

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL CORPORATION,
WESTERN DIGITAL TECHNOLOGIES, INC., and SANDISK, LLC,
Petitioner,

v.

MARTIN KUSTER,
Patent Owner.

IPR2020-01410
Patent 8,705,243 B2

Before THOMAS L. GIANNETTI, DAVID C. McKONE, and
NABEEL U. KHAN, *Administrative Patent Judges*.

KHAN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Western Digital Corporation, Western Digital Technologies, Inc., and SanDisk, LLC (collectively, “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–18 (“the challenged claims”) of U.S. Patent No. 8,705,243 B2 (Ex. 1001, “the ’243 patent”). Martin Kuster (“Patent Owner”) filed a Preliminary Response (Paper 9, “Prelim. Resp.”). With our authorization, Petitioner and Patent Owner filed additional briefing. *See* Papers 10, 11. On February 17, 2021, upon consideration of the Petition, Preliminary Response, the additional briefing, and the evidence cited, we determined that Petitioner established a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition and instituted review to determine the patentability of the challenged claims on all grounds. Paper 13 (“Dec. Inst.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 18, “PO Resp.”), Petitioner filed a Reply (Paper 29, “Pet. Reply”), and Patent Owner filed a Sur-Reply (Paper 35, “PO Sur-reply”). An oral hearing was held on November 17, 2021, and the hearing transcript is included in the record. Paper 48 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 (2019), addresses issues and evidence raised during the *inter partes* review. For the reasons that follow, Petitioner demonstrates by a preponderance of the evidence that claims 1–18 of the ’243 patent are unpatentable.

B. Related Matters

The parties identify the following matters as related to this case: *Kuster v. Western Digital Corp.*, Case No. 3:20-cv-01089-M (N.D. Tex.), which was dismissed; *Kuster v. Western Digital Technologies, Inc.*, Case No. 6:20-cv-00563-ADA (W.D. Tex.) (“the parallel litigation”); and IPR2020-01391 involving U.S. Patent No. 8,693,206, which claims priority to the ’243 patent. Pet. 2–3; Paper 7, 2–3.

C. The ’243 Patent

The ’243 patent, titled “External Storage Device,” relates to mobile storage devices including universal serial bus (USB) sticks with chip on board (COB) flash memory. Ex. 1001, code (54), 1:17, 22–23, 27–28. The ’243 patent describes that USB connection design is governed by standards that have been revised over time. *Id.* at 1:33–35. For example, USB 2.0 standard cables have four wires, whereas newer USB 3.0 standard cables have eight wires and a new “SuperSpeed” bus for improved data transfer rates. *Id.* at 1:40–41, 45–52. The ’243 patent explains that it would be desirable to modify existing USB COB 2.0 sticks to include connections that are compatible with the USB 3.0 standard. *Id.* at 1:58–59. However, the ’243 patent explains that USB 2.0 sticks have a rectilinear design with components embedded on one side of a printed circuit board (PCB) and USB 2.0 connections flush with the opposing side of the PCB, and this configuration does not readily permit adding USB 3.0 connections to existing USB 2.0 sticks. *Id.* at 1:60–65.

Embodiments of the ’243 patent are directed to an external storage device having a substrate, a controller, at least one memory die stack, a plurality of connection fingers, and a contact bar. Ex. 1001, 2:25–30. The

external storage device connector may be configured to support two or more mechanically different USB standards. *Id.* at 2:30–32. Figure 8 of the '243 patent is reproduced below:

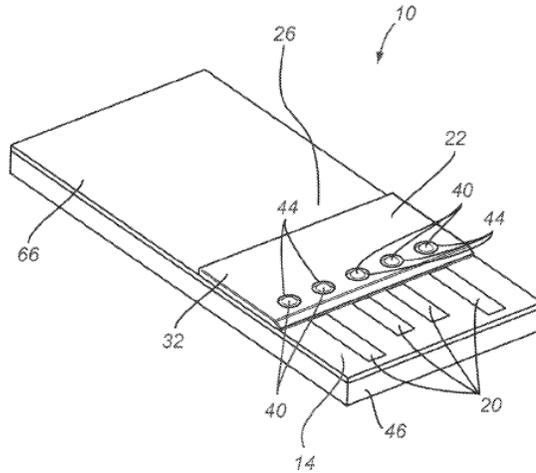


Figure 8 depicts an embodiment of external device 10 having a PCB substrate with connection surface 26 and connector 14. Ex. 1001, 4:29–30, 4:42–43. Connector 14 comprises a plurality of connection fingers 20 mounted to or embedded within connection surface 26, and contact bar 22 mounted to connection surface 26. *Id.* at 4:55–58, 5:8–9. Connection fingers 20 provide USB 2.0 standard compatibility when connector 14 is inserted in a corresponding USB 2.0 connector. *Id.* at 4:59–67. Contact bar 22 comprises cover 32 having apertures 44, through which coupling projections 40 of extensions 38 project. *Id.* at 6:10–14. The combination of coupling projections 40 and connection fingers 20 provides USB 3.0 standard compatibility when connector 14 is inserted in a corresponding USB 3.0 connector. *Id.* at 6:16–25. Extensions 38 have a spring-loaded design that ensures coupling projections 40 are securely coupled to the corresponding USB 3.0 connector. *Id.* at 6:28–32

Another embodiment of the '243 patent is shown in Figure 35, which is reproduced below:

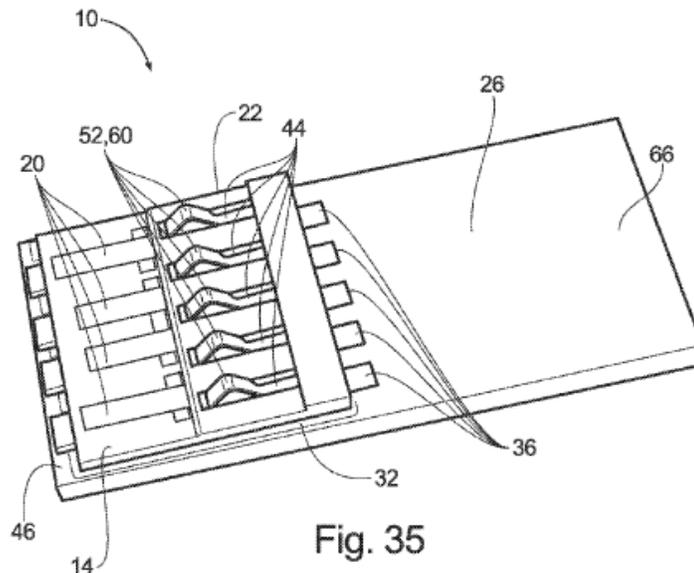


Figure 35 depicts external storage device 10 in which connector 14 comprises a combination of contact bar 22 and springs 52. Ex. 1001, 8:13–15. Connection fingers 20 may be mounted to or embedded within cover 32 of contact bar 22. *Id.* at 8:15–17. A plurality of resilient contact springs 52 may be mounted to contact bar 22 so that coupling projections 60 extend through apertures 44. *Id.* at 6:55–56, 8:20–22. Connection pads 36 on springs 52 electrically couple the springs to substrate 12. *Id.* at 8:24–28. Inserting connector 14 into a corresponding USB 3.0 connector causes contact springs 52 to apply force to the USB 3.0 connector and create an electrical coupling between coupling projections 60 and the USB 3.0 connector. *Id.* at 7:45–53. Contact springs 52 are retractable such that coupling projections 60 completely retract within an outer casing of device 10 when it is inserted into a USB 2.0 connector. *Id.* at 8:4–7.

D. Illustrative Claims

Of the challenged claims, claims 1, 12, and 18 are independent. Claims 2–11 depend from independent claim 1, and claims 13–17 depend from independent claim 12.

Claim 1, reproduced below with annotations, is illustrative.

1. [1.a] An external storage device comprising:

[1.b] a substrate that includes a connection surface and a component surface, the connection surface opposite the component surface;

[1.c] at least one memory die stack mounted on one of the connection surface and the component surface of;

[1.d] a controller configured to access the at least one memory die stack, the controller mounted on one of the connection surface and the component surface of the substrate;

[1.e] a contact bar mounted on the connection surface of the substrate, the contact bar comprising a cover and a plurality of springs, each of the plurality of springs including a portion that is located at a first distance relative to the connection surface of the substrate;

[1.f] a plurality of connection fingers embedded to be exposed upon the cover of the contact bar, wherein the plurality of connection fingers are located at a second distance relative to the connection surface of the substrate, the second distance being less than the first distance; and

[1.g] wherein a first interface comprises the plurality of connection fingers, and a second interface comprises the plurality of springs.

Ex. 1001, 9:54–10:8.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–18 would have been unpatentable on the following grounds:

Ground	Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1	1-4, 9-13, 18	102 ¹	Hsiao ²
2	1-4, 9-13, 18	103	Hsiao
3	1-18	103	Hsiao, Sun ³
4	1-6, 9-15	103	Chen ⁴ , Cheng ⁵
5	7, 8, 16, 17	103	Chen, Cheng, Hiller ⁶
6	1-18	103	Chen, Sun
7	18	103	Chen, Cheng, Wan ⁷

In addition, Petitioner relies on the USB 2.0 Specification (Ex. 1007), the USB 3.0 Specification (Ex. 1008), and the Declaration of R. Jacob Baker, Ph.D., P.E. (Ex. 1005) in support of the asserted grounds of unpatentability. *See generally* Pet. Patent Owner relies on the Declaration of Mr. Eric Welch (Ex. 2050). *See generally* PO Resp.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art at the time of the invention would include someone having a bachelor's degree in electrical engineering, computer engineering, or mechanical engineering,

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the application from which the ’243 patent issued claims priority to applications filed before this date, the pre-AIA versions of §§ 102 and 103 apply.

² Hsiao et al., US 8,480,435 B2, July 9, 2013 (Ex. 1009, “Hsiao”).

³ Sun et al., WO 2011/160321 A1, Dec. 29, 2011 (Ex. 1014, “Sun”).

⁴ Chen et al., US 7,625,243 B2, Dec. 1, 2009 (Ex. 1010, “Chen”).

⁵ Cheng et al., US 2009/0098773 A1, Apr. 16, 2009 (Ex. 1012, “Cheng”).

⁶ Hiller et al., US 2008/0150111 A1, June 26, 2008 (Ex. 1013, “Hiller”).

⁷ Wan et al., US 7,563,140 B1, July 21, 2009 (Ex. 1011, “Wan”).

and at least one year of experience in USB and other computer interface protocols. Pet. 27–28 (citing Ex. 1005 ¶¶ 43–48). Patent Owner does not propose a level of ordinary skill in its Response, but Mr. Welch testifies that “a person of ordinary skill in the art would have had at least bachelor’s degree (or equivalent), including coursework in electrical engineering, computer engineering, physics and/or related fields, and, in addition, two or more years’ work experience with USB product development involving, in particular USB-compliant connectors (plugs and receptacles).” Ex. 2050 ¶ 16.

Petitioner’s proposed level of ordinary skill does not materially differ from that articulated by Mr. Welch. Both require a bachelor’s in many of the same fields and roughly one to two years of experience with USB protocols or USB product development. Neither Petitioner nor Patent Owner indicates that the outcome of any arguments made in this case would change depending on the level of ordinary skill in the art. We adopt Petitioner’s description, which we determine to be consistent with the level of skill reflected in the asserted prior art references. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). We note, however, that we would reach the same conclusions under either proposed level of ordinary skill.

B. Claim Construction

In this *inter partes* review, the Board applies the same claim construction standard as that applied in federal courts. *See* 37 C.F.R. § 42.100(b) (2020). Under this standard claim terms “are generally given their ordinary and customary meaning” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v.*

AWH Corp., 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (citations omitted). The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent,” and “as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313, 1321. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317 (citation omitted).

1. Mounted On

Petitioner proposes that “mounted on,” as recited in claims 1, 12, and 18, be construed as “securely attached, affixed or fastened to.” Pet. 25 (citing *Asyst Techs., Inc. v. Emtrak, Inc.*, 402 F.3d 1188, 1193 (Fed. Cir. 2005)). Specifically, Petitioner argues “mounted on” as recited in the context of the challenged claims “does not require that the contact bar be mounted *entirely* on the substrate’s connection surface.” *Id.* citing (Ex. 1005 ¶¶ 105–107).

Patent Owner argues that Petitioner’s proposed construction replaces the word “on” with the word “to” and improperly encompasses any attachment of a component *to* a substrate. PO Resp. 29. Patent Owner argues that the term be construed to require “a contact bar that is positioned ‘*on*’ the surface of the substrate. *Id.* at 30. Patent Owner argues that the

plain meaning of the term and the intrinsic record provides no support for Petitioner's construction. *Id.* at 30–32.

The term “mounted on” appears in several limitations of claim 1, including limitations 1.c, 1.d, and 1.e. The dispute between the parties, however, centers only on how the term should be construed in limitation 1.e, which recites “a contact bar mounted on the connection surface of the substrate” (Ex. 1001, 9:63–64) and only with respect to the Grounds involving Chen. Patent Owner does not dispute Petitioner's contentions that Hsiao teaches a contact bar “mounted on” the connection surface of the substrate. *See* PO Resp. 42–55. For the reasons stated below, we determine Petitioner has not shown that Chen teaches certain other limitations of the independent claims regardless of whether it teaches “a contact bar mounted on the connection surface of the substrate.” *See infra* § II.D.2.

Thus, it is not necessary to construe the term “mounted on” to resolve the dispute between the parties.

2. *Embedded to be Exposed Upon the Cover of the Contact Bar*

The only word in the phrase “embedded to be exposed upon the cover of the contact bar,” recited in claims 1, 12, and 18, that Petitioner offers a construction for is the word “embedded,” which Petitioner argues has no special meaning in the art and should be afforded its ordinary dictionary definition of “set firmly into a mass or material.” Pet. 26 (citing Ex. 1005 ¶ 111). Patent Owner does not dispute Petitioner's construction. PO Resp. 34–35.

We adopt Petitioner's construction, which we find is supported by the evidence of record. Ex. 1005 ¶ 111.

3. Memory Die Stack

Petitioner argues that the term “‘stack’ may have only one memory die.” Pet. 26 (citing Ex. 1005 ¶¶ 71–72, 81, 112). Patent Owner “does not dispute Petitioner’s position.” PO Resp. 35.

Based on the issues presented, we determine that this term does not require express construction.

