

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKING DRILL & TOOL, INC.,

Petitioner,

v.

HONGJIA WANG,

Patent Owner.

IPR2023-00474

Patent 11,007,583

PATENT OWNER'S MOTION TO SEAL UNDER 37 C.F.R. § 42.54

I. RELIEF REQUESTED

Pursuant to 35 U.S.C. § 316, 37 C.F.R. § 42.54, and the Office Patent Trial Practice Guide, Section I.E, Patent Owner Hongjia Wang (“Mr. Wang”) respectfully requests that the Board seal (1) portions of Patent Owner’s Corrected Response to the Petition (Paper 30); (2) portions of Exhibit 2034, the Declaration of William Endres, and Exhibit 2036, the Declaration of David Fisher; and (3) Exhibits 2039-2040, 2055-2057, and 2059-2071. The Board previously granted Viking’s Unopposed Motion for Entry of a Protective Order (Paper No. 29; Exhibit 1028).

II. CERTIFICATION

Counsel for Mr. Wang certifies that it has conferred with counsel for Petitioner Viking Drill & Tool, Inc. regarding the relief sought. Viking does not oppose this Motion to Seal insofar as it relates to confidential business information of Viking or third-party Kimball Midwest. The Parties have also agreed to the proposed Stipulated Protective Order, previously filed by Viking as Exhibit 1028.

III. GOVERNING LAW, RULES, AND PRECEDENT

Section 42.54 of Title 37 of the Code of Federal Regulations provides:

A party may file a motion to seal where the motion to seal contains a proposed protective order, such as the default protective order set forth in the Office Patent Trial Practice Guide. The motion must include a certification that the moving party has in good faith

conferred or attempted to confer with other affected parties in an effort to resolve the dispute. The Board may, for good cause, issue an order to protect a party or person from disclosing confidential information, including, but not limited to, one or more of the following: . . . (7) Requiring that a trade secret or other confidential research, development, or commercial information not be revealed or be revealed only in a specified way.

Likewise, the Office Patent Trial Practice Guide provides that “protective orders may be entered by the Board to protect a party from disclosing confidential information.” Consolidated Practice Guide at § I.E.4.

IV. REASONS FOR SEALING THE MATERIAL IDENTIFIED

The material subject to this Motion to Seal reflects and includes information that Mr. Wang, Viking, and/or third-party Kimball Midwest previously designated as “Attorneys Eyes Only” under the Protective Order entered in the Litigation (Ex. 1030). Each category will be addressed in turn.

A. Patent Owner’s Confidential Information (Exhibits 2039-2040)

The Consolidated Trial Practice Guide (November 2019) provides that “the rules aim to strike a balance between the public’s interest in maintaining a complete and understandable file history and the parties’ interest in protecting truly sensitive information.” Consolidated Practice Guide, 19. Patent Owner submits that this Motion to Seal protects Patent Owner’s sensitive information while not

significantly impacting the public's interest in maintaining a complete and understandable record of the proceeding.

Patent Owner requests that the Stipulated Protective Order previously submitted by Viking as Exhibit 1028 be entered in this proceeding to protect the sensitive confidential information contained in the Exhibits discussed below.

Patent Owner and Petitioner agreed to enter and be bound by the Stipulated Protective Order.

Exhibit 2055 is a financial business record from Patent Owner's United States distributor, Astro Pneumatic Tool Company, that contains highly sensitive information regarding Astro and Patent Owner's sales data, negotiated sales pricing and sales volume for downstream customers, and revenue data for the years 2018–2023. These financial records provide detailed revenue information which is not available to the public and is highly likely to cause significant harm to Patent Owner, Astro, and Astro's customers if released. Disclosure of this competitively sensitive confidential information would provide competitors an unearned competitive advantage by allowing an inside peek into the sales of Patent Owner and his U.S. distributors, including information regarding product revenue, sales volume, and pricing. Patent Owner is relying on this exhibit for its argument regarding objective indicia of non-obviousness. This Exhibit has been designated

as “Attorneys’ Eyes Only” in connection with the Litigation and under the Parties’ Stipulated Protective Order. The document is being filed entirely under seal.

Exhibit 2056 is an email between Astro and Matco Tools, the distributor of the Hyper-Step drill bits that embody the ‘583 Patent claims, discussing industry views on the Hyper-Step drill bits. The email reveals commercially sensitive business information of Patent Owner’s third-party customers, and disclosure of this competitively sensitive information would provide competitors an unearned competitive advantage regarding how Patent Owner’s customers view its products and how best a competitor could target these customers. Disclosure of this information may harm both Patent Owner and its third-party customers. Patent Owner is relying on this information for its argument relating to objective indicia of non-obviousness. This Exhibit has been designated as “Attorneys’ Eyes Only” in connection with the Litigation and under the Parties’ Stipulated Protective Order. The document is being filed entirely under seal.

B. Kimball Midwest’s Confidential Information (Exhibits 2059-2061)

In addition, Patent Owner is relying on confidential information designated as “Attorneys Eyes Only” that was produced by third-party Kimball Midwest, in connection with the Litigation. Patent Owner is relying on this information for its argument relating to objective indicia of non-obviousness. Disclosure of such information may cause harm to Kimball Midwest’s competitive interests, and

given that Kimball Midwest is not a party to this proceeding or to the Litigation, Patent Owner moves to seal the same.

Exhibit 2059 is a document concerning comparative testing results for the Easy-Boost drill bit that was produced by Kimball Midwest in the litigation. Companies routinely protect internal documentation relating to product development and testing, and the contents of this document reflect the confidential research, development, and commercial information relating to the design, development, and manufacture of the embodying drill bits. This Exhibit has been designated by third-party Kimball Midwest as “Attorneys’ Eyes Only” in connection with the Litigation and under the Parties’ Stipulated Protective Order. The document is being filed entirely under seal.

Exhibit 2060 are slides concerning the product development briefing for Kimball Midwest’s Ultra Step Drill Bits that were produced by Kimball Midwest in the litigation. Companies routinely protect internal documentation relating to product development and marketing, and the contents of this document reflect the confidential research, development, and commercial information relating to the design, development, and manufacture of the embodying drill bits. This Exhibit has been designated by third-party Kimball Midwest as “Attorneys’ Eyes Only” in connection with the Litigation and under the Parties’ Stipulated Protective Order. The document is being filed entirely under seal.

Exhibit 2061 is an email concerning testing of the Kimball Midwest's Ultra Step Drill Bits that were produced by Kimball Midwest in the litigation. Companies routinely protect internal documentation relating to product development and testing, and the contents of this document reflect the confidential research, development, and commercial information relating to the design, development, and manufacture of the embodying drill bits. This Exhibit has been designated by third-party Kimball Midwest as "Attorneys' Eyes Only" in connection with the Litigation and under the Parties' Stipulated Protective Order. The document is being filed entirely under seal.

C. Viking's Confidential Information (Exhibits 2055-2057 and 2062-2071)

Exhibits 2055-2057 and 2062-2071 contain information that Viking previously designated as "Attorneys' Eyes Only" under the Protective Order entered in the Litigation (Ex. 1030.) Patent Owner does not dispute the propriety of Viking's designation of the material under the District Court Protective Order and/or the Parties' Stipulated Protective Order in this IPR Proceeding.

More specifically, the information subject to this motion reflects and includes Viking's internal business documents. The information concerns Viking's financial information (Exs. 2064-2066), Viking's relationships and negotiations with its customers (Exs. 2055-2057, 2067-2071), and Viking's development and testing of products embodying the '583 Patent claims (Exs. 2062-2063). Patent

Owner moves to seal the same, in the event that disclosure would cause commercial harm to Viking.

