

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WILLIS ELECTRIC CO., LTD.,
Petitioner,

v.

POLYGROUP MACAU LTD (BVI),
Patent Owner.

Cases IPR2017-00331¹
Patent 9,119,495 B2

Before WILLIAM V. SAINDON, JEREMY M. PLENZLER, and
BARBARA A. PARVIS, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
Finding Challenged Claims Unpatentable
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Willis Electric Company, Limited (“Petitioner”) requested an *inter partes* review of claims 1–30 (“challenged claims”) of U.S. Patent No.

¹ IPR2017-00332 has been consolidated into this proceeding.

IPR2017-00331 and IPR2017-00332
Patent 9,119,495 B2

9,119,495 B2 (Ex. 1001, “the ’495 Patent”). IPR2017-00331, Paper 2 (“Pet.”); IPR2017-00332, Paper 2 (“’332 Pet.”)). In support of each of its Petitions, Petitioner offers a Declaration of Dr. William K. Durfee, who has been retained as an expert witness in each of the instant proceedings.

IPR2017-00331, Ex. 1002 (“Ex. 1002”) ¶ 1; IPR2017-00332, Ex. 1002 (“’332 Ex. 1002”) ¶ 1. Polygroup Macau Limited (BVI) (“Patent Owner”) filed a Preliminary Response and supporting Declaration of Dr. Michael Lebby to each of the Petitions. IPR2017-00331, Paper 8 (“Prelim. Resp.”); IPR2017-00331, Ex. 2001 (“Ex. 2001”); IPR2017-00332, Paper 8 (“’332 Prelim. Resp.”); IPR2017-00332, Ex. 2001 (“’332 Ex. 2001”).

Upon consideration of the parties’ contentions and supporting evidence, we instituted an *inter partes* review pursuant to 35 U.S.C. § 314, as to the challenged claims of the ’495 Patent. IPR2017-00331, Paper 11 (Dec.”); IPR2017-00332, Paper 11 (“’332 Dec.”). Because the subject matter of the claims and the challenges significantly overlap, we also consolidated the IPR2017-00331 and IPR2017-00332 *inter partes* reviews and terminated IPR2017-00332. *Id.* at 2, 18.

After institution, Patent Owner filed a Patent Owner Response in the consolidated IPR2017-00331 and IPR2017-00332 proceedings. IPR2017-00331, Paper 26 (“PO Resp.”). Patent Owner offers an additional Declaration of Dr. Lebby in support of its Patent Owner Response. ’331 Ex. 2004. Petitioner filed a Reply in the consolidated IPR2017-00331 and IPR2017-00332 proceedings. IPR2017-00331, Paper 37 (“Reply”).

Petitioner offers an additional Declaration of Dr. Durfee in support of its Reply. Ex. 1026.²

Petitioner also filed a Motion to Seal. IPR2017-00331, Paper 39 (“Mot. to Seal”).

We have jurisdiction under 35 U.S.C. § 6. The evidentiary standard is a preponderance of the evidence. *See* 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has demonstrated by a preponderance of evidence that challenged claims 1–30 of the ’495 Patent are unpatentable.

A. Related Matters

The ’495 Patent has been asserted against Petitioner in *Polygroup Macau Ltd. v. Willis Elec. Co.*, No. 3:15-cv-552 (W.D. N.C. (filed Nov. 16, 2015)). *See, e.g.*, Pet. 71; Paper 5, 2.

Petitioner also filed petitions requesting *inter partes* review of U.S. Patent No. 8,863,416 (IPR2017-00309); U.S. Patent No. 6,794,825 (IPR2017-00330); and U.S. Patent No. 8,959,810 (IPR2017-00334 and 00335). *Id.*³

² For papers and exhibits filed in only IPR2017-00332 prior to consolidation, we use an abbreviated format including only the three digit proceeding number, i.e., ’332 prior to the paper number or exhibit number. In subsequent citations, we do not include the full proceeding number prior to the Exhibit number, but instead use only the aforementioned abbreviated format. For papers and exhibits filed in only IPR2017-00331 or after consolidation of IPR2017-00331 and IPR2017-00332, no IPR designation is included.

³ The oral hearings were consolidated in Cases IPR2017-00309, IPR2017-00331, IPR2017-00332, IPR2017-00334, and IPR2017-00335. *See, e.g.*,

B. The '495 Patent

The '495 Patent is directed to transferring electricity between trunk sections of an artificial tree (e.g., a Christmas tree). Ex. 1001, (57). An electrical connection runs up the trunk of the tree to provide a source of electricity for light strings draped over the branches. *See id.* at 7:34–52, Figs. 5, 15. Physically connecting the trunk sections during assembly of the tree also electrically connects the trunk sections. *Id.* at (57), 15:44–48, Figs. 5, 15.

C. Challenged Claims

Petitioner challenges claims 1–30. Of the challenged claims, claims 1, 11, 21, and 28 are the only independent claims. Claims 2–10, 12–20, 22–27, 29, and 30 depend, directly or indirectly, from independent claim 1, 11, 21, or 28. Claim 1 is illustrative and is reproduced below.

1. An artificial tree comprising:
 - a plurality of tree trunk sections;
 - a male end of a first trunk section of the plurality of tree trunk sections, the male end having a central prong and a channel prong, the central prong and the channel prong configured to conduct electricity; and
 - a female end of a second trunk section of the plurality of tree trunk sections, the female end having a central void and a channel void, the central void having a central contact device disposed at least partially therein, and the channel void having a channel contact device disposed at least partially therein, the channel contact device disposed around the central void, and the central contact device and the channel contact device configured to conduct electricity;

IPR2017-00331, Paper 44 (“Tr.”), 3:3–6.

wherein the central prong of the male end is configured to engage the central contact device of the female end and the channel prong of the male end is configured to engage the channel contact device of the female end to conduct electricity between the male end of the first trunk section and the female end of the second trunk section; and

wherein the channel prong of the male end is configured to engage the channel contact device of the female end in a plurality of configurations, each configuration providing a different rotational alignment of the first trunk section with respect to the second trunk section.

Ex. 1001, 15:64–16:23.

D. Prior Art and Asserted Grounds

Petitioner asserts that the challenged claims of the '495 Patent are unpatentable, under 35 U.S.C. § 103(a), on the grounds below. Pet. 1–2, '332 Pet. 1–2). We instituted on each of these grounds. Dec. 18.

References	Claims Challenged
Chen ⁴ in view of the knowledge of a person of ordinary skill in the art ⁵	1–30
Chen and Geithoff ⁶	1–30
Otto ⁷ in view of the knowledge of a person of ordinary skill in the art	1–8, and 11–19

⁴ U.S. Patent No. 8,454,186 B2 (issued June 4, 2013) (Ex. 1007).

⁵ Throughout this Final Written Decision, for ease of reference in identifying this ground, we omit “in view of the knowledge of a person of ordinary skill in the art.” For example, we identify this ground as “Chen alone.” In our analysis, however, we discuss any reliance on the knowledge of the skilled artisan.

⁶ U.S. Patent No. 4,437,782 (issued March 20, 1984) (Ex. 1013).

⁷ German Utility Model Registration Number G8436328.2 (published April 4, 1985) (Ex. 1009). Unless otherwise noted, citations are to the certified English-language translation, submitted as part of Exhibit 1009.

References	Claims Challenged
Otto and McLeish ⁸	21–30

II. ANALYSIS

A. Claim Construction

Both parties propose constructions for “female end” and “channel void.” Pet. 19–28; ’332 Pet. 19–25; PO Resp. 6–13; Reply 2–12. Petitioner proposes constructions for other terms including “plurality of configurations [locations]” and “vertically extending section,” which Patent Owner does not respond to expressly. Pet. 23–28; ’332 Pet. 23–27; PO Resp. 6–13. The disputes between the parties as to the patentability of claims 1–30 can be resolved based on determining the broadest reasonable interpretations of “channel void,” “female end,” “plurality of configurations [locations],” and “vertically extending section.” See *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”)

We construe the claims using the broadest reasonable construction in light of the ’495 Patent Specification. See 37 C.F.R. § 42.100(b). Applying that standard, we interpret the claim terms of the ’495 Patent according to their ordinary and customary meaning in the context of the patent’s written description. See *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor is entitled to be his or her own lexicographer of patent

⁸ U.S. Patent No. 7,066,739 B2 (issued June 27, 2006) (Ex. 1023).

claim terms by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, however, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

1. “female end”

The dispute regarding “female end” arises because Patent Owner contends “Petitioner improperly relies on *Chen*’s disclosure of a ‘male end’ to teach the claimed ‘female end’ of the ’495 Patent.” PO Resp. 6. The disputes between the parties hinge on whether a “female end” must be that of an electrical connector. PO Resp. 6–10; Reply 2–12.⁹

Patent Owner contends “female end” means “an end of an electrical connector having no externally exposed electrical conductors.” PO Resp. 6. Patent Owner contends that its proposal is what “[a] POSA would have understood from the Claims and the Specification” and “[b]y reciting the claimed ‘end[s]’ as being either ‘female’ or ‘male,’ the ’495 Patent indicates that those claimed elements are more than just generic ‘ends;’ otherwise, the terms ‘female’ and ‘male’ would be rendered superfluous.” *Id.* at 6–7.

Petitioner contends “female end” means “an end of a trunk section having a central void and a channel void.” Reply 2 (emphasis omitted). Petitioner cites to the language of the claims and the ’495 Patent Specification and contends “the understanding of a POSA” is “the terms male and female are relative and an end can be labeled male or female

⁹ The Petitions do not include a proposed construction of “female end.” Pet. 19–28; ’332 Pet. 19–27.

depending on what aspects you are looking at.” *Id.* at 7 (citing Ex. 1026 ¶¶ 22–24; Ex. 1002 ¶ 59). With respect to whether “female end” must be that of an electrical connector, Petitioner contends “*in no instance* does the specification describe the ‘female end’ in the patent as an end of an electrical connector. Instead, the specification states repeatedly that the female end is part of a ‘trunk section.’” *Id.* at 4–5 (citing Ex. 1001, 4:27–34, 4:65–66, 5:4–5, 5:8–9, 5:12–13, 5:16–17, 5:26–27, 5:29–30, 5:47, 5:53–54, 10:41, 11:61–66, 13:35–36, Figs. 1, 3a–c, 4a–c, 7, 8, 12a–d, 13, 14b; Ex. 1026 ¶ 7). Dr. Durfee testifies “[t]he specification states several times that the female end is the end of a trunk section.” Ex. 1026 ¶ 7 (citing Ex. 1001, 4:27–34, 10:41, 11:61–66, 13:35–36, 14:24–25). Dr. Durfee further testifies that even “parts of the specification” relied on or like those relied on by Patent Owner “describe the female end as part of a ‘power distribution subsystem’ of a ‘trunk section.’” *Id.* (citing Ex. 1001, 3:15–16, 3:64–65, 7:42–43, 8:28–29, 8:51–52, 10:38–39, 11:6–7, 12:27–29).

Based on the record before us, after considering all of the evidence and argument presented by the parties, we agree with Petitioner’s proposed construction. We credit the testimony of Dr. Durfee (Ex. 1026 ¶¶ 6, 7, 9, 11–17, 22–24; Ex. 1002 ¶ 59) over that of Dr. Lebby (Ex. 2004 ¶¶ 40–44, 94–98, 100) because, as will be explained below, Dr. Durfee’s testimony is consistent with the language of the claims and the ’495 Patent Specification.

We start our analysis by considering the language of the independent claims, reproduced below.

a female end of a second trunk section of the plurality of tree trunk sections, the female end having a central void and a channel void, the central void having a central contact device disposed at least partially therein, and the channel void having

a channel contact device disposed at least partially therein . . .
and the central contact device and the channel contact device
configured to conduct electricity.

Ex. 1001, 16:3–11 (Claim 1), 16:63–17:4 (Claim 11), 18:44–52 (Claim 28)
(emphases added).

a *female end of a second trunk section* of the plurality of tree
trunk sections, the female end having a central void disposed
within a vertically extending section, the central void having
a central contact device disposed at least partially within, the
female end also having a channel void disposed around the
vertically extending section, the channel void having a
channel contact device disposed at least partially therein . . .
and the central contact device and the channel contact device
configured to conduct electricity.

Ex. 1001, 17:59–18:2 (Claim 21) (emphases added).

Consistent with Petitioner’s contentions (Reply 4, 6) and Dr. Durfee’s
testimony (Ex. 1026 ¶¶ 6, 12), each of the independent claims recites that the
“female end” is of a “trunk section,” not an electrical connector (Ex. 1001,
16:3–11, 16:63–17:4, 17:59–18:2, 18:44–52). Additionally, in each of the
independent claims, that “female end of a second trunk section” has “the
central contact device and the channel contact device [that are] configured to
conduct electricity.” *Id.* Accordingly, the claims recite that the “end” is that
of a trunk section.

Furthermore, consistent with Dr. Durfee’s testimony (Ex. 1026 ¶ 7)
the ’495 Patent Specification describes the female end as part of a trunk
section. Ex. 1001, 4:27–34, 10:41, 11:61–66, 13:35–36, 14:24–25. The
’495 Patent Specification also indicates that Figures 1, 3a–c, 4a–c, 7, depict
views of “a female end of a tree trunk section.” Ex. 1001, 4:65–66, 5:4–5,
5:8–9, 5:12–17, 5:26–27, 5:29–30, 5:47, 5:53–54.