4. Springs, Connection Fingers, Contact Bar Cover, and First and Second Distances

In a subsection of the Claim Construction section of its Petition, Petitioner provides excerpts and photographs from portions of Patent Owner’s complaint in the parallel litigation to “show[] Patent Owner’s construction of springs, connection fingers, contact bar cover and first and second distances.” Pet. 26–27 (citing Ex. 1016, 7–8). Petitioner makes no other comments or representations regarding these excerpts.

Patent Owner argues “Petitioner does not dispute that Patent Owner’s annotations [found in the photographs from the complaint] evidence the proper construction of the foregoing terms” and thus the Board should interpret the terms consistent with the “agreed upon annotations” in those photographs. PO Resp. 35.

We disagree that by including excerpts and photographs from Patent Owner’s complaint in the parallel litigation, Petitioner adopted or agreed to the annotations present therein. Petitioner presented these excerpts in a subsection titled “Patent Owner’s Construction of ‘Springs’ ‘Connection Fingers’, ‘Contact Bar Cover’ and First and Second Distances.” Pet. 26. Petitioner makes no other substantive comments in this subsection and does not indicate that it is adopting or agreeing to any representations made in the

excerpts. Instead, it appears Petitioner included these excerpts merely to apprise the Board of the positions Patent Owner has taken in the parallel litigation. We, therefore, do not regard the annotations to represent a proposed express claim construction for these terms by either party. To the extent we need to construe any other terms, we will do so in the context of analysis of the prior art that follows.

C. Grounds Involving Hsiao (Grounds 1–3)

Petitioner contends that claims 1–4, 9–13, and 18 are unpatentable as anticipated by Hsiao. Pet. 39–53. Petitioner also contends that claims 1–4, 9–13, and 18 are obvious over Hsiao and claims 1–18 are obvious over Hsiao and Sun. *Id.* at 53–66. Patent Owner argues Hsiao is not prior art to the '243 patent. PO Resp. 36–42. Thus, before we analyze the aforementioned grounds, we first turn to the issue of whether Hsiao is prior art to the '243 patent.

1. Whether Hsiao is Prior Art to the '243 Patent

a) Parties' Contentions and Arguments

Patent Owner argues that Martin Kuster, the named inventor of the '243 patent, had already conceived of and reduced to practice his invention by September 7, 2010, over two months before the November 23, 2010, filing date of Hsiao. PO Resp. 36. Patent Owner argues Mr. Kuster first conceived a new configuration for a “USB 3 Stick” on April 15, 2009, when he sketched it in his design notebook. *Id.* at 38 (citing Ex. 2035 ¶¶ 12, 18–19). According to Patent Owner, Mr. Kuster specifically remembers this design because it was the only one of his designs that had two screws in its housing. *Id.* (citing Ex. 2035 ¶ 20). Patent Owner alleges that Mr. Kuster built a working prototype of his design before September 7, 2010. *Id.* at 37–

38. According to Patent Owner, Mr. Kuster knows that he completed the working prototype before September 7, 2010, because he knows he completed it before starting work on further incorporating an eSATA interface into a USB 3.0 flash drive, and Mr. Kuster's notebooks show these eSATA related designs dated September 7, 2010. *Id.* at 40 (citing Ex. 2035 ¶¶ 22, 32). In addition, Patent Owner alleges that Mr. Kuster knows he had prepared stable working prototypes before September 24, 2010, when he met with Victorinox⁸ to discuss go-to-market timelines. *Id.* (citing Ex. 2013 ¶ 33). Patent Owner argues the prototype, which included substrate, memories, USB controller, contact bar, connection fingers, and springs, practiced each of the independent claims of the '243 patent. *Id.* at 41 (citing Ex. 2035 ¶¶ 23–24; Ex. 2050 ¶¶ 32–34, 70–73). On October 21, 2010, Patent Owner argues Mr. Kuster met with his attorneys to disclose his invention. *Id.* at 20 (citing Ex. 2035 ¶¶ 34–35; Ex. 2045).

Petitioner disputes that Mr. Kuster conceived of and reduced to practice his invention prior to the filing date of Hsiao, primarily arguing that Mr. Kuster's assertions about the dates of conception and reduction to practice are uncorroborated and unsupported by any independent evidence. Pet. Reply 6. For example, Petitioner argues that Mr. Kuster's notebooks are unwitnessed and therefore fail to corroborate his testimony. *Id.* at 6–7. Petitioner argues that without Mr. Kuster's testimony and added annotations it is not evident that the drawings in his notebooks have the features that Patent Owner argues they do, such as the screws, contact bar, memory die

⁸ Patent Owner contends Victorinox is a company known for its iconic Swiss Army knives. PO Resp. 15 (citing Ex. 2035 ¶¶ 11–13).

stack, controller, substrate and housing. *Id.* at 8. Petitioner points out that Mr. Kuster's prototype bears no indication of when it was made. *Id.* Petitioner also argues that Mr. Kuster's testimony regarding his meetings with his attorneys is also uncorroborated because the attorney time records do not mention any of the elements claimed in the '243 patent. *Id.* at 9 (citing Ex. 2045).

Petitioner notes that Patent Owner provides no evidence of diligence in reducing the invention of the '243 patent to practice after November 23, 2010. Pet. Reply 10. Thus, even if Patent Owner could show conception prior to that date, it could not benefit from that earlier conception date. *Id.*

Similarly, Petitioner argues that Patent Owner's argument that Mr. Kuster built a working prototype before September 7, 2010, is premised solely on Kuster's uncorroborated testimony that he made the prototype before working on the eSATA interface and that an undated sketch of the eSATA interface was drawn on September 7, 2010. Pet. Reply 11 (citing Ex. 2035 ¶¶ 19–22, 32; Ex. 2038, 6). Petitioner indicates that assigning the September 7, 2010, date to the page that shows the eSATA interface, page 26 of the notebook, based on the date appearing on page 19, is "disingenuous," particularly because intervening pages 20 and 21 have been torn out making it difficult to determine whether they had other dates affixed to them. *Id.* Finally, Petitioner argues that the assertion that a stable and working prototype was built before the September 24, 2010, meeting with Victorinox is also uncorroborated. Pet. Reply 11–12.

In its Sur-reply, Patent Owner argues that the proper standard for assessing corroboration is the "rule of reason" standard and that under this standard, Mr. Kuster's notebooks, prototype, provisional application filings,

law firm billing records, and photographs all provide evidence corroborating Mr. Kuster's testimony. PO Sur-reply 16–20.

b) *Analysis*

“In an *inter partes* review, the burden of persuasion is on the petitioner to prove ‘unpatentability by a preponderance of the evidence,’ 35 U.S.C. § 316(e), and that burden never shifts to the patentee.” *Dynamic Drinkware, LLC v. National Geographics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). The burden of production, however, is a shifting burden. *Id.* at 1379. Thus, Petitioner bears the burden of persuasion, by a preponderance of the evidence, that the challenged claims are unpatentable. 35 U.S.C. § 316(e). Petitioner has proffered Hsiao, which presumptively constitutes prior art under 35 U.S.C. § 102(e), because it was filed on November 23, 2010, which is prior to the January 31, 2012, filing date the '243 patent. *See* Ex. 1001 code (22). This difference in dates shifts the burden of production to Patent Owner to produce evidence supporting a date of invention before Hsiao's filing date. *See Dynamic Drinkware*, 800 F.3d at 1379.

“To antedate . . . an invention, a party must show either an earlier reduction to practice, or an earlier conception followed by a diligent reduction to practice.” *Purdue Pharma L.P. v. Boehringer Ingelheim GmbH*, 237 F.3d 1359, 1365 (Fed. Cir. 2001). “Conception is the formation, in the mind of the inventor, of a definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.” *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998). Conception is complete when the idea is so clearly defined in the inventor's mind that only ordinary skill is necessary to reduce the invention to practice. *Burroughs Wellcome Co. v. Barr Labs., Inc.*, 40 F.3d 1223, 1228 (Fed. Cir. 1994). Actual

reduction to practice occurs when: (1) a party constructs an embodiment or performs a process that satisfies every element of the claim at issue, and (2) the embodiment or process operates for its intended purpose. *See Eaton v. Evans*, 204 F.3d 1094, 1097 (Fed. Cir. 2000).

It is well established that when a party seeks to prove conception through an inventor's testimony, the party must proffer independent evidence corroborating the inventor's testimony. *Cooper*, 154 F.3d at 1330. To be "independent," the corroborating evidence must be evidence other than the inventor's testimony. *In re NTP, Inc.*, 654 F.3d 1279, 1291 (Fed. Cir. 2011). The sufficiency of the proffered corroboration is determined by a "rule of reason" analysis in which all pertinent evidence is examined. *See NTP*, 654 F.3d at 1291. Even under the "rule of reason" analysis, however, the "evidence of corroboration must not depend solely on the inventor himself." *Cooper*, 154 F.3d at 1321; *see also Hahn v. Wong*, 892 F.2d 1028, 1033 (Fed. Cir. 1989) (corroborating evidence must be "independent of information received from the inventor").

Mr. Kuster testifies that he conceived of his invention by April 15, 2009, and reduced it to practice by September 7, 2010. Ex. 2035 ¶¶ 18, 22. Importantly, because Patent Owner argues that Mr. Kuster reduced his invention to practice before Hsiao's November 23, 2010, filing date, Patent Owner does not rely on demonstrating diligence. PO Sur-reply 27. Thus, Patent Owner's allegations of pre-dating Hsiao hinge on its argument that Mr. Kuster reduced his invention to practice before Hsiao's filing date. The evidence presented by Patent Owner regarding reduction to practice is as follows.

Mr. Kuster testifies that he conceived of a USB 3.0 flash drive on April 15, 2009. Ex. 2035 ¶ 18. As evidence, Patent Owner provides excerpts from Mr. Kuster's white notebook showing handwritten sketches of a "USB 3 Stick" with a handwritten date of April 15, 2010. Ex. 2035 ¶¶ 18–19; Ex. 2036, 1. Mr. Kuster testifies that he started building a working prototype USB 3.0 flash drive soon after April 15, 2010, and that he completed this working prototype by September 7, 2010. Ex. 2035 ¶¶ 22, 32. Mr. Kuster says he knows he completed his working prototype before September 7, 2010, because he knows he completed the working prototype before starting work on an alternative design which incorporated an eSATA interface ("eSATA alternative design"). *Id.* ¶ 22. Mr. Kuster testifies that his notebook shows a drawing of the eSATA alternative design on September 7, 2010. *Id.* Thus, Mr. Kuster concludes, his working prototype was completed before September 7, 2010. *Id.* An undated page 26 from Mr. Kuster's red notebook show sketches of a "USB 2/3 eSATA II/III" design. Ex. 2038, 6. Page 19 of the same notebook is dated September 7, 2010. Ex. 2038, 4. Thus, Mr. Kuster ascribes the September 7, 2010, date to the eSATA alternative design that he testifies is shown on page 26 of his red notebook. The working prototype is still in possession of Mr. Kuster and photographs of it were put into evidence as Exhibit 2039. Ex. 2035 ¶ 21.

Mr. Kuster also testifies that on September 24, 2010, he met with Victorinox to prepare go-to-market timelines for his USB 3.0 flash drive. Ex. 2035 ¶ 33. Mr. Kuster testifies that it was his practice to prepare stable working prototypes before such meetings and that therefore he had prepared such a stable working prototype on or before September 24, 2010. *Id.*

Having reviewed the evidence and arguments presented by both parties, we agree with Petitioner that Mr. Kuster's testimony is insufficiently corroborated by independent evidence. Mr. Kuster's testimony regarding the date that his invention was reduced to practice is supported only by his own unwitnessed notebooks and not by any evidence independent of Mr. Kuster himself. Unwitnessed inventor notebooks, by themselves, are not sufficient to corroborate inventor testimony regarding dates of conception and reduction to practice. *Aptor Miitors ApS v. Kamstrup A/S*, 887 F.3d 1293, 1297 (Fed. Cir. 2018).

Patent Owner argues that under the rule of reason, these notebooks corroborate Mr. Kuster's testimony. PO Sur-reply 20. Patent Owner relies on *Fleming v. Escort Inc.*, 774 F.3d 1371 (Fed. Cir. 2014) to argue that corroboration has been found on "far less evidence than present in the record here." PO Sur-reply 17. We find *Fleming* to be inapposite. In *Fleming* the Federal Circuit found an accused infringer's defense of prior invention to be sufficiently corroborated by documentary evidence. *Fleming*, 774 F.3d at 1377. This evidence included data from experiments, notes and correspondence, and "[m]ost tellingly" a letter from the Vice President of Cincinnati Microwave, a company that the purported prior inventor was working for, showing interest in patenting the inventor's idea. *Id.* Thus, in *Fleming* there was evidence, independent of the prior inventor, such as the Vice President's letter, that corroborated the testimony showing prior invention. As explained above, here Patent Owner presents no evidence that is independent of Mr. Kuster himself.

Moreover, even if we were to agree with Patent Owner that Mr. Kuster's unwitnessed notebooks are independent evidence corroborating his

testimony, these notebooks would still not corroborate the central element of Mr. Kuster's testimony that he reduced to practice his invention by September 7, 2010. Taken in the light most favorable to Patent Owner, the notebooks, at best, establish that Mr. Kuster sketched certain elements of his invention starting in 2009 and that he sketched a USB eSATA interface on September 7, 2010. Ex. 2035 ¶¶ 18–20, 32. The notebooks, however, do not discuss the working prototype. The only evidence presented by Patent Owner pertaining to the date a working prototype may have been created is Mr. Kuster's testimony that "I know that I completed this working prototype before I began work on an alternative design in which I further incorporated an eSATA interface into the design." Ex. 2035 ¶ 22. Nothing else, not even the notebooks, directly connect Patent Owner's assertions regarding reduction to practice to the September 7, 2010, date.

Similarly, Patent Owner provides no independent evidence supporting its argument that Mr. Kuster prepared a working prototype on or before the September 24, 2010, meeting with Victorinox. There is no evidence in the record from Victorinox, for example, regarding the meeting and no evidence other than Mr. Kuster's testimony that a stable working prototype had been prepared for the meeting. Patent Owner alleges that Mr. Kuster's notes demonstrate that a meeting with Victorinox took place on September 24, 2010, because, for example, Mr. Kuster's notebooks contain a marketing timeline for certain USB products on pages dated September 24, 2010. PO Sur-reply 25; Ex. 2037, 3. These pages, however, do not discuss a working prototype. We must rely solely on Mr. Kuster's testimony that "[i]t was my practice to prepare stable working prototypes to confirm the technical feasibility of my product designs before I would meet with Victorinox to set

timelines for launching new products.” Ex. 2035 ¶ 33. Thus, even if we were to consider Mr. Kuster’s notebooks, the contention that Mr. Kuster had prepared a working prototype by September 24, 2010, is supported only by his own testimony.

