

NOTE: This disposition is nonprecedential.

**United States Court of Appeals  
for the Federal Circuit**

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**POLYGROUP LIMITED MCO,**  
*Appellant*

v.

**WILLIS ELECTRIC COMPANY, LTD.,**  
*Appellee*

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2021-1401, 2021-1402

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Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2016-00800, IPR2016-00801, IPR2016-01609, IPR2016-01610, IPR2016-01611, IPR2016-01612.

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OPINION ISSUED: January 19, 2022  
OPINION MODIFIED: April 20, 2022\*

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DOUGLAS SALYERS, Troutman Pepper Hamilton Sanders LLP, Atlanta, GA, argued for appellant. Also represented by PUJA PATEL LEA; ROBERT A. ANGLE, CHRISTOPHER FORSTNER, Richmond, VA.

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\* This opinion has been modified and reissued following a petition for rehearing filed by Appellee.

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PATRICK M. ARENZ, Robins Kaplan LLP, Minneapolis, MN, argued for appellee. Also represented by BRENDA L. JOLY, EMILY ELIZABETH NILES, RONALD JAMES SCHUTZ.

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Before DYK, HUGHES, and STOLL, *Circuit Judges*.

Opinion for the court filed by *Circuit Judge* HUGHES.

Opinion concurring-in-part and dissenting-in-part filed by  
*Circuit Judge* STOLL.

HUGHES, *Circuit Judge*.

This is a patent case involving lighted artificial trees. Polygroup Limited MCO appeals from the final written decision of the Patent Trial and Appeal Board in an inter partes review upholding the patentability of claims 7, 10, 11, 16, 18–22, 25, 26, and 28 of U.S. Patent No. 8,454,186 and claims 1–3, 5–9, 11, 12, 14, and 15 of U.S. Patent No. 8,454,187. With respect to every claim except claim 7 of the '186 patent, we reverse the Board's determination that Polygroup failed to establish the unpatentability of the challenged claims. We conclude that the Board applied erroneous claim constructions and that, under the proper constructions, Miller teaches every limitation of claims 10, 11, 16, 18–22, 25, 26, and 28 of the '186 patent and claims 1–3, 5–9, 11, 12, 14, and 15 of the '187 patent. Polygroup has, therefore, established that these claims are unpatentable.

For claim 7 of the '186 patent, the Board exceeded the scope of our remand when it considered a combination of Miller and Lessner. We therefore vacate and remand its decision with regard to claim 7 of the '186 patent.

I

A

Willis Electric Company, Ltd. owns the '186 and '187 patents, both of which are “directed to lighted artificial

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trees having separable, modular tree portions mechanically and electrically connectable between trunk portions.” ’186 patent 1:16–19; ’187 patent 1:15–18. The trunk portions house connector assemblies containing electrical wiring and electrical connectors that provide a source of electricity for light strings. ’186 patent 11:4–7, 11:57–67, 14:65–67. The connector assemblies “are securely positioned within their respective trunk sections” and designed to “permit the electrical connection of the connectors at any rotational orientation about a vertical axis,” thus simplifying tree assembly. *Id.* 15:1–6, 15:45–59.

The patents share much of the same specification and their independent claims follow a common pattern, disclosing components of a first tree portion, components of a second tree portion, and—pertinent to this appeal—how those tree portions connect to each other. Claim 10 of the ’186 patent is representative and is reproduced below.

10. A lighted artificial tree, comprising:

a first tree portion including a first trunk portion, a first plurality of branches joined to the first trunk portion, and a first light string, the first trunk portion having a first trunk body and a trunk connector, at least a portion of the trunk connector housed within the first trunk body and electrically connected to the first light string;

a second tree portion including a second trunk portion, a second plurality of branches joined to the second trunk portion, and a second light string, the second trunk portion having a first trunk body and a trunk connector, at least a portion of the trunk connector housed within the second trunk portion and electrically connected to the second light string; and

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wherein *the second tree portion is mechanically and electrically connectable to the first tree portion by coupling a lower end of the second trunk body to an upper end of the first trunk body along a common vertical axis at a rotational orientation of the first trunk portion relative the second trunk portion about the common vertical axis, thereby causing the trunk connector of the first trunk portion to make an electrical connection with the trunk connector of the second trunk portion within an interior of the lighted artificial tree, the electrical connection being made independent of the rotation orientation of the first trunk portion relative the second trunk portion about the common vertical axis.*

'186 patent 22:33–60 (emphasis added as by the Board at Appx21–22). Polygroup petitioned for and the Board instituted inter partes review of claims 1, 3, 4, 6–9, 11, 15–22, 25, 26, and 28 of the '186 patent and claims 1–15 of the '187 patent.