Accordingly, we determine that “female end” recited in independent claims 1, 11, 21, and 28 is “an end of a trunk section having a central void and a channel void,” as Petitioner proposes (Reply 2).¹⁰

2. “*channel void*”

Initially, we note that neither party contends that “channel void,” itself, has any special meaning in the art or that the ’495 Patent provides a lexicographical definition for that term. The parties proposed constructions for “channel void” are similar. Petitioner contends that a “channel void” is “a hollow or aperture which may be substantially circular, offset from the center and configured to receive and engage a portion of another connector.” Pet. 23; ’332 Pet. 23. Patent Owner proposes that the “channel void” requires “[a] hollow or aperture *disposed within a portion of the female end*, which may be substantially circular, offset from the central void and configured to receive and engage a portion of *the male end*.” PO Resp. 11.

Petitioner further contends “the ’495 [patent] does not narrowly disclose a female end of a ‘connector’ but instead discloses the female end of a trunk section,” and, “[t]hus, the channel void is not limited to being ‘within’ the female end of an electrical connector as proposed by PO.” Reply 14–15 (citing Ex. 1026 ¶¶ 21–22). Dr. Durfee testifies that “[a] POSA would understand the female end to be the end of a trunk section, not a connector.” Ex. 1026 ¶ 21.

¹⁰ In light of this determination, we need not resolve the dispute as to whether “female end” requires “no externally exposed electrical conductors” (PO Resp. 6), because the contacts are enclosed within the trunk body as discussed *infra* in Sections II.C.1 and II.C.2.

Dr. Lebby testifies that “[b]ased on the Petitioner’s construction, a channel void could be interpreted as merely air or space that is independent of the female end,” which “is unreasonably broad and inconsistent with the claim language and specification of the ’495 Patent.” Ex. 2004 ¶ 108. Dr. Lebby also testifies that “the channel void includes actual structure of the ‘female end,’ and is not simply air or space.” *Id.* ¶ 110.

As discussed *supra* in Section II.A.1, we agree with Petitioner that the “female end” is of a tree trunk section.¹¹ In view of our aforementioned determination, based on the record before us, after considering all of the evidence and argument presented by the parties, we see no real difference in the parties’ proposed constructions because the claims recite that the “female end” has a “channel void” and that the male end engages the female end. Ex. 1001, 16:3–11, 16:63–17:4, 17:59–18:15, 18:44–64. Because the claims already recite expressly the additional limitations that are part of Patent Owner’s proposed construction (PO Resp. 11), those limitations structurally define “channel void” such that it is not merely air or space, as Dr. Lebby testifies (Ex. 2004 ¶¶ 108, 110). Although the ’495 Patent Specification depicts the channel void being formed in the power distribution subsystem, the ’495 Patent Specification makes clear that the patent is not limited to these embodiments. Ex. 1001, 6:10–15, 6:22–32, 6:42–47. Accordingly, we adopt Petitioner’s proposed construction, with the caveat the meaning of

¹¹ This stands in contrast to the claims of U.S. Patent No. 8,863,416 B2 (the ’416 patent), which shares a common specification with the ’495 patent. The ’416 patent is at issue in the related IPR2017-00309 proceeding. Claim 1 of the ’416 patent, for example, recites “the second power distribution subsystem comprising a female end, the female end having a central void and a channel void.”

“channel void” pertains to just that term and should not be understood to negate the express recitations of each of the independent claims, for example, requiring that the “female end of a second trunk section” has the “channel void.” Ex. 1001, 16:3–11, 16:63–17:4, 17:59–18:15, 18:44–64.

3. *“plurality of configurations [locations]”*

Petitioner asserts the broadest reasonable construction of “plurality of configurations” or “plurality of locations on the channel contact device” is its plain and ordinary meaning, allowing any/infinite number of configurations or alignments for any/infinite number of rotational alignments, recited in each of the independent claims. Pet. 23; ’332 Pet. 23. Petitioner provides persuasive support citing embodiments in the ’495 Patent Specification that describe engaging trunk segments “regardless of the angular relationship, or rotational alignment” or “*at any number of angular displacements.*” Pet. 24 (citing Ex. 1001, 9:21–28); ’332 Pet. 24 (citing Ex. 1001, 9:21–28). Petitioner also persuasively argues that dependent claim 20 is directed more narrowly to an alignment mechanism to prevent rotation. Pet. 23–25; ’332 Pet. 25.

Patent Owner does not provide responsive contentions regarding the meaning of the term or dispute Petitioner’s showing with respect to this limitation. *See generally* PO Resp. Upon consideration of the entire trial record, we adopt Petitioner’s construction for the reasons set forth in the Petitions.

4. *“vertically extending section”*

Claims 7, 8, 17–19, 21–25, and 28–30 recite “vertically extending section.” Petitioner contends “the broadest reasonable interpretation is the

plain meaning of the phrase: any vertically extending portion of the [male or female] end of the trunk section.” Pet. 28; ’332 Pet. 27.

Patent Owner contends “the plain language of the Claims makes clear that both an independent ‘vertically extending section’ and a ‘channel contact device’ are required, i.e., the ‘vertically extending section’ cannot serve as the ‘channel contact device.’” PO Resp. 23. Patent Owner points to two unnumbered portions of the female end of the connector depicted in the ’495 Patent Specification, i.e., a portion within female end 105 in Figure 3b and a portion of female end 700 in Figure 8. *Id.* at 24–25 (citing Ex. 1001, Figs. 3b, 8 (with Patent Owner’s annotations highlighting the vertically extending section in light blue)).

Petitioner responds “nowhere does the specification disclose, let alone define ‘vertically extending section.’” Reply 26. Petitioner asserts “PO’s purported illustration of the vertically extending section . . . along with PO’s argument that the ’495 requires anything specific of the vertically extending section, is therefore a misrepresentation given that no such structure is disclosed in that Figure of the specification of the ’495 [patent].” *Id.* (citing Ex. 1026 ¶ 40).

We start by noting that the recitation of “vertically extending section” differs in the various claims. Each of claims 7 and 17 recites “a vertically extending section of the female end,” claim 21 similarly recites “the female end having . . . a vertically extending section,” and claim 29 recites “the female end comprising a vertically extending section.” Ex. 1001, 16:39–43, 17:35–39, 17:59–67, 18:65–67. In contrast, each of claims 19, 24, and 28 recites “the male end having a vertically extending section.” Ex. 1001, 17:43–47, 18:22–26, 18:38–39. Claims 8, 18, 22, 23, 25, and 30 recite

further limitations of one of the aforementioned recitations of “vertically extending section.” *Id.* at 16:44–46, 17:40–42, 18:16–21, 18:27–28, 19:3–6. Petitioner’s contentions more broadly pertain to “a ‘vertically extending section’ of the male or female end of a trunk section.” Pet. 26; ’332 Pet. 25–26. In contrast, Patent Owner’s contentions pertain to only the recitation of “vertically extending section” of the “female end” in claims 7, 17, 21, and 29. PO Resp. 26.

Petitioner’s contentions that the ’495 Patent Specification does not disclose a “vertically extending section” are conclusory. *See, e.g.*, Reply 26. That certain portions of drawings are unnumbered, such as those identified by Patent Owner (PO Resp. 24–25 (citing Ex. 1001, Figs. 3b, 8)) does not in itself support that the disclosure is insufficient. Upon consideration of Petitioner’s contentions (Pet. 26–28; Reply 26) and Patent Owner’s contentions (PO Resp. 24–25), we are not persuaded that Petitioner has shown that the ’495 Patent Specification does not disclose “vertically extending section.”

Patent Owner, however, has not provided a reason why the plain meaning of “vertically extending section” (i.e., a section that extends vertically) is not the broadest reasonable interpretation. PO Resp. 23–25. Patent Owner’s contentions are premised on another recitation in claims 7, 17, 21, and 29, i.e., “channel contact device.” *Id.* Consistent with Patent Owner’s contentions, each of claims 7, 17, 21, and 29 recites expressly the same structure requiring that the “female end” has (1) the “central void” disposed within the “vertically extending section” and (2) the “channel contact device” “disposed around the vertically extending section.” Ex. 1001, 16:39–43, 17:35–39, 17:59–67, 18:65–19:2.

Accordingly, upon consideration of the entire trial record, we are persuaded that the broadest reasonable interpretation of “vertically extending section” is the plain meaning of the phrase, which is a vertically extending portion or section of the end of the trunk section, with the caveat that other recitations of the claims also are required including that the “contact channel device” is separate and must be “disposed around the vertically extending section,” as recited in each of claims 7, 17, 21, and 29. *Id.*

B. Person of ordinary skill in the art

Petitioner proposes that a person of ordinary skill in the art would have been:

- (1) a person with at least a bachelor’s degree in mechanical engineering or electrical engineering; and at least one to two years of experience in mechanical and electrical design aspects of products having mechanical and electrical connections, or
- (2) a designer with at least one to two years of experience in designing lighted artificial trees.

Pet. 19–20 (numbering added) (citing Ex. 1002 ¶ 8). Patent Owner does not dispute Petitioner’s contentions regarding the level of skill. *See, e.g.*, PO Resp. 45–48; *see also* Prelim. Resp. 39 (“Patent Owner will accept Petitioner’s proposed POSA definition for purposes of this Preliminary Response only”).

We adopt Petitioner’s description of a person of ordinary skill in the art as it is consistent with the level of skill implied by the disclosures of the prior art references. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art itself can reflect the appropriate level of skill in the art).

C. The Chen Grounds and Independent Claims 1 and 11

Petitioner contends that claims 1 and 11 are obvious over Chen alone, “Chen and its provisional 61/385,751, incorporated by reference,”¹² and Chen and Geisthoff. Pet. 1; ’332 Pet. 1.

1. Chen’s Non-Provisional Disclosure alone or in combination with Geisthoff

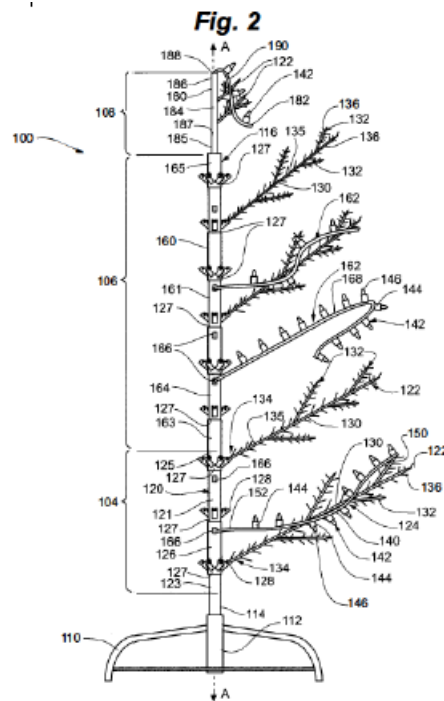
Each of independent claims 1 and 11 recites an artificial tree including first and second trunk sections. Each of claims 1 and 11 also includes limitations specifying that the male end has prongs and female end has voids that engage to conduct electricity in a plurality of configurations (claim 1) or locations (claim 11) each providing a different rotational alignment.

Petitioner asserts that the subject matter of claims 1 and 11 would have been obvious to a person of ordinary skill in the art. Pet. 29–43. Petitioner asserts that Chen teaches most of the elements of claims 1 and 11 with the possible exception of each of the plurality of configurations (claim 1) or locations (claim 11) providing a different rotational alignment. *Id.* at 29. Petitioner asserts that to the extent Chen is deficient, Geistoff “discloses structures that prevent fully rotatable mechanical joints in the form of splines running lengthwise on the shaft.” *Id.* at 61.

We turn to Petitioner’s assertion that Chen teaches an artificial tree including a first trunk section having a male end with prongs and a second trunk section having a female end with voids that engage with the male end to conduct electricity in a plurality of configurations (claim 1) or locations

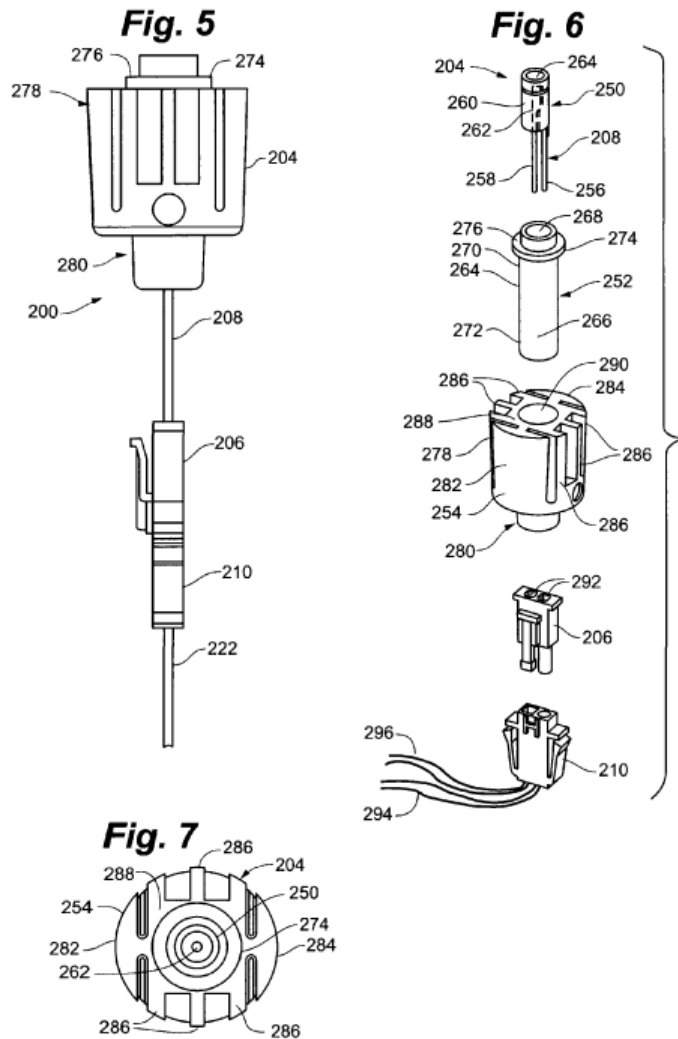
¹² We refer to provisional 61/385,751 herein as the “’751 provisional” or “Chen’s provisional application.”

