IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

CFL TECHNOLOGIES LLC, Plaintiff, v. OSRAM SYLVANIA, INC. and LEDVANCE, LLC, Defendants.	Civil Action No. 18-1445-RGA

MEMORANDUM OPINION

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January 21, 2022

: /s/ Richard G. Andrews
ANDREWS, U.S. DISTRICT JUDGE:

Before me is the issue of claim construction of multiple terms in U.S. Patent No. 5,757,140 ("the '140 patent") and U.S. Patent No. 6,172,464 ("the '464 patent"). The parties submitted a Joint Claim Construction Brief (D.I. 110) and Appendix (D.I. 111), and I heard oral argument on December 9, 2021. (D.I. 119).

I. BACKGROUND

The asserted patents have some common material, as they both descend from a patent application filed in 1985. They relate to "ballast" circuitry used to power fluorescent lamps. ('140 patent, 1:41–42). Electronic ballasts typically have three basic parts: (1) a rectifier that converts conventional 60-Hz alternating current ("AC") voltage into a direct current ("DC") voltage; (2) an inverter that converts the DC voltage into a high frequency AC voltage (e.g., 30,000 Hz); and (3) an output circuit that shapes the AC voltage to the lamp. (*See id.*, 1:48–60; D.I. 111-1, Ex. M, ¶ 15; D.I. 111- 7, Ex. S, ¶ 56). Per the parties, the following claims are representative, and I have italicized and/or emphasized the disputed terms.

Claims 16 and 17 of the '140 patent:

> **16.** An arrangement comprising:
>
> a source providing a DC supply voltage at a set of DC terminals; and
>
> *inverter and load circuitry* connected with the DC terminals and operative to provide an AC voltage at a pair of AC terminals with which is connected a *gas discharge lamp*; the AC voltage being of a frequency substantially higher than that of the power line voltage on an ordinary electric utility power line; *the gas discharge lamp* being characterized by drawing a lamp current from the AC terminals at certain times and not at other times; *the inverter and load circuitry* being characterized in that the frequency of the AC voltage is different during the times when lamp current is being drawn as compared with times when lamp current is not being drawn.

17. The arrangement of claim 16 wherein the frequency of the AC voltage is lower during the times when lamp current is being drawn as compared with the times when lamp current is not being drawn.

Claim 3 of the '464 patent:

3. A structure characterized by having a central axis about which the following elements are assembled:

a *screw-base* operative to screw into a lamp socket of a type usually used for receiving and holding an ordinary household incandescent light bulb; *the screw-base* being otherwise characterized by having base terminals and by being disposed symmetrically about the central axis;

a fluorescent lamp having lamp terminals and plural cylindrical lamp segments disposed apart from, but parallel to, each other as well as to the central axis; *each of the plural cylindrical lamp segments having a* ***total length****; the fluorescent lamp being further characterized in that a flat plane disposed perpendicular to the central axis and intersecting one of the cylindrical lamp segments anywhere along its* ***total length*** *creates a cross-sectional pattern that (i) is symmetrical with respect to a flat plane disposed parallel to the central axis, and (ii) includes nothing but cross-sections of substantially identical cylindrical lamp segments*;

an *electronic sub-assembly* having input terminals and output terminals; the input terminals being connected with the base terminals; the output terminals being connected with the lamp terminals; *the electronic sub-assembly* being operative to supply an alternating voltage at its output terminals provided it be supplied with an AC power line voltage at its input terminals; the frequency of the alternating voltage being distinctly higher than that of the AC power line voltage; *the electronic subassembly* being additionally characterized by including a transistor through which flows unidirectional current pulses at a periodic rate equal to that of the alternating voltage; *each current pulse having a duration* ***distinctly shorter*** *than half of the complete cycle of the alternating voltage*; and

housing means mounted rigidly on *the screw-base* and operative to house *the electronic sub-assembly* as well as to hold and support the fluorescent lamp, thereby to form a fluorescent lamp entity adapted to be screwed into and powered from a lamp socket at which ordinary AC power line voltage is provided.

II. LEGAL STANDARD

"It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (internal quotation marks omitted). "'[T]here is no magic formula or

catechism for conducting claim construction.' Instead, the court is free to attach the appropriate weight to appropriate sources 'in light of the statutes and policies that inform patent law.'" *SoftView LLC v. Apple Inc.*, 2013 WL 4758195, at *1 (D. Del. Sept. 4, 2013) (quoting *Phillips*, 415 F.3d at 1324) (alteration in original). When construing patent claims, a court considers the literal language of the claim, the patent specification, and the prosecution history. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977–80 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). Of these sources, "the specification is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at 1315 (internal quotation marks omitted).

"[T]he words of a claim are generally given their ordinary and customary meaning. . . . [Which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1312–13 (citations and internal quotation marks omitted). "[T]he ordinary meaning of a claim term is its meaning to [an] ordinary artisan after reading the entire patent." *Id.* at 1321 (internal quotation marks omitted). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314.

When a court relies solely upon the intrinsic evidence—the patent claims, the specification, and the prosecution history—the court's construction is a determination of law. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 331 (2015). The court may also make factual findings based upon consideration of extrinsic evidence, which "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony,

dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317–19 (internal quotation marks omitted). Extrinsic evidence may assist the court in understanding the underlying technology, the meaning of terms to one skilled in the art, and how the invention works. *Id.* Extrinsic evidence, however, is less reliable and less useful in claim construction than the patent and its prosecution history. *Id*.

Means-plus-function claiming allows a patentee to express a claim limitation by reciting a function to be performed rather than a structure for performing that function. Such claims are governed by 35 U.S.C. § 112, ¶ 6,[1] which states:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

When a claim does not use the term "means," there is a rebuttable presumption that § 112, ¶ 6 does not apply. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc in relevant part). This presumption can be overcome "if the challenger demonstrates that the claim term fails to 'recite sufficiently definite structure' or else recites 'function without reciting sufficient structure for performing that function.'" *Id.* at 1349 (quoting *Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2000)). If § 112, ¶ 6 applies, the court must first identify the claimed function. *Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1311 (Fed. Cir. 2012). Next, "the court must identify the corresponding structure in the written description of the patent that performs the function." *Id.*

[1] The priority dates of the '140 and '464 patents might be about 1980, and they are pre-AIA. The AIA "renumbered" the provision to be § 112(f).

