Filed August 10, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TOSHIBA AMERICA INFORMATION SYSTEMS, INC.
AND
MSI COMPUTER CORP.
Petitioners

v.

WALLETEX MICROELECTRONICS LTD.
Patent Owner

Case No.: IPR2018-01538
Patent 7,458,825

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 7,458,825

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 7,458,825
1002	Declaration of R. Jacob Baker, Ph.D., P.E.
1003	Curriculum Vitae for R. Jacob Baker, Ph.D., P.E.
1004	Applicant's May 28, 2008 Response to Office Action
1005	Notice of Allowance
1006	Provisional Application No. 60/580,573
1007	Provisional Application No. 60/614,393
1008	Provisional Application No. 60/628,692
1009	Provisional Application No. 60/675,450
1010	WIPO Pub. No. WO 2005/124932
1011	U.S. Patent No. 7,361,059 to Harkabi et al.
1012	U.S. Provisional Application No. 60/490413
1013	Dana Davis, *Overload and Reverse-Current Circuitry Protects Battery and Load*, EDN (March 1, 1996)
1014	Paul Wiener and Jim Witham, *Meeting USB and IEEE 1394 Overcurrent Protection Requirements Using PolySwitch Devices*, WESCON/97 Conf. Proc. (Nov. 6, 1997)
1015	USB 2.0 Specification
1016	U.S. Pat. App. Pub. No. 2002/0091049 to Hisano et al.
1017	U.S. Patent No. 6,883,718 to Le et al.

Exhibit No.	Description
1018	U.S. Patent No. 6,725,302 to Benayoun et al.
1019	U.S. Pat. App. Pub. No. 2002/0126882 to Funahashi
1020	U.S. Pat. App. Pub. No. 2002/0169978 to Kim et al.
1021	U.S. Pat. App. Pub. No. 2003/0149816 to Poo et al.
1022	*Reversible Connections LLC v. Toshiba Am. Info. Sys., Inc.*, No. 8:17-cv-01252, Dkt. No. 37 (C.D. Cal. May 25, 2018) (Amended Joint *Markman* Prehearing Statement)
1023	Declaration of Rachel J. Watters
1024	Declaration of Gerard P. Grenier
1025	Declaration of Jeffrey L. Ravencraft
1026	USB 2.0 Specification Engineering Change Notice #1: Mini-B Connector (October 20, 2000)

Petitioners Toshiba America Information Systems, Inc. ("TAIS") and MSI Computer Corp. ("MSI") (collectively, "Petitioners") request *inter partes* review in accordance with 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq*. of claims 1-24 of U.S. Pat. No. 7,458,825 ("'825 Patent") which issued on December 2, 2008. Non-party Reversible Connections LLC alleged in related district court litigations that the '825 Patent is assigned to Walletex Microelectronics Ltd. and that Reversible Connections LLC is the exclusive licensee.

I. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8(A)(1)

Petitioners provide the following mandatory notices:

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

TAIS and MSI are the petitioners and real parties-in-interest in this matter. Although Reversible Connections LLC also sued G.B.T. Inc., ASRock America, Inc., and Razer USA, Ltd. (collectively, "Other Defendants"), those Other Defendants are not real parties-in-interest nor are they parties-in-privity with TAIS and MSI. None of the Other Defendants had any direction or control over the selection of prior art, the drafting of this petition and supporting materials, or review of the petition and supporting materials prior to its filing. Nor did any of the Other Defendants contribute to the funding of this IPR petition. *See Wi-Fi One, LLC v. Broadcom Corp.*, 887 F.3d 1329, 1340-41 (Fed. Cir. 2018) (parties that do not direct, control, or fund the *inter partes* review proceeding are not real

parties-in-interest); *see also Vizio, Inc. v. Nichia Corp.*, IPR2017-00551, 2017 WL 2901317, at *2 (P.T.A.B. July 7, 2017) ("A non-party is not necessarily a real party-in-interest by virtue of its status as a co-defendant or co-member of a joint defense group with a petitioner."); Office Patent Trial Practice Guide, 77 F.R. 48756, 48760 ("[I]f Party A is part of a Joint Defense Group with Party B in a patent infringement suit, and Party B files a PGR petition, Party A is not a 'real party-in-interest' or a 'privy' for the purposes of the PGR petition based solely on its participation in that Group.").

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

The following cases and PTAB proceedings are related matters within the meaning of 37 C.F.R. § 42.8(b)(2):

- *G.B.T. Inc. v. Walletex Microelectronics Ltd.*, IPR2018-00325 (institution denied on July 3, 2018);
- *G.B.T. Inc. v. Walletex Microelectronics Ltd.*, IPR2018-00326 (instituted on July 5, 2018);
- *Reversible Connections LLC v. Toshiba America Information Systems, Inc.*, No. 8:17-cv-01252-JVS-JCG (C.D. Cal.);
- *Reversible Connections LLC v. GBT Inc.*, No. 2:17-cv-05382-JVS-JCG (C.D. Cal.);

- *Reversible Connections LLC v. MSI Computer Corp.*, No. 2:17-cv-05383-JVS-JCG (C.D. Cal.);
- *Reversible Connections LLC v. ASRock America, Inc.*, No. 5:17-cv-01445-JVS-JCG (C.D. Cal.);
- *Reversible Connections LLC v. Razer USA, Ltd.*, No. 8:17-cv-01254-JVS-JCG (C.D. Cal.).

TAIS is a party to the matter *Reversible Connections LLC v. Toshiba America Information Systems, Inc.*, No. 8:17-cv-01252-JVS-JCG (C.D. Cal.). MSI is a party to the matter *Reversible Connections LLC v. MSI Computer Corp.*, No. 2:17-cv-05383-JVS-JCG (C.D. Cal.). Reversible served its Complaint against MSI on August 10, 2017 and served its Complaint against TAIS on August 14, 2017.

C. Lead And Back-up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioners provide the following designation of counsel:

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D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Please direct all correspondence to lead counsel and back-up counsel at the addresses shown above. Petitioners also consent to electronic service by email to Knobbe.TAIS@knobbe.com.

II. GROUNDS FOR STANDING UNDER 37 C.F.R. § 42.104(A)

Petitioners certify that the '825 Patent is available for *inter partes* review and that Petitioners are not barred or estopped from requesting *inter partes* review challenging the patent claims on the grounds identified in this petition. The present petition is being filed less than a year after the service of the complaint on Petitioners in the District Court litigations, and is not barred under 35 U.S.C. § 315(b).

III. INTRODUCTION TO THE '825 PATENT

A. Summary of the Alleged Invention

The '825 Patent's inventors set out to solve the frustrating problem of inserting a USB plug into a computer the wrong way. Ex. 1001 at 3:11-21. To

that end, the inventors disclosed a USB plug that a user could insert in two opposite orientations (right side up and upside down) into a USB receptacle. *Id.* at 5:42-62, Figs. 2a-2e, 7:22-25. Figures 2a and 2b, reproduced below, illustrate the double-sided USB plug of the patent with contacts c1 through c8.

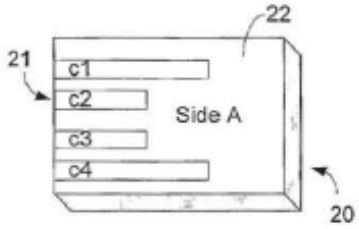


FIG. 2a

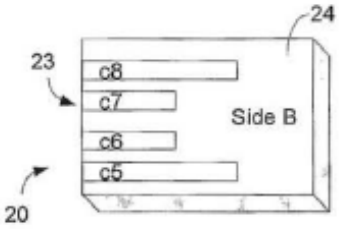


FIG. 2b

Figure 2c shows a cross-sectional view of the double-sided USB plug in Figures 2a and 2b (labeled 26) inserted into a USB receptacle 25. *See* Ex. 1001 at 6:17-36.

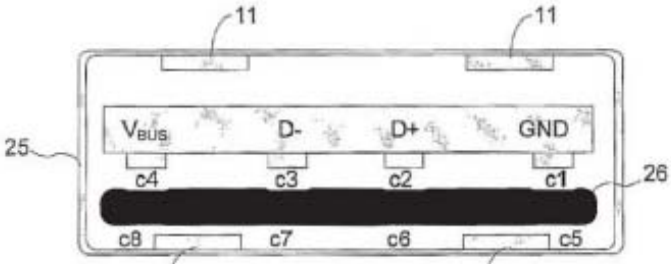


FIG. 2c

Because the USB plug is reversible, the assignee arranged contacts c5-c8 shown in Figure 2c so that when flipped over, they mate correctly with the V_{BUS}, D-, D+, and GND contacts on the USB receptacle. *Id.* at 5:42-6:7. The '825 Patent describes these contacts as "spatially aligned in anti-phase relationship" or "spatially aligned in a mutually opposed relationship." *Id.* at 5:66, Claim 1.

Because the contacts on both sides must perform the same function when connected in either orientation to the USB receptacle, the corresponding pairs of contacts must be electrically interconnected. *See id.* at 6:41-57; Figs. 2d, 2e. Figure 2c, reproduced below with annotations, shows this "anti-phase" or "mutually opposed" relationship.

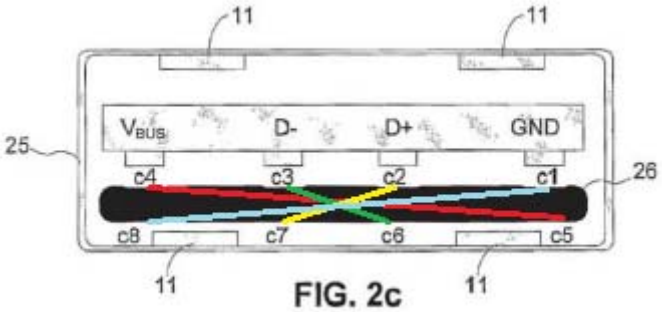


FIG. 2c

However, due to the double-sided nature of the disclosed plug, the inventors warned that a short circuit might occur when a contact on one side of the plug opposite the receptacle contacts the metallic shielding of the receptacle. *Id.* at 3:14-17, 6:41-67. For example, in Figure 2c, above, a short circuit would occur if contact c5 touches the resilient leaf 11. The plug internally connects contact c5 to V_{BUS} via contact c4. Resilient leaf 11, part of the metallic frame, is grounded. *See id.* at 6:36-52. Thus when contacts c5 and resilient leaf 11 touch, they complete a short circuit from V_{BUS} to GND. To prevent this type of short circuit from happening, the '825 Patent describes adding a short circuit prevention device, such as diodes or a relay system. *Id.* at 6:41-7:7.

In order to broaden the scope of their claims to cover more than just USB

plugs, the inventors created the term "flexibly connectable computer systems" and its acronym "FCCS" "to denote any interface standard for allowing devices to be connected to a computer." *Id.* at 2:65-3:3, 17:1-9. The inventors specifically disclosed that USB, mini-USB, and IEEE 1394 connectors fell within the meaning of FCCS. *Id.* at 17:1-9.

Claim 1 of the '825 Patent recites:

> A multi-contact connector supporting on opposite surfaces first and second sets of mutually opposed contacts wherein corresponding contacts in each set are electrically interconnected and are spatially aligned in a mutually opposed relationship allowing the connector to be connected in two opposed orientations to a corresponding FCCS-compatible receptacle supporting on an internal surface thereof a multi-contact data connector having only a single set of contacts that is compatible to either one of said sets of contacts such that identical functionality is obtained regardless of the orientation of the connector within the receptacle, said connector further comprising a short circuit prevention device to prevent an electric short circuit between contacts of the receptacle on inserting the connector therein.

Id. at Claim 1.

B. Prosecution History of the '825 Patent

The '825 Patent issued from U.S. Patent Application No. 11/629,870, filed on December 18, 2006. Ex. 1001. It claims priority to four United States provisional patent applications:

(1) No. 60/675,450, filed on April 28, 2005;

(2) No. 60/628,692, filed on November 18, 2004;

(3) No. 60/614,393, filed on September 30, 2004; and

(4) No. 60/580,573, filed on June 17, 2004.

See Ex. 1001; Exs. 1006-1009.

U.S. Patent Application No. 11/629,870 was the national phase entry of a PCT application, PCT/IL2005/000647, filed on June 17, 2005. On the national phase entry date, December 18, 2006, the applicant canceled all pending claims (1-120) and added new claims 121-144.

On February 28, 2008, the examiner issued an Office Action rejecting all pending claims as indefinite under 35 U.S.C. §112; rejecting all pending claims as obvious under 35 U.S.C. § 103(a) based on U.S. Patent No. 4,781,610 (Mercer) in view of U.S. Patent No. 4,607,209 (Guim); objecting to all pending claims for informalities (not spelling out the first occurrence of abbreviations); objecting to Figure 1 as not designating what was Prior Art; and objecting to the title of the invention as not descriptive.

On May 28, 2008, the applicant filed a Response amending the title, amending Claims 121 and 124, and amending Figure 1. The applicant amended Claim 121 (which corresponds to issued Claim 1 of the '825 Patent) as follows:

> A multi-contact connector supporting on opposite surfaces first and second sets of mutually opposed contacts wherein corresponding contacts in each set are electrically interconnected and are spatially aligned in ~~anti-phase~~ a mutually opposed relationship allowing the connector to be connected in two opposed orientations to a corresponding FCCS-compatible receptacle supporting on an internal surface thereof a multi-contact data connector having only a single set of contacts that is compatible to either one of said ~~set~~ sets of contacts such that identical functionality is obtained regardless of the orientation of the connector within the receptacle, said connector further comprising a short circuit prevention device to prevent an electric short circuit between contacts of ~~an FCCS compatible~~ the receptacle on inserting the connector therein.

Ex. 1004 at 3.

In support of this amendment, the applicants argued that "the Examiner objected to the definition in claim 121 'in antiphase relationship' under 35 U.S.C.

§112, second paragraph. This definition has been amended to read 'mutually opposed spatial relationship', which is believed to be clearer." Ex. 1004 at 8.

> Regarding the prior art rejection, the applicant also argued:
>
> Mercer does indeed show a double-sided plug 19 having pins that project from both surfaces and allow the plug to be inserted in either of two orientations into a female connector. However, the female connector is a terminal block 18, i.e. not in the form of a receptacle having contacts supported on an internal surface thereof as now defined in claim 121. Likewise, although it is true that the plug 19 can be inserted in either of two orientations into the terminal block 18, this is done precisely to achieve different functionality.

Ex. 1004 at 8-9. The applicant pointed out that Mercer taught its double-sided plug for changing power levels as follows: "One set of pins is interconnected for 220 volt operation while the other set of pins is interconnected for 440 volt operation. If it is desired to change from one power level to another, connector 19 is disconnected, reversed and re-engaged with terminal block 18." *Id.* at 9. The applicant thus argued that "It is respectfully submitted that this teaches away from the invention, where a principal object is to allow the plug to be inserted in either orientation within the receptacle and achieve identical functionality." *Id.* The applicant additionally argued that "the problem of short-circuit protection does not

- and cannot - arise with Mercer since his female connector is in the form of a terminal block rather than a receptacle and the inactive contacts are directed away from the terminal block." *Id.* at 10.