As to the prototype itself, Mr. Kuster says he has in his possession and photographs of which are in the record. Ex. 2039. But the prototype is not dated and does not provide any support to Mr. Kuster’s testimony that it was built by September 7, 2010, or by September 24, 2010.

Patent Owner also relies on law firm billing records as demonstrating that Mr. Kuster met with his lawyers in October of 2010 to discuss patenting his invention. PO Sur-reply 16, 20 (citing Exs. 2044, 2045). The law firm billing records, however, do not mention a working prototype and provide no other evidence that Mr. Kuster had completed his working prototype at the time this meeting took place.

Patent Owner contends that notebook pages filed with the provisional applications prove “the notebooks are genuine, contemporaneous records—not an after-the-fact fabrication.” PO Sur-reply 16. As discussed above, the notebook pages were not witnessed. The best argument that can be made is that they were in existence as of the filing of provisional applications in 2011, which was after the alleged September 7, 2010, invention date and Hsiao’s filing date.

Finally, Patent Owner contends Mr. Welch “confirmed that [Mr. Kuster’s testimony] credibly evidences a prior reduction to practice of the claimed invention.” PO Sur-reply 15 (citing Ex. 2050 ¶¶ 70–73). Mr. Welch testified that the “primary evidence” for his testimony was Mr. Kuster’s declaration. Ex. 1037, 35:9–15. We do not find Mr. Welch’s

testimony helpful as corroboration. It is not based on personal knowledge, nor is it independent of Mr. Kuster

In summary, we determine Patent Owner has not provided sufficient evidence corroborating Mr. Kuster's testimony that he reduced his invention to practice prior to the filing date of Hsiao, and thus has not produced evidence sufficient to satisfy Patent Owner's burden of establishing that the claimed invention is entitled to an earlier priority date than Hsiao.

2. *Ground 1 – Anticipation by Hsiao*

Anticipation under 35 U.S.C. § 102 requires that each limitation in a claim is found in a single prior art reference, arranged as recited in the claim. *Net MoneyIn, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). The disclosure of the element by the reference can be an express disclosure or an inherent disclosure. *Verdegaal Bros., Inc. v. Union Oil Co. of Calif.*, 814 F.2d 628, 631 (Fed. Cir. 1987).

As explained below, we determine based on the present record that Petitioner has shown by a preponderance of the evidence that claims 1–4, 9–13, and 18 are anticipated by Hsiao.

a) *Overview of Hsiao*

Hsiao relates to a USB connector that supports USB 2.0 and USB 3.0 protocols. Ex. 1009, 1:6–8. Hsiao explains that most devices having USB interfaces can only support USB 2.0, and is concerned with designing a USB electrical connector that is capable of connecting to both USB 2.0 and USB 3.0 protocols. *Id.* at 1:25–29. Figure 9 of Hsiao is reproduced below:

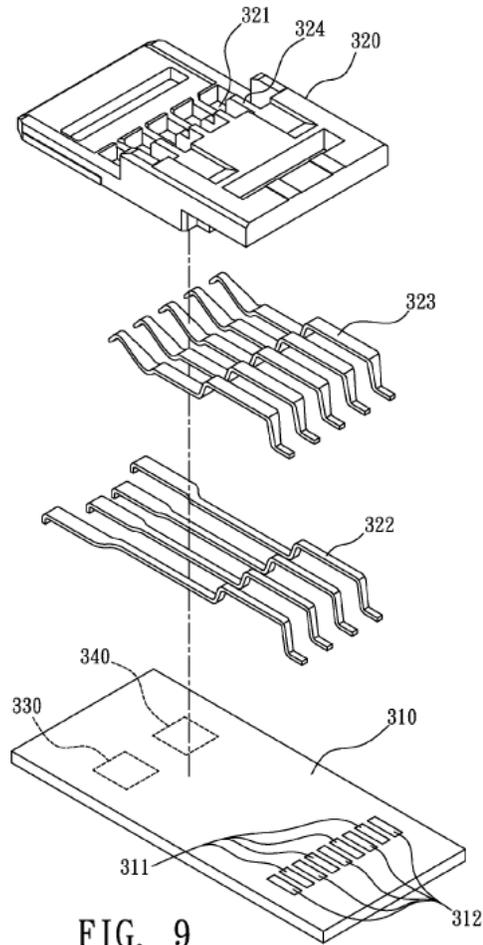


FIG. 9

Figure 9 depicts an exploded view of a preferred USB connector embodiment comprising substrate 310 and connector main body 320. Ex. 1009, 6:38–46. Substrate 310 includes a plurality of first contact pads 311 for transmitting USB 2.0 signals and second contact pads 312 for transmitting USB 3.0 signals. *Id.* at 6:47–51, 6:59–7:3. Main body 320 is made of insulating material and includes a plurality of opening slots 321 and slot columns 324 positioned between adjacent opening slots 321. *Id.* at 7:4–10.

A plurality of first terminals 322 are installed below slot columns 324 and coupled to first contact pads 311. Ex. 1009, 7:10–15. A plurality of second terminals 323 are installed in opening slots 321 and coupled to

second contact pads 312. *Id.* at 7:18–22. Figure 10 of Hsiao is reproduced below:

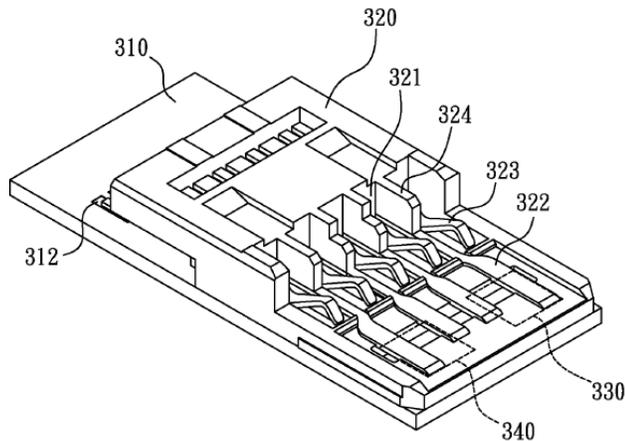


FIG. 10

Figure 10 depicts an assembled view of a preferred USB connector embodiment. First terminals 322 and second terminals 323 are staggered and integrally formed with connector main body 320, which is disposed on substrate 310. Ex. 1009, 7:39–43. Four first terminals 22 function as a USB 2.0 connector, and five second terminals 323 enable function as a USB 3.0 connector. *Id.* at 7:47–51.

b) *Analysis of Independent Claim 1*

a. [1.a] “An external storage device comprising”

Petitioner argues that Hsiao discloses an external storage device in the form of a “USB COB flash memory device.” Pet. 39 (citing Ex. 1009, 7:30–36, Figs. 9, 10). Patent Owner does not explicitly contest Petitioner’s arguments regarding the preamble of claim 1. *See generally* PO Resp.

Generally, a preamble does not limit a claim. *Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). Here, we need not decide whether claim 1’s preamble limits the claim because Petitioner

establishes that Hsiao's disclosure of a USB flash memory device discloses "[a]n external storage device," as recited in the preamble of claim 1.

b. [1.b] "a substrate that includes a connection surface and a component surface, the connection surface opposite the component surface"

Petitioner identifies Hsiao's "Chip on Board (COB) substrate" as disclosing the claimed substrate. Pet. 40 (quoting Ex. 1009, 6:51–55). Petitioner identifies the "surface [of the COB substrate] where contact pads 311 and 312 are installed" as the claimed "connection surface." Pet. 40 (citing Ex. 1009, 6:47–7:3). Petitioner identifies the surface where memory 340 and controller 330 are installed as the "component surface" and argues that this surface is opposite the connection surface as indicated by the dotted lines in Figures 9 and 10 of Hsiao. Pet. 41 (citing Ex. 1009, Figs. 9, 10; Ex. 1005 ¶¶ 156–158). Patent Owner does not explicitly contest Petitioner's arguments regarding limitation 1.b. *See generally* PO Resp.

Based on the evidence of record and the parties' arguments, we are persuaded that Hsiao's disclosure of the COB substrate with contact pads on one side and memory and controller on the other side discloses "a substrate that includes a connection surface and a component surface, the connection surface opposite the component surface," as recited in limitation 1.b.

c. [1.c] "at least one memory die stack mounted on one of the connection surface and the component surface"

Petitioner identifies Hsiao's flash memory 340 coupled to contact pads on substrate 310 of Hsiao's USB flash memory device as the claimed "memory die stack mounted on one of the connection surface and the component surface." Pet. 41 (citing Ex. 1009, 7:30–33). Petitioner argues that one of ordinary skill would have known that flash memory 340

necessarily has at least one memory die. *Id.* at 41–42 (citing Ex. 1005 ¶¶ 159–160). Patent Owner does not explicitly contest Petitioner’s arguments regarding limitation 1.c. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments. Hsiao discloses “[t]he substrate 310 of the USB connector of the present invention is further installed with a USB controller 330 and at least one flash memory 340 respectively coupled to the plural first contact pads 311 and the plural second contact pads 312.” Ex. 1009, 7:30–33. Dr. Baker provides credible testimony that “a flash memory must have at least one memory die.” Ex. 1005 ¶ 160. Thus, Hsiao’s USB connector with its flash memory 340 discloses the claimed “one memory die stack mounted on one of the connection surface and the component surface.” For the aforementioned reasons provided by Petitioner, we are persuaded Hsiao discloses limitation 1.c.

d. [1.d] “a controller configured to access the at least one memory die stack, the controller mounted on one of the connection surface and the component surface of the substrate”

Petitioner identifies Hsiao’s USB controller 330 connected to contact pads on the substrate, as disclosing the claimed “controller configured to access the at least one memory die stack.” Pet. 42 (citing Ex. 1005 ¶¶ 161–162). Petitioner argues the controller is configured to access Hsiao’s memory and that both the controller and memory are connected to contact pads 311 and 312. *Id.* Petitioner further argues that one of ordinary skill would have known that the USB controller provides an interface between the USB bus and the flash memory. *Id.* (citing Ex. 1005 ¶¶ 161–162).

Patent Owner argues that Hsiao lacks a disclosure of this element and that Petitioner instead relies on what a person of ordinary skill “would have

imagined would have been provided in Hsiao's device" rather than what was "disclosed or necessarily present." PO Resp. 52.

After considering the evidence of record, we are persuaded by Petitioner's arguments. Hsiao discloses "[t]he substrate 310 of the USB connector of the present invention is further installed with a USB controller 330 and at least one flash memory 340 respectively coupled to the plural first contact pads 311 and the plural second contact pads 312." Ex. 1009, 7:30–33. Dr. Baker credibly testifies that because "both the controller and memory are connected to contact pads 311 and 312, it is clear that the controller is configured to access memory" since "the purpose of the USB controller is to provide a USB standard compatible interface between the USB bus and the flash memory." Ex. 1005 ¶ 162.

We disagree that Petitioner has improperly relied on the knowledge of one of ordinary skill in lieu of disclosure in Hsiao. "A reference anticipates a claim if it discloses the claimed invention 'such that a skilled artisan could take its teachings in combination with his own knowledge of the particular art and be in possession of the invention.'" *In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995) (quoting *In re LeGrice*, 301 F.2d 929, 936 (CCPA 1962)). Furthermore, "[e]very patent application and reference relies to some extent upon knowledge of persons skilled in the art to complement that [which is] disclosed." *In re Bode*, 550 F.2d 656, 660 (CCPA 1977) (quoting *In re Wiggins*, 488 F.2d 538, 543 (CCPA 1973)). Those persons "must be presumed to know something" about the art "apart from what the references disclose." *In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962). Hsiao explicitly discloses (1) a USB controller, (2) flash memory, and (3) that the two are connected to each other. Dr. Baker's testimony adds what one of ordinary

skill would have known about USB controllers, i.e., that the USB controllers provide an interface between the USB bus and flash memory and that, therefore, Hsiao's USB controller accesses the memory that it is connected to. For the aforementioned reasons provided by Petitioner, we are persuaded Hsiao discloses limitation 1.d.

- e. [1.e] “a contact bar mounted on the connection surface of the substrate, the contact bar comprising a cover and a plurality of springs, each of the plurality of springs including a portion that is located at a first distance relative to the connection surface of the substrate”*

Petitioner identifies Hsiao's connector main body 320 as disclosing the claimed contact bar comprising a cover and terminals 323. Pet. 42 (citing Ex. 1009, 7:39–42). Petitioner argues that the terminals disclose the claimed “springs” which are integrally formed with the connector main body and that the connector main body is mounted on the substrate's connection surface. *Id.* at 42–43 (citing Ex. 1009, 7:39–47). Petitioner argues that “[o]ne end of the springs (terminals 323) is ‘upwardly bended then downwardly bended after being exposed outside the opening slots 321.’” *Id.* at 43 (quoting Ex. 1009, 7:27–29). According to Petitioner, the height of the upwardly bended portion of the springs discloses the portion of the springs “that is located at a first distance relative to the connection surface of the substrate.” *Id.* (citing Ex. 1009, Fig. 10; Ex. 1005 ¶¶ 163–165). Petitioner's contentions regarding the contact bar and the springs are shown in Hsiao's Figure 10, as annotated by Petitioner, reproduced below.