III. CONSTRUCTION OF DISPUTED TERMS

1. "inverter and load circuitry" (claims 16 and 17 of the '140 patent)

a. *Plaintiff's proposed construction*:

i. Functions: (1) operative to provide an AC voltage at a pair of AC terminals with which is connected a gas discharge lamp; (2) the AC voltage being of a frequency substantially higher than that of the power line voltage on an ordinary electric utility power line; (3) the gas discharge lamp being characterized by drawing a lamp current from the AC terminals at certain times and not at other times; (4) the inverter and load circuitry being characterized in that the frequency of the AC voltage is different during the times when lamp current is being drawn as compared with times when lamp current is not being drawn

ii. Structure: Voltage-fed inverter 24 to the extent of at least one of saturable inductors 49, 47 whose secondary winding(s) drive bases of two inverter transistors 42, 43 for turn-on and turn-off, and whose primary winding(s) plus the inductor 51 / capacitor 52 combination form a series current path between ground and the midpoint of transistors 42, 43, with lamp load connectability across capacitor 52; the lamp current flowing through at least one of the primary winding(s) of saturable inductors 49, 47

b. *Defendants' proposed construction*:

i. Functions: agree with Plaintiff's functions

ii. Structure: half-bridge inverter with two transistors series-connected across the DC output of the power supply and two toroidal saturable core transformers, an external load, a variable inductor and series-connected capacitor, two bias capacitors, two shunt diodes, a capacitor connected across the collector-emitter terminals of one of the transistors, a toroid heater to heat the toroidal saturable transformers and connected in series with the external load and the series-connected capacitor

c. *Court's construction*:

i. Functions: (1) operative to provide an AC voltage at a pair of AC terminals with which is connected a gas discharge lamp; (2) the AC voltage being of a frequency substantially higher than that of the power line voltage on an ordinary electric utility power line; (3) the gas discharge lamp being characterized by drawing a lamp current from the AC terminals at certain times and not at other times; (4) the inverter and load circuitry being characterized in that the frequency of the AC voltage is

different during the times when lamp current is being drawn as compared with times when lamp current is not being drawn

ii. Structure: half-bridge inverter 24 with two toroidal saturable core transformers 49, 47 whose secondary windings 53, 54 drive bases of two inverter transistors 42, 43 for turn-on and turn-off, and whose primary windings 48, 46 plus the variable inductor 51 / capacitor 52 combination form a series current path between ground and the midpoint of transistors 42, 43, with lamp load connectability across capacitor 52; the lamp current flowing through the primary windings 48, 46 of the two toroidal saturable core transformers 49, 47

The parties agree that the claim term is means-plus-function. They do not explain why they come to this conclusion. They also agree on what the functions are. It is not self-evident to me that the agreed-upon functions make sense. But, inasmuch as there is no dispute about the means-plus-function nature of the disputed term, and no dispute about the functions, I accept them.

As a preliminary issue, the parties dispute the legal standard to be applied. Plaintiff contends that the structure should only include those elements from the specification that are "clearly linked" or necessary to perform the recited functions. (D.I. 110 at 6). Defendants argue that the court cannot "strip down" the structure disclosed by the inventor—i.e., the structure must include the full circuitry disclosed in Figure 2. (D.I. 119 at 48:7–49:19). In support, Defendants cite *Bennett Marine, Inc. v. Lenco Marine, Inc.*, 549 F. App'x 947, 954 (Fed. Cir. 2013) (non-precedential), where the Federal Circuit stated that where a patent discloses "only one specific type of circuit to perform part of the function," "the corresponding structure should be limited to that specific structure and its equivalents, rather than any circuit capable of performing the required function."

The issue in *Bennett* was different from the issue in this case. The Court in *Bennett* considered "whether [the corresponding] structure should be limited to the specific circuit shown

in figure 2 or whether the structure should be construed broadly as the generic circuit shown in figure 1, i.e., any circuit fulfilling the required function." *Id.* The patentee argued that the corresponding structure should be any generic circuit that could perform the required function, but the Federal Circuit limited the structure to the circuit disclosed in Figure 2 as it was the only circuit disclosed in the patent for performing the claimed function. *Id.* at 954–55. Thus, I do not think *Bennett* stands for the proposition that the corresponding circuit must contain every single element disclosed by the patentee, even if they are not necessary to performing the claimed functions.

Rather, the Federal Circuit has held in precedential opinions that § 112, ¶ 6 does not "permit incorporation of structure from the written description beyond that necessary to perform the claimed function." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999); *see also B. Braun Med., Inc. v. Abbott Lab'ys*, 124 F.3d 1419, 1424 (Fed. Cir. 1997) ("[S]tructure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim."). "The corresponding structure to a function set forth in a means-plus-function limitation must actually perform the recited function, not merely enable the pertinent structure to operate as intended." *Asyst Techs., Inc. v. Empak, Inc.*, 268 F.3d 1364, 1371 (Fed. Cir. 2001).

Thus, I agree with Plaintiff that only those components that are necessary to performing the claimed functions should be included in the corresponding structure. *See, e.g.*, *Intel Corp. v. Broadcom Corp.*, 172 F. Supp. 2d 515, 533–36 (D. Del. 2001) ("The court agrees the components in Figure 8A that are not necessary to perform the recited function of the pixel interpolating means should not [be] included in the corresponding structure of that element. If

the court included unnecessary structure as 'corresponding structure,' this would impermissibly narrow the claimed function.").

Both parties agree that Figure 2 represents an embodiment of the claimed invention and the starting point for determining the corresponding structure for "inverter and load circuitry."

