

NOTE: This disposition is nonprecedential.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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2018-1748, 2018-1749, 2018-1750

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Appeals from the United States Patent and Trade-  
mark Office, Patent Trial and Appeal Board in Case Nos.  
IPR2016-01615, IPR2016-01616, and IPR2016-01617.

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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. Patent No. 8,936,379. The Patent Trial and Appeal Board instituted review of all challenged claims. The Board determined that Polygroup had not established the unpatentability of any of the challenged claims. Polygroup now appeals. Because the Board did not err in finding that Korengold does not teach an “interference fit” under the broadest reasonable interpretation of that term, we affirm the Board’s determination that claims 12, 15, and 32 were not shown to be unpatentable. But, we find that the Board erred in construing “modular artificial tree” and erred in finding that Polygroup failed to establish a motivation to combine the asserted prior art. As a result, we vacate the Board’s determination that claims 1–6, 8, 10–11, 13–14, 16–17, and 28–29 were not shown to be unpatentable. On remand, the Board should consider whether those claims are unpatentable under a proper construction.

## I

### A.

Willis Electric Co., Ltd. owns the ’379 patent, which is directed to a lighted artificial tree. The tree is comprised of “separable, modular tree portions mechanically and electrically connectable between trunk portions.” ’379 patent col. 1 ll. 13–15. 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 an electrical connection regardless of the rotational alignment of the trunk portions. These features simplify tree assembly by removing the need for “significant manipulation and handling of the

tree sections to securely align and couple the sections together.” ’379 patent col. 2 ll. 26–28.

The ’379 patent relates to the patents at issue in our companion case, *Polygroup Ltd. v. Willis Elec. Co.*, No. 18-1745, slip op. (Fed. Cir. Jan. 28, 2019), but the ’379 patent focuses more specifically on the structure and positioning of the mechanical-electrical connectors within the trunk sections. Independent claims 1 and 5 are representative of the challenged claims and are reproduced below.

1. A *modular artificial tree*, comprising:

a first trunk portion having a first elongated trunk body defining a first cavity for receiving a first wiring harness including a first electrical wire and a second electrical wire;

a second trunk portion having a second elongated trunk body defining a second cavity for receiving a second wiring harness including a first electrical wire and a second electrical wire;

a first trunk connector insertable into the first trunk body along a central vertical axis, and securable to the first trunk body in at least four rotational alignment positions about the central vertical axis, including at a final insertion position, the first trunk connector being entirely located within the first cavity at the final insertion position[;]

a first electrical contact set including a first electrical contact and a second electrical contact engaged with the first trunk connector and electrically connected to the first electrical wire and the second electrical wire of the first wiring harness, respectively;

a second trunk connector insertable into the second trunk body along the central vertical axis, and

securable to the second trunk body in at least four rotational alignment positions about the central vertical axis, including at a final insertion position;

a second electrical contact set including a first electrical contact and a second electrical contact engaged with the second trunk connector and electrically connected to the first electrical wire and the second electrical wire of the second wiring harness, respectively; and

wherein connecting the first and second trunk portions causes the first electrical contact set to be electrically connected to the second electrical contact set.

'379 patent col. 23 l. 63–col. 24 l. 30 (emphasis added).

5. A lighted *modular artificial tree*, comprising:

a first tree section including a first elongated trunk defining a vertical axis, a plurality of branches coupled to the first trunk, and a first plurality of lights, the first elongated trunk enclosing a first wiring harness configured to supply power to the first plurality of lights;

a second tree section including a second elongated trunk, a plurality of branches coupled to the second trunk, and a second plurality of lights, the second elongated trunk housing a second wiring harness;

a connector assembly configured to connect the first tree section to the second tree section along the vertical axis, the connector assembly including a first trunk connector located at least partially within the first trunk, a second trunk connector located at least partially within the second trunk,

a first pair of electrical contacts electrically connectable to a second pair of electrical contacts;

a top tree section including a vertically extending top portion, a plurality of branches coupled to the top portion, and a third plurality of lights, and a top connector connecting the top tree section to the second tree section and including:

a top connector body having a first portion insertable into the second trunk, a flanged portion coupled to the first portion, and a receiving port for receiving a portion of the vertically extending top portion, and

wherein the first plurality of lights are electrically connected to the second plurality of lights through the connector assembly, and the second plurality of lights are electrically connected to the third plurality of lights and,

wherein the flanged portion of the top connector body is outside the second trunk body and abutting a top edge of the second trunk portion.

'379 patent col. 24 l. 51–col. 25 l. 16 (emphasis added).