(claim 11). Petitioner points to Figure 2 of Chen, which Petitioner asserts depicts “trunk portions 120, 160, 180 and the artificial tree.” *Id.* at 29. Dr. Durfee provides an excerpted version of Figure 2 of Chen, reproduced below, and testifies it depicts that the multiple portions are “mechanically coupled and electrically connected to one another.” Ex. 1002 ¶ 53 (citing Ex. 1007, Fig. 2).

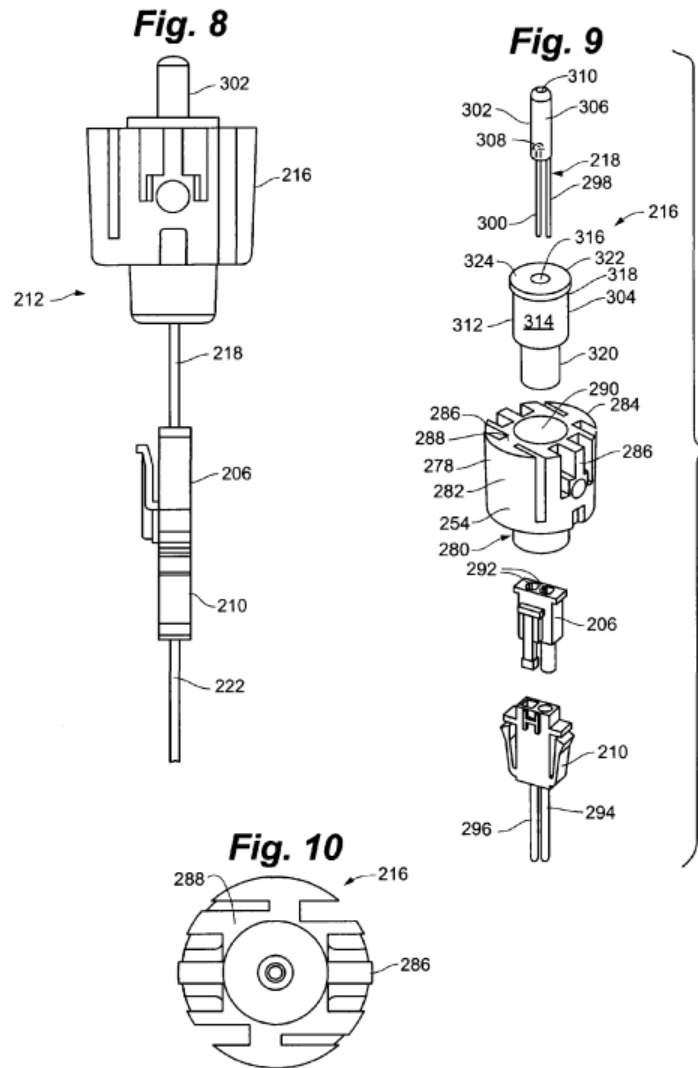


The figure reproduced above is Figure 2 of the '495 Patent illustrating the front view of a base and trunk assembly of a tree. Ex. 1007, Fig. 2. We are persuaded by Petitioner's undisputed contentions and credit Dr. Durfee's testimony that Chen teaches an artificial tree with a plurality of tree trunk sections (Pet. 29; Ex. 1002 ¶ 83) because we find that Chen's artificial tree (*see, e.g.*, Ex. 1007, Fig. 2) has multiple trunk sections that are mechanically and electrically coupled (*see, e.g., id.* at Figs. 2–10, 14, 16).

We turn to Petitioner’s showing with respect to “a male end of a first trunk section” and “a female end of a second trunk section,” as well as the specific structural requirements of these ends recited in claims 1 and 11. Figures 5–10 of Chen are reproduced below to assist in illustrating Petitioner’s contentions.



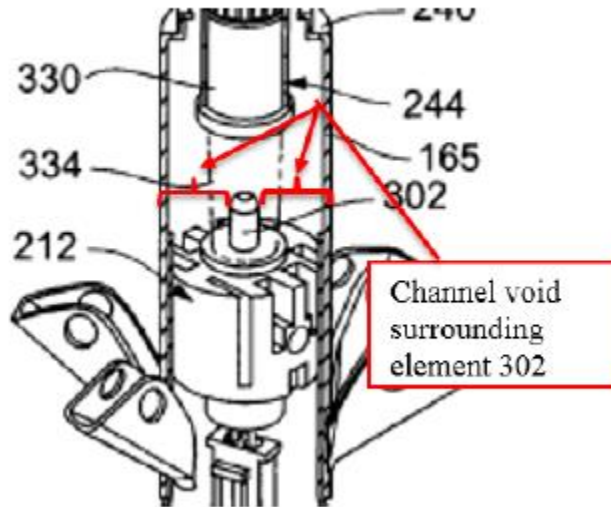
Figures 5–7 are side, exploded, and end views, respectively, of Chen’s connector 200. Ex. 1007, 5:27–33, 10:58–62.



Figures 8–10 are side, exploded, and end views, respectively, of Chen’s connector 212. Ex. 1007, 5:34–40, 12:1–5.

Petitioner cites Chen’s female connector 200 (Ex. 1007, 10:58–62) as corresponding to the male end of the first trunk section with contact 262 corresponding to the “central prong” and contact 260 corresponding to the “channel prong” (Pet. 30–31), and male connector 212 (Ex. 1007, 12:1–5) as corresponding to the female end of the second trunk section with receptacle 310 corresponding to the “central void” and the region surrounding contact

306 corresponding to the “channel void” (Pet. 31–33; Ex. 1002 ¶¶ 84–92). Petitioner provides an annotated version of a portion of Chen’s Figure 16b (“the annotated figure”), reproduced below, to illustrate the “channel void” in Chen. Pet. 33; Ex. 1002 ¶¶ 89–92.



The figure reproduced above is a fragmentary view of Chen’s Figure 16b, which depicts a cross-sectional view of Chen’s tree, and includes Petitioner’s annotation identifying the “channel void” in that figure.

Dr. Durfee testifies “[a]s displayed in Figs. 9 and 16b, connector 212, including contacts 306 and 308, as well as the surrounding channel void, is disposed within upper end 165 of trunk portion body 161.” Ex. 1002 ¶ 91 (citing Ex. 1007, 10:5–6, Figs. 2–4, 9, 16b); Ex. 1026 ¶ 28. Dr. Durfee also testifies “a POSA reviewing Figure 16b would understand a channel void of empty space surrounds element 302 and extends outwardly to the walls of trunk portion 160, and that such an arrangement would include a circular channel void.” Ex. 1026 ¶ 28. As seen in the annotated figure above, male connector 212 (considered the female end of the second trunk section by

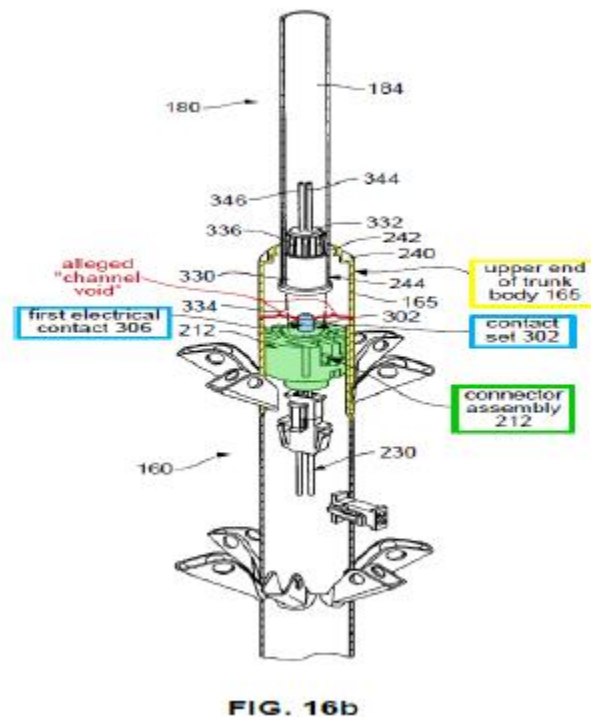
Petitioner) includes a void between element 302 and upper end 165 of trunk body 161. Ex. 1007, Fig. 16b.

Patent Owner counters that “Petitioner’s attempt to map *Chen*’s male end to the claimed female end fails for two reasons.” PO Resp. 14. First Patent Owner asserts that “[t]he claimed female end refers to an electrical connector that is separate from the actual tree trunk section,” so “Petitioner cannot rely on a combination of the tree trunk section and *Chen*’s connectors to meet the claimed female end.” *Id.* at 16 (citing Ex. 2004 ¶¶ 154–155). Patent Owner’s assertion and Dr. Lebby’s testimony (PO Resp. 14–16; Ex. 2004 ¶¶ 154–155) are premised on Patent Owner’s overly narrow construction of “female end” requiring it to be the “end” of an electrical connector that is separate from the actual tree trunk section. For reasons discussed *supra* in Section II.A.1, we adopt Petitioner’s proposal that “female end” recited in independent claims 1 and 11 is “an end of a trunk section having a central void and a channel void.” Consistent with Dr. Durfee’s testimony (Ex. 1002 ¶ 91; Ex. 1026 ¶ 28), *Chen* connector 212, including contacts 306 and 308, as well as the surrounding channel void, is disposed within upper end 165 of trunk portion body 161. Ex. 1007, 10:5–6, Figs. 2–4, 9, 16b.

Second, Patent Owner also contends that connector assembly 212 “includes exposed contacts,” which bar it from reading on the claimed “female end” and that *Chen*’s trunk connector 212 “does not have the claimed channel void.” PO Resp. 16–22. Patent Owner’s contentions and Dr. Lebby’s testimony (PO Resp. 16–22; Ex. 2004 ¶¶ 42, 121–29, 156–174), however, again are premised on overly narrow construction of “female end” requiring it to be the “end” of an electrical connector that is separate from

the actual tree trunk section. In particular, Patent Owner’s contentions in this regard identify portions of only the electrical connector 212. *Id.* (citing *e.g.*, Ex. 1007, Figs. 8, 9). Chen, however, teaches that the connector is within the trunk of the artificial tree. *See, e.g.*, Ex. 1007, 10:5–6 (“An upper trunk connector assembly 212 is inserted into upper end 165 of second trunk body 161.”), Figs. 2–4, 16b; *see also id.* at 5:27–40 (describing Figures 5 through 10 as illustrating views a “trunk connector assembly.”). Consistent with Dr. Durfee’s testimony (Ex. 1026 ¶ 28) Figure 16b illustrates a circular channel void surrounding element 302 and extending outwardly to the walls of trunk portion 160. Ex. 1007, Fig. 16b, 8:63–9:5, 10:5–6; *see also id.* at 12:23–29 (“contact set 302 comprises a coaxial electrical connector” in which “first electrical contact 306 comprises a portion of outside surface of contact set 302” and “[s]econd electrical contact 308 . . . may be located generally at a center, bottom portion of receptacle 310.”)

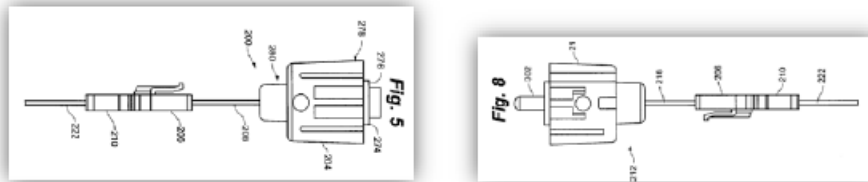
As noted above in our claim construction discussion, the claim allows for the “channel void” to be defined, at least partially, by an inner wall of the trunk section (i.e., the “channel void” may be defined by a combination of an inner wall of a trunk section and an outer wall of a separate electrical connector). Patent Owner’s annotated version of Chen’s Figure 16b, reproduced below, further illustrates that under our construction, there is no dispute that Chen teaches a “channel void.”



The figure reproduced above is an annotated version of Chen's Figure 16b, which "is a cross-sectional view of the middle trunk portion joined to the upper trunk portion" (Ex. 1007, 5:58–59), and includes Patent Owner's own annotation showing the "channel void" defined in Chen by the combination of connector assembly 212 and the body of trunk section 160. Furthermore, because contact set 302 (including contacts 306 and 308) are enclosed within the trunk body 165, we find that the female end has "no externally exposed electrical conductors," contrary to Patent Owner's contention. PO Resp. 6–7, 16–22.¹³

¹³ As discussed *supra* in Section II.A.1, Patent Owner contends "female end" means "an end of an electrical connector having no externally exposed electrical conductors." PO Resp. 6–7. Because we adopt Petitioner's proposed construction that "female end" recited in independent claims 1 and 11 is "an end of a trunk section having a central void and a channel void" (Reply 2) and Chen discloses that the recited contacts are enclosed within

We now turn to the remaining elements recited in claims 1 and 11. With respect to the requirement that the central and channel prongs of the male end engage the central and channel contact devices of the female end, Petitioner's excerpted, rotated versions of Figures 5 and 8 of Chen, reproduced below, show how Chen's connectors engage. Pet. 34 (citing Ex. 1007, Figs. 5, 8).



Figures 5 and 8 illustrate a side view of connector 200 and a side view of connector 212, respectively (Ex. 1001, 5:27–29, 5:34–36, 10:58–60) and are depicted as rotated by Petitioner to show alignment (Pet. 34).

