

NOTE: This disposition is nonprecedential.

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

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**POLYGROUP LIMITED MCO,**  
*Plaintiff-Appellant*

v.

**WILLIS ELECTRIC COMPANY, LTD,**  
*Defendant-Appellee*

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2018-1745, 2018-1746, 2018-1747

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Appeals from the United States Patent and Trade-  
mark Office, Patent Trial and Appeal Board in Nos.  
IPR2016-00800, IPR2016-00801, IPR2016-01609,  
IPR2016-01610, IPR2016-01611, IPR2016-01612,  
IPR2016-01613.

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Decided: January 28, 2019

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

HUGHES, *Circuit Judge*.

This is a patent case involving lighted artificial trees. Polygroup Ltd. MCO petitioned for inter partes review of U.S. Patents Nos. 8,454,186, 8,454,187, and 9,044,056. The Patent Trial and Appeal Board instituted review of all the challenged claims of the patents. The Board determined that Polygroup had not established the unpatentability of any of the challenged claims. The Board also granted Willis Electric Co.'s Motion to Amend the '056 patent. Polygroup now appeals both the Board's decisions on patentability and Willis's Motion to Amend. Because the Board's finding that Polygroup failed to establish a motivation to combine prior art references is supported by substantial evidence, we affirm the Board's determination that claim 15 of the '186 patent; claims 4, 10, and 13 of the '187 patent; and claims 2, 4, and 5 of the '056 patent were not shown to be unpatentable. However, we conclude that the Board applied erroneous claim constructions and refused to consider Polygroup's arguments that a single reference renders many of the claims obvious. Therefore, we vacate the Board's patentability determinations as to the remaining challenged claims of the '186, '187, and '056 patents. On remand, the Board should consider Polygroup's arguments based on Miller alone and whether those claims are unpatentable under a proper construction. We affirm the Board's grant of Willis's Motion to Amend the '056 patent.

## I

### A.

Willis Electric Co., Ltd. owns the '186, '187, and '056 patents, all of which are directed to a lighted artificial tree. The trees are comprised of "separable modular tree portions mechanically and electrically connectable be-

tween trunk portions.” ’186 patent col. 1 ll. 15–18. The hollow trunk portions contain electrical wiring and electrical connectors that provide a source of electricity for light strings draped over the branches. The connectors are designed so that mechanically connecting trunk portions during assembly also creates an electrical connection between the trunk portions. The connectors form this electrical connection regardless of the rotational alignment of the trunk portions. These features simplify tree assembly by removing the need to “rotate or reposition a particular tree portion after lifting it up and before placing it onto a base portion.” ’186 patent col. 15 ll. 51–53.

The ’186, ’187, and ’056 patents share much of the same specification, and their independent claims follow a common pattern. Claim 1 of the ’186 patent is representative and is reproduced below.

1. 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 defining a first trunk interior and having a first trunk electrical connector and a first trunk wiring assembly, the first trunk wiring assembly electrically connectable to the first light string and the first trunk electrical connector, and wherein at least a portion of the first trunk wiring assembly is located within the first trunk interior;

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 defining a second trunk interior and having a second trunk electrical connector and a second trunk wiring assembly, the second trunk wiring assembly electrically connectable to the second lighting string and the

second trunk electrical connector, and wherein at least a portion of the second wiring assembly is located within the second trunk interior; and

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;

wherein an end of the second trunk portion is configured to couple with an end of the first trunk portion in at least four different rotational alignments of the first trunk portion relative the second trunk portion about the central vertical axis, and the electrical connection between the first and second *tree portions* are made independent of the rotational alignments of the first trunk portion relative the second trunk portion about the central vertical axis when the lower end of the second trunk portion is coupled to the upper end of the first trunk portion.

'186 patent col. 21 ll. 15–53 (emphasis added).

Except for claim 28 of the '186 patent, every challenged claim requires at least one “tree portion” comprised of various parts, such as a trunk portion, branches, and light strings. The specifications describe the tree portions as “modular” and explain that the trees provide “simplified structures . . . for mechanically coupling tree portions along the trunk without the burden of multiple steps such as rotational alignment or affixing external fasteners.” '186 patent col. 1 l. 17, col. 14 ll. 21–24. Claim 28 of the '186 patent does not claim a tree portion. In-

stead, its preamble recites a “modular lighted artificial tree” comprised of multiple trunk portions. ’186 patent col. 24 l. 26.

