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Paper 33
Date: July 22, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

U.D. ELECTRONIC CORP.,
Petitioner,

v.

PULSE ELECTRONICS, INC.,
Patent Owner.

Case IPR2019-00511
Patent 6,773,302 B2

Before KEVIN F. TURNER, DAVID C. McKONE, and SCOTT E. BAIN, *Administrative Patent Judges.*

TURNER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Granting-in-Part Patent Owner's Motion to Amend
35 U.S.C. § 318(a)

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that a preponderance of the evidence shows that claims 1, 3–9, and 11–16 (the "Challenged Claims") of U.S. Patent No. 6,773,302 B2 (Ex. 1001, "the '302 Patent") are unpatentable. We grant-in-part and deny-in-part the motion to amend claims filed by Pulse Electronics, Inc. ("Patent Owner").[1]

I. INTRODUCTION

A. Summary of Procedural History

U.D. Electronic Corp. ("Petitioner")[2] filed a Petition (Paper 2, "Pet.") requesting *inter partes* review of the Challenged Claims. Pet. 1. We instituted an *inter partes* review of the Challenged Claims[3] on all grounds of unpatentability asserted in the Petition. Paper 10 ("Inst. Dec."). Thereafter, Patent Owner filed a Patent Owner Response (Paper 16, "PO Resp."). Petitioner filed a Reply to the Patent Owner Response (Paper 18, "Pet. Reply"), to which Patent Owner filed a Sur-reply (Paper 24, "PO Sur-reply").

[1] Patent Owner identifies itself as the sole real party-in-interest. Paper 3, 2.
[2] Petitioner identifies itself as the sole real party-in-interest. Pet. 2.
[3] Patent Owner points out that claim 10 was statutorily disclaimed and should not have been included in the claims upon which this proceeding was instituted. PO Resp. 59–60. Patent Owner is correct and we exclude claim 10 from the Challenged Claims.

Patent Owner also filed a Revised Contingent Motion to Amend (Paper 23, "RMTA").[4] Petitioner filed an Opposition to the RMTA (Paper 26, "RMTA Opp."), to which Patent Owner filed a Reply (Paper 29, "RMTA Reply"), and further to which Petitioner filed a Sur-reply (Paper 31, "RMTA Sur-reply").

Oral argument was held on June 3, 2020, and a transcript of the hearing appears in the record. Paper 32 (Tr.). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 (2017). Petitioner bears the burden of proving unpatentability of the Challenged Claims by a preponderance of the evidence, and the burden of persuasion never shifts to Patent Owner. *See* 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2017); *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc*., 800 F.3d 1375, 1378 (Fed. Cir. 2015).

B. Related Proceedings

The Petition states that the '302 Patent is asserted in the following litigation: *Pulse Electronics, Inc. v. U.D. Electronic Corp.*, No. 3:18-CV-00373-BEN-MSB (S.D. Cal.) Pet. 2; *see also* Paper 3, 2. The following post grant proceedings involve the patents in suit between the parties: IPR2019-00262 (denied), IPR2019-00508 (denied), and IPR2019-00515 (denied).

C. The '302 Patent

The '302 Patent "relates generally to micro-miniature electronic elements." Ex. 1001, 1:15–16. The '302 Patent details that the connector

[4] Prior to filing its Revised Contingent Motion to Amend, Patent Owner filed a Contingent Motion to Amend (Paper 15), to which Petitioner filed an opposition (Paper 20), and further to which we issued Preliminary Guidance (Paper 19) and Revised Preliminary Guidance (Paper 21).

assembly components described and illustrated therein are "highly efficient at using the interior volume of the connector as compared to prior art solutions, mitigate cross talk and EMI to a high degree, and allow for the use of a variety of different components . . . within the connector assembly at once, thereby reducing labor cost." *Id.* at 1:66–2:4. Annotated versions, with our annotations, of Figures 1a and 1b, of the '302 Patent, are reproduced below.

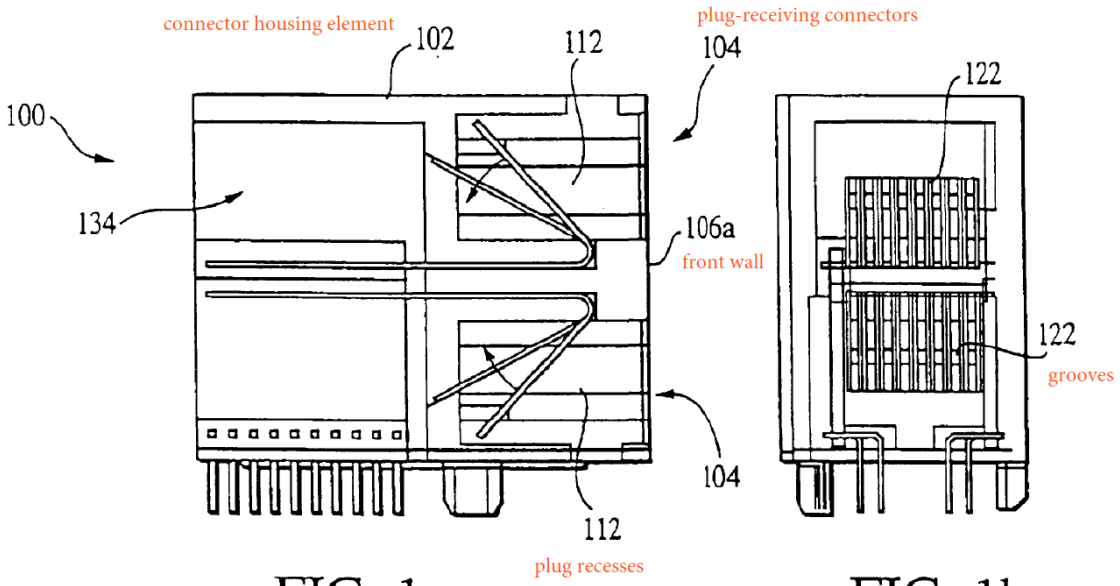

FIG. 1a FIG. 1b

Figures 1a and 1b provide side cross-sectional and rear plan views respectively of a single port pair embodiment of the connector assembly in the '302 Patent.

The '302 Patent discloses that assembly 100 involves connector housing element 102 having two modular plug-receiving connectors 104 formed therein. Ex. 1001, 5:10–14. Front wall 106*a* of connectors 104 is further disposed generally perpendicular or orthogonal to the printed circuit board (PCB) surface to which connector assembly 100 is mounted, with the latch mechanism located away from the PCB, such that modular plugs may be inserted into plug recesses 112 formed in connectors 104 without physical

interference with the PCB. *Id.* at 5:14–21. A plurality of grooves 122 are disposed generally parallel and oriented substantially horizontally within housing 102 and are spaced and adapted to guide and receive conductors 120 (not shown in Figures 1a and 1b). *Id.* at 5:38–44.

Plug recesses 112 are adapted to each receive one modular plug (not shown) having a plurality of electrical conductors disposed therein in a predetermined array, the array being so adapted to mate with respective conductors 120*a* present in recesses 112, thereby forming an electrical connection between the plug conductors and connector conductors 120*a*. Ex. 1001, 5:54–63. Annotated Figures 1c and 1d, with our annotations, are reproduced below, illustrating the connector conductors.

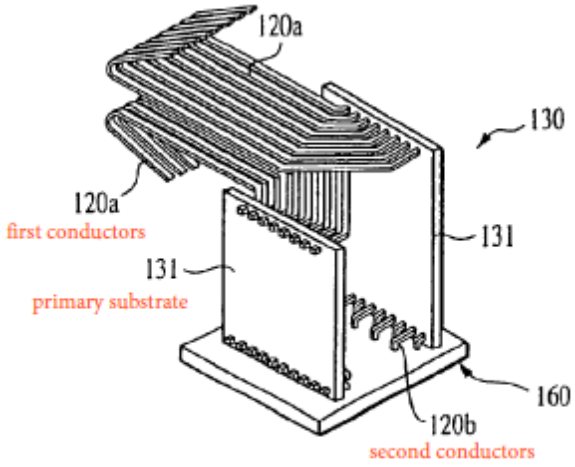

FIG. 1c

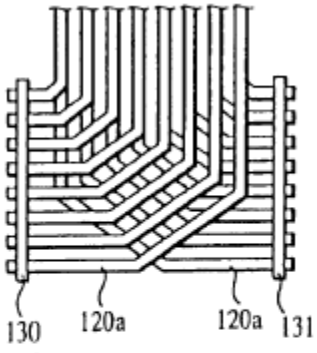

FIG. 1d

Figure 1c provides a perspective view of the primary substrate assemblies, without electronic components or conductive traces, and Figure 1d provides a top plan view of the conductors of the connector assembly.

First conductors 120*a* of substrate/component assembly 130 are deformed such that when assembly 130 is inserted into its cavity 134, upper conductors 120*a* are received within grooves 122, maintained in position to mate with the conductors of the modular plug when the latter is received

within plug recess 112. Ex. 1001, 5:57–62. Second conductors 120*b* are also provided, formatting to the PCB. *Id.* at 5:63–64.

> The offset position of the substrate 131 allows any electrical components disposed thereon to fit entirely within the cavity 134, thereby allowing for a "standard" connector housing profile, and further allowing for the simultaneous placement of two assemblies 130 within the housing at the same time (including the associated electrical components, . . . if provided), one for the upper connector, and one for the lower connector.

Id. at 5:64–6:4 (boldface omitted).

"[W]hen viewed from directly above, significant portions of each conductor's run [do] not overlap with that of its corresponding conductor on the other substrate 131 … [which] provides enhanced electrical separation, especially since it helps to avoid almost completely parallel straight runs of conductors." *Id.* at 6:22–28 (boldface omitted).

D. Illustrative Claim

As noted above, Petitioner challenged claims 1 and 3–16, with claims 1, 6, 9, 11, and 14–16 being independent claims, and independent claim 10 having been disclaimed. Claim 1 is illustrative of the Challenged Claims and is reproduced below:

> 1. A connector assembly comprising:
>
> a connector housing comprising a connector having:
>
> a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;
>
> at least one substrate having at least one electrically conductive pathway associated therewith;
>
> a cavity adapted to receive at least a portion of said at least one substrate;
>
> a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form

an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate; and

a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate;

wherein at least a portion of said first conductors are substantially coplanar and each include an effectively curved portion, the effective radius of each said effectively curved portion being different for each of said first conductors.

Ex. 1001, 19:23–47.

E. The Asserted Grounds of Unpatentability

Petitioner challenges the patentability of the Challenged Claims of the '302 Patent based on the following grounds under 35 U.S.C. §§ 102 and 103, relying on the Declarations of Dr. Michael Lebby ("Lebby Decl.," Ex. 1006; "Supp. Lebby Decl.," Ex. 1011). Pet. 24–75; Pet. Reply. Patent Owner relies on the Declarations of Mr. Leslie Alan Baxter ("Baxter Decl.," Ex. 2005; "Supp. Baxter Decl.," Ex. 2006)[5] in arguing against Petitioner's assertions. PO Resp.; PO Sur-reply.

Reference(s)	Basis	Claims Challenged
Kan[6]	§ 103	1, 3–5, 13–15

[5] Petitioner objected to Exhibits 2002 and 2001, Mr. Baxter's original Declaration and Curriculum Vitae, respectively, asserting that they were not relevant, being directed to IPR2019-00508. Paper 12. Patent Owner acknowledged the error and filed the correct Declaration (Ex. 2005) in response to the objections. Paper 13. Petitioner raised no further objections and we deem the prior objections to be moot.

[6] U.S. Patent No. 6,179,668 B1 (filed June 22, 1999) (issued Jan. 30, 2001) (Ex. 1003, "Kan").

Reference(s)	Basis	Claims Challenged
Kan	§ 102	1, 3–5, 13–15
Kan, Hughes[7]	§ 103	6–8
Kan, Hughes, Loudermilk[8]	§ 103	9, 11, 12, 16[9]
Kan, Hughes, Loudermilk, Scheer[10]	§ 103	11, 12

II. ANALYSIS OF PETITION

In our analysis of Petitioner's unpatentability contentions with respect to the Challenged Claims, we next address the applicable principles of law; the level of ordinary skill in the art; the proposed construction of claim terms; the scope and content of the asserted prior art; and then further analyze Petitioner's contentions with respect to each alleged ground of unpatentability for purposes of determining whether Petitioner shows by a preponderance of the evidence the unpatentability of the Challenged Claims.

A. Principles of Law

A "prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim.'" *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). "A single prior art reference may anticipate without disclosing

[7] U.S. Patent No. 4,225,209 (filed May 18, 1979) (issued Sept. 30, 1980) (Ex. 1004, "Hughes").
[8] U.S. Patent No. 5,639,267 (filed Jan. 26, 1996) (issued June 17, 1997) (Ex. 1005, "Loudermilk").
[9] Claim 10 was previously included in the claims covered by this ground of unpatentability, but was statutorily disclaimed by Patent Owner.
[10] U.S. Patent No. 5,501,608 (filed Dec. 20, 1993) (issued Mar. 26, 1996) (Ex. 1009, "Scheer").

a feature of the claimed invention if such feature is necessarily present, or inherent, in that reference." *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 958 (Fed. Cir. 2014) (citing *Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003)).