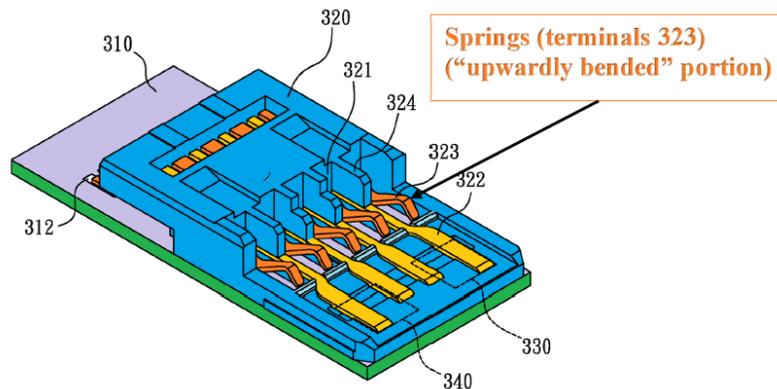


FIG. 10

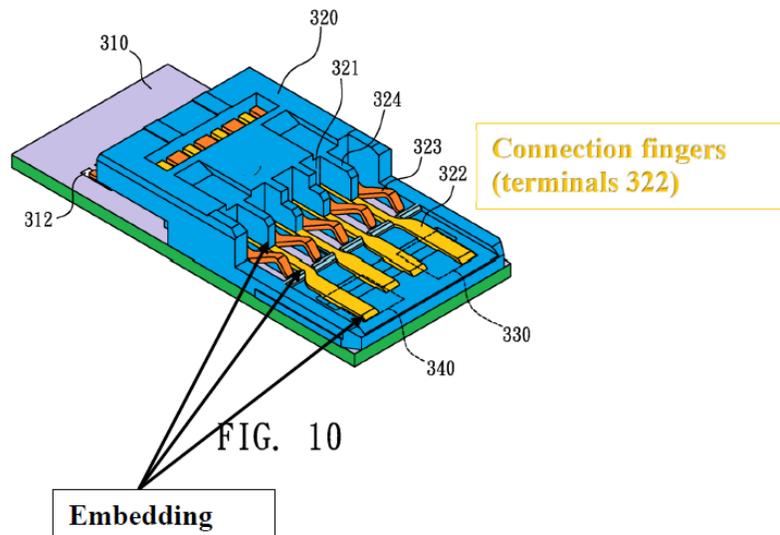
Id. at 44. The Figure above is a schematic assembled view of a USB connector with color and annotations added by Petitioner. Patent Owner does not explicitly contest Petitioner's arguments regarding limitation 1.e. *See generally* PO Resp.

After considering the evidence of record, for the reasons provided by Petitioner summarized above, we are persuaded that Hsiao's disclosure of connector main body 320 with terminals 323 discloses the claimed "contact bar comprising a cover and a plurality of springs." We are also persuaded that the height of the upwardly bended portion of terminals 323 discloses the claimed "first distance relative to the connection surface." Thus, we are persuaded Hsiao discloses limitation 1.e.

f. [1.f] "a plurality of connection fingers embedded to be exposed upon the cover of the contact bar, wherein the plurality of connection fingers are located at a second distance relative to the connection surface of the substrate, the second distance being less than the first distance"

Petitioner identifies Hsiao's first terminals 322 as disclosing the claimed "plurality of connection fingers." Pet. 44 (citing Ex. 1005 ¶ 167).

These first terminals can be seen in yellow in Petitioner’s annotated version of Hsiao’s Figure 10.



Id. at 46. The Figure above is a schematic assembled view of a USB connector with color and annotations added by Petitioner. As shown in Figure 10 above, Petitioner argues that Hsiao’s first terminals are embedded in multiple places. First, Petitioner argues the first terminals are “embedded to be exposed upon the cover of the contact bar” by being “‘installed below the plural slot columns 324’ of connector main body 320, and ‘exposed outside the slot columns 324 then forwardly extended.’” *Id.* at 44 (citing Ex. 1009, 7:10–13, Fig. 10). Second, Petitioner argues the terminals are also embedded when they are “held in the opening in the horizontal lip shown in Ex. 1009, Fig. 10.” *Id.* at 45 (citing Ex. 1005 ¶ 168). Finally, Petitioner argues that the “‘forwardly extended’ contact portion of terminals 322 would necessarily be fixed firmly in the front section of connector main body 320 to facilitate proper mating with and ensure compatibility with the USB 2.0 standard receptacle” and that this shows that the forwardly extended portion of the terminals are also embedded upon the cover of the contact bar. *Id.*

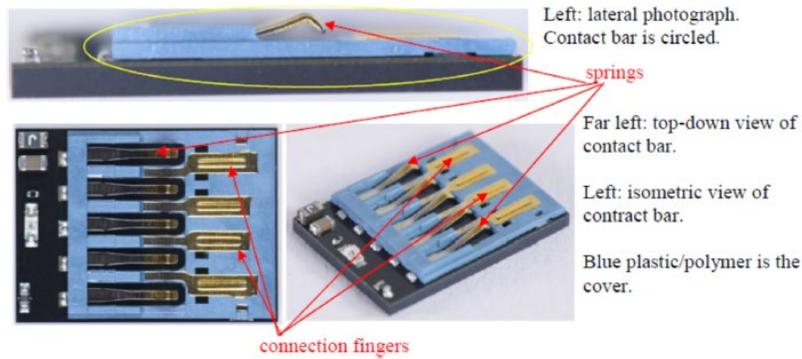
(citing Ex. 1009, Fig. 10; Ex. 1005 ¶ 168). Petitioner also relies on Hsiao’s description that the terminals are “integrally formed” with connector main body 320 before they are mounted on the substrate’s connection surface, which, according to Petitioner, indicates that the terminals are embedded. *Id.* at 44–45 (quoting Ex. 1009, 7:39–47).

Petitioner argues that the height of the forwardly extended portions of the terminals 322 above substrate 310’s connection surface discloses a “second distance” that is less than the first distance as depicted in Figure 10 of Hsiao. Pet. 46 (citing Ex. 1005 ¶ 169).

Patent Owner argues that “Hsiao does not teach ‘a plurality of connection fingers embedded to be exposed upon the cover of the contact bar.’” PO Resp. 42. Patent Owner argues that the portion of Hsiao’s first terminals 322 that are installed below Hsiao’s slot columns 324 are *not* the ‘connection fingers.’” *Id.* at 43. Instead, according to Patent Owner, “[t]he ‘connection fingers’ are the four contacts that are exposed to make a connection with the receptacle.” *Id.* Patent Owner provides several reasons supporting its argument.

First, Patent Owner relies on the USB 3.0 standard as support for this contention. *Id.* (citing Ex. 1008, 5–10).

Second, Patent Owner refers to certain photographs of an accused product from its complaint in the parallel litigation. PO Resp. 44–45. These photographs are reproduced below.



The springs and connection fingers are identified above.
This row of the chart shows the relative distances recited in the claims.
A portion of each spring is located approximately 1.51 mm from the connection surface.
The connection fingers are located approximately 0.64 mm from the connection surface.

Id. (citing Pet. 27). The picture above includes three photographs of a USB connector as well as annotations included in Patent Owner’s complaint in the parallel litigation. Patent Owner argues that because Petitioner includes the above photographs in its Petition, Petitioner adopted, for purposes of claim construction, the annotations included in the photographs. *Id.* These annotations label “the wide, frontward portion of the flat gold-colored components” as connection fingers, but not “the narrow, rearward extending wires that electrically connect the fingers to [the] respective contacts.” *Id.* at 44 (citing Pet. 27).

Third, Patent Owner argues that Petitioner’s declarant Dr. Baker annotated Figures 9 and 10 of Hsiao at a deposition to indicate that the wide frontward portions of Hsiao first terminals are the connection fingers. PO Resp. 45–46 (citing Ex. 2027, 82:5–14, 83:13–17). The annotated Figure 10 Patent Owner refers to is reproduced below.

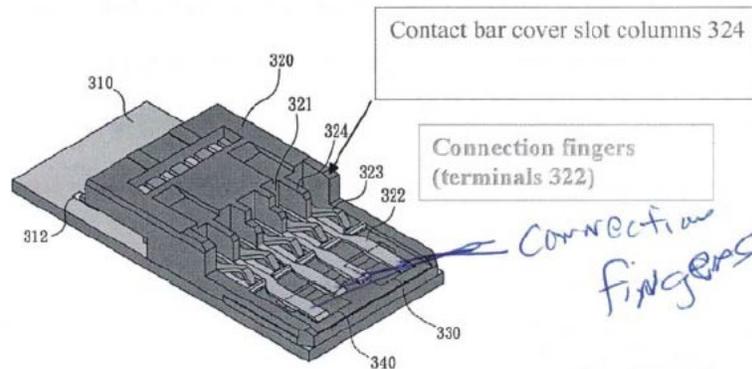


FIG. 10

Id. at 46. According to Patent Owner, Figure 10 above shows Dr. Baker’s annotations in handwriting labeling the front portion of terminals 322 as the connection fingers, which Patent Owner argues supports its argument that only that portion of terminals 322 should be considered connection fingers. *Id.*

Finally, Patent Owner relies on the testimony of Mr. Welch that “a POSITA would not consider the entirety of Hsiao’s first terminals 322 to be ‘connection fingers.’” PO Resp. 47 (citing Ex. 2050 ¶ 74). Mr. Welch analogizes the connection fingers to the human hand, in which the outwardly extended portions are the fingers while the remainder is not considered the fingers. *Id.*

If the connection fingers are properly identified as the outwardly extended portion of terminals 322, argues Patent Owner, then “it is clear that the Hsiao’s connection fingers are not ‘embedded’ into the contact bar.” PO Resp. 47. Patent Owner argues that Figure 9 of Hsiao shows a flat surface where the outwardly extended portion of terminals 322 rest, with no indentation that would allow them to be set firmly into the material. *Id.* at 47–48 (citing Ex. 1009, Fig. 9).

Even if the entirety of Hsiao's terminals 322 were considered to be connection fingers, Patent Owner argues no portion of these terminals are both embedded and exposed. According to Patent Owner, the rearward portion of the terminals are beneath slot columns 324 of the connector main body 320 and thus are not exposed and the forward portions of the terminals are not embedded. PO Resp. 48–49.

Having reviewed the evidence of record and the parties' arguments, we are persuaded that Hsiao first terminals 322 disclose the claimed "plurality of connection fingers" and that the first terminals 322 are "embedded to be exposed upon the cover of the contact bar." We disagree with Patent Owner that only the wide frontward portion of Hsiao's first terminals 322 are the connection fingers. The portion of the USB 3.0 standard which Patent Owner relies on makes no mention of connection fingers and instead merely provides dimensions of a USB 3.0 receptacle. *See Ex. 1008, 5-08–5-10.* We disagree that Petitioner's including photographs from Patent Owner's complaint in the parallel litigation in its Petition means that Petitioner adopted a construction of the term "connection fingers" that limited the term to only wide frontward portion of Hsiao's first terminals 322. Petitioner included the photographs in the claim construction section of its Petition, under a subsection titled "Patent Owner's Construction of 'Springs' 'Connection Fingers', 'Contact Bar Cover' and First and Second Distances." Pet. 26. Petitioner makes no other substantive comments in this subsection and does not indicate that it is adopting any construction of any of the terms. It is clear Petitioner included these photographs merely to apprise the Board of the positions Patent Owner has taken in the parallel litigation.

We also do not find Dr. Baker's annotations of Figures 9 and 10 at his deposition to reflect an affirmative opinion that only the wide frontward portion of first terminals 322 are the connection fingers. Nor do they contradict or override his explicit testimony identifying first terminals 322 as the claimed connection fingers. Ex. 1005 ¶ 167 ("Hsiao discloses a 'plurality of connection fingers' – *i.e.*, first terminals 322."). At his deposition, Dr. Baker was asked by Patent Owner's counsel to "circle that wide portion" of Hsiao's first terminals 322 in Figure 10. Ex. 2028, 81:19–21. He was then asked whether he had "identified these as the connection fingers in Hsiao" (*id.* at 81:23–24) to which he responded that "I've labeled the connection fingers as terminals 322 in figure 10 on page 75" (*id.* at 82:2–4). Contrary to Patent Owner's argument, the deposition testimony shows Dr. Baker confirmed his prior opinion that the terminals 322 of Hsiao are the claimed connection fingers. Mr. Welch testifies that "[a] POSITA would not consider the entirety of Hsiao's first terminals 322 to be 'connection fingers'" but provides no support from intrinsic evidence for his testimony. Ex. 2050 ¶ 74. We therefore do not weigh his testimony heavily in this regard.

As explained earlier, Petitioner identifies Hsiao's first terminals 322 as the recited connection fingers. Hsiao discloses that first terminals 322 are "installed below the plural slot columns 324 [of connector main body 320] and exposed outside the slot columns 324 then forwardly extended." Ex. 1009, 7:11–12. Hsiao further discloses that "the plural first terminals 322 . . . [are] integrally formed with the connector main body 320; then the connector main body 320 is disposed on the substrate 310." *Id.* at 7:39–43. Referring again to Figure 10 of Hsiao, as annotated by Petitioner, the

rearward portion of first terminals 322 can be seen to be installed below the slot columns 324 demonstrating that the first terminals are embedded in the connector main body. The frontward portion of the first terminals 322 are exposed on the surface of the connector main body. This is consistent with Hsiao's disclosure that first terminals 322 are "installed below the plural slot columns 324 [of connector main body 320] and exposed outside the slot columns 324 then forwardly extended." Ex. 1009, 7:11–12.

In addition, Figure 10 of Hsiao shows that the frontward portion is held in the openings of a horizontal lip going across Hsiao's connector main body. The terminals 322 are therefore set firmly into the horizontal lip of the connector main body and therefore embedded in this lip but also exposed upon the connector main body.

We, therefore determine that the aforementioned disclosure demonstrates that the first terminals 322 are set firmly into the connector main body and thus embedded to be exposed upon the cover of the contact bar (i.e., the connector main body).

Furthermore, even if we were to agree with Patent Owner that only the wide frontward portions of terminals 322 are the claimed connection fingers, we would still determine that Hsiao discloses that this frontward portion is embedded to be exposed on the connector main body. We agree with Petitioner that the frontward portions of terminals 322 are fixed firmly in the front section of connector main body and thus embedded in it. Figure 9 of Hsiao from the Petition with annotations is reproduced below.

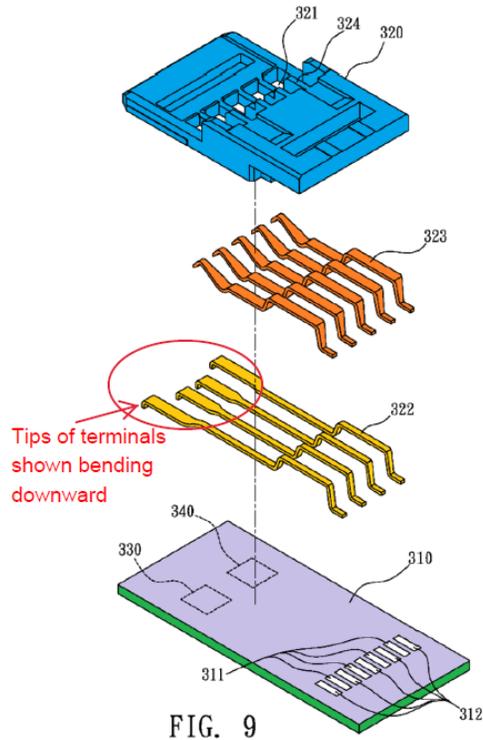


FIG. 9

Pet. 40 (annotations added). Figure 9 above is a schematic exploded view of a USB connector with color provided by Petitioner and textual annotations, in addition to the color provided by Petitioner, have been added here for convenience. It shows the front tips of the terminals 322 to bend downward. When these same terminals are shown in Figure 10, the bent tips appear to be sunken into the connector main body demonstrating that they are embedded into the connector main body. Figure 10 of Hsiao from the Petition with annotations is reproduced below.

