elements from Ellner and Titchener in the way claimed by the '654 Patent. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012).

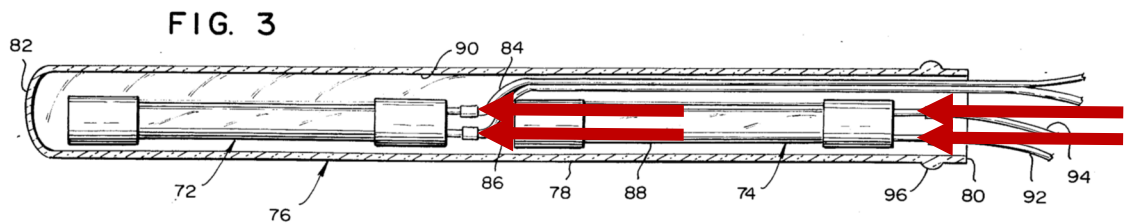
Far from the “simple substitution” argued by Petitioner, the teachings of Ellner and Titchener would teach away from combining these references. Ellner, as shown below, teaches an ultraviolet lamp construction that can be elongated and requires electrical connection on only one end. EX1006 at 1:37-43, FIG. 1-8. Ellner relies on the terminal pins (58 and 62, indicated by the red arrows) being connected to a pair of wires (64 and 66) by means of connectors (68 and 70). EX1006 at 3:34-

35. The wires (64 and 66) may then be connected to a source of electrical power to energize a UV lamp. *Id.* at 3:34-37.



Ellner (EX1006), Fig. 2 (annotated)

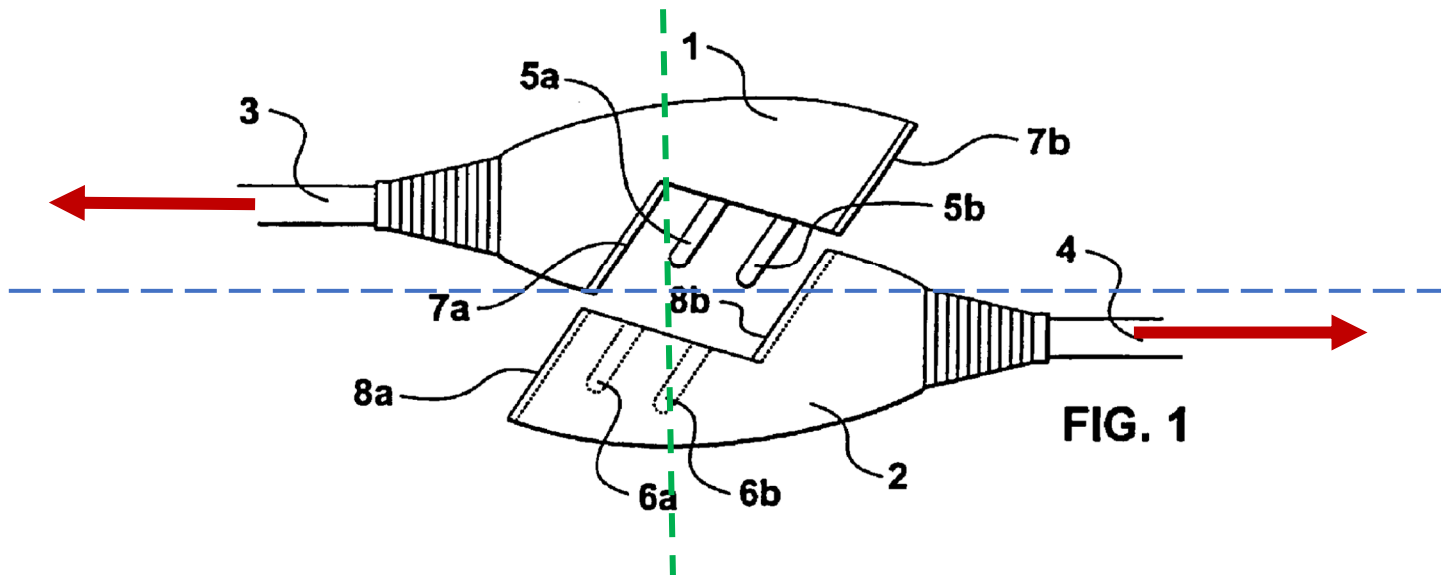
Ellner also teaches that the ultraviolet lamps may be elongated by inserting multiple lamps into a quartz sleeve, still with the electric connections for each ultraviolet lamp exiting on a single end of the construction as shown below (Fig 3) where the red arrows indicate Ellner's nonangled terminal pins.