A patent claim is unpatentable as obvious if "the differences between" the claimed subject matter "and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a).[11] An invention "composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 418 (2007).

The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). An obviousness determination "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364,

[11] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. We quote the AIA version of 35 U.S.C. § 103, which applies to applications with an effective filing date after March 16, 2013, however, the pre-AIA version of § 103 is nearly identical and any differences do not affect our analysis here.

1380 (Fed. Cir. 2016). Rather, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR*, 550 U.S. at 418.

B. Level of Ordinary Skill in the Art

Petitioner states that a person of ordinary skill in the relevant art in of the '302 Patent would have had a bachelor's degree in electrical engineering, or mechanical engineering, with two or more years of experience designing connectors with EMI shielding. Pet. 24 (citing Ex. 1006 ¶¶ 55–58). Patent Owner's definition of a person of ordinary skill in the relevant art is largely the same, urging a similar amount of education and experience, detailing "at least one year of experience with electrical connectors having internal electronic components, or at least two years' experience with designing electrical connectors having internal electronic components." Prelim. Resp. 18 (citing Ex. 2002 ¶ 27). We determined previously that the proffered definitions were largely the same and we determined them to be appropriate for the technology addressed by this proceeding. Inst. Dec. 7. Patent Owner subsequently agreed that "there are not meaningful differences between the parties' definitions of a POSITA for purposes of this proceeding." PO Resp. 9–10. We continue to adopt Petitioner's definition for purposes of this decision.

C. Claim Construction

We apply the same claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340,

51358 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019)). Petitioner acknowledges this standard. Pet. 10. Under *Phillips*, claim terms are generally afforded "their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312. "[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313. "[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips* at 1313. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner proposes constructions for fifteen claim terms. Patent Owner counters those proposals or offers different constructions for six terms, and argues that eleven of Petitioner's proposed constructions are not "germane to the present IPR." *See* Pet. 10–21; Prelim. Resp. 20–31, 30. With respect to the explicit means-plus-function limitations identified by Petitioner, specifically Petition section IV.C.2.j) – o) (Pet. 20–21), Patent Owner indicates that it does not dispute those constructions. Prelim. Resp. 30; PO Resp. 37. As such, with respect to the means-plus-function limitations identified (Pet. 20–21, 47–50), we determine that those constructions comport with the applicable claim construction standard, and adopt them for purposes of this decision.

With respect to the remaining proposed claim constructions, we identified in our Institution Decision those limitations that we determined were necessary to resolve the grounds of unpatentability proposed by

Petitioner at that stage of the proceeding. These claim terms and proposed constructions are identified in the chart below and discussed in the following sections. For any disputed term not expressly addressed below, we discern no need to adopt explicit constructions at this time. *Vivid Techs., Inc.*, 200 F.3d at 803 ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy").

In our Institution Decision, we preliminarily adopted the following claim constructions for the claim terms listed below.

	Claim Term	Claims	Adopted Meaning
i	"effectively curved portion"	1–3, 7, 9, 13–16	"any form of bend of the first conductors" (Inst. Dec. 9–10).
ii	"substantially coplanar"	1, 7, 9, 13–16	"oriented or maintained within the same plane" (*Id.* at 10).
iii	"the effective radius of each said effectively curved portion being different for each of said first conductors"	1, 7, 9, 13–16	Plain and ordinary meaning (*Id.* at 11–12).
iv	"wherein said at least one electrical component has an elevation below that of said first conductor"	4	"the at least one electrical component resides below the first conductors" (*Id.* at 12).
v	"port pair"	11, 12	"an upper and lower modular connector (port) which are in a substantially over-under arrangement; i.e., one port disposed substantially atop the other port" (*Id.* at 12–13).

	Claim Term	Claims	Adopted Meaning
vi	". . . in a direction having an angular relationship to . . ."	11	"angular relationship" should be construed as "formed at an angle other than parallel (zero angle);" the rest of the limitation understood according to its plain and ordinary meaning (*Id.* at 13–14).
vii	"routing the first conductors. . . to mate . . . in a direction which is substantially opposite to that of the corresponding portions"	12	"is substantially opposite to that of the corresponding portions," requires that the routing is occurring substantially opposite (*Id.* at 14–17).
viii	"a connector housing comprising . . . at least one substrate"	1, 6, 9, 11, 13, 14, 16	Plain and ordinary meaning; does not require that "a portion of at least one substrate" be disposed on the connector housing (*Id.* at 17).

In Patent Owner's Response, many of the adopted constructions are contested, with alternative constructions proffered. PO Resp. 13–36. In response, Petitioner argues that those alternative constructions are unsupported or overbroad. Pet. Reply 1–10. We address each above-listed claim term below.

i."effectively curved portion"

Claims 1–3, 7, 9, and 13–16 recite, in part, that the first conductors include an "effectively curved portion." Petitioner alleges that the cited limitation is not defined in the Specification, and argues that the plain meaning, in the context of the '302 Patent, should be construed as "any form of bend in the first conductors." Pet. 11–12. We reviewed that construction, and Patent Owner's opposing construction, in the Institution Decision and

we determined that "effectively curved portion" should be construed as any form of bend of the first conductors. Inst. Dec. 9–10.

Patent Owner continues to dispute this construction, arguing that "the conductors must effectively curve approximately 90 degrees because the claimed substrate is substantially vertical and substantially orthogonal to the front face of the housing." PO Resp. 14–15; PO Sur-reply 2–10. Further, Patent Owner argues that

> the "effectively curved" configuration enables (i) one end of each of the conductors to attach to the substrate disposed in the vertical/orthogonal orientation and (ii) an opposing end of the conductors to engage with a modular plug proximate to a front face of a connector housing at an industry-standard angle (i.e., such that the modular plug inserts into the housing and mates with the opposing end **at a right angle**.

PO Resp. 16 (citing Ex. 2006 ¶¶ 68–69). Additionally, Patent Owner argues that "the only embodiments disclosed in the '302 Patent have the substrates positioned substantially orthogonal and substantially vertical to the face of the housing," and that the run of conductors must make an approximately 90º change in direction to provide an electrical interconnection. *Id*. at 18.

Petitioner counters that "desired effect," as used by Patent Owner, and "approximately 90º" do not appear in the '302 Patent, that Patent Owner's construction would render the claim invalid, and that the construction ignores the express language of the specification of the '302 Patent. Pet. Reply 2. Petitioner argues that given the lack of support or explanation in the specification, the use of Patent Owner's claim construction would introduce ambiguity into the claims, and the only reference in the specification to a 90º angle does not mention a portion producing a desired effect, or a curve of approximately 90 degrees. *Id*. at 4–6 (citing Ex. 1001, 17:6–8). Petitioner also points out that the specification of the '302 Patent

details that it is in "no way meant to be limiting," and that neither the specification nor the prosecution history details to one of ordinary skill in the art the intended scopes of "desired", "effective" and "approximately." *Id*. at 8–9 (citing Ex. 1001, 19:10–20).

After review of the proffered arguments, we remain persuaded that Petitioner's construction is consistent with the plain and ordinary meaning in the context of the '302 Patent. Patent Owner cites to multiple cases regarding the use of embodiments of the invention set forth in the specification to interpret limitations, despite claim language that could be interpreted more broadly. PO Resp. 16–18; PO Sur-reply 8–10 (citing *Toro Co. v. White Consol. Indus., Inc.,* 199 F.3d 1295, 1301–02 (Fed. Cir. 1999); *Gen. Am. Transp. Corp. v. Cryo–Trans, Inc.,* 93 F.3d 766, 770 (Fed. Cir. 1996); *Modine Mfg. Co. v. U.S. Int'l Trade Comm'n,* 75 F.3d 1545, 1550–51 (Fed. Cir. 1996)). We determine that the portions of the specification cited by Patent Owner are not express or implied definitions of the term "effectively curved portion." *See Phillips* at 1321 (the specification "acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication"). Patent Owner continues that "the only embodiments disclosed in the '302 Patent have the substrates positioned substantially orthogonal and substantially vertical to the face of the housing," and "the run of the conductors *must* make an approximately 90° change in direction to provide an electrical interconnection." *Id*. at 18. Such arguments and case law would be pertinent if we interpreted claim 1, for example, as *requiring* substrates to not be orthogonal or if we required the "effectively curved portion" to *not* result in a 90° change in direction. We do not interpret claim 1 that way, so Patent Owner's arguments are not persuasive.

In contrast, Patent Owner is asking that we incorporate aspects of the disclosure into a claim that does not recite such requirements. It is improper to add a limitation appearing in the specification and the drawings, but not appearing in the unambiguous language of a claim. *See Gart v. Logitech, Inc*., 254 F.3d 1334, 1343 (Fed. Cir. 2001). This is particularly true where the specification does not define the term at issue to include that additional limitation or otherwise include language requiring it. Claims 1–3, 7, 9, and 13–16 recite, in part, that the first conductors include an "effectively curved portion," and each claim recites that limitation unambiguously.

Although we acknowledge the varying embodiments disclosed in the '302 Patent, we are persuaded that confining the "effectively curved portion" to be "approximately 90º" is overly narrow. We continue to determine that adopting Patent Owner's construction would unduly limit the cited claims, i.e., claims 1–3, 7, 9, and 13–16, by importing limitations that are not part of the claims. *See* S*uperguide Corp. v. DirecTV Enterprises, Inc.,* 358 F.3d 870, 875 (Fed. Cir. 2004). As such, we continue to determine that "effectively curved portion" should be construed as any form of bend of the first conductors.

ii."substantially coplanar"

Claims 1, 7, 9, and 13–16 recite, in part, that the first conductors are "substantially coplanar," which Petitioner alleges is not defined in the Specification. Pet. 12–13. Petitioner argues that the plain meaning, in the context of the '302 Patent, should be "oriented or maintained within the same plane." *Id*. at 13. We previously determined that "substantially coplanar" should be construed as "oriented or maintained within the same plane." Inst. Dec. 10. Patent Owner provides no alternative construction for this claim term. PO Resp. 22. Upon review of the Specification of the '302

Patent and the subject claims, we continue to adopt this construction for purposes of this decision.

iii. "the effective radius of each said effectively curved portion being different for each of said first conductors"

Claims 1, 7, 9, and 13–16 recite, in part, "the effective radius of each said effectively curved portion being different for each of said first conductors." Patent Owner continues to assert that Petitioner's construction of the cited limitation as "the vector of curvature for an associated bend" (Pet. 13–14), is unreasonable and should not be adopted. PO Resp. 22–27. We determined in the Institution Decision that the cited claim term needs no specific construction and can be understood according to its plain and ordinary meaning. Inst. Dec. 11–12. Neither party appears to dispute such a construction. *See* PO Resp. 22; Pet. Reply 10. As such, we construe the limitation according to its plain and ordinary meaning in the analysis below.

iv. "wherein said at least one electrical component has an elevation below that of said first conductor"

Claim 4 recites, in part, "wherein said at least one electrical component has an elevation below that of said first conductor." We previously determined that this limitation should be construed as "the at least one electrical component resides below the first conductors." Inst. Dec. 12. Patent Owner originally provided this construction and further distinguishes it from the construction offered by Petitioner. PO Resp. 27–28. There does not appear to be a dispute with respect this construction. *See generally* PO Resp.; Pet. Reply; PO Sur-reply. Upon review of the Specification of the '302 Patent and the subject claims, we continue to adopt this construction for purposes of this decision.

v. "port pair"

Claims 11 and 12 both recite the limitation "port pair." We previously determined that "port pair" should be construed as "an upper and lower modular connector (port) which are in a substantially over-under arrangement; i.e., one port disposed substantially atop the other port." Inst. Dec. 12–13. Patent Owner provides no alternative construction for this claim term. PO Resp. 28. Upon review of the Specification of the '302 Patent and the subject claims, we continue to adopt this construction for purposes of this decision.

vi. ". . . in a direction having an angular relationship to . . ."

Claim 11 recites, in part, "said first conductors of a first connector in said port pair being routed over at least a portion of their length to a corresponding one of said at least one substrate in a direction having an angular relationship to the corresponding portion of said first conductors associated with a second connector in said port pair." In the Institution Decision, we determined that the term "angular relationship" should be construed as "formed at an angle other than parallel (zero angle)." Inst. Dec. 14. We further determined that the rest of the limitation in claim 11 can be interpreted according to its plain and ordinary meaning. *Id*. Patent Owner indicates that it generally agrees with this construction, but points out that the inclusion of "parallel" in the construction contradicts the embodiment illustrated in Figure 1D of the '302 Patent, in that the "angular relationship" can be "180-degrees out from one another," but considered parallel in terms of their directions. PO Resp. 28–30. We concede the point raised by Patent Owner and adopt as a construction "formed at an angle other than zero angle" for the claimed portion of "angular relationship," recited in the limitation. Petitioner does not appear to disagree. *See*

generally Pet. Reply. We continue to determine that the rest of the limitation in claim 11 is interpreted according to its plain and ordinary meaning.

vii. "routing the first conductors. . . to mate . . . in a direction which is substantially opposite to that of the corresponding portions"

Claim 12 recites, in part, "said angular relationship comprises routing the first conductors of said first connector in said port pair to mate with said at least one substrate in a direction which is substantially opposite to that of the corresponding portions of said first conductors of said second connector of said port pair." In the Institution Decision, we determined that the claim limitation can find support from either interpretation espoused by Petitioner and Patent Owner, and we found support for Petitioner's construction on the basis of Petitioner's declarant. Inst. Dec. 16–17. We continue to adopt Petitioner's construction, outlined below, and we address Patent Owner's additional arguments against Petitioner's construction.