Relying on the testimony of Dr. Durfee, Petitioner asserts that its excerpted, rotated versions of Figures 5 and 8 of Chen show how Chen's connectors fit together to form two connections of (1) the central prong with the central void/connection device and (2) the channel prong with the channel void/channel connection device. *Id.*; Ex. 1002 ¶ 93. Consistent with Petitioner's contentions and Dr. Durfee's testimony (Pet. 34–35; Ex. 1002 ¶¶ 93–95), Chen teaches that coupling the trunk sections i.e., the “multiple points of mechanical contact between connector assemblies 200 and 212” (Figures 5 and 8) “combined with the secure fit of connector assemblies 200 and 212 to the trunk portions” “creates a substantial

the trunk body, we need not resolve the dispute as to whether “female end” requires “no externally exposed electrical conductors” (PO Resp. 6–7).

mechanical coupling not only at the trunk walls, but also at the inside” (Ex. 1007, 10:59, 12:2, 15:13–17, Fig. 14b). Also, consistent with Petitioner’s contentions and Dr. Durfee’s testimony (Pet. 34–35; Ex. 1002 ¶¶ 93–95), Chen teaches that “[i]n addition to the mechanical coupling” “the two portions become electrically connected” (Ex. 1007, 15:31–34). In particular, Chen teaches:

[W]hen connector assembly 212 is coupled to connector assembly 200, contact set 250 is inserted into cavity 264 of contact set 260 of connector assembly 200. Contact 262 of contact set 250 is inserted into cavity 310 of contact set 302. Consequently, an electrical connection is made between contact 260 of connector assembly 200 and contact 306 of connector assembly 212, thus electrically connecting wires 256 and 298. An electrical connection is also made between contact 262 of connector assembly 200 and contact 308 of connector assembly 212, thus electrically connecting wires 258 and 300.

Ex. 1007, 15:34–44. Chen further teaches that connector assembly 200 is configured to receive its counter-part to “form a coaxial-like electrical connection.” Ex. 1007, 9:8–11. Fig. 16b, 8:63–9:5, 10:5–6; *see also id.* at 11:8–20, 12:23–29 (“contact set 302 comprises a coaxial electrical connector” in which “first electrical contact 306 comprises a portion of outside surface of contact set 302” and “[s]econd electrical contact 308 . . . may be located generally at a center, bottom portion of receptacle 310.”) Patent Owner does not dispute these contentions.

Regarding the final remaining element, Petitioner asserts that Chen teaches each of the plurality of configurations (claim 1) or locations (claim 11) providing a different rotational alignment. Pet. 35–36; Ex. 1002 ¶¶ 96–97. As discussed *supra* in Section II.A.3, we agree with Petitioner’s contention that the broadest reasonable construction of “plurality of

configurations” and “plurality of locations on the channel contact device” is the “plain and ordinary meaning, allowing any/infinite number of . . . rotational alignments” (*see, e.g.*, Pet. 23). Consistent with Petitioner’s contentions and Dr. Durfee’s testimony (Pet. 35–36; Ex. 1002 ¶¶ 96–97), Chen discloses that “the coaxial nature of connectors 200 and 212 permit the electrical connection of the connectors at any rotational orientation about a vertical axis” and “[i]f some rotation occurs inadvertently, the coupling and connection still occurs, regardless of the rotation.” Ex. 1007, 15:45–59, 2:54–63 (“The electrical connection is made independent of any rotational orientation of the first trunk portion relative [to] the second trunk portion about the common vertical axis.”), 12:19–25.

As an alternative example, Petitioner points to Chen’s teaching that “[i]n another embodiment requiring only minimal rotational alignment, lower end 123 and upper end 198 *may comprise other shapes at their ends, such as a square, leaving four coupling positions about axis A.*” Pet. 36 (citing Ex. 1007, 14:25–40). Relying on the testimony of Dr. Durfee, Petitioner also contends that a person of ordinary skill in the art would have been motivated to implement this variation to prevent disruptive spin of tree portions. *Id.* (citing Ex. 1002 ¶¶ 99–100). Petitioner’s contentions and Dr. Durfee’s testimony are consistent with the evidence cited by each. For example, Petitioner provides evidentiary support (*see, e.g.*, Pet. 36) by pointing to Chen’s express teaching of the proposed modification. Ex. 1007, 14:25–40; *see also id.* at 13:12–14 (“[B]ody portion 330 may take other

shapes adapted to couple with trunk body 184, such as square or rectangular, as needed.”)¹⁴

Patent Owner does not dispute Petitioner’s contentions regarding independent claims 1 and 11, except with respect to “female end” and “channel void,” discussed above. As set forth in our Order of May 9, 2017, issued with our Decision on Institution, Patent Owner has been cautioned “that any arguments for patentability not raised in the response will be deemed waived.” Paper 12, 7.

For the reasons given, upon consideration of the arguments and evidence in the entire trial record, we are persuaded by and adopt as our own Petitioner’s contentions and credit and give substantial weight to the testimony of Dr. Durfee that the limitations recited in claims 1 and 11 are taught or suggested by Chen (i.e., Chen’s Non-Provisional Disclosure) alone or in combination with Geisthoff. Additionally, we are persuaded by and adopt as our own Petitioner’s analysis, which relies upon Dr. Durfee’s supporting testimony regarding his articulated reasoning as to why one of ordinary skill in the art would have been motivated to modify the teachings of Chen in the manner recited in claims 1 and 11. Accordingly, based on the evidence in the entire trial record, we determine that Petitioner has

¹⁴ Because we adopt Petitioner’s proposed construction, we need not discuss further this alternative example, or Petitioner’s assertions regarding Geisthoff, which simply provides further teachings regarding the shape and reasons to incorporate such a shape into an artificial tree. We discuss these teachings further with respect to claim 20. We, however, note that we are persuaded that these teachings satisfy the recitations of plurality of configurations (claim 1) or locations (claim 11) even under the narrower construction that Petitioner raises, but contends is too narrow.

demonstrated by a preponderance of the evidence that claims 1 and 11 are unpatentable as obvious over Chen’s Non-Provisional Disclosure alone or also in combination with Geisthoff.

2. The ’751 Provisional Disclosure

Although not necessary in light of our aforementioned determination, as a separate, independent reason for unpatentability, we turn to Petitioner’s alternative contentions that the disclosure from the ’751 provisional of Chen teaches the limitations recited in claims 1 and 11. *See, e.g.*, Pet. 43–51.

Patent Owner contends that it is improper for Petitioner to rely on teachings from that provisional application. PO Resp. 55–64. As an initial matter, the parties do not dispute that Chen qualifies as prior art under at least 35 U.S.C. § 102(e). Pet. 9; PO Resp. 58–59. Petitioner does not rely on the provisional application for a priority date for Chen or as a standalone printed publication. *See, e.g.*, Tr. 7:7–9:9. Instead, Petitioner relies on the provisional application as being part of the disclosure of Chen due to its incorporation by reference. Pet. 43; Reply 17–18.

Patent Owner does not identify, nor do we find, any particular fault in the manner in which the provisional application was incorporated by reference into Chen. PO Resp. 55–64. Patent Owner, instead, contends that the provisional application was not made available to the public. *See, e.g.*, PO Resp. 60 (referring to the provisional application as “nonpublic information” and asserting “effective incorporation has always been predicated on public disclosure of the incorporated material”); *see also* Tr. 38:9–20 (“And [the provisional application is] a secret document. Until it’s cited in the Chen patent and then ultimately that is, that issues.”), 40:1–14

(“By its fair nature, [the provisional application is] treated specially in the statutes and rules and it’s a secret[] document. Up until the time when it is, here, if it’s incorporated by reference, then it can become publicly available.”)

Petitioner contends that the provisional application “was available as of the March 29, 2012, publication date of *Chen*’s non-provisional patent application.” Reply 18 (citing 37 C.F.R. §1.14(a)(1)(v)–(vi)). Consistent with Petitioner’s contentions, *Chen* was published on March 29, 2012. Ex. 1007, (65). A provisional patent application, such as the one at issue in this proceeding, is available to the public upon written request and payment of a fee after, for example, the non-provisional application is published. *See, e.g.*, 37 C.F.R. §§ 1.11(a) (2006), 1.14(a)(1)(v)–(vi) (2007).

We have considered Patent Owner’s arguments that the provisional application was not made available to the public and we are persuaded by Petitioner’s showing that the ’751 provisional was available as of the March 29, 2012, publication date of *Chen*’s non-provisional patent application. Indeed, as noted above, Patent Owner’s position is premised on the mistaken understanding that provisional patent applications are not publicly available until the corresponding non-provisional filing issues as a patent. Patent Owner does not identify particular support for its contentions. *See, e.g.*, Tr. 38:22–39:1 (“And while both sides have cited a variety of cases, surprisingly to me there is no case that precisely addresses this.”).

Based on the record before us, we determine that the disclosure from the provisional application was properly incorporated by reference in *Chen* and publically available as of the publication date of the application resulting

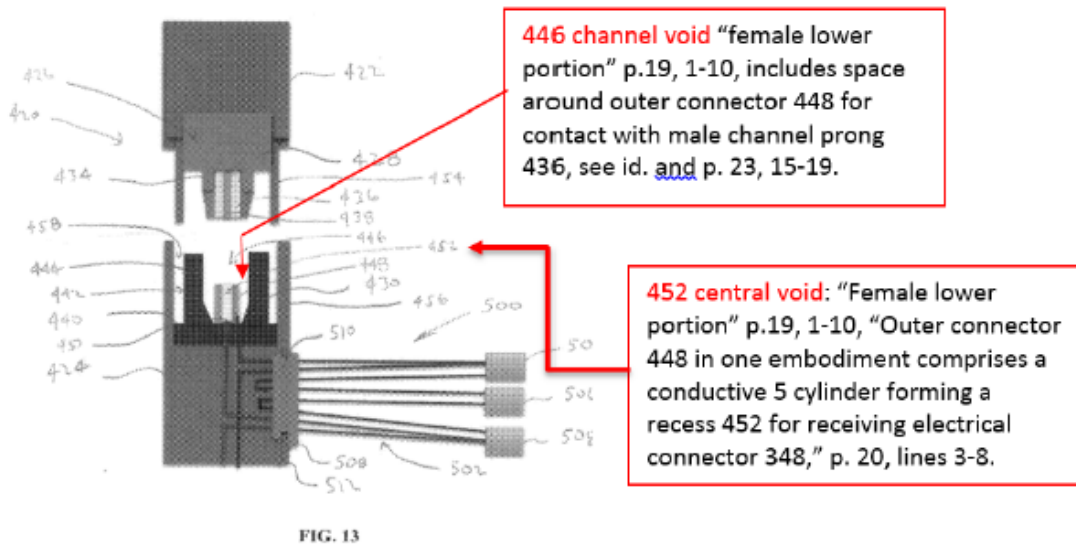
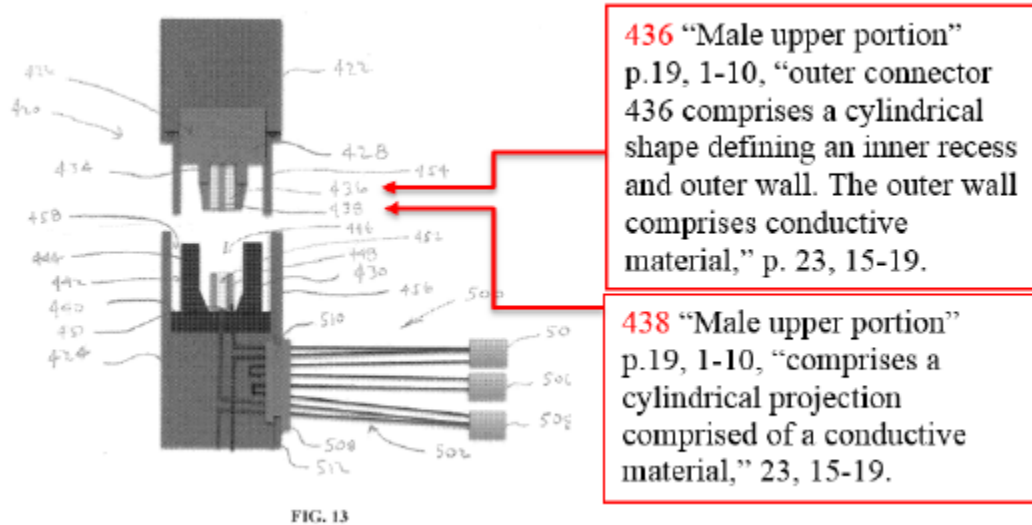
in the Chen patent (i.e., March 29, 2012). Therefore, the provisional application is part of the disclosure of Chen.

Petitioner cites the disclosure of the provisional application of Chen as expressly teaching each limitation recited in claims 1 and 11. Pet. 43–51. Patent Owner does not dispute Petitioner’s contentions regarding the alleged teachings from the disclosure of the provisional application and, instead, relies on its contentions with respect to whether the disclosure from the provisional application can be used for Petitioner’s challenges. PO Resp. 13 n.4. For the reasons given above, we are not persuaded by those contentions.

With respect to Petitioner’s challenge, we are persuaded by, and adopt, Petitioner’s undisputed contentions and credit and give substantial weight to Dr. Durfee’s testimony regarding the teachings of Chen’s provisional application’s disclosure. Pet. 43–51; Ex. 1002 ¶¶ 115–124. We start by noting that Petitioner asserts that the ground is “not redundant because 61/385,751 contains a more express disclosure of ‘central prong’ than the ’186, and has structure for a ‘channel void’ that includes an additional structure defining the exterior boundary of the void.” Pet. 43; Ex. 1002 ¶ 113.

We now turn to Petitioner’s challenge and Dr. Durfee’s testimony regarding claims 1 and 11. Pet. 43–51; Ex. 1002 ¶¶ 115–124. Chen’s provisional application describes a tree with “trunk 166 includ[ing] three portions, base portion 172, middle portion 174, and upper portion 176, that are each electrically and mechanically linked together” (Ex. 1008, 9:18–20), which Petitioner cites as corresponding to the “plurality of tree trunk sections” in claims 1 and 11 (Pet. 44–45; Ex. 1002 ¶ 115). As for the “male

end of a first trunk section of the plurality of tree trunk sections” and the “female end of a second trunk section of the plurality of tree trunk sections,” relying on the testimony of Dr. Durfee, Petitioner provides annotated versions of Figure 13 from Chen’s provisional application, which are reproduced below.