Ellner (EX1006), Fig. 3 (annotated)

Titchener, as shown below (Fig. 1), teaches a mechanism where a first connector (1) comprising male coupling parts (5a and 5b) forms more complete connection with a second connector (2) comprising female coupling parts (6a and 6b) by exerting a pulling force on cables (3 and 4) located on opposing sides of the

connectors. EX1007 at 3:37-47, 1: 40-44 (“the male and the female coupling part are positioned in relation to the two ends in such a manner that a pulling force, exerted to the two ends, will change a partial coupling between the first connector and the second connector into a complete coupling.”).



Titchener (EX1007), Fig. 1 (annotated)

For the angled connector system taught by Titchener to work as disclosed, that is, where the connection is stronger as opposing forces are applied on both ends (red arrows) of the connection, the angled pins have to connect from the side cannot be positioned where the connection is made at the end. Thus, Titchener requires that the pins *not* be aligned with respect to a line orthogonal (green line) to the longitudinal axis (blue line). If the connection were made at the end of the device where the ends of the pins would be in plane orthogonal to the longitudinal axis, the

connection would not become stronger. This is would eliminate the benefit taught by Titchener.

If one were to attempt to substitute the backward or reverse facing angled configuration taught by Titchener for the straight, non-angled terminal pins in Ellner, the resulting device would not result in the invention claimed by the '654 Patent where the ends of the connectors are aligned to a plane orthogonal to the longitudinal axis. Because the Ellner and Titchener references teach vastly different connection mechanisms, there is no motivation for combining them and no expectation that such a combination would successfully achieve the invention claims in the '654 Patent. Accordingly, Petitioner has failed to carry its burden to explain how these disparate references could reasonably be combined based on their operating principles to reach the claimed invention.

2. One of Ordinary Skill in the Art Would Not Combine Ellner, Titchener, and Solymar

Petitioner's obviousness challenges to claims 20-22 each rely on the combination of Ellner, Titchener, and Solymar. Each of the claims 20-22 depend directly or indirectly from independent claim 1 of the '654 patent and contain the additional limitation that a cross-section of the base portion containing the longitudinal axis comprises a plurality of peaks and a plurality of valleys. Similar

to Petitioner's combination of Ellner and Titchener, Petitioner provides no motivation for the combination of Ellner, Titchener, and Solymar.

Rather, consistent with grounds 1 of the Petition, Petitioner only offers a conclusory statement that "[i]t would be obvious to one of ordinary skill in the art to modify the combination of Ellner of Titchener with Solymar to include additional peaks and valleys to apply an additional physical obstruction to arcing." Pet., 40. This unsupported statement lacks any reasoning or explanation and is therefore insufficient. Petitioner's unsupported conclusion, proposing Solymar's addition to an already incompatible set of references fails to meet its burden.

Similar to Ellner, Solymar discloses lamp configurations where the electrical connection extends longitudinally out of one end of the lamp. Therefore, for the same reasons stated above, this arrangement is also inconsistent with Titchener.

Further, the Solymar design depends on the two pairs of electrical pins being offset in a stepped manner to resist electrical arcing between the pin pairs, which prevents all of its pin ends from being in substantial alignment along a plane orthogonal to the longitudinal axis as required by the claims. Petitioner offers no basis for ignoring these aspects of the Solymar design in seeking to reach the claimed invention and no explanation for how or why a POSITA would make these modifications to a combined Ellner/Titchener design, and expect them to work.

**C. PETITIONER FAILS TO MEET ITS BURDEN OF SHOWING A
REASONABLE LIKELIHOOD OF UNPATENTABILITY UNDER GROUND 1**

Petitioner's ground 1 requests cancellation of claims 1-5, 8-19, 23, and 24 based on Ellner in view of Titchener. Claims 1, 23, and 24 are the independent claims challenged by ground 1.

**1. Petitioner Fails to Meet Its Burden of Showing a Reasonable
Likelihood of Unpatentability of Independent Claim 1**

Petitioner's proposed combination is based on its inaccurate characterization of the references and application of this mischaracterization to each feature of the claims in a vacuum without consideration of the remaining features of the claims. "In determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983)." MPEP § 2141.02(I).