> On August 11, 2008 the examiner issued a Notice of Allowance stating:
>
> Prior art does not [sic] a multi-contact connector having two sets of contacts interconnected, spatially aligned and mutually opposed relationship wherein the connector could be connected to a receptacle in two opposed orientations and provide identical functions.

Ex. 1005 at 2. The '825 Patent issued on December 2, 2008.

As shown in the file history recounted above, the applicant distinguished the prior art (i.e., Mercer) for providing a double-sided plug for changing power levels, rather than for providing "identical functions" as recited in the pending claim.

C. <u>The Grounds in this Petition Were Not Previously Considered</u>

The invalidity grounds provided in this Petition are not cumulative or redundant of the prior art considered during the original prosecution of the application for the '825 Patent because they do not rely upon a double-sided plug for changing power levels, as the applicant distinguished the prior art considered during the original prosecution (Mercer). Rather, the invalidity grounds in this Petition rely upon prior art that discloses a double-sided connector for providing the "identical functions" of the '825 Patent, whether a USB connector is inserted in

one direction or in the reverse direction. The invalidity grounds in this petition are also not cumulative or redundant of the prior art considered during the original prosecution of the application for the '825 Patent because they are not deficient on short circuit prevention; rather, the invalidity grounds in this petition rely upon prior art that teaches short circuit prevention in the context of a double-sided connector.

D. The Claims of the '825 Patent Are Not Entitled to a Priority Date Earlier than June 17, 2005

1. An Earlier Filed Provisional Must Contain Sufficient Disclosure to Support the Full Scope of Later Claimed Subject Matter

The '825 Patent is not entitled to the benefit of an earlier effective filing date based on any of the four provisional applications because each lack written description support for the claims. The Federal Circuit has explained that a patent may only rely on a provisional application to establish an earlier effective filing date if that application contains adequate written description support under 35 U.S.C. § 112. *See Star Sci., Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1371 (Fed. Cir. 2011) (*citing Trading Techs. Int'l Inc. v. Espeed Inc.*, 595 F.3d 1340, 1359 (Fed. Cir. 2010)).

Here, the provisional applications do not contain written description support for at least the term "FCCS compatible" recited in the sole independent claim, Claim 1. The term "FCCS" does not appear in any of the provisional patent

applications. "FCCS" is an acronym that has no plain and ordinary meaning without the definition provided by the patentee. Ex. 1002 ¶¶ 60, 76.

2. The Provisional Applications Do Not Disclose "FCCS"

The patentees added "flexibly connectable computer systems" and "FCCS" in the PCT application on June 17, 2005. *See* Ex. 1010. Before that filing, the patentee had disclosed its invention as pertaining to USB only. *See generally*, Exs. 1006-1009; Ex. 1002 ¶¶ 60-73.

The first provisional, 60/580,573 disclosed a double-sided USB connector and provided a few applications for the connector, including some card-based devices and one involving a wearable bracelet. *See* Ex. 1006. The second provisional, 60/614,393 added discussion about several prior art references, provided more detailed measurements for the size of the double-sided connector, and disclosed several new figures and embodiments, including a headphone that terminated with a USB receptacle so that it could mate with an MP3 player having the double-sided USB connector. *See* Ex. 1007. The third provisional, 60/628,692, added new figures showing additional devices having the double-sided USB connector, including a device with a read-only and read-write memory. *See* Ex. 1008. The fourth provisional, 60/675,450, made some minor changes to the text and added another figure of a card-shaped device that can generate a one-time password. *See* Ex. 1009; *see also* Ex. 1002 ¶¶ 61-69. However, none of those

provisional applications discussed the terms "flexibly connectable computer systems" or "FCCS." Those provisional applications disclosed embodiments of the double-sided plug as pertaining to USB only. There was no disclosure, for example, of IEEE 1394 in the provisional patent applications' figures or text. Nor do any of the applications explain how to make an IEEE 1394 or connector other than USB reversible.

3. The PCT Application Filed June 17, 2005 Was the First Application in the Priority Chain to Provide Written Description Support

The applicants first disclosed "flexibly connectable computer systems," "FCCS," and "IEEE 1394" in the PCT Application, filed on June 17, 2005. *See* Ex. 1010. By adding "FCCS" to the specification and the claims, the patentees broadened the scope of the specification and claims to include a broader set of connectors than the previously disclosed USB connectors. For example, in that PCT application, the applicants disclosed for the first time that IEEE 1394 is an example of an FCCS connector, and therefore falls within the scope of Claim 1's "FCCS-compatible receptacle." *Id.* at p. 25, ll. 24-30. Because the provisional applications do not provide any support for "FCCS" or "IEEE 1394," they do not convey to those skilled in the art that the patentee was in possession of the full scope of the claims of the '825 Patent prior to the PCT filing date. *See* Ex. 1002 ¶¶ 71-73; *see also Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed.

Cir. 2010). Accordingly, the earliest effective filing date for the '825 Patent is June 17, 2005—the filing date of the PCT application.

IV. SUMMARY OF THE ISSUES PRESENTED

The threshold issue for consideration by the Board is whether Harkabi constitutes prior art under 35 U.S.C. § 102(e)(2) [1]. Harkabi constitutes prior art for at least two separate reasons. First, the four provisional patent applications to which the '825 Patent claims priority, do not provide written description support of the '825 Patent claims. Thus, the effective filing date of the '825 Patent is June 17, 2005, the filing date of the PCT application. Harkabi therefore constitutes prior art based on its July 26, 2004 filing date.

Second, Harkabi constitutes prior art even if the Board were to determine that the '825 Patent is entitled to claim the benefit of its earliest provisional application, No. 60/580,573, filed on June 17, 2004. Harkabi claims priority to a provisional application filed on July 28, 2003. That provisional provides written description and enablement support for the Harkabi claims. Thus, Harkabi is prior art to the '825 Patent under 35 U.S.C. § 102(e)(2) as of its provisional application filing date.

[1] Because the '825 Patent is a pre-AIA patent, all references to the United States Code are to the pre-AIA versions.

The remaining issues for the Board's consideration is whether Harkabi, alone or in combination with the other prior art references relied upon herein, anticipate or render obvious claims 1-24 of the '825 Patent.

V. STATEMENT OF THE PRECISE RELIEF REQUESTED

Petitioners respectfully request that the Board cancel claims 1-24 of U.S. Patent No. 7,458,825 based on the following grounds for unpatentability:

Ground 1. Claims 1, 2, 4, 8, 9 are anticipated by U.S. Patent No. 7,361,059 to Harkabi ("Harkabi").

Ground 2. Claims 1, 2, 4, 8-10 are obvious over multiple embodiments disclosed in Harkabi.

Ground 3. Claim 5 is obvious over Harkabi in view of *Overload and Reverse-Current Circuitry Protects Battery and Load.*

Ground 4. Claims 6 is obvious over Harkabi in view of *Meeting USB (Universal Serial Bus) Overcurrent Protection Requirements Using PolySwitch Devices*.

Ground 5. Claims 3 and 6 are obvious over Harkabi in view of the USB 2.0 Specification.

Ground 6. Claims 7 and 22 are obvious over Harkabi in view of U.S. Pat. App. Pub. No. 2002/0091049 to Hisano et al.

Ground 7. Claims 13, 14, 15, and 18 are obvious over Harkabi in view of U.S. Patent No. 6,883,718 to Le et al.

Ground 8. Claims 11 and 12 are obvious over Harkabi in view of U.S. Patent No. 6,725,302 to Benayoun et al.

Ground 9. Claims 16, 17, 23, and 24 are obvious over Harkabi in view of U.S. 2002/0169978 to Kim et al.

Ground 10. Claim 19 is obvious over Harkabi in view of US 2002/0126882 to Funahashi.

Ground 11. Claims 20 and 21 are obvious over Harkabi in view of US 2003/0149816 to Poo et al.

VI. REASONS FOR THE REQUESTED RELIEF

A. The Level of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") related to the '825 patent would have at least (1) a bachelor's degree in electrical engineering, computer engineering, mechanical engineering, or a related field and at least three years of work experience dealing with USB and other computer interface protocols, or (2) five or more years of experience in those technologies without a bachelor's degree. Ex. 1002 ¶¶ 40-45; *see* IPR2018-00326, Paper 14 at 9-10 (Institution Decision) (adopting Patent Owner's assessment of the level of ordinary skill in the art).

B. Claim Construction

In an IPR proceeding, the Board gives claims their "broadest reasonable construction in light of the specification." 37 C.F.R. §42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1279 (Fed. Cir. 2015). However, the Board need not construe claims terms unnecessary to resolving the controversy. *Shenzhen Liown Elecs. Co. v. Disney Enters., Inc.*, IPR2015-01656, Paper 7 at 10 (P.T.A.B. Feb. 8, 2016).

Petitioners believe that for the purposes of this proceeding only the Board need not expressly construe any claim terms in order to evaluate the patentability of the claims because the prior art identified discloses the claims and the preferred embodiment of the '825 Patent. Furthermore, even under the constructions proposed in the corresponding district court litigation, the prior art anticipates and renders obvious each challenged claim. *See generally*, Ex. 1022.

C. Asserted Prior Art

1. U.S. Patent No. 7,361,059 ("Harkabi")

a. Harkabi Discloses the Same Double-Sided USB Connector Claimed by the '825 Patent

Harkabi, titled "Electrical Connector," discloses a double-sided USB plug for use in standard USB receptacles. Harkabi was not cited during prosecution of the '825 Patent. Like the inventors of the '825 Patent, the Harkabi inventors recognized the difficulty in orienting a USB plug for insertion into a USB port,

because both the USB receptacle and the plug are asymmetric internally and can only be mated in one orientation. *See* Ex. 1011 at 3:1-4 ("There is clearly an unmet need for a plug mechanism that is operable with the USB that allows correct insertion of the plug into a USB port without necessitating user consideration of plug alignment."); *see also id.* at 2:13-67.

To solve this problem, Harkabi provides two embodiments of a double-sided USB plug capable of insertion in either orientation into a USB receptacle, called the SLIM and FLEX embodiments. *See id.* at 3:8-24. First, Harkabi's SLIM embodiment eliminates the metal shell or shielding found on a standard USB plug in favor of a slimmer, double-sided USB plug without the metal shell. The SLIM embodiment also includes two sets of contacts on opposite sides of a tongue, so that the plug can be correctly inserted into a USB receptacle right-side up and upside-down. Harkabi arranged those contacts in a manner so that when flipped over, they still mate correctly with the USB receptacle's contacts.

Harkabi also recognized that a short circuit might occur when one set of contacts touches the metal shell of a USB receptacle, so Harkabi included protective edges 303 on the SLIM connector to prevent contacts from touching the shell. Figure 8, reproduced below, illustrates this SLIM embodiment.

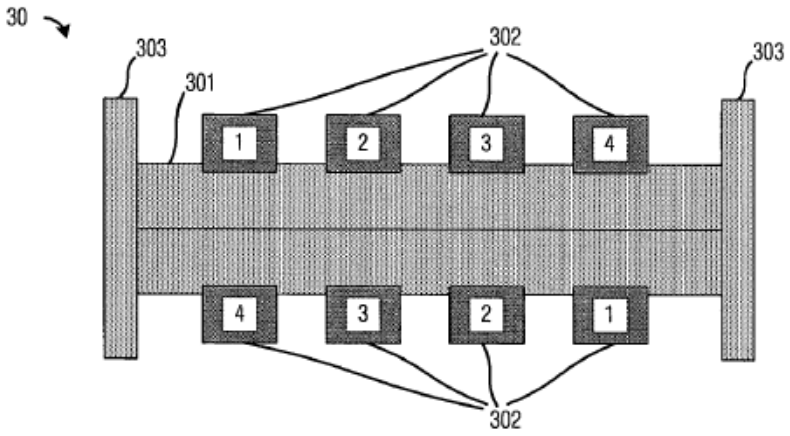


Fig. 8

Id. at Fig. 8.

Second, Harkabi's FLEX embodiment, shown in Figures 10b and 10c below, has the shielding or metal shell, but makes the tongue containing the USB contacts flexible, so that the tongue can be bent and directed into position when inserted into a USB receptacle. The FLEX embodiment also includes two sets of contacts on opposite sides of the tongue so that the plug can be inserted into a USB receptacle right-side up and upside-down. To protect against a short circuit in this embodiment, Harkabi introduced insulating strips, labled 404 below, that prevent the contacts on the plug from contacting the metal shell.

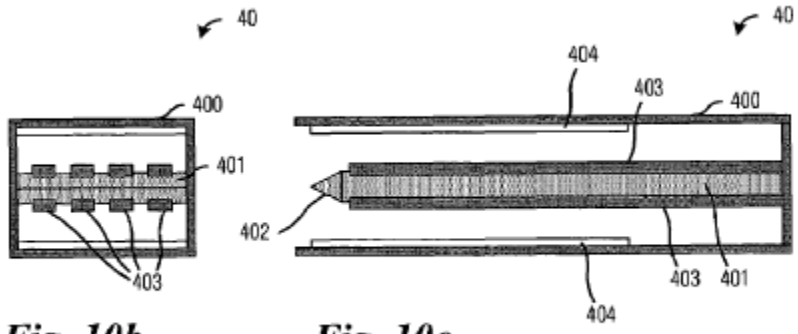


Fig. 10b ***Fig. 10c***

Id. at Figs. 10b, 10c. Fig. 12c illustrates how the tongue of the FLEX embodiment bends and is directed into position when inserted into a receptacle.

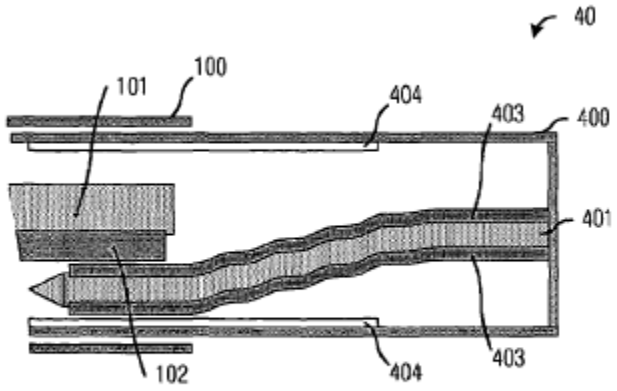


Fig. 12c

Id. at Fig. 12c.

b. Harkabi Recognized the Short Circuit Problem and Provided Solutions

Harkabi also recognized that a short circuit could occur due to the double-sided nature of the USB plug. "In some instances, USB receptacle 100 may serve as common electrical ground. In order to avoid short-circuiting the electrical contact points 302 on the opposite side of tongue 301 that are not participating in the electrical mating, protective edges 303 are used." Ex. 1011 at 5:23-27.