The figures reproduced above are Figure 13 from Chen’s provisional application, which depicts a section view of a connection system for the tree

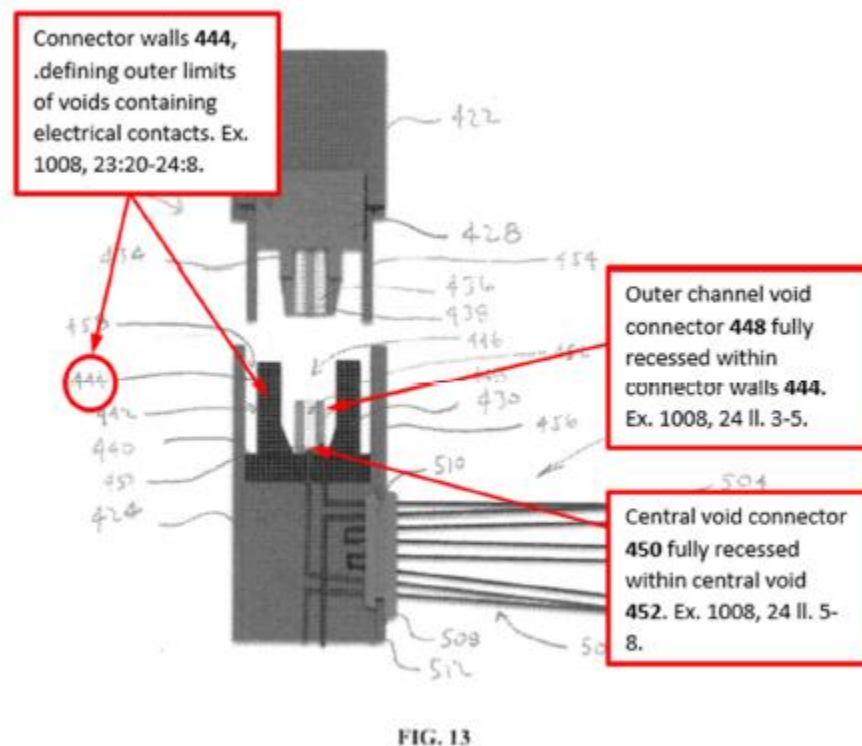
disclosed in Chen's provisional application (Ex. 1008, 6:21–22), and include annotations labeling the portions of Figure 13 corresponding to the various parts of the male and female ends of the trunk sections (Pet. 44–46; Ex. 1002 ¶¶ 115–117).

Consistent with Petitioner's contentions and Dr. Durfee's testimony that Figure 13 teaches ends of trunk sections (Pet. 44–46; Ex. 1002 ¶¶ 115–117), the provisional application teaches that Figure 13 illustrates “two portions of a trunk of an artificial pre-lit tree” (Ex. 1008, 19:1).

Additionally, Figure 13 and the related description teach the features of the “male end” and “female end” recited in claims 1 and 11 including, for example, the “male end” having “a central prong,” and “a channel prong” and the “female end” having “a central void” and “a channel void,” with contact devices disposed therein. For instance, as seen in the figures reproduced above, and as set forth in the Petition and consistent with Dr. Durfee's testimony (Pet. 45–48; Ex. 1002 ¶¶ 115–119), Chen's provisional application teaches a male end having a central prong (438) and a channel prong (436), as well as a female end having a central void (452) having central contact (348) and a channel void (446) having a channel contact device (448), as recited in claims 1 and 11. *See* Ex. 1008, 19–20, 23 (describing the arrangement shown in Figure 13 consistent with Petitioner's contentions). Furthermore, the disclosure of the provisional application describes the part including prongs 436, 438 as “a male upper portion” (*id.* at 19) and the part including receiving portions 446 and 452 as “a female lower portion” (*id.* at 19–20).

Additionally, consistent with Petitioner's contentions and Dr. Durfee's testimony (*see, e.g.*, Pet. 43; Ex. 1002 ¶ 113; Reply 21–22; Ex.

1026 ¶ 33), Chen’s provisional application teaches structure for a “channel void,” e.g., connector walls 444 such that the female-side electrical contacts are fully recessed in voids that are themselves surrounded by electrical-connector housing. Ex. 1008, Fig. 13. Dr. Durfee testifies connectors 448 and 450 are fully recessed in connector walls 444, as illustrated in annotations to Figure 13 in his Reply Declaration and set forth below.



The figure reproduced above is Figure 13 from the provisional application, which is a sectional view of the connection system for the artificial tree (Ex. 1008, 6:21–22, 19:1–2), and includes annotations labeling the portions of Figure 13 corresponding to the connector walls, as well as the voids (Reply 21–22; Ex. 1026 ¶ 33). We find that Figure 13 illustrates contacts fully recessed within walls 444 that form the electrical housing, consistent with Petitioner’s contentions and Dr. Durfee’s testimony.

Regarding the requirement that the male end is configured to engage the female end to conduct electricity, recited in claims 1 and 11, also consistent with Petitioner’s contentions (Pet. 46–48), we find that connectors 436, 438, 448, 450 form the electrical connection between the “male upper portion” (barrel portion 428) and “female lower portion” (receiver portion 430). Ex. 1008, 19–20 (describing when the upper and lower portions “are mechanically connected” those portions “also become electrically connected as barrel portion 428 . . . fits into receiver portion 430”). With respect to that connection, we find that the female end has no externally exposed electrical conductors.¹⁵ The disclosure from Chen’s provisional application cited by Petitioner explains that “[o]uter connector 448 . . . comprises a conductive cylinder forming a recess 452 for receiving electrical connector 348” and “[i]nner connector 450 . . . comprises a pad-like, flat connection point for contacting with an end of electrical connector 438.” Ex. 1008, 20.

Claim 1 further recites “wherein the channel prong of the male end is configured to engage the channel contact device of the female end in a plurality of *configurations*, each configuration providing a different rotational alignment of the first trunk section with respect to the second trunk section.” Ex. 1001, 16:19–23 (emphasis added). Claim 11 includes a recitation that is similar except the male end is configured to engage “at a plurality of *locations* on the channel contact device, each location providing

¹⁵ As discussed *supra* in Section II.A.1, Patent Owner contends “female end” means “an end of an electrical connector having no externally exposed electrical conductors.” PO Resp. 6. Because Chen discloses that the recited contacts are enclosed, we need not resolve the dispute as to whether “female end” requires “no externally exposed electrical conductors”

a different rotational alignment.” *Id.* at 17:12–17 (emphasis added). Relying on the testimony of Dr. Durfee, Petitioner asserts that these limitations are taught by the ’751 Provisional’s disclosure of circular trunk segments or cylindrical or barrel shaped electrical connectors depicted in Figures 8 and 13, respectively. Pet. 49; Ex. 1002 ¶¶ 120–124. Petitioner asserts, alternatively, the ’751 Provisional’s disclosure of a rectangular connection in connection with Figure 13 teaches these limitations, particularly under a construction requiring discrete alignment. Pet. 50; Ex. 1002 ¶¶ 122–124. Dr. Durfee testifies that including a rectangular shape to the barrel would provide up to four alignments and a person having ordinary skill in the art would be motivated to implement this variation to ensure the tree can be assembled in a multitude of directions electrically, but once assembled the tree portions will not spin with respect to each other making assembly more convenient. Ex. 1002 ¶ 122.

We are persuaded by Petitioner’s uncontested showing and credit and give substantial weight to the testimony of Dr. Durfee because Petitioner’s showing and Dr. Durfee’s testimony are consistent with the evidence cited by each. For example, Chen’s provisional application teaches that walls 444 “may comprise a single, cylindrical wall” (Ex. 1008, 19:22), which covers the recitations of “plurality of configurations” and “plurality of locations on the channel contact device” in accordance with the construction that we adopted. In particular, as discussed *supra* in Section II.A.3, we determine that the broadest reasonable interpretation is the “plain and ordinary meaning, allowing any/infinite number of . . . rotational alignments” (*see, e.g.*, Pet. 23). Additionally, Figures 8 and 13 illustrate such a cylindrical wall. Ex. 1008, Figs. 8, 13. Even under a narrower interpretation, the

limitations are satisfied as Chen's provisional application teaches walls 444 may have "a rectangular or other shape." Ex. 1008, 20:1.

Based on our review of Petitioner's undisputed contentions and the corresponding disclosure from Chen's provisional application, we are persuaded that Chen's provisional application teaches the features asserted by Petitioner. Upon consideration of the entirety of the record, Petitioner's contentions in connection with the teachings of Chen's provisional application's disclosure (the '751 Provisional) establish by a preponderance of the evidence that claims 1 and 11 are unpatentable.

D. The Chen Grounds and Dependent Claims 2–6, 9, 10, 12–16, and 20

Each of claims 2–6, and 9 depends directly from claim 1 and each of claims 12–16, and 20 depends directly from claim 11. Claim 10 depends from claim 9. As discussed *supra* in Sections II.C.1 and II.C.2, we are persuaded by and adopt as our own Petitioner's contentions and credit and give substantial weight to the testimony of Dr. Durfee that Petitioner has shown by a preponderance of the evidence that independent claims 1 and 11 would have been obvious. Patent Owner does not dispute separately Petitioner's contentions regarding the further recitations of claims 2–6, 9, 10, 12–16, and 20 and, instead, relies on its contentions and evidence provided for independent claims 1 and 11. *See generally* PO Resp.

We turn now to discussion of the further recitations of dependent claims, starting with claims 2, 12, and 20. Claim 2 recites "wherein the channel prong of the male end is configured to engage the channel contact device of the female end in at least three configurations." Ex. 1001, 16:24–26. Claim 12, similarly, recites wherein the channel prong of the male end is

configured to engage the channel contact device of the female end in at least three locations around the central void. *Id.* at 17:18–21. Claim 20 recites “[t]he artificial tree of claim 11 further comprising one or more alignment mechanisms to prevent the first tree trunk section from rotating with respect to the second tree trunk section when the first tree trunk section and the second tree trunk section engage.” *Id.* at 17:48–51.

For the recitations of “at least three configurations” and “at least three locations” in claims 2 and 12 respectively, Petitioner points to Chen’s teaching of “a rounded trunk section” and “a square trunk section,” and further references its contentions for the independent claims. Pet. 37–38 (citing *e.g.*, Ex. 1007, 14:25–40, 13:11–14). As an initial matter, we find that Petitioner’s showing for “plurality of configurations” and a “plurality of locations” recited in independent claims 1 and 11 also satisfies “at least three configurations” and “at least three locations” in claims 2 and 12 respectively, and our analysis and reasoning regarding independent claims 1 and 11, discussed *supra* in Sections II.C.1 and II.C.2, applies to dependent claims 2 and 12. For instance, we are persuaded that the teaching of a rounded trunk section or a rounded or cylindrical connector covers the recitations of “at least three configurations” and “at least three locations” in claims 2 and 12 respectively. Regarding Chen’s non-provisional disclosure, we are persuaded by “the coaxial nature of connectors 200 and 212 permit the electrical connection of the connectors at any rotational orientation about a vertical axis” and “[i]f some rotation occurs inadvertently, the coupling and connection still occurs, regardless of the rotation.” Ex. 1007, 15:45–59; 2:54–63 (“The electrical connection is made independent of any rotational orientation of the first trunk portion relative [to] the second trunk portion

about the common vertical axis.”), 12:19–25. We also are persuaded, for example, by Chen’s provisional application’s disclosure that walls 444 “may comprise a single, cylindrical wall.” Ex. 1008, 19:22, Fig. 13.

Further, to the extent that “at least three configurations” and “at least three locations” in claims 2 and 12 respectively is construed to require discrete alignments, we are persuaded by Petitioner’s alternate contentions showing it would have been obvious to one having ordinary skill in the art to provide square trunk sections or connections. Pet. 37–38 (citing *e.g.*, Ex. 1007, 14:25–40, 13:11–14). For example, we are persuaded by Chen’s teaching that “[i]n another embodiment requiring only minimal rotational alignment, lower end 123 and upper end 198 *may comprise other shapes at their ends, such as a square, leaving four coupling positions about axis A.*” Ex. 1007, 14:25–40 (emphasis added); *see also id.* at 13:12–14 (“[B]ody portion 330 may take other shapes adapted to couple with trunk body 184, such as square or rectangular, as needed.”). We also are persuaded by the testimony of Dr. Durfee that a person of ordinary skill in the art would have been motivated to implement this variation in the embodiment of Chen discussed above to prevent disruptive spin of tree portions. Ex. 1002 ¶¶ 99–100. We also are persuaded that the limitations are satisfied by Chen’s provisional application’s teaching that walls 444 may have “a rectangular or other shape.” Ex. 1008, 20:1.

With respect to claim 20 and the recitation of “[t]he artificial tree of claim 11 further comprising one or more alignment mechanisms to prevent the first tree trunk section from rotating with respect to the second tree trunk section when the first tree trunk section and the second tree trunk section engage” (Ex. 1001, 17:48–51), Petitioner refers back to its contentions for

independent claim 11 including, for example, Chen’s teachings (in both the non-provisional and provisional application disclosures) that the trunk ends may be square or rectangular. Pet. 42 (citing Ex. 1007, 13:11–14, 14:25–40), 59 (citing Ex. 1008, 19:9–20:2, Figs. 5, 8). We are persuaded by and adopt as our own Petitioner’s contentions and we credit and give substantial weight to Dr. Durfee’s testimony that each of Chen’s non-provisional and provisional application disclosures satisfy the further recitations of claim 20. For instance, we find the further recitations are taught because the Chen’s non-provisional disclosure teaches “other shapes at their ends, such as a square, leaving four coupling positions about axis A” (Ex. 1007, 14:37–40) and the ends “may take other shapes . . . such as square or rectangular” (*id.* at 13:10–14). We find the further recitations of claims 20 are taught by Chen’s provisional application’s disclosure that walls 444 “in the case of a rectangular or other shape, may comprise multiple walls” (Ex. 1008, 19:22–20:2).

