

Paper No. ____

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKING DRILL & TOOL, INC.
Petitioner

v.

HONGJIA WANG
Patent Owner

Case IPR2023-00474

U.S. Patent No. 11,007,583

PETITIONER'S REPLY

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UPDATED EXHIBIT LIST

Exhibit No.	Exhibit Description
1001.	U.S. Patent No. 11,007,583
1002.	Prosecution history of U.S. Patent No. 11,007,583
1003.	File history of Re-examination Proceeding No. 90/014,941
1004.	Expert Declaration of Dr. Steven R. Schmid
1005.	<i>Curriculum Vitae</i> of Dr. Steven R. Schmid
1006.	U.S. Patent No. 2,193,186 (“Bannister”)
1007.	Chinese Patent Application Publication No. 103084629 (“Zhou”)
1008.	U.S. Patent No. 2,276,532 (“Welty”)
1009.	U.S. Patent Application Publication No. 2018/0133808 (“Wang”)
1010.	U.S. Patent No. 8,029,215 (“Gentry”)
1011.	U.S. Patent No. 10,058,929 (“Durfee”)
1012.	U.S. Patent No. 4,582,458 (“Korb”)
1013.	U.S. Patent No. 5,452,971 (“Nevills”)
1014.	G.B. Patent No. 2,405,820 (“Sheldon”)
1015.	J.P. Patent No. 63,016,912 (“Shibata”)
1016.	U.S. Patent No. 38,119
1017.	Society of Manufacturing Engineers, Tool and Manufacturing Engineers Handbook, Fourth Edition (1983), Volume I, Chapter 9

1018.	Prosecution history of U.S. Patent Pub. No. 2018/0133808
1019.	PCT Pub. No. WO 2017136966 (PCT Application PCT/CN2016/073767)
1020.	Proof of Service of Summons in Civil Action No. 21-cv-02759 dated January 16, 2022
1021.	Patent Owner's and Petitioner's Joint Claim Construction Statement in Civil Action No. 21-cv-02759 dated October 24, 2022
1022.	Patent Owner's Supplemental Infringement Contentions in Civil Action No. 21-cv-02759 dated July 8, 2022
1023.	Viking Drill & Tool Product Catalog published in 2014
1024.	Matco Tools, Hyper-Step Drill Bits brochure published in 2018
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1050.	<i>Right Tool Makes Deep Holes Easier to Drill</i> , Cutting Tool Engineering, dated January 1, 2025.

I. INTRODUCTION

Patent Owner's ("PO's") only challenge to Ground 1 (anticipation by Zhou) is that Zhou does not teach certain *unclaimed* features. But the law only requires that a reference teach the *claimed* features in order to anticipate. Zhou does so and, therefore, anticipates claims 1, 2, 5, 8, 13-15, and 19.

Regarding Ground 2, PO does not dispute that Zhou in view of the secondary references teaches each and every element of all the challenged claims (including those disputed in connection with Ground 1). Rather, PO contends that it would not have been obvious to add features from step drills onto Zhou. This ignores that Zhou already incorporates step drill features on a twist drill. The further modifications needed to meet the claim language would have been both minor and obvious to a POSA.

Regarding Grounds 3 and 4, PO argues that Welty is limited to a gun drill and that it would not have been obvious to have spiral flutes on a gun drill. The evidence, including several of the references cited by PO, show that this is wrong. PO also alleges that Welty is not configured to crush chips into finer chips. This argument is inconsistent with the construction PO advanced in the co-pending litigation and has not challenged in this IPR. Finally, PO alleges that Welty does not teach "cylindrical second step surface[s]," which is inconsistent with the

infringement allegations PO has asserted in the litigation. Welty in view of the secondary references invalidates each and every challenged claim.

Finally, PO's argument that secondary considerations show non-obviousness should be rejected. Weak secondary evidence does not overcome a strong showing of obviousness under the primary factors such as that present here. Moreover, PO has not established the necessary nexus between the alleged secondary evidence of non-obviousness and the claims.

II. PETITIONER'S EVIDENCE UNDERLYING ANTICIPATION AND OBVIOUSNESS IS UNREBUTTED

The Board's Order of Jan. 10, 2024 struck Paragraphs 52-107 of PO's expert declaration, Exhibit 2034. Paper 41. This represents the entirety of PO's evidence on the primary factual issues underlying anticipation and obviousness, including what the prior art teaches and whether there is a motivation to combine references. Therefore, PO's arguments against anticipation and *prima facie* obviousness are mere attorney argument unsupported by any evidence. Consequently, Petitioner's evidence on these issues stands unrebutted.