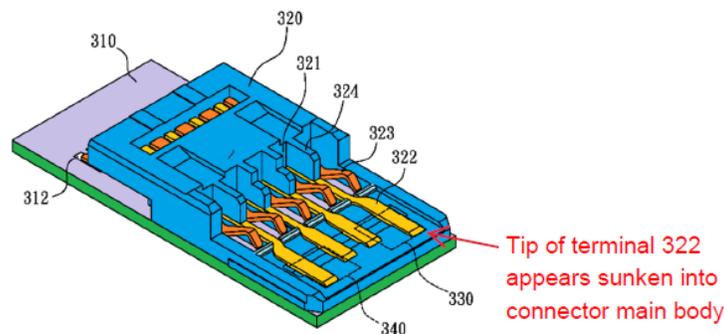


FIG. 10

Id. (annotations added). Figure 10 above is a schematic assembled view of a USB connector with color added by Petitioner and textual annotations, in addition to the color provided by Petitioner, have been added here for convenience. As can be seen in this figure, the tips of terminals 322 bend downward into the connector main body demonstrating that they are embedded into it.

This determination is supported by Dr. Baker's testimony. Dr. Baker credibly testifies that a person of ordinary skill would have understood that the forwardly extended portion of the first terminal is also embedded on the connector main body because it is fixed firmly in the front section of connector main body 320 to prevent them from bending upward or moving laterally. Ex. 1005 ¶ 168. Dr. Baker provides credible testimony that the front portion of the terminals 322 bend downward and that this bent tip would be embedded in the connector main body to secure the contacts and prevent them from bending upwards or moving laterally. *Id.*

Patent Owner argues that Figure 9 of Hsiao shows a flat surface where the outwardly extended portions of terminals 322 rest, with no indentation that would allow them to be set firmly into the material. PO Resp. 47–48 (citing Ex. 1009, Fig. 9). We find, however, that Figure 9 of Hsiao

affirmatively shows tips of first terminals 322 bending downward and both Figures 9 and 10 show them embedded into the connector main body. If there were no indentations for the curved tips to embed into, the terminals 322 would be lifted off of the surface of the connector main body.

Consistent with the presence of indentations, Figure 10 shows the frontward portions of terminals 322 lying flat on the surface of the connector main body and the tips being embedded into the main body.

In summary, we determine that the entirety of terminals 322 disclose the recited connection fingers and that these terminals 322 are embedded under the slot columns of connector main body and exposed onto the connector main body and also embedded on the connector main body's horizontal lip. We also determine that if only the frontward portions of terminals 322 were to be considered the connection fingers, as Patent Owner contends, these portions would still be embedded and exposed on the connector main body because they are embedded where the tips of the terminals sink into the surface of the connector main body while still being exposed. Accordingly, we determine that Hsiao discloses limitation 1.f.

g. [1.g] "wherein a first interface comprises the plurality of connection fingers, and a second interface comprises the plurality of springs."

Petitioner relies on Hsiao's disclosure that "the four first terminals 322 [connection fingers] of the USB connector are assembled as a USB2.0 connector, the five second terminals 323 [springs] of the USB connector are assembled as a USB3.0 connector" as disclosing the claimed first and second interfaces. Pet. 47 (citing Ex. 1009, 7:47–50). Patent Owner does not explicitly contest Petitioner's arguments regarding limitation 1.g. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner's arguments for the reasons stated above, which we agree with and adopt. Accordingly, we determine that Hsiao discloses limitation 1.g.

h. Summary

Accordingly, having considered the arguments and evidence, we are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 1 of the '243 patent.

c) Claim 2

Claim 2 depends from claim 1 and recites "wherein each of the plurality of springs further comprises a projection configured to be located at the first distance in an uncompressed position." Ex. 1001, 10:9–12. Petitioner identifies the high point of Hsiao's terminals 323 upwardly bended end as the claimed projection and the projection's height above the substrate as the claimed first distance. Pet. 47. Petitioner argues that when the springs are uncompressed, the projections are located a first distance above substrate 310. *Id.* (citing Ex. ¶¶ 172–173; Ex. 1009, Fig. 10). Patent Owner does not separately contest Petitioner's arguments regarding claim 2. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner's arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 2 of the '243 patent.

d) Claim 3

Claim 3 depends from claim 2 and recites "the projections are configured to extend through a plurality of apertures in the cover in the

uncompressed position.” Ex. 1001, 10:13–15. Petitioner relies on Hsiao’s Figures 9 and 10 as showing that the projections of Hsiao’s terminals 323 extend through a plurality of apertures, (slots 321) in the cover (connector main body 320) when uncompressed. Pet. 48 (citing Ex. 1009, 7:27–29). An annotated version of Figures 9 and 10 of Hsiao, appearing in the Petition, are reproduced below.

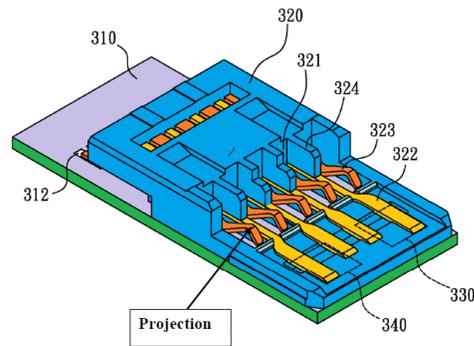
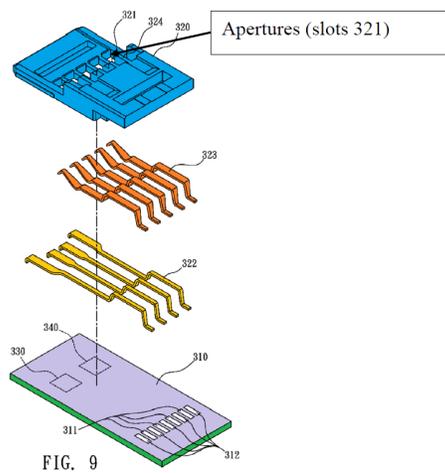


FIG. 10

Id. at 48–49. Figure 9 above is a schematic exploded view of a USB connector with color and annotations provided by Petitioner; Figure 10 above is a schematic assembled view of a USB connector with color and annotations added by Petitioner. Petitioner argues that the above annotated versions of Figures 9 and 10 show terminals 323 extending through and exposed outside the opening slots 321. *Id.* at 48 (citing Ex. 1005 ¶¶ 174–175; Figs. 9–10). Patent Owner does not separately contest Petitioner’s arguments regarding claim 3. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 3 of the ’243 patent.

e) *Claim 4*

Claim 4 depends from claim 1 and recites “the at least one memory die stack is mounted on the component surface of the substrate.” Ex. 1001, 10:17–19. Petitioner argues that Hsiao discloses this limitation by teaching that “substrate 310 has ‘at least one flash memory 340’ that is coupled to contact pads 311 and 312.” Pet. 49 (quoting Ex. 1009, 7:30–36). Petitioner argues that the memory 340 is mounted on the surface opposite the connection surface of substrate 310 as shown by the dotted lines in Figures 9 and 10 of Hsiao. *Id.* Patent Owner does not separately contest Petitioner’s arguments regarding claim 4. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 4 of the ’243 patent.

f) *Claim 9*

Claim 9 depends from claim 1 and recites “wherein the first distance comprises a first height above the connection surface, and the second distance comprises a second height above the connection surface, wherein the second height is less than the first height.” Ex. 1001, 10:35–39. Petitioner argues that Hsiao teaches this limitation for the same reasons argued for the limitations of claim 1 requiring “each of the plurality of springs including a portion that is located at a first distance relative to the connection,” and “wherein the plurality of connection fingers are located at a second distance relative to the connection surface of the substrate, the second distance being less than the first distance” (the “distance

limitations”). *See* Pet. 43 (arguing the height of the upwardly bended portion of terminals 323 discloses the portion of the springs “that is located at a first distance relative to the connection surface of the substrate”); *Id.* at 46 (arguing that the height of the forwardly extended portions of the terminals 322 above substrate 310’s connection surface discloses a “second distance” that is less than the first distance as depicted in Figure 10 of Hsiao). Patent Owner does not separately contest Petitioner’s arguments regarding claim 9. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 9 of the ’243 patent.

g) Claims 10 and 11

Claim 10 depends from claim 1 and recites that “each of the springs includes a connection pad.” Ex. 1001, 10:40–41. Claim 11 depends from claim 10 and recites that “each of the springs is integrally formed with the corresponding connection pad.” *Id.* at 10:42–44.

Petitioner argues Hsiao’s springs (terminals 323) and connection fingers (terminals 322) are “integrally formed” with the contact bar cover (connector main body 320), which is then mounted on substrate 310’s connection surface by welding the springs’ tail ends to the substrate’s contact pads 312 using surface mount technology. Pet. 50 (citing Ex. 1009, 7:39–47, Figs. 9–10). Petitioner identifies the tails of springs as the recited connection pads of claim 10. *Id.* (citing Ex. 1005 ¶¶ 180–182). Petitioner argues that each spring is integrally formed with the corresponding

connection pad as required by claim 11. *Id.* at 51 (citing Ex. 1005 ¶¶ 183–184). Patent Owner does not separately contest Petitioner’s arguments regarding claims 10 and 11. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claims 10 and 11 of the ’243 patent.

h) *Independent Claim 12*

Independent claim 12 is nearly identical to claim 1 except that claim 12 adds the following limitation: “a plurality of coupling points mounted on the connection surface of the substrate for electrically coupling with the contact bar.” Ex. 1001, 10:65–67. For the limitations of claim 12 that are identical to those of claim 1, Petitioner relies on the same arguments as it did for the corresponding limitations of claim 1. *See* Pet. 51. For the additional limitation of claim 12, as explained above, Petitioner identifies the “surface [of the COB substrate] where contact pads 311 and 312 are installed” as the claimed “connection surface.” *Id.* at 40 (citing Ex. 1009, 6:47–7:3).

Petitioner identifies the contact pads 311 and 312 as the claimed coupling points mounted on the connection surface. *Id.* at 52. Petitioner argues that the connection fingers (first terminals 322) and springs (terminals 323) of the contact bar (connection main body 320) are welded onto the contact pads and that therefore the contact bar is electrically coupled with these coupling points. *Id.* (citing Ex. 1005 ¶¶ 186–187). Patent Owner does not separately contest Petitioner’s arguments regarding claim 12. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 12 of the ’243 patent.

i) *Claim 13*

Claim 13 depends from claim 12 and recites “the at least one memory die stack is mounted on the component surface of the substrate.” Ex. 1001, 11:4–6. Petitioner relies on the same arguments it made for claim 4. *See* Pet. 52. For the reasons explained above in our analysis of claim 4, we are persuaded by Petitioner’s arguments that Hsiao discloses the limitations of claim 13. *See supra* § II.C.2.e. Thus, we are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 13 of the ’243 patent.

j) *Independent Claim 18*

Independent claim 18 is nearly identical to claim 1 except that claim 18 adds the following limitation: “wherein the external storage device is configured to support Universal Serial Bus ‘USB’) 2.0 and USB 3.0 standards in effect as of Jan. 31, 2011.” Ex. 1001, 12:20–22. For the limitations of claim 18 that are identical to those of claim 1, Petitioner relies on the same arguments as it did for the corresponding limitations of claim 1. *See* Pet. 53. For the additional limitation of claim 18, Petitioner argues that the USB 2.0 and 3.0 standards published in April 2000 and November 2008 respectively and thus were in effect as of January 31, 2011. *Id.* (citing Ex. 1007; Ex. 1008; Ex. 1019 ¶¶ 1–10; Ex. 1001, 1:37–45). Petitioner argues that Hsiao teaches that its memory device supports USB 2.0 and 3.0 by

disclosing that “the four first terminals 322 of the USB connector are assembled as a USB2.0 connector, the five second terminals 323 of the USB connector are assembled as a USB3.0 connector.” *Id.* (quoting Ex. 1009, 7:47–54); *see also* Ex. 1005 ¶¶ 191–192). Patent Owner does not separately contest Petitioner’s arguments regarding claim 12. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao discloses the limitations of claim 18 of the ’243 patent.

k) *Conclusion as to Ground 1 – Anticipation over Hsiao*

For the reasons stated above, we determine Petitioner has demonstrated that Hsiao discloses the limitations of claims 1–4, 9–13, 18. Accordingly, we determine Petitioner has shown by a preponderance of the evidence that claims 1–4, 9–13, and 18 are anticipated by Hsiao.

3. *Ground 2 – Alleged Obviousness over Hsiao*

As explained above, Petitioner argues that Hsiao anticipates claims 1–4, 9–13, and 18 of the ’243 patent. Petitioner argues, in the alternative, that if the claim limitation “a plurality of connection fingers embedded to be exposed upon the cover of the contact bar” requires the entire forwardly extended portion of Hsiao’s terminals 322 to be embedded in the front portion of the connector main body 320, and if the Board does not find that Hsiao discloses this claim limitation under such an interpretation, then Hsiao renders obvious this limitation. Pet. 53–54.

As we discuss above, we determine that Hsiao anticipates claims 1–4, 9–13, and 18 of the '243 patent. Accordingly, we do not address Petitioner's alternative obviousness challenge over Hsiao.

4. Ground 3 – Alleged Obviousness over Hsiao and Sun

Petitioner contends that claims 1–4, 9–13, and 18 are obvious over the combination of Hsiao and Sun. Pet. 54–66. We provide a brief overview of relevant law and of Sun and then analyze whether this combination teaches the limitations of claims 1–4, 9–13, and 18 in the sections below in light of Patent Owner's arguments.

A claim is unpatentable under § 103(a) 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.” *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (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, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333

(Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

a) *Overview of Sun*

Sun relates to USB data storage devices using stacked flash memory.