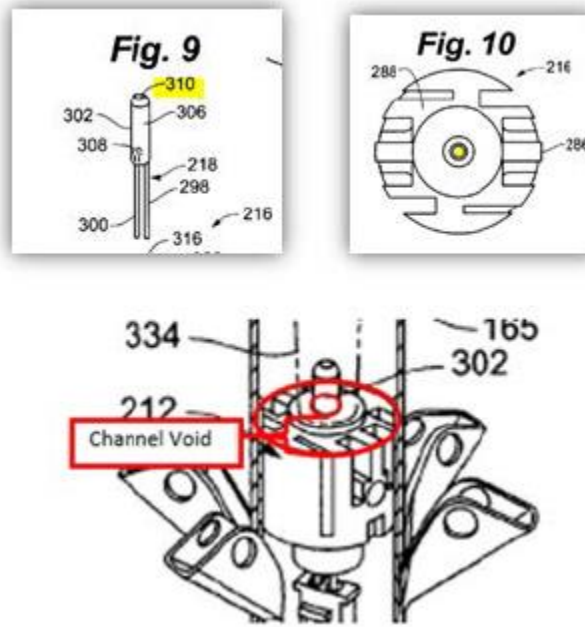
As a separate, independent reason why we are persuaded by Petitioner’s challenge as to claim 20, we also are persuaded by Petitioner’s contentions (Pet. 37, 42–43, 61–62) and credit Dr. Durfee’s testimony (Ex. 1002 ¶¶ 98, 112, 139–41) that the square and rectangular shaped ends that prevent rotation were known to those of ordinary skill in the art as supported by Petitioner’s evidence including Krize (Ex. 1012, Figs. 3, 13) and Geisthoff (Ex. 1013, Figs. 1, 2, 2:61–65, 3:6–10, 3:21–35). We also are persuaded that a person of ordinary skill in the art would have looked to these mechanisms, for example, to provide “easy assembly” for securing a structure that “resembles” an artificial tree trunk (Ex. 1002 ¶ 140) and to “limit the rotation of trunk bodies with respect to one another” (*id.* ¶ 141

(citing Ex. 1013, Figs. 1, 2, 2:61–65, 3:6–10, 3:21–35)). As further support that the skilled artisan would have had reason to implement trunk ends with alignment mechanisms to prevent trunk section rotation, we are persuaded that Chen’s Non-Provisional Disclosure at least suggests that trunk bodies “may comprise other shapes at their ends.” Ex. 1007, 14:25–40; 13:10–14 (“[B]ody portion 330 may take other shapes adapted to couple with trunk body 184.”); *see also* Ex. 1008, 19:9–20:2 (“Walls 444 may comprise a single, cylindrical wall, or in the case of a rectangular or other shape, may comprise multiple walls.”)

For the reasons given, we are persuaded by Petitioner’s showing and credit and give substantial weight to Dr. Durfee’s testimony regarding claims 2, 12, and 20.

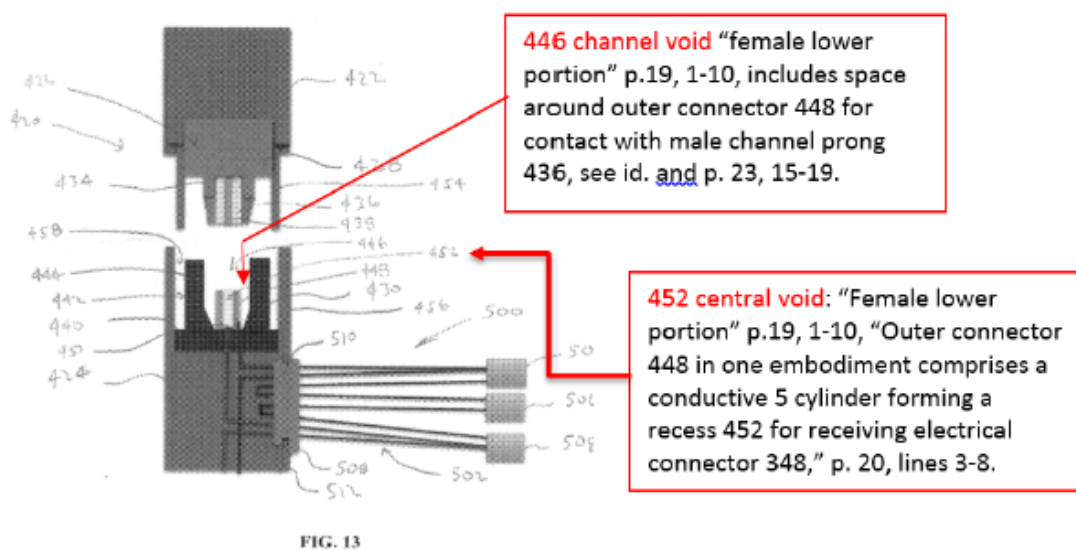
We turn now to claims 3–6 and 13–16. Each of claims 3–6 and 13–16 recites further physical attributes regarding the channel void of the female end, the channel contact device of the female end, and the central void of the female end. With regard to the further recitations of claims 3–6 and 13–16, Petitioner refers back to its contentions for independent claims 1 and 11. Pet. 38, 51. In Chen’s Non-Provisional Disclosure, Petitioner again points to the circular and cylindrical structures of Chen relied on for the independent claims. *Id.* at 38–40 (citing *e.g.*, Ex. 1007, 12:23–25, 15:10–11, 15:37–38, Figs. 8–10, 14, 16; Ex. 1002 ¶¶ 105–07). In Chen’s provisional application, Petitioner again points to the cylindrical connector described with respect to Figure 13. *Id.* at 51–53 (citing *e.g.*, Ex. 1008, 19, Fig. 13; Ex. 1002 ¶¶ 127–28). Patent Owner does not argue separately claims 3–6 and 13–16.

Each of claims 3 and 13 recites “wherein the channel void of the female end is disposed 360 degrees around the central void of the female end.” Ex. 1001, 16:27–29, 17:18–21. Each of claims 5 and 15 further recites “wherein the channel void of the female end is substantially circular, and the central void of the female end is disposed proximate the center of the substantially circular channel void.” Ex. 1001, 16:33–36, 17:28–31. We are persuaded by, and adopt, Petitioner’s undisputed contentions and credit and give substantial weight to Dr. Durfee’s testimony because they are consistent with the evidence cited therein. Pet. 38–40, 51–53; Ex. 1002 ¶¶ 105–07, 125, 127–28. We start with Petitioner’s contentions regarding Chen’s Non-Provisional Disclosure. Petitioner points to Chen’s receptacle 310 as corresponding to the “central void” and Chen’s region surrounding contact 306 as corresponding to the “channel void.” *See, e.g.*, Pet. 31–33, 38–40, Ex. 1002 ¶¶ 90, 91, 106. Figures 9, 10, and 16b illustrate the central void and channel void.



The figures reproduced above are Figures 9, 10, and 16b from Chen, which include a fragmentary view of an exploded view of the trunk connector assembly, a top view of the trunk connector assembly, and a cross-sectional view of the middle trunk portion joined to the upper portion, respectively (Ex. 1007, 5:37–40, 5:58–59), and include annotations by Dr. Durfee labeling the portions of Figures 9, 10, and 16b corresponding to the central void (highlighted in yellow) and the channel void (annotated in red) (Ex. 1002 ¶¶ 89–92, 106). We find that these figures and the related description teach the recitations of claims 3, 5, 13, and 15 because the channel void of the female end (annotated in red) is substantially circular and disposed 360 degrees around the central void (cavity 310, highlighted in yellow) of the female end and the central void is disposed proximate the center of the substantially circular channel void. Ex. 1007, Figs. 9, 10, 16b, 15:10–11.

Regarding Chen's provisional application, Petitioner points to Figure 13, and its related description.



The figure reproduced above is Figure 13 from Chen's provisional application, which is a section view of a connection system for the tree disclosed in Chen's provisional application (Ex. 1008, 6:21–22), and includes annotations labeling the portions of Figure 13 corresponding to the various parts of the female end of the trunk section (Pet. 46; Ex. 1002 ¶¶ 116–117). We find that, consistent with the Petition and Dr. Durfee's testimony (*id.*), Chen's provisional application teaches a female end with a central void (452) having central contact (348) and a channel void (446) having a channel contact device (448). *See* Ex. 1008, 19–20, 23 (describing the arrangement shown in Figure 13 consistent with Petitioner's contentions). We find that these figures and the related description teach the recitations of claims 3, 5, 13, and 15 because the channel void (446) of the female end is substantially circular and disposed 360 degrees around the central void (452) of the female end and the central void (452) is disposed proximate the center of the substantially circular channel void (446). *See* Ex. 1008, 19–20, 23, Fig. 13.

Each of claims 4 and 14 further recites “wherein the channel contact device of the female end is disposed 360 degrees around the central void of the female end.” Ex. 1001, 16:30–32, 17:25–27. Each of claims 6 and 16 further recites “wherein the channel contact device of the female end is at least partially cylindrical.” *Id.* at 16:37–38, 17:32–34. We are persuaded by, and adopt, Petitioner's undisputed contentions and credit and give substantial weight to Dr. Durfee's testimony regarding claims 4, 6, 14, and 16 because they are consistent with the evidence cited therein. Pet. 38–40, 51–53; Ex. 1002 ¶¶ 105–07, 125, 127–28. For instance, we find that Chen's non-provisional disclosure teaches the recitations of claims 4, 6, 14, and 16

because Chen's channel contact device 306 is at least partially cylindrical and is disposed 360 degrees around the central void 310 of the female end. *See, e.g.*, Figs. 9, 10, 16b, Ex. 1007, 12:23–25, 15:37–38. As an independent reason, we find that Chen's provisional application teaches the recitations of claims 4, 6, 14, and 16 because Chen's provisional application teaches a female end having a channel contact device (448) that is at least partially cylindrical and is disposed 360 degrees around the central void (452). *See* Ex. 1008, 19–20, 23 (describing the arrangement shown in Figure 13 consistent with Petitioner's contentions).

For the reasons given, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding claims 3–6 and 13–16.

We now turn to claims 9 and 10. Claim 9 recites “[t]he artificial tree of claim 1 further comprising a light string in electrical communication with the central prong of the male end, the channel prong of the male end, the central contact device of the female end, and the channel contact device of the female end.” Ex. 1001, 16:47–51. Claim 10 recites “[t]he artificial tree of claim 9, one or more of the plurality of tree trunk sections comprising an inner sleeve and one or more of the plurality of tree trunk sections comprising an outer sleeve, the inner sleeve configured to slide inside the outer sleeve and to provide lateral support to the artificial tree.” *Id.* at 16:52–56.

Regarding Chen's non-provisional disclosure, Petitioner points to Chen's teaching of powering strings of lights on branches that is accomplished by connectors. Pet. 41 (citing Ex. 1007, 2:50–54, 10:17–33, Figs. 15a, 15b, 17; Ex. 1002 ¶ 110). Petitioner further points to Chen's

teaching of portions of the tree that connect to form a mechanical connection and provide lateral support. *Id.* at 41–42 (citing Ex. 1007, [57], 2:39–41, 4:3–13; Ex. 1002 ¶ 111). We are persuaded by, and adopt, Petitioner’s undisputed contentions and credit and give substantial weight to Dr. Durfee’s testimony because we find that Chen teaches powering strings of lights with the claimed prongs and contacts, as well as providing portions of the tree for lateral support. Ex. 1007, [57], 2:39–41, 2:50–54, 4:3–13, 10:17–33, Figs. 15a, 15b, 17; Ex. 1002 ¶¶ 110, 111.

Regarding Chen’s provisional application, Petitioner points to Chen’s provisional application’s teaching of lighting system 100 powering lighting sections 108. Pet. 55–56 (citing Ex. 1008, 9:11–14, Fig. 2; Ex. 1002 ¶ 131). Petitioner further points to Chen’s provisional application’s teaching of inner sleeve (end of 204; 454) and outer sleeve (end of 206; 456). *Id.* at 56–59 (citing Ex. 1008, 20, Figs. 5, 8, 13; Ex. 1002 ¶¶ 131–35)). We are persuaded by, and adopt, Petitioner’s undisputed contentions and credit and give substantial weight to Dr. Durfee’s testimony because we find that Chen’s provisional application teaches powering strings of lights with the claimed prongs and contacts, as well as providing inner and outer sleeves for lateral support. Ex. 1008, 9, 19–20, Figs. 2, 5, 8, 13; Ex. 1002 ¶¶ 131–35.

Accordingly, having reviewed the Petition and Patent Owner Response, and the evidence cited therein, we determine for the reasons given that Petitioner has demonstrated by a preponderance of the evidence that each of claims 2–6, 9, 10, 12–16, and 20 is unpatentable as obvious over (1) Chen’s Non-Provisional Disclosure alone or also in combination with Geisthoff; and (2) Chen’s provisional application (the ’751 Provisional’s disclosure).