For every challenged claim, Polygroup relied on U.S. Patent No. 4,020,201 (Miller) as a primary reference for obviousness. Miller discloses an artificial tree “wherein the lighting system wiring is essentially housed and concealed within the trunk members” that are “removably sleeved together.” Miller 1:5–6, 1:30–32. Miller uses a traditional plug and socket electrical connector within its hollow trunk to form an electrical connection between light strings. Appx11, 15.

The Board initially found that Polygroup had failed to prove by a preponderance of the evidence that any of the challenged claims were unpatentable. On appeal, we affirmed the Board’s decision with respect to claim 15 of the '186 patent and claims 4, 10, and 13 of the '187 patent. *Polygroup Ltd. MCO v. Willis Elec. Co., Ltd.*, 759 F. App’x 934,

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936 (Fed. Cir. 2009) (*Polygroup I*). But we vacated the Board’s patentability determinations on the remaining claims because “the Board [had] applied erroneous claim constructions and [had] refused to consider Polygroup’s arguments that a single reference renders many of the claims obvious.” *Id.* We therefore instructed the Board to consider on remand “Polygroup’s arguments based on Miller . . . alone and whether those claims are unpatentable under a proper construction.” *Id.*

## B

On remand, the Board found that Polygroup had established by a preponderance of the evidence that claims 1, 3, 4, 6, 8, and 9 of the ’186 patent are unpatentable in view of Miller alone,<sup>1</sup> but had failed to establish the same for the remaining challenged claims—specifically, claims 7, 10, 11, 16–22, 25, 26, and 28 of the ’186 patent and claims 1–3, 5–9, 11, 12, 14, and 15 of the ’187 patent.

### 1

Willis contended, and the Board agreed, that Miller “requires the separate steps of making an electrical connection between the first and second trunk members and making a mechanical connection between the trunk members.”<sup>2</sup> Appx13–14, 23. Thus, the dispositive consideration, according to the Board, was whether the claims “require that the mechanical connection between the tree/trunk portions results in the electrical connections.” Appx21, 24.

The Board found that independent claim 1 of the ’186 patent had no such requirement, based on its reading of the following “wherein” clause:

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<sup>1</sup> The Board’s decision with respect to the patentability of claims 1, 3, 4, 6, 8, and 9 of the ’186 patent has not been challenged on appeal and is final.

<sup>2</sup> Polygroup does not dispute this.

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wherein the second tree portion is mechanically coupleable to the first tree portion about a central vertical axis, and the second tree portion is electrically connectable to the first tree portion such that a portion of the first trunk electrical connector of the first trunk portion contacts a portion of the second trunk electrical connector of the second trunk portion, thereby creating an electrical connection between the first wiring assembly and the second wiring assembly.

'186 patent 21:14–53. Under the Board's reading, "[c]laim 1 does not require structure that provides mechanical and electrical connection in a single step (e.g., when the mechanical connection is made, an electrical connection is also made)." Appx14 (internal quotation marks omitted). The Board acknowledged that this claim "requires that 'the second tree portion is mechanically coupleable to the first tree portion about a central vertical axis.'" Appx14. But it determined that "the claim permits that mechanical connection to be independent of the electrical connection." Appx14.

The Board concluded that Polygroup had established the unpatentability of claim 1 of the '186 patent in view of Miller alone. It further concluded that claims 3, 4, 6, 8, and 9—all of which depend from independent claim 1—of the '186 patent are obvious in view of Miller alone.