III. GROUND 1 – THE CLAIMS DO NOT REQUIRE CURVED MAJOR AND MINOR CUTTING EDGES

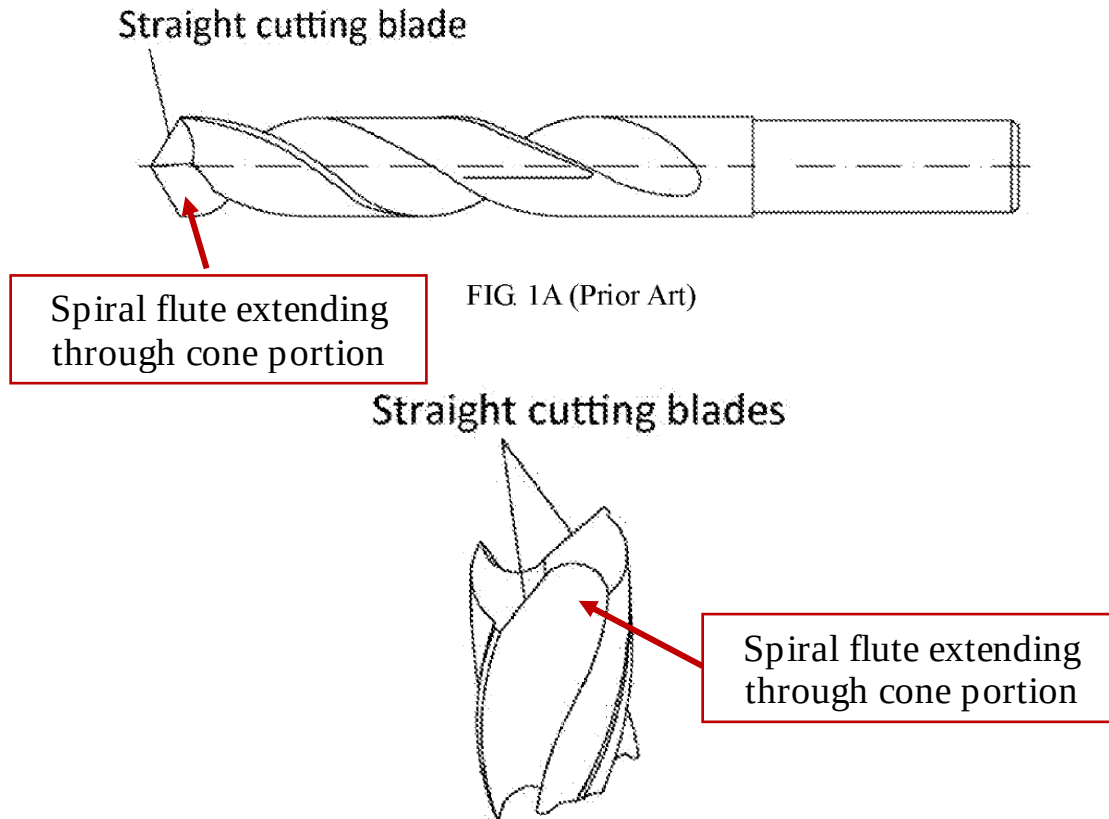
PO argues that Zhou does not anticipate the independent claims because it does not disclose major and minor cutting edges that are "curved." Paper 30 ("Response") at 9-14. However, the independent claims do not require curved

cutting edges; instead, they require only “a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute” and “a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute.” Ex-1001, Claims 1 and 8. A reference need not teach unclaimed features in order to be anticipatory. *See Respirationics, Inc. v. Zoll Med. Corp.*, 656 F. App'x 531, 535 (Fed. Cir. 2016) (“[T]he fact that an unclaimed element may be necessary for a device to function as claimed does not, standing alone, allow courts to treat the unclaimed element as a claim limitation.”).

Although the claims make no mention whatsoever of curved cutting edges, PO asserts this necessarily results from the intersection of the sidewall of a spiral flute and the respective step surfaces. This is both unsupported by evidence¹ and incorrect. There is no requirement that the leading wall of the claimed spiral flute spiral along the entire length of the flute. Rather, the claims are broad enough to allow a spiral flute that, as in Zhou, has a portion of its sidewall that is straight on the leading edge of the cone portion while still maintaining its generally spiral shape. Ex-1044, ¶¶9-12. Indeed, even the prior art “normal twist drill” shown in