E. The Chen Grounds and Claims requiring a “vertically extending section” (Claims 7, 8, 17–19, and 21–30)

We first turn to the independent claims that recite a “vertically extending section,” starting with independent claim 21. Independent claim 21 is similar to claim 1 except that it recites further attributes pertaining to a vertically extending section of a “female end.” Ex. 1001, 17:53–18:15. As discussed *supra* in Section II.A.4, we are persuaded that the broadest reasonable interpretation of “vertically extending section” is the plain meaning of the phrase, which is a vertically extending portion or section of the male or female end of the trunk section, with the caveat that other recitations of the claims also are required including that the “channel contact device” is separate and must be “disposed around the vertically extending section,” as recited in claim 21. Ex. 1001, 17:59–67.

Petitioner’s contentions and Dr. Durfee’s testimony for claim 21 in IPR2017-00332 are substantially the same as those presented for claims 1 and 11 in IPR2017-00331, except that the ’332 Petition includes further contentions regarding the vertically extending section, recited in claim 21. *Compare* ’332 Pet. 28–39, 44–54; ’332 Ex. 1002 ¶¶ 83–105, 118–130, *with* Pet. 29–37, 43–51; Ex. 1002 ¶¶ 83–101, 113–124; *see also* Reply 16–25 (responding to the Patent Owner response for the limitations common to all independent claims). Additionally, Patent Owner’s contentions and Dr. Lebbby’s testimony for claim 21 in IPR2017-00332 are substantially the same as those presented for claims 1 and 11 in IPR2017-00331, except that Patent Owner provides further contentions regarding the vertically extending section, recited in claim 21. *See generally* PO Resp.; Ex. 2004. Upon consideration of the arguments and evidence in the entire trial record, for the

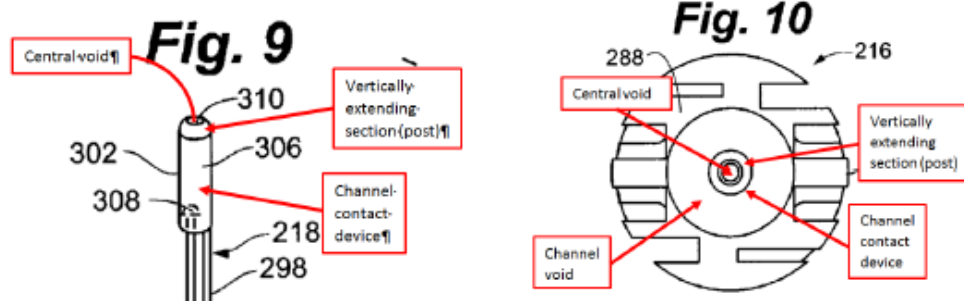
same reasons discussed *supra* Sections II.C.1 and II.C.2, we are persuaded by and adopt as our own Petitioner’s contention and credit and give substantial weight to the testimony of Dr. Durfee that the limitations recited in claim 21 that are common to those recited in claims 1 and 11 are taught or suggested by the asserted art and that one having ordinary skill in the art would have had a reason to modify the teachings of that art in the manner set forth by Petitioner for the reasons Petitioner articulates.

We turn now to Petitioner’s showing with respect to the recitation in claim 21 of a “female end” as set forth fully below:

a female end of a second trunk section of the plurality of tree trunk sections, the female end having a central void disposed within a vertically extending section, the central void having a central contact device disposed at least partially therein, the female end also having a channel void disposed around the vertically extending section, the channel void having a channel contact device disposed at least partially therein, the channel contact device disposed around the vertically extending section, and the central contact device and the channel contact device configured to conduct electricity;

Ex. 1001, 17:53–18:2.

Petitioner contends that “Chen meets this requirement by disclosing a ‘post’ surrounding central void 310 and around which the channel contact device 306 is disposed.” ’332 Pet. 34 (citing e.g., Ex. 1002 ¶ 96). Dr. Durfee testifies that Figure 9 and 10 of Chen depict the post, as shown in the annotations to the Figures below.

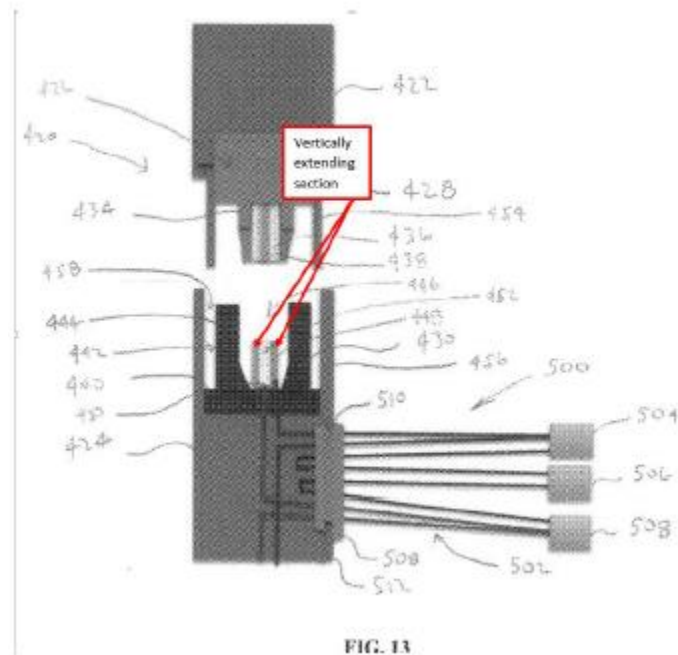


The figures reproduced above are Figures 9 and 10 from Chen, which include a fragmentary view of an exploded view of the trunk connector assembly and a top view of the trunk connector assembly, respectively (Ex. 1007, 5:37–40), and include annotations labeling the portions of Figures 9 and 10 corresponding to the central void, the channel void, the channel contact device, and the vertically extending section (post) (’332 Pet. 34–35; ’332 Ex. 1002 ¶ 96). Dr. Durfee, additionally, testifies that a person having ordinary skill in the art would have understood Figures 9 and 10 to depict insulation material to avoid creating an electrical connection between first electrical contact 306 and second electrical contact 308. ’332 Ex. 1002 ¶ 96 (citing *e.g.*, Ex. 1008, 31:5–7).

Regarding its contentions that Chen’s provisional application renders claim 21 obvious, relying on the testimony of Dr. Durfee, Petitioner contends “[t]he Chen Provisional discloses [the] vertically-extending section of the female end as outer connector 448,” which “comprises an insulated surface to ‘avoid creating an electrical connection’ between electrical contacts that would cause the electrical connection to fail.” ’332 Pet. 49 (citing Ex. 1002 ¶ 124; Ex. 1008, 31:5–7). Dr. Durfee testifies that a person having ordinary skill in the art would have understood that claim element to be met because, as shown in Figure 13, central void 452 is disposed within

the vertically extending section 448, which is insulated, and channel contact device 438 is disposed around an on the surface of outer connector 448.

'332 Ex. 1002 ¶ 124. Dr. Durfee provides an annotation to Figure 13, shown below.



The figure reproduced above is Figure 13 from Chen's provisional application, which is sectional view of the connection system for the artificial tree (Ex. 1008, 6:21–22, 19:1–2), and includes annotations labeling the portions of Figure 13 corresponding to the vertically extending section ('332 Pet. 49; '332 Ex. 1002 ¶ 124).

Regarding Chen and the Non-Provisional Disclosure, Patent Owner disputes Petitioner's position pertaining to the recitation of "vertically extending section" of the "female end." PO Resp. 22–30. In particular, Patent Owner contends that Petitioner does not show sufficiently that Chen's Non-Provisional disclosure teaches a "contact channel device" that is

separate and is “disposed around the vertically extending section,” as recited in claim 21. *Id.* Relying on the testimony of Dr. Lebby, Patent Owner disputes that electrical contact 306 is an outermost surface of a post “given Chen’s lack of a discussion regarding such post.” PO Resp. 27 (citing *e.g.*, Ex. 2004 ¶¶ 121–124, 180–191).

Dr. Lebby testifies:

The contact set 302 does not include a “post” separating first electrical contact 306 and second electrical contact 308 with non-conductive material. Rather, the receptacle 310 of the contact set 302 shows that the contact set 302 includes a hollow structure with space separating the first electrical contact 306 and the second electrical contact 308. A POSA would have understood that air in the space separating the first electrical contact 306 and the second electrical contact 308 functions as an insulator between the two electrical contacts.

Ex. 2004 ¶ 123; *see also id.* ¶ 193 (“A POSA would have understood that the first electrical contact 306 and the second electrical contact 308 can be separated by space, and not a physical structure composed of a non-conductive material.”)

After consideration of Patent Owner’s contentions and Dr. Lebby’s testimony to the contrary, we are persuaded by Petitioner’s contentions and credit and give substantial weight to Dr. Durfee’s testimony (’332 Pet. 34–35; ’332 Ex. 1002 ¶ 96; Reply 26–29; Ex. 1026 ¶¶ 41–43) because we find that Petitioner’s contentions and Dr. Durfee’s testimony are consistent with Chen’s teachings. For instance, consistent with Petitioner’s contentions and Dr. Durfee’s testimony, we find that Chen at least suggests such a vertically extending section for example, by disclosing that “contact set 302 comprises a coaxial electrical connector” in which “first electrical contact 306 comprises *a portion of outside surface* of contact set 302” and “[s]econd

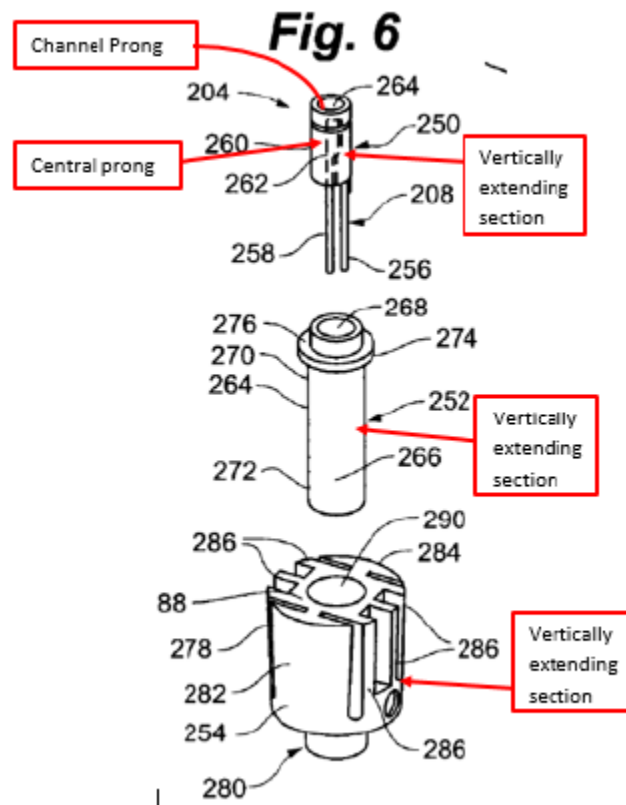
electrical contact 308 . . . may be located generally at a center, bottom portion of receptacle 310.” Ex. 1007, 12:23–29 (emphasis added), Figs. 9, 10. Dr. Lebby’s testimony indicates that he acknowledges that insulation in some form (e.g., air) is needed between first electrical contact 306 and second electrical contact 308. Ex. 2004 ¶¶ 123, 193. We find that Chen’s disclosure at least suggests that the contact is formed on only an “outside surface” of the cylindrical object depicted in Figure 9 and, further, need not comprise the entire structure, but may be only “a portion” of that object (Ex. 1007, 12:23–29, Figs. 9, 10), with the remainder being insulation as Dr. Lebby acknowledges is needed between contacts 306 and 308 (Ex. 2004 ¶¶ 123, 193). Furthermore, we find that Dr. Durfee’s testimony that one having ordinary skill in the art would have known and had reason to implement an insulator using insulating material is consistent with the evidence of record of the knowledge of the skilled artisan, including Dr. Durfee’s testimony (’332 Ex. 1002 ¶ 96; Ex. 1026 ¶¶ 41–43), as well as the teaching of such an insulator in Chen’s provisional application, incorporated by reference in Chen “[a]n inside surface of connector 448 may be insulated to avoid creating an electrical connection between connector 348 and connector 448.” Ex. 1008, 20:5–7, Fig. 13.

Patent Owner does not dispute Petitioner’s contentions regarding the teachings from the disclosure of Chen’s provisional application and, instead, relies on its contentions with respect to whether the disclosure from Chen’s provisional application can be used for Petitioner’s challenges. PO Resp. 13 n.4, 22–30. As discussed *supra* in Section II.C.2, we are not persuaded by those contentions. For the reasons given, we are persuaded by Petitioner’s

showing and credit and give substantial weight to Dr. Durfee's testimony regarding claim 21.

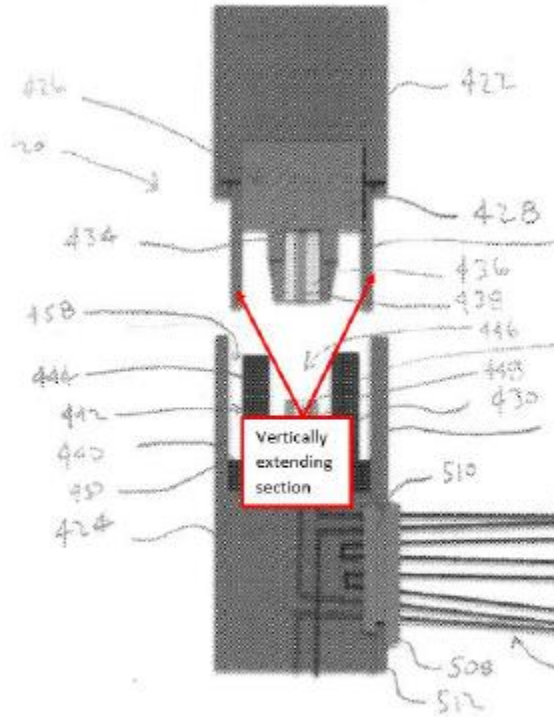
We next turn to the other independent claim, i.e., independent claim 28. Independent claim 28 is similar to claim 1 except that it recites "the male end having a vertically extending section." Petitioner's contentions and Dr. Durfee's testimony for claim 28 in IPR2017-00332 are substantially the same as those presented for claims 1 and 11 in IPR2017-00331, except that the '332 Petition includes further contentions regarding the vertically extending section, recited in claim 28. *Compare* '332 Pet. 28–39, 44–54; '332 Ex. 1002 ¶¶ 83–105, 118–130, *with* Pet. 29–37, 43–51; Ex. 1002 ¶¶ 83–101, 113–124; *see also* Reply 16–25 (responding to the Patent Owner response for the limitations common to all independent claims). Additionally, Patent Owner's contentions and Dr. Lebby's testimony for claim 28 in IPR2017-00332 are substantially the same as those presented for claims 1 and 11 in IPR2017-00331. *See generally* PO Resp.; Ex. 2004. Patent Owner does not dispute Petitioner's contentions as to claim 28, other than Patent Owner's dispute with respect to independent claims 1 and 11, discussed *supra* in Sections II.C.1 and II.C2.