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The Board separately considered the patentability of claim 7 of the '186 patent. Polygroup had conceded that Miller alone does not teach every limitation of that claim and instead asserted that "one skilled in the art would have modified Miller's teachings based on those" in U.S. Patent No. 3,409,867 (Lessner). Appx19. The Board was not persuaded. According to the Board, combining Miller and Lessner "adds an additional connection point in Miller's plug and socket connectors, further complicating assembly,

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rather than providing ease and speed of assembly and disassembly.” Appx20. Because the Board found no motivation to combine, the Board concluded that Polygroup failed to establish the unpatentability of claim 7 of the ’186 patent.

## 3

The Board found that Polygroup had failed to establish that the remaining challenged claims are unpatentable. Although all of the independent claims—i.e., claims 1, 10, 20, and 28 of the ’186 patent and claims 1 and 7 of the ’187 patent—generally follow a common pattern, the Board determined that only independent claim 1 of the ’186 patent is obvious in view of Miller alone.

“Critically distinguishing” the remaining independent claims “from independent claim 1,” the Board said, “is that they require that the mechanical connection between the tree/trunk portions results in the electrical connections.” Appx21, 24. With little explanation, the Board relied upon the independent claims’ similarly-patterned “wherein” clauses as support for reading a “results in” limitation into each respective claim. Appx21–22, 24–25 (quoting the “wherein” clauses in claims 10, 20, and 28 of the ’186 patent and claims 1 and 7 of the ’187 patent).

The Board proceeded to decide that, because “the electrical connection in Miller is independent of the mechanical connection [between] tree portions,” Appx23, 25, Polygroup had failed to establish the unpatentability of claims 10, 20, and 28 of the ’186 patent and claims 1 and 7 of the ’187 patent based on Miller alone. Consequently, it also concluded that Polygroup had failed to establish the unpatentability of claims 11, 16–19, 21, 22, 25, and 26 of the ’186 patent—all of which depend from either independent claim 10 or 20—and dependent claims 2, 3, 5, 6, 8, 9, 11, 12, 14, and 15 of the ’187 patent—all of which depend from either independent claim 1 or 7.

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Polygroup now appeals. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

## II

We first address claim 7 of the '186 patent. The Board should not have considered whether that claim was obvious in view of Miller and Lessner because its consideration of Lessner was outside the scope of our mandate. “Unless remanded by [an appellate] court, all issues within the scope of the appealed judgment are deemed incorporated within the mandate and thus are precluded from further adjudication.” *Hayward Indus., Inc. v. Pentair Water Pool & Spa, Inc.*, 814 F. App'x 592, 597 (Fed. Cir. 2020) (alteration in original) (quoting *Engel Indus., Inc. v. Lockformer Co.*, 166 F.3d 1379, 1383 (Fed. Cir. 1999)). Our mandate in *Polygroup I* remanded to the Board the question of whether, under a proper construction, the challenged claims are unpatentable in view of Miller alone. *See* 759 F. App'x at 936, 944. The Board went beyond that question when it rendered its obviousness determination based on a lack of motivation to combine Miller and Lessner.

We therefore vacate and remand the Board's decision concluding that Polygroup failed to establish the unpatentability of claim 7 of the '186 patent in view of Miller and Lessner. We note that Polygroup admitted that Miller does not teach every limitation in the claim. *See* Oral Argument at 5:35–54, [https://oralarguments.cafc.uscourts.gov/default.aspx?fl=21-1401\\_10052021.mp3](https://oralarguments.cafc.uscourts.gov/default.aspx?fl=21-1401_10052021.mp3) (Oct. 5, 2021); Appx19. The Board may consider this statement on remand when it considers the unpatentability of claim 7 in view of Miller alone.

## III

Polygroup asserts that the Board erroneously construed the challenged independent claims to “require that the mechanical connection between the tree/trunk portions results in the electrical connections.” Appx21, 24. We agree.