## B.

Polygroup Ltd. filed eight petitions for IPR of the ’186, ’187, and ’056 patents, asserting obviousness based on several different combinations of prior art references. For each patent, the Board consolidated the petitions into a single IPR proceeding and instituted review on all challenged claims on all challenged grounds.

For every challenged claim of the ’186 and ’187 patents as well as claims 2 and 4 of the ’056 patent, Polygroup relies on U.S. Patent No. 4,020,201 (Miller) as a primary reference in combination with German Patent No. DE8466328 (Otto) and French Patent No. FR 1,215,214 (Jumo). Miller discloses an artificial tree with hollow trunk members that house electrical wiring for a light system. The Miller tree is assembled by “removably sleev[ing] together” its trunk members and “removably sleev[ing]” branches into apertures on the trunk members. J.A. 842–43. Miller uses a traditional plug and socket electrical connector within its hollow trunk to form an electrical connection between light strings.

Otto discloses an artificial tree with coaxial connectors between its trunk sections that create simultaneous electrical and mechanical connections. Polygroup uses Otto “only to show the *availability* of trunk connectors that provide simultaneous electrical and mechanical connections at a multitude of rotational positions.” J.A. 332 (emphasis added). Polygroup argues that based on Otto, a person of ordinary skill in the art would have been motivated to enhance Miller with the electrical connector taught by Jumo. Jumo discloses coaxial electrical connectors for use in electrical devices with multiple tubular elements, such as a lamp. Jumo’s connectors create a simultaneous mechanical and electrical connection when

fitted together, and they may be connected in multiple rotational positions.

For claims 11, 13, and 16–19 of the '056 patent, Polygroup relies on a combination of Miller and either U.S. Patent No. 1,974,472 (Seghers) or U.S. Patent No. 8,053,042 (Loomis).

For claim 5 of the '056 patent, Polygroup relies on U.S. Patent Application Publication No. 2007/0230174 A1 (Hicks) as a primary reference in combination with Otto and U.S. Patent No. 7,066,739 B2 (McLeish). Hicks discloses an artificial tree with hollow trunk members that house the light wiring system. Hicks teaches removable branches, each having its own electrical connector. Electricity is provided to the light strings on each branch individually, so that a branch can be removed and replaced without affecting lights on other branches. McLeish discloses a coaxial electrical connector with male and female parts having magnetic portions designed to attract one another and form a simultaneous mechanical and electrical connection.

Following institution, Willis sought to amend the '056 patent by substituting claim 21 for claim 1. Proposed claim 21 adds the limitation of a third electrical terminal and requires that the “second and third electrical terminals are configured to provide power to the first light string *separate* from power provided to a second light string.” J.A. 196 (emphasis added).

### C.

The Board issued a consolidated decision for the IPRs involving the '186 and '187 patents and a separate decision for the IPR involving the '056 patent. In both decisions, a majority of the Board found that Polygroup failed

to prove by a preponderance of the evidence that any of the challenged claims are unpatentable.<sup>1</sup>

The Board first addressed the construction of “tree portion” and “modular lighted artificial tree.” It construed “tree portion” to mean “a mechanically and electrically connectable modular and unitary portion of an artificial tree.” J.A. 12; *see also* J.A. 174. Because the branches in both Miller and Hicks are detachable from the trunk sections, the Board found that neither reference discloses the “trunk-branch-light unit” required under its construction. J.A. 33; *see also* J.A. 186–87.

Turning to “modular lighted artificial tree,” the Board found the preamble of claim 28 of the ’186 patent to be limiting. It then construed “modular lighted artificial tree” to mean “a tree constructed of modular portions, each modular portion being a separate tree section.” J.A. 22. The Board clarified that its construction “means that the modules in [claim 28] are the various trunk portions and their associated structures, . . . similar to the tree portions of claims 1, 10, and 20 [of the ’186 patent].” J.A. 24. The Board thus found that just as Miller does not disclose a “tree portion,” Miller also does not disclose a “modular lighted artificial tree.” Because Polygroup relied on either Miller or Hicks to teach a “tree portion” and a “modular lighted artificial tree” for each of its asserted grounds of obviousness, the Board determined that Polygroup failed to prove that any of the challenged claims are obvious.