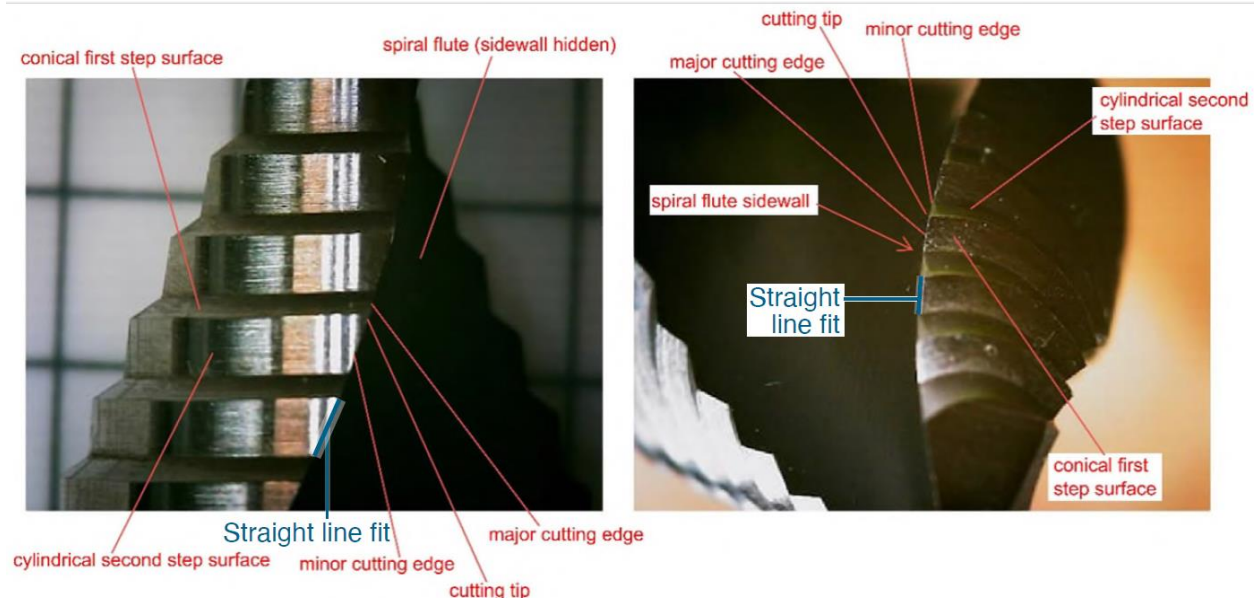
¹ The paragraphs of PO’s expert declaration relied on by PO to support this inherency argument (Ex-2034, ¶¶61, 65, 66) are among those stricken by the Board. *See* Paper 41.

Figures 1A-1C of the '583 patent has spiral flutes that extend all the way to the tip of the drill, including the cone-shaped portion formed by the top cutting edges:



Ex-1001 at FIGs. 1A-1C; Ex-1044, ¶11. Notably, PO does not challenge that Zhou has a spiral flute extending along the cone portion, and even admits that Zhou's straight cutting edges are formed by "grind[ing] back the sidewall of the spiral flute (as in Zhou and Bannister)." Response, 21-22 (emphasis added). The claims are satisfied even if the spiral flute has a straightened sidewall that leads to straight major and minor cutting edges.

Moreover, the photos provided by PO to show that such a drill has curved edges (Response, 14) fail to clearly show the shape of the cutting edges, which apparently fit well to straight lines, as shown below in blue. Ex-1044, ¶10.



PO's attempt to distinguish its claims based on features that are neither disclosed nor claimed in the '583 patent is without merit and should be rejected. As set forth in Ground 1, claims 1, 2, 5, 8, 13-15 and 19 are anticipated by Zhou.

IV. GROUND 2

A. It Would Have Been Obvious to Modify Zhou to Have Curved Cutting Edges and Spirally Formed Cutting Tips

Even if curved major and minor cutting edges were inherent limitations of the independent claims (which they are not), the challenged claims still would have been obvious as set forth in Ground 2. As explained in the Petition in connection with dependent claims 18 and 22, it would have been obvious to modify Zhou to

have a flute with a leading sidewall that maintains its helical shape all the way to the tip of the drill. Petition at 66-68; Ex-1004, ¶¶201-202. Since this is the same feature that leads to the allegedly-inherent “curved” major and minor cutting edges, the claims would have been obvious even if PO’s argument is accepted. Ex-1044, ¶13; Ex-1004, ¶¶201-202.