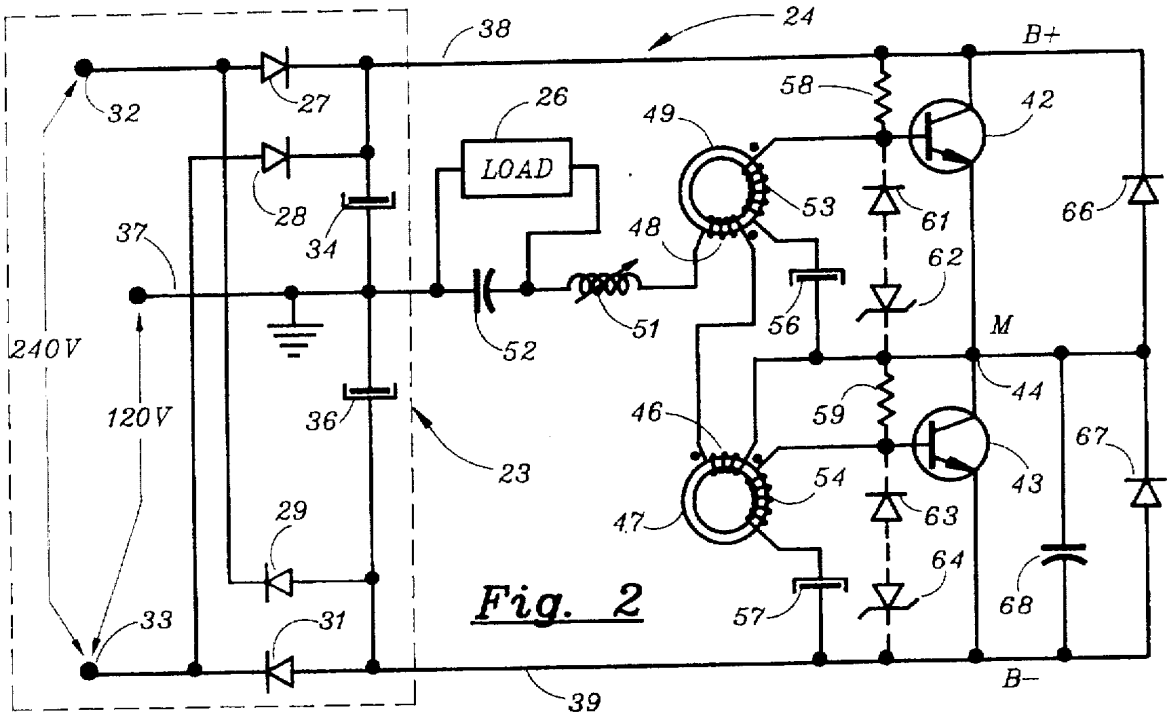


Fig. 2

Plaintiff argues that the corresponding structure includes elements 42, 43, 47 (and/or 49), 48 (and/or 46), 51, 52, and 53 (and/or 54). Defendants argue that the corresponding structure includes elements 26, 42, 43, 47, 49, 51, 52, 56, 57, 66, 67, 68, and 81 (shown in Figure 6).

Defendants' central argument is that their proposed structure incorporates the "main elements" of Figure 2 as identified by the Applicant. The specification states, "FIG. 2 is a schematic diagram illustrating the essential features of a push-pull inverter circuit particularly suitable for energizing the lamp unit of FIG. 1." ('140 patent, 3:49–51). Defendants argue that the quoted language shows that the elements in Figure 2 are the required elements of the

invention. (D.I. 110 at 13–14). Under this logic, the corresponding structure should include every element shown in Figure 2. But Defendants' proposed structure does not do so, which seems to undercut their argument.

I am not convinced that the quoted language requires that every element shown in Figure 2 be in the corresponding structure. The language does not show that every element is necessary to performing the claimed functions of the "inverter and load circuitry." It only shows that these elements are "particularly suitable" for "energizing the lamp unit." The claimed functions are more specific than simply "energizing a lamp."

Defendants also argue that the prosecution history of the '140 patent supports their proposed structure. In the Applicant's brief appealing the patent examiner's final rejection, he stated, "With particular reference to Fig. 2, the invention is concisely described by claim 15, as follows: An arrangement comprising: . . . inverter and load circuitry (consisting of main elements 42, 43, 47, 49, 56, 57, 66, 67, 68, 51, 52 . . . .)." (D.I. 100-2, Ex. K at 96). Defendants argue that this language shows that the Applicant understood the "inverter and load circuitry" to comprise these "main elements." This quoted language, however, was in the "Summary of Invention" section of the appeal brief. At the time the Applicant filed his brief, the Manual of Patent Examining Procedure required appellants to provide a concise explanation of the invention which referred to the specification by page and line number. MPEP § 1206 (1992). The MPEP further provided, "Since the claims are read in light of the disclosure, compliance with this requirement does not limit the claims." *Id.* Thus, I do not think it would be proper for this Court to rely on the language from the "Summary of Invention" section to limit the corresponding structure of the claim.

Defendants also point to an Amendment in response to Board Action, where the Applicant stated, "[C]laims 15-17 (just like all the other pending claims) are directed to the embodiment of Fig. 2 as implemented: (i) according to the modification represented by Fig. 6 . . . ." (D.I. 100-2, Ex. K at 143). While this language shows that these claims cover the embodiment depicted in Figure 2, it does not show that every element depicted in Figure 2 (or Figure 6) is necessary to perform the claimed functions.

Thus, I reject Defendants' argument that the "essential features" and "main elements" language in the specification and prosecution history support their proposed structure. Instead, I must address whether the elements identified by Defendants are necessary to performing the claimed functions.

a. Inductor 51

Both parties agree that inductor 51 should be included in the structure but disagree about whether this inductor should be limited to a variable inductor. The specification provides, "The inductor 51, preferably a known ferrite core inductor, has an inductance variable by mechanical adjustment of the air gap in order to effect variation in the level of the inductor and capacitor voltage and hence the power available to the load, as will be described." ('140 patent, 5:10–14). Plaintiff argues that a "variable" inductor is merely preferred to accomplish a lamp dimming effect. (D.I. 110 at 9). This does not seem to be the case. The language of the specification states that the inductor "has an inductance variable," and the only "preferred" language is where the specification states that the inductor is "preferably a known ferrite core inductor." The parties further agree that element 51 is depicted in Figure 2 using the symbol for a variable inductor. (D.I. 119 at 32:3–6, 60:6–12). Thus, I find that inductor 51 is a variable inductor because this is the only type of inductor disclosed in the written description.

b. Toroidal Saturable Core Transformers 47 and 49

The parties dispute whether the corresponding structure should contain one saturable inductor (47 or 49) or two toroidal saturable core transformers (47 and 49). Plaintiff argues that only one saturable inductor is required. In support, Plaintiff points to language in the specification stating, "Transistor drive current is preferably provided through the use of at least one saturable inductor to control the transistor inversion frequency . . . ." ('140 patent, 3:8–11; *see also id.*, 3:19–22 ("According to another feature of the present invention, reliable and highly efficient half-bridge inverters include a saturable inductor in a current feedback circuit to drive the transistors for alternate conduction.")).