As mentioned above, Harkabi added mechanisms to prevent such a short circuit from occurring. In the SLIM embodiment, "[t]he protective edges 303 protrude from tongue 301 a little more than the electrical contacts 302 do, and thus prevent physical connection to housing 100 that might otherwise cause a short

circuit." *Id.* at 5:23-30. In the FLEX embodiment, "insulation strips 404 are lined inside shell 400" to avoid the short circuit. *Id.* at 5:60-62.

c. Harkabi Is Entitled to Claim the Benefit of Its Provisional Application Filing Date for § 102(e) Prior Art Purposes

Petitioners bear the burden of proof to show that a reference patent is entitled to the filing date of its provisional application. *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015). "A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1." *Id*.

Harkabi claims priority to U.S. Provisional Application No. 60/490,413, filed on July 28, 2003 ("Harkabi Provisional") (Ex. 1012). Harkabi is entitled to claim the benefit of the Harkabi Provisional filing date for § 102(e)(2) purposes because the Harkabi Provisional provides full written description support and enablement for the claims of Harkabi as set forth in more detail below.

i. Harkabi's Claims

Harkabi contains twelve claims. Claim 1 recites the double-sided connector. Claim 2 adds that the double-sided connector's contacts are configured for conducting signal, ground, and supply voltages that comply with the USB standard. Claim 3 adds that the double-sided connector can mate with a USB Type A receptacle. With the exception of Claims 5 and 7, which introduce an additional

limitation, the remaining claims merely reword and selectively incorporate certain limitations of Claims 1-3 of Harkabi. Specifically:

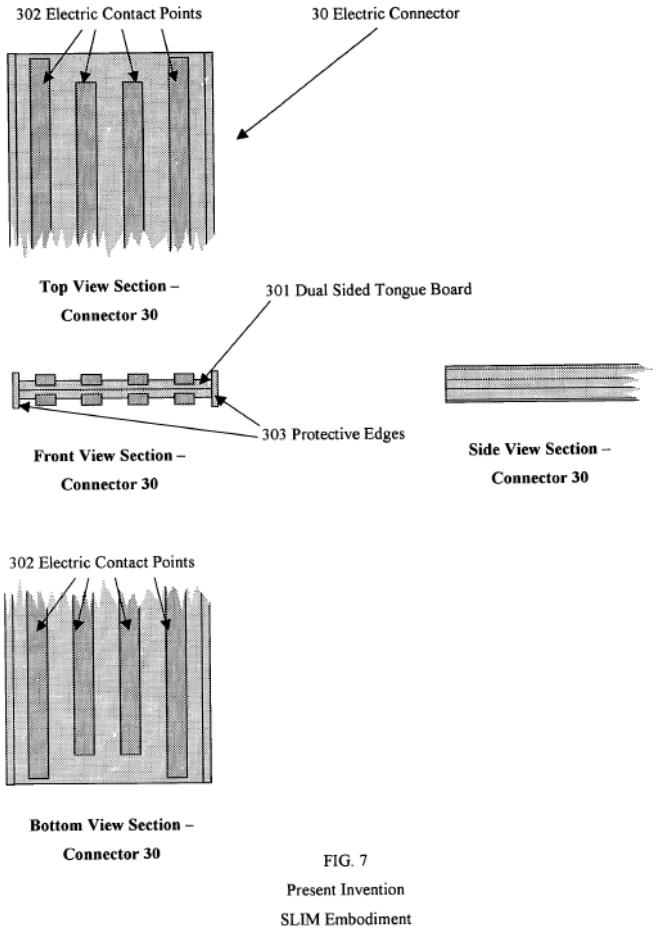
- Claim 4 combines Claims 1, 2, and 3 in independent form.
- Claim 5 recites the elements of Claim 4, but further specifies the order of the electrical contacts (e.g., ground, signal A, signal B, voltage). *See* Ex. 1011 at 7:48-55. The Harkabi Provisional discloses this specific arrangement in Figures 8 and 14. Ex. 1012 at Fig. 8.
- Claim 6 rephrases Claim 4.
- Claim 7 recites the elements of Claim 6 with the additional ordering limitation from Claim 5.
- Claim 8 rewords Claim 1.
- Claim 9 adds the same limitation to Claim 8 that Claim 2 adds to Claim 1.
- Claim 10 rephrases Claim 1 by using more words to describe the "reverse symmetry" relationship of the contacts.
- Claim 11 adds the same limitation to Claim 10 that Claim 2 adds to Claim 1.
- Claim 12 adds a limitation that to Claim 10 that is found in Claim 1.

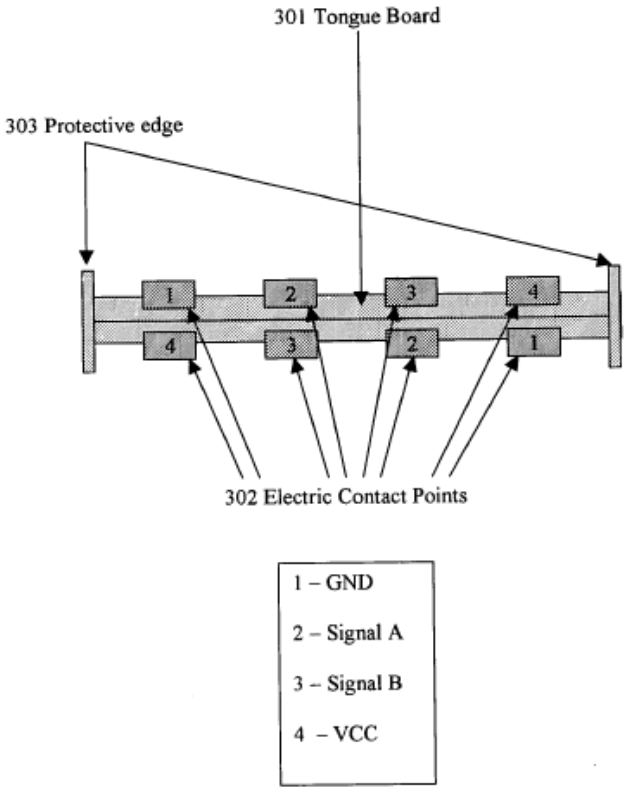
See Ex. 1002 ¶¶ 86-107.

ii. The Harkabi Provisional Provides § 112, ¶ 1 Support for All Claims of Harkabi

As discussed above, the majority of Harkabi's claim limitations are found in Claims 1-3. Accordingly, the claim chart below maps the elements of Claims 1-3 to the support in the Harkabi Provisional below.

Harkabi Claim 1	**Harkabi Provisional**
An electrical connector comprising:	"The present invention is an improvement of existing USB series 'A' plugs. The improvement revealed in present invention is achieved by providing electrical contact points on both sides of connector tongue board, thus facilitating the insertion of USB devices into USB host computers." Ex. 1012 at 9:8-11; *see also id.* at 6:1-2.

	 *Id.* at Fig. 7; *see also id.* at 9:12-14.
a tongue having first and second flat sides bounded by opposing edges; a first set of one or more electrical contacts located on the first side of the tongue; a second set of one or more electrical contacts located on the second side of the tongue,	"Shown in FIG 7, is an electrical plug 30 in accordance with one embodiment of the present invention (SLIM embodiment) and comprises of a tongue 301, a plurality of contacts 302 on both sides of tongue 301, and protective edges 303." *Id.* at 9:12-14; *see also id.* at Fig. 7.

each of said second set of electrical contacts being electrically connected with a respective one of the first set of electrical contacts and being positioned electrically and physically in reverse symmetry with the first set of contacts; whereby the electrical connector will electrically and physically mate to a corresponding receptacle when inserted into the receptacle, irrespective of whether the first or second side is oriented to mate with a set of contacts of the receptacle, and	"Electrical contacts 302 are present on both sides of tongue 301. This promises that insertion of tongue 301 into receptacle 100 in either of 2 possible alignments will produce proper electrical mating. In order to assure that each of electrical contact points 302 is mated with the correct electrical contact point 102 in USB port 1, regardless of original alignment of tongue 301, the electrical contact points on each side of tongue 301 are oppositely aligned, as shown in FIG. 8." *Id.* at 10:1-6.  FIG. 8 Present Invention SLIM Embodiment – Electrical Contacts *Id.* at Fig. 8; *see also id.* Fig. 7, 14.

	"Internal Electronics 501 are connected to Top Electric Contact Points 302 by using Internal Electronic Contacts 502. In the top view, Top Internal Electric Contacts 502 are directly connected to Top Electric Contact Points 302. In Bottom view, electrical plug 30 must maintain same order and positioning of Bottom Electric Contact Points 304 relative to Top Electric Contact Points 302. Internal Electronics 501, however, are the same piece of silicon both top and bottom. Therefore, Bottom Internal Electric Contacts 504 must be crossed to match Bottom Electric Contact Points 304." *Id.* at 12:7-14.

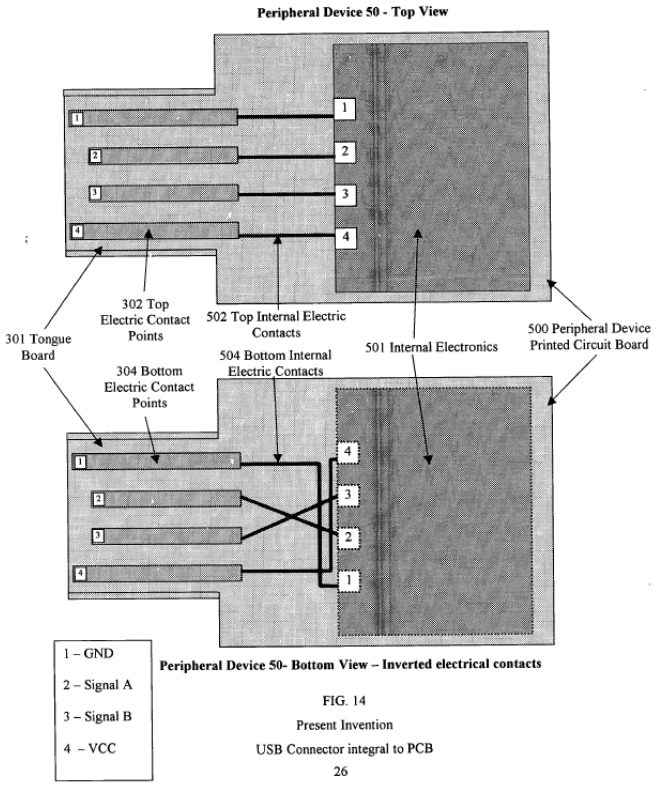
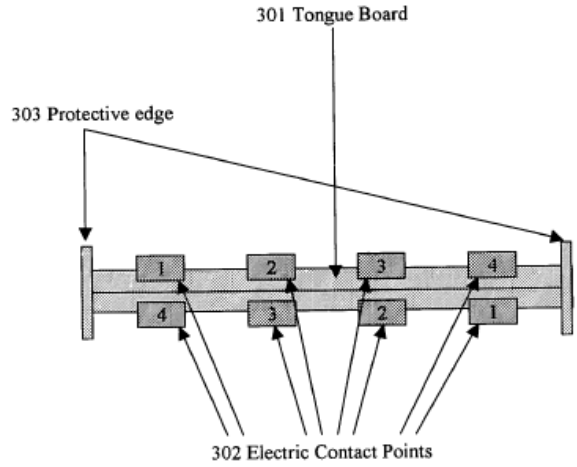


FIG. 14
Present Invention
USB Connector integral to PCB
26

protectors extending outward from each of the first and second sides of the tongue along the opposite edges of the tongue and terminating a distance beyond the electrical contacts carried by the first and second sides, whereby the electrical contacts are prevented from physically contacting a housing of the corresponding receptacle.	"In some instances, USB receptacle 100 may serve as common electrical ground. In order to avoid short-circuiting the electrical contact points 302 on the opposite side of tongue 301 that are not participating in the electrical mating, protective edges 303 are used. The protective edges 303 protrude from tongue 301 a little more than the electrical contacts 302 do, and thus prevent physical connection that may cause a short circuit." *Id.* at 10:7-11; *see also id.*at Fig. 7.
Harkabi Claim 2	**Harkabi Provisional**
The electrical connector of claim 1 wherein the first and second set of electrical contacts are configured for conducting data signals and ground and supply voltages which comply with a universal serial bus (USB) standard.	"The present invention is an improvement of existing USB series 'A' plugs. The improvement revealed in present invention is achieved by providing electrical contact points on both sides of connector tongue board, thus facilitating the insertion of USB devices into USB host computers." *Id.* at 9:8-11; *see also id.* at 10:1-6.

	 FIG. 8 Present Invention SLIM Embodiment – Electrical Contacts *Id.* at Fig. 8.
Harkabi Claim 3	**Harkabi Provisional**
The electrical connector of claim 1 wherein the electrical connector mates with a USB standard "A type" compliant receptacle.	"The present invention is an improvement of existing USB series 'A' plugs. The improvement revealed in present invention is achieved by providing electrical contact points on both sides of connector tongue board, thus facilitating the insertion of USB devices into USB host computers." *Id.* at 9:8-11; *see also id.* at Fig. 9 (showing insertion of the SLIM plug into a USB Type A receptacle).

Further, the additional limitation in Claims 5 and 7 relating to the particular ordering of the electrical contacts is taught in Figure 8 of the Harkabi Provisional,

and also on Figure 14. The Declaration of R. Jacob Baker provides a further claim chart showing the written description and enablement support for Claims 1-12 of Harkabi. [2] *See* Ex. 1002 at ¶ 107. However, as shown in that claim chart, the § 112 support for all claims of Harkabi is the same as in the abbreviated claim chart above (with the addition of Figures 8 and 14 for Claims 5 and 7).

As described above, the Harkabi Provisional provides complete § 112, ¶ 1 support for each of Harkabi's claims. Accordingly, Harkabi is § 102(e)(2) prior art as of its provisional filing date.

Alternatively, if the Board finds that the '825 Patent is entitled to an effective filing date no earlier than June 17, 2005, Harkabi is also § 102(e)(2) prior art as of its July 26, 2004 nonprovisional filing date.

2. Paul Wiener, *Meeting USB and IEEE 1394 Overcurrent Protection Requirements Using PolySwitch Devices*, WESCON/97 Conference Proceedings ("Wiener")

The IEEE published the article titled, "Meeting USB Overcurrent Protection Requirements Using PolySwitch Devices" ("Wiener") on November 6, 1997. The article was presented at the WESCON/97 Conference held on November 6, 1997 and published in the WESCON/97 Conference Proceedings. The article was also available for download on IEEE Xplore as of August 6, 2002. S*ee* Ex. 1024. Wiener was also cited by numerous patents to other inventors prior to the '825

[2] Citations are given in page:line format or column:line format.

Patent. *See, e.g.*, U.S. Pat. Nos. 6,189,099, 6,477,589, 7,689,724, 7,805,720. Wiener is thus prior art under § 102(b). Wiener explains how to use PolySwitch devices in order to implement overcurrent protection as required by the USB specification. *See* Ex. 1014 at 444.