PO has not convincingly rebutted Petitioner’s case for the obviousness of modifying Zhou to have a flute with a sidewall that maintains its helical shape all the way to the tip of the drill. PO does not dispute that the prior art drills taught by Durfee show this feature. PO instead contends that “[i]t was not at all obvious to combine step-like features, similar in a way to those found in step drills, to the exterior of the cone portion of a twist drill.” Response, 24. But Zhou already does just this! Modifying Zhou to have a flute with sidewalls that spiral up the entirety of the cone portion, rather than having a straight cut along the leading edge, is but a small modification that would be a matter of routine engineering design choice. Ex-1004, ¶202; Ex-1044, ¶14. The Board already preliminarily rejected PO’s assertion that a POSA would never combine features of a step drill with a twist drill, Paper 15 (Institution Decision) at 14, and the numerous prior art references that have already done this (e.g., Zhou, Welty, Bannister, and Sheldon) show that PO’s argument is not credible. Ex-1006—Ex-1008, Ex-1014. Indeed, the Tool and

Manufacturing Engineers Handbook from 1983 shows and describes a twist drill with steps:



Step drill

Ex-1017 at 23, 25 ("Step drills have two or more diameters ground into the lands of the drill. Normally, the drill will be of the two-flute style[.]").

Modifying Zhou to have a spiral flute sidewall along the cone portion leading edge would lead to improved swarf evacuation, which can result in increased tool life and improved workpiece finish. Ex-1004, ¶202. It would also eliminate a manufacturing step by allowing the flute to be ground in a single operation rather than two (i.e., one grind to form the spiral flute and a second to grind back the leading edge of the cone portion to be straight). Ex-1044, ¶15. This is far from a “major redesign” of Zhou. It is nonsensical that a POSA would not seek to improve upon Zhou’s teachings just because Zhou already improves upon standard twist drills. Ex-1044, ¶17. As asserted by PO, “drill innovators are always attempting to improve the speed of a drilling operation, ease of cutting, precision in cutting, and durability and longevity of drill bits and their cutting edges, as measured in tool life, by way of reduced wear rate and reduced likelihood of chipping or breakage.” Response, 39.

PO's assertion that this modification would "completely change and destroy Zhou's principle of operation" by creating "an extreme curve" (Response, 20) is both unsupported by evidence and wrong. The prior art is replete with examples of cone portions having a spiral flute with sidewalls that spiral up the cone portion, and this problem has not been identified by those references. The ubiquitous standard twist drill, which commonly has a 135° point angle (similar to the 135° and 140° angles of Zhou, Ex-1007, [0024]) and a helical flute with spiral sidewalls extending all along the cone portion, does not have an "extreme curve" that causes problems. Ex-1001, FIGs. 1A-1C; Ex-1017, 47-52; Ex-1044, ¶18. PO has not demonstrated how Zhou would be any different from standard twist drills in this regard.

Thus, even assuming that independent claims 1 and 8 require curved major and minor cutting edges, those claims would have been obvious for the same reason as claims 18 and 22. PO has not disputed that all other limitations of claims 1, 2, 5, 7-8, 12-15, 18-19 and 22 are either disclosed in Zhou or would have been obvious to add to Zhou. Therefore, these claims should all be held unpatentable and cancelled.

V. GROUND 3

A. It Would Have Been Obvious to Modify Welty to Have a Spiral Flute and Spiral Cutting Tips

PO's argument is premised on the alleged incompatibility of spiral flutes on gun drills. PO argues that Welty is a gun drill for drilling "very deep holes," and that a POSA would not be motivated to add a spiral flute to Welty's gun drill. Response, 41-46. But Welty is not limited to gun drills. Indeed, the word "gun" does not even appear in Welty. Instead, Welty is directed generally to "drills for operating on metals." Ex-1008 at 1, 1:1-2. And while boring "accurate diameters of great depth" (*id.* at 1, l:305) is one of Welty's objects, that is not the only object. Other objects include providing a drill: (1) that requires less power to operate, (2) that does not bind and break during use (3) that has three boring portions and (4) where the boring portions increase in diameter so that work can be easily drilled. *Id.* at 1, 1:6-22. PO's argument fails for this reason alone.

Moreover, even taking into account Welty's object of drilling deep holes, PO's argument fails because spiral flutes are not only known to be compatible with deep hole drilling; they are advantageous for this purpose. Ex-1044 ¶¶20, 24 Adding the features taught by Bannister, Durfee, Korb, and Zhou would improve Welty's drill and advance all of the objectives of Welty's invention. Ex-1004, ¶¶212-214.

Welty is not limited to drilling holes of any particular l/d,² such as “100:1 ... up to 300:1” as PO argues. Response, 41. Although there is no widely accepted threshold for what constitutes a deep hole, PO's own exhibits consider anything greater than a l/d ratio from 3:1 or 10:1 to be a deep hole. Ex-2102 at 1; Ex-2101 at 1, FIG. 6; Ex-2100 at 3. PO's own licensed twist drills from a Matco DB29HSG set,³ produced in the litigation as TS002068, are capable of drilling holes of more than 3:1 l/d. Ex-1044, ¶23. The smallest allegedly practicing size, 5/32”, can even drill holes of over 10:1 l/d. *Id.* This demonstrates that twist drills with spiral flutes can be used for deep hole drilling.