The preamble of each challenged claim recites a “modular artificial tree.” Claims 1, 17, and 29 require that the connector fit into the trunk body “in at least four rotational alignment positions about the central vertical axis.” '379 patent col. 24 ll. 20–21; *see also id.* at col. 26 ll. 3–5; *id.* at col. 28 ll. 33–34. Although none of the claims here recite the “tree portion” limitation at issue in our companion case, *see Polygroup*, No. 18-1745, slip op. at 4, claim 5 recites multiple “tree sections.” And the Board construed “tree section” identically to “tree portion.” *See id.* at 7 (noting that the Board construed “tree portion” to mean “a mechanically and electrically connectable modular and unitary portion of an artificial tree”). Claims 12, 15, and 32 depend from claims 1, 5, and 28 respectively,

and each adds the limitation of an “interference fit” formed between the trunk connector and the trunk body.

## B.

Polygroup Ltd. filed three petitions for IPR of the ’379 patent alleging obviousness based on different combinations of prior art references. The Board instituted review on all challenged grounds in three separate IPR proceedings.

Polygroup’s petitions rely on six prior art references, three of which are relevant here: U.S. Patent No. 4,072,857 (DeVicaris), U.S. Patent No. 2,229,211 (Korengold), and U.S. Patent Application Publication No. 2007/0230174 A1 (Hicks).

Polygroup relies on DeVicaris for each of its asserted grounds. DeVicaris is directed to an artificial tree with hollow trunk sections that contain electrical wiring and have electrical-mechanical connectors for attaching the trunk sections. During assembly, the trunk sections must be aligned in a single rotational position about the vertical axis. The branches in DeVicaris are detachable from the trunk sections, and the tree is assembled by first connecting the trunk sections, and then attaching the branches to the trunk.

Polygroup relies on Korengold to teach both the “interference fit” limitation in claims 12, 15, and 32, and the “four rotational alignment positions” limitation in claims 1, 17, and 29. Korengold is directed to an electrical connector used to supply power between conduit pipe sections in an electrical device with multiple tubular parts, such as a modular lamp. The external diameter of the connector is “substantially equivalent” to the internal diameter of the pipe, which allows the connectors to form a “snug fitting” when inserted into the pipe. J.A. 1100. Polygroup argues that Korengold’s “snug fit[]” is equivalent to the “interference fit” in the ’379 patent. Polygroup

also argues that a person of ordinary skill in the art would have been motivated to apply the type of connection taught by Korengold to the connectors in DeVicaris, resulting in a “connector . . . securable to the □ trunk body in at least four rotational alignment positions.” ’379 patent col. 24 ll. 18–21.

Polygroup relies on Hicks for the obviousness of claims 5, 10, 11, and 15–17. Hicks discloses an artificial tree with hollow trunk members that house the light wiring system. Hicks also 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.

### C.

The Board issued a consolidated decision for the three IPRs challenging the ’379 patent. 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 “modular artificial tree” recited in the preamble of each claim. The Board found the preamble to be limiting, and it construed “modular artificial tree” to mean “a tree constructed of modular portions, each modular portion being a separate tree section.” J.A. 14. Crediting the testimony of Willis’s expert, the Board found that a “person having ordinary skill in the art ‘recognizes modular’ as a ‘distinct’ type of artificial tree with tree sections that come ‘with branches pre-attached to the trunk’ so that assembly is ‘quick and easy.’” J.A. 19. Accordingly, the Board found

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

that neither DeVicaris nor Hicks teaches a “modular artificial tree” because the branches of each are separately attached to the trunk sections. Because every challenged claim recites a “modular artificial tree,” and Polygroup failed to provide a prior art reference teaching that limitation, the Board found that Polygroup failed to prove that any of the challenged claims are unpatentable.

As an alternate basis for its patentability determinations as to claims 12, 15, and 32, the Board found that Korengold fails to teach an “interference fit” as required by those claims. The Board construed “interference fit” to mean “an engineered connection where two components or parts to be connected are manufactured to be of different dimensions such that when one component is pressed into the other, they interfere and deform to force a connection.” J.A. 30. The Board concluded that Polygroup failed to show that Korengold’s “snug fit” between two parts with “substantially equivalent” diameters teaches a fit where parts “interfere to force a connection so as to secure the connection.” J.A. 47.

As an alternate basis for its patentability determinations as to claims 1, 2–4, 6, 8, 13, 14, 17, and 29, the Board found that Polygroup failed to establish that a skilled artisan would have been motivated to combine DeVicaris with Korengold. Polygroup argued a person of ordinary skill would have been motivated to combine the references because the “ease of assembly [of DeVicaris] is improved because of the rotational freedom afforded by Korengold’s interference-fit connection.” J.A. 39. According to the Board, Polygroup failed to show that Korengold teaches rotational freedom. Additionally, because Korengold does not teach an “interference fit,” the Board concluded that a skilled artisan would not look to Korengold for such a fit.