Petitioner asserts that the limitation should be "construed as for example, having the first conductors of the first connector be oriented at an angle that is opposite (e.g., upside down) of the first conductors of the second connector as illustrated in FIG. 2a of the '302 patent . . . and the corresponding description in the specification." Pet. 18–19 (citing Ex. 1001, 5:5–8; Ex. 1006 ¶ 54i). Petitioner alleges that its construction is consistent with Figure 2a of the '302 patent, reproduced below with annotations by Petitioner (Pet. 19):

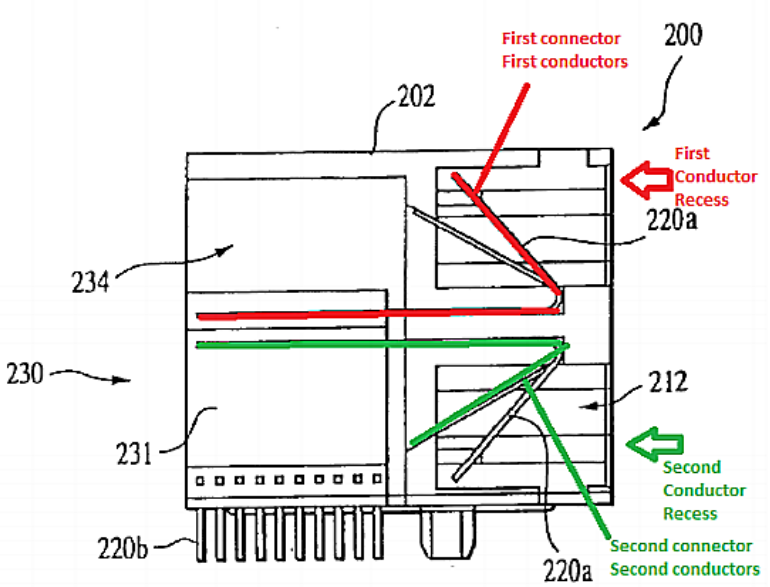

FIG. 2a

Figure 2a provides a side cross-sectional view of an embodiment of the connector assembly in the '302 Patent, as annotated by Petitioner.

Patent Owner argues that Petitioner's construction is incorrect and unreasonably broad because it excludes features of claim 12. PO Resp. 34–35. Patent Owner argues that the construction "wholly ignores the recited feature 'routing the first conductors of said first connector in said port pair to mate with said at least one substrate in a direction,'" and "includes an opposing direction that includes *any* portion of the conductor (such as e.g., a portion of the conductor which is distal relative to the substrate)." *Id*. at 35 (citing Ex. 2006 ¶ 90). We do not agree.

Claim 12 addresses only the mating of the first conductors with said at least one substrate. Although Patent Owner essentially argues that "the corresponding portions" must be where the first conductors of second connector of the port pair mate with the at least one substrate, claim 12 is not that specific. As we stated in the Institution Decision, "the claim limitation

can find support from either interpretation." Inst. Dec. 17. Even acknowledging this, however, we do not agree with Patent Owner that the adopted construction is "unreasonably broad." We have also reviewed that testimony of Mr. Baxter with respect to original claims 24 and 25 (Ex. 2006 ¶¶ 92–95), but we find it unavailing of Patent Owner's position because those original claims do not recite conductors mated to the at least one substrate, which is central to Patent Owner's construction.

As such, we continue to determine that "is substantially opposite to that of the corresponding portions," per the cited limitation of claim 12, requires that the routing is occurring substantially opposite.

viii. "a connector housing comprising . . . at least one substrate"

Claims 1, 6, 9, 11, 13, 14 and 16 recite the term "a connector housing comprising . . . at least one substrate." In the Institution Decision, we did not agree with Patent Owner's proffered construction of that limitation as "a connector housing that includes at least a portion of at least one substrate disposed therein." Inst. Dec. 17 (citing Prelim. Resp. 29). Patent Owner renews its argument, asserting that:

> In accordance with the '302 Patent, "the housing element 102 includes a cavity 134 formed in the back of the connector 104 generally adjacent to the rear wall, the cavity 134 being adapted to receive the component substrate assemblies 130." [Ex. 1001,] 5:48–51. Further, "electrical components may be disposed on either or both sides of the primary substrates 131 if desired, consistent with available room in the housing cavity (see, e.g., FIGS. 2d–2f)." *Id*. at 6:5–7. Thus, the specification is clear that the cavity receives the substrate assemblies and the housing "includes a cavity", thus, the connector housing includes at least a portion of at least one substrate.

PO Resp. 36. As we stated in the Institution Decision, we agree that "the connector housing has a connector, which in turn has the at least one

substrate as one of its constituent parts." Inst. Dec. 17. As such, we agree that the connector housing includes at least a portion of the at least one substrate. To the extent that Patent Owner's construction suggests that "a portion of at least one substrate" be disposed directly on the connector housing, we are not persuaded that claims 1, 6, 9, 11, 13, 14, and 16 provide for such a direct placement.

D. Scope and Content of the Prior Art

Petitioner relies on Kan, Hughes, Loudermilk, and Scheer to show the unpatentability of the Challenged Claims. Pet. 24–75. Each of the first three of these references is summarized briefly below.

1. Overview of Kan

Kan is a U.S. patent directed to an electric connector including a circuit board and a terminal board. Ex. 1003, Abstract. "The terminal board has a plurality of upper terminals and lower terminals integrally formed therein," and "[t]he upper terminals have curved contacts extending into a cavity formed in a vertical section of the terminal board." *Id*. Annotated Figures 1 and 2 of Kan, with our annotations, are reproduced below.

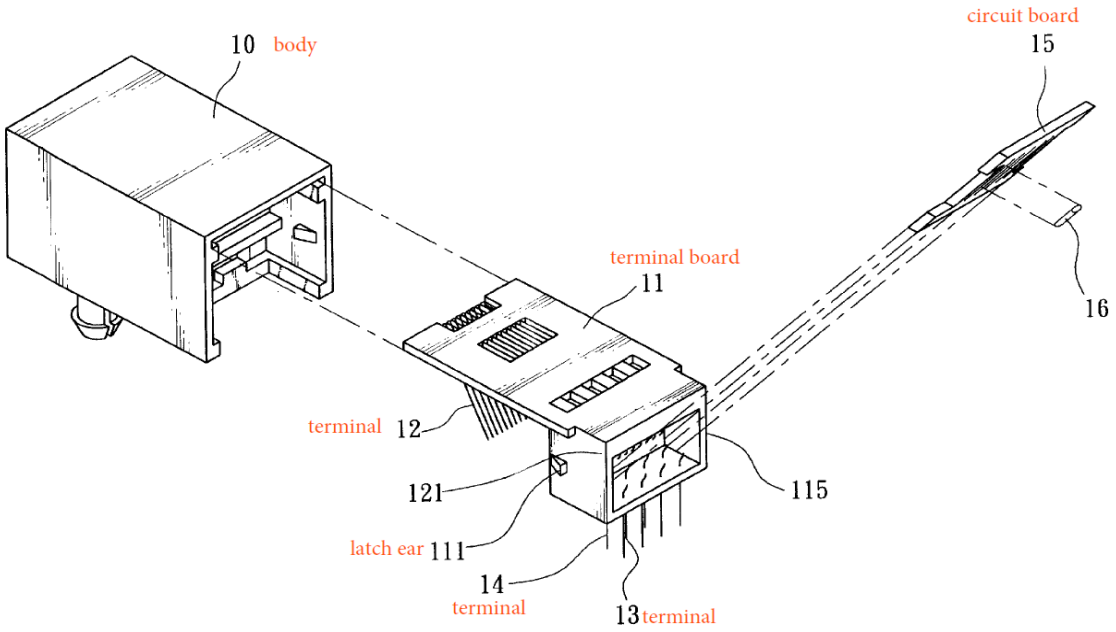

FIG. 1

Annotated Figure 1 of Kan illustrates a perspective exploded view of its electric connector.

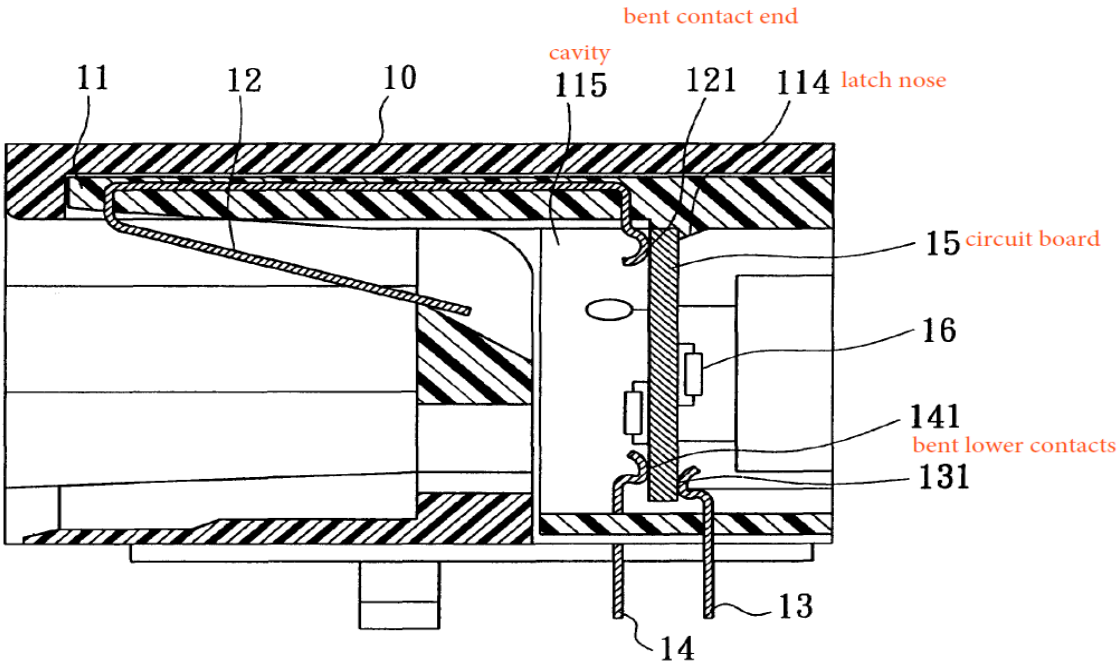

FIG. 2

Annotated Figure 2 of Kan illustrates a front sectional view of its electric connector.

As illustrated in Figure 1, Kan discloses a connector with body 10, terminal board 11, which includes terminals 12, 13, and 14 located therein. Ex. 1003, 1:65–2:33. Circuit board 15 engages with terminal board 11 through bent lower contacts 131 and bent contact end 121, as illustrated in Figure 2. *Id*. The connector has cavity 115 through which the slanted end of terminal 12 is suspended into below the top flange for connecting with an input. *Id*. A groove is formed in the bottom side of the top flange under each terminal to enable terminal 12 to have more elastic strength.

As illustrated in Figure 3A of Kan, reproduced below with our annotation, terminals disposed on terminal board 11 have bends based on the grooves thereon. Figure 4A of Kan, also reproduced below with our annotations, illustrates component 16 mounted on circuit board 15 and connected through electronic traces 17.

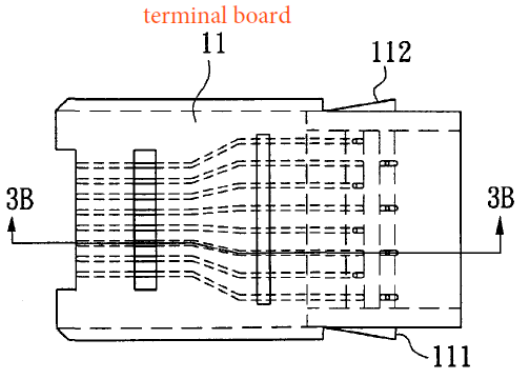

FIG. 3A

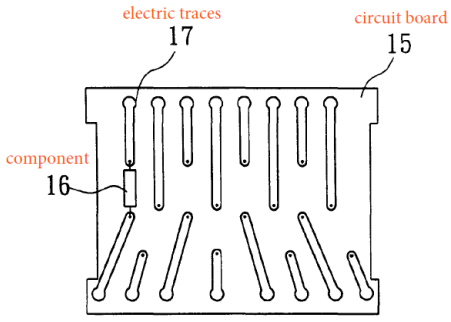

FIG. 4A

Figures 3A and 4A of Kan illustrate the terminals disposed on the terminal board and component mounted on the circuit board, respectively.