For example, Petitioner offers no support or explanation for how a POSITA would align all of the ends of the electrical connectors such that they are "in substantial alignment along a plane orthogonal to the longitudinal axis" for electrical connector that are otherwise oblique to the longitudinal axis. EX1001 at 6:11-14. No oblique electrical connectors in substantial alignment along a plane orthogonal to the longitudinal axis are found in either Titchener or Ellner. Titchener's oblique

electrical connectors are not in substantial alignment along a plane orthogonal to the longitudinal axis due to the side arrangement needed to reach its objective relative a pulling force. EX1007 at FIGs. 1-14. Thus, Titchener requires discarding the very claim feature (ends of all electrical connectors of the lamp device being in substantial alignment along a plane orthogonal to the longitudinal axis) for which Petitioner cites Ellner and for which Ellner requires to achieve its objective.

Petitioner is relying on the oblique nature of Titchener to modify Ellner. Comparatively, Petitioner only supports this feature with other electrical connectors that are not oblique to the longitudinal axis, like those in Ellner. EX1006 at FIGs. 4-8; *See also* EX1009 at Fig. 2; EX1010 at Fig. 7. Petitioner offers no other reference or explanation for how a POSITA would have arrived at a configuration where the connectors are in substantial alignment along a plane orthogonal to the longitudinal axis with a reasonable expectation of success. Discarding the teaching of Titchener, on the other hand, and angling the pins in Figs. 2 and 3 of Ellner obliquely in a non-reverse angle, and keeping the ends of the pins in a plane orthogonal to the lengthwise direction, would provide no benefit in reliability of the connection because Ellner discloses a wire connection. There would be no motivation for a POSITA to do so, and no expectation of success, and Petitioner does not attempt to provide one. As such, Petitioner has failed to show a POSITA

would rely on Titchener to modify Ellner. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959); MPEP § 2143.01(VI).

Further, Petitioner’s proposed combination of Ellner and Titchener impermissibly changes the principals of how both references operate. Ellner provides no indication that it relied on the wires connected to the terminal pins or even the terminal pins to keep the lamps connected and in place. Instead, Ellner’s manner of connecting the terminal pins to the separate wires, of a pair of wires, of Ellner was an important aspect of Ellner’s disclosed elongated lamp configuration where multiple lamps can be stacked end-to-end in a single quartz tube. EX1006 at 2:62-64, 3:38-4:13, Fig. 3. In contrast, Titchener relies on pulling two cables in opposite direction to reinforce a connection. Titchener’s ability to draw the cable connectors together in this manner is a distinction that finds no comparative analysis to the connectors located at the end of Ellner’s lamp configuration. EX1007 at 1:21-23, 1:39-60, 2:35-41, 3:35-50, 4:12-15.

Titchener’s configuration requires that “the male and the female coupling part are positioned in relation to the two ends in such a manner that a pulling force, exerted to the two ends will change a partial coupling between the first connector and the second connector into a complete coupling.” EX1007 at 1:40-44. Petitioner’s proposed use of Titchener (*i.e.*, placing the connectors at the end of the device) discards the very feature needed for Titchener to achieve its intended

objective (*i.e.*, a mechanism that increases a connection when receiving pulling forces). Similarly, the proposed combination would remove the independent wire connectors and require the lamp to have a side connection as opposed to the end connection required by Ellner.

Accordingly, Petitioner fails to illustrate there is a reasonable likelihood independent claim 1 is unpatentable.

2. Petitioner Fails to Meet Its Burden of Showing a Reasonable Likelihood of Unpatentability of Independent Claim 23

Like claim 1, Petitioner also challenges independent claim 23 under ground 1 and recites elongated electrical connectors “being aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis” and each elongated electrical connector “configured to form an oblique angle with respect to the longitudinal axis.” EX1001 at 8:4-11. Independent claim 23 further recites “none of the elongate electrical connectors of the lamp device being staggered with respect to the longitudinal axis.”

Here, Petitioner’s arguments seeking to combine Ellner and Titchener suffer from the same deficiencies as discussed with respect to claim 1. As discussed above, Petitioner’s reliance on Titchener for electrical connectors that are oblique without the reverse angled side plug orientation is misplaced because under such a modification Titchener would no longer achieve its objective to provide a stronger

connection when pulling on the ends of the cords. Comparatively, Ellner's separate wires are connected to terminal pins by a separate connector and are not pulled to make any connection. As with claim 1, Petitioner has not and cannot articulate why a POSITA would have any reasonable expectation of success, to combine Ellner and Titchener and arrive at the claimed invention.