D. Materials Quoting From Same (Paper 30 and Exhibits 2034 and 2036)

Patent Owner also moves to seal the portions of Patent Owner's Corrected Response to the Petition (Paper 30) and the Declarations of William Endres (Exhibit 2034) and David Fisher (Exhibit 2036). The portions of Paper 30, Exhibit 2034, and Exhibit 2036 that Patent Owner seeks to seal quote from or describe the sealed portions of Exhibits 2039-2040, 2055-2057, and 2059-2071, discussed above. Because disclosure of the foregoing information would harm Patent Owner, Kimball Midwest, and/or Viking's commercial interests, Patent Owner moves to seal the same.

Consistent with the Board's Rules, public versions of Paper 30, Exhibit 2034, and Exhibit 2036 which have been redacted of all Parties' confidential information, are filed concurrently herewith as Attachments A, B, and C.

V. PROPOSED PROTECTIVE ORDER

The Board granted Viking's Unopposed Motion for a Entry of a Protective Order. (Paper 29). Thus, the Parties' Stipulated Protective Order (Exhibit 1028) governs the treatment and filing of confidential information in this case.

VI. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board grant this Motion to Seal.

Dated: November 7, 2023

Respectfully submitted,

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CERTIFICATION OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e)(4) and 42.205(b) and the agreement of the parties, the undersigned certifies that on November 7, 2023, a true and correct copy of the **PATENT OWNER'S MOTION TO SEAL UNDER 37 C.F.R. § 42.54** was served by electronic mail upon the following:

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ATTACHMENT A

Proposed Redactions to Patent Owner's Corrected Response To Viking Drill &
Tool's Petition for *Inter Partes* Review of U.S. Patent No. 11,007,583

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKING DRILL & TOOL, INC.
Petitioner

v.

HONGJIA WANG
Patent Owner

IPR2023-00474

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

**PATENT OWNER'S CORRECTED RESPONSE TO
VIKING DRILL & TOOL'S PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. 11,007,583**

Viking Drill & Tool's Petition Filing Date: January 17, 2023

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I. INTRODUCTION

Patent Owner Hongjia Wang (“Mr. Wang”) filed and served a complaint on Viking Drill & Tool, Inc.

(“Viking”) alleging Viking has infringed his patents, including U.S. Patent No. 11,007,583 (“the Wang Patent,” that ’583 Patent,” or “the Subject Patent”). In response, Viking filed the present petition for inter partes review (“IPR”) of the Wang Patent.

The '583 Patent describes a novel twist drill bit that offers (1) easier drilling due to the fact that cutting resistance is distributed to each of the plurality of cutting tip thereby requiring a smaller overall drilling force than in conventional twist drill tips; (2) increased “precision of the drilling,” (3) “smoother

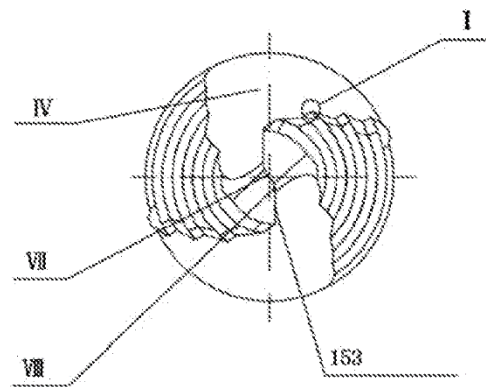
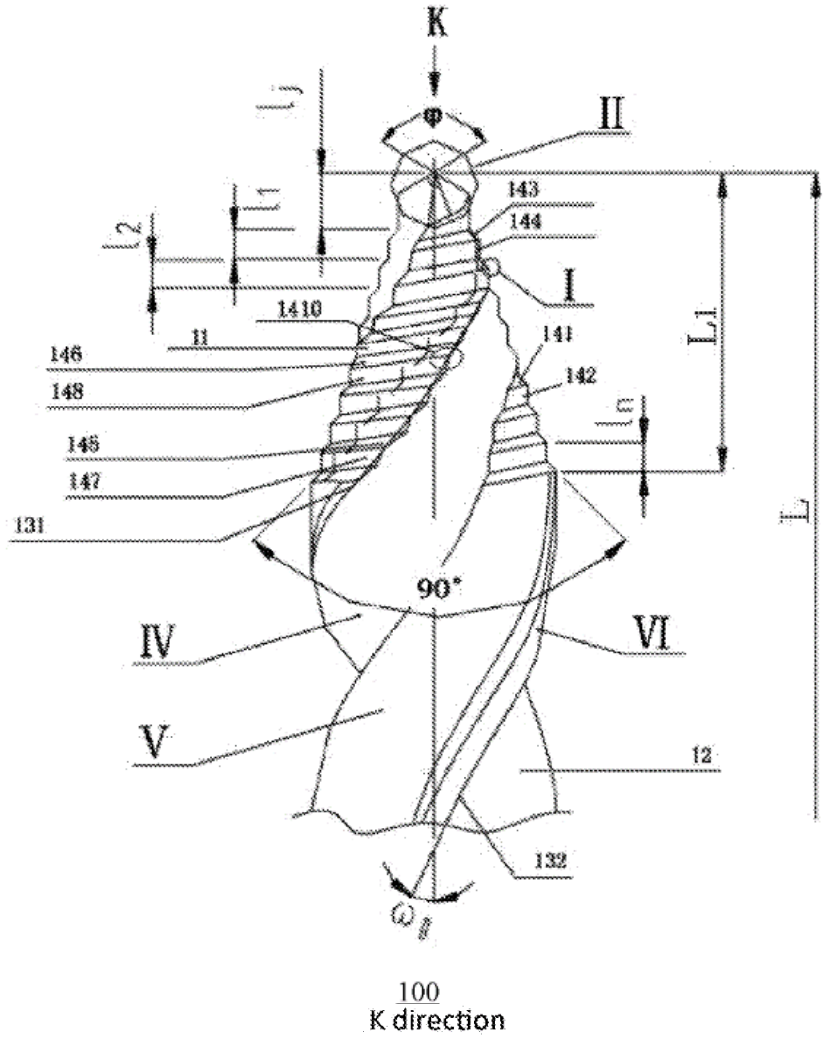


FIG. 4A

drilling,” and (4) increased “lifetime of the drill bit” due to the fact that the drilling force and consequently the cutting heat are distributed across a plurality of cutting tips; and (5) reduced accidents to the operator, tool, and workpiece as a result of the increased stability due to the even distribution of the cutting force. (**Ex. 1001**, col. 9:14-31, 48-61). Mr. Wang’s innovation distributes the cutting forces of the twist drill across multiple cutting edges and cutting tips, which (unlike in a standard twist drill and unlike a standard step drill) are simultaneously engaged with the workpiece to disperse relatively small cutting forces upon each of the cutting edges and cutting tips. (Ex. 2034 (Endres Decl.) ¶163). This configuration thus leads the drill bit with to (1) a faster penetration rate and thus reduced time to produce a given hole; (2) improved durability due to better distribution of the thermal load (heat) and mechanical load (force) generated at the cutting edge during cutting; (3) improved chip evacuation as a result of a plurality, and for larger bits many, chips having narrower width than for a standard twist drill where the chip width is approximately equal to the cutting lip length where the narrower chips are also weaker and have a tendency to fracture into short lengths; (4) reduced or eliminated bit walking during cutting; and (5) allowing users to drill large-diameter holes in thin workpieces like sheet metal with a twist drill, meaning with a drill that has many other uses (versus resorting to a step drill that is only practically applicable for making through holes in thin workpieces), without the

need to first drill a pilot hole (and thus eliminating the need to switch drill bits).
(Ex. 2034 ¶164).