2. Overview of Hughes

Hughes is an issued U.S. patent directed to an electrical connector receptacle used in the telecommunications industry. Ex. 1004, 1:5–7. In an embodiment illustrated in Figure 1, reproduced with annotations below,

cable 6, having connector plug 4, is introduced to an opening 20 of plug-receiving end 16 of connector 2. *Id.* at 2:51–3:6. Connector 2 is mounted on side 12 of circuit board 10, with conductors 8 extending through holes 100 in the circuit board to allow for connection. *Id*. As illustrated, the circuit board is mounted orthogonally to the plug-receiving end of the connector, with our annotations.

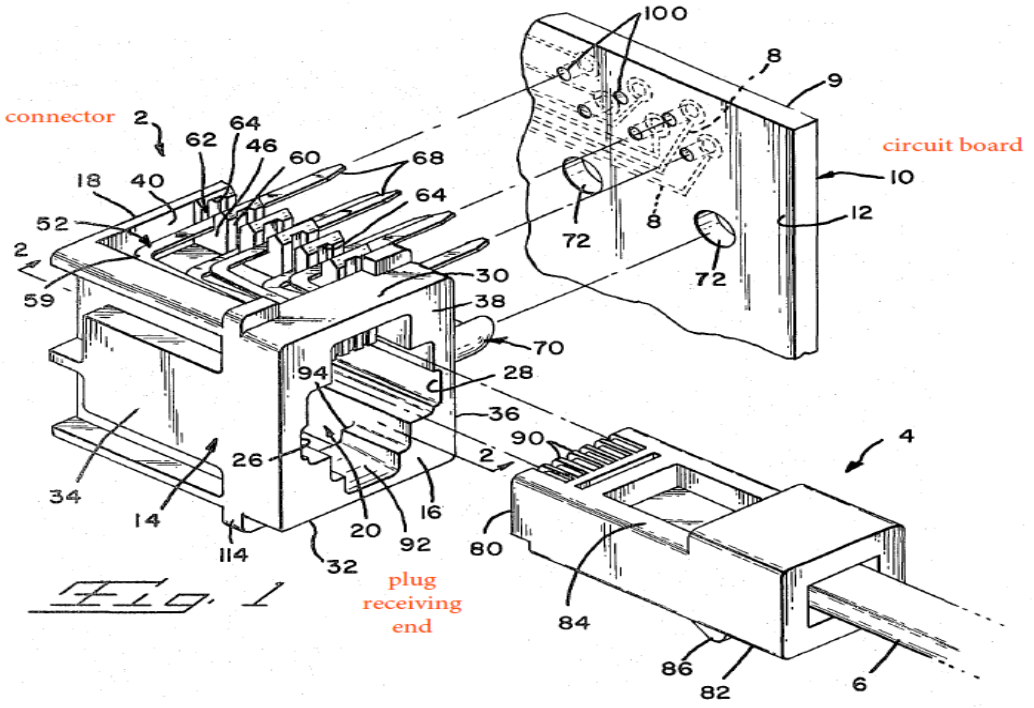

Figure 1 of Hughes provides a perspective view of a connector receptacle with a plug in alignment with the plug-receiving opening.

3. Overview of Loudermilk

Loudermilk is an issued U.S. patent directed to a modular jack assembly involving multiple connectors and a backplane sub-assembly for connecting the connectors to the circuit board. Ex. 1005, Abstract. Figures 7 and 14 of Loudermilk illustrate one embodiment of such a multi-port connector assembly, and are reproduced below.

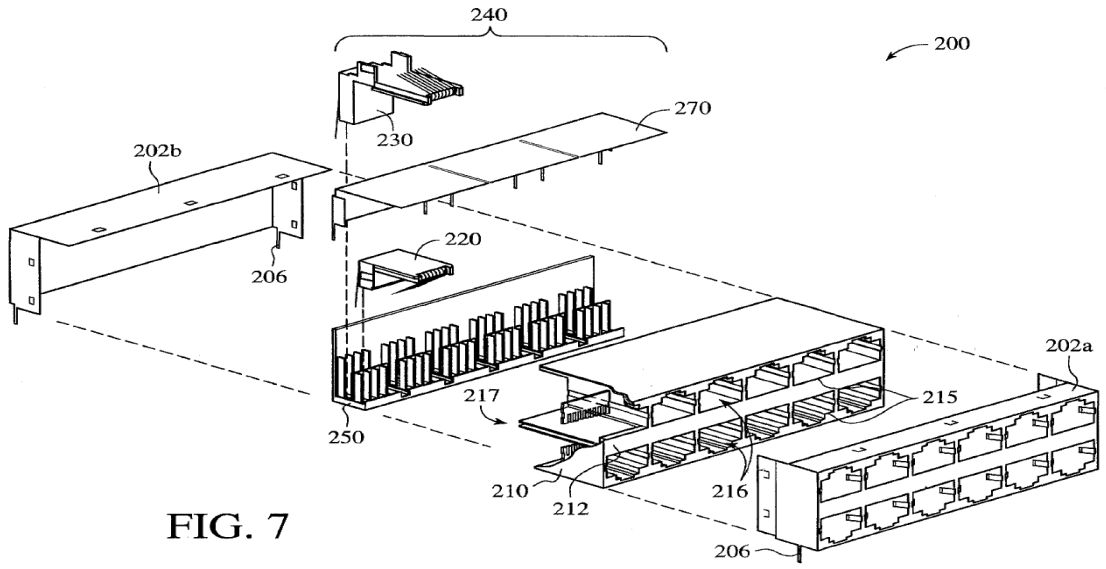

FIG. 7

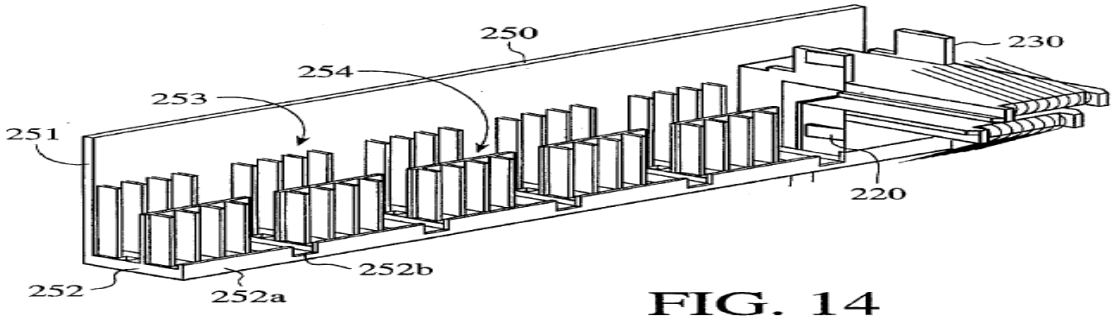

FIG. 14

Figure 7 shows an exploded view of the modular jack assembly and Figure 14 shows a perspective view of the backplate member.

The assembly illustrated in Figure 7 shows a pair of plug-receiving cavities 216 on top of each other, with one port stacked atop the other port. Figure 14 illustrates conductors of a first connector (upper contact pin array 230) being opposite in orientation to the conductors of the second connector (lower contact pin array 220). Ex. 1005, 4:17–26.

E. Alleged Obviousness Over Kan

Petitioner contends claims 1, 3–5, and 13–15 of the '302 Patent are unpatentable under 35 U.S.C. § 103 over Kan. Pet. 24–50; Pet. Reply 10–23. Patent Owner argues that certain limitations of the cited claims are not taught or suggested by Kan. PO Resp. 37–41; PO Sur-reply 10–15. We

address Petitioner's and Patent Owner's arguments below and determine, for the reasons provided below, that Petitioner shows by a preponderance of the evidence that Kan renders claims 1, 3–5, and 13–15 obvious.

1. Analysis of Cited Art as Applied to Independent Claim 1

a) Petitioner's Assertions Regarding Elements of Claim 1

Petitioner asserts that all of the elements of claim 1 are taught or suggested by Kan. Pet. 29–41. Petitioner asserts that a person of ordinary skill in the art would have understood that "a connector assembly" means a connector housing with elements of a connector. *Id*. at 29 (citing Ex. 1006 ¶ 66). Additionally, Petitioner asserts that although Kan does not explicitly utilize the term "a modular plug having a plurality of terminals disposed thereon," Kan discloses a cavity for the purposes of receiving an input so that the input of the terminals interacts with terminals 12 of the connector, which is equivalent to the recess adapted to receive at least a portion of a modular plug. *Id*. at 31. Petitioner asserts that a person of ordinary skill in the art would substitute an "input power source having terminals" with a "modular plug having terminals" to yield predictable results as both are well known structures, thereby rendering "a modular plug having a plurality of terminals disposed thereon" to have been obvious in view of Kan. *Id*. With respect to the limitations that at least a portion of the first conductors are substantially coplanar, Petitioner asserts that Kan, in Figure 3A, illustrates terminals 12, which are "substantially coplanar and have adiabatic bends with differing effective radii." *Id.* at 40 (citing Ex. 1006 ¶¶ 82–83).

b) Patent Owner's Arguments Regarding Elements of Claim 1

As discussed above, Patent Owner's arguments with respect to this ground are largely directed towards Petitioner's proposed construction of "effectively curved portion" recited in claim 1 and Patent Owner's

alternative construction. PO Resp. 37–41; PO Sur-reply 10–15. We have addressed Patent Owner's arguments in the Claim Construction section above. *See* Section II.C.i. As noted above, Patent Owner argues that "effectively curved portion" should be construed as "a portion producing the desired effect of being curved by approximately 90°," with which we do not agree. Because Patent Owner's arguments rely on its own construction, i.e., not the adopted construction, we do not find those arguments to be persuasive.

Patent Owner also argues that "Kan's terminals are 'effectively straight,' and exhibit no change in their ultimate direction." PO Resp. 37–38 (citing Ex. 1003, Fig. 3A); PO Sur-reply 11. We do not find this to be persuasive because claim 1 does not recite limitations directed to "ultimate direction." The claimed requirement is for an "effectively curved portion," and we are persuaded that Petitioner has demonstrated that Kan discloses conductors with such curved portions.

Patent Owner also argues that even assuming, arguendo, that Petitioner's claim constructions were correct, Kan would not expressly or inherently teach or suggest that the effective radius is different for *each* of the conductors, i.e., that bends, or effective radii, in the conductors shown in Figure 3 of Kan could be the same although they bend in different directions. PO Resp. 38–40.

We do not agree with Patent Owner's arguments. Patent Owner's contention that the curvatures for the conductors illustrated in Figure 3A of Kan would be the same is supported by conjecture. The declaration cited for support (Ex. 2006 ¶¶ 114–116) argues that the "top set of four conductors are mirror images of the bottom set[] of four conductors," so that twinned conductors would have identical effective bend radii. Mr. Baxter also

testifies that "[i]t is my opinion the Petitioner injects 'vector' in its construction[,] i.e., to read a direction into the claim language[,] so that it can construe Kan as being more like the '302 Patent embodiments than it actually is." *Id*. ¶ 116.

Again, we do not agree. The center-line conductor, illustrated in Figure 3A of Kan, just above "3B," has almost no curvature, compared to the outer conductors which have a greater degree of curvature. The "mirrored" conductors have bends which occur in different directions, such that the curved portions would not share a common radius. As Patent Owner notes: "a radius is simply defined as a straight line from the center of a circle (or sphere) to any point at its circumference." PO Resp. 26–27 (citing Ex. 2006 ¶ 76). The effective radii of the "twinned" conductors would be measured from different circles or spheres, and would not be the same. As such, we do not agree that the paths of the conductors have the same curvature or even vectors of curvature, and we do not determine Patent Owner's arguments to be persuasive.

As such, we are persuaded that Petitioner has shown by a preponderance of the evidence that Kan teaches or suggest all of the limitations of claim 1 to render that claim obvious under 35 U.S.C. § 103, for the reasons identified in the Petition, as discussed above, which we adopt as our own findings.

2. Analysis of Cited Art as Applied to Independent Claims 13–15

With respect to independent claim 13, Petitioner asserts that most of the elements of claim 13 are substantially the same as elements recited in claim 1. Pet. 45. Petitioner notes that claim 13 recites "a recess formed in the front surface," and "a rear cavity," and argues that a person of ordinary skill in the art would conclude that those differing aspects of claim 13 are

taught or suggested by the disclosure of Kan. *Id*. at 45–46 (emphases added) (citing Ex. 1006 ¶¶ 101–103).

With respect to independent claim 14, Petitioner asserts that most of the elements of claim 14 are substantially the same as elements recited in claim 13. Pet. 46. Petitioner argues that claim 14 recites "electric components dispose din [sic] at least some of said first conductive pathways," which is disclosed by Kan with its component 16 mounted on circuit board 15 and having electric traces 17. *Id*. (citing Ex. 1003, 2:34–37, Figs. 4A, 4B; Ex. 1006 ¶ 116).