Even if Welty's drill was intended only for drilling holes of even greater depth (e.g., greater than 10:1 l/d), it still would have been obvious to add a spiral flute to Welty. At the time of the alleged invention, twist drills with spiral flutes were known to be useful and advantageous for drilling holes with l/d on the order of 30:1 or 40:1, and even higher. Ex-2101 at 13 (describing twist drills as requiring less radial force and having higher feed rates than single lip drills); Ex-1050 at 4. The helical flutes specifically allow for improved mechanical chip removal with lower required coolant flow rates. Ex-2101 at 13-14. Thus, even if Welty is

² Length to diameter or depth to diameter, referred to as “l/d” in shorthand.

³ PO contends that these practice the claims of the '583 patent. Ex. 2074.

interpreted as being limited to very deep holes, a POSA would have found it obvious to incorporate helical flutes on Welty's drill to further improve upon Welty's stepped tip design. Ex-1044, ¶24.

PO also argues that a spiral flute would be incompatible with Welty because "Welty is focused on providing . . . a heel opposite the cutting edge." Response, 41. Although Welty does teach heels, or pads, opposite the cutting edges of each step in order to provide a bearing surface while allowing for radial relief used to reduce binding, this is just one of the numerous objectives of Welty. Ex-1008 at 1, 1:3-22. Heels are compatible with a single spiral flute on Welty, and adding two spiral flutes to Welty (consistent with twist drills known to be useful for deep hole drilling) would obviate the need for heels altogether⁴ while eliminating binding as the opposite cutting edges provide bearing surfaces and allow for radial relief. Ex-1044, ¶25.

B. Configured to Crush Chips into Finer Chips

PO argues that Welty's drill is not configured to crush chips into finer chips because "chips are flushed away from the cutting tip as soon as they are formed" and "[i]n order for chips to be crushed into finer chips, the chips would need to be

⁴ A two-fluted drill could still use heels, if dictated by other design considerations. Ex-1004, ¶250; Ex-1044, ¶25.

located at the front of the drill for a period of time sufficient for further crushing of the chips.” Response, 46. PO’s argument is contrary to the claim construction that it advocated for in the Litigation and has not disputed in this IPR. In the Litigation, PO argued that “configured to crush cutting chips into finer chips” should be construed to mean “creating cutting chips that are smaller than they would be if the drill did not have composite cutting blade groups.” Petition at 23-24, Ex-1021 at 4. Welty has a series of stepped cutting blade groups that produce chips narrower than those produced by a conventional drill of similar outer diameter, thereby producing smaller chips than if no stepped cutting blades were present. Ex-1004, ¶¶231-33; Ex-1044, ¶26. This is true regardless of whether chips are flushed away immediately after cutting. *Id.* Therefore, Welty’s drill meets this limitation.

PO’s argument also fails because it is unsupported by any evidence and is wrong. In any twist drill (including both the ’583 patent and Welty), chips are not retained in front of the drill and compressed as they are formed. Ex-1044, ¶27. Because material is cut through shearing, chips flow into the chip evacuation flutes immediately as they are formed. *Id.* As PO’s expert acknowledged, any further breaking of the chips after they are formed would occur inside the flutes as a result of the flute sidewalls interfering with the chips and bending them until they break into smaller pieces. Ex-1046, 68:24-71:12; *see also* Ex-1044, ¶28. PO has provided

no evidence that Welty's drill would not form discontinuous chips in this manner just because it can use pressure coolant to help evacuate swarf. A POSA would understand that Welty's drill would form discontinuous chips broken apart at least partially by interference between chips and the sidewall of Welty's flute, regardless of whether pressure coolant is used to evacuate chips. Ex-1044, ¶28.⁵

C. Cylindrical Second Step Surfaces

PO argues that Welty does not disclose "cylindrical second step surfaces" because its flank surfaces have "heels" (areas having a slightly increased radius) and radial relief (areas having a slightly reduced radius). Response, 47. However, the '583 patent contemplates surfaces that are generally cylindrical while allowing some deviations for relief. Ex-1001, 5:56-65 ("Although the axial minor cutting edge inclination angle is not 0° because the minor cutting edge has a certain chamfer, a surface on which the back portion 148 of the minor cutting edge is located can be approximately regarded as a cylindrical surface."). Indeed, PO has accused Petitioner's products of infringing the challenged claims even though they employ radial relief and are not perfectly cylindrical. Ex-1022, 7, 14; Ex-1045,

⁵ As explained in Petitioner's opening papers, a POSA would know that Welty's drill as modified to have a spiral flute would be operable without the use of pressure coolant to evacuate chips. Ex-1004, ¶212.