These benefits are accomplished through the configuration disclosed in the specification and specifically through the configuration recited in the challenged claims of the '583 Patent.

As discussed below, Viking's proposed invalidity grounds are based on misreadings of the challenged claims and impermissible hindsight. Mr. Wang's novel drill bit design is as groundbreaking as it is effective. The evidence clearly shows that, prior to the introduction of embodiments of the challenged claims, no one had seen anything like it. The design received rave reviews, was an immediate commercial success, and quickly targeted for copying by competitors of Mr. Wang's company, Tsteigen. It is unsurprising that one of those copycats now seeks to challenge the patentability of the claimed invention, rather than seeking to design around it.

For the sake of clarity, Patent Owner provides the following table showing the challenged patent claims, including the fact that independent patent Claim 8 is identical to independent patent Claim 1, except for the two additional claim elements, and that, apart from depending from Claim 8, dependent Claims 12, 15, and 18 are identical to dependent claims 7, 19, and 22, respectively:

1. A twist drill, comprising: - an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion; - a shank portion axially fixed to the cylinder portion opposite the cone portion; - a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall; - a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising: - a conical first step surface; - a cylindrical second step surface adjacent to the conical first step surface; - a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute; - a minor cutting edge defined by the intersection of the cylindrical second step and the sidewall of the spiral flute; a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute; and	8. A twist drill, comprising: - an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion; - a shank portion axially fixed to the cylinder portion opposite the cone portion; - a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall; - a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising: - a conical first step surface; - a cylindrical second step surface adjacent to the conical first step surface - a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute; - a minor cutting edge defined by the intersection of the cylindrical second step and the sidewall of the spiral flute, the minor cutting edge being configured to smooth the machined surface of the workpiece to improve surface quality; and a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute;
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a top blade provided on the front end of the cone portion; wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and wherein at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	a top blade provided on the front end of the cone portion, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge; wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and wherein at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.
2. The twist drill of claim 1 wherein, the minor cutting edge being configured to smooth the machined surface of the workpiece to improve surface quality.	[this element recited above in claim 8]
5. The twist drill of claim 1 wherein, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the	[this element recited above in claim 8]

straight major cutting edge and the chisel edge.	
7. The twist drill of claim 1 wherein, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	12.The twist drill of claim 8 wherein, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.
	13.The twist drill of claim 8 wherein, a straight minor cutting edge length of the top blade is greater than each of the minor cutting edges of the plurality of composite cutting blade groups
	14.The twist drill of claim 8 wherein, the operation portion is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.
19. The twist drill of claim 1 wherein the cylinder portion is longer than the cone portion.	15.The twist drill of claim 8 wherein the cylinder portion is longer than the cone portion.
22. The twist drill of claim 1 wherein the cutting tips of the plurality of composite cutting blade groups are formed spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.	18.The twist drill of claim 8 wherein the cutting tips of the plurality of composite cutting blade groups are formed spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.

(Ex. 1001, pp. 14-15, 17).

II. THE BOARD SHOULD REAFFIRM THE WANG '583 PATENT CLAIMS VIKING CHALLENGED IN ITS PETITION

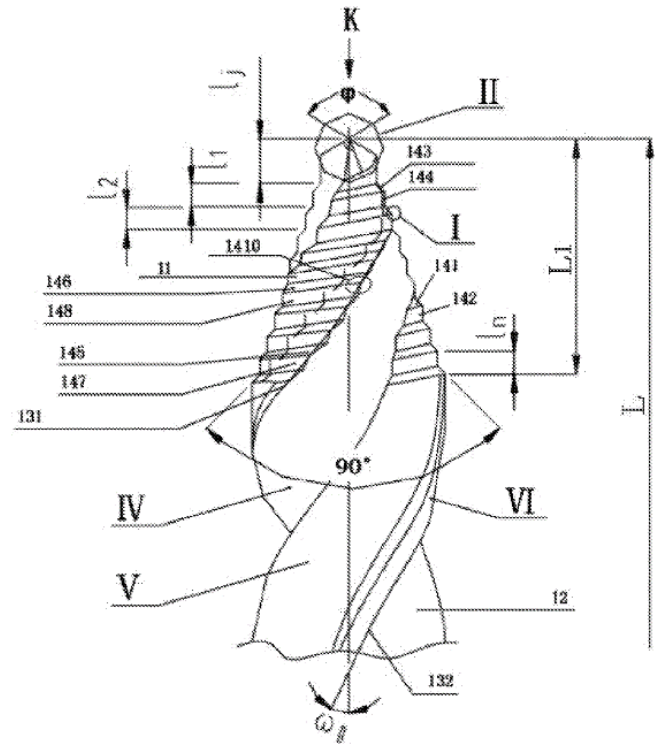
Each ground in Viking's petition for *inter parte* patent review should be rejected as discussed below.

A. Claims 1, 2, 5, 8, 13-15, and 19 Are Not Anticipated by Zhou

Zhou does not anticipate the challenged patent claims of the '583 patent. In particular, Zhou does not disclose at least the following limitations of independent claims 1 and 8: (1) “a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute”; and (2) “a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute.”

“Claims cannot be ‘anticipated’ by devices that are not the same. Invalidity for anticipation requires that ‘[t]he identical invention must be shown in as complete detail as contained in the patent claim.’ *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989); see *In re Skvorecz*, 580 F.3d 1262, 1266 (Fed. Cir. 2009) (‘A rejection for ‘anticipation’ means that the invention is not new. Anticipation requires that all of the claim elements and their limitations are shown in a single prior art reference.’). Not only must each claim element be shown in a single reference, but the elements must be ‘arranged or combined in the same way as recited in the claims.’ *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1370 (Fed. Cir. 2008); *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) (‘Anticipation requires the presence in a single prior art disclosure of all elements of a claimed invention arranged as in the claim.’).” *TF3 Ltd. v. Tre Milano, LLC*, 894 F.3d 1366, 1374 (Fed. Cir. 2018).

Claims 1 and 8 recite “a spiral flute ... extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall.” In reference to the spiral flute, “spiral” is “[a] three-dimensional curve traced by a point moving round and simultaneously advancing along a ... cone.” (Ex.



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FIG. 3

2098.) The '583 Patent describes the spiral flute formation on the cone

portion, describing that “at the cone portion 11, the cone surface intersects with the sidewalls of the spiral flute IV to form a plurality of first spiral lines 131” (**Ex. 1001**, the '583 Patent, col. 5:9-11). Further, “[a]n intersection of the first step surface 141 and the front flute sidewall of the spiral flute IV is a major cutting edge 143”. *Id.*, col. 5:18-22. “The composite cutting blade groups conically and spirally extend along the rake face 133 of the spiral flute IV towards the shank (shank portion 2) and terminate at the maximum outer diameter of the twist drill 100.” (*Id.*, col. 6:10-13).