3. Dana Davis, *Overload and Reverse-Current Circuitry Protects Battery and Load*, EDN, Mar. 1, 1996

Overload and Reverse-Current Circuitry Protects Battery and Load ("EDN") was published in EDN magazine on March 1, 1996. *See* Exs. 1013, 1023. EDN thus constitutes prior art under § 102(b). EDN explains that battery-operated equipment must be protected against reversed currents and accidental short circuits which can be fatal to portable equipment. EDN provides numerous examples of circuits that can prevent overcurrent conditions and explains that the simplest method of providing that protection is to include a diode in the circuit to prevent the short circuit.

4. Universal Serial Bus Specification Revision 2.0 ("USB 2.0 Specification")

The USB Implementers Forum, the standards setting organization for USB, published the USB 2.0 Specification on April 27, 2000. *See* Ex. 1025. The USB 2.0 Specification is also admitted prior art—the '825 Patent specifically points readers to find the USB specification at www.usb.org. Ex. 1001 at 6:13-15. Moreover, the USB 2.0 Specification was available prior to the '825 Patent, as

evidenced by the '825 Patent's reference to mini-USB, an alternative connector that was added to the USB 2.0 Specification via an engineering change notice in October 2000. *See id.* at 17:6-9; *see also* Ex. 1026. Thus, the USB 2.0 Specification is prior art under § 102(b). The USB 2.0 Specification provides all of the mechanical and electrical details to create USB-compliant connectors.

5. U.S. Pat. App. Pub. No. 2002/0091049 to Hisano et al. ("Hisano")

Hisano, titled "Exercise Aid Device and Exercise Aid Method Employing the Same," published on July 11, 2002. *See* Ex. 1016. Thus, Hisano constitutes prior art under § 102(b). Hisano discloses an exercise headphone that connects via USB and contains sensors such as pulse sensors.

6. U.S. Patent No. 6,883,718 ("Le")

Le, titled "Credit Card Sized Memory Card With Host Connector," issued on April 26, 2005 from an application filed on February 27, 2004. *See* Ex. 1017. Le is thus prior art under § 102(e)(2). Le discloses a credit card shaped memory card with a thin USB plug, a magnetic stripe, and a smart card contact.

7. U.S. Patent No. 6,725,302 ("Benayoun")

Benayoun, titled "Universal Serial Bus (USB) With Wireless Communication Hubs," issued on April 20, 2004 from an application filed on September 6, 2000. *See* Ex. 1018. Benayoun is thus prior art under § 102(a).

8. U.S. Patent App. Pub. No. 2002/0169978 to Kim et al. ("Kim")

Kim, titled "Computer and Driving Method Therefor," published on November 14, 2002. *See* Ex. 1020. Kim therefore constitutes prior art under § 102(b). Kim discloses a USB-based personal device that can serve as a flash storage medium, an MP3 player, and a security system.

9. U.S. Patent App. Pub. No. 2003/0149816 to Poo et al. ("Poo")

Poo, titled "Portable Data Storage and Image Recording Device Capable of Direct Connection to a Computer USB Port," published on August 7, 2003. *See* Ex. 1021. Thus, Poo constitutes prior art under § 102(a). Poo describes a portable image capture and recording device that connects to a computer via a USB plug.

10. U.S. Patent App. Pub. No. 2002/0126882 ("Funahashi")

Funahashi, titled "Fingerprint Identification System, Fingerprint Identification Apparatus, Fingerprint Identification Method, and Biometric Identification Apparatus," published on September 12, 2002, and thus is prior art under § 102(b). *See* Ex. 1019. Funahashi describes a fingerprint sensor that connects via USB to a computer.

VII. CLAIMS 1-24 OF THE '825 PATENT ARE UNPATENTABLE

Pursuant to Rule 42.104(b)(4)-(5), the following sections (as confirmed by the Declaration of Dr. R. Jacob Baker (Ex. 1002)) detail the grounds of unpatentablility, the limitations of the challenged claims of the '825 Patent, and

how these claims were therefore anticipated or rendered obvious in view of the prior art.

All grounds of unpatentability asserted herein rely on Harkabi as the primary reference. Claims 1-7 of the '825 Patent claim a connector, while Claims 9-24 recite applications for the claimed connector. Claim 8 claims a female connector that connects to the connector of Claim 1. Claim 1 is the sole independent claim. Accordingly, several of the secondary references relied upon herein relate to different USB devices (e.g., webcams, memory sticks, fingerprint sensors, MP3 players) that use a USB plug to connect with a computer.

A. GROUND 1: Claims 1, 2, 4, 8, and 9 Are Anticipated by Harkabi.

In order to anticipate a claim, a prior art reference that teaches multiple embodiments must disclose all of the limitations in a single embodiment. *See Panasonic Corp. v. Optical Devices, LLC*, IPR2014-00302, Paper 9 at 13-14 (P.T.A.B. July 11, 2014). The Harkabi SLIM embodiment anticipates Claims 1, 2, 4, 8, and 9 of the '825 Patent.

1. Claim 1

a. "A multi-contact connector"

Harkabi teaches that the SLIM embodiment is a multi-contact connector. "In one exemplary embodiment (hereafter SLIM embodiment), the ***connector*** tongue board is not housed in a shell. The tongue board, which has ***two sets of contact points***, one on each side of the tongue board, may be correctly inserted into

host receptacle in two alignments." Ex. 1011 at 3:10-14 (emphasis added); *see* Ex. 1002 ¶ 123.

b. <u>"supporting on opposite surfaces first and second sets of mutually opposed contacts"</u>

Harkabi teaches that the SLIM embodiment connector supports on opposite surfaces two sets of mutually opposed contacts. Specifically, Harkabi teaches that "[t]he plug 30 includes a tongue 301" and "a plurality of contacts 302 on both sides of tongue 301." Ex. 1011 at 4:57-61; *see also id.* at 3:10-14 ("The tongue board, which has ***two sets of contact points, one on each side of the tongue board***, may be correctly inserted into host receptacle in two alignments.") (emphasis added). Figure 7b of Harkabi shows a head-on view of the SLIM embodiment plug 30 that has a tongue 301 and two sets of contacts 302 on opposite sides.

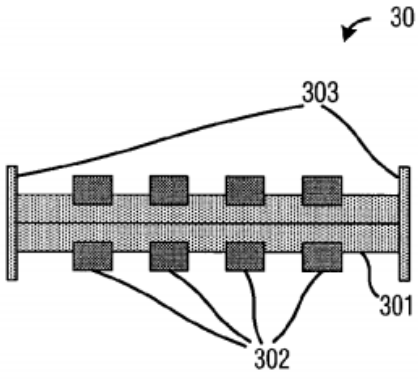


Fig. 7b

Id. at Fig. 7b; *see also id*. at 3:66-67.

As shown in Fig. 7b and discussed immediately below, Harkabi teaches that the two sets of contacts 302 are "mutually opposed." *See id.* at 6:4-21; *see also* Ex. 1002 ¶ 124.

c. <u>"wherein corresponding contacts in each set are electrically interconnected and are spatially aligned in a mutually opposed relationship"</u>

Harkabi teaches that corresponding contacts on the two sides of the SLIM embodiment connector are electrically interconnected and spatially aligned in a mutually opposed relationship. Harkabi explains:

> FIGS. 14a and 14b show an example of a SLIM embodiment in which the present invention is used to connect a peripheral device 50 to a USB host computer (not shown) without the use of a cable. The electrical plug 30 is an integral part of the printed circuit board (PCB) 500. Internal electronics 501 are connected to top electric contact points 302 by using internal electronic contacts 502. ***In the top view of FIG. 14a, top internal electric contacts 502 are directly connected to top electric contact points 302. In the bottom view of FIG. 14b, electrical plug 30 must maintain same order and positioning of bottom electric contact points 304 relative to top electric contact points 302. Internal electronics 501, however, are the same chip (e.g., piece of silicon) both top and bottom. Therefore, bottom***

internal electric contacts 504 must be crossed to match bottom electric contact points 304.

Id. at 6:4-21 (emphasis added). Figures 14a and 14b are reproduced below showing how the two sets of contacts 302 and 304 are electrically interconnected.

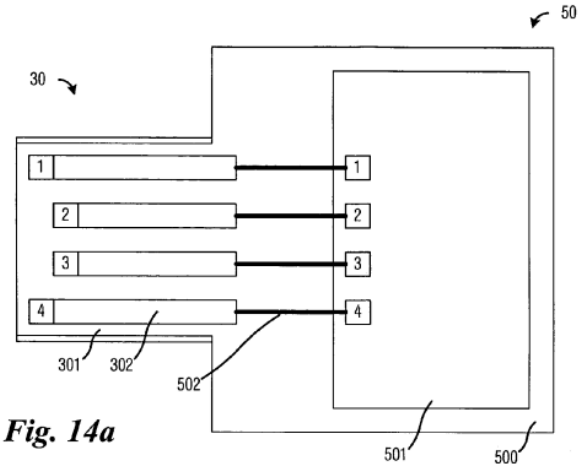


Fig. 14a

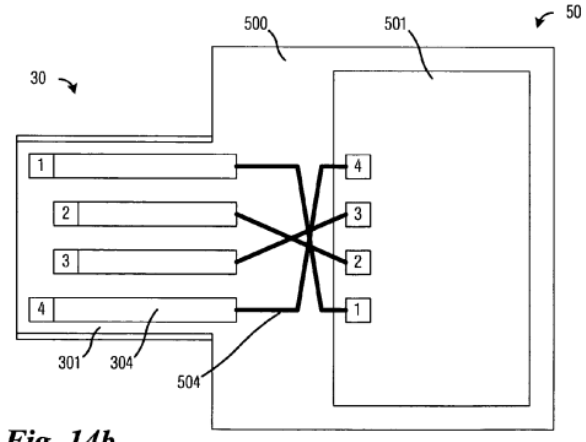


Fig. 14b

Id. at Figs. 14a-14b.

Harkabi thus teaches that the corresponding contacts in the two sets (top and bottom) are electrically interconnected because the two sets of contacts both connect to the same internal electronics 501 chip.

Further, Harkabi teachecs that the corresponding contacts in the two sets are also mutually opposed. Harkabi explains that "[i]n order to assure that each of electrical contact points 302 are mated with the correct electrical contact points 102 in USB port 1, regardless of original alignment of tongue 301, the electrical contact points on each side of tongue 301 are oppositely aligned, as shown in FIG. 8." *Id.* at 5:4-9; *see also id.* at 6:17-19. Figure 8, below, shows how the top set of contacts {1, 2, 3, 4} are mutually opposed to the bottom set of contacts {4, 3, 2, 1}.

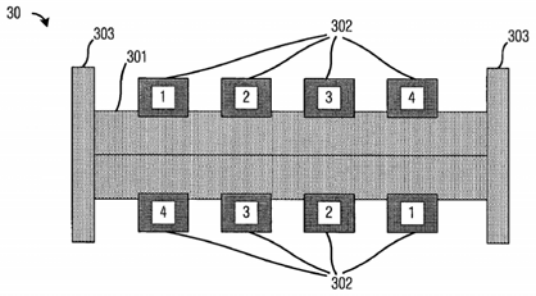


Fig. 8

Id. at Fig. 8; *see* Ex. 1002 ¶ 125-27.

d. <u>"allowing the connector to be connected in two opposed orientations to a corresponding FCCS-compatible receptacle supporting on an internal surface thereof a multi-contact data connector having only a single set of contacts that is compatible to either one of said sets of contacts such that identical functionality is obtained regardless of the orientation of the connector within the receptacle"</u>

Harkabi teaches that the purpose of the SLIM embodiment connector is to allow it to be inserted in two opposed orientations into a USB receptacle and that

identical functionality is obtained regardless of the orientation of the SLIM connector in the USB receptacle. Specifically, Harkabi explains:

> Electric contacts 302 are present on both sides of tongue 301. This ensures that insertion of tongue 301 into receptacle 100 in either of two possible alignments will produce proper electrical mating. In order to assure that each of electrical contact points 302 are mated with the correct electrical contact points 102 in USB port 1, regardless of original alignment of tongue 301, the electrical contact points on each side of tongue 301 are oppositely aligned . . . .

Id. at 5:1-9; *see also id.* at 4:47-52.

Furthermore, the USB port described by Harkabi is an FCCS-compatible receptacle according to the '825 Patent. *See* Ex. 1001 at 17:1-6 ("In the following claims, reference to FCCS connector relates to any connector that is adapted for use with 'flexibly connectable computer systems' . . . . USB-compatible connectors are an example of such a connector . . . .").

Figures 9a and 9b of Harkabi confirm that the USB port "support[s] on an internal surface thereof a multi-contact data connector having only a single set of contacts that is compatible to either one of said sets of contacts," as recited in this limitation.

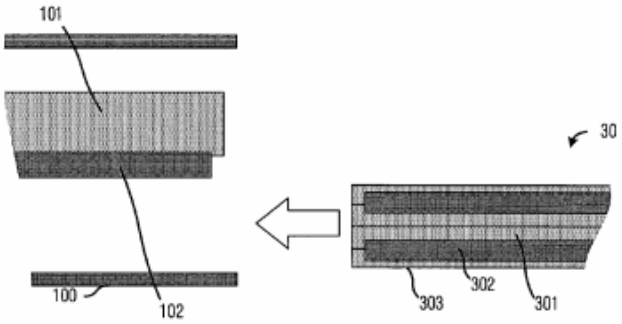


Fig. 9a

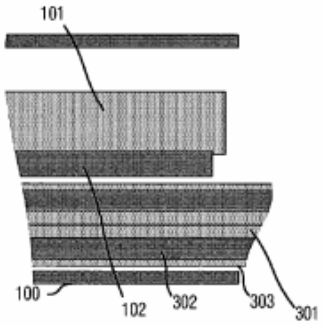


Fig. 9b

Ex. 1011 at Figs. 9a-9b.

As shown above, the USB receptacle 100 has an internal surface 101 which supports a multi-contact data connector having a single set of contacts 102. *See id.* at 4:62-67. The single set of contacts 102 is compatible with either of the two sets of contacts 302 on the plug 30. *See id.* at 5:1-4 ("Electric contacts 302 are present on both sides of tongue 301. This ensures that insertion of tongue 301 into receptacle 100 in either of two possible alignments will produce proper electrical mating."); *see also* Ex. 1002 ¶¶ 128-29.

e. <u>"said connector further comprising a short circuit prevention device to prevent an electric short circuit between contacts of the receptacle on inserting the connector therein."</u>

As mentioned above, Harkabi also recognized that a short circuit could occur due to the double-sided nature of the USB plug and added a mechanism to prevent an electric short circuit from occurring when the USB plug is inserted into the USB receptacle. Harkabi explains, "[i]n some instances, USB receptacle 100 may serve as common electrical ground. In order to avoid short-circuiting the electrical contact points 302 on the opposite side of tongue 301 that are not participating in the electrical mating, protective edges 303 are used. The protective edges 303 protrude from tongue 301 a little more than the electrical contacts 302 do, and thus prevent physical connection to housing 100 that might otherwise cause a short circuit." *Id.* at 5:23-30. Harkabi Figure 8, reproduced below, shows the protective edges 303 on the sides of the SLIM embodiment USB plug 30.