The specification also states, "Drive current to the base terminals of transistors 42 and 43 is provided by secondary windings 53, 54 of transformers 49, 47, respectively." (*Id.*, 5:18–20; *see also id.*, 6:18–20 ("As seen in FIG. 3. saturable transformers 47, 49 provide transistor drive current only after the current through inductor 51 has diminished to zero."); 6:23–26 ("This coordination of base drive current and inductor current is achieved because of the series-connection between the inductor 51 and the primary windings 46, 48 of saturable transformers 47, 49, respectively.")). While the '140 patent refers to elements 47 and 49 as both "inductors" (*id.*, 5:48, 6:7, 40) and "transformers" (*id.*, 5:4, 19–20, 6:10–11, 18), the specification expressly identifies elements 47 and 49 as "transformers" in connection with performing the claimed functions. (*See id.*, 5:18–20, 6:18–20, 6:23–26). In Figure 2, elements 47 and 49 are depicted with transformer symbols, not inductor symbols (as shown for element 51). I therefore agree with Defendants that elements 47 and 49 are transformers. Since the language in the specification indicates that two transformers are necessary to provide transistor drive current, I

find that the structure for "inverter and load circuitry" comprises two toroidal saturable core transformers.

c. Bias Capacitors 56 and 57, Capacitor 68, and Shunt Diodes 66 and 67

Defendants' proposed structure also includes bias capacitors 56 and 57, capacitor 68, and shunt diodes 66 and 67. Plaintiff argues that these elements are not necessary to perform the claimed functions. (D.I. 110 at 9–10). Defendants do not appear to dispute this. Their only response is "each of these numbered components are identified by the specification and by the Applicant as 'essential elements' and 'main elements' of the 'inverter and load circuity.'" (*Id.* at 22). But I have already found that this argument does not support Defendants' proposed structure. Defendants have not shown that these structural elements are necessary to perform any of the claimed functions. Thus, I decline to include these elements in the corresponding structure.

d. External Load 26

Defendants also argue that the structure should include external load 26. They reason that since the claim recites "inverter and load circuitry," the structure must include an inverter and a load. (D.I. 110 at 20; D.I. 119 at 63:19–64:7). I disagree. In the context of the claim, "inverter and load" acts as a descriptor of "circuitry"—i.e., "inverter and load circuitry" is circuitry that uses an inverter to provide power to a load.

Including external load 26 in the structure would also be inconsistent with the claim language and specification. The specification provides that external load 26 may be a gas discharge lamp. ('140 patent, 4:35–38). One of the claimed functions of "inverter and load circuitry" includes being "operative to provide an AC voltage at a pair of AC terminals with which is connected a gas discharge lamp." The "inverter and load circuitry" and "gas discharge

lamp" are thus separate claim elements. The lamp is the object of the functions, not a structure necessary to perform the functions. Thus, I decline Defendants' request to include the external load 26 in the corresponding structure.[2]

In their Joint Claim Construction Chart (D.I. 99), the parties raised a dispute as to the construction of "load." Plaintiff proposes construing "load" as "reactive componentry near where the lamp is connected that provides a natural frequency." Defendants argue that "load" should be given its plain and ordinary meaning. I agree with Defendants. Plaintiff has not provided any reason to deviate from the plain and ordinary meaning. Thus, I construe "load" to have its plain and ordinary meaning.

e. Toroid Heater 81

Defendants argue that toroid heater 81 should also be included in the corresponding structure. As shown in Figure 6, a toroid heater can be used to regulate the inverter output. ('140 patent, 3:61–62). It does so by "heat[ing] the toroidal saturable inductors in order to decrease their saturation flux limit and hence their saturation time. The result is to decrease the periodic transistor conduction time and thereby increase the transistor inversion frequency." (*Id.*, 7:59–64). Defendants argue that the toroid heater achieves the claimed function requiring "that the frequency of the AC voltage is different during the times when lamp current is being drawn as compared with times when lamp current is not being drawn." (D.I. 110 at 35). In support, Defendants point to the Applicant's Amendment in response to Board Action, stating:

> [I]t would be clear (i.e., to any person possessing but ordinary skill in the particular art pertinent hereto) that the inverter frequency would be higher when lamp load 26" is disconnected—this being so because the magnitude of the voltage developing across tank-

[2] Defendants also argue that the "inverter and load circuitry" limitation is indefinite for failure to disclose sufficient structure for the external load 26. (D.I. 110 at 23). I disagree. The specification discloses a sufficient structure: "[E]xternal load 26. . . may comprise a gas discharge device s[u]ch as the fluorescent lamp 11 in FIG. 1." ('140 patent, 4:35–38).

> capacitor C" would then be higher (due to the increased Q-multiplication); which, in turn, causes the magnitude of the current flowing through the Toroid Heater to increase; which, in turn, causes the Toroid Heater to heat toroids 47, 49 to a higher temperature, thereby causing the inverter frequency to increase; etc.

(D.I. 100-2, Ex. K at 143).

I am not convinced that this language requires including the toroid heater in the corresponding structure. The specification discloses that saturable transformers 47 and 49, along with variable inductor 51 and capacitor 52 regulate the transistor inversion frequency (without use of the toroid heater). (*See* '140 patent, 6:38–46 ("It has been found desirable to regulate the transistor inversion frequency, determined mainly by the saturation time of the saturable inductors 47, 49, to be equ[a]l to or higher than the natural resonance frequency of the inductor and capacitor combination in order to provide a high voltage output to external load 26. A high voltage across capacitor 52 is efficiently developed as the transistor inversion frequency approaches the natural resonant frequency of the inductor 51 and capacitor 52 combination."); *see also id.*, 7:36–39 ("If the load 26 comprises a gas discharge lamp, the voltage across the capacitor 52 will be reduced once the lamp is ignited to prevent voltages on the inductor 51 and the capacitor 52 from reaching destructive levels.")).

While the toroid heater may be used to further regulate the inverter output, it is not necessary to perform the claimed function requiring that the frequency of the AC voltage is different when lamp current is being drawn as compared with when current is not being drawn. Thus, I decline to include the toroid heater in the corresponding structure.

f. "Voltage-Fed" Inverter

Plaintiff's proposed structure would limit inverter 24 to a "voltage-fed" inverter. Relying solely on the opinion of its expert, Plaintiff contends that a POSA would appreciate that the inverter in Figure 2 is "voltage-fed" rather than "current-fed." (D.I. 110 at 29–30). There is no

support in the specification for this limitation. Thus, I decline to limit the structure to a "voltage-fed" inverter.

g. Compact Construction

Plaintiff argues that this claim limitation requires "compact construction"—i.e., the invention should be limited to compact inverter circuits that can fit within the base of a compact fluorescent lamp. (*Id.* at 11–12). This limitation is not reflected in Plaintiff's proposed construction, so it is unclear what Plaintiff wants the Court to do. Regardless, I do not think it is proper to import this limitation into the claims. The specification states, "The inverter circuits according to the present invention . . . can be compactly constructed . . . ." ('140 patent, 2:67–3:1). This language does not amount to a clear and unmistakable disclaimer of claim scope.