As an alternate basis for its patentability determinations for all claims of the ’186 and ’187 patents as well as

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<sup>1</sup> A single member of the Board dissented in both decisions and would have found all challenged claims unpatentable as obvious under 35 U.S.C. § 103.

claims 2 and 4 of the '056 patent, the Board found that Polygroup failed to establish that a skilled artisan would have been motivated to combine Miller with Otto and Jumo because Jumo is not analogous prior art.<sup>2</sup> Similarly, as an alternate basis for claim 5 of the '056 patent, the Board found that Polygroup failed to establish a motivation to combine Hicks with Otto and McLeish because Polygroup did “not give sufficient technical reasoning or evidence that a person of ordinary skill in the art would consider modifying Hicks’s connector *with McLeish’s*.” J.A. 188 (emphasis in original).

The Board also granted Willis’s Motion to Amend the '056 patent. The Board rejected Polygroup’s assertion that proposed claim 21 would have been obvious in view of Hicks, Otto, and U.S. Patent No. 5,049,403 (Falossi) because “Hicks does not disclose . . . separate power provided to the first and second light strings” as required by claim 21. J.A. 203.

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

## II

We first consider the Board’s claim constructions of “tree portion” and “modular lighted artificial tree.” We review the Board’s ultimate claim construction de novo and any underlying factual determinations involving

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<sup>2</sup> The Board also found that secondary considerations of commercial success, industry praise, and licensing demonstrate the non-obviousness of the '186 patent. Because we remand the Board’s patentability determinations of the '186 patent except for claim 15, we do not reach the merits of parties’ arguments with respect to secondary considerations. On remand, the Board may also consider secondary considerations for the remanded claims of the '187 patent.



extrinsic evidence for substantial evidence. *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1280 (Fed. Cir. 2015). During IPR of an unexpired patent, the Board gives the claims their broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b). 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. See *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

For the reasons below, we find that the Board erred in its construction of both “tree portion” and “modular lighted artificial tree.” Because the Board’s decisions with respect to claims 11, 13, and 16–19 of the ’056 patent rely solely on its erroneous construction of “tree portion,” we vacate the Board’s decision with respect to those claims and remand for the Board to consider the patentability of those claims under a proper construction.

#### A.

The Board construed “tree portion” to mean “a mechanically and electrically connectable modular and unitary portion of an artificial tree.” J.A. 12. It emphasized that “tree portion” requires “that the subcomponents are structured, arranged, and connectable in a way that they are interfaced with as a unit.” J.A. 21. The Board noted that the specification “explains that the module of its modular tree is called a ‘tree portion,’ and that the tree is made by connecting the various tree portion modules to assemble the tree.” J.A. 15. The Board also highlighted a disclosed embodiment where branches are non-detachably connected to the trunk by “branch support rings,” which it found “provides modularity by making it easy for the user to interact with the tree portion as a modular unit.” J.A. 16–17.

Applying its construction to Miller and Hicks, the Board found that neither reference teaches a “tree por-

tion” because they disclose branches and lights that are separate and removable from the trunk sections. Accordingly, the Board found that both Miller and Hicks fail to disclose the “trunk-light-branch” unit required under the Board’s construction. J.A. 33, 186–87. Thus, although it is not clear from the plain language of its construction, the Board’s analysis makes clear that the Board understood “unitary” to require non-detachable branches. Polygroup argues this was error. We agree.

Although the specification supports the Board’s finding that “tree portion” requires some level of modularity, *see* ’186 patent col. 1 ll. 15–17 (describing the present invention as an artificial tree having “separable, modular tree portions”), it does not support reading “tree portion” to require a “unitary” structure with branches that are non-detachably affixed to the trunk. While the patents disclose an embodiment with branches non-detachably connected to the trunk via “branch support rings,” *id.* at col. 6 ll. 53–55, col. 7 ll. 1–8, we have warned against confining claims to the specific embodiments recited in the specification. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005). We find nothing in the specification of any of the challenged patents that supports limiting “tree portion” to an embodiment with non-detachable branches. Therefore, the Board erred by construing “tree portion” to require a “unitary” structure, i.e. one with non-detachable branches.