Based on these disclosures, the POSA would understand that the major cutting edge and minor cutting edge, which are formed by the intersection with the sidewall of the spiral flute, must necessarily be curved when the claim limitations are met. (Ex. 2034, ¶61). Because the flute spirals about the cone portion in the claims, the sidewall (*i.e.*, at least the portion of the flute sidewall adjacent to the major cutting edge) must also be on a spiral line all along the cone portion. In fact, Petitioner’s Expert agrees that “having the cutting tips formed spirally on the cone portion is an inherent result of maintaining the spiral shape of the flute side walls all the way to the tip of the drill.” (Ex. 2105 at 253). Further, in the Petition, Viking also states that “Zhou discloses cutting tips appear to be formed along a straight line by the flute edge.” (*Petition* at 67). Therefore, since the intersection of the curved sidewall of the spiral flute and the conical first step surface defines the major cutting edge, the major cutting edge must also be curved. (Ex. 2034, ¶65). For the same reason, since the intersection of the curved sidewall of the spiral flute and the cylindrical second step surface defines the minor cutting edge, the minor cutting edge must also be curved. (*Id.*).

Thus, in order for Zhou to anticipate Claims 1 and 8 (and their respective dependent claims), the major cutting edge and minor cutting edge must each be curved. (*Id.* ¶66.)

Viking ignores this requirement entirely in its Petition. Instead, Viking argues without analysis that “Zhou shows a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the flute.” (*Petition* at 42). Viking does the same with respect to the “minor cutting edge.” (*Id.*) In making this argument, Petitioner ignores the fact that Claims 1 and 8 of the ‘583 Patent require that the major and minor cutting edges be defined by the intersection of the conical first step surface / cylindrical second step surface **and the sidewall of the spiral flute.**” (Ex. 2034, ¶65). In fact, Petitioner omits the claim language “sidewall of the **spiral** flute” from the foregoing assertions.

Zhou fails to disclose, among other limitations recited in claim 1, “a major cutting edge” that is defined by the intersection of the conical first step surface and the sidewall of a spiral flute. (*Id.* ¶61). Instead, as shown in red to the right, Zhou’s major cutting edges are ground straight. (See **Ex. 1007**, Zhou, Fig. 2, reproduced here and colored red). This is because the flute is ground straight or planar, not spiral, at the intersection with the conical first step surfaces.

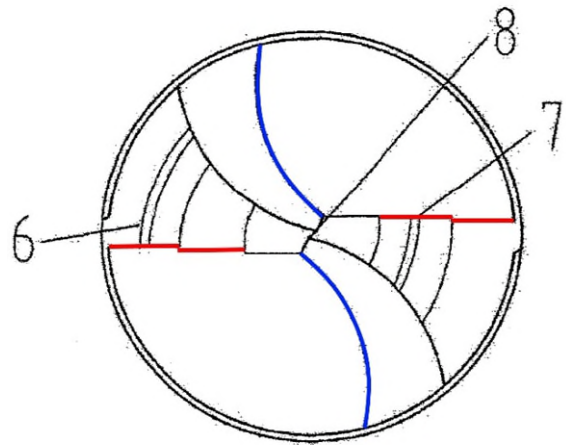


Fig. 2

Similarly, Zhou fails to disclose a minor cutting edge that is defined by the intersection of the cylindrical second step and the sidewall of a spiral flute. (Ex.

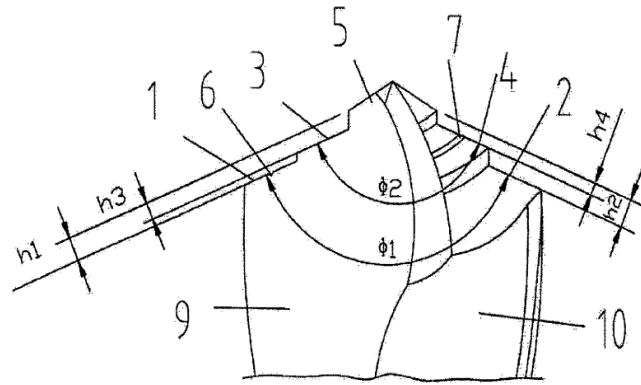


Fig. 1

2034, ¶65). Instead, Zhou’s minor cutting edge is straight. (See **Ex. 1007**, Zhou, Figs. 1 and 2, reproduced here). This is because, again, the flute is straight or planar, not spiral, at the intersection with the cylindrical second step surfaces.

Rather, in Zhou, the **flank edge** (as opposed to the cutting blades) is defined by the intersection of the spiral flute sidewall. This is shown in the annotated figures 2 and 3 below, with the supposed major cutting edges proposed by Petitioner highlighted in red and the flank edges highlighted in blue.

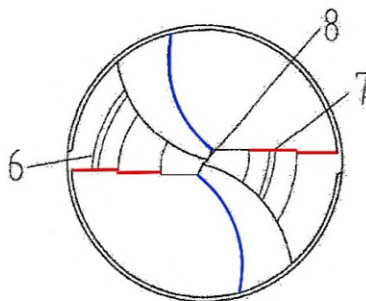


Fig. 2

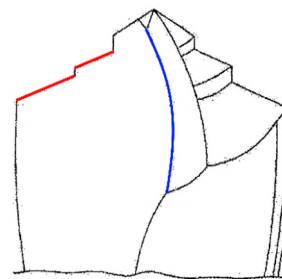
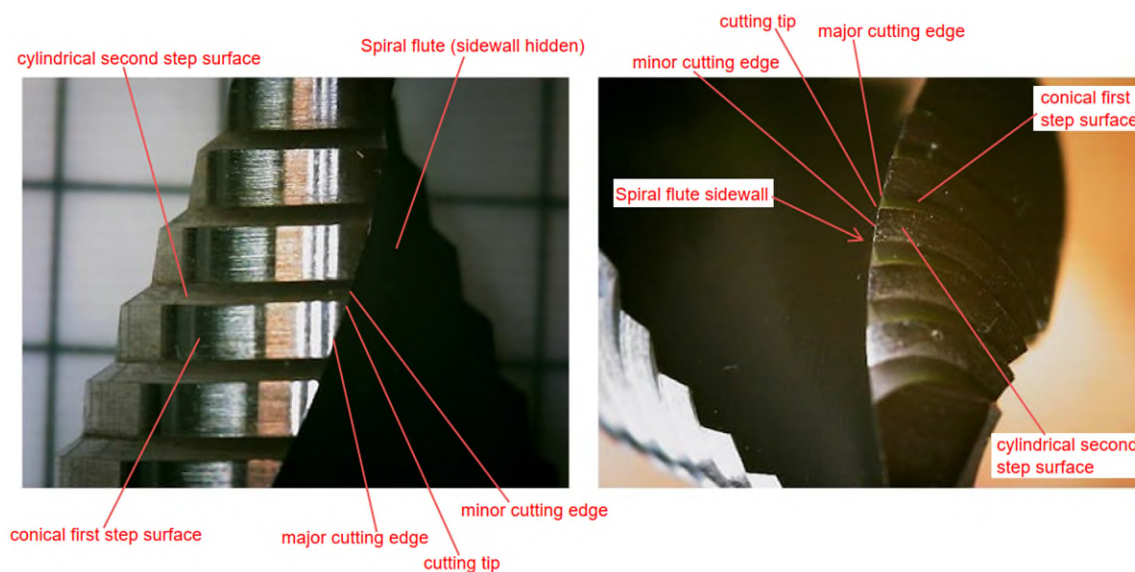


Fig. 3

Essentially, the sidewall defining Zhou’s major and minor cutting edges is not spiral, and thus, Zhou does not have the “major cutting edge **defined by the**

intersection of the conical first step surface and *the sidewall of the spiral flute*” or “minor cutting edge *defined by the intersection* of the cylindrical second step surface and *the sidewall of the spiral flute*” as required by the independent claims of the ‘583 patent. (Ex. 2034, ¶65).