Ex. 1014, 1:4–8. Figure 9 of Sun is reproduced below:

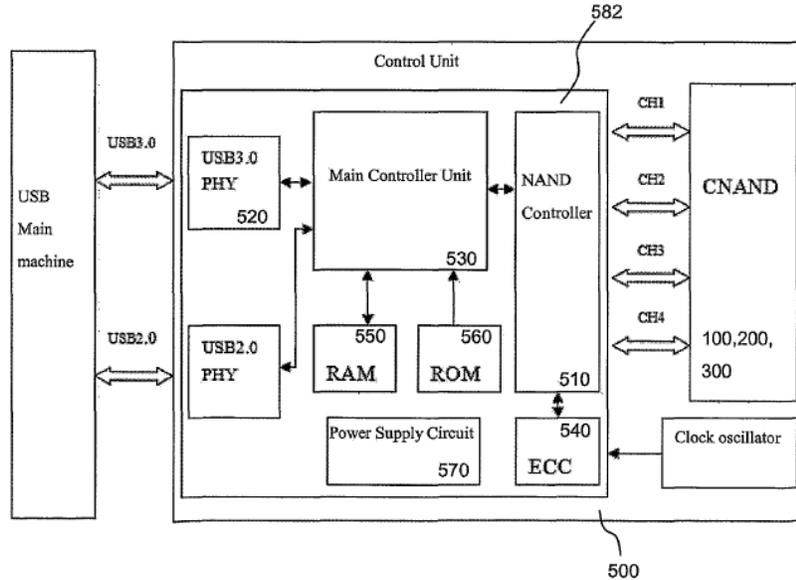


FIG. 9

Figure 9 is a schematic block diagram that depicts USB flash drive 500 incorporating a four-channel flash memory assembly 100, 200, 300. Ex. 1014, 11:12–14. USB flash drive 500 includes NAND controller 510 for providing high-speed data transfer in parallel to and from the flash memory assembly, USB 3.0 physical layer interface (PHY) 520, main controller 530, error checking and correction (ECC) arrangement 540, random access memory (RAM) 550, and read only memory 560. *Id.* at 11:16–12:6. A USB 2.0 PHY interface is connected to main controller 530 to make the flash drive compatible with USB 2.0 devices. *Id.* at 12:8–10. Figure 10A of Sun is reproduced below:

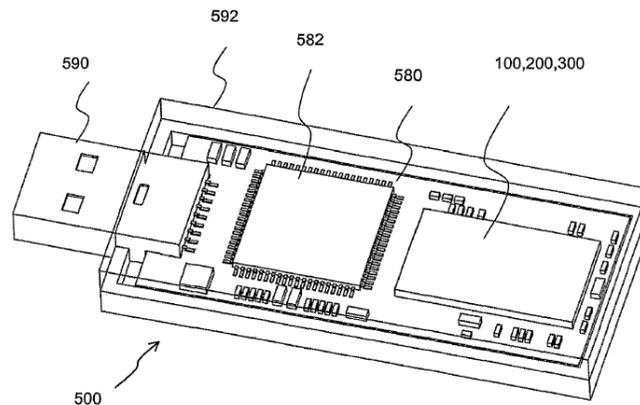


FIG. 10A

Figure 10A is a perspective view of USB flash drive 500 including Integrated circuit (IC) package 582 (USB 3.0 controller), USB connector 590, and flash memory assembly 100, 200, 300 mounted to PCB 580. Ex. 1014, 12:13–14, 12:18–19, 13:16.

b) *Claims 1, 2, 3, 9–12, and 18*

Petitioner relies on its arguments under the grounds alleging anticipation over Hsiao but argues in addition that if Hsiao does not expressly disclose that “Hsiao’s ‘controller’ is ‘configured to access memory,’ Sun discloses this, and [Hsiao] and Sun combined render claims 1–4, 9–13, and 18 obvious.”⁹ Pet. 54–66. Petitioner argues that Sun discloses a flash drive with a USB 3.0 Controller 582 that cooperates with the flash memory assembly to effectuate data transfer to and from the memory, and a Main Controller 530. *Id.* at 55 (citing Ex. 1014, 11–12, Fig. 9). Petitioner argues “[i]t would have been obvious to POSITA to configure

⁹ As explained in our analysis of the anticipation grounds over Hsiao, we determine that Hsiao does disclose that its controller is configured to access the memory die stack. §II.C.2.d. This ground is, therefore, an additional reason for unpatentability of claims 1–4, 9–13, and 18.

Hsiao's USB controller 330 to access Hsiao's flash memory 340 in order to effect data transfer to and from memory in compliance with the USB specifications as taught by Sun." *Id.* at 55–56 (citing Ex. 1005 ¶¶ 194–197).

Patent Owner argues Hsiao teaches away from combining with Sun and that “it would not have been possible to combine Sun’s memory-related teachings with the device of Hsiao without defeating the purpose of Hsiao.” PO Resp. 53. The object of Hsiao, according to Patent Owner, “is to ‘provide a USB connector, having features of small volume and lower production cost.’” *Id.* (citing Ex. 1009, 1:4–42). Patent Owner argues that this is achieved by employing an in-plug contact bar comprising both USB 2.0 and 3.0 contacts and then installing that contact bar directly on top of Hsiao’s PCB comprising the memory controller and memory so that the controller and memory are within the footprint of Hsiao’s contact bar. *Id.* Sun’s memory controller 582 and flash memory assembly 100, 200, and 300, on the other hand, are installed rearward of Sun’s plug comprising USB contacts, according to Patent Owner. *Id.* at 54 (citing Ex. 1014, Fig. 10A). In addition, Patent Owner argues, Sun’s memory controller and flash memory assemblies are too large to fit within Sun’s plug connector 590 where Hsiao’s contact bar resides. *Id.* Thus, Patent Owner argues, “[i]t would not be possible to incorporate Sun’s controller and memory into the Hsiao reference without greatly increasing the size of Hsiao’s substrate” defeating the purpose of Hsiao to provide a USB connector having small volume. *Id.* at 54–55.

Having reviewed the evidence of record and the parties’ arguments, we determine that Sun’s disclosures related to its USB controller combined with Hsiao’s disclosures (explained in relation to the anticipation ground 1

above) would teach “a controller configured to access the at least one memory die stack, the controller mounted on one of the connection surface and the component surface of the substrate” along with the other limitations of claims 1, 2, 3, 9–12, and 18. For example, Sun discloses a NAND controller 510, a main controller 530, and USB 3.0 Controller 582 that are “arranged to cooperate with the flash memory assembly to effect high speed multi-channel data transfer.” Ex. 1014, 11–12. Dr. Baker provides credible testimony that given Sun’s disclosure it would have been obvious “to configure Hsiao’s USB controller 330 to access Hsiao’s flash memory 340 in order to effect data transfer to and from memory in compliance with the USB 2.0 and 3.0 specifications as taught by Sun.” Ex. 1005 ¶ 197. This demonstrates Sun’s controller is “configured to access the at least one memory die stack” as recited in claims 1, 12, and 18.

Furthermore, Petitioner has articulated a reason with rational underpinning to combine Sun’s teachings related to its USB controller with Hsiao. Petitioner has explained that doing so would provide the benefit of effectuating data transfer to and from memory in compliance with the USB specification and has supported this contention with credible testimony from Dr. Baker. Pet. 55–56 (citing Ex. 1005 ¶¶ 194–197).

We disagree that Hsiao teaches away from combining with Sun or that combining the teachings of the two references would defeat the purpose of Hsiao providing a USB connector having small volume. Patent Owner’s argument misunderstands Petitioner’s proposed combination. Petitioner does not propose to “incorporate Sun’s controller and memory into the Hsiao reference” as argued by Patent Owner. PO Resp. 54–55. Instead, Petitioner proposes to configure Hsiao’s USB controller 330 to access Hsiao’s flash

memory 340 in order to effect data transfer as taught by Sun. Pet. 55–56 (citing Ex. 1005 ¶¶ 194–197). In other words, Petitioner’s proposed combination retains Hsiao’s memory and controller, and their respective sizes, but configures them to operate as taught by Sun. Incorporating the teachings of Sun’s memory and controller does not require or imply bodily incorporation of those components into Hsiao. “It is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.” *In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012) (citations omitted); *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“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.”). Moreover, as Petitioner argues in its Reply Brief (Pet. Reply 20), Hsiao teaches various embodiments that allow for changes “in matters of shape, size, and arrangement of parts” (Ex. 1009, 7:64–8:5).

c) *Claims 4–8 and 13–17*

Claims 4–8 and 13–17 depend from claims 1 and 12 respectively, and claim various placements of memory die stacks and number of memory dies in a stack. We analyze Petitioner’s contentions regarding each of these claims more specifically below. Here, however, we provide a general overview of Petitioner’s contentions and Petitioner’s reason to combine Hsiao with Sun. Generally, Petitioner argues that Sun discloses three flash memory assemblies, 100, 200, and 300, each of which have four stacked dies. Pet. 56 (citing Ex. 1014, 6, 9–11, Figs. 2-2A, 3-3A, 8-8A). Petitioner argues that Sun teaches that the memory die stack is placed on the surface

opposite that on which the connector is mounted, and also teaches that the memory assemblies could be mounted on both sides of the PCB. *Id.* at 57–63 (citing Ex. 1014, 9, 12–15, Figs. 2, 8A, 10–10A, 11–11C; Ex. 1005 ¶¶ 198–199, 200–206).

Petitioner argues that one of ordinary skill would have a finite number of choices regarding which substrate surface to mount a memory die stack on. Pet. 64. According to Petitioner, the memory could be mounted on the same surface as the USB connector, the opposite surface, or both surfaces and that the decision of which surface(s) to use is a function of design requirements such as the desired dimensions and memory capacity of the storage device. *Id.* If a slimmer design is required, then the memory may be mounted on the same surface, if a shorter design is required, then memory may be mounted on the opposite surface, and if increased memory capacity is required, then memory may be mounted on both surfaces. *Id.* at 64–65 (citing Ex. 1005 ¶¶ 209–212).

Similarly, Petitioner argues that the number of dies to include in the memory die stack and the arrangement of those dies is a function of desired size and memory capacity. Pet. 64. If greater memory capacity was required, more dies could be included in the stack. *Id.* at 65 (citing Ex. 1005 ¶¶ 213–214).

We determine that Sun’s disclosures combined with Hsiao would have taught the limitations of claims 4–8 and 13–17 for the reasons discussed more specifically below. Petitioner has articulated a reason with rational underpinning to combine Sun’s teachings related to its memory assemblies with Hsiao’s teaching, and supported its arguments with Dr. Baker’s testimony explaining how one of ordinary skill would vary the

number, arrangement, and placement of the memory in the USB device based on design requirements that that these variations would be finite and obvious to try based on those design requirements. *See* Ex. 1005 ¶¶ 209–214. *See KSR*, 550 U.S. at 402 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp.”).

d) *Claims 4 and 13*

Claim 4 depends from claim 1 and recites “wherein the at least one memory die stack is mounted on the component surface of the substrate.” Ex. 1001, 10:17–19. Claim 13 depends from claim 12 and recites the same language. *Id.* at 11:4–6.

Petitioner argues “Sun discloses an embodiment (Figs. 11–11C) in which the multi-channel memory die stack is placed on the surface opposite that on which the connector is mounted.” Pet. 58 (citing Ex. 1014, Figs. 11–11A). Petitioner indicates that in Sun, the connector 590 and IC 582 are mounted on the same side of PCB 580 and “that ‘flash memory assembly of the flash drive 600 is mounted on the side of the PCB 580 opposite to that on which the IC 582 is mounted.’” Pet. 59 (citing Ex. 1014, 14, Figs. 11–11C). Patent Owner does not separately dispute Petitioner’s above arguments. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. Specifically, we agree that by disclosing that the flash memory assembly is mounted on the side opposite of the IC and the connector, Sun

teaches a memory die stack that is mounted on the component surface of the substrate.

e) *Claims 5 and 14*

Claim 5 depends from claim 1 and recites “wherein the at least one memory die stack is mounted on the connection surface of the substrate.” Ex. 1001, 10:20–22. Claim 14 depends from claim 12 and recites the same language. *Id.* at 11:7–9.

Petitioner argues Sun discloses this configuration in Figure 10 and 10A. Pet. 60. Petitioner also points out that Sun discloses that “stacked flash memory assemblies could be mounted on both sides of the PCB.” *Id.* at 61 (citing Ex. 1014, 14). Patent Owner does not separately dispute Petitioner’s above arguments. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao and Sun teach the limitations of claims 5 and 14 of the ’243 patent.

f) *Claims 6 and 15*

Claim 6 depends from claim 1 and recites “a plurality of memory die stacks, wherein at least one of the plurality of memory die stacks is mounted on the connection surface of the substrate, and at least one of the plurality of memory die stacks is mounted on the component surface of the substrate.” Ex. 1001, 10:23–28. Claim 15 depends from claim 12 and recites the same language. *Id.* at 11:9–14.

Petitioner argues that Sun teaches USB 3.0 flash drives having memory die stacks mounted on both PCB surfaces and thus at least one

memory die stack mounted on the connection and component surface. Pet. 59–60 (citing Ex. 1014, 14–15; Ex. 1005 ¶¶ 200–202); Pet. 61 (citing Ex. 1005 ¶ 205). Patent Owner does not separately dispute Petitioner’s above arguments. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao and Sun teach the limitations of claims 6 and 15 of the ’243 patent.

g) *Claims 7 and 16*

Claim 7 depends from claim 6 and recites “wherein each of the plurality of memory die stacks comprises a plurality of dies.” Ex. 1001, 10:29–31. Claim 16 depends from claim 15 and recites the same language. *Id.* at 11:15–17.

Petitioner argues that Sun discloses the memory die stacks each include four dies. Pet. 61, 56 (citing Ex. 1014, 6) (“flash memory assembly 100 of Figures 2, and 2A” includes “a stack of 4 flash memory dies 102, 104, 106, & 108.”) Patent Owner does not separately dispute Petitioner’s above arguments. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao and Sun teach the limitations of claims 7 and 16 of the ’243 patent.

h) *Claims 8 and 17*

Claim 8 depends from claim 7 and recites “wherein the plurality of dies of at least two of the plurality of memory die stacks are stacked in an overlapping arrangement.” Ex. 1001, 10:32–34. Claim 17 depends from claim 16 and recites the same limitation. *Id.* at 11:18–20.

Petitioner relies on Figures 2, 2A, and 8A of Sun along with their corresponding descriptions as teaching the aforementioned limitations. Pet. 61–62. Patent Owner does not separately dispute Petitioner’s above arguments. *See generally* PO Resp.

After considering the evidence of record, we are persuaded by Petitioner’s arguments for the reasons stated above, which we agree with and adopt. In particular, Sun discloses:

As shown more particularly in Figures 2 and 2A, the dies are organized such that the contact portion of one die is on one lateral end, while that of an adjacent die is on the direct opposite lateral end. This zigzag stacking facilitates a more balanced and symmetrical stacking to facilitate a more stable structure and enables more dies to be stackable in a stack to further increase storage capacity. In addition, this stacking arrangement also provides a more space efficient arrangement for the bonding wire to negotiate when extending from the die to the PCB.