Both Miller and Hicks disclose artificial trees with branches attached to hollow trunk members. Neither reference requires the trunk members to be connected before adding the branches. Thus, in either reference, the branches and lights can first be attached to the trunk members, resulting in a modular trunk-light-branch structure. That the branches are removable from the trunk members is of no moment under a proper construction of “tree portion.”

## B.

The Board found the preamble of claim 28 of the '186 patent to be limiting, and it construed the term “modular lighted artificial tree” to mean “a tree constructed of modular portions, each modular portion being a separate tree section.” J.A. 22. Under this construction, the Board found that “modular lighted artificial tree” incorporates the structural requirements of “tree portion.” This was error.

We find no support in the specification of the '186 patent for reading “tree portion” into claim 28 based on the “modular lighted artificial tree” language in the preamble. While the '186 patent's specification describes “tree portion” as “modular” in the Field of Invention, *see* '186 patent col. 1 l. 17, it also describes other aspects of the tree as “modular” throughout the specification, such as the connector assembly and light system, *see e.g. id.* at col. 17 l. 25 (noting the “modularity and detachability of connector assembly 200”); *see also id.* at col. 18 ll. 33, 46, 50 (discussing the “modularity” of the lighting system). Thus, the '186 specification describes a tree that is “modular” in several respects, only one of which relates to “tree portion.” We, therefore, disagree with the Board that “reciting that the tree is ‘modular’ means that the tree has the multiple tree portion construction described in the specification.” J.A. 23. Instead, we find Polygroup's proposed construction, “an artificial tree with elements capable of being easily joined or arranged with other parts or units,” J.A. 22, to represent the broadest reasonable interpretation of “modular lighted artificial tree” in view of the '186 patent's specification.

## III

Next, we consider the Board's findings that Polygroup failed to establish that a person of ordinary skill would have been motivated to combine Miller with Otto and Jumo or Hicks with Otto and McLeish. A party asserting

that a claimed invention is obvious “must demonstrate . . . that a skilled artisan would have had reason to combine the teaching of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success from doing so.” *PAR Pharm., Inc. v. TWI Pharm, Inc.*, 773 F.3d 1186, 1193 (Fed. Cir. 2014) (internal quotation marks omitted). Whether a skilled artisan would have been motivated to combine the prior art is a factual question, which we review for substantial evidence. *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1343 (Fed. Cir. 2017); *see also In re Giannelli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014). Whether a reference in the prior art is analogous is also a question of fact reviewed for substantial evidence. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1237 (Fed. Cir. 2015). Substantial evidence requires that “a reasonable mind might accept the evidence to support the finding.” *In re Giannelli*, 739 F.3d at 1379.

Our analysis here applies to the Board’s patentability findings for all challenged claims of the ’186 and ’187 patents as well as claims 2, 4, and 5 of the ’056 patent. For the reasons set forth below, we find that substantial evidence supports the Board’s determinations that Polygroup failed to establish a motivation to combine either set of references. We also find, however, that the Board erred in failing to consider whether Miller alone renders many of the challenged claims of the ’186 and ’187 patents obvious.

#### A.

For every challenged claim of the ’186 and ’187 patents, as well as claims 2 and 4 of the ’056 patent, Polygroup argued that a person of ordinary skill would have been motivated by Otto’s teaching of the use and availability of coaxial connectors in artificial trees to modify the Miller tree with the connector taught by Jumo. The

Board rejected Polygroup's proposed motivation because it found that Jumo is not analogous prior art.