With respect to independent claim 15, Petitioner asserts that the claim closely resembles claim 1 but recites some elements in means-plus-function format. Pet. 47. Petitioner discusses all of the elements of claim 15, providing the corresponding structure, as well as citations to elements of Kan that are asserted to teach or suggest those corresponding structures. *Id*. at 47–50 (citing Ex. 1006 ¶¶ 120–128).

Patent Owner does not provide separate arguments with respect to the elements of claims 13–15, except with respect to similar elements argued regarding claim 1. *See* PO Resp. 37–41. As discussed above, we are not persuaded by Patent Owner's arguments.

As such, we are persuaded that Petitioner has shown by a preponderance of the evidence that Kan teaches or suggest all of the limitations of claims 13–15 and renders those claims obvious under 35 U.S.C. § 103, for the reasons identified in the Petition, as discussed above, which we adopt as our own findings.

3. Analysis of Cited Art as Applied to Dependent Claims 3–5

Claim 3 requires a plurality of bend segments, claim 4 requires at least one electrical component disposed on the at least one substrate at an

elevation below the first conductors, and claim 5 requires at least one conductor carrier adapted to retain the first conductors in a predetermined orientation. We have reviewed Petitioner's explanations and supporting evidence regarding dependent claims 3–5, citing to specific portions of Kan, and, on the current record, find them persuasive. *See* Pet. 41–45.

Patent Owner does not address separately Petitioner's explanations and supporting evidence as to how Kan accounts for the limitations recited in dependent claims 3–5, other than discussed above. *See generally* PO Resp; PO Sur-reply. We determine, therefore, that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of dependent claims 3–5 would have been obvious over Kan under 35 U.S.C. § 103. We adopt these findings as our own.

4. Conclusion on Obviousness over Kan

For the reasons provided above, we determine that Petitioner has shown by a preponderance of the evidence that Kan renders 1, 3–5, and 13–15 of the '302 Patent unpatentable under 35 U.S.C. § 103.

F. Alleged Anticipation by Kan

Petitioner also contends that claims 1, 3–5, and 13–15 of the '302 Patent are anticipated by Kan under 35 U.S.C. § 102(a). Pet. 50–51. Petitioner argues that "Kan indisputably discloses elements [a]–[e] and [g]–[h] as they are described in the '302 patent," and that limitation [f], i.e., forming an electrical contact with respective terminals when the modular plug is received within the recess, "is expressly disclosed in Kan except for the 'modular plug' component." *Id*. Petitioner continues that "a person of skill in the art would understand the 'input terminal' described in Fig. 2 of Kan to be equivalent to the 'modular plug' disclosed in claim 1 of the '302

patent." *Id*. at 51 (citing Ex. 1006 ¶¶ 130–131). Petitioner makes similar assertions with respect to claims 3–5 and 13–15. *Id.* Patent Owner opposes this ground on the same bases discussed above with respect to the obviousness ground over Kan, and does not address anticipation by Kan separately. PO Resp. 41.

We determine that Petitioner has shown by a preponderance of the evidence that claims 1, 3–5, and 13–15 are also anticipated by Kan. We note that although Petitioner refers to limitation [f], the discussion of the "modular plug" limitation is made with respect to limitation [c]. *See* Pet. 31. Petitioner invokes the understanding of a person of ordinary skill in the art in connection with construing the claim terms "a connector assembly," "a modular plug having a plurality of terminals disposed thereon," "at least one electrically conductive pathway," "effective radius," and "effectively curved portion." *See id*. at 29, 31, 33, 38–39. As such, those portions are taken as discussion of claim scope and not how elements in the claims are specifically obvious in view of the teachings of Kan.

In addition, assuming the understanding that some type of plug would be received by the recess of the connector of Kan to allow for electrical connection and communication, the presence of some type of plug would have been inherent to the disclosure of Kan. As such, Petitioner's assertions that a modular plug having terminals would have been obvious to use in view of Kan, and that such plugs were well known in the art (*id*. at 31–32), are directed to inherency, with respect to the anticipation ground over Kan. Also, we determine that the additional claims addressed in this ground, i.e., claims 3–5 and 13–15, are discussed in the obviousness ground with respect to how one of ordinary skill in the art would have construed claim terms therein, and do not address the obviousness of claim elements over the

disclosure of Kan. *See id*. at 41–50. As such, Petitioner has demonstrated that Kan discloses the limitations of those latter claims.

In consideration of the above, we are persuaded that Petitioner has shown by a preponderance of the evidence that Kan anticipates claims 1, 3–5, and 13–15 of the '302 Patent under 35 U.S.C. § 102.

G. Alleged Obviousness over Kan and Hughes

Petitioner contends claims 6–8 of the '302 Patent are unpatentable under 35 U.S.C. § 103 over Kan and Hughes. Pet. 52–56; Pet. Reply 16–23. Patent Owner argues that the references teach away from each other, that the rationale supplied by Petitioner is incorrect, and that the asserted combination is based improperly on hindsight. PO Resp. 41–49; PO Sur-reply 16–23. We address Petitioner's and Patent Owner's arguments below and determine, for the reasons provided below, that Petitioner has shown by a preponderance of the evidence that the combination of Kan and Hughes renders claims 6–8 obvious.

1. Analysis of Cited Art Applied to Independent Claim 6

Petitioner asserts that independent claim 6 recites identical elements to those found in claim 1, but "diverges from claim 1 in its last element," namely "wherein said at least one substrate is disposed in substantially vertical orientation within, and substantially orthogonal to the front face of, said housing." Pet. 52 (citing Ex. 1006 ¶¶ 139–143). Petitioner acknowledges that Kan discloses that its circuit board is disposed with its housing in a substantially vertical orientation. *Id*.

Because of this, Petitioner also cites to Hughes for its disclosure of a circuit board engaged with a sidewall of the connector so that it is orthogonal to the front face of the housing. Pet. 53 (citing Ex. 1004, Fig. 1). Petitioner argues that it would have been obvious for a person of ordinary

skill in the art to apply the teachings of Hughes to the connector of Kan because both are directed to incorporating a circuit board with a connector assembly, that such a combination would allow for the circuit board to be oriented conveniently for insertion of a connector plug, and that such a configuration would save space for the connector assembly. *Id*. at 53–54 (citing Ex. 1006 ¶¶ 137, 145–149).

Patent Owner responds that the '302 Patent expressly teaches away from the combination proposed by Petitioner of Kan and Hughes for the same reason that it taught away from Scheer '067 (U.S. Patent No. 5,759,067, Ex. 2004). According to Patent Owner, Scheer '067 discloses a second printed circuit board external to the housing of the connector of Scheer '067 and was discussed in the prosecution of the application that resulted in the '302 Patent. PO Resp. 41–42. Patent Owner also argues that "any electronic components if used would necessarily be disposed on an external PCB or motherboard (10), and which would as shown in Hughes clearly *not* fit within the connector of Kan." *Id*. at 42. Petitioner responds that Hughes was cited to show the possible reorientation of the internal circuit board from horizontal to vertical, and not to show that the external circuit board of Hughes could be inserted in the connector of Kan. Pet. Reply 16. We agree and continue to be persuaded that one of ordinary skill in the art would have been motivated to reorient the printed circuit board of Kan in view of Hughes, with or without moving the board external to the housing of the connector. *See* Inst. Dec. 29.

Patent Owner also argues that its declarant, Mr. Baxter, disagrees with Dr. Lebby's opinion that the orthogonal orientation of a substrate was well-known. PO Sur-reply 16 (citing Pet. Reply 18–19; Ex. 1006 ¶ 145). Patent Owner continues that Petitioner failed to explain how the combination

would occur and how it would not wholly frustrate and impermissibly change the basic operating principle of Kan. *Id*. Patent Owner also argues that when the components of the combination were known previously, and where the combination is believed ineffective, the invention can still be determined to be non-obvious. *Id*. at 18–19 (citing *United States v. Adams*, 383 U.S. 39, 50 (1966)). We acknowledge that Mr. Baxter disagrees with Dr. Lebby (*compare* Ex. 2006 ¶¶ 127–131, *with* Ex. 1011 ¶¶ 23–29) but we determine Dr. Lebby's testimony to be more credible. We determine that the manner of orienting of a substrate within a connector falls within a "finite number of identified, predictable solutions," such that the reorientation of such a substrate would have been "obvious to try." *KSR*, 550 U.S. at 421. As such, we do not determine Patent Owner's argument to be persuasive.

Patent Owner also argues that the rationale proposed by Petitioner is unpersuasive because the unfiltered connector of Hughes does not disclose an internal board, and that any combination of Kan with Hughes would result, at most, in the "second conductors," but not the "first conductors," being bent so that the internal conductors mate with the internal substrate. PO Resp. 43 (citing Ex. 2006 ¶¶ 124, 128). Patent Owner additionally asserts that the reorientation envisioned by the combination would add to material costs, reduce performance due to longer conductor runs, necessitate additional alterations, and provide no space savings or advantage. *Id*. at 43–44 (citing Ex. 2006 ¶¶ 122, 129). Petitioner responds that the rationale for combining Kan and Hughes merely involves a design choice, and would apply a known technique to a known device to yield predictable results in an improved system. Pet. Reply 19–20 (citing *KSR*, 550 U.S. at 415–421). We agree with Petitioner. "The test for obviousness is not whether the features

of a secondary reference may be bodily incorporated into the structure of the primary reference. . . . Rather, the test is what the combined teachings of those references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Any modification of a prior art device will result in changes thereto, as a matter of course; the question, rather, is whether there existed sufficient motivation for a person of ordinary skill to make the proposed modifications in light of the evidence of record. We find that Petitioner's evidence of the benefits resulting from the combination, i.e., saving space for the connector assembly and reorienting the plug-receiving opening for insertion of a connector plug in accordance with the desired implementation based on where the housing is mounted, provide sufficient motivation to make these changes, and that Patent Owner's arguments about the materials costs and possible reduced performance are insufficient to defeat the evidence of motivation to combine.

Patent Owner also argues that Petitioner's combination of Hughes and Kan is the product of impermissible hindsight, and the combination would change the basic principles of operation of the connectors for which they were designed. PO Resp. 45–47. Patent Owner argues that "Hughes was designed to operate by mounting to an external circuit board, and Kan was designed to operate by engaging a circuit board inside of the housing," and their combination would render Kan unfit for its intended purpose of supporting a compact size. *Id*. at 46–47. We do not agree. Mr. Baxter has acknowledged that Hughes and Kan are analogous technologies directed to the common problem in the art of incorporating a circuit board with a connector so that it may offer additional functions. *See* Ex. 2006, ¶¶ 145–148. We disagree that the combination of Kan and Hughes would change

either device's basic principle of operation. It is axiomatic that such a combination of Kan and Hughes would not be the same as the individual connectors, and we are not persuaded that the size of Kan would need to be increased such that it would be unfit for its intended purposes. As such, we do not determine Patent Owner's argument to be persuasive.

With respect to claim 6 specifically, Patent Owner argues that the "connector receptacle of Hughes does not include any sort of substrate within its housing," such that the substrate of Hughes is not incorporated "within . . . said housing," per claim 6. PO Resp. 47. We have addressed this incorporation argument above, and do not determine it to be persuasive.

On the whole, we find that the information provided by Petitioner demonstrates by a preponderance of the evidence that the subject matter of claim 6 would have been obvious over the combination of Kan and Hughes.

2. Analysis of Cited Art Applied to Dependent Claims 7 and 8

With respect to dependent claim 7, Petitioner asserts that the limitations of that claim are identical to an element of claim 1, discussed above, argued to be disclosed by Kan alone. Pet. 54 (citing Ex. 1006 ¶¶ 150–151).

With respect to dependent claim 8, that claim further recites that "said first and second conductors mate with said at least one substrate at the top and bottom portions thereof, respectively." Petitioner asserts that this aspect is taught by Kan, namely that the circuit board 15 is mated with the bent contact end 121 of the upper terminals 12, and bent lower contacts 131 and 141 extending through the cavity 115 engage with the circuit board 15 at the top and bottom portions of the circuit board 15, respectively. Pet. 54–55 (citing Ex. 1003, Fig. 2; Ex. 1006 ¶¶ 152–153).

With respect to claims 7 and 8, Patent Owner argues that a person of ordinary skill in the art would not have combined Hughes with Kan to meet the limitations of claims 7 and 8 because Kan does not teach changing the ultimate direction of the conductors and Hughes lacks the recited substrate. PO Resp. 49 (citing Ex. 2006 ¶ 124). Patent Owner also argues that such a skilled artisan would have had no motivation to combine "the low-performance unfiltered connector of Hughes with the high-performance filtered connector of Kan." *Id*. (citing Ex. 2006 ¶¶ 127–130). We have addressed these arguments *supra* regarding the analysis of claims 1 and 6, and do not find them to be more persuasive in view of claims 7 and 8. As such, we do not determine Patent Owner's argument to be persuasive.