2. "gas discharge lamp" (claims 16 and 17 of the '140 patent)

a. *Plaintiff's proposed construction*: plain and ordinary meaning

b. *Defendants' proposed construction*: "the gas discharge lamp is disconnectable from the inverter and load circuitry"

c. *Court's construction*: plain and ordinary meaning

Claim 16 recites, "the gas discharge lamp being characterized by drawing a lamp current from the AC terminals at certain times and not at other times." Defendants argue that this term should be limited to a disconnectable gas discharge lamp because disconnection is the only means presented in the specification for the gas discharge lamp to not draw current. (D.I. 110 at 38). In support, Defendants point to portions of the patent specification which describe the invention as comprising a disconnectable gas discharge lamp. (*See, e.g.*, '140 patent, Abstract, 1:51–53 ("A gas discharge lamp is disconnectably connected across the tank capacitor of the L-C circuit . . . ."), 7:50–52 ("[W]hen the load 26' is unplugged from the circuit, the inverter stops oscillating and the development of high voltages in the inverter is prevented.")).

I do not think a POSA would understand disconnectability to be an "important feature" of the claimed invention. (D.I. 110 at 38). The specification states, in a section captioned "Additional Explanations and Comments," "The fluorescent lighting unit of FIG. 1 could be made in such manner as to permit fluorescent lamp 11 to be disconnectable from its base 12 and ballasting means 16. However, if powered with normal line voltage without its lamp load connected, frequency-converting power supply and ballasting circuit 16 is apt to self-destruct." ('140 patent, 13:48–53). This language shows that while the lamp may be disconnectable, there is a potential for self-destruction of the circuit if the lamp is designed in this manner. To avoid this self-destruction, the specification recommends, "For instance, with the tank capacitor (52) being permanently connected with the lamp load (11)—thereby automatically being removed whenever the lamp is removed—the inverter circuit is protected from self-destruction." (*Id.*, 13:57–61). Since the patent provides an example where the lamp is permanently connected to capacitor 52—which I have found to be in the corresponding structure for "inverter and load circuitry"—a POSA would not understand disconnectability to be required.

I also note that in claim 12 of the '140 patent, the patentee claims "a disconnectable gas discharge lamp." (*Id.*, 19:23). The use of "disconnectable" here suggests that the patentee knew how to claim a disconnectable gas discharge lamp but chose not to do so in claim 16. *See Takeda Pharm. Co. v. Zydus Pharms. USA, Inc.*, 743 F.3d 1359, 1365 (Fed. Cir. 2014) (declining to limit claim when the inventors knew how to include those limitations "when they so desired").

Thus, Defendants' proposal to limit this term to a disconnectable gas discharge lamp is unwarranted. I instead apply the plain and ordinary meaning.

3. "electronic sub-assembly" (claim 3 of the '464 patent)

a. *Plaintiff's proposed construction*:

i. Functions: (1) being operative to supply an alternating voltage at its output terminals provided it be supplied with an AC power line voltage at its input terminals; (2) the frequency of the alternating voltage being distinctly higher than that of the AC power line voltage; (3) the electronic subassembly being additionally characterized by including a transistor through which flows unidirectional current pulses at a periodic rate equal to that of the alternating voltage; (4) each current pulse having a duration distinctly shorter than half of the complete cycle of the alternating voltage

ii. Structures:

A. [To achieve function 1] Bridge rectifier of power supply 23, or voltage doubler and rectifier of power supply 23

B. [To achieve functions 2, 3 and 4] Voltage-fed inverter 24 to the extent of at least one of saturable inductors 49, 47 whose secondary winding(s) drive bases of two inverter transistors 42, 43 for turn-on and turn-off, and whose primary winding(s) plus the inductor 51 / capacitor 52 combination form a series current path between ground and the midpoint of transistors 42, 43, with lamp load connectability across capacitor 52; the lamp current flowing through at least one of the primary winding(s) of saturable inductors 49, 47

b. *Defendants' proposed construction*:

i. Functions: agree with Plaintiff's functions

ii. Structures:

A. [To achieve function 1] A bridge rectifier, having four diodes connectable to a 240 volt AC supply at two terminals, or a rectifier and voltage doubler connectable to a 120 volt AC input taken between a ground line and the terminals, and two connected capacitors, the ground line being directly connected to a half-bridge inverter

B. [To achieve functions 2, 3 and 4] half-bridge inverter with two transistors series-connected across the DC output of the power supply and two toroidal saturable core transformers, an external load, a variable inductor and series-connected capacitor, two bias capacitors, two shunt diodes, a capacitor connected across the

collector-emitter terminals of one of the toroidal saturable core transformers, a toroid heater to heat the toroidal saturable core transformers and connected in series with the external load and the series-connected capacitor

c. *Court's construction*:

i. Functions: (1) being operative to supply an alternating voltage at its output terminals provided it be supplied with an AC power line voltage at its input terminals; (2) the frequency of the alternating voltage being distinctly higher than that of the AC power line voltage; (3) the electronic subassembly being additionally characterized by including a transistor through which flows unidirectional current pulses at a periodic rate equal to that of the alternating voltage; (4) each current pulse having a duration distinctly shorter than half of the complete cycle of the alternating voltage

ii. Structures:

A. [To achieve function 1] A bridge rectifier, having four diodes 27, 28, 29, and 31 connectable to a 240 volt AC supply at terminals 32, 33, or a rectifier and voltage doubler connectable to a 120 volt AC input taken between a ground line 37 and terminal 33 or 32, the ground line 37 being directly connected to a half-bridge inverter 24

B. [To achieve functions 2, 3 and 4] half-bridge inverter 24 with two toroidal saturable core transformers 49, 47 whose secondary windings 53, 54 drive bases of two inverter transistors 42, 43 for turn-on and turn-off, and whose primary windings 48, 46 plus the variable inductor 51 / capacitor 52 combination form a series current path between ground and the midpoint of transistors 42, 43, with lamp load connectability across capacitor 52; the lamp current flowing through the primary windings 48, 46 of the two toroidal saturable core transformers 49, 47

The parties again agree that the term is means-plus-function and they agree as to the functions. I again accept these agreements.