As explained in connection with claim 1, Petitioner's only support (Pet., 31-32) are conclusory statements that "such a modification would be a simple substitution of one known element (*i.e.*, angled connectors 5a and 5b of Titchener) for another (*i.e.*, non-angled terminal pins 126, 128, 130, and 132 of Ellner) to obtain predictable results" and "[s]uch a modification would also be applying a known technique (*i.e.*, use of angled connectors) to a known device ready for improvement (any embodiment of Ellner) to yield predictable results". Because such statements are unsupported and contrary to the teachings of the cited references, Petitioner cannot show a reasonable likelihood independent claim 23 is unpatentable.

Petitioner also fails to explain how a POSITA following the teachings of Titchener would keep from staggering the ends of the electrical connectors that are otherwise oblique to the longitudinal axis. Titchener's oblique electrical connectors are staggered due to the side arrangement necessary to reach its objective relative to a pulling force. EX1007 at FIGs. 1-14. Instead, Petitioner only supports this feature with other electrical connectors that are not oblique to the longitudinal axis, like

Ellner. EX1006; *see also* EX1009 at Fig. 2; EX1010 at Fig. 7. Such design modifications only come from hindsight to arrive at the claimed invention. Because Petitioner has not and cannot offer any reference or explanation for how a POSITA would have arrived at a configuration where the connectors are in substantial alignment along a plane orthogonal to the longitudinal axis, Petitioner fails to show a reasonable expectation of success.

Accordingly, Petitioner fails to illustrate there is a reasonable likelihood independent claim 23 is unpatentable.

3. Petitioner Fails to Meet Its Burden of Showing a Reasonable Likelihood of Unpatentability of Independent Claim 24

Like independent claims 1 and 23, Petitioner also challenges independent claim 24 under ground 1 and recites elongated electrical connectors “being aligned in a spaced relationship with respect to a line orthogonal to the longitudinal axis” and each elongated electrical connector “configured to form an oblique angle with respect to the longitudinal axis.” EX1001 at 8:17-23. Like independent claim 1, independent claim 24 further recites “ends of all of the electrical connectors being in substantial alignment along a plane orthogonal to the longitudinal axis.” EX1001 at 8:27-29.

Once again, Petitioner’s arguments seeking to combine Ellner and Titchener suffer from the same deficiencies as discussed with respect to independent claim 1.

As discussed above, Petitioner's reliance on Titchener for electrical connectors that are oblique without the reverse angled side plug orientation is misplaced because under such a modification Titchener would no longer achieve its objective to provide a stronger connection when pulling on the ends of the cords. Comparatively, Ellner's separate wires are connected to terminal pins by a separate connector and are not pulled to make any connection. As with claim 1, Petitioner has not and cannot articulate why a POSITA would have any reasonable expectation of success, to combine Ellner and Titchener and arrive at the claimed invention.

As explained in connection with claim 1, Petitioner's only support (Pet., 31-32) are conclusory statements that "[s]uch a modification would be a simple substitution of one known element (*i.e.*, angled connectors 5a and 5b of Titchener) for another (*i.e.*, non-angled terminal pins 126, 128, 130, and 132 of Ellner) to obtain predictable results" and "[s]uch a modification would also be applying a known technique (*i.e.*, use of angled connectors) to a known device ready for improvement (any embodiment of Ellner) to yield predictable results". Because such statements are unsupported and contrary to the teachings of the cited references, Petitioner cannot show a reasonable likelihood independent claim 23 is unpatentable.

Here, similar to claim 1, Petitioner offers no support or explanation for how a POSITA would align all of the ends of the electrical connectors such that they are "in substantial alignment along a plane orthogonal to the longitudinal axis" for

electrical connector that are otherwise oblique to the longitudinal axis. EX1001 at 8:21-24. No oblique electrical connectors in substantial alignment along a plane orthogonal to the longitudinal axis are found in either Titchener or Ellner. Titchener's oblique electrical connectors are not in substantial alignment along a plane orthogonal to the longitudinal axis due to the side arrangement needed to reach its objective relative a pulling force. EX1007 at FIGs. 1-14. Thus, Titchener requires discarding the very claim feature (ends of all electrical connectors of the lamp device being in substantial alignment along a plane orthogonal to the longitudinal axis) for which Petitioner cites Ellner and for which Ellner requires to achieve its objective.