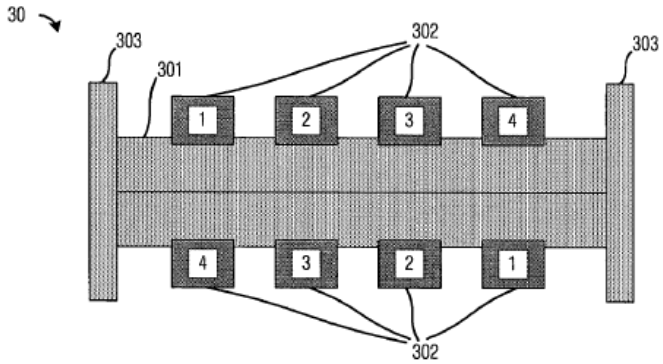


Fig. 8

Id. at Fig. 8 (showing the protective edges 303); *see also* Ex. 1002 ¶¶ 130-32.

Accordingly, Harkabi's SLIM embodiment teaches all limitations of Claim 1.

2. Claim 2 – "The connector according to claim 1, wherein the first and second set of contacts are supported on a planar substrate"

As explained above, the SLIM embodiment teaches all limitations of Claim 1. Claim 2 adds that the "contacts are supported on a planar substrate." The SLIM embodiment teaches that the first and second sets of contacts are supported on a planar substrate, specifically tongue 301 in the SLIM embodiment. *See* Ex. 1011 at 4:57-61. Figures 7b and 7d, reproduced below, show the tongue 301 as being geometrically planar and a substrate supporting the contacts 302.

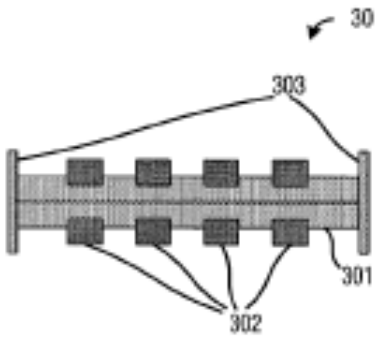


Fig. 7b

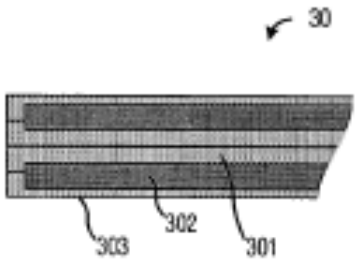


Fig. 7d

Id. at Figs. 7b and 7d.

Harkabi also teaches that the SLIM embodiment may be an integral part of a printed circuit board 500, which is another planar substrate. *Id.* at 6:4-21, Figs. 14a-14b; *see also* Ex. 1002 ¶¶ 133-35.

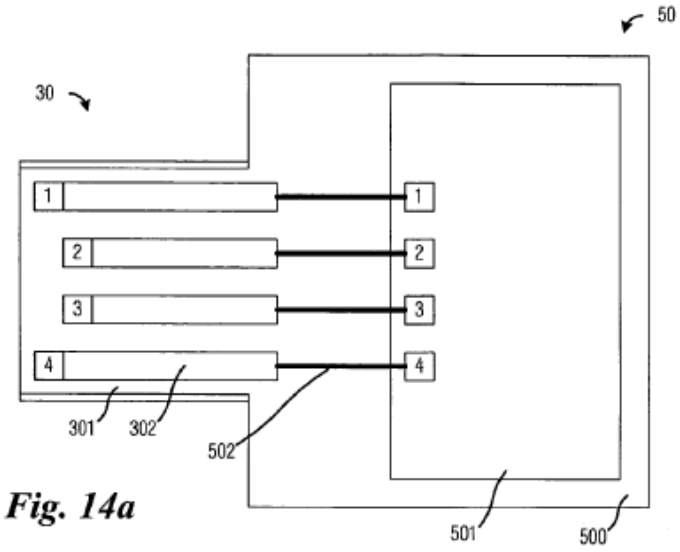


Fig. 14a

Accordingly, Harkabi's SLIM embodiment teaches all limitations of Claim 2.

3. Claim 4 – "The connector according to claim 1, being USB-compatible or mini-USB compatible"

As explained above, Harkabi's SLIM embodiment anticipates Claim 1. The SLIM embodiment also teaches that it is "an improvement of existing USB series 'A' plugs" and is used for "insertion of the improved plug connector for devices operable with the USB into USB host computers." Ex. 1011 at 4:47-52; *see also* Ex. 1002 ¶¶ 136-37. Accordingly, Harkabi's SLIM embodiment teaches USB-compatibility.

4. Claim 8 – "A female connector adapted for accommodating the connector according to claim 1."

Petitioners contend that Claim 8 is an improper dependent claim under § 112 ¶ 4 because it claims a "female connector." The '825 Patent explains that

receptacle is a female connector (*i.e.,* the FCCS-compatible receptacle in Claim 1). *See, e.g.*, Ex. 1001 at 5:54-55, 12:50; *see also* IPR2018-00325, Paper 14 at 9-11 (P.T.A.B. May 14, 2018) (Patent Owner's Corrected Preliminary Response) (arguing that receptacle means female connector). Because the "connector according to claim 1" is inserted into the "female connector," the "female connector" is a separate device from the claimed connector in Claim 1.[3] However, even if Claim 8 properly recites a "female connector," Harkabi also discloses a female connector.

The '825 Patent explains that a USB receptacle is a "female connector." *See* Ex. 1001 at 6:17-20 ("FIG. 2d [sic] shows a modified USB receptacle 25 (constituting a female USB connector) according to the invention to which the

[3] In the Institution Decision for IPR2018-00326, the Board requested the parties there to clarify whether they contend that Claims 8 and 9 are independent or dependent claims. IPR2018-00326, Paper 14 at 25 (P.T.A.B. July 5, 2018). Petitioners contend that Claims 8 and 9 are not independent claims at least because during prosecution, the Applicant stated that Claim 121 (which issued as Claim 1) is the only independent claim. *See, e.g.,* Ex. 1004 at 12 ("Claims 122 to 144 are likewise deemed allowable by virtue of their being dependent on an allowable base claim.").

complementary male USB connector 20 may be coupled in either direction."); *see also id.* at 5:54-55, 12:50.

Harkabi explains that the SLIM embodiment is designed to connect to a USB receptacle 100. *See* Ex. 1011 at 4:62-67, 5:23-30; *see also* Ex. 1002 ¶¶ 138-41. Accordingly, Harkabi's SLIM embodiment teaches all limitations of Claim 8.

5. Claim 9 – "A portable device comprising an electric circuit coupled to the connector according to claim 1."

Claim 9 requires that the connector be coupled to an electric circuit in a portable device. Harkabi discloses that its SLIM embodiment plug is intended to be used with computer peripherals (*i.e.*, a portable device with an electric circuit):

> FIGS. 14a and 14b show an example of a SLIM embodiment in which the present invention is used to connect a peripheral device 50 to a USB host computer (not shown) without the use of a cable. The electrical plug 30 is an integral part of the printed circuit board (PCB) 500. Internal electronics 501 are connected to top electric contact points 302 by using internal electronic contacts 502.

Ex. 1011 at 6:4-11. Figures 14a and 14b, reproduced below, show the peripheral device 50.

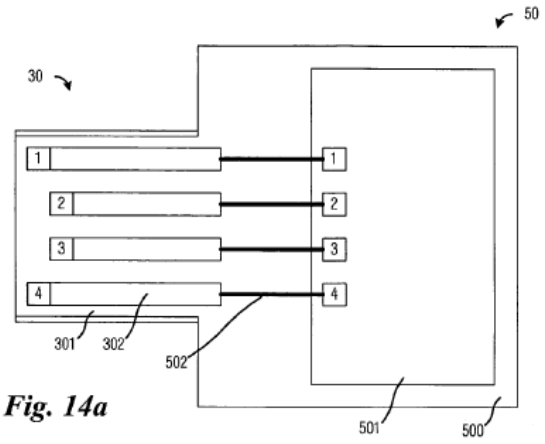


Fig. 14a

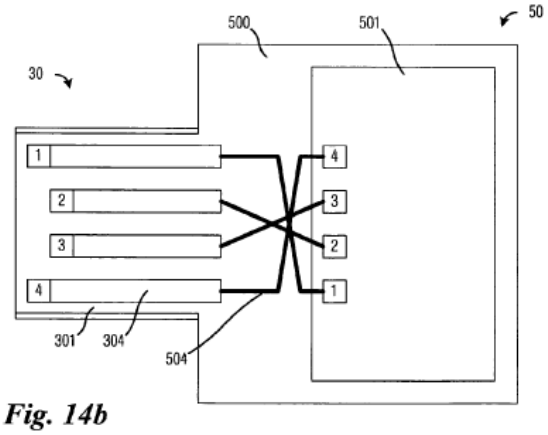


Fig. 14b

Id. at Figs. 14a, 14b. Further, Harkabi provides examples of other devices that can use the connector, such as storage devices, computer mice, keyboards, digital cameras, PDAs, and MP3 players. *See id.* at 1:15-24, 4:47-62; *see also* Ex. 1002 ¶¶ 142-43. Accordingly, Harkabi teaches all limitations of Claim 9.

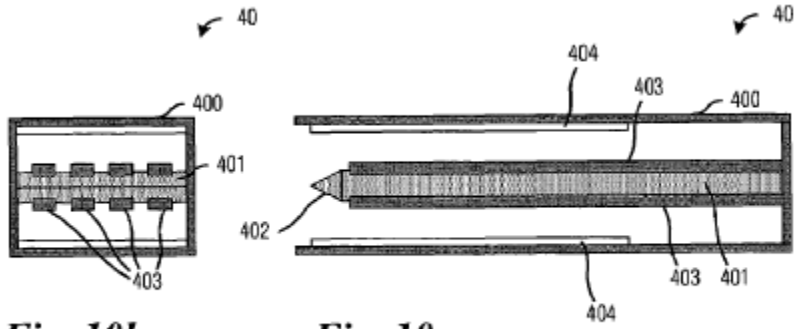
B. GROUND 2: Claims 1, 2, 4 and 8-10 Are Obvious Over Harkabi

While Harkabi's SLIM embodiment anticipates several claims, as described above, the FLEX embodiment, when combined with the SLIM embodiment, also renders Claims 1-4 and 8-10 obvious. *See Panasonic*, IPR2014-00302, Paper 9 at

13-14 (explaining that combining aspects from different embodiments in the same reference is proper for a § 103 analysis).

1. Claim 1

As discussed above, Harkabi's FLEX embodiment retains the traditional metal shell of a USB plug, but makes the tongue flexible, so that the tongue can be bent and directed to the correct position when inserted into a USB receptacle.



Id. at Figs. 10b, 10c (showing the FLEX embodiment).

a. "A multi-contact connector"

Harkabi teaches that the FLEX embodiment is a multi-contact connector. Specifically, Harkabi teaches that the FLEX embodiment is an alternative embodiment to the SLIM embodiment, whereby "the solution is achieved by using a flexible tongue board that can position itself according to the computer receptacle's rectangular card position, thus achieving electrical mating in every insertion." Ex. 1011 at 3:19-22; *see also id.* at 5:31-33; *see* Ex. 1002 ¶ 145.

b. "supporting on opposite surfaces first and second sets of mutually opposed contacts"

The FLEX embodiment has first and second sets of mutually opposed contacts supported on opposite surfaces. Harkabi explains that "[t]he plug 40 includes a shell 400, a flexible tongue 401, a tongue tip 402, ***a plurality of contacts 403 on both sides of flexible tongue 401***, and insulating strips 404." *Id.* at 5:34-36 (emphasis added); *see also id.* at 3:22-24 ("Here too, exist ***two sets of contact points, one on each side of the flexible tongue board***."). As discussed immediately below, the FLEX embodiment teaches that the two sets of contacts are mutually opposed. *See* Ex. 1002 ¶¶ 146-47.

c. "wherein corresponding contacts in each set are electrically interconnected and are spatially aligned in a mutually opposed relationship"

A POSITA reading Harkabi would understand that the contacts on the FLEX embodiment are electrically interconnected. *See* Ex. 1011 at Fig. 11; Ex. 1002 ¶ 148. However, to the extent that Harkabi does not explicitly state that the contacts are electrically interconnected in its discussion of the FLEX embodiment, the SLIM embodiment teaches that the corresponding contacts in each set are electrically interconnected because the contacts 302 in the SLIM embodiment are connected to the same internal electronics 501. *See* Ex. 1011 at 6:4-21. A POSITA would have been motivated to combine this teaching from the SLIM embodiment with the FLEX embodiment because this would have been the use of

a known technique, taught on the same page of Harkabi, to improve a similar device. *See* Ex. 1011 at 6:4-21 (explaining that the top and bottom sets of contacts on the SLIM embodiment are connected to the same chip in peripheral device 50); *see also id.* at 6:22-30 (explaining that features of the described embodiments could be substituted or varied); Ex. 1002 ¶ 149.

Harkabi further explains that the corresponding contacts in the FLEX embodiment are spatially aligned in a mutually opposed relationship. Specifically, Harkabi explains that "[i]n order to ensure that each electrical contact point 402 is mated with the correct electrical contact point 102 in USB port 1, regardless of original alignment of flexible tongue 401, the electrical contact points on each side of flexible tongue 301 [sic] are oppositely aligned, as shown in FIG. 11." Ex. 1011 at 5:64-6:1; *see also* Ex. 1002 ¶¶ 149-50.

Accordingly, the FLEX embodiment combined with the SLIM embodiment teaches this limitation.

d. "allowing the connector to be connected in two opposed orientations to a corresponding FCCS-compatible receptacle supporting on an internal surface thereof a multi-contact data connector having only a single set of contacts that is compatible to either one of said sets of contacts such that identical functionality is obtained regardless of the orientation of the connector within the receptacle"

Harkabi teaches that the FLEX embodiment is designed to be connected in two opposed orientations to a USB receptacle. *See* Ex. 1011 at 5:39-59; 5:64-6:3.

As discussed above, a USB receptacle is an "FCCS-compatible receptacle" according to the '825 Patent and supports on an internal surface a multi-contact data connector having only a single set of contacts such that identical functionality is obtained when the FLEX embodiment plug is inserted in either of two orientations. *See* Ex. 1001 at 17:1-9; *see also* Ex. 1002 ¶¶ 151-52.

e. "said connector further comprising a short circuit prevention device to prevent an electric short circuit between contacts of the receptacle on inserting the connector therein."

Harkabi's FLEX embodiment provides "insulating strips 404" to prevent a short circuit between contacts of the receptacle when the FLEX embodiment plug is inserted into a USB receptacle. "In some USB connectors, shell 400 may serve as common electrical ground. In order to avoid short-circuiting the electrical contact points 403 not participating in the electrical mating, insulation strips 404 are lined inside shell 400." Ex. 1011 at 5:60-63. Figure 13c, reproduced below, shows the insulation strips 404 lining the inside of shell 400 that prevent the non-mated contacts from touching the shell 400 and causing an electric short circuit.