For function 1, the parties dispute whether the corresponding structure includes capacitors 34 and 36. The '464 patent specification states, "Because the voltages across transistors 42, 43 are relatively low (due to the effect of capacitors 34, 36), the half-bridge inverter 24 is very reliable. The absence of switching transients minimizes the possibility of

transistor burn-out." ('464 patent, 5:46–50). Plaintiff argues that although these capacitors filter the DC voltage and enhance inverter output quality and reliability, they are not necessary to performing the claimed function of converting the AC power line voltage into a DC voltage. (D.I. 110 at 49). Relying on their expert's opinion, Defendants respond, "[T]he capacitors 34 and 36 ensure that the voltages across transistors 42 and 43 are steady, which aids in regulating the conversion of the 240V/120V AC input into DC. They also ensure that there are no switching transients and 'the possibility of transistor burn-out,' which is a critical rectification function that is claimed." (*Id.* at 49–50).

I agree with Plaintiff that although capacitors 34 and 36 enhance the reliability of the inverter, they are not necessary to perform function 1. I see no support in the specification for Defendants' contention that avoiding switching transients is a "critical rectification function." Nor do I see this function in the agreed-upon functions for this term. Accordingly, I find that the corresponding structure for function 1 does not include capacitors 34 and 36.

I will adopt the remaining portion of Defendants' proposed structure for function 1 as this is the structure disclosed in the specification for performing the claimed functionality. (*See* '464 patent, 3:7–24 ("[A] power supply 23, connected to a conventional AC input, provides a DC output for supplying a high-efficiency inverter circuit 24. . . . The power supply 23 comprises bridge rectifier having four diodes 27, 28, 29 and 31 connectable to a 240 volt AC supply at terminals 32, 33. . . . The power supply 23 also comprises a voltage doubler and rectifier optionally connectable to a 120 volt AC input taken between the ground line 37 and terminal 33 or 32. The voltage doubler and rectifier means provides a direct electrical connection by way of line 37 [b]etween one of the 120 volt AC power input lines and the inverter 24, as shown in FIG. 2.")).

For functions 2–4, the parties simply repeat their arguments from the "inverter and load circuitry" term. (See D.I. 110 at 44–48). I will therefore adopt the corresponding structure from "inverter and load circuitry" for functions 2–4 of "electronic sub-assembly" for the reasons stated above.[3]

4. "screw-base" (claim 3 of the '464 patent)

a. *Plaintiff's proposed construction*: plain and ordinary meaning

b. *Defendants' proposed construction*: this term is means-plus function and indefinite, or alternatively:

i. Functions: (1) operative to screw into a lamp socket of a type usually used for receiving and holding an ordinary incandescent light bulb; (2) the screw-base characterized by having base terminals and being disposed about the central axis

ii. Structure: a screw-type plug disconnectably connected to a U-shaped gas discharge lamp; two leads that connect a ballasting circuit to a screw-type plug itself adapted for screw-in insertion into an Edison-type incandescent socket

c. *Court's construction*: plain and ordinary meaning

Claim 3 of the '464 patent recites "a screw-base operative to screw into a lamp socket . . . ." Defendants contend that the use of the term "operative to" makes this a means-plus-function limitation. (D.I. 110 at 53). I disagree. Simply because there is a functional limitation in a structural claim does not convert some portion of the claim to be means-plus-function. A POSA would understand the term "screw-base" to recite a sufficiently definite structure in light of the disclosures in the specification.

[3] Many of Defendants' arguments for "inverter and load circuitry" were based on the prosecution history of the '140 patent. Yet, Defendants fail to explain how that prosecution history applies to the construction of a term in the '464 patent (which is not a continuation of the '140 patent). While I am not convinced that I can consider the '140 patent prosecution history for this claim term, I do not need to decide the issue, as I did not rely on the prosecution history in construing "inverter and load circuitry."

Figure 1 of the ’464 patent shows a “fluorescent lamp unit adapted for screw-in insertion into a standard Edison incandescent socket.” (’464 patent, 2:23–25).

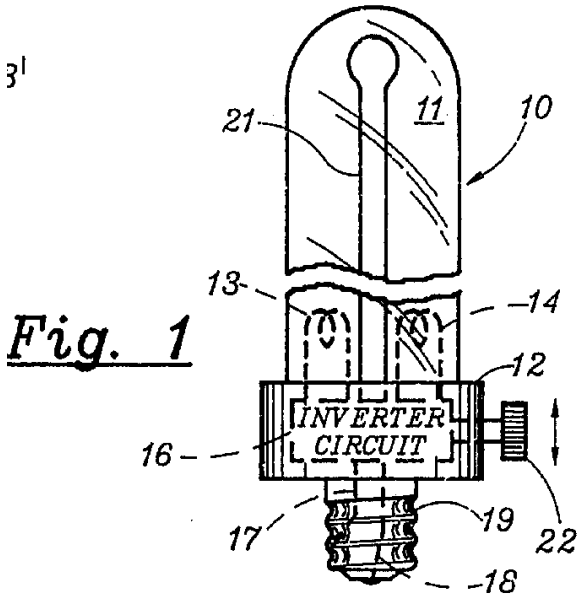


Fig. 1

The “screw-base” is depicted as element 19 in Figure 1. (*Id.*, 9:10). In light of Figure 1, a POSA would understand that “screw-base” is the base of the lightbulb which can be screwed into a lamp socket. Defendants argue that since the ’464 patent also refers to element 19 as “screw-type plug,” a POSA would be confused as to the scope of this term. (D.I. 119 at 106:22–107:17). I am not convinced that a POSA would have any trouble understanding the term “screw-base” in the context of claim 3 even if the inventor was inconsistent in how he referred to element 19. The claims only use the term “screw-base” (not “screw-type plug”) and the specification clearly associates “screw-base” with element 19. (’464 patent, 9:10).

Thus, I apply the plain and ordinary meaning, which is, as always, the default in claim construction. *Phillips*, 415 F.3d at 1316.