Petitioner is relying on the oblique nature of Titchener to modify Ellner. Comparatively, Petitioner only supports this feature with other electrical connectors that are not oblique to the longitudinal axis, like those in Ellner. EX1006 at FIGs. 4-8; *See also* EX1009 at FIG. 2; EX1010 at FIG. 7. Petitioner offers no other reference or explanation for how a POSITA would have arrived at a configuration where the connectors are in substantial alignment along a plane orthogonal to the longitudinal axis with a reasonable expectation of success.

Accordingly, Petitioner fails to illustrate there is a reasonable likelihood independent claim 24 is unpatentable.

4. Petitioner Fails to Meet Its Burden of Showing a Reasonable Likelihood of Unpatentability of Dependent Claims 2-5 and 8-19.

Claims 2-5 and 8-19 depend directly or indirectly on claim 1 of the '654 Patent. Because the combination in ground 1 does not render independent claim 1 obvious, for at least the same reasons, each combination cannot render obvious dependent claims 2-5 and 8-19.

D. PETITIONER FAILS TO MEET ITS BURDEN OF SHOWING A REASONABLE LIKELIHOOD OF UNPATENTABILITY UNDER GROUND 2

Ground 2 seeks to rely on the combination of Ellner, Titchener and Solymar to challenge dependent claims 20-22. Dependent claims 20-22 recite, at least, a base portion of the electrical connectors “comprises a plurality of peaks and valleys.” As an initial matter, this ground fails because a POSITA would not have been motivated to combine Ellner and Titchener with a reasonable expectation of success for reasons previously discussed with respect to ground 1.

Like Titchener, Petitioner acknowledges Solymar was considered during the prosecution of the '654 Patent. Pet., 39. Petitioner relies on Solymar for teaching peaks and valleys. However, Petitioner gives to explanation or demonstration as to why or how a POSITA would have had a reasonable expectation of success or how the proposed modification is capable of maintaining the ends of all of the electrical connectors of the lamp device in substantial alignment along a plane orthogonal to the longitudinal axis, as required by claims 20-22 of the '654 Patent.

Instead, the peaks and valleys of Solymar result in offsetting the ends of the electrical connectors therein and resist electrical arcing. This is only achieved in Solymar when “the planes of the end wall portions are spaced apart by predetermined spacing larger than said predetermined distance in order to still further prevent electrical arcing between the pairs of pins exteriorly of the arc tube.” EX1008 at 2:17-29; *See also* 4:22-30.

Petitioner provides no motivation for combining Solymar with Ellner and Titchener. Petitioner does not resolve how a POSITA would reconcile the need of Solymar to misalign the ends of its electrical connections to obstruct electrical arcing with the need of aligning all of the ends of the electrical connections of Ellner to find the present claims obvious. Instead, Petitioner only states the conclusory statement that “[s]uch a modification would be a simple substitution of one known element (*i.e.*, a peak and valley of Titchener) for another (*i.e.*, multiple peaks and valleys of Solymar [sic]) to obtain predictable results.” Pet., 40. Again, this is impermissible hindsight. The proposed modification is being made not because of some articulated rationale or motivation from the references or otherwise, but because that is how the ’654 Patent specification says to do it. Because the features of the references are directly conflicting with each other, there can be no “simple substitution” with any reasonable expectation of success. Accordingly, there is no basis to support that the combined arrangement of Ellner, Titchener, and Solymar have any likelihood of

success or would obtain predictable results. In view of such a conflicting assertion, there is no support that there is a reasonable likelihood that at least claims 20-22 of the '654 Patent are unpatentable.

VII. MANDATORY DISCLOSURES

At this time, the parties have not reached an agreement on mandatory discovery of the initial disclosures set forth in the Office Patent Trial Practice Guide. *See* 37 C.F.R. § 42.51(a)(2).

VIII. CONCLUSION

For the foregoing reasons, Trojan respectfully requests that the Board deny the Petition and decline to institute *inter partes* review of the '654 patent.

Respectfully submitted,

Dated: September 14, 2023

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), I, Steven E. Feldman, certify that Patent Owner's Preliminary Response to Petition for Inter Partes Review of U.S. Patent No. 8,167,654 contains 7338 words, excluding those portions identified in 37 C.F.R. § 42.24(a), as measured by the word-processing system used to prepare this paper. This paper also complies with the general format requirements of 37 C.F.R. § 42.6(a).

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that the foregoing Patent Owner's Preliminary Response to Petition for Inter Partes Review of U.S. Patent No. 8,167,654 was served electronically via e-mail on September 14, 2023, in its entirety on the following counsel of record for Petitioner:

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