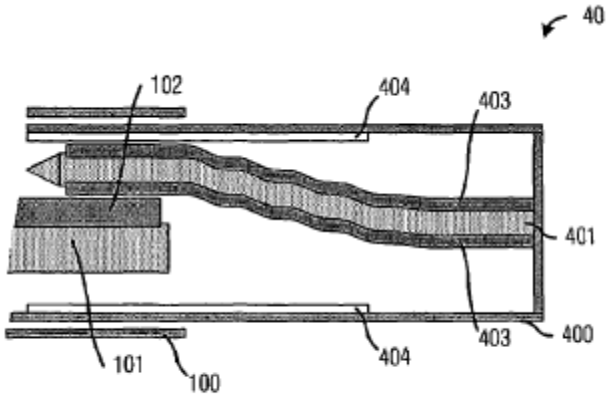


Fig. 13c

Id. at Fig. 13c; *see also* Ex. 1002 ¶¶ 153-54.

Accordingly, Harkabi's FLEX embodiment, combined with the SLIM embodiment, teaches all limitations of Claim 1.

2. <u>Claims 2, 4, 8, and 9</u>

As discussed above, the FLEX embodiment in combination with the SLIM embodiment renders Claim 1 obvious. Also as discussed in Ground 1, Harkabi teaches all the limitations of Claims 2, 4, 8, and 9.

Moreover, Harkabi teaches that the FLEX embodiment also contains the limitations of dependent Claims 2, 4, and 8. As to Claim 2, the FLEX embodiment teaches that the two sets of contacts are supported on a planar substrate, specifically the tongue 401. *See* Ex. 1011 at 5:31-38. As to Claim 4, the FLEX embodiment is designed to be USB-compatible. *See id.* at 5:54-57. As to Claim 8, a USB receptacle is the female connector that mates with the FLEX embodiment plug. *Id*; *see also* Ex. 1002 ¶¶ 155-57.

Regarding Claim 9, a POSITA would have combined the teachings of the SLIM embodiment used on a peripheral device with the FLEX embodiment by swapping the SLIM connector for the FLEX connector. Ex. 1011 at 6:4-21. A POSITA would have been motivated to make this combination because the FLEX embodiment is an alternate USB connector. Ex. 1002 ¶ 158. Moreover, a connector by itself serves little to no purpose—one would have used the FLEX connector on a portable device with an electric circuit in order for it to be useful. Accordingly, Harkabi renders Claims 2, 4, 8, and 9 obvious.

3. Claim 10 – "The portable device according to claim 9, further comprising a power source."

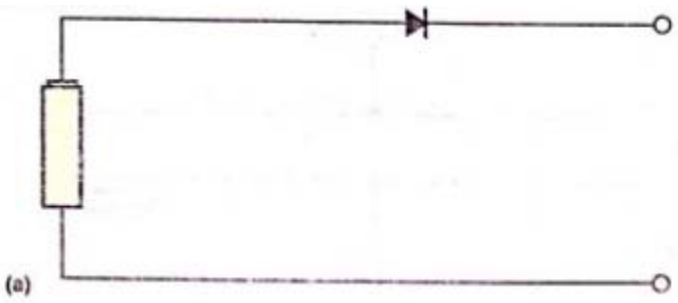
As discussed above, Harkabi renders Claims 1 and 9 obvious. Harkabi also teaches the additional limitation that the portable device has a power source.

Harkabi teaches that USB plugs may be used with peripherals such as printers, digital cameras, PDAs, and MP3 players and that its SLIM and FLEX embodiments are improved USB plugs. Ex. 1011 at 1:15-24, 3:8-10, 4:47-61. Each of those devices must have a power source in order to operate, whether the power be sourced directly from an electrical outlet or by an internal battery. Ex. 1002 ¶ 159. Accordingly, Harkabi renders Claim 10 obvious.

C. GROUND 3: Claim 5 is Obvious Over Harkabi in View of EDN

Claim 5 recites, "The connector according to claim 1, wherein said short circuit prevention device is a diode." As discussed above, Harkabi discloses all

limitations of Claim 1. Harkabi also recognized the need for preventing a short circuit and provided multiple solutions including the protective edges and insulating strips. EDN provides additional solutions for preventing accidental short circuits. Ex. 1013 at 165. EDN explains that the "simplest" way of preventing a short circuit is to use a diode. *Id.* The circuit diagram from EDN, below, shows a diode connected in series to the output terminal of a battery.



Id.

A POSITA would understand that a diode is a circuit element that blocks current from flowing in one direction, while allowing current to flow in the other direction. Ex. 1002 ¶ 164. Moreover, a POSITA would adapt EDN's diode solution to solve the short circuit problem in Harkabi because the problems are similar. *Id.* ¶¶ 162-63. To accomplish this, a POSITA would modify the Harkabi SLIM embodiment by connecting a diode in series, as described in EDN. *Id.* at ¶ 163-64. A POSITA would place a diode in series with each of the plug-side V_{BUS} contacts so that each diode blocks current that would otherwise flow to the

metal shell of the USB receptacle. *Id.* at ¶ 163. This EDN series diode configuration thus prevents the plug contact touching the metal shell of the USB receptacle from completing a short circuit. *Id.*

A POSITA would have been motivated to combine Harkabi with EDN because EDN teaches circuits of general applicability to protect against short circuits and other overcurrents in electronic devices. Ex. 1002 ¶ 164.[4] Moreover, a POSITA would be motivated to modify Harkabi with a diode in this manner because this would have been an application of a known technique to a known device ready for improvement to yield a predictable result. *Id.* For example, one would recognize that the protective edges, while offering a mechanical solution to the problem, may be prone to damage and wear after repeated usage. *Id.* ¶ 165. Moreover, the metal shielding of a USB receptacle can often become damaged and/or bent by user actions, such as accidentally tripping over a cord that is connected to the receptacle. *Id.* Thus, a POSITA would recognize that the SLIM

[4] In IPR2018-00325 (not instituted) and IPR2018-00326 (instituted), Patent Owner criticized another reference, Chen, as failing to teach short circuit prevention because the diode prevented a reverse-current instead. Although Petitioners disagree with that assertion, the EDN reference does not suffer from that defect because EDN describes its solution as applicable to a "shorted battery" and other overcurrent-causing conditions. Ex. 1013 at 165-66.

connector would be improved with the addition of circuitry (*e.g.*, diodes) to prevent a short circuit in case the protective edges are unable to prevent the short circuit. *Id*. Alternatively, a POSITA could modify the SLIM connector by removing the protective edges and relying solely on the diodes to protect against the short circuit. *Id.* This would improve the SLIM connector by making it even thinner, which would be particularly useful in applications where the connector needs to be as thin as possible (*e.g.*, a thin flash drive). *Id.*

D. GROUND 4: Claim 6 Is Obvious Over Harkabi in View of Wiener

Claim 6 recites, "The connector according to claim 1, further comprising a switching unit to conduct an electric current only if there is no electric short circuit between the anode and the cathode." As discussed above, Harkabi teaches all the limitations of Claim 1. Petitioners also note that Claim 6 does not recite an antecedent basis for "the anode" and "the cathode," and is therefore likely indefinite. However, even if Claim 6 is not indefinite, Harkabi in view of Wiener renders this claim obvious.

Wiener explains that the USB specification (rev 1.0) requires overcurrent protection in order to prevent damage in the event of "user actions, such as shorting the pins" of a USB. Ex. 1014 at 444. Wiener further explains, "As with any powered port, short circuits and equipment damage can occur and should be a concern. During a short circuit event, current can get high enough to cause

damage to the bus-powered hub." *Id.* at 452. The Wiener PolySwitch is a type of switch that "protects the circuit by going from a low-resistance to a high-resistance state in response to an overcurrent." *Id.* at 443. Figure 5 of Wiener explains that the PolySwitch device is placed in series with the +5V Vcc contact of a USB port.

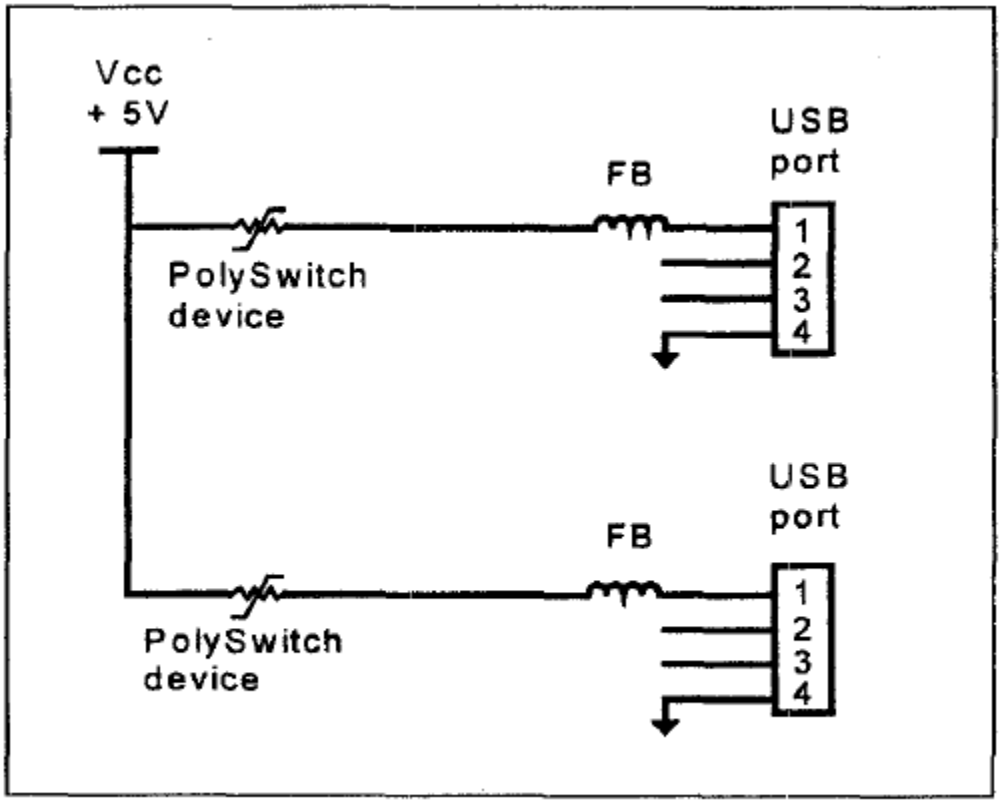


Figure 5. Individual port protection (Two-port example).

Id. at Fig. 5.

A POSITA would apply the solution shown in Wiener to the Harkabi SLIM embodiment by including the disclosed PolySwitch. Ex. 1002 ¶ 167-71. As shown in Wiener, a POSITA would connect one terminal of a PolySwitch to the V_{BUS} terminal on one side of the double-sided plug and then using the other

terminal of the PolySwitch as the V_{BUS} terminal on that side of the plug. Wiener Figure 5 also describes the use of two PolySwitch devices with multiple USB ports. This would suggest to a POSITA the application of another PolySwitch connected in the same manner on the other side of the Harkabi double-sided plug. Ex. 1002 ¶ 170-72. In this manner, the SLIM embodiment plug could be made thinner by removing the protective edges 303. This would be particularly useful in applications where the thinness of the SLIM embodiment connector is paramount (e.g., a very thin USB flash drive). *Id. at* ¶ 174.

A POSITA would have been motivated to combine Harkabi and Wiener in this manner because this would have been the use of a known technique to improve a similar device in the same way. Ex. 1002 ¶ 173. Moreover, as Wiener states, the USB Specification *requires* this type of protection. Ex. 1014 at 444. One would have a reasonable expectation of success in performing this combination because Wiener explains that connecting the PolySwitch in this manner allows one port to become short-circuited without disabling the other ports. *Id.* at 447. Similarly, the desired operation of the SLIM embodiment would allow one set of contacts needs to work correctly when mated to the USB receptacle, even if the second set of contacts on the opposite side were shorted to the metal frame. Ex. 1002 ¶ 173. Additionally, as explained above with respect to Claim 5, a POSITA would also recognize that Harkabi's SLIM connector would be improved by adding the

PolySwitch devices as an additional or alternative short circuit protection because the protective edges of the SLIM connector and the metal shielding of a USB receptacle are prone to damage and wear. *Id.* at ¶ 174.

Accordingly, Harkabi and Wiener teach all limitations of Claim 6.

E. GROUND 5: Claims 3 and 6 are Obvious Over Harkabi in View of the USB 2.0 Specification

1. Claim 3 - "The connector according to claim 2, wherein the planar substrate is formed of a material that is sufficiently resilient to bend to a curvature radius of less than 50 cm without losing electrical or mechanical functionality."

As discussed above, Harkabi teaches all limitations of Claims 1 and 2. Harkabi teaches that the tongue 401 in the FLEX embodiment is "flexible" so that it can mate properly with a USB receptacle. Ex. 1011 at 5:31-53. Figure 12c shows how the tongue 401 bends when inserted into a USB receptacle.

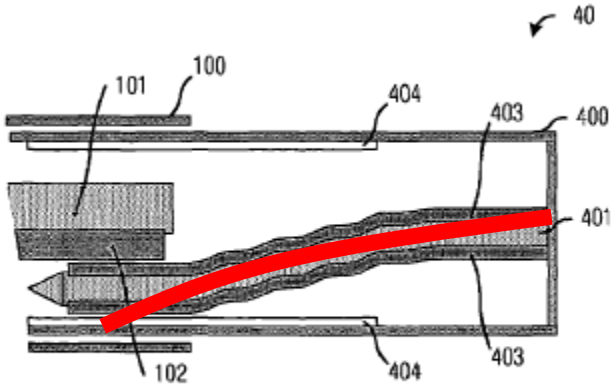


Fig. 12c

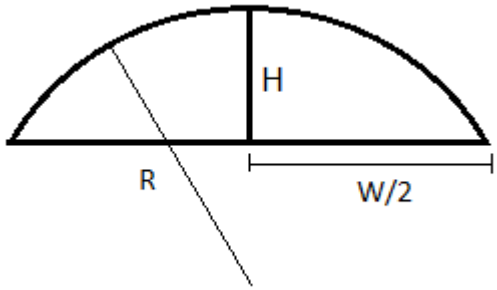
Id. at Fig. 12c (annotated). Harkabi does not disclose a measurement of the radius of curvature of the tongue 401 when it bends according to Figure 12c. However,

one of ordinary skill in the art, reading Harkabi in view of the USB 2.0 Specification, would understand that the bend depicted in Figure 12c have radii of curvature significantly less than 50cm. Ex. 1002 ¶¶ 180-82. In fact, a conservative estimate of the radius of curvature in Figure 12c is about 2 cm. *Id.* at ¶ 181.