"Prior art is analogous where either (1) 'the art is from the same field of endeavor, regardless of the problem addressed' or (2) even if the reference is not within the same field of endeavor, 'the reference still is reasonably pertinent to the particular problem with which the inventor is involved.'" *In re Ethicon, Inc.*, 844 F.3d 1344, 1349 (Fed. Cir. 2017) (quoting *In re Clay*, 966 F.2d 656, 658–59 (Fed. Cir. 1992)). The Board determined that the relevant field of endeavor here is "artificial trees with decorative lighting." J.A. 37. The Board found that Jumo, which is directed to a "latching side-by-side support arm for electrical device," is not within this field of endeavor because it is unrelated to *decorative* lighting or artificial trees. *Id.* Next, the Board found the problem faced by the inventor was "convenient assembly and disassembly . . . as it relates to artificial trees." *Id.* The Board concluded that Jumo is concerned with durability rather than convenient assembly. J.A. 40. Thus, "even under [Polygroup's] own proposed definition of the problem," "assembly, disassembly, and electrically connecting sections of an artificially lit object," Jumo is not reasonably pertinent to the problem faced by the inventor. J.A. 37–40.

Polygroup argues that none of the Board's findings above are supported by substantial evidence. We disagree. Although the challenged patents cover electrical connections between tubular portions of a device, those connections are all within the context of an artificial tree. The Board thus did not err in defining the field of endeavor as "artificial trees with decorative lighting." J.A. 37. Similarly, the Board did not err in defining the problem with which the inventor was faced as "assembly and disassembly . . . as it relates to artificial trees." *Id.* We agree with the Board that Jumo does not relate to artificial trees or decorative lighting, and Polygroup points to nothing in Jumo addressing the problem of convenient

assembly or disassembly. Substantial evidence supports the Board’s finding that Jumo is not analogous art. Because “[g]enerally, a skilled artisan would only have been motivated to combine analogous art,” *In re Ethicon, Inc.*, 844 F.3d at 1349, we also find that substantial evidence supports the Board’s determination that Polygroup failed to establish a motivation to combine Miller with Otto and Jumo.

Polygroup also claims the Board erred in concluding that its petition “does not rely on Otto for the structure of the [] connections” and in considering only whether a skilled artisan would enhance Miller with the connector from Jumo. J.A. 28. We find no such error. Polygroup’s petition uses Otto “only to show the availability of trunk connectors that provide simultaneous electrical and mechanical connections” in support of its claim that a skilled artisan “would have been motivated to enhance *Miller’s* artificial tree with a similar concept via the multi-position *Jumo* connectors.” J.A. 332.

#### B.

Polygroup argues that even if there is no motivation to combine Miller with Otto and Jumo, Miller alone renders many of the challenged claims obvious. The Board declined to consider Miller alone, however, because it found that Polygroup “set forth an obviousness ground containing and requiring [] three references.” J.A. 41 n. 31. We disagree.

Polygroup’s petitions explicitly argued that Miller alone teaches every element of the challenged claims of the ’186 and ’187 patents in its limitation-by-limitation analysis except for claim 15 of the ’186 patent and claims 4, 10, and 13 of the ’187 patent. *See* J.A. 360–384, 2546–67, 2570–76 (’186 patent); *Polygroup Ltd. v. Willis Elec. Co.*, IPR2016-01609, Paper 2 at 34–73 (P.T.A.B. Sept. 2, 2016) (same); *see also Polygroup Ltd. v. Willis Elec. Co.*, IPR2016-01612, Paper 2 at 37–72 (P.T.A.B. Aug. 26, 2016)

(’187 patent); *Id.*, Paper 28 at 27–51 (P.T.A.B. Apr. 18, 2016) (same); *Id.*, Paper 34 at 36–69 (P.T.A.B. Aug. 26, 2016) (same). The Board erred when it refused to consider these arguments. See *Realtime Data, LLC v. Iancu*, No. 2018-1154, 2019 WL 149835, \*4 (Fed. Cir. Jan. 10, 2019) (affirming the Board’s obviousness finding based on a single reference where the petitioner’s primary argument was that all of the elements were disclosed in a single reference, and the petitioner also argued, in the alternative, that some of the elements were disclosed by a second reference).<sup>3</sup> Therefore, we vacate the Board’s obviousness determinations of all challenged claims of the ’186 and ’187 patents except claim 15 of the ’186 patent and claims 4, 10, and 13 of the ’187 patent.<sup>4</sup> On remand, the Board should consider whether Miller alone renders those claims obvious.