¶27. PO cannot propound one construction for infringement (allowing for deviation from perfect cylinder) and another for invalidity (not allowing for deviation from perfect cylinder). *Data Engine Techs. LLC v. Google LLC*, 10 F.4th 1375, 1381 (Fed. Cir. 2021). Welty teaches cylindrical second step surfaces.

Thus, it would have been obvious to modify Welty to have a spiral flute, and Welty teaches crushing and cylindrical second step surfaces as those elements were interpreted by PO for the purpose of infringement in the litigation. PO has not disputed that all other limitations of claims 1, 2, 7, 19, and 22 are either disclosed in Welty or would have been obvious to add to Welty. Therefore, these claims should all be held unpatentable and cancelled.

VI. GROUND 4

It would have been obvious to a POSA to modify Welty to have a split point tip geometry and top blade cutting edge lengths as claimed in claims 5, 8, and 12-13. Petition at 83-86. PO challenges this ground solely on the basis that a POSA would not combine features of a twist drill with a gun drill. Response, 49. That argument fails for the reasons discussed above. *See supra*, §(V)(A). Split point tips are known to be advantageous on drills because they provide fast penetration and accurate starting, both of which further the objectives of Welty's invention. Ex-1004, ¶250; Ex-1044, ¶30. Following the Board's Order striking evidence

(Paper 41), PO's arguments against *prima facie* obviousness by Welty are unsupported by evidence and constitute only attorney argument.

PO has not disputed that all other limitations of claims 5, 8, 12-15, and 18 are either disclosed in Welty or would have been obvious to add to Welty.

Therefore, these claims are also unpatentable.

VII. SECONDARY CONSIDERATIONS DO NOT REFUTE THE OBVIOUSNESS OF THE CHALLENGED CLAIMS

For Grounds 2-4, PO argues that objective indicia show that the challenged claims were not obvious. Response, 25-40, 49. PO's arguments should be rejected. PO's evidence of alleged objective indicia is extremely weak, and "simply cannot overcome the strong showing of obviousness." *Becton, Dickinson & Co. v. Baxter Corp. Englewood*, 998 F.3d 1337, 1345 (Fed. Cir. 2021) (citation omitted). Furthermore, secondary considerations arguments require a nexus between the evidence and the claimed invention. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). PO has not established the necessary connection between success of the device to specific features of the patent claims.

A. Patent Owner's Evidence is Weak and Does Not Show Non-Obviousness

1. Commercial Success

PO trumpets that [REDACTED]

[REDACTED]. Response, 36-37. Even in the abstract, this is not

impressive. PO has cited no case where [REDACTED] in annual sales was sufficient to show commercial success.

Moreover, PO's analysis regarding commercial success is fatally flawed because PO has not contextualized these sales to unpatented products and/or the twist drill industry as a whole. *See In re Applied Materials, Inc.*, 692 F.3d 1289, 1300 (Fed. Cir. 2012); *In re Ben Huang*, 100 F.3d 135, 140 (Fed. Cir.1996); *Red Diamond, Inc. v. Southern Visions, LLP*, IPR2019-01671, Paper 35 at 39-40 (PTAB Mar. 31, 2021). The overall twist drill market in the U.S. is conservatively estimated to be **over \$300 million per year**. Ex-1045, ¶16. [REDACTED]

[REDACTED] Similarly, PO points to the fact that Viking has sold [REDACTED] Vortex drills over a three-year period. Response, 57. But over the same three-year period, Viking sold [REDACTED] [REDACTED] non-stepped twist drills. Ex-1045, ¶15. Even assuming Viking's Vortex drills are covered by the '583 patent (which Viking disputes), [REDACTED] [REDACTED] does not show commercial success.

2. Copying

In an effort to show copying, PO points to [REDACTED] [REDACTED]. Response, 50-52. However, [REDACTED] [REDACTED] do not show copying because this is merely industry benchmarking. *See CaptionCall, L.L.C. v. Ultratec, Inc.*, IPR2015-

00637, Paper 98 at 84 (PTAB Sept. 7, 2016); *Jiaxing Super Lighting Elec.*

Appliance Co. v. CH Lighting Tech. Co., 2022 U.S. Dist. LEXIS 146033, at *15 (W.D. Tex. Aug. 16, 2022). [REDACTED]

[REDACTED] This is insufficient to show copying. *See, e.g., B/E Aero., Inc. v. C&D Zodiac, Inc.*, 709 Fed. Appx 687, 696 (Fed. Cir. 2017).