The photographs of the Matco Hyper-Step drill below illustrate the concept that cutting blades defined by the sidewall of a spiral flute must necessarily be curved as well. (*Id.*, ¶¶65-66). Because Zhou does not disclose this feature, it is not an anticipatory reference.



B. Claims 1, 2, 5, 7, 8, 12-15, 18, 19 and 22 Are Not Obvious Based on Zhou in View of Bannister and/or Gentry and/or Durfee

1. Primary Considerations Demonstrate Non-Obviousness

In its second alleged Ground for rejection, Viking admits that Zhou does not teach or suggest a plurality of cutting tips that are arranged spirally (as recited in Wang’s Claims 18 and 22) or a top blade major cutting edge that is longer than the

major cutting edge of the composite cutting blade groups (as recited in Wang's Claims 7 and 12). To overcome these limitations, Viking argues that Zhou renders the '583 Patent obvious in combination with Bannister and Gentry or Durfee. Viking also attempts to combine Zhou with Korb, although not specifically stated in its obviousness grounds. Viking's assertion fails for two main reasons: (1) a combination of Zhou with Bannister would not result in several additional limitations of the '583 Patent; and (2) a POA would not have combined Zhou with Gentry, Durfee, or Korb.

Zhou discloses a twist drill with a top blade, intermediate cutting edges 3 and 4 (on opposite sides of the flute 9) and outer cutting edges 1 and 2 (on opposite sides of flute 9). The innovation Zhou describes is that his cutting edges 1 and 3 are offset axially from each other and his cutting edges 2 and 4 are offset axially from each other. (**Ex. 1007**, pp. 8-9, ¶¶ [0022]-[0024] and Fig. 1).

That is, as Figures 1 and 2 of Zhou show, the top blade 5 is flanked by intermediate cutting edges 3 (on one side of flute 9) and 4 (on the other side). The drop from top blade 5 to intermediate cutting edge 3 is greater than the drop from top blade 5 to intermediate cutting edge 4. (*Id.*). Then, the drop from edge 4 to edge 2 is greater than the drop from edge 3 to edge 1, and overall, the drop from top blade 5 to outer cutting edge 2 is greater than the drop from top blade 5 to outer

cutting edge 1 (i.e., the cutting edges are simply asymmetrical, with $h_3 > h_4$ and yet $h_1 < h_2$). (*Id.*).

In addition to the above-mentioned admissions by Viking and the failure of Zhou to disclose the major and minor cutting edges, a POSA also would not be motivated to modify Zhou's straight cutting tips with the cutting tips of Gentry or Durfee to create the claimed cutting tips formed spirally on a cone portion exterior. Claims 1 and 8 require

1) a spiral flute with a sidewall "extending from a front end of the cone portion and at least partway up the cylinder portion",

2) "a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute",

3) "a minor cutting edge defined by the intersection of the cylindrical second step and the sidewall of the spiral flute" and

4) a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute."

Dependent claims 18 and 22 add to claims 1 and 8, respectively, the limitation "the cutting tips of the plurality of composite cutting blade groups are

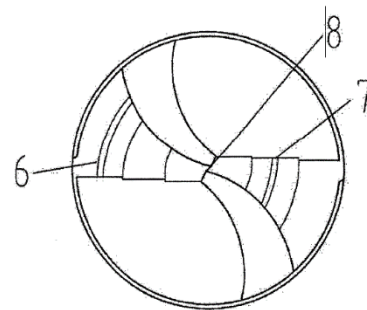


Fig. 2

formed spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.”

However, as discussed above, Zhou does not disclose the major or minor cutting blades of the ‘583 Patent. Indeed, Dr. Schmid opined “the cutting tips formed spirally on the cone portion is an inherent result of maintaining the spiral shape of the flute side walls all the way to the tip of the drill.” (**Ex. 2105** at 253). Thus, if there is a spiral flute formed about the cone portion, then the sidewall must be ground or cut back to create cutting edges that are straight (or any other shape not matching the curvature of the spiral flute sidewall).

For the reasons discussed below, a POSA would not be motivated to combine Zhou with Bannister, Gentry, or Durfee.

Zhou teaches an obtuse point angle for the protruding and sunken edges (1, 2, 3, 4), ranging between “a point angle of 90° - 160° ”. See *Zhou*, paras. 0008-9. In Zhou’s Fig. 1, the point angle between edges 1 and 2 is 135° (Φ_1); and the point angle between edges 3 and 4 is 140° (Φ_2). See *Id.*, para. 0024 and Fig. 1.

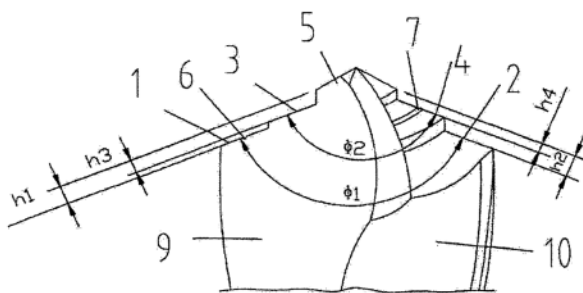


Fig. 1

Zhou expresses a strong desire to take a standard twist drill and improve its performance. Zhou states “In order to increase drilling efficiency and drill bit life, experts in various countries have many methods of grinding the drill tips (i.e. chisel edges) and main cutting edges of twist drills in increasing drilling efficiency which help considerably and drill bit life; examples are the Chinese "multi-facet drill", and cross-sharpened drill types commonly used in America.” *Zhou*, para. 0003. Zhou posits “[w]ould it be possible to take advantage of progress in modern processing techniques to achieve a further reduction in the drilling axial resistance and torque of a twist drill by precisely changing the technical parameters of the main cutting edges thereof, so that swarf is separated and expelled more smoothly, and the new drill type is suitable for large-scale industrial production?” *Id.* at para. 0004 (emphasis added).

Zhou further states “[a]n object of the present utility model is to provide a twist drill which exhibits a further significant reduction in drilling axial resistance and torque and thereby achieves significantly increased drilling efficiency and drill life. *Id.* at para. 0004. To further emphasize the desire to make specific modifications to standard twist drills, Zhou also states “Compared with world standard twist drills, and cross-sharpened twist drills in common use throughout the world, the most notable distinguishing features of the present utility model are the main cutting edge segmentation and the asymmetrical edge heights, which are

intended to achieve a further reduction in the drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability.” *Id.* at para. 0014; *see also* para. 0029.

It is clear that Zhou did not envision a major redesign of the drill bit; but instead, it took the straight main cutting edges of a standard drill (within the standard or obtuse point angle range) and made them segmented with asymmetrical edge heights (that is, the step heights on one side do not match those on the other side). (Ex. 2034, ¶75). This addition to standard drill bits creates the benefits of a “reduction in the drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability.” *Id.*

Nevertheless, Petitioner argues that a POSA would have modified Zhou to create the claimed invention. However, Zhou would require a substantial redesign to include cutting tips formed spirally on a cone portion exterior and defeats Zhou’s principle of operation. “Combinations that change the ‘basic principles under which the [prior art] was designed to operate,’ *In re Ratti*, 270 F.2d 810, 813 (CCPA 1959), may fail to support a conclusion of obviousness.” *Plas-Pak Industries, Inc. v. Sulzer Mixpac AG*, 2014-1447, 5 (Fed. Cir. Jan. 27, 2015) (non-precedential). *See Also Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed.