Ex. 1014, 9. This disclosure of Sun’s stacking arrangement demonstrates that Sun discloses a plurality of memory die stacks are stacked in an overlapping arrangement as recited by claims 8 and 17. We are persuaded that Petitioner has shown by a preponderance of the evidence that Hsiao and Sun teach the limitations of claims 8 and 17 of the ’243 patent.

i) *Objective Indicia of Nonobviousness*

In addition to arguing that Hsiao and Sun do not teach the limitations of the challenged claims, Patent Owner argues that objective evidence

confirms the patentability of the challenged claims. PO Resp. 69–77. Factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of nonobviousness. *Graham*, 383 U.S. at 17. Notwithstanding what the teachings of the prior art would have suggested to one with ordinary skill in the art at the time of the invention, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that the claimed invention would not have been obvious to one with ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–1472 (Fed. Cir. 1984).

For us to give substantial weight to objective indicia of obviousness or nonobviousness, a proponent must establish a nexus between the evidence and the merits of the claimed invention. *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). “[T]here is no nexus unless the evidence presented is ‘reasonably commensurate with the scope of the claims.’” *Id.* (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)).

A patentee is entitled to a presumption of nexus “when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)). Even without the presumption, Patent Owner “is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Fox Factory*, 944 F.3d at 1373–74 (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)). Also, the nexus must be “to some aspect of the claim *not already in the prior art.*” *In re Kao*, 639 F.3d

1057, 1069 (Fed. Cir. 2011) (emphasis added). “Ultimately, the fact finder must weigh the [objective indicia] evidence presented in the context of whether the claimed invention as a whole would have been obvious to a skilled artisan.” *Lectrosonics*, IPR2018-01129, Paper 33 at 33 (citing *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331–32 (Fed. Cir. 2016)).

Patent Owner makes three primary arguments regarding objective indicia of nonobviousness. We examine these three arguments in turn. Patent Owner’s first argument is that many other companies patented numerous ways of implementing USB 3.0 flash drives but none came upon Mr. Kuster’s inventive design, demonstrating that this design was non-obvious. PO Resp. 71–73. Patent Owner argues that after the release of the USB 3.0 specification, there was an “intense need” for solutions implementing the USB 3.0 standard and that in response a barrage of designs were published between 2008 and 2010 with proposed solutions. *Id.* at 71–72 (citing Exs. 2022, 2029, 2030–2034). But none of these, according to Patent Owner, included a contact bar mounted on a substrate, with the contact bar including both springs and connection fingers embedded to be exposed on the contact bar, as Mr. Kuster’s invention does. PO Resp. 72–73. Patent Owner argues that “[w]ere Mr. Kuster’s solution obvious, as [Petitioner] argues, one would have expected that others would have identified and published it during this period of intense development.” *Id.* at 73.

We disagree with Patent Owner’s argument. As an initial matter, and as can be seen in our analysis of Petitioner’s Grounds, we disagree that no solutions existed that included the elements of the challenged claims. Instead, we determine that Hsiao alone and Hsiao combined with Sun teach

the limitations of the challenged claims. *See supra* § II.C.2.k; *infra* §§ II.C.3.c, II.C.4.i. Thus, Patent Owner’s premise that no one other than Mr. Kuster proposed a similar design as that claimed by the ’243 patent is simply incorrect.

Moreover, Patent Owner does not provide sufficient legal support for the proposition that because Mr. Kuster’s design was one among many others to provide an implementation of the USB 3.0 standard, that such a fact implies that Mr. Kuster’s design was non-obvious. Indeed, such an argument runs counter to typical factors, such as long-felt need and failure of others, that show non-obviousness. Typically, a persistent need that was unmet for a significant period of time along with evidence of others failing to provide a solution for such a need can demonstrate non-obviousness. *See In re Gershon*, 372 F.2d 535, 538 (CCPA 1967). Here, however, Patent Owner argues the opposite. According to Patent Owner the USB 3.0 specification was released in November 2008 (PO Resp. 7 (citing Ex. 1008)) and within two years of this release a “barrage of designs . . . were published between 2008 and 2010” with competing solutions for implementing USB 3.0 (PO Resp. 72). Mr. Kuster’s design was one of them. Other than attorney argument, Patent Owner has not shown how such facts demonstrate non-obviousness.

Patent Owner’s second argument is that Mr. Kuster’s invention was widely adopted by other companies, whose products are commercially successful. PO Resp. 73–77. Patent Owner argues that Mr. Kuster’s invention was introduced to the public in January 2012 at the CES trade show and that after it was introduced, the industry widely adopted Mr.

Kuster's design. *Id.* at 74–76.¹⁰ Specifically, Patent Owner argues that Petitioner itself adopted Mr. Kuster's design and that other companies such as Kingston, Samsung, Corsair, EMTEC, Verbatim, Monster Digital, and Patriot Memory have as well. As support, Patent Owner provides claim charts submitted in the parallel litigation and also provides photographs of the flash drives of the aforementioned companies. *Id.* at 76 (citing Ex. 1016, 2–8, Ex. 2048, 3, 6, 9, 12, 15, 18, 21). In addition, Patent Owner provides a market study which it argues demonstrates that “market adoption of ‘Chip on Board (CoB) USB 3.0 Flash Drives’ already exceeded that of conventional USB 3.0 flash drives in 2015” and that sales of over 33 million units were expected in 2020 versus 10 million units for conventional devices.” *Id.* at 27 (citing Ex. 2046, 58).

Petitioner argues that Kuster provides no evidence of nexus between the novel features of the challenged claims and the identified devices. Pet. Reply 29. We agree that Patent Owner provides insufficient evidence that the products from companies such as Kingston, Samsung, and others embody the claimed features and are coextensive with them. As to Petitioner's products, Patent Owner provides claim charts from the parallel

¹⁰ In relation to the CES trade show, Patent Owner also briefly mentions that “Victorinox received significant attention and praise for its new products, and was a finalist for Best of CES award.” PO Resp. 74. The only evidence of this praise is Mr. Kuster's testimony that “Victorinox was a finalist for the Best of CES award.” Ex. 2035 ¶ 38. No evidence is provided establishing a nexus between the CES award and the claimed features. Indeed no evidence is provided that the award Victorinox won was for its USB product rather than other products displayed at CES. Because of the lack of evidence and any substantial argument related to industry praise, we do not further analyze this argument.

litigation, which it argues show that Petitioner has adopted Mr. Kuster's patented invention. PO Resp. 76 (citing Ex. 1016). Those claim charts, prepared by Patent Owner, do not prove infringement. They are, at best, contentions. Patent Owner, has not provided any evidence that Petitioner's products have been found to infringe the '243 patent, or that Petitioner has conceded infringement. Without an infringement finding or a prior adjudication, we are not in the position to say that these products embody the '243 patent's claims and are coextensive with them based on the evidence presented to us. Moreover, simply establishing that a product infringes the patent is not enough to show a nexus. *See Fox Factory*, 944 F.3d at 1377 (holding that a *prima facie* case of nexus cannot be made by simply showing that "the patent claims broadly cover the product that is the subject of the evidence of secondary considerations").

Furthermore, Patent Owner has not presented sufficient evidence that the alleged commercial success of the identified products is due to the claimed elements, either individually or as a whole, and therefore has not established the required nexus for this additional reason. The cited portions of the market research study relied on by Patent Owner show sales of CoB USB devices exceeding those of conventional USB devices (*e.g.* Ex. 2046, 58) but no evidence is presented on how CoB USB devices relate to the claimed elements and whether it is those claimed elements that have helped drive sales. Petitioner argues that the evidence presented by Patent Owner shows that any commercial success of USB 3.0 CoB USB devices was largely due to CoB manufacturing technology and other advantages that stem from CoB design. Pet. Reply 30 (citing Ex. 2046, 36–37). Petitioner argues that CoB USB devices were not invented by Patent Owner and were

well known in the industry prior to the '243 patent. Pet. Reply 31 (citing Ex. 1005 ¶ 73; Ex. 1017 ¶ 9). Dr. Baker provides credible testimony confirming Petitioner's argument. Ex. 1005 ¶ 73. The market study data related to CoB USB device sales do not, therefore, provide sufficient evidence that the alleged commercial success of the identified products is due to novel features claimed by the '243 patent, rather than the use of CoB technology which Mr. Kuster did not invent.

Finally, Patent Owner argues the asserted prior art, such as Hsiao and Chen, were not commercially successful. PO Resp. 77. Besides attorney argument, however, Patent Owner provides no legal support for imposing such a requirement, nor have we found any, that the commercial success, or lack thereof, of prior art products is an objective indicia of nonobviousness. Furthermore, there is insufficient evidence supporting Patent Owner's assertion of lack of commercial success for those patents.

Accordingly, based on the evidence and arguments presented, we do not weigh Patent Owner's evidence of objective indicia of nonobviousness heavily and do not find it to significantly support Patent Owner's position in the obviousness analysis.

j) *Conclusion as to Ground 3 – Obviousness over Hsiao and Sun*

For the reasons explained above and based on the arguments and evidence presented in the Petition, we determine that Petitioner has shown sufficiently that the combination of Hsiao and Sun would have taught each limitation of claims 1–18 of the '243 patent. Weighing all of the evidence of obviousness and nonobviousness together, including the content of the prior art, the differences between the prior art teachings and the claim limitations, and the objective indicia of non-obviousness, we determine Petitioner has

shown by a preponderance of the evidence that Hsiao and Sun render obvious claims 1–18 of the '243 patent.

D. Grounds Involving Chen (Grounds 4–7)

Petitioner challenges the claims of the '243 patent over several grounds involving Chen combined with various other pieces of prior art. *See* Pet. 66–93. For example, Petitioner contends that claims 1–6 and 9–15 are unpatentable as obvious over Chen and Cheng; claims 7, 8, 16, and 17 are obvious over Chen, Cheng, and Hiller; claims 1–18 are obvious over Chen and Sun; and claim 18 is obvious over Chen, Cheng, and Wan. Pet. 66–93.

As we explain below, we determine Petitioner has not sufficiently demonstrated that Chen teaches the distance limitations of claim 1 requiring the springs be located a “first distance” relative to the connection surface of the substrate, the connection fingers be located a “second distance” relative to the connection surface of the substrate, and requiring the “second distance” to be less than the “first distance.” Independent claims 12 and 18, the only other independent claims of the '243 patent, recite limitations identical to limitation 1f. *See* Ex. 1001, 10:63–64, 12:15–16. Relying on Chen alone, Petitioner makes the same arguments with respect to each of these limitations of claims 1, 12, and 18. *See* Pet. 73–74, 78, 89. Our determination that Chen does not teach the distance limitations, therefore, is dispositive of all grounds relying on Chen (grounds 4–7) and for this reason, we need not analyze Petitioner’s remaining contentions for these grounds.

Below we provide a brief overview of Chen and then analyze Petitioner’s contentions with respect to the distance limitations of claim 1.

1. Overview of Chen

Chen relates to an extension to USB connectors that includes conductive contacts adapted for the USB 2.0 protocol and differential contacts adapted for a non-USB 2.0 protocol. Ex. 1010, Abstract. This allows the extension to connect to a standard USB 2.0 connector and a non-USB 2.0 connector. Ex. 1010, code (57). Figure 2 of Chen is reproduced below:

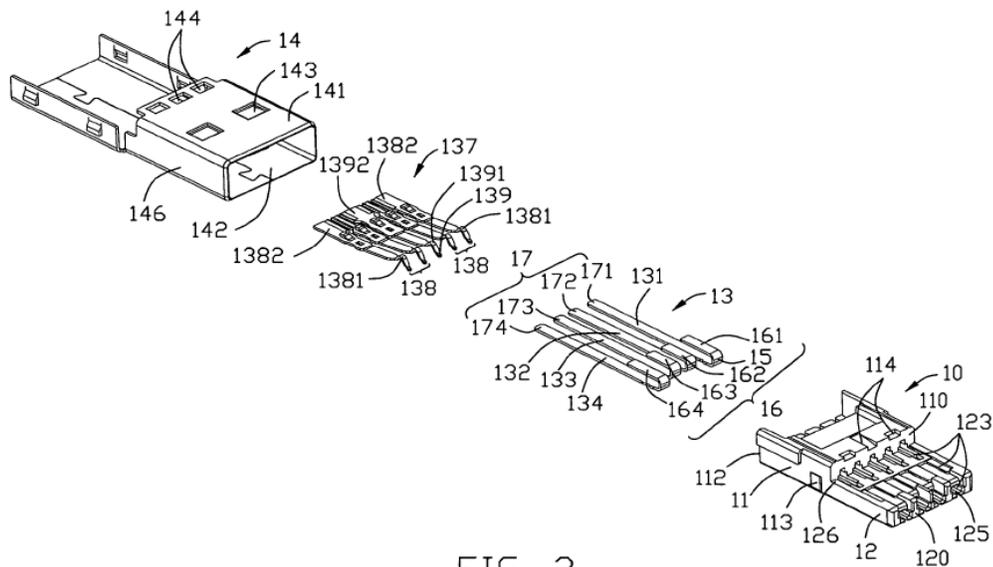


FIG. 2

Figure 2 depicts an exploded view of an extension to USB plug according to one embodiment. Ex. 1010, 4:43–44. Extension to USB plug 100 comprises metal shell 14, plug contacts 13, and plug housing 10, which includes insulative base portion 11 and insulative tongue portion 12. *Id.* at 5:49–54. Plug contacts 13 include four plug conductive contacts 131, 132, 133, 134, each including a flat and non-elastic plug contact portion 16, and a plurality of additional contacts 137. *Id.* at 6:31–34, 50–52. The four plug conductive contacts 131, 132, 133, 134 provide compatibility with standard USB receptacles. *Id.* at 7:51–61. Additional plug contacts 137 include two pairs of differential contacts 138 for conducting high-speed signals and

grounding contact plug 139 for preventing cross-talk between the pairs of differential contacts 138. *Id.* at 7:15–21. Each differential plug contact 138 has elastic contact portion 1381, and grounding contact plug 139 has elastic grounding contact portion 1391. *Id.* at 7:21–22, 28–29. Figure 3 of Chen is reproduced below:

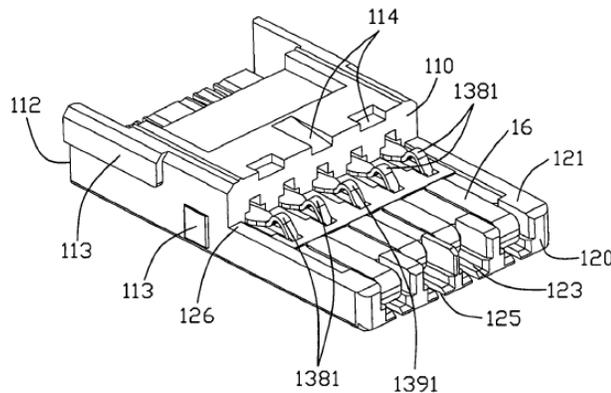


Figure 3 above is a perspective view of an extension to a USB plug, and depicts housing 10 with passageways 123 for receiving plug conductive contacts 131, 132, 133, 134 and additional plug contacts 137. *Id.* at 6:34–44.