With respect to the recitation in claim 28 of "the male end having a vertically extending section," Petitioner contends "a POSA looking at Fig. 6 would conclude that elements 250, 252, and 280 are vertically extending elements, each of which would contain, at least partially the channel prong and the central prong, upon assembly." '332 Pet. 31 (citing '332 Ex. 1002 ¶ 89; Ex. 1007, Fig. 6). Petitioner's annotations of Figure 6 are reproduced below.



The figure reproduced above is Figure 6 from Chen, which is an exploded view of trunk connector assembly 200 of the connection system for the artificial tree (Ex. 1007, 5:30–31, 10:58–63), and it includes annotations labeling the portions of Figure 6 corresponding to the vertically extending section ('332 Pet. 31; '332 Ex. 1002 ¶ 89). We find consistent with Petitioner's contentions and Dr. Durfee's testimony (*id.*) that elements 250, 252, and 280 are vertically extending sections and contact 262 corresponding to the "central prong" and contact 260 corresponding to the "channel prong" (*id.* at 29–31) are disposed within elements 250, 252, and 280. Patent Owner does not dispute Petitioner's contentions or Dr. Durfee's testimony in this regard.

Petitioner, additionally, points to projecting wall 454 illustrated in Figure 13 of Chen's provisional application.



The figure reproduced above is Figure 13 from Chen's provisional application, which is section view of the connection system for the artificial tree (Ex. 1008, 6:21–22, 19:1–2), and includes annotations labeling the portions of Figure 13 corresponding to the vertically extending section ('332 Pet. 47; '332 Ex. 1002 ¶ 121). We find that Figure 13 and the corresponding disclosure of Chen's provisional application are consistent with Petitioner's contentions and Dr. Durfee's testimony. Ex. 1008, 19–20, Fig. 13.

Patent Owner does not dispute Petitioner's contentions regarding the teachings from the disclosure of Chen's provisional application and, instead, relies on its contentions with respect to whether the disclosure from Chen's

provisional application can be used for Petitioner's challenges. PO Resp. 13 n.4, 22–30. As discussed *supra* in Section II.C.2, we are not persuaded by Patent Owner's contentions. For the reasons given, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding claim 28.

We now turn to the dependent claims, starting with dependent claims 7, 17, and 29. Claims 7, 17, and 29 depend from claim 6, 16, and 28, respectively. As discussed *supra* in Section II.D and immediately above, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding claims 6, 16, and 28.

Like independent claim 21, each of dependent claims 7, 17, and 29 further recites “a vertically extending section” of the female end, as well as additional recitations similar to those discussed with respect to claim 21. Ex. 1001, 16:39–43, 17:35–39, 18:65–67. The parties' contentions for the dependent claims are the same as those presented for independent claim 21 in all relevant respects. *See generally* Pet.; '332 Pet.; Reply. For the reasons given with respect to claim 21, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding dependent claims 7, 17, and 29.

We now turn to dependent claims 8, 18, 22, and 23. Each of claims 8, 18, and 22 recites the further limitation of “wherein the channel contact device of the female end is disposed on the surface of the vertically extending section of the female end.” Ex. 1001, 16:44–46, 17:40–42, 18:16–18. Claim 23 recites the further limitations of “wherein the vertically extending section of the female end is substantially cylindrical.” Ex. 1001, 18:16–21. Patent Owner does not dispute Petitioner's contentions as to

claims 8, 18, 22, and 23, other than Patent Owner's dispute with respect to the broader recitation discussed above with respect to independent claim 21. *See generally* PO Resp.

Similar to the reasons given with respect to independent claim 21, for dependent claims 8, 18, 22, and 23, we are persuaded by Petitioner's contentions and credit and give substantial weight to Dr. Durfee's testimony (Pet. 40, 53; Ex. 1002 ¶¶ 108, 129; '332 Pet. 34–35, 39; '332 Ex. 1002 ¶¶ 96, 107; Reply 26–29; Ex. 1026 ¶¶ 41–43) that Chen at least suggests such a vertically extending section for example, by teaching that “contact set 302 comprises a coaxial electrical connector” in which “first electrical contact 306 comprises *a portion of outside surface* of contact set 302” and “[s]econd electrical contact 308 . . . may be located generally at a center, bottom portion of receptacle 310.” Ex. 1007, 12:23–29 (emphasis added), Figs. 9, 10. As illustrated, for example, in Figure 9, first electrical contact 306 appears on the outside surface around a substantially cylindrical vertically extending section. *See, e.g.*, Ex. 1007, Fig. 9.

Additionally, for the aforementioned reasons, we are persuaded by Dr. Durfee's testimony that one having ordinary skill in the art would have known and had reason to implement such an insulator. For instance, we find Dr. Durfee's testimony consistent with the evidence of record, including the teaching of such an insulator in Chen's provisional application, incorporated by reference in Chen “[a]n inside surface of connector 448 may be insulated to avoid creating an electrical connection between connector 348 and connector 448” and, the teaching of forming such a contact around a cylindrical insulator. Ex. 1008, 19–20, Fig. 13. Also, although not necessary in light of our aforementioned determination, as a separate,

independent reason for unpatentability, we find that those disclosures in Chen's provisional application (*id.*), as well as the other disclosures in Chen's provisional application identified by Petitioner for the independent claims establish that Petitioner has shown sufficiently unpatentability of claims 8, 18, 22, and 23 in light of Chen's provisional application.

Accordingly, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding dependent claims 8, 18, 22, and 23.

We next turn to dependent claims 24, 25, and 30. Claim 24 depends from claim 21 and recites "the male end having a vertically extending section." Ex. 1001, 18:22–26. Claims 25 and 30 depend from claims 24 and 29, respectively, and further recite "wherein the vertically extending section of the male end is substantially cylindrical." Ex. 1001, 18:27–29, 19:3–6. For the same reasons given with respect to claim 28, we are persuaded that Chen's Figure 6 and corresponding disclosure teach elements 250, 252, and 280 that are vertically extending sections and contact 262 corresponding to the "central prong" and contact 260 corresponding to the "channel prong" are disposed within elements 250, 252, and 280. *See, e.g.*, Ex. 1007, Fig. 6. Additionally, we find that as shown in Figure 6, each of elements 250, 252, and 280 is substantially cylindrical. *Id.*

We also find that Chen's provisional application's disclosure of projecting wall 454 illustrated in Figure 13 is a vertically extending section. Ex. 1008, 6:21–22, 19–20, Fig. 13. Furthermore, as shown in annotated versions of Figure 13 and disclosed in related description discussed *supra* in Sections II.C.1 and II.C.2, as well as that reproduced immediately above in our discussion of claim 28, the male end has projecting wall 454 and that

wall is substantially cylindrical. Ex. 1008, 19–20, Fig. 13. Patent Owner does not dispute separately Petitioner’s contentions as to claims 24, 25, and 30. *See generally* PO Resp. For the reasons given, we are persuaded by Petitioner’s showing and credit and give substantial weight to Dr. Durfee’s testimony regarding claims 24, 25, and 30.

We turn to dependent claim 19, which depends from claim 11 and further recites “the male end having a vertically extending section, the vertically extending section having a central void, and wherein the central prong and the channel prong are disposed at least partially within the central void of the vertically extending section of the male end.” Ex. 1001, 17:43–47. As discussed *supra* in Sections II.C.1 and II.C.2, we are persuaded by and adopt as our own Petitioner’s contentions and credit and give substantial weight to the testimony of Dr. Durfee that Petitioner has shown by a preponderance of the evidence that independent claim 11 is obvious. Patent Owner does not dispute separately Petitioner’s contentions regarding the further recitations of claim 19 and, instead, relies on its contentions and evidence provided for independent claim 11. *See generally* PO Resp.

Regarding claim 19, Petitioner contends that elements 250, 252, and 280, shown in Figure 6, are vertically extending elements, each having a central void, i.e., voids 264, 268, and 290, respectively. Pet. 40–41; Ex. 1002 ¶ 109. We are persuaded by Petitioner’s contentions and credit the testimony of Dr. Durfee (*id.*) because they are consistent with the evidence cited therein, including Figure 6 reproduced with annotations highlighting elements 250, 252, and 280 in our discussion of claim 28. As can be seen from Figure 6 and its corresponding disclosure, each of elements 250, 252,

and 280 has a central void, i.e., voids 264, 268, and 290. *See, e.g.*, Ex. 1007, Fig. 6.

Petitioner contends that Chen's provisional application teaches vertically-extending section 454 that has a space, wherein the central prong 438 and channel prong 436 are both at least partially disposed. Pet. 54–55; Ex. 1002 ¶ 130. Figure 13 of Chen's provisional application with an annotation highlighting projecting wall 454 is reproduced above in our discussion of independent claim 28. We find that Figure 13 illustrates projecting wall 454 that is a 3D circular trunk section having central prong 438 and channel prong 436 at least partially disposed within. Ex. 1008, Fig. 13. For the reasons given, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding claim 19.

We finally turn to dependent claims 26 and 27. Each of claims 26 and 27 depends from claim 21 and further recites “wherein the channel contact device of the female end is at least partially cylindrical” and “wherein the channel contact device of the female end is disposed 360 degrees around the central void of the female end,” respectively. Ex. 1001, 18:29–34.

Petitioner contends these recitations are met because “the outside surface of 302 is cylindrical electrical contact 306, or the channel contact device.”

'332 Pet. 42; '332 Ex. 1002 ¶¶ 113–114. We find that channel contact device, i.e., electrical contact 306 is disposed 360 degrees around recess 310 and that Chen's teachings are consistent with Petitioner's contentions. *See, e.g.*, Ex. 1007, Figs. 9, 10, 16, 15:10–11 (“Contact 262 of contact set 250 is inserted into cavity 310 of contact set 302.”); 15:37–38. Regarding Chen's provisional application, Petitioner contends that channel contact device 448

is disposed 360 degrees around central void 452. We find that Chen's provisional application's teachings are consistent with Petitioner's contentions. Ex. 1008, 19:1–20:17 (“Outer connector 448 in one embodiment comprises a conductive cylinder forming a recess 452 for receiving electrical connector 348.”), Fig. 13. Patent Owner does not dispute separately Petitioner's contentions as to claims 26 and 27. *See generally* PO Resp. For the reasons given, we are persuaded by Petitioner's showing and credit and give substantial weight to Dr. Durfee's testimony regarding claims 26 and 27.

Accordingly, having reviewed the Petition and Patent Owner Response, and the evidence cited therein, we determine for the reasons given that Petitioner has demonstrated by a preponderance of the evidence that each of claims 7, 8, 17–19, and 21–30 is unpatentable as obvious over (1) Chen's Non-Provisional Disclosure alone or also in combination with Geisthoff; and (2) Chen's provisional application (the '751 Provisional's disclosure).

F. The Otto Grounds (Claims 1–30)

Petitioner challenges claims 1–8 and 11–19 as unpatentable over Otto in view of the knowledge of a person of ordinary skill in the art. Pet. 63–70. Petitioner challenges claims 21–30 as unpatentable over Otto and McLeish. '332 Pet. 59–68. In light of our other unpatentability determinations based on Chen, we take no position on whether these same claims are also anticipated by or obvious over Otto in view of the knowledge of a person of ordinary skill in the art or McLeish.

G. Petitioner's Motion to Seal

Petitioner filed a Motion to Seal Exhibit 1047. Mot. to Seal, 1–2. Petitioner contends that Patent Owner does not object to Petitioner's confidential designation. *Id.* Petitioner, more specifically, contends that Exhibit 1047 is an internal business record with customer and sale information and has been filed under seal to protect confidential business and sale information. *Id.* Consistent with Petitioner's contentions, Exhibit 1047 is an e-mail that includes sales information. *See generally* Ex. 1047.

We do not rely upon Exhibit 1047 in our decision. As such, the public would have little interest in Exhibit 1047. Accordingly Petitioner's Motion to Seal is *granted*.

III.CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that claims 1–30 of the '495 Patent are unpatentable, based on obviousness under 35 U.S.C. § 103(a) over Chen alone or also in combination with Geisthoff. In particular, for the reasons given, Petitioner has demonstrated by a preponderance of the evidence that claims 1–30 would have been obvious based on (1) Chen's Non-Provisional Disclosure alone or also in combination with Geisthoff; and (2) Chen's provisional application (the '751 Provisional's disclosure).¹⁶

¹⁶ These obviousness determinations also take into consideration the knowledge of one having ordinary skill in the art, as explained in our analyses.

IV. ORDER

In view of the foregoing, it is hereby:

ORDERED that claims 1–30 of the '495 Patent have been proven to be unpatentable;

FURTHER ORDERED that Petitioner's Motion to Seal Exhibit 1047 is granted; and

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2017-00331 and IPR2017-00332
Patent 9,119,495 B2

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