5. "each of the plural cylindrical lamp segments having a *total length*; the fluorescent lamp being further characterized in that a flat plane disposed perpendicular to the central axis and intersecting one of the cylindrical lamp segments anywhere along its *total length* creates a cross-sectional pattern that (i) is symmetrical with respect to a flat plane disposed parallel to the central axis, and (ii) includes nothing but cross-sections of substantially identical cylindrical lamp segments" (claim 3 of the '464 patent)

a. *Plaintiff's proposed construction*: plain and ordinary meaning

b. *Defendants' proposed construction*: indefinite as to "total length" or, alternatively, "the fluorescent lamp being a U-shaped tube structure, such that a flat plane disposed perpendicular to the central axis and intersecting one of the cylindrical lamp segments anywhere along its total length produces a symmetrical cross-sectional pattern reflecting nothing but cross-sections of substantially identical cylindrical lamp segments"

c. *Court's construction*: "each of the plural cylindrical lamp segments having a total length; the fluorescent lamp being a U-shaped tube structure, such that a flat plane disposed perpendicular to the central axis and intersecting one of the cylindrical lamp segments anywhere along its total length creates a cross-sectional pattern that (i) is symmetrical with respect to a flat plane disposed parallel to the central axis, and (ii) includes nothing but cross-sections of substantially identical cylindrical lamp segments"

"total length" to be accorded its plain and ordinary meaning

In claim 3, "total length" refers to the length of the "plural cylindrical lamp segments." Defendants contend that this term is indefinite because Plaintiff might argue that a single point is the "total length" of the lamp segment in an accused product. (D.I. 119 at 111:20–113:1). This argument is one of non-infringement, not indefiniteness, and is more appropriately resolved at summary judgment. Defendants also argue that the patent does not provide "objective boundaries" for a POSA to determine what "total length" means. (D.I. 110 at 60). I disagree. Claim 3 recites, "plural cylindrical lamp segments [are] disposed apart from, but parallel to, each other as well as to the central axis." ('464 patent, 11:7–11). In the context of claim 3, a POSA would understand that the "total length" of the lamp segments is the length where the segments

are parallel. Thus, this term is not indefinite. Instead, I give "total length" its plain and ordinary meaning as it is an ordinary phrase that a jury would easily understand.

Defendants alternatively argue that, in the full claim term proposed for construction, the fluorescent lamp should be limited to a U-shaped lamp. In support, Defendants point to statements made by the patent examiner in a non-final rejection and again in a final rejection of claim 10 (a previous version of claim 3). The examiner found that a prior art reference "clearly discloses everything recited except for the U-shaped lamp tube structure and the lack of a globe" but that it would have been obvious to modify the prior art to use a U-shaped tube structure. (D.I. 99-8, Ex. H at 109–10). On appeal of this rejection, the Applicant argued, "As still another matter of elementary fact, Applicant herewith makes Examiner aware that, when using a 'U-shaped tube structure' so as to eliminate Abernathy's 'lead 27,' each leg of the 'U-shaped tube' would cast a shadow with respect to the light emitted from the other leg." (*Id.* at 64). In its decision on appeal, the Board stated, "The disclosed invention is directed to a U-shaped fluorescent lamp . . . ." (*Id.* at 18).

I do not think the Applicant's statements amount to a clear and unmistakable disavowal of claim scope or "acquiescence" to a narrower claim scope. But the fact that the examiner, the applicant, and the Board all seemed to agree that the claimed invention was limited to a U-shaped lamp tube structure does provide evidence of how one of skill in the art understood the scope of the claims. In light of the prosecution history and the fact that the only embodiment of the lamp is a U-shaped lamp (Figure 1), I find that a POSA would understand that the "fluorescent lamp" in claim 3 is a U-shaped lamp.

6. "each current pulse having a duration *distinctly shorter* than half of the complete cycle of the alternating voltage" (claim 3 of the '464 patent)

a. *Plaintiff's proposed construction*: plain and ordinary meaning

b. *Defendants' proposed construction*: indefinite as to "distinctly shorter" or, alternatively, "the conduction period of each transistor is shorter in duration than one quarter of the full period of the natural resonant frequency of the inductor and capacitor combination"

c. *Court's construction*: "each current pulse having a duration shorter than one quarter of the complete cycle of the alternating voltage"

Defendants argue that the term "distinctly shorter" is indefinite because it is a term of degree and the '464 patent provides no objective boundaries for a POSA to measure that degree. (D.I. 110 at 66).

To meet the definiteness requirement of § 112, the "patent's claims, viewed in light of the specification and prosecution history, [must] inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). "[C]laims having terms of degree will fail for indefiniteness unless they 'provide objective boundaries for those of skill in the art' when read in light of the specification and the prosecution history." *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388, 1396 (Fed. Cir. 2016) (quoting *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370–71 (Fed. Cir. 2014)).

Plaintiff claims that this term is not indefinite because "distinctly" has a common meaning: "in a way that is very noticeable or apparent." (D.I. 110 at 68 (citing dictionary definition)). At other points in its argument, Plaintiff argues that "distinctly shorter" means "detectably shorter," "discernably shorter," or shorter "outside the realm of measurement error." (*Id.* at 66, 69; D.I. 119 at 125:7–17). Plaintiff's proposed interpretations essentially equate the term "distinctly shorter" with "shorter," which is improper. *See Merck & Co. v. Teva Pharm.*

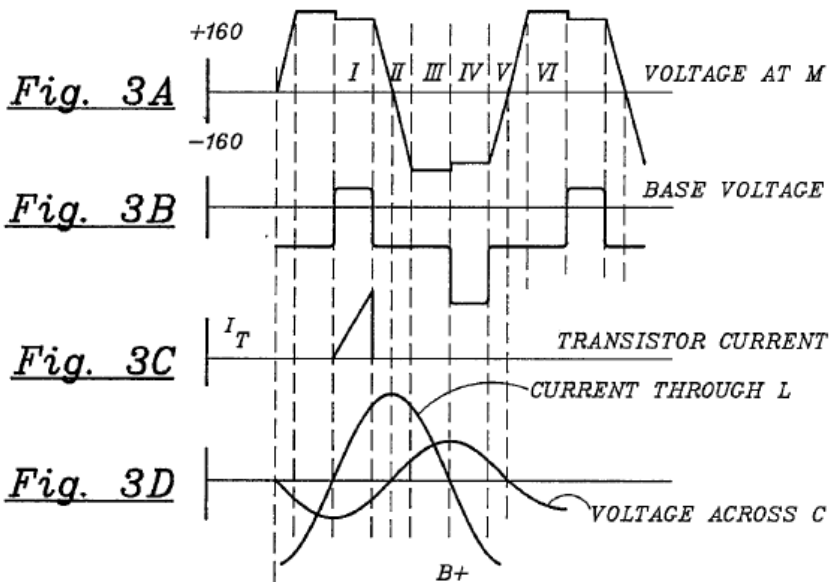
USA, Inc., 395 F.3d 1364, 1372 (Fed. Cir. 2005) ("A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.").[4]

Plaintiff's interpretation would not only render the term "distinctly" superfluous, but it would also be inconsistent with the patent's use of the term "distinctly." Claim 3 also recites "the frequency of the alternating voltage being distinctly higher than that of the AC power line voltage." ('464 patent, 11:25–27). The specification explains that the frequency of the inverter circuit is typically between 20 and 40 kHz, while the ordinary AC power line voltage is 60 Hz. (*Id.*, 2:65, 8:19–25). The frequency of the inverter circuit is approximately 1,000 times higher than the AC power line voltage, so "distinctly higher" in claim 3 corresponds to approximately "1,000 times higher." This use of "distinctly" to represent different orders of magnitude is inconsistent with the argument that "distinctly" means "detectably" or "outside the realm of measurement error."