We agree with and are persuaded that Petitioner has demonstrated by a preponderance of the evidence that dependent claims 7 and 8 would have been obvious under 35 U.S.C. § 103 in view of the teachings of Kan and Hughes.

H. Alleged Obviousness over Kan, Hughes, and Loudermilk

Petitioner contends claims 9, 11, 12, and 16 of the '302 Patent are unpatentable under 35 U.S.C. § 103 over Kan, Hughes, and Loudermilk. Pet. 56–70; Pet. Reply 23–25. Patent Owner argues that there would not have been motivation to combine the references and the combination of references would not have achieved the performance requirements needed. PO Resp. 49–54; PO Sur-reply 23–25. We address Petitioner's and Patent Owner's arguments below and determine, for the reasons provided, that Petitioner has shown by a preponderance of the evidence that Kan, Hughes, and Loudermilk render claims 9, 11, 12, and 16 obvious.

1. Petitioner's Assertions Regarding Claims 9, 11, 12 and 16

Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine the teachings of Kan, Hughes, and Loudermilk "to improve the incorporation of a circuit board with a connector, in particular to save space when designing a connector assembly with multiple circuit boards, or when the receptacle needs to be oriented in a particular manner for insertion of a connector plug." Pet. 69. Petitioner also argues that it would have been obvious to extend the teachings of Kan and Hughes with the multi-port assembly of Loudermilk, and that the utilization of stacked port pairs would have allowed for maximization of space used and compliance with industry port requirements. *Id*. at 70 (citing Ex. 1006 ¶¶ 181–182, 194–195, 209–210, 214–215, 225).

With respect to independent claim 9, Petitioner asserts that the claim recites the same elements as claims 1 and 5, but relates to a "multi-port connector assembly" as opposed to a single "connector assembly," as recited in those latter claims. Pet. 56. Petitioner asserts that persons of ordinary skill in the art would have recognized that the connectors of Kan are adaptable for multi-port assemblies and cites to Loudermilk. *Id*. at 56–57 (citing Ex. 1006 ¶¶ 161–179). Petitioner asserts the use of multiple connectors as provided in Loudermilk would have been obvious to serve additional connections, and that the mere duplication of parts provides no patentable significance unless new and unexpected results are produced. *Id*. at 58 (citing Ex. 1006 ¶¶ 162–164, 180–182; *In re Harza*, 274 F.2d 669 (CCPA 1960)).

With respect to independent claim 11, Petitioner asserts that independent claim 11 is largely identical to claims 1 and 9, with the final distinguishing element detailing that at least two of the connectors are

disposed in a port pair with conductors of the first connector being routed over a portion of their length in an angular relationship to a corresponding portion of conductors of the second conductor. Pet. 61. Petitioner asserts that Loudermilk discloses such port pairs and that both Kan and Loudermilk illustrate that the first conductors of the first connector have an angular relationship that is opposite (e.g., upside down) in comparison to the first conductors of the second connector. *Id*. at 62–65 (citing Ex. 1003, Figs. 2A; Ex. 1005, Fig. 7; Ex. 1006 ¶¶ 203–208).

With respect to dependent claim 12, that claim limits the portions of the conductors proximate to the substrate and provides that the routing occurs through mating of the portions in opposite directions. Petitioner asserts that Loudermilk illustrates, in Figure 14, a configuration where, proximate to the substrate 252b, the first conductor of first connector mates from the top of the connector towards the bottom, and the first connector of the second conductor mates from the bottom to the top of the connector to the substrate. Pet. 66–67 (citing Ex. 1005, Fig. 14; Ex. 1006 ¶¶ 211–213).

With respect to independent claim 16, Petitioner asserts that claim 16 recites identical elements to claims 1 and 9, with the exception of the last element of claim 16 directed to a plurality of restraining means that retain the conductors in a substantially coplanar and separated configuration. Pet. 68. Petitioner asserts that the corresponding structure for the restraining means "includes grooves 122/222 or grooves 282." *Id*. at 68–69 (citing Ex. 1001, 5:38–44, 5:57–63, 7:1–8, 7:24–32, 9:36–41). Petitioner asserts that the limitations are thus similar to those recited in claims 5 and 9, discussed above, and are disclosed by Kan for the same reasons. *Id*. at 69.

2. Patent Owner's Arguments Regarding Claims 9, 11, 12, and 16

With respect to the combination of Kan, Hughes, and Loudermilk, Patent Owner argues that one of ordinary skill in the art would not have been motivated to combine the single port structures of Kan and Hughes with the multi-port structure of Loudermilk, and any resulting combination would not have been able to meet the performance requirements of the '302 Patent. PO Resp. 49–50 (citing Ex. 2006 ¶¶ 139, 143). Patent Owner also argues that "each reference engages the circuit board differently," refuting the combination, and that both "Kan and Loudermilk teach and suggest effectively parallel straight runs with no change in ultimate direction and that engage at the back of the connector with another structure," unlike the instant invention. *Id*. at 50–51 (citing Ex. 2006 ¶¶ 134, 142). Patent Owner also argues that Kan and Loudermilk have "markedly different design criteria," such that a multi-port version of Kan would need to be redesigned "from the ground up" to account for the potentially severe EMI issues. *Id*. at 51–52 (citing Ex. 2006 ¶¶ 141, 143).

Petitioner responds that Hughes is applied to the combination to show that reorientation is known in the art, and Loudermilk is shown to demonstrate a multiport assembly. Pet. Reply 24. We agree that a cited reference can suggest aspects to a combination of references without requiring all of the disclosed aspects of that cited reference to be incorporated. Obviousness does not require the bodily incorporation of the teachings of one reference to another reference—an ordinary artisan has the capacity for ordinary creativity when combining references. *See Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016). We agree with Patent Owner that there are clear differences in Kan and Loudermilk, but we are not persuaded that one of

ordinary skill in the art would not have configured a multi-port version of the connector of Kan in view of the teachings of Loudermilk. As such, we do not determine Patent Owner's arguments with respect to combining the teachings of Kan, Hughes, and Loudermilk to be persuasive.

With respect to claims 11 and 12, Patent Owner argues that "[n]either Kan or Loudermilk in any way teach or suggest conductors that have 'an angular relationship to the corresponding portion of said first conductors associated with a second connector in said port pair' as claimed in claim[s] 11 and 12." PO Resp. 51, 53. We do not find this argument to be persuasive, in that Loudermilk illustrates, in Figure 14, a configuration where, proximate to the substrate 252b, the first conductor of first connector mates from the top of the connector towards the bottom, and the first connector of the second conductor mates from the bottom to the top of the connector to the substrate, providing for opposite directions and at least an angular relationship between the conductors.

With respect to claim 16, Patent Owner argues "neither Kan nor Loudermilk in any way teach or suggest conductors with 'an effectively curved portion, the effective radius of each such curved portion being different' as claimed in claim 16." PO Resp. 52, 54. This argument is identical to the argument raised above with respect to similar language in claim 1 and Kan; we find it no more persuasive in relation to claim 16.

With respect to claim 9, Patent Owner argues that "[n]either Kan or Loudermilk teach or suggest conductors in electrical connection with a substrate that is 'orthogonal' with 'respect to a front face of said housing' as explicitly claimed in claim 9." PO Resp. 51, 53. Patent Owner's argument does not, however, address the disclosure of Hughes, which is relied upon by Petitioner to suggest this aspect of claim 9. As such, we are persuaded that

the combination of Kan, Hughes, and Loudermilk renders this aspect of claim 9 obvious.

On the whole, we find that the information provided by Petitioner demonstrates by a preponderance of the evidence that the subject matter of claims 9, 11, 12, and 16 of the '302 Patent are unpatentable under 35 U.S.C. § 103 over Kan, Hughes, and Loudermilk.

I. Alleged Obviousness over Kan, Hughes, Loudermilk, and Scheer

Petitioner contends claims 11 and 12 of the '302 Patent are unpatentable under 35 U.S.C. § 103 over Kan, Hughes, Loudermilk, and Scheer. Pet. 70–75; Pet. Reply 25–27. Patent Owner argues that there would have not been motivation to combine the references, as suggested by Petitioner, and the combination fails to teach or suggest all of the elements of claims 11 and 12. PO Resp. 54–59; PO Sur-reply 25–26. We address Petitioner's and Patent Owner's arguments below and determine, for the reasons provided, that Petitioner has shown by a preponderance of the evidence that Kan, Hughes, Loudermilk, and Scheer render claims 11 and 12 obvious.

1. Petitioner's Assertions Regarding Claims 11 and 12

Petitioner notes that this ground is directed to an alternative construction for the limitations recited in claim 11. Pet. 70–71. Petitioner asserts that "there is a reasonable possibility that the claim limitation can be narrowly interpreted to require that only the portions connecting into the substrate along the same plane is considered for the purposes of determining the direction and the angular relationship." *Id*. As discussed above, however, we are not persuaded that only coplanar portions need to be considered for the limitations of claim 11 to be met.

Petitioner asserts that a person of ordinary skill in the art would have been motivated to combine the teachings of Kan, Hughes, Loudermilk, and Scheer "to improve the incorporation of a circuit board with a connector, in particular to save space when designing a connector assembly with multiple circuit boards, or when the receptacle needs to be oriented in a particular manner for insertion of a connector plug." Pet. 74. Petitioner continues that "it would have been obvious to use the fan out structure of Scheer to orient the connectors in opposite directions respective to their substrate as required, as it is a well-known technique to orient the connectors to their respective contacts or circuit boards." *Id*. at 75 (citing Ex. 1006 ¶¶ 231–233).

2. Arguments Regarding Obviousness over Kan, Hughes, Loudermilk, and Scheer

Patent Owner argues that Scheer discloses conductors that are "effectively straight," and the '302 Patent provides that such a design is "not optimal for space usage and electrical performance" and allows "for significant cross-talk and EMI opportunity." PO Resp. 55 (citing Ex. 1001, 1:44–51). Patent Owner also asserts that Scheer "does not disclose 'a port pair' as that term has been defined by Petitioner," and that "Scheer merely teaches that RJ-45 and RJ-11 jacks can be alternately used in the receptacle." *Id*. at 57–58. Petitioner responds that a person of ordinary skill in the art looking at Scheer would have clearly understood that the fan out structure of Scheer, could be used to orient a first connector in one direction, and another connector in another direction based on the teachings of Kan, Hughes, and Loudermilk, based on the rationale applied to combine the references. Pet. Reply 27 (citing Ex. 1006 ¶¶ 229, 231–234).

We note that we do not find deficiencies in the combination of Kan, Hughes, and Loudermilk as applied to the claims in that ground of

unpatentability, and we do not find Patent Owner's arguments go the efficacy of the combination of Kan, Hughes, Loudermilk, and Scheer. As such, Patent Owner's argument that Scheer fails to disclose "a port pair" is unavailing. On the whole, we find that the information and rationales provided by Petitioner collectively demonstrate by a preponderance of the evidence that the subject matters of claims 11 and 12 of the '302 Patent would have been obvious over the combination of Kan, Hughes, Loudermilk, and Scheer as well.

III. ANALYSIS OF PATENT OWNER'S REVISED CONTINGENT MOTION TO AMEND

Patent Owner's Corrected Revised Contingent Motion to Amend (Paper 23, "RMTA") seeks entry of substitute claims 17–23 to the extent that we find the Challenged Claims unpatentable. RMTA 1. As discussed above, Petitioner has shown by a preponderance of the evidence that the Challenged Claims are unpatentable. We now turn to consider whether to enter any of the substitute claims proposed by Patent Owner. For the reasons that follow, we deny Patent Owner's motion with respect to claims 17, 20, and 21 because those substitute claims are indefinite, but grant Patent Owner's motion with respect to claims 18, 19, 22, and 23.

A. Principles of Law Concerning a Motion to Amend

In an *inter partes* review, amended claims are not added to a patent as of right, but rather must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). The Board must assess the patentability of proposed substitute claims "without placing the burden of persuasion on the patent owner." *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see also Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129,

Paper 15 at 3–4 (PTAB Feb. 25, 2019) (precedential). Subsequent to the issuance of *Aqua Products*, the Federal Circuit issued a decision in *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027 (Fed. Cir. 2017) ("*Bosch*"), as well as a follow-up order amending that decision on rehearing. *See Bosch Auto. Serv. Sols., LLC v. Iancu*, No. 2015-1928 (Fed. Cir. Mar. 15, 2018) (Order on Petition for Panel Rehearing).

In accordance with *Aqua Products*, *Bosch*, and *Lectrosonics*, a patent owner does not bear the burden of persuasion to demonstrate the patentability of the substitute claims presented in the motion to amend. Rather, ordinarily, "the petitioner bears the burden of proving that the proposed amended claims are unpatentable by a preponderance of the evidence." *Bosch*, 878 F.3d at 1040 (as amended on rehearing); *Lectrosonics*, Paper 15 at 3–4. In determining whether a petitioner has proven unpatentability of the substitute claims, the Board focuses on "arguments and theories raised by the petitioner in its petition or opposition to the motion to amend." *Nike, Inc. v. Adidas AG*, No. 2019-1262, 2020 WL 1802796, at *5 (Fed. Cir. Apr. 9, 2020).