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We review the Board’s ultimate claim construction de novo and any underlying factual determinations involving extrinsic evidence for substantial evidence. *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1280 (Fed. Cir. 2015). Because Polygroup filed its IPR petition before November 13, 2018, we apply the broadest reasonable interpretation standard. See *Ethicon LLC v. Intuitive Surgical, Inc.*, 847 F. App’x 901, 906 n.4 (Fed. Cir. 2021). Under this standard, claim terms are generally given their ordinary and customary meaning, as would be understood by a skilled artisan in the context of the entire disclosure. *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1061 (Fed. Cir. 2016).

Despite the similarities between the language in claims 1 and 10, the Board construed claim 10 to “require that the mechanical connection between the tree/trunk portions results in the electrical connections.” Appx21. Said differently, the claim “require[s] structure that provides mechanical and electrical connection in a single step (e.g., when the mechanical connection is made, an electrical connection is made).” Appx14 (internal quotation marks omitted). Under the broadest reasonable interpretation standard, we cannot agree.

While the term “coupling” is broad enough to mean mechanically connecting or electrically connecting or both,<sup>3</sup> neither the claim language nor the specification requires such “coupling” occur in a single step. Indeed, the specification discloses embodiments in which a series of mechanical connections are made when assembling the lighted artificial tree’s tree/trunk portions. See, e.g., ’186 patent 8:63–9:5 (“[S]uch mechanical and electrical connections are

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<sup>3</sup> See, e.g., *Couple*, *Merriam-Webster.com Dictionary*, <https://www.merriam-webster.com/dictionary/couple> (last visited Dec. 16, 2021) (“to join for combined effect”; “to fasten together”; “to bring (two electric circuits) into such close proximity as to permit mutual influence”).

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accomplished in part through a series of trunk connectors and wiring harnesses inserted into base 102 and trunk portions 120, 160, and 180.”); *id.* 15:13–18 (“These multiple points of mechanical contact between connector assemblies 200 and 212 combined with the secure fit of connection assemblies 200 and 212 to the trunk portions via plugs 254 creates a substantial mechanical coupling not only at the trunk walls, but also at the inside, center portions of base portion 102 and trunk portion 120.”); *id.* 16:50–53 (“Consequently, a secondary mechanical coupling between connector assembly 212 and connector assembly 244, and between trunk portions 160 and 180, is formed.”). And the specification also indicates that electrical connections can precede mechanical connections. *See id.* 16:14–17 (“[W]hen trunk portions 120 and 160 are joined, first trunk wiring harness 222, *already in electrical connection* with connector assembly 200, becomes electrically connected with second trunk wiring harness 230 via connector assembly 212.” (emphasis added)).

Thus, under the broadest reasonable interpretation, we construe claim 10 of the ’186 patent to permit the mechanical and electrical connections be made independently. For the same reasons that we reject the Board’s construction of claim 10, we also reject the Board’s identical constructions of claim 28 of the ’186 patent and claims 1 and 7 of the ’187 patent.

In addition, we conclude that claim 20 of the ’186 patent does not require a mechanical connection to result in an electrical connection. Claim 20 provides that the trunk portions can be connected mechanically and electrically “by aligning” the trunk portions “such that a portion of the first trunk wall is coupled to a portion of the second trunk wall to form a *first* mechanical connection” between the trunk portions, and a “portion of the first [trunk] connector is received by the second [trunk] connector, thereby forming a *second* mechanical connection between” the trunk portions “and forming an electrical connection between” the trunk

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wiring assemblies. *Id.* 23:52–24:3 (emphases added). This language makes clear that the mechanical and electrical connections need not occur in a single step. The “aligning” step forms the first mechanical connection, while the “receiving” step forms both the second mechanical connection between the trunk portions and the electrical connection between the trunk wiring assemblies.

We accordingly conclude that the Board applied erroneous claim constructions when it upheld the patentability of independent claims 10, 20, and 28 of the ’186 patent and independent claims 1 and 7 of the ’187 patent. Under the proper construction, we conclude that Miller teaches every limitation of these claims and, therefore, that Polygroup has established the unpatentability of each independent claim challenged on appeal. *See In re Hodges*, 882 F.3d 1107, 1115–16 (Fed. Cir. 2018) (overturning the Board’s claim construction and then finding claims unpatentable under the proper construction because that was the “only permissible factual finding”). As Willis admitted, the dependent claims all rise and fall with their corresponding independent claims. *See Oral Argument* at 25:08–30 (Oct. 5, 2021). Therefore, claims 11, 16, 18, 19, 21, 22, 25, and 26 of the ’186 patent, which depend from either independent claim 10 or 20, are unpatentable. As are claims 2, 3, 5, 6, 8, 9, 11, 12, 14, and 15 of the ’187 patent, which depend from either independent claim 1 or 7.