2. Distance Limitations of Independent Claims 1, 12, and 18

Claim 1 recites “a substrate that includes a connection surface and a component surface.” Ex. 1001, 9:55–56. Claim 1 further recites “a contact bar” with a “plurality of springs” that include a “portion that is located at a first distance relative to the connection surface of the substrate.” *Id.* at 9:63–67. Claim 1 further recites “a plurality of connection fingers” that are “located at a second distance relative to the connection surface of the substrate. *Id.* at 10:1–4. Finally, claim 1 recites that “the second distance [be] less than the first distance.” *Id.* at 10:5. Independent claims 12 and 18 recite nearly identical language. *See* 10:45–64, 11:21–12:16.

Petitioner identifies a printed circuit board (“PCB”) enclosed within outer case 36 of Chen’s memory device as the recited “substrate.” Pet. 66–67 (“The substrate is the PCB described above which necessarily has two opposite surfaces.”). Petitioner identifies Chen’s contacts 137 as the recited “springs” (*id.* at 71–72) and argues that the “first distance is the height of contact portions 1381, 1391 above the PCB surface on which the contact bar is mounted” (*id.* at 73). Finally, Petitioner identifies Chen’s conductive contacts 131–134 as the recited “connection fingers” which “include ‘a plug contact portion 16’ that ‘is flat and non-elastic.’” *Id.* at 73 (citing Ex. 1010, 6:50–58, Figs. 2–3). Petitioner argues the “second distance is the height of plug contact portion 16 above the PCB surface.” *Id.* at 74. According to Petitioner “[s]ince plug contact portion 16 ‘is substantially coplanar with supporting surface 121’ . . . and portions 1381/1391 of the springs ‘protrud[e] upwardly beyond the supporting surface 121’ . . . the second distance is necessarily less than the first distance.” *Id.* at 74 (citing Ex. 1010, 6:60–62, 7:45–46).

Patent Owner argues “none of the grounds teaches the recited ‘distance’ terms in the claims.” PO Resp. 59. According to Patent Owner “[t]he ‘distance’ terms must be relative to the connection surface of the substrate, but the ‘heights’ to which Petitioner points are not relative to the substrate.” *Id.* Patent Owner argues that the distances identified by Petitioner are relative to element 122, which “is the ‘bottom surface’ of ‘plug tongue portion 12,’” not relative to the connection surface of the substrate. *Id.* Thus, according to Patent Owner, Petitioner’s “[g]rounds 4–7 further fail for failure to teach a plurality of springs a ‘first distance’ relative

to a connection surface and a plurality of connection fingers a ‘second distance’ from a connection surface of a substrate.” *Id.* at 60.

We agree with Patent Owner. As explained above, Petitioner identifies Chen’s contacts 137 as the recited “springs” and Chen’s conductive contacts 131–134 as the recited “connection fingers.” Pet. 71–74. Figures 2 and 3 of Chen, as annotated by Petitioner, show the components of Chen that Petitioner has identified as corresponding to the claimed limitations.

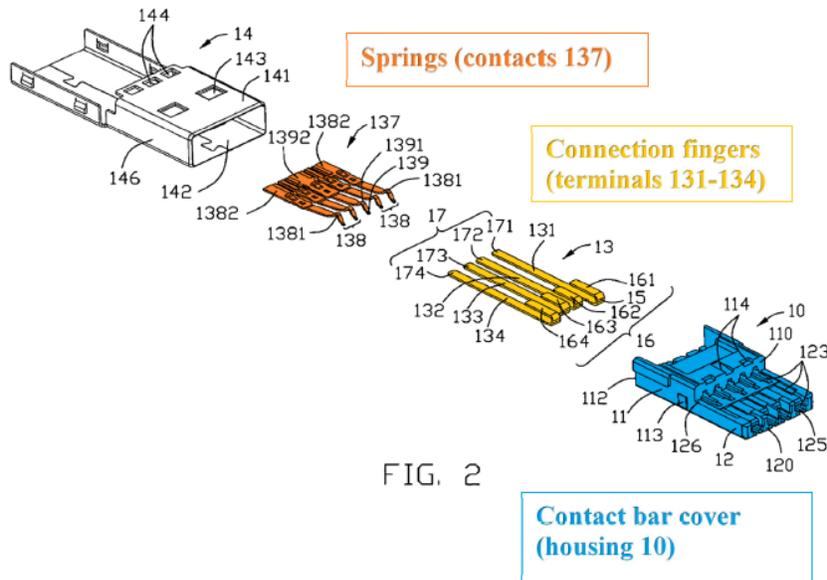


FIG. 2

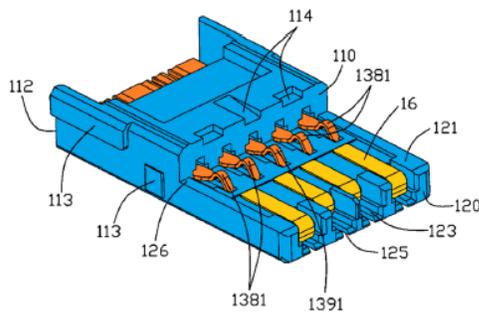


FIG. 3

Pet. 71. Figure 2 above is an exploded perspective view of an extension to a USB plug, with color and annotations provided by Petitioner; Figure 3 above is a perspective view of the extension to the USB plug, with color and annotations provided by Petitioner. As shown in annotated Figures 2 and 3, above, Petitioner identifies contacts 1381/1391 (orange) as the claimed “springs,” plug contact portion 16 (yellow) as part of the claimed “connection fingers,” and housing 10 (blue), as the claimed “contact bar.”

Petitioner identifies the claimed “substrate” as the PCB enclosed within outer case 36 of Chen’s memory device. Pet. 66–67 (“The substrate is the PCB described above which necessarily has two opposite surfaces.”). This outer case is illustrated in Figure 13 of Chen, reproduced below with annotations added by Patent Owner:

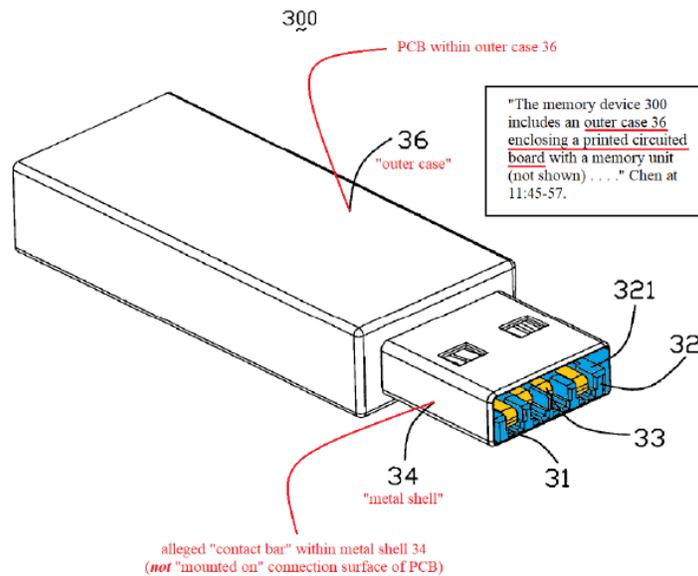


FIG. 13

PO Resp. 57. Figure 13 above is a perspective view of an extension to a USB plug, with color and annotations provided by Patent Owner. Outer case 36, illustrated above in the annotated version of Figure 13, encloses the

PCB. Ex. 1010, 11:45–57. Although the PCB is not visible in Figure 13 because it is enclosed in outer case 36, the PCB can be understood to be rearward of metal shell 34 and the components of Chen that Petitioner has identified as the contact bar (blue), the springs (not visible), and the connection fingers (yellow).

Petitioner identifies the first distance as “the height of contact portions 1381, 1391 above the PCB surface on which the contact bar is mounted.” Pet. 73. Petitioner identifies the second distance as “the height of plug contact portion 16 above the PCB surface.” *Id.* at 74. Petitioner illustrates these heights in their annotated version of Figure 4, reproduced below:

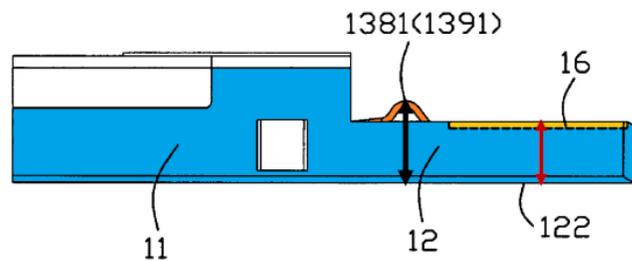


FIG. 4

Id. In the annotated version of Chen’s Figure 4 above, Petitioner identifies with black and red arrows the first and second distances, respectively. As can be seen, the two heights identified by Petitioner are relative to “bottom surface 122” of the “plug tongue portion 12,” not to the PCB. *See* Ex. 1010, 6:14–16. As explained above, the PCB is rearward from these components, not directly below them in Chen’s memory device. By identifying the height of the spring and connection fingers relative to the bottom surface 122 of the plug tongue portion, Petitioner has, at best, identified distances relative to the contact bar, but not to the connection surface of the claimed substrate.

In its Reply Brief, Petitioner fails to sufficiently address Patent Owner’s argument that the identified distances are relative to bottom surface 122 but not to the PCB. Instead, Petitioner merely argues that because the springs sit above the connection fingers “the springs are necessarily higher above the surface than the ‘connection fingers.’” Pet. Reply 21 (citing Ex. 1005 ¶¶ 239–241). Petitioner, however, does not demonstrate that the “surface” mentioned here is the surface of the PCB.

Similarly, Dr. Baker testifies that the first and second distances are distances of the springs and connection fingers respectively to the PCB but identifies only distances to the bottom surface 122 as the first and second distances without sufficiently explaining why these distances are relative to the PCB. *See* Ex. 1005 ¶¶ 236, 241.

Accordingly, we determine Petitioner has not provided sufficient evidence demonstrating that Chen teaches the distance limitations of the independent claims.

3. Conclusion – Grounds Involving Chen (Grounds 4–7)

For the reasons above, we determine Petitioner has not demonstrated that Chen teaches the distance limitations of independent claim 1 and the corresponding distance limitations of independent claims 12 and 18 and the challenged claims depend therefrom. For Grounds 4–7, Petitioner relies only on Chen as teaching the distance limitations. Accordingly, we determine Petitioner has not demonstrated by a preponderance of the evidence that the prior art relied upon for Grounds 4–7 renders claims 1–18 obvious.

III. MOTION TO EXCLUDE

Petitioner moves to exclude Exhibit 2044 and paragraphs 32–35 and 70–73 of Exhibit 2050. Papers 40, 47. Patent Owner opposes. Paper 41.

Exhibit 2044 is a declaration from Mr. Frederick L. Whitmer, one of Petitioner’s counsel. Paper 40, 2. Mr. Whitmer’s testimony is directed to Kilpatrick Townsend time records of a meeting with Mr. Kuster relied on by Patent Owner in support of its argument that Mr. Kuster conceived and reduced to practice his alleged invention before the effective date of Hsiao. *See, e.g.*, PO Resp. 20. Petitioner contends Mr. Whitmer lacks personal knowledge and the records are hearsay insofar as they are offered to show what was discussed at the meeting. Paper 40, 2–3.

Exhibit 2050 is a declaration from Patent Owner’s expert, Mr. Eric Welch. The paragraphs that Petitioner seeks to exclude also relate to the alleged conception and reduction to practice by Mr. Kuster, and express Mr. Welch’s opinion on the evidence presented on that issue, specifically Mr. Kuster’s declaration testimony, and whether Hsiao qualifies as prior art. Petitioner contends these paragraphs “consist of conclusory testimony that simply parrots Mr. Kuster’s uncorroborated testimony concerning his alleged conception and reduction to practice of claimed inventions” and should be excluded. Paper 40, 3.

As we explain above in our analysis of whether Hsiao is prior art to the ’243 patent, we have considered Mr. Whitmer’s declaration and the cited testimony from Mr. Welch, but still determine that Hsiao is prior art to the ’243 patent—a conclusion not adverse to Petitioner. *See* § II.C.1. We therefore deny Petitioner’s motion as moot.

IV. CONCLUSION¹¹

For the foregoing reasons, we determine Petitioner has shown by a preponderance of the evidence that claims 1–4, 9–13, and 18 are anticipated by Hsiao. We determine Petitioner has shown by a preponderance of the evidence that claims 1–18 would have been obvious over Hsiao and Sun. We determine Petitioner has not shown by a preponderance of the evidence that claims 1–6 and 9–15 would have been obvious over Chen and Cheng; claims 7, 8, 16, and 17 would have been obvious over Chen, Cheng, and Hiller; claims 1–18 would have been obvious over Chen and Sun; or claim 18 would have been obvious over Chen, Cheng, and Wan.

In summary:

Claims	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4, 9–13, 18	102	Hsiao	1–4, 9–13, 18	
1–4, 9–13, 18	103 ¹²	Hsiao		
1–18	103	Hsiao, Sun	1–18	
1–6, 9–15	103	Chen, Cheng		1–6, 9–15

¹¹ 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).

¹² Because we determine that Hsiao anticipates claims 1–4, 9–13, and 18 of the ’243 patent, we do not address Petitioner’s alternative obviousness challenge over Hsiao.

7, 8, 16, 17	103	Chen, Cheng, Hiller		7, 8, 16, 17
1-18	103	Chen, Sun		1-18
18	103	Chen, Cheng, Wan		18
Overall Outcome			1-18	

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED claims 1-18 of the '243 patent are held to be unpatentable; and

FURTHER ORDERED that Petitioner's Motion to Exclude is denied; 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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Patent 8,705,243 B2

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