PO's allegation that Viking [REDACTED]

[REDACTED] (Response, 52) is unsupported and false. Rather than copy the Hyper-Step, Viking used its own expertise with twist drills and step drills to develop a better stepped-tip twist drill. Ex-1045, ¶¶9-14. The document that PO cites to support the alleged copying (Ex-2063) was created more than a year **after** introduction of the Vortex drills for the specific purpose of showing the substantial differences between the drills. Ex-1045, ¶¶10-12. To a POSA, the differences between the products reflected in Ex-2063 are very substantial and show a lack of copying. *Id.*

PO next claims that commercial acquiescence by other companies shows nonobviousness. Response, 54-55. However, the '583 patent was only granted in May of 2021, which is not a long enough period to show industry acceptance or widespread acceptance for commercial acquiescence. *See, e.g., RCA Corp. v. Applied Digital Data Sys., Inc.*, 730 F.2d 1440 (Fed. Cir. 1984); *Cisco Systems,*

Inc. v. SSL Services, LLC, IPR2015-01754, Paper 58 at 36 (PTAB Feb. 22, 2017). Moreover, commercial acquiescence is traditionally shown by licensing agreements. *See, e.g., Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004); *see also* Donald S. Chisum, *Patents* § 5.05[3]. PO presents no evidence of licensing. PO also cites no authority to show that filing of reexaminations shows acquiescence. To the contrary, Guehring’s filing of reexaminations merely shows that it does not believe the ’583 patent is valid. Guehring might have any number of reasons for not entering the U.S. market, and PO cannot extrapolate nonobviousness from such limited evidence. *See Iron Grip Barbell Co.*, 392 F.3d 1324; *ABT Systems, LLC v. Emerson Elec. Co.*, 797 F.3d 1350, 1361–62 (Fed. Cir. 2015).

Finally, there is a real-world explanation for why Viking and others did not introduce stepped-tip twist drills earlier that has nothing to do with copying or alleged non-obviousness: cost effective manufacturability. Historically, creating steps on a drill was a time-intensive, expensive operation. Ex-1045, ¶¶5-6.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Thus, there is no reason here to infer

non-obviousness from the fact that the commercial products at issue here were not introduced earlier.

3. **Industry Praise**

PO claims that the Hyper-Step drill bits have received “numerous accolades” in the industry. Response, 55. PO further claims that Viking’s and Kimball’s internal documents are evidence of industry praise, citing *Apple Inc. v. Samsung Elecs. Co., Ltd.* 839 F.3d 1034 (Fed. Cir. 2016). *Id.* As discussed *supra*, these internal documents are unpersuasive to show copying or industry praise. Furthermore, unlike in *Apple*, these internal documents do not praise technology captured by the challenged claims, but the product as a whole.

PO cites to a variety of online reviews and Youtube comments as evidence of industry praise, but this evidence is not reliable. Firstly, the evidence is from Youtube videos and anonymous commentors. Response, 55-56. Moreover, the videos have been stricken by the Board, and PO cannot cite to print-outs of Youtube videos that are not on the record to support a finding of nexus. See Paper 41 (striking Exhibits 2050, 2053, and 2054); *Halliburton Energy Servs. V. U.S. Well Servs., LLC*, IPR2022-00610, Paper 40 at 68-69 (PTAB Aug. 30, 2023). Furthermore, the anonymous, unsubstantiated reviews and comments are unreliable hearsay – there is no basis to conclude that they are even genuine, much

less that they come from people knowledgeable in the drilling industry. *See Apple*, 839 F.3d at 1054 (noting that industry praise should come from industry players).

In addition, some of the alleged “industry praise” actually criticizes the drills. *See* Ex-2016, 7; Ex-2017, 8; Ex-2018, 4-6. It is improper for PO to pick and choose comments to support its theory, and intentionally ignore other comments from *within the same exhibit*. To the extent the Board credits any weight to the purported industry praise, it must also consider and equally weight criticisms contained in PO’s own exhibits.

4. Unexpected Results

PO conclusorily asserts that the alleged benefits of the Hyper-Step drills were unexpected. Response, 40, 48-49. This is not true. In terms of their cutting operation, the Hyper-Step drills function the same as known step drills. Ex-1045, ¶¶4, 24-25; Ex-1044, ¶¶32-38. Moreover, the supposed unexpected results were known in the prior art. Ex-1044, ¶¶32-38. For that reason, a POSA would not be at all surprised by how the Hyper-Step drills function. *Id.* PO has presented no evidence to the contrary.

5. Long-Felt Need

Lastly, PO argues that long-felt but unmet need overcomes obviousness. Response, 58-60. However, “the mere passage of time without the claimed invention is not evidence of nonobviousness;” rather, a patentee must submit

“actual evidence of long-felt need.” *In re Kahn*, 441 F.3d 977, 990-91 (Fed. Cir. 2006) (citation omitted). PO presents no such evidence here, and instead relies solely on the passage of time. Response, 59.