**REVERSED, VACATED, AND REMANDED**

**COSTS**

No costs.

NOTE: This disposition is nonprecedential.

**United States Court of Appeals  
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STOLL, *Circuit Judge*, concurring-in-part and dissenting-in-part.

I respectfully dissent-in-part. I agree with the Board's construction of claims 10, 20, and 28 of the '186 patent and claims 1 and 7 of the '187 patent, which, in my view, cover a different embodiment than claim 1 of the '186 patent. Thus, I would affirm the Board's patentability determinations. As to claim 7 of the '186 patent, however, I agree with the majority's analysis and therefore concur with the vacatur and remand of the Board's decision as to that claim.

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The shared patent specification discloses two distinct embodiments relevant to this claim construction dispute: (1) an embodiment in which the mechanical coupling and electrical connection are made separately and independently, and (2) an embodiment in which the mechanical coupling simultaneously creates an electrical connection. In my view, Polygroup’s construction, which the majority accepts, is erroneous because it fails to account for the claim language requiring a simultaneous connection.

Claim 1 of the ’187 patent provides a particularly strong example:

A lighted artificial tree, comprising: . . . a first tree portion . . . [and] a second tree portion . . .

and the second tree portion is electrically connectable to the first tree portion such that a portion of the first trunk electrical connector of the first trunk portion contacts a portion of the second trunk electrical connector of the second trunk portion *when the first tree portion and the second tree portion are mechanically coupled*, . . .

’187 patent col. 21 ll. 9–64 (emphasis added). Claim 1 of the ’187 patent clearly requires an electrical connection “when [the tree portions] are mechanically coupled.” *Id.* at col. 21 ll. 41–42. In other words, the plain claim language dictates that when the mechanical connection is made, an electrical connection is also made. In contrast with claim 1 of the ’186 patent, which recites a mechanical connection that is independent of the electrical connection, claim 1 of the ’187 patent requires the mechanical and electrical connection to occur in a single step—the same step. Accordingly, claim 1 of the ’187 patent requires structure that provides mechanical and electrical connection in a single step, whereas claim 1 of the ’186 patent does not require such structural elements.

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Similarly, claim 7 of the '187 patent, and claims 10, 20, and 28 of the '186 patent also require the mechanical coupling to “caus[e],” “make,” or “form” the electrical connection. *See* '186 patent col. 24 ll. 51–63 (“the second trunk portion is mechanically and electrically connectable to the first trunk portion . . . thereby causing the trunk connector of the first trunk portion to make an electrical connection with the trunk connector of the second trunk portion . . .”); *see* '187 patent col. 15 ll. 48–52 (“A user simply aligns the trunk portion with the base portion or other trunk portion along a vertical axis and brings the trunk portion downward to couple with the stationary base or trunk portion, thus mechanically coupling and electrically connecting the tree portions.”). As such, in my view, the plain language of those claims also requires simultaneous electrical and mechanical connection.

For these reasons, I respectfully dissent-in-part. I would affirm the Board’s determination that Polygroup failed to prove that claims 10, 11, 16, 18–22, 25, 26, and 28 of the '186 patent and claims 1–3, 5–9, 11, 12, 14, and 15 of the '187 patent are unpatentable over the prior art of record.

**United States Court of Appeals  
for the Federal Circuit**

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**POLYGROUP LIMITED MCO,**  
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**JUDGMENT**

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THIS CAUSE having been considered, it is

ORDERED AND ADJUDGED:

**REVERSED, VACATED, AND REMANDED**

FOR THE COURT

April 20, 2022  
Date

/s/ Peter R. Marksteiner  
Peter R. Marksteiner  
Clerk of Court