"Before considering the patentability of any substitute claims" we "first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics,* Paper 15 at 4. Accordingly, a patent owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of filing date is sought); (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the

claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

B. Substitute Claims 17–23

In the proceeding before us, Patent Owner filed a Motion to Amend, proposing substitute claims 17–23, if any original claim was found to be unpatentable. Paper 15, 2. Patent Owner requested Preliminary Guidance on its Motion to Amend. *Id.* at 3. Pursuant to Patent Owner's request, we provided Preliminary Guidance on Patent Owner's Motion to Amend. Paper 19. Because there was an error in the uploading of Petitioner's Opposition to the Motion to Amend, we issued Revised Preliminary Guidance (Paper 21), providing our views on the Motion to Amend in view of Petitioner's Opposition. After receiving our Preliminary Guidance and Revised Preliminary Guidance, Patent Owner filed a Revised Motion to Amend (Paper 23, "RMTA"), revising substitute claim 18, providing additional written description support for the substitute claims, and addressing antecedent basis issues in some of the substitute claims. RMTA 1. Subsequently, Petitioner submitted an Opposition to the Revised Motion to Amend (Paper 26, "RMTA Opp."), to which Patent Owner submitted a Reply (Paper 29, "RMTA Reply"), and Petitioner submitted a Sur-reply (Paper 31, "RMTA Sur-reply").

Patent Owner's substitute claims 17–23 are all independent, and seek to replace original claims 1, 9, 11, 13, 14, 15, and 16, respectively. Claims 17–19, 22, and 23 are set forth below, with additions to the original claim shown in underlining and deletions shown as strikethroughs or through bracketing.

1. Substitute claim 17 (to replace claim 1)

17. A connector assembly comprising:
a connector housing comprising a connector having:
a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;
at least one substrate having at least one electrically conductive pathway associated therewith;
a cavity adapted to receive at least a portion of said at least one substrate;
a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate; and
a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate;
wherein at least a portion of said first conductors are substantially coplanar and each include a portion producing a desired effect of being curved by approximately 90 degrees ~~an effectively curved portion~~, the effective radius of each said effectively curved portion being different for each of said first conductors.

RMTA, 28. For purposes of the Motion to Amend, we consider substitute claims 20 and 21 together with substitute claim 17 because they recite similar limitations that establish their patentability, as discussed below.

2. Substitute claim 18 (to replace claim 9)

18. A multi-port connector assembly comprising:

a connector housing comprising first and second sidewalls and a defining a bottom plane, and a plurality of signal conditioning connectors, the plurality of signal conditioning connectors each having:
a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;

at least one substrate having at least one electrically conductive pathway associated therewith and at least one signal conditioning component within said at least one electrically conductive pathway, said at least one substrate being disposed in substantially vertical orientation and substantially orthogonal orientation with respect to a front face of said housing;

a cavity adapted to receive at least a portion of said at least one substrate;

a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate;

a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate and exiting said connector housing through said bottom plane; and

at least one conductor carrier, said at least one conductor carrier comprising a substantially unitary body having a plurality of grooves formed therein, said grooves further adapted to frictionally receive at least a portion of respective ones of said first conductors therein, said first conductors and said plurality of grooves each including an effectively curved portion, the effective radius of each effectively curved portion being different, the at least portions of the respective ones of the first conductors received within said plurality of grooves each being effectively curved only towards a same one of the first and second sidewalls of the connector housing, the effective curvature avoiding substantially parallel straight runs of the at least portions of the first conductors, said at least one carrier also being adapted to retain said first conductors substantially coplanar and separated from one another.

Id. at 29–30.

3. *Substitute claim 19 (to replace claim 11)*

19. A multi-port connector assembly comprising:

a connector housing comprising a plurality of connectors each having:

a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;

at least one substrate having at least one electrically conductive pathway associated therewith, said at least one substrate being disposed in substantially vertical orientation and substantially orthogonal orientation with respect to a front face of said housing;

a cavity adapted to receive at least a portion of said at least one substrate;

a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate; and

a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate;

wherein at least two of said connectors are disposed in a port pair, said first conductors of a first connector in said port pair being routed over at least a portion of their length to a corresponding one of said at least one substrate in a direction having an angular relationship to the corresponding portion of said first conductors associated with a second connector in said port pair; and wherein said at least one substrate of said first connector is disposed adjacent to and parallel with a first sidewall of the connector housing, and the at least one substrate of the second connector is disposed adjacent to and parallel with a second sidewall of the connector housing, such that a space is created between the at least one substrate of the first connector and the at least one substrate of the second connector, the space

sufficient to contain: (i) a first plurality of signal conditioning electronic components mounted on said at least one substrate of the first connector, and (ii) a second plurality of signal conditioning electronic components mounted on said at least one substrate of the second connector.

Id. at 30–32.

4. Substitute claim 22 (to replace claim 15)

22. A connector assembly comprising:

connector housing means:

a recess formed within said housing means and adapted to receive at least a portion of a modular plug having a plurality of terminals;

at least one means for supporting components having at least one electrically conductive pathway associated therewith;

a cavity formed in said housing means and adapted to receive at least a portion of said at least one means for supporting;

a plurality of first conductor means disposed at least partly within said recess, said first conductor means being configured to form an electrical contact with respective ones of said terminals, and form an electrical pathway between said first conductor means and said at least one means for supporting; and

a plurality of second conductor means, at least one of said second conductor means being in electrical communication with said at least one electrically conductive pathway of said at least one means for supporting;

wherein ~~at least some of~~ said first conductor means each have a portion producing a change in direction of approximately 90 degrees ~~an effectively curved portion~~, ~~the~~ an effective radius of each said ~~effectively curved~~ portion[[s]] being different for each of said first conductor means, said ~~effectively curved~~ portions of each of said ~~at least some~~ first conductor means also being substantially coplanar with one another and having said change in direction to a common side.

Id. at 34–35.

5. Substitute claim 23 (to replace claim 16)

23. A multi-port connector assembly comprising:

a connector housing comprising a plurality of connectors each having:

a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;

at least one substrate having at least one electrically conductive pathway associated therewith, said at least one substrate being disposed in substantially orthogonal and substantially vertical orientation with respect to a front face of said housing;

a cavity adapted to receive at least a portion of said at least one substrate;

a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate;

a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate; and

at least one means for holding said first conductors, said means comprising a plurality of restraining means, said restraining means further adapted for receiving at least a portion of respective ones of said first conductors, at least some of said first conductors including a portion producing a net change in direction of approximately 90 degrees ~~an effectively curved portion~~, the effective radius of each such ~~curved~~ portion producing a net change in direction of approximately 90 degrees being different, said at least one holding means also being adapted to retain said first conductors substantially coplanar and separated from one another.

Id. at 35–37.

C. Statutory and Regulatory Requirements

Before considering the patentability of any substitute claims, the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15, at 4–8.

1. Claim Listing

A motion to amend "must include a claim listing . . . show[ing] the changes clearly." 37 C.F.R. § 42.121(b). Patent Owner's Revised Motion to Amend does so. *See* RMTA 27–37.

2. Reasonable Number of Substitute Claims

A motion to amend "may . . . propose a reasonable number of substitute claims. . . . The presumption is that only one substitute claim would be needed to replace each challenged claim, ..." 37 C.F.R. § 42.121(a)(3). *Lectrosonics*, Paper 15 at 4–5 (citing 37 C.F.R. § 42.121(a)(3) ("There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim."). The Petition challenges claims 1, 3–9, and 11–16 of the '302 Patent (14 claims) and the Revised Motion to Amend proposes substitute claims for 7 of the Challenged Claims. RMTA 12. Petitioner does not contest this aspect. *See* RMTA Opp. We determine that the number of proposed substitute claims is reasonable.

3. Respond to Ground of Unpatentability

We next consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics*, Paper 15 at 5–6. Patent Owner details how the proposed substitute claims respond to the grounds of unpatentability asserted in the Petition. RMTA 14–25. Petitioner does not contest this aspect. *See* RMTA Opp. In light of Patent

Owner's statements, we determine that the amended language in the proposed substitute claims is responsive to the grounds of unpatentability involved in this trial.

4. Scope of Amended Claims

A motion to amend may be denied where "[t]he amendment seeks to enlarge the scope of the claims of the patent or introduce new subject matter." 37 C.F.R. § 41.121(a)(2)(ii)); *Lectrosonics,* Paper 15 at 6–7. Patent Owner has detailed the changes being made through each substitute claim, with the scope of each claim being further limited through amendment. RMTA 2–5. Petitioner does not contest this aspect. *See* RMTA Opp. We determine that the limitations added via the proposed substitute claims do not enlarge the scope of the original claims.

5. New Matter/Written Description

A motion to amend claims must set forth "[t]he support in the original disclosure of the patent for each claim that is added or amended." 37 C.F.R. § 41.121(b)(1)*; Lectrosonics*, Paper 15 at 7 ("the Board requires that a motion to amend set forth written description support in the originally filed disclosure of the subject patent for each proposed substitute claim, and also set forth support in an earlier filed disclosure for each claim for which benefit of the filing date of the earlier filed disclosure is sought" (citing 37 C.F.R. § 42.121(b)(1)–(2))). For this requirement, Patent Owner must cite "to the original disclosure of the application, as filed, rather than to the patent as issued." *Id.* at 8.

The test for determining compliance with the written description requirement is whether the disclosure of the application as originally filed reasonably conveys to a person of ordinary skill in the art that the inventor had possession of the claimed subject matter at the time of filing, rather than

the presence or absence of literal support in the specification for the claim language. *See Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563 (Fed. Cir. 1991); *In re Kaslow*, 707 F.2d 1366, 1375 (Fed. Cir. 1983).

Patent Owner provides a table detailing the support in the disclosure of the '302 Patent and its provisional for each proposed substitute claim. RMTA 5–12. The statements are not disputed, other than Petitioner's assertion that specific claim limitations added in proposed substitute claims 17, 20, and 21 "lack written description support and enablement." RTMA Opp. 3–4. Given the disposition of claims 17, 20, and 21, discussed below, Petitioner's assertion regarding those claims is moot. For these reasons, and considering the entirety of the record, we find by a preponderance of the evidence that Patent Owner's proposed substitute claims find adequate support in the original disclosure of the patent, other than as noted below.

D. Indefiniteness of Substitute Claims

The substitute claims having met the statutory and regulatory requirements above, we now examine the potential indefiniteness of proposed, substitute claims 17–23. Of those claims, Petitioner continues to assert that claims 17, 20, and 21 contain claim terms that, in the context that they are used, are ambiguous and indefinite. We address those three substitute claims in this section.

Petitioner argues that the term "desired effect" in claim 17, 20, and 21 is so ambiguous as to render the claims in which it appears indefinite. RMTA Opp. 4–9. Petitioner cites to *Rowpar Pharmaceuticals Inc. v. Lornamead Inc.*, No. 13–01071, 2014 WL 1259777 (D. Ariz. March 25, 2014) as determining that "the words 'desired effect' in Lornamead's proposed interpretation are ambiguous and appear to focus on the intent of

the manufacturer or users of the accused product, which is improper during claim construction." RMTA Opp. 5. Petitioner also asserts that "desired effect" does not have a plain and ordinary meaning "because it can only have meaning if the intent or state of mind of an accused infringer such as Petitioner is considered." *Id*. at 6. Petitioner also points out that "desired effect" does not appear in the '302 Patent or its prosecution history, and cites to the testimony of Dr. Lebby that the term is ambiguous. *Id*. at 7 (citing Ex. 1011 ¶ 13). Lastly, Petitioner asserts that the term "desired effect" is "surplusage that adds nothing to the claim language." *Id*. at 8–9.

Patent Owner responds that because *Rowpar* involved a different disputed term and a different patent-in-suit, Petitioner's citation of *Rowpar* is unpersuasive. RMTA Reply 1. Patent Owner additionally argues that courts have construed terms to include "desired effect language" and found them to be definite. *Id*. (citing *Takeda Pharm. Co. v. Mylan Inc.*, No. 13-CV-04001, 2014 WL 5862134, at *25 (N.D. Cal. Nov. 11, 2014) (construing "therapeutically effective amount" as "a nontoxic but sufficient amount of the active ingredient to provide the desired effect")). Patent Owner also argues that claims 17, 20, and 21 are "self-defining" because the meaning of "desired effect" is plainly evident when reading the entire claim. *Id*. at 2. Patent Owner also argues that the specification of the '302 Patent uses the term "desired" in various contexts 33 times, and asserts that "a reasonably definite meaning can be ascribed from" the limitation used in claims 17, 20, and 21. *Id*. at 3.

Petitioner responds that although the term "desired" appears many times in the specification of the '302 Patent, per Patent Owner's argument, none of those instances discuss the claim limitation "a portion producing a desired effect of being curved by approximately 90º." RMTA Sur-reply 1.