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<sup>3</sup> Although the Board instituted review on the ground of “Miller in view of Otto and Jumo,” J.A. 41 n. 31, we do not read the Board’s institution decision as a partial institution. Instead, we merely recognize as we did in *Realtime Data*, that when a petition sets forth a ground with multiple references, but the petitioner’s primary arguments rely on a single reference, the Board should consider those arguments irrespective of a motivation to combine references. Therefore, this case does not raise any issue under *SAS Institute Inc. v. Iancu*, 138 S.Ct. 1348 (2018), or our cases interpreting it.

<sup>4</sup> Claim 15 of the ’186 patent and claims 4, 10, and 13 of the ’187 patent each require a “coaxial” connector. See ’186 patent col. 23 l. 9; ’187 patent col. 22 ll. 7–12, col. 23 ll. 2–7, 16. Because Polygroup does not rely on Miller to teach a “coaxial” connector, the Board did not err in failing to consider Miller alone for these claims.

## C.

For claim 5 of the '056 patent, Polygroup argued that a person of ordinary skill would have been motivated by Otto to enhance Hicks with the connector taught by McLeish. The Board rejected Polygroup's proposed motivation because Polygroup gave insufficient technical reasoning or evidence that a skilled artisan "would consider modifying Hicks's connector *with McLeish's*." J.A. 188. The Board found no evidence that McLeish's connector is substitutable for use in artificial trees. Instead, it found that "McLeish functions to connect loose, movable structures, or structures that are otherwise out of reach." J.A. 189.

We agree with the Board that Polygroup fails to point to any persuasive evidence that a skilled artisan would consider McLeish suitable for use in artificial trees. Accordingly, we find that substantial evidence supports the Board's conclusion that Polygroup failed to establish a motivation to enhance the Hicks tree with the connector from McLeish.

## IV

Finally, we consider the Board's grant of Willis's Motion to Amend the '056 patent by substituting claim 1 with proposed claim 21. Polygroup argues the Board erred because the combination of Hicks with Otto and Falossi renders proposed claim 21 obvious. The Board found that the proposed claim would not have been obvious in view of those references because "Hicks does not disclose . . . separate power provided to the first and second light strings" as required by claim 21. J.A. 203. We find no reversible error in this conclusion.

Proposed claim 21 requires the second and third electric terminals to be "configured to provide power to the first light string *separate* from power provided to a second light string." J.A. 196 (emphasis added). Alt-



though Hicks discloses separate power cords in its upper and lower sections, the Board found that “all light strings in Hicks would reside on the same power connection” because they all flow through the same three prong adapter. J.A. 202–03. Thus, Hicks does not provide separate power in the manner required by claim 21.

Polygroup argues that Hicks’s “second power cord 48 only provides power to the bottom portion, [so] it does not connect via the three-prong plug 44.” Appellant’s Reply Br. at 31. Figure 2 of Hicks, however, appears to depict power cord 48 connecting to the three-prong adapter 44. *See* J.A. 942. Given this disclosure, we find that the Board’s conclusion that Hicks does not teach separate power in the manner of claim 21 is supported by substantial evidence. Accordingly, the Board did not err in granting Willis’s Motion to Amend.

## V

We affirm the Board’s determination that Polygroup failed to establish the unpatentability of claim 15 of the ’186 patent, claims 4, 10, and 13 of the ’187 patent, and claims 2, 4, and 5 of the ’056 patent because Polygroup failed to establish a motivation to combine the asserted prior art references. We vacate the Board’s obviousness determinations of all remaining challenged claims of the ’186 and ’187 patents because the Board failed to consider whether those claims are unpatentable in view of Miller alone. We also vacate the Board’s patentability determinations of claims 11, 13, and 16–19 of the ’056 patent because they rely solely on the Board’s erroneous claim construction of “tree portion.” On remand, the Board should consider whether the claims are unpatentable in light of our opinion. We affirm the Board’s grant of Willis’s Motion to Amend the ’056 patent.

**AFFIRMED-IN-PART, VACATED-IN-PART, AND  
REMANDED**

COSTS

No costs.