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 "modular artificial tree" and "interference fit." 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). Substantial evidence requires that "a reasonable mind might accept the evidence to support the finding." *In re Gianneli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014).

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 the Board erred in its construction of "modular artificial tree," but it did not err in its construction of "interference fit."

## A.

The Board found the recitation of "modular artificial tree" in the preamble of each claim to be limiting because it "provides necessary context at least for the terms 'trunk portion' and 'tree section,' and how they interface with each other." J.A. 12. The Board then construed "modular artificial tree" to mean "a tree constructed of modular portions, each modular portion being a separate tree section." J.A. 11. Relying on the testimony of Willis's expert, Dr. Brown, the Board concluded that a modular tree is "a 'distinct' type of artificial tree with tree sections that come 'with branches pre-attached to the trunk.'" J.A. 19. This conclusion was error because the Board's con-

struction does not represent the broadest reasonable interpretation of “modular artificial tree.”

First, we note that other than claim 5, none of the independent claims of the '379 patent recite branches. We find no support for reading such a limitation into the claims as the Board did here. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1320 (Fed. Cir. 2005) (cautioning against reading limitations from the specification into the claims).

Additionally, while the '379 patent's specification discloses “modular tree portions” in the Field of Invention, *see* '379 patent col. 1 l. 14, it also describes other aspects of the tree as “modular” throughout the specification, such as the connector assembly and light system, *see id.* at col. 18 l. 36 (noting the “modularity and detachability of connector assembly 200”); *id.* at col. 20 ll. 50–53 (discussing the “modularity” of the lighting system). Given these disclosures, we are not persuaded that the broadest reasonable interpretation of “modular artificial tree” requires a tree with “tree sections that come ‘with branches pre-attached to the trunk.’” J.A. 15. Instead, we find Polygroup's proposed construction, “an artificial tree with elements capable of being easily joined or arranged with other parts or units,” to be more consistent with the entire disclosure of the '379 patent. J.A. 11.

To the extent the Board relied on Dr. Brown's testimony in reaching its construction, the Board erred in doing so. While it can be proper to rely on expert testimony “to establish that a particular term in the patent . . . has a particular meaning in the pertinent field[,] . . . conclusory, unsupported assertions by experts as to the definition of a claim term are not useful” during claim construction. *Phillips*, 415 F.3d at 1318. Dr. Brown's statement is a conclusory and unsupported assertion, and we find it to be inconsistent with the intrinsic record. So, his testimony does not provide substantial evidentiary

support for the Board's conclusion that a modular tree is one with "branches pre-attached to the trunk." J.A. 15.

Because the Board's determinations on the patentability of claims 1–6, 8, 10–11, 13–14, 16–17, and 28–29 relied solely on its erroneous construction of "modular artificial tree," we vacate those determinations and remand to the Board for consideration of whether those claims are obvious under a proper construction.<sup>2</sup>

## B.

The Board construed "interference fit" to mean "an engineered connection where two components or parts to be connected are manufactured to be of different dimensions such that when one component is pressed into the other, they interfere and deform to force a connection." J.A. 30. The Board emphasized that the key to an interference fit is that the difference in dimensions forces a connection that "is strong enough to cause the two pieces to remain fixed relative to each other." J.A. 22. The Board rejected Polygroup's proposed construction, "a fit between two parts in which the external dimension of one part slightly exceeds the internal dimension of the part into which it has to fit," J.A. 22, because it is "unconcerned with whether the two parts are fixed relative to each other, and is only concerned with whether they are somewhat different in size." J.A. 23.

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<sup>2</sup> The Board also found that Hicks does not disclose the "tree section" limitation of claim 5. The Board construed "tree section" to have the same meaning as "tree portion," a limitation in the related patents at issue in our companion case. *See Polygroup*, No. 18-1745, slip op. at 7. Because we found that the Board erred in construing "tree portion" in that case, *id.* at 10, we find that the Board erred in construing "tree section" here.

We find that the Board's construction reflects the broadest reasonable interpretation of "interference fit" given the '379 patent's specification. The specification describes the "interference fit" between the connector and the trunk wall as one where "force is exerted" so that the parts are "held together." *See* '379 patent col. 12 l. 66–col. 13 l. 2; *see also id.* at col. 13 ll. 62–65. The specification also explains that the parts or components "deform" in order to fit the connector "inside [the] base-trunk portion," and that "[s]uch deformation or compression" forms an "interference fit." *Id.* at col. 16 ll. 1–4. Thus, we agree with the Board that the key consideration for an "interference fit" is the connection generated between the parts and whether the parts deform to force a connection, not whether the difference in their diameters is slight or substantial.