PO’s long-felt need argument also fails for the same reason as its commercial success argument. If, as PO contends, the Hyper-Step drills were really a game-changing improvement, then one would expect them to dominate the market. But that hasn’t happened. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

The reality is that any alleged need was filled long before the Hyper-Step drills. For example, PO claims that the Hyper-Step drills resolves walking and the necessity of drilling pilot holes. Response, 39-40. However, this purported need in the market was already fully solved by the well-known split-tip design already applied to existing twist drills and step drills. Ex-1045, ¶¶18-19. Indeed, drillmakers already discouraged drilling pilot holes because of the damage it causes to the cutting edge of the drill. *Id.*, ¶20. The need for reduced slippage was already resolved by three-flatted shanks, which is also old and unclaimed. Ex-2011; *Id.*, ¶21. And the benefit of faster cutting with reduced torque was already

achieved by known step drills. Ex-1045, ¶24; *see also* Ex-1007, 1. Therefore, the purported long-felt and unmet need PO claims simply did not exist.

B. There is No Nexus

The burden of establishing nexus is on the patentee. *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). A presumption of nexus is only appropriate if “the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them.” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (cleaned up).

PO is not entitled to a presumption of nexus. First, it has not shown that the Hyper-Step drills are covered by the challenged claims. For example, PO has presented no evidence that the Hyper-Step drills have “spirally formed” composite cutting blade groups as claimed. When asked in deposition whether the Hyper-Step drills sold by Matco and Fisher had axial relief, Mr. Wang stated that he “cannot answer this question” and was unable to identify whether axial relief was present in the products because “this related [sic] the specific indication of the product.” Ex-1049, 81:11-83:7. Dr. Endres was similarly unable to testify that the Hyper-Step drills have axial relief because he never took measurements of the drills. Ex-1046, 33:6-8.

Second, PO has not shown that the Hyper-Step drills are co-extensive with the claims. This can be seen from the fact that the alleged differences between the claims and the prior art at issue are extremely minor and have nothing to do with the alleged commercial success and other objective indicia. For example, the alleged differences between the claims and Zhou are limited to minor differences in the geometry of the stepped surfaces. *See supra*, §§III-IV. This is also true for Bannister in IPR2023-00473. Yet PO has presented no evidence that the alleged objective indicia are tied or attributable to these minor differences.

Because PO is not entitled to a presumption of nexus, it must show that nexus exists “by showing that the evidence of secondary considerations is the direct result of the unique characteristics of the claimed invention.” *Fox Factory* at 1375. The evidence must be “tied to the novel elements of the claim at issue” and “reasonably commensurate with the scope of the claims.” *Institut Pasteur & Universite Pierre Et Marie Curie v. Focarino*, 738 F.3d 1337, 1347 (Fed. Cir. 2013).

Here, there is no evidence of a connection between the alleged success of the commercial products and the specific features of the ’583 patent claims. To the contrary, [REDACTED]

[REDACTED] *See In re DBC*, 545 F.3d 1373, 1384 (Fed. Cir. 2008) (evidence of commercial success was

insufficient in part, due to patentee’s “aggressive network marketing”). [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

PO also failed to address the impact of [REDACTED]

[REDACTED] on commercial success [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Therefore, a significant portion of the commercial success of the Hyper-Step drill can be attributed to [REDACTED].

Finally, “if the feature that creates the commercial success was known in the prior art, the success is not pertinent.” *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006); *see also In re Huai-Hung Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011) (“there must be a nexus to some aspect of the claim not already in the prior art”). Here, as discussed above, all of the advantages [REDACTED] [REDACTED] relate to features and technology already known in the art. *Supra*, §§VII(A)(4-5).

Thus, even assuming there was credible evidence to find commercial success or other objective indicator of non-obviousness (which there is not), PO has not met its burden of showing a nexus between the objective evidence and the claimed invention.

VIII. CONCLUSION

For these reasons, PO's arguments are insufficient to overcome the Board's initial findings that the challenged claims of the '583 patent are invalid for the reasons set forth in the Petition.

Dated: January 16, 2024

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(a)(1)(i), the undersigned hereby certifies that the foregoing PETITIONER'S REPLY contains 5,521 words, excluding parts of this Petition exempted under § 42.24(a), as measured by the word processing system used to prepare this paper.

Dated: January 16, 2024

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CERTIFICATE OF SERVICE

I certify that on January 16, 2024, I caused a true and correct copy of the foregoing Petitioner's Reply to be served via electronic mail on the following:

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