Cir. 2016) (aff’g IPR non-obviousness decision; there is no motivation to combine references where that “substitution would destroy the basic objective of” a key feature of one of the prior art designs).

If the sidewall was redesigned to remain spiral, because the point angles are obtuse, the resulting cutting blade shape would need to include an extreme curve, creating a sharp point at the outer diameter not generally found on standard twist drills. This is illustrated in red below. However, making such changes would completely change and destroy Zhou’s principle of operation, creating points of weakness at the tips and be contrary to the benefits Zhou was seeking. (Ex. 2034 ¶76).

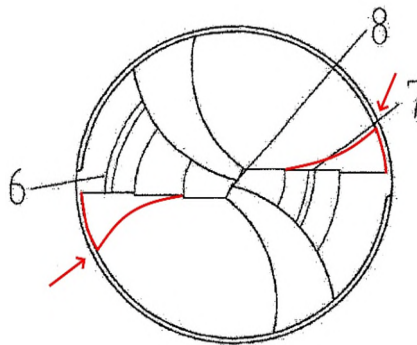


Fig. 2

This extreme cutting edge curvature can be avoided by grinding the flute sidewall to change the geometry of the cutting edges, which is exactly what Zhou does. (*Id.* ¶77). All of the twist drills that include steps on the front end, that Petitioner has cited as prior art, came to the conclusion that the cutting edges should not be defined by the spiral flute sidewall. (*Id.*) All of them are straight or

have otherwise been reshaped by removing the spiral flute sidewall. See, for example, Zhou's straight cutting edges, Bannister's scalloped cutting edges, and Welty's straight cutting edges. Only hindsight reconstruction can explain Petitioner's assertion that a POSA would have been motivated to replace the straight cutting edges with the curved or spiraled cutting edges of step drills. The "[d]etermination of obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534,546 (Fed. Cir. 1998).

Petitioner's justification for the combination in spite of these difficulties makes no sense. Petitioner argues that "[a] POSA would have known that maintaining the spiral shape of the flute side walls was desirable since it helps to lift swarf away from the cutting surface and out of the hole being cut." (*Petition* at 67). And that "a POSA would have been motivated to modify Zhou's flute to have the side walls maintain their spiral shape (resulting in the cutting tips also formed spirally) in order to obtain the known benefits of spiral flute side walls on a drill ...". Petitioner appears to be arguing that, for the sole benefit of carrying swarf away, a POSA would have modified the cutting tip in Zhou, even with all of the issues that would be created in Zhou by doing so. Each of Zhou, Bannister, and Welty appreciated these difficulties and decided to either avoid spiral flutes

altogether (as in Welty) or grind back the sidewall of the spiral flute (as in Zhou and Bannister). (Ex. 2034 ¶77.)

Zhou already includes the advantage of efficiently removing swarf from the hole. (*Id.* ¶78.) Zhou describes the “[b]eneficial effects of the present utility model: [which include] reduced drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, further increasing drilling efficiency and drill bit durability.” (Ex. 1007, Abstract). Zhou elaborates that “the most notable distinguishing features of the present utility model are the main cutting edge segmentation and the asymmetrical edge heights, which are intended to achieve a further reduction in the drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability.” (*Id.* ¶0014).

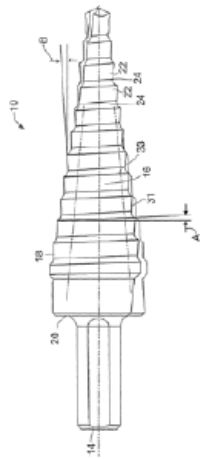
Petitioner has failed to describe how the proposed modifications would provide an advantage over and above the advantages already inherent to Zhou’s drill bit, and how they are not redundant thereto. Since Zhou, Bannister, Gentry, and Durfee disclose drill bits and “each device independently operates effectively” (at least so far as swarf removal is concerned) “a person ... who was merely seeking to create a better device ..., would have no reason to combine the features of both devices into a single device.” *See Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d. 1342 (Fed. Cir. 2012). “Rejections on obviousness

grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

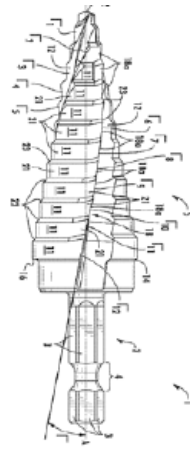
Petitioner does not explain why such a modification to Zhou “would have been an improvement on what [Zhou’s drill bit] already provides.” See *Sony Corp. v. Fujifilm Corp.*, IPR2018-01751, Paper 14, 11 (PTAB April 12, 2019).

Further, no evidence is provided by Petitioner that forming the cutting tips spirally on the cone portion as argued to be taught by Gentry and Durfee would further improve swarf removal; and there is no indication that swarf removal is a problem with Zhou’s drill bit. See *Ex parte Saiki*, Appeal No. 2000-0373, Ser. No. 08/450,245 (Jan. 31, 2002). There is no need in Zhou for this doubling up of advantages, and is the product of hindsight. See *Ex parte Burns*, Appeal No. 2016-000351, Ser. No. 13/843,754. (Ex. 2034 ¶79).

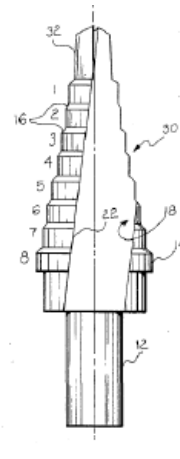
Moreover, as Viking admits, Zhou describes a twist drill, as does Bannister. Gentry, Durfee, and Korb, by contrast, each describes a step drill. (Petition at 2).



U.S. 8,029,215 (Gentry)
(FIG. 1)



U.S. 10,058,929 (Durfee)
(FIG. 1)



U.S. 4,582,458 (Korb)
(FIG. 7)

Twist drills and step drills have different purposes and different applications. Specifically, twist drills, such as those disclosed by Zhou and Bannister, are configured to bore deep into relatively thick workpieces. On the other hand, a step drill, such as those disclosed by Gentry, Durfee, and Korb, are configured to drill holes of different diameters in sheet metal or other relatively thin workpieces, the desired diameter dictating how many “steps” of the step drill the user pushes through the sheet metal or the like. (**Ex. 2034**, ¶82). Because step drills are configured to create smooth, round holes of various diameters in thin material, the step height is configured to be taller than the material thickness.

It 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. Twist drill innovators have had no motivation to add a plurality of steps to the exterior surface of the cone portion of a twist drill. (*Id.* ¶83).

2. Objective Evidence of Secondary Considerations Also Overcome Any Obviousness Challenges

In addition, objective evidence of secondary considerations overcome any *prima facie* case of obviousness. As the Federal Circuit has recognized, “[i]t is the secondary considerations that are often most probative and determinative of the ultimate conclusion of obviousness or nonobviousness.” *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573 (Fed. Cir. 1996). “Objective indicia of nonobviousness must be considered in every case where present.” *Apple Inc. v. Samsung Elecs. Co., Ltd.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc). These include commercial success enjoyed by devices practicing the patented invention, industry praise for the patented invention, copying by others, the existence of a long-felt but unsatisfied need for the invention, and unexpected results. *Id.* at 1052.