Although I reject Plaintiff's interpretation of this term, I will not find this term indefinite. There are at least two examples provided in the specification that provide objective boundaries for a POSA to determine the scope of "distinctly shorter."

First, Figure 3C shows the waveforms of the current through transistor 42. (*Id.*, 4:12–15).

[4] At oral argument, Plaintiff contended that in some cases, the court may construe a claim term in a way that makes a word in the claim superfluous. (D.I. 119 at 133:14–19). Plaintiff then filed a supplemental letter citing to cases where the Federal Circuit has done so. (D.I. 116 at 1–2; see also D.I. 118). These cases, however, permitted surplusage where the intrinsic evidence compelled an alternative construction. *See, e.g.*, *ERBE Elektromedizin GmbH v. Canady Tech. LLC*, 629 F.3d 1278, 1286 (Fed. Cir. 2010). Here, Plaintiff points to nothing in the specification or prosecution history that would compel the court to adopt a superfluous construction.



"As shown in FIG. 3c, current-flow in transistor 43 terminates at the end of period I." (*Id.*, 4:27–29). This figure shows a transistor current pulse having a duration "distinctly shorter" than half of the complete cycle of the alternating voltage, which is shown in Figure 3A (time periods I–VI).

Second, the specification states, "[T]he conduction period of each transistor is desirably shorter in duration than one quarter of the full period corresponding to the natural resonant frequency of the inductor and capacitor combination." (*Id.*, 5:18–22).

Figure 3C and the "desirably shorter" language in the specification provide points of comparison for POSAs to determine whether a potentially infringing product has a transistor current pulse with a duration "distinctly shorter" than half of the complete cycle of the alternating voltage. *See Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1335–36 (Fed. Cir. 2010). While I do not find this term to be indefinite, I will construe this term consistent with the examples provided in the specification—i.e., "each current pulse having a duration shorter than

one quarter of the complete cycle of the alternating voltage."[5] This seems to be what the patentee meant by "distinctly shorter." In light of the disclosures in the specification, a POSA would readily understand that "distinctly shorter than half" means "shorter than one quarter."

7. "housing means" (claim 3 of the '464 patent)

a. *Plaintiff's proposed construction*:

i. Functions: (1) being operative to house the electronic sub-assembly (2) as well as to hold and support the fluorescent lamp, (3) thereby to form a fluorescent lamp entity adapted to be screwed into and powered from a lamp socket at which an ordinary AC power line voltage is provided

ii. Structure: Compact integral base 12 houses and fits within it frequency-converting power supply and ballasting circuit 16, secures folded fluorescent lamp 11, and forms a fluorescent lamp entity adapted to be screwed into and powered from a lamp socket at which an ordinary AC power line voltage is provided by way of screw base 19 and leads 17, 18

b. *Defendants' proposed construction*:

i. Functions: (1) being operative to house the electronic sub-assembly (2) as well as to hold and support the fluorescent lamp

ii. Structure: A housing unit that cannot be disconnected from the screw-type plug, in which a ballasting circuit is wholly contained, a ground-plane, a manually rotatable external knob connected to a variable inductor, two cathodes, and two leads

c. *Court's construction*:

i. Functions: (1) being operative to house the electronic sub-assembly (2) as well as to hold and support the fluorescent lamp

ii. Structure: Compact integral base 12 houses and fits within it frequency-converting power supply and ballasting circuit 16, and secures folded fluorescent lamp 11

[5] Defendants' alternative proposed construction refers to the "resonant frequency of the inductor and capacitor combination" instead of the "frequency of the alternating voltage." Defendants claim, "[T]he reference to the resonant frequency is readily understood as equivalent to the frequency of the alternating voltage." (D.I. 110 at 68). While Plaintiff seems to agree with this proposition (*see id.* at 69), I see no reason to deviate from the language of the claims as it will unnecessarily confuse the jury.

This term is a means-plus-function term.

Defendants agree with Plaintiff's first two proposed functions but disagree with Plaintiff's third function: "thereby to form a fluorescent lamp entity adapted to be screwed into and powered from a lamp socket at which an ordinary AC power line voltage is provided." Defendants argue that the "thereby" clause at the end of claim 3 modifies the two earlier functions. (D.I. 110 at 72). I agree. This clause describes the result of the two disclosed functions of the housing means, not an additional functional feature. Thus, I decline to include the "thereby" clause as a claimed function.

Plaintiff's proposed structure (omitting the structure relating to the third function) corresponds with the claimed functions and comports with the specification's disclosures. (*See* '464 patent, 2:55–61 ("FIG. 1 illustrates a screw-in gas discharge lamp unit 10 comprising a folded fluorescent lamp 11 suitably secured to an integral base 12. The lamp comprises two cathodes 13, 14 which are supplied with the requisite high operating voltage from a frequency-converting power supply and ballasting circuit 16, which, because of its compact size, conveniently fits within the base 12.")).

Defendants argue that this structure should also include a ground plane and a manually rotatable external knob. I disagree. Neither of these structures are necessary to perform any claimed function. The patent provides, "A ground plane comprising a wire or metallic strip 21 is disposed adjacent a portion of the fluorescent lamp 11 as a starting aid." (*Id.*, 2:65–3:1). Defendants contend that this language shows that the ground plane helps "support" the fluorescent lamp 11. (D.I. 110 at 74). I see no basis for this argument. The purpose of the ground plane is to act as "starting aid" for a lamp, which is unrelated to the claimed functions.

The manually rotatable external knob controls the "variation of the lamp illumination intensity." ('464 patent, 3:1–6). The knob is not necessary to house the electronic sub-assembly or support the lamp.

Thus, I adopt Plaintiff's proposed structure as it relates to the two claimed functions.

IV. CONCLUSION

Within five days the parties shall submit a proposed order consistent with this Memorandum Opinion suitable for submission to the jury.