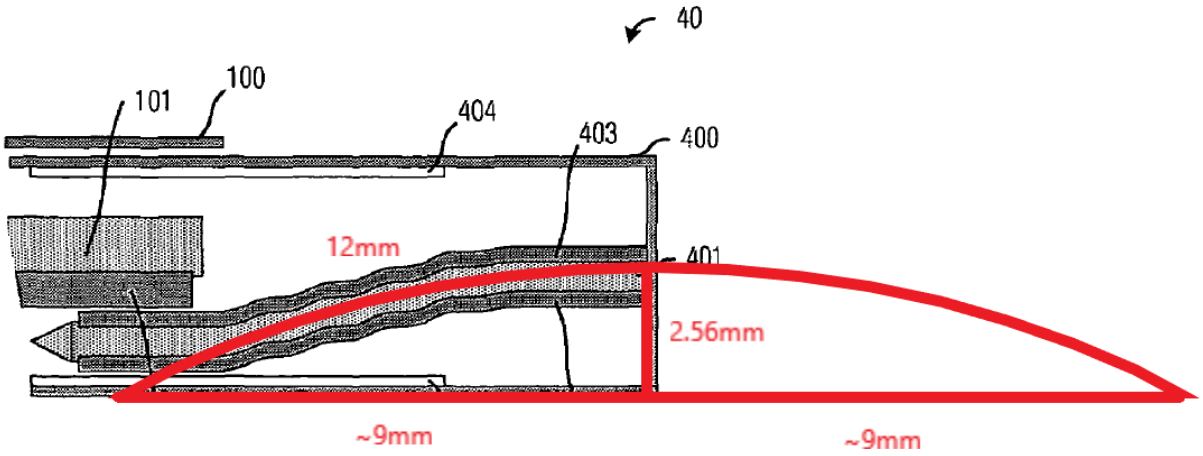
The USB 2.0 Specification explains that a USB Series A plug has a length of 12.0 millimeters and a USB Series A receptacle has a height of 5.12 millimeters. Ex. 1015 at Figs. 6-4, 6-7. Harkabi explains that the "flexible tongue 401 is positioned inside shell 400, in the center of the lateral axis of shell 400." Ex. 1011 at 5:36-38. Thus, based on the height of the USB receptacle, the flexible tongue 401 must be able to bend such that the tip of flexible tongue 401 is able to move at least half of 5.12 mm (2.56 mm).

While Harkabi does not state a measurement for the flexible tongue 401, a POSITA would understand that the length of the flexible tongue 401 would be roughly the same as the length of a normal USB Series A plug, which is 12.0 mm. Ex. 1002 ¶ 181.

The mathematical formula for calculating the radius of curvature R of an arc of a circle, given its height and width is: $R = H/2 + W^2/8H$.



Here, the height H is the distance that the tip of flexible tongue 401 would move in order to mate with the USB receptacle and the half-width W/2 is a length slightly shorter than 12 mm, the approximate length of the flexible tongue 401. Ex. 1002 ¶¶ 176-81. Using an approximation for W/2 of 9 mm, the radius of curvature for the bend illustrated in Figure 12c is 17.1 mm, which is less than 50 cm (different approximations for W/2 on the same order of magnitude as 9mm would still provide a radius less than 50 cm). Ex. 1002 ¶¶ 182-84. The following annotated diagram of Figure 12c shows the relevant geometrical variables.



Ex. 1011 at Fig. 12c (annotated).

Accordingly, a POSITA would understand that Harkabi's FLEX embodiment, in view of the USB 2.0 Specification renders Claim 3 obvious.

2. Claim 6 – "The connector according to claim 1, further comprising a switching unit to conduct an electric current only if there is no electric short circuit between the anode and the cathode."

Harkabi in view of the USB 2.0 Specification renders this claim obvious. Claim 6's short circuit is not necessarily the same short circuit that is being prevented by the short circuit prevention device in Claim 1. Claim 6 describes an "electric short circuit between the anode and the cathode," presumably referring to the anode and cathode of the switching unit, whereas Claim 1 describes an "electric short circuit between contacts of the receptacle." Accordingly, a reference teaches this limitation if it discloses a switching device used to prevent a short circuit between the anode and the cathode of the switching unit.

The USB 2.0 Specification requires that all USB hosts and self-powered hubs (e.g., a device with a USB plug) must implement over-current (i.e., short circuit) protection for safety reasons, and that the over-current limiting mechanism may be a solid-state switch. Ex. 1015 at § 7.2.1.2.1. Specifically, the USB 2.0 Specification provides:

> The host and all self-powered hubs must implement over-current protection for safety reasons, and the hub must have a way to detect the over-current condition and report it to the USB software. Should

> the aggregate current drawn by a gang of downstream facing ports exceed a preset value, the over-current protection circuit removes or reduces power from all affected downstream facing ports. . . . The preset value cannot exceed 5.0 A and must be sufficiently above the maximum allowable port current such that ***transient currents (e.g., during power up or dynamic attach or reconfiguration)*** do not trip the over-current protector. . . . Polymeric PTCs and solid-state switches are examples of methods, which can be used for over-current limiting.

Id. (emphasis added).

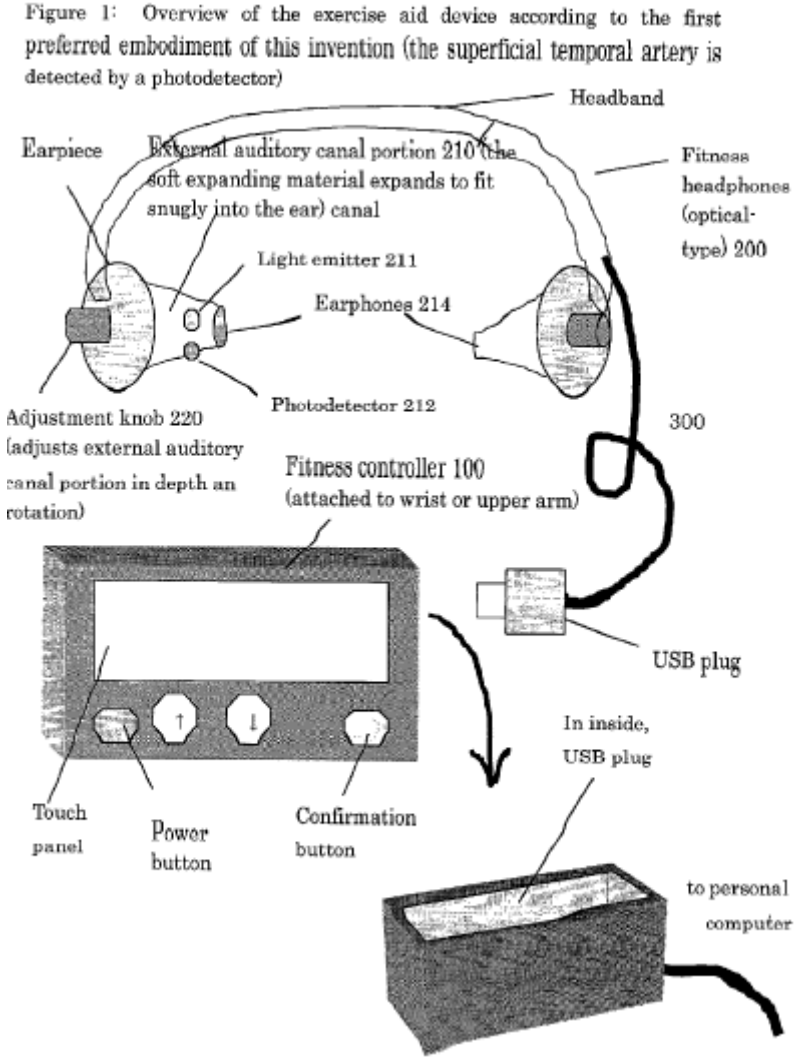
Accordingly, the USB 2.0 Specification teaches that a solid-state switch may be used to provide over-current protection caused by transient currents during a dynamic attach (i.e., a short circuit on inserting the plug). Ex. 1002 ¶¶ 185-88.

A POSITA would have been motivated to combine the teachings of Harkabi with the USB 2.0 Specification in order to comply with USB 2.0 standard. *Id.* Harkabi does not supplant the entire USB 2.0 standard, rather it was designed as an improvement on the physical USB plug. Accordingly, a POSITA would refer to the USB 2.0 Specification and implement its teachings in order to create a USB compliant device that uses the Harkabi double-sided USB plug.

F. Ground 6: Claims 7 and 22 are obvious over Harkabi in view of Hisano

1. Claim 7 - "The connector according to claim 1, being adapted for connection to an earphone."

Hisano discloses a headphone that connects via a USB plug to a fitness controller which plays music and also stores exercise data. *See* Ex. 1016 at ¶ 51-53. Figure 1 of Hisano shows the headphone which connects by a USB cable:



Id. at Fig. 1.

A POSITA would be motivated to combine Harkabi and Hisano by swapping the standard USB plug of the Hisano headphone with either of Harkabi's SLIM or FLEX plugs. Such a modification would have been a simple substitution of one known element for another to obtain a predictable result (*i.e.*, the headphone plug can now be inserted both ways). Ex. 1002 ¶¶ 189-91. Accordingly, Harkabi and Hisano render Claim 7 obvious.

2. Claim 22 – "The portable device according to claim 9, further comprising at least one transducer for capturing electro-physiological information.

As discussed above, Harkabi anticipates and/or renders obvious Claim 9. Hisano also teaches that its headphone contains sensors for detecting electro-physiological information such as pulse waves. "The external auditory canal portion 210 of the fitness headphones has a light emitter 211 and a photodetector 212. . . . The reflected light [which is affected by heart rate] is detected by the photodetector in the external auditory canal portion, and the signal associated with this light can be processed as a pulse wave signal." Ex. 1016 at ¶ 52; *see also id.* at ¶ 56. Thus, Hisano teaches a transducer, the photodetector, that captures electro-physiological information such as pulse waves.

As discussed above, a POSITA would have been motivated to combine Harkabi and Hisano. Ex. 1002 ¶¶ 191-95. Accordingly, Harkabi and Hisano render Claim 22 obvious.

G. Ground 7: Claims 13, 14, 15, and 18 are obvious over Harkabi in view of Le

1. Claim 13 – "The portable device according to claim 9, having a planar substrate supporting the connector and supporting a magnetic stripe"

As discussed above, Harkabi teaches all limitations of Claims 1 and 9. Harkabi does not disclose a "planar substrate . . . supporting a magnetic stripe." However, Le discloses a credit card shaped USB memory card with a magnetic stripe. Specifically, Le discloses:

> Memory card 10 includes flexible housing 12, IC module 14 within housing 12, shieldless tab 16 protruding from corner edge 22 of housing 12, and a magnetic stripe 28. Magnetic stripe 28 conforms to a magnetic stripe standard that allows access to the memory within IC module 14 by a magnetic stripe reader coupled to a host computing device. In this way, memory card 10 may be backward-compatible with conventional magnetic stripe readers often used for credit card and debit card financial transactions.

Ex. 1017 at 6:54-62. Figure 2 of Le illustrates the credit card shaped memory card with the magnetic stripe.

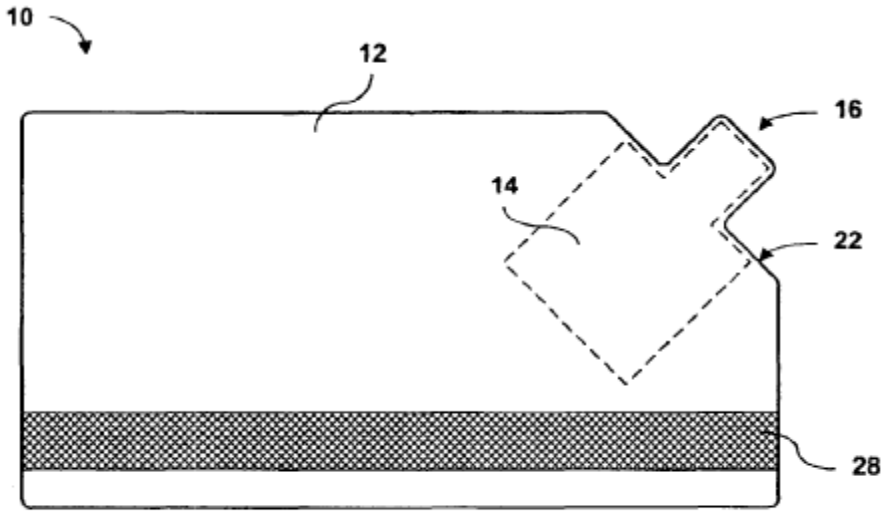


FIG. 2

Id. at Fig. 2; *see also id.* at Figs. 3A-7.

Moreover, Le explains that the "shieldless tab 16 may comprise a Universal Serial Bus (USB) compatible tab without an electrical shield. Electrical contacts 20 disposed on shieldless tab 16 maintain compatibility with the host connection standard regardless of the form of shieldless tab 16." *Id.* at 6:14-18.

A POSITA would have been motivated to combine the teachings of Harkabi (SLIM embodiment) and Le because Le explicitly teaches the use of an altered, shieldless USB plug. Ex. 1002 ¶¶ 196-201. The Harkabi SLIM embodiment is such a shieldless USB plug. Accordingly, a POSITA would combine the credit card of Le with the SLIM embodiment connector. Thus, Harkabi and Le render Claim 13 obvious.

2. Claim 14 – "The portable device according to claim 9, being formed of a material and being dimensioned to be compatible with a standard credit card."

As explained above, Le discloses a credit card shaped memory card with a USB plug. *See* Ex. 1017 at 6:52-62. Le expressly discloses that its credit card shaped "memory card 10 may be backward-compatible with conventional magnetic stripe readers often used for credit card and debit card financial transactions." *Id.* at 6:59-62. Moreover, Le teaches that its device has dimensions "substantially similar to a credit card" and that it is made of plastic. *See id.* at 5:24-31, 5:46-56. Most credit cards are made of plastic. Ex. 1002 ¶ 203.

Further, as explained above, a POSITA would have been motivated to combine Harkabi's SLIM embodiment with Le because Le teaches that its credit card shaped memory card would use an altered, shieldless USB plug. *Id.* at 6:14-18; *see* Ex. 1002 ¶ 204. Accordingly, Harkabi's SLIM embodiment and Le render Claim 14 obvious.

3. Claim 15 – "The portable device according to claim 9, further comprising electronic contacts to communicate with a smart card."

Le discloses a credit card shaped memory card with smart card contacts to communicate with a smart card reader. Le teaches, "[s]mart card contact 18 conforms to a smart card standard such as an ISO 7816 that allows access to a memory within IC module 14 by a reader compatible with the smart card

standard." Ex. 1017 at 5:9-12; *see also id.* at 5:12-23. Figures 1A and 1B of Le shows the smart card contact 18 on the credit card shaped memory card with a USB plug.