“For objective evidence of secondary considerations to be relevant, there must be a nexus between the merits of the claimed invention and the objective evidence.” *Volvo Penta of the Americas, LLC v. Brunswick Corp.*, 81 F.4th 1202, 1210 (Fed. Cir. 2023). Nexus can be shown in two ways: (1) via a presumption of nexus; or (2) via a showing that the evidence is a direct result of the unique characteristics of the claimed invention. *Id.*

A patent owner is entitled to a presumption of nexus when it shows that the “asserted objective evidence is tied to a specific product that ‘embodies the claimed features and is coextensive with them.’” *Volvo Penta*, 81 F.4th at 1210. In

these cases, the burden then shifts to the petitioner to present evidence to rebut the presumed nexus. Furthermore, the “inclusion of noncritical features does not defeat a presumption of nexus.” *Id.*; *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016). “The coextensive requirement does not require a patentee to prove perfect correspondence between the product and a patent claim.” *Quanergy Sys., Inc. v. Velodyne Lidar USA, Inc.*, 24 F.4th 1406, 1417–18 (Fed. Cir. 2022). Rather, it requires the patentee to demonstrate that the product is essentially the claimed invention. *Id.* at 1418.

(a) The Tsteigen Easy-Boost And Viking Vortex Point Drill Bits Embody The Patent Claims And Are Co-Extensive With Them

Here, the claim charts attached to the declaration of William Endres establish that the Easy-Boost drill bits manufactured by Tsteigen, Inc.¹ embody the claims of the ‘583 Patent, including claims 1, 8, 14, 15, 18, 19, and 22. (Ex. 2034, ¶¶125-136; Exs. 2074-2089.) Similar claim charts show that Petitioner Viking’s Vortex Point drill bits and the private label versions thereof practice the claims of

¹ Tsteigen’s Easy-Boost drill bits are distributed in the United States under private labels, the Matco Hyper-Step drill bits and Astro Pneumatic Onyx drill bits, which are identical in all but branding. (Ex. 2035 (Wang Decl.); Ex. 2036 (Fisher Decl.) ¶¶ 7-10.)

the ‘583 Patent. (Ex. 2034, ¶¶137-141; Ex. 2090; Ex. 2071 at 26:24-27:15.)

Finally, the Steel Vision Tools Stepped Tip drill bits and the VIM HSSC29 drill bits also embody the claims of the ‘583 Patent. (Ex. 2034, ¶¶142-148; Ex. 2094-2097).

Each of the Easy-Boost, Vortex Point, Stepped Tip, and HSSC29 drill bits are coextensive with the patented invention. As an initial matter, the claims of the ‘583 Patent are directed to an entire drill bit. (Ex. 2034, ¶149.) The practicing products are likewise entire drill bits. (*Id.*) This is not a situation where the claimed invention is “merely a subcomponent” of the practicing products. *Quanergy*, 24 F.4th at 1418.

Other than drill bit size and the color of the index containing the drill bits, there are no unclaimed features in the “standard” MATDB29HS / TS29, MATDB4HSL, and MATDB4HSXL models. (Ex. 2034, ¶150.) Drill bit size is insignificant given that persons of ordinary skill in the art understand that drill bits come in 29 standard incremental sizes (MATDB29HS, MATDB29HSG, and TS29) as well as 8 silver & deming sizes, depending on the size of the hole to be drilled. (*Id.* ¶152.) Viking Drill’s Type 250-VT (standard 29 incremental sizes) and Type 280-VT (8 silver & deming) drill bits are essentially identical to the MATDB29HS and HSL/HSXL models, and likewise contain no significant unclaimed features. (*Id.* ¶ 154.) The Steel Vision Stepped Tim and VIM HSSC29

drill bits are akin to the MATDB29HS and Type 250-VT drill bits, and likewise contain no unclaimed features. (*Id.*)

The only practicing products that contain unclaimed features are the following variations on the Hyper-Step drill bits: (1) MATDB29HSR² (reduced shank drill bits); (2) MATDBC21HSM (cobalt); (3) MATDBC29HSRM (cobalt, reduced shank); and (4) MATDB29HSRS (cobalt, reduced shank, stubby).

The size of the drill bit shank (standard or reduced) is an insignificant feature. (Ex. 2034 ¶157.) This is a standard variation in the field and impacts only the type of drill chucks that the drill bits are compatible with; it does not materially impact the product's functionality (nor is it advertised as doing so in the product literature). (*Id.*)

The drill bit material (cobalt or steel) is an insignificant feature. (*Id.* ¶169.) POSAs would understand that the claimed drill bits can be made from different materials, including most commonly, steel and cobalt. (*Id.*) Although cobalt is advertised as a stronger material than steel, this feature does not have a material

² MATDB29HSRG is identical to the MATDB29HSR, except for the color of the index containing the drill bits, which is green for the HSRG model. (Ex. 2036, ¶8.)

impact on patentability or functionality. (*Id.*) The cobalt drill bits are still “essentially the claimed invention.” (*Id.*)

The “stubby” drill bits refer to a drill bit where the cylinder portion is $\frac{1}{2}$ to $\frac{2}{3}$ the length of a traditional drill bit. (*Id.* ¶158) Stubby drill bits have greater rigidity than standard drill bits and a slightly more specialized use case (where drilling in tight spaces is required). (*Id.*) However, a POSA would not regard this feature as having a material impact on patentability or functionality. (*Id.*) Companies routinely offer standard and stubby sized models of essentially the same products. (*Id.*) Notably, the ‘583 Patent explicitly contemplates variations in the length of the cylinder portion. (see ‘583 Pat., Cl. 15 and 19).

Accordingly, the Tsteigen Easy-Boost drill bits and the Viking Vortex Point drill bits embody the claims of the ‘583 Patent and are coextensive with them. Thus, they are entitled to a presumption of nexus. *Quanergy*, 24 F.4th at 1417.

(b) There Is Significant Objective Indicia Of Nonobviousness

Here, there is strong objective evidence of at least the following secondary considerations: (1) copying and commercial acquiescence; (2) industry praise; (3) commercial success; and (4) long-felt but unmet need.

(i) Copying

A. Copying by Viking Drill & Tool

Since the embodying Easy-Boost drill bits were introduced in the United States (under Matco's Hyper-Step private label), many competitors of Tsteigen (and of Astro and Matco) have copied Mr. Wang's patented configuration, including Petitioner Viking Drill with their Vortex-Point drill bits. (Ex. 2036 ¶¶25-35.) Viking Drill manufactures and sells its Vortex-Point drill bits under private labels to the following distributors: [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

The evidence shows that [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

It also notes that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

As demonstrated above, Viking’s copying of the Hyper Step drill extended to all of its patented features. (Ex. 2090.) The Vortex Point drill bits embody the ‘583 Patent claims and are coextensive with them, and are thus entitled to a presumption of nexus. But even if not, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Courts have routinely found such

internal documents to provide telling evidence of both copying and industry praise. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1054 (Fed. Cir. 2016) (holding that internal documents of competitor constituted substantial evidence of copying by Samsung that supports the verdict of nonobviousness); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1352 (Fed. Cir. 2012) (reversing JMOL of obviousness and finding substantial evidence supporting jury’s finding of copying where “Maersk’s internal document expressly ties its copying to the novel ‘dual-activity’ features of Transocean’s invention, which it distinguishes from the ‘dual drilling’ taught in the prior art.”).

In fact, the only features not copied [REDACTED] are unclaimed (and insignificant) features, such as the total length of the drill bit and the amount by which the length of the cylinder portion exceeds the length of the cone portion. (Ex. 2063 at p.2; *Hughes Tool Co. v. Dresser Indus., Inc.*, 816 F.2d 1549, 1556 (Fed. Cir. 1987) (“continuous use of the patented feature while other features were not copied gives rise to an inference that there is a nexus between the patented feature and the commercial success”).