Because we find no error in the Board's claim construction of "interference fit," we also find that the Board's determination that Korengold does not teach an "interference fit" is supported by substantial evidence. Korengold teaches a "snug fit[]" formed by parts with "substantially equivalent" diameters. J.A. 1100. Nothing in its disclosure teaches that the parts "interfere [and deform] to force a connection." *See* J.A. 47. Nor does Korengold require that the external diameter of the connector exceeds the internal diameter of the pipe. Thus, Korengold fails to teach an interference fit even under Polygroup's proposed construction, which requires that the external dimension of one part "slightly exceeds" the internal dimension of the part into which it is to fit. *See* J.A. 22.

### III

Next, we consider the Board's finding that Polygroup failed to establish that a skilled artisan would have been motivated to combine DeVicaris with Korengold. 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 person of ordinary skill would have been motivated to combine the prior art is a factual question reviewed for substantial evidence. *Intercontinental Great Brands LLC v. Kellogg N. Am. Co.*, 869 F.3d 1336, 1343 (Fed. Cir. 2017); *see also In re Gianelli*, 739 F.3d at 1379.

In its petition, Polygroup argued that a skilled artisan would have been motivated to enhance the tree from DeVicaris with the “interference fit-type connection” taught by Korengold. J.A. 160. According to Polygroup, “[t]he rotational freedom afforded by *Korengold’s* interference fit-type connection would permit the . . . electrical connectors of *DeVicaris* to be inserted into, and secured within, respective trunk sections in *any* rotational alignment position.” *Id.*

The Board rejected Polygroup’s proposed motivation. The Board found that Korengold does not teach rotational freedom because “an electrical connector assembly within a conduit pipe . . . does not in itself teach rotational freedom.” J.A. 40. Further, because the Board determined that Korengold does not teach an “interference fit,” it found that a skilled artisan would not look to Korengold for such a fit. The Board also found that a person of ordinary skill would not have been motivated to replace the connectors in DeVicaris with the connectors in Korengold. Given the record before us, we conclude that the Board’s rejection of Polygroup’s proposed motivation is not supported by substantial evidence for three reasons.

First, the Board’s determination that a skilled artisan would not replace the connectors in DeVicaris with the

connectors from Korengold is irrelevant to the motivation actually proposed by Polygroup. Polygroup suggested enhancing DeVicaris with the *connection* used to insert Korengold's connectors into the conduit pipe, *not* the connectors themselves. Because most of the Board's analysis, and the expert testimony it relied upon, focused on the motivation to replace DeVicaris's *connector* with Korengold's *connector*, neither that analysis nor the expert testimony provides substantial evidentiary support for the Board's rejection of Polygroup's proposed motivation. *See* J.A. 41–43 (focusing on the finding that replacing DeVicaris's *connector* with Korengold's *connector* would make tree assembly more difficult).

Second, the fact that Korengold does not teach an “interference fit” as that term is used in claims 12, 15, and 32 is also irrelevant to the motivation to combine analysis. Polygroup argues that a skilled artisan would look to Korengold's connection because it teaches rotational freedom. Polygroup's choice to refer to Korengold's connection as an “interference fit-type connection” has no bearing on whether Korengold teaches rotational freedom, so it also has no bearing on whether a skilled artisan would have been motivated in the manner Polygroup proposes. That Korengold does not teach an “interference fit” is only relevant to the patentability of claims 12, 15, and 32, which include that limitation.

Finally, the Board's determination that Korengold fails to teach rotational freedom is not supported by substantial evidence. Korengold discloses a cylindrical connector that is inserted into a cylindrical pipe with a “substantially equivalent” diameter such that the two parts form a “snug fitting.” J.A. 1100. Such an arrangement would allow the connector to be inserted in “*any* rotational alignment position,” as Polygroup's expert asserted. J.A. 1020. Nowhere does Korengold suggest that its connectors require a particular rotational alignment. Thus, no reasonable fact finder could conclude that

Korengold fails to teach a connection with rotational freedom. And we agree with Polygroup that a person of ordinary skill would have been motivated to enhance DeVicaris with Korengold because Korengold's rotational freedom would improve the ease of assembly of the DeVicaris tree.

#### IV

We have considered the parties' remaining arguments and find them unpersuasive. We conclude that the Board erred in its construction of "modular artificial tree" and that Polygroup established a sufficient motivation to combine DeVicaris with Korengold. Therefore, we vacate the Board's determination that Polygroup failed to prove that claims 1–6, 8, 10–11, 13–14, 16–17, and 28–29 are not unpatentable. On remand, the Board should consider whether those claims are unpatentable under a proper construction. We affirm the Board's determination that Polygroup failed to prove that claims 12, 15, or 32 are unpatentable because Korengold fails to teach an "interference fit" under the broadest reasonable interpretation of that term.

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

#### COSTS

No costs.