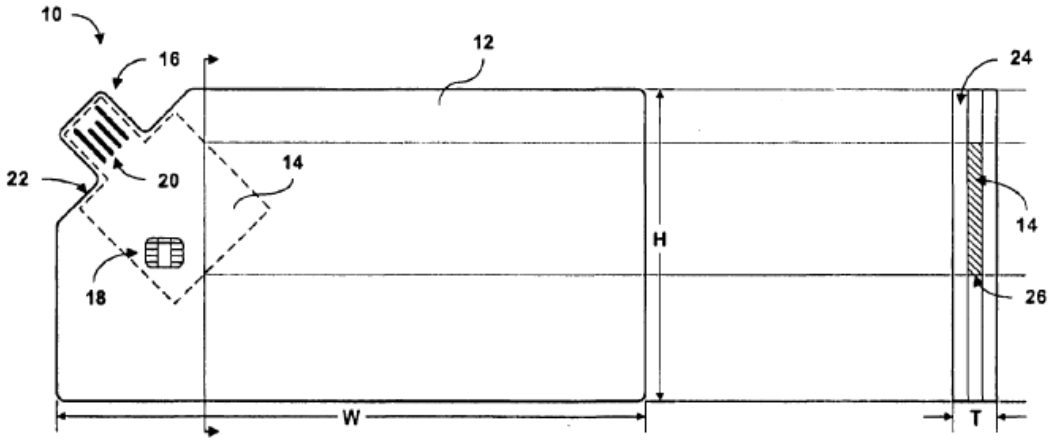


FIG. 1A FIG. 1B

As discussed above, a POSITA would have been motivated to combine the Harkabi SLIM embodiment with Le because Le expressly teaches that its credit card shaped memory card should be used with an altered, shieldless USB plug. *See* Ex. 1002 ¶¶ 205-07. Accordingly, Harkabi's SLIM embodiment and Le render Claim 15 obvious.

4. Claim 18 – "The portable device according to claim 9, wherein the electronic circuit includes an authentication unit for authenticating the device."

Le teaches that "the memory within IC module 14 is partitioned into a secured memory and a non-secured memory such that memory card 10 can

perform credit card applications requiring an authentication key stored in the secured memory . . . ." Ex. 1017 at 4:52-58; *see also id.* at 11:48-67. Le explains that the secured memory partition is used "for performing financial transactions with the memory card." *Id.* at 3:46-50. Accordingly, Le teaches that it has an authentication unit (the secured memory that stores authentication keys) for authenticating the memory card during financial transactions.

As discussed above, a POSITA would have been motivated to combine the Harkabi SLIM embodiment with Le because Le expressly teaches that its credit card shaped memory card should be used with an altered, shieldless USB plug. Moreover, Harkabi expressly teaches that "security keys" are a use case for USB devices. Accordingly, a POSITA would have been further motivated to combine Harkabi's improved USB plug with Le to create a USB security key that is easier to insert. Ex. 1011 at 2:3-5; Ex. 1002 ¶¶ 208-10. Accordingly, Harkabi's SLIM embodiment and Le render Claim 18 obvious.

H. Ground 8: Claims 11 and 12 are obvious over Harkabi in view of Benayoun

1. Claim 11 – "The portable device according to claim 9, further comprising a communication circuit for communicating with an external electronic device."

Benayoun discloses a USB wireless communication hub that enables communication with other devices. Ex. 1018 at 2:46-50. Specifically, Benayoun discloses:

> FIG. 2 illustrates a modified USB configuration according to one embodiment of the invention. As illustrated, a wireless adapter is integrated in each hub. Wireless adapter 28 added to hub 10 is used as a downstream port (the only upstream port of the hub is occupied by the host computer connection), while wireless adapter 30 added to hub 12 is used as an upstream port. Wireless adapter 28 is provided with an antenna 32 by which communication with wireless adapter 30, also provided with an antenna 34, is completed. Communication is completed by means of radio waves at, for example, a frequency of 2.4 GHz.

Id. at 4:9-19; *see also id.* at 4:20-24, Fig. 2.

Accordingly, Benayoun teaches a portable device (the hub 10) that has a USB plug (the upstream port connected to the computer) and which has a communication circuit for communicating with an external electronic device (the wireless adapter).

A POSITA would have been motivated to combine Harkabi with Benayoun because such a modification would have been a simple substitution of a known device for another to achieve a predictable result. Specifically, one would swap the USB plug used for the upstream port connected to the computer with either the SLIM or FLEX USB connectors described by Harkabi. This would achieve the

predictable result of making it easier to connect the hub to a computer. *See* Ex. 1002 ¶¶ 211-14. Accordingly, Harkabi and Benayoun render Claim 11 obvious.

2. Claim 12 – "The portable device according to claim 9, wherein the communication circuit is adapted to enable access to the external electronic device."

Claim 12 lacks an antecedent basis for "the communication circuit," which is not found in either Claims 1 or 9, from which Claim 12 depends. Claim 11 is the only other claim that would provide an antecedent basis for "the communication circuit." However, even if Claim 12 properly recites "the communication circuit," Harkabi and Benayoun render this claim obvious.

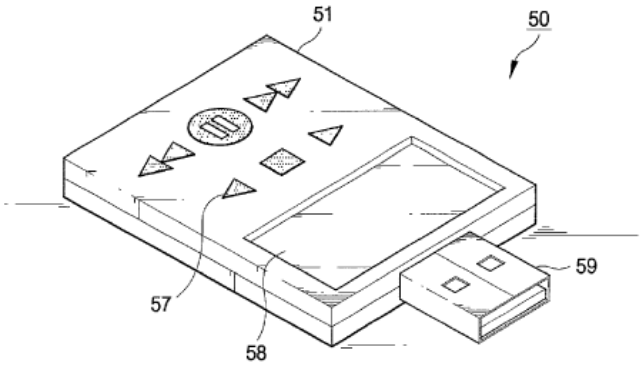
Benayoun teaches that the wireless hub enables access to an external electronic device. *See* Ex. 1018 at 2:46-50 ("[O]ne purpose of the invention is to provide a Universal Serial Bus with wireless communication hubs enabling the input/output devices connected thereto to be located in a room or office different from the host computer."); *see also id.* at 2:51-54, 4:20-24, 5:7-9. Accordingly, Benayoun discloses that the USB communication circuit (wireless hub) is adapted to enable access to the external electronic device.

As discussed above, a POSITA would have been motivated to combine Harkabi and Benayoun. *See* Ex. 1002 ¶¶ 215-18. Accordingly, Harkabi and Benayoun render Claim 12 obvious.

I. Ground 9: Claims 16, 17, 23, and 24 are obvious over Harkabi in view of Kim

1. Claim 16 – "The portable device according to claim 9, further comprising a display device for displaying visual information."

Kim discloses a multi-purpose personal device that connects via USB to a computer. *See* Ex. 1020 at ¶ 41. Figure 2 of Kim shows an embodiment of the device that has an LCD screen 58:



Id. at Fig. 2. Kim explains that the screen shows information such as MP3 information. *Id.* at ¶ 31.

A POSITA would have been motivated to combine Harkabi with Kim because this would have been a simple substitution of one known element for another to obtain a predictable result. Ex. 1002 ¶¶ 220-22. Specifically, a POSITA would just replace the standard USB plug on Kim's device with either the SLIM or the FLEX embodiments of Harkabi. This would predictably make it easier for the end user to plug the device into a computer. *Id.* Harkabi also

suggests this combination. *See* Ex. 1011 at 1:23-24 (PDAs have screens). Accordingly, Harkabi and Kim render Claim 16 obvious.

2. Claim 17 – "The portable device according to claim 9, further comprising an audio play unit for playing audio information"

As discussed above, Kim discloses a multi-purpose portable device. Kim discloses that its device has an MP3 playback part so that it can play music. *See, e.g.*, Ex. 1020 at ¶¶ 30-33, 41-42. Also as discussed, a POSITA would have been motivated to combine Harkabi with Kim. *See* Ex. 1002 ¶¶ 223-26. Moreover, Harkabi explains that MP3 players were commonly connected to computers by USB cables. Ex. 1011 at 1:23-24. Accordingly, Harkabi and Kim render Claim 17 obvious.

3. Claim 23 – "The portable device according to claim 9, further including a user interface for receiving user input"

As discussed above, Kim discloses an LCD display. Kim discloses that the "MP3 playback part 56 is controlled by the plurality of play/control buttons 57 provided to the casing 51, and outputs information of the MP3 file on the LCD screen 58." Ex. 1020 at ¶ 33. Thus, Kim discloses a user interface for receiving the user's input.

As discussed above, a POSITA would have been motivated to combine Harkabi with Kim. *See* Ex. 1002 ¶¶ 227-30; *see also* Ex. 1011 at 1:23-24. Accordingly, Harkabi and Kim render Claim 23 obvious.

4. Claim 24 – "The portable device according to claim 9, wherein the electronic circuit includes a flash memory"

Kim discloses that the MP3 player uses a flash memory to store the MP3 files. *See, e.g.*, Ex. 1020 at ¶¶ 15, 30, 32.

As discussed above, a POSITA would have been motivated to combine Harkabi with Kim. *See* Ex. 1002 ¶¶ 231-34; *see also* Ex. 1011 at 1:23-24. Accordingly, Harkabi and Kim render Claim 24 obvious.

J. Ground 10: Claim 19 is obvious over Harkabi in view of Funahashi

Claim 19 recites, "The portable device according to claim 9, further comprising a biometric sensor." Funahashi teaches that "[t]he present invention also relates to a biometric identification apparatus for reading biometric information relating to a feature of human body . . . ." Ex. 1019 at ¶ 2; *see also id.* at ¶¶ 33-34. Funahashi also teaches that its fingerprint reader or biometric sensor is connected to a computer via USB. *See, e.g., id.* at ¶ 69 ("In the identification apparatus 4, the CPU 18 constitutes data input means together with the USB controller 26, and it receives the registration image data of a fingerprint from the registration apparatus 2 via the USB cable 28, and stores the registration image data in the image memory 16 . . . ."); *id.* at ¶¶ 65, 72, 76-77, 101.

A POSITA would swap the USB plug used in Funahashi with Harkabi's double-sided USB plug (either of the SLIM or FLEX embodiments). Such a modification would have been a simple substitution of one known element for

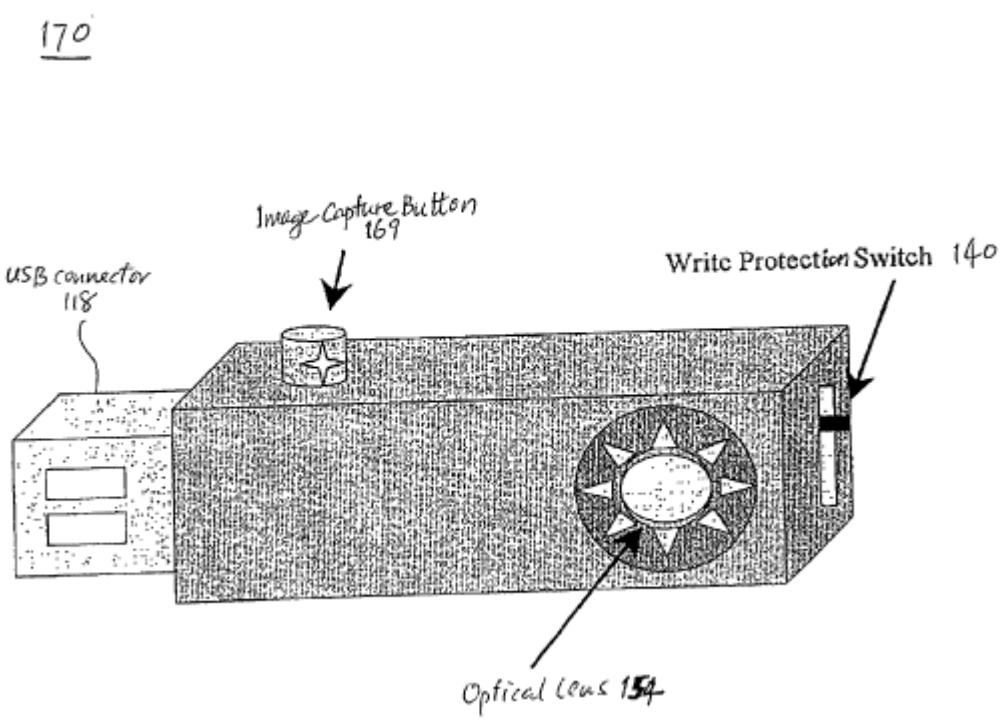
another to obtain the predictable result of an improved USB plug that makes it easier to plug the device into a computer. *See* Ex. 1002 ¶¶ 235-38.

Accordingly, Harkabi and Funahashi render Claim 19 obvious.

K. Ground 11: Claims 20 and 21 are obvious over Harkabi in view of Poo

1. Claim 20 - "The portable device according to claim 9, further comprising an imaging device for capturing visual information."

Poo discloses a portable image capture device that connects to a computer via a USB connector. *See, e.g.*, Ex. 1021 at ¶ 41. Figure 2 of Poo shows an embodiment of the USB camera:



Id. at Fig. 2.

A POSITA would be motivated to combine Harkabi with Poo because such a modification would have been a simple substitution of one known element for

another to obtain a predictable result. *See* Ex. 1002 ¶¶ 239-42. Specifically, one would replace the USB plug on the camera with either of the SLIM or FLEX embodiment USB plugs described in Harkabi. This would lead to the predictable result of the cameras being easier to plug into the computer. *Id*. ¶ 241. Moreover, Harkabi itself suggests this combination. *See* Ex. 1011 at 1:23-24.

Accordingly, Harkabi and Poo render Claim 20 obvious.

2. Claim 21 – "The portable device according to claim 9, further comprising a transducer for capturing audio information."

As explained above, Poo teaches a USB camera. Poo further explains that "Those of skill in the art would appreciate that camera module 50 may capture still images and/or continuous video. For embodiments where camera module 50 captures continuous video, module 50 may further include an acoustic digitizer circuit (not shown) for digitizing sound recorded by a microphone in module 50." Ex. 1021 at ¶ 32. Thus, Poo also discloses a portable device with a transducer for capturing audio.

As discussed above, a POSITA would have been motivated to combine Harkabi with Poo. Ex. 1002 ¶¶ 243-46. Thus, Harkabi and Poo render Claim 21 obvious.

VIII. CONCLUSION

For the reasons provided herein Petitioners submit that Claims 1-24 of the '825 Patent are unpatentable and should be canceled.

Respectfully submitted,

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CERTIFICATE OF TYPE-VOLUME LIMITATIONS UNDER 37 C.F.R. § 42.24

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Petitioner Toshiba America Information Systems, Inc. hereby certifies that this document complies with the type-volume limitation of 37 C.F.R. § 42.24(a)(1)(i). According to Microsoft Office Word 2010's word count, this document contains approximately 13,692 words, including any statement of material facts to be admitted or denied in support, and excluding the table of contents, table of authorities, mandatory notices under § 42.8, exhibit list, certificate of service or word count, or appendix of exhibits or claim listing.

Dated: August 10, 2018

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PETITION FOR INTER PARTES REVIEW OF U.S. PAT. 7,458,825 and EXHIBITS 1001-1026** are being served on August 10, 2018 to:

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