Petitioner also argues that because no scope of the identified limitation has been identified, the limitation can introduce ambiguity into the claims. *Id*. at 3. Petitioner also argues that the *Takeda Pharmaceuticals* case, cited by Patent Owner, actually supports Petitioner's position, as the term "desired effect," in that case, explained what the desired effect would be in its specification, whereas the specification of the '302 Patent provides no such definition. *Id*. (citing *Takeda Pharm*., at *23).

After review of all of the evidence and arguments, we are persuaded that the limitations "a portion producing a desired effect of being curved by approximately 90 degrees" and "a portion producing a desired effect of changing direction by approximately 90 degrees," as recited in substitute claims 17, 20, and 21, render those claims indefinite under 35 U.S.C. § 112. We agree with Petitioner that the limitation is not described or defined in the specification of the '302 Patent, and that its meaning would rely on the intent of the manufacturer or users. Having a portion being "curved by approximately 90 degrees," can be understood through the discussion of the conductors in the specification and their illustration in the embodiments presented in the figures. However, the addition of "producing a desired effect" adds ambiguity, and makes it impossible to define the metes and bounds of substitute claims 17, 20, and 21. Our discussion with counsel for both parties at Oral Hearing is illustrative:

> JUDGE TURNER: . . . "[A] portion changing direction by approximately 90 degrees," how is that different in terms of being a limitation and limiting, you know, the claim from the prior art, as opposed to, "a portion producing a desired effect of changing the direction." The "producing a desired effect," what is -- how does that change the claim? How is that producing a desired effect, not simply a nonce term, that just says, here's something nice to do, as opposed to saying, do it. This is what

I'm – it's an argument that Petitioner has raised, and they say it raises indefiniteness, but I'm trying to understand, if I take the language out, does the claim have the same scope?

MR. GAZDZINSKI [Counsel for Patent Owner]: No, Your Honor, it does not . . . because that desired effect -- and this gets into, you know, "effectively curved," and "desired effect." What they are is, they are construct for what I meant, at least initially in the patent and here in the amendments, for a net change. Okay? In other words, that you can put all the wiggles and serpentines and 90-degree bends you want in the middle of those conductors, but -- which would, as I indicated earlier, would be good engineering practice, by the way -- but it is -- even if you wanted to do that, what this claim says is, they have to make that net change of 90 degrees in their effective direction.

So if I have a river, by analogy, and it meanders, but then when it gets to the ocean, it's pointing west instead of south, then that is a desired effect of changing direction by approximately 90 degrees. It's a net effect.

. . .

MR. MEHTA [Counsel for Petitioner]: . . . Then, going back up to the point of "desired effect," we hear now that the patent owner says this refers to a "net change." This is the first time I'm hearing about a net change, so I can't really -- I don't have anything in the record to respond to it. I would say that that also doesn't affix in determining the difference between the scope of claim 17 in your question, "without the language," "with the language."

It seems the same to us to consider what scope of project product would be captured by claim 17, MTA, with and without the desired effect of being curved by 90 degrees, or simply saying the portion is bent by 90 degrees, or the portion is bent simply by 90 degrees. It seems to be the same scope, and if that's the case, every word has to have a meaning, and "a desired effect" no longer has a meaning.

. . .

MR. GAZDZINSKI [Counsel for Patent Owner]: . . . The "desired effect" here is necessary to set a -- or "net effect" is necessary to say, Oh, yeah, in that 90-degree bend, paraphrasing, ultimately changes the direction of the river. And that's the part,

> I think, that they are missing. Just to say 90 degrees -- [indiscernible] but just a 90-degree bend in the middle of it, and it doesn't ultimately change direction.

Tr. 65:8–66:19, 75:7–24, 83:23–84:5.

As such, this provides confirmation that the intended meaning for the claim term "producing a desired effect" is not defined or determined from the specification of the '302 Patent, and would be subject to much speculation. To the extent that "producing a desired effect" is not surplusage or a nonce term, its actual coverage, in terms of claim scope, is open to too much interpretation to be considered definite. "As the statutory language of 'particular[ity]' and 'distinct[ness]' indicates, claims are required to be cast in clear—as opposed to ambiguous, vague, indefinite—terms. It is the claims that notify the public of what is within the protections of the patent, and what is not." *In re Packard,* 751 F.3d 1307, 1313 (Fed. Cir. 2014). *See also Nautilus v. Biosig Instruments, Inc.*, 572 U.S. 898 (2014) (alternate indefiniteness standard). As such, we are persuaded by a preponderance of the evidence that claims 17, 20, and 21 are indefinite under 35 U.S.C. § 112.

We also note that Petitioner also raises the issue of indefiniteness of the term "each," as used in substitute claims 17 and 20. RMTA Opp. 9–12. Because we determine substitute claims 17, 20, and 21 to be indefinite due to other claim limitations, we do not reach the additional points of indefiniteness raised by Petitioner.

Additionally, Petitioner asserted previously that the phrase "approximately 90 degrees" was ambiguous, but dropped those assertions in view of statements made in the Preliminary Guidance and Revised Preliminary Guidance and testimony from Patent Owner's declarant as to

how the term would be understood by one of ordinary skill in the art. *See* RMTA Opp. 4 n.3.

We determine the limitation "approximately 90 degrees" to not be ambiguous. A person of ordinary skill would understand "approximately 90 degrees" to be a term of degree including values near or equal to 90 degrees. *See, e.g.*, *Ortho-McNeil Pharm. v. Caraco Pharm*, 476 F.3d 1321, 1328 (Fed. Cir. 2007). It also appears that a person of ordinary skill in the microelectronics arts would understand the term "approximately 90 degrees" to accommodate minor variations and imperfections attendant to practicing the invention, which may result in the manufacture of one or more conductors that are bent "approximately"—but not *exactly*—90 degrees. As Patent Owner's declarant explains, the term "approximately" accounts for the fact that there are manufacturing tolerances such that a curve or change in direction of exactly 90 degrees may not always be achieved. Ex. 1010, 38, 53–54. Therefore, it appears that the existing state of the art would provide a background or standard such that the scope of the term "approximately 90 degrees" would not be unclear or ambiguous to a person of ordinary skill in the art.

E. Obviousness of Substitute Claims over the Prior Art of Record

Having already determined that claims 17, 20, and 21 are indefinite under 35 U.S.C. § 112, we now turn to Petitioner's assertions of obviousness of substitute claims 18, 19, 22, and 23.

1. Substitute Claim 18

Petitioner contends that Kan in combination with Hughes teaches each and every feature of substitute claim 18. RMTA Opp. 18–20. Petitioner asserts that Hughes can be applied for its teachings to reorient the printed circuit board to achieve space savings, as well as convenient insertion of the

connector plug. *Id*. at 20. Petitioner continues that the "substantially vertical" language, added to claim 9 to result in substitute claim 18, is still met by Hughes' disclosure. Patent Owner responds that the '302 Patent expressly teaches away from the combination of Hughes with Kan, and a person of skill in the art would not combine Kan and Hughes. RMTA Reply 11–12.

Claim 18 recites, in part, "the effective curvature avoiding substantially parallel straight runs of the at least portions of the first conductors." A review of Petitioner's assertions regarding substitute claim 18 shows that Petitioner is apparently still relying on Figure 3A of Kan as disclosing the "effectively curved portion[s]" in that claim. RMTA 18–20; *see also* Sections II.D.1, II.E.1 (analysis of Kan). We are not persuaded, however, that Figure 3A of Kan demonstrates such curvature as "avoiding the substantially parallel straight runs." Although each conductor on substrate is effectively curved in a portion, the overall run of the conductors therein are mostly "straight." That would also be true if consideration is given to element 121 (Ex. 1003, Fig. 2) where the conductor mates with the substrate. As such, we are not persuaded that Kan in view of Hughes teaches or suggests all of the elements of substitute claim 18.

2. Substitute Claim 19

Petitioner argues that the combination of Kan and Hughes teaches the "wherein" clause of substitute claim 19, i.e., the last clause detailing a space created sufficient to contain multiple pluralities of signal conditioning electronic components. RMTA Opp. 20–21. Petitioner explains that "Kan[] discloses these features" and "points to the same issues (i.e., orthogonal vs. parallel)." *Id.* Patent Owner responds that the '302 Patent expressly teaches

away from the combination of Hughes with Kan, and a person of skill in the art would not combine Kan and Hughes. RMTA Reply 11–12.

We are not persuaded by Petitioner's arguments because the arguments do not point out or explain with specificity how the combination of Kan and Hughes would have rendered the "wherein" clause obvious. Although Kan discloses a connector with "other desired functions such as rectification, prevention and the like" (Ex. 1003, 1:30–36, 2:35–38, 52–58), Petitioner has not demonstrated that combining the reoriented printed circuit board of Hughes into Kan would allow for spaces to be created sufficient to contain multiple pluralities of signal conditioning electronic components. *See* RMTA Opp. 20–21. As such, we are not persuaded that Kan in view of Hughes teaches or suggests all of the elements of substitute claim 19.

3. Substitute Claims 22 and 23

Petitioner contends Kan discloses the limitation "a portion producing a [net] change in direction of approximately 90 degrees," as recited in substitute claims 22 and 23. RMTA Opp. 12. Petitioner explains "Kan employs a 90 degree curve to mate with the substrate, for example at element 121." *Id.* at 12–13 (citing Ex. 1003, 2:13–15, Fig. 2). Petitioner continues that "some portion of the conductors" are curved so they eventually cause the curve of approximately 90 degrees to mate with the substrate. *Id*. at 13 (citing Ex. 1011 ¶¶ 19–20; Ex. 1003, Figs. 2, 3A). We do not agree.

Even if the bends of element 121 in Figure 2 of Kan were to show, for each terminal 12, "a portion producing a desired effect of being curved by approximately 90 degrees," Kan fails to teach or suggest the particular combination of elements recited in proposed substitute claims 22 and 23. *See* Ex. 1003, Abstract, Fig. 1 (showing a plurality of terminals 12 disposed

on terminal board 11), Fig. 2, 1:65–2:33. This is because Petitioner relies on a different portion of Kan—Figure 3A—for "the effective radius of each said portion being different for each of said first conductors means," for substitute claim 22. *See* RMTA 12–14. In other words, substitute claim 22 requires that the "portion" satisfy both aspects, i.e., producing a changing in direction of approximately 90 degrees and the effective radius of each being different. Kan does not disclose a "portion" that satisfies both aspects of claim 22. With respect to substitute claim 23, which recites, in part, "the effective radius of each such portion producing a net change in direction of approximately 90 degrees," Petitioner does not explain how the cited aspect of that claim is taught or suggested by Kan.

In addition, Petitioner also asserts that claims 22 and 23 are rendered obvious over Kan in view of Hughes, such that the resulting connector would provide a portion producing a desired effect of a 90 degree change. RMTA Opp. 16–18. Petitioner continues that "[a] person of ordinary skill in the art would modify Kan in view of Hughes to rearrange the orientation of the terminal or socket of connector depending on the different space or orientation of the device to which the connector is applied." *Id* at 16. We agree with Patent Owner, however, that this is based on "a logical premise," and does not provide a rationale to rearrange the conductors in the combined connector of Kan and Hughes such that they meet the limitations of proposed substitute claims 22 and 23. *See* RMTA Reply 9–11. Petitioner's rationale is general enough to cover any possible change that might result from taking Kan in view of Hughes. We are not persuaded that this demonstrates the obviousness of substitute claims 22 and 23 by a preponderance of the evidence.

F. Conclusion

We find that Petitioner has shown by a preponderance of the evidence that proposed substitute claims 17, 20, and 21 are indefinite as required under 35 U.S.C. § 112. Thus, we deny Patent Owner's Corrected Revised Contingent Motion to Amend with respect to substitute claims 17, 20, and 21.

We also find that Petitioner has not shown that the proposed substitute claims 18, 19, 22, and 23 are unpatentable by a preponderance of the evidence. Thus, we grant Patent Owner's Corrected Revised Contingent Motion to Amend with respect to substitute claims 18, 19, 22, and 23.

IV. CONCLUSION

Our final determination in this case is summarized below: [12]

Claims	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claims Not shown Unpatentable
1, 3–5, 13–15	102	Kan	1, 3–5, 13–15	
1, 3–5, 13–15	103	Kan	1, 3–5, 13–15	
6–8	103	Kan, Hughes	6–8	
9, 11, 16	103	Kan, Hughes, Loudermilk	9, 11, 16	
11, 12	103	Kan, Hughes, Loudermilk, Scheer	11, 12	
Overall Outcome			1, 3–9, 11–16	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	
Substitute Claims Proposed in the Amendment	17–23
Substitute Claims: Motion to Amend Granted	18, 19, 22, 23
Substitute Claims: Motion to Amend Denied	17, 20, 21
Substitute Claims: Not Reached	

[12] Should Patent Owner wish to pursue amendment of the Challenged Claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2) (2019).

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1 and 3–9, and 11–16 of the '302 Patent have been proven to be *unpatentable*;

FURTHER ORDERED that Patent Owner's Revised Contingent Motion to Amend (Paper 73) is *denied-in-part* and *granted-in-part*; and

FURTHER ORDERED that, because this is a Final Written Decision, the 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.

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