Furthermore, in their advertising, many of these copycats point to elements of the patented drill bit configuration as advantages over competing products, such as: “split-point design gives accurate starting and is selfcentering eliminating the need for the use of a center punch”, “unique tip geometry reduces heat generation

cutting tool wear increasing tool life”, and “step drill design easily enlarges existing holes without damaging the point.” (Ex. 2036 ¶¶28-35; Ex. 2027 at p. 2; *see also* Ex. 2024 at p. 1; Ex. 2025 at p. 1; Ex. 2026 at pp. 1, 3; Ex. 2048 at p.1; Ex. 2058 at 10.) Notably, not a single one of these companies promotes or instructs its users to use the copycats as step drills. (*Id.*)

In fact, Mr. Wang and his company, Tsteigen, Inc., sued Viking Drill & Tool in the District of Minnesota on July 2021, and the litigation has been costly. Viking has pointed to a number of its step drill lines to argue that Mr. Wang’s patented configuration is merely obvious. Mr. Wang’s attorneys have invited Viking to then sell those step drills instead of the imitations of Mr. Wang’s patented twist drills, but Viking has, unsurprisingly, repeatedly refused this invitation.

B. Copying by Other Companies

Other companies have followed suit and manufactured their own versions of the Easy-Boost drill bit design, including the Steel Vision Tools Stepped Tip drill bit and the VIM HSSC29 drill bit. These products also embody the ‘583 Patent claims and are coextensive with them. (Exs. 2094-2097.) Like the companies selling private label versions of the Vortex Point drill bits, Steel Vision and VIM advertise the patented features of the ‘583 Patent, confirming the nexus between their copying and merits of the claimed invention. (Ex. 2028 at p. 1.)

Relatedly, a German company, Guehring KG, has filed three requests for *ex parte* reexamination of Mr. Wang’s ’583 patent. When a company refrains from entering the U.S. marketplace with a competing product and instead files a request for reexamination of a patent on that product, this represents a form of commercial acquiescence. That is, Guehring KG has refrained from entering the U.S. marketplace for nearly two years now and, in that time, it has filed no less than three requests for reexamination of Mr. Wang’s ’583 patent. (Ex. 2036, ¶36.) This represents a clear instance of commercial acquiescence.

(ii) Industry Praise

Mr. Wang and the patented Hyper-Step drill bits have received numerous accolades in the industry. Viking and Kimball’s internal documents (discussed in detail above) concerning [REDACTED] [REDACTED]. *Apple Inc.*, 839 F.3d at 1054 (Fed. Cir. 2016) (“internal documents from the patentee’s top competitor represent important admissions, acknowledging the merits of the patented advance over the then state of the art and can be used to establish industry praise”) (same internal documents of competitor used to establish copying and industry praise).

The industry praise for the product embodiments does not end there. Matco’s patented DH29HSG Hyper-Step drill bits have 120 user reviews, including 112 five-star reviews. (Ex. 2011, pp. 3-40.) Many of these positive

reviews specifically point to aspects of the patented configuration, such as the “unique point design” and “steps feature”, as well as advantages of the patented design, such as durability and cutting speed. (Ex. 2011, pp. 4, 17; Ex. 2034 ¶¶175-178.) The Hyper-Step drill bits have also been recognized in technical journals, including TechShop magazine, which praised that “[t]hese drill bits act like a step drill, spreading the job of cutting across multiple levels, which keeps the drill bit cooler, resulting in less wear and maybe best of all, there’s no more need for a pilot hole.” (Ex. 2012.) There have also been numerous positive reviews of the patented drill bits on YouTube from industry insiders, honing in on advantages of the patented configuration—improved durability, cutting speed, and centering capabilities. (Ex. 2036 ¶¶40-51; Ex. 2034 ¶¶175-178; Exs. 2013–2018; Exs. 2049-2054.) And, user discussions on technical forums have commented on the “unique design for drill bits” and “new geometry” of the patented Hyper-Step drill bits. (Ex. 2036 ¶¶52-55; Ex. 2019 at p.1; Ex. 2020 at p.1.) Others have praised the drill bits, saying they “drill through everything” and “just plunge through material.” (Ex. 2021 at p. 1; Ex. 2022 at p. 5.)

(iii) Commercial Success

Mr. Wang’s patented Easy-Boost drill bits are sold in the United States under Matco Tools’ Hyper-Step and Astro Pneumatics’ Onyx private labels. These

products have been extremely commercially successful, selling [REDACTED] worth over \$15.5 million between 2018 and March 2023. (Ex. 2039).

Matco Tools is one of the nation’s largest automotive tool distributors with over 13,000 different tool lines. The Hyper-Step drill bits have consistently been one of Matco Tools’ best-selling products since Matco began selling them in the United States in 2018. (Ex. 2036 ¶12.) Internal emails exchanged between Astro and Matco (before Viking or other competitors began copying the patented invention) reveal that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

As established above, the Easy-Boost and Vortex Point drill bits embody the ‘583 patent claims and are coextensive with them, so such sales are entitled to a presumption of nexus. In addition, the nexus between the commercial success of the product embodiments and the merits of the patented invention is clear. Astro and Matco both advertise the patented features (and performance deriving therefrom) of the product embodiments in their marketing materials. (Exs. 2011, 2041-2046; Ex. 2034, ¶¶179-180; Ex. 2036, ¶¶23-24.) For example, Matco’s advertisements of the Hyper-Step drill bits include the following descriptors: “SUPERIOR DESIGN. Patented Hyper-Step design cuts 45% faster and are the best drill bits for sheet metal, steel and hardened metals like broken fasteners; ELIMINATES THE NEED FOR PILOT HOLES. Hyper-Step design in large sizes eliminates the need for up to two pilot holes that traditional drill bits require; LONG LASTING. Stays sharp up to 4X longer compared to conventional and other specialty tip designs; INNOVATIVE. The multi-stepped tip acts like a step drill, allowing for laser like holes through sheet metal and prevents walking on curved surfaces; ELIMINATES SLIPPAGE. Three-flatted shanks to reduce slippage common with keyless chucks.” (Ex. 2011.) This ties directly to the key benefits of the patented invention, i.e., (1) faster cutting speeds; (2) improved durability due to less heat generation on each successive cutting edge; . . . (4) elimination of bit walking; and (5) elimination of the need to drill a pilot hole with

a first small drill bit before switching to a large-diameter drill bit for larger holes.
(Ex. 2034, ¶180.)

Viking, Norseman, [REDACTED]

[REDACTED] (*Supra*, §II.B.2.b.i.A.)

(iv) *Long-Felt But Unmet Need*

Twist drills have existed since the 1800s and step drills have existed since the mid-1900s. (Ex. 2034, ¶181.) Twist 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. (*Id.* ¶182.) One need only examine [REDACTED]

[REDACTED] Exs. 2055, 2056, 2057, 2059, 2060, and 2061.

Furthermore, when drilling large diameter holes through metal with a twist drill, it has historically been necessary to first drill a pilot hole with a smaller-diameter drill bit, or else experience tells the operator that the larger-diameter drill bit would or could too easily “walk” off the desired location for the drill hole. (*Id.* ¶183.) Yet, using a starter bit to first form a pilot hole would require users to switch drill bits during cuts, creating a two-step process. Many twist-drill innovators have also attempted to solve this problem.

Yet, despite all these years of innovating, twist drill innovators had never thought to combine or had never successfully combined a plurality of composite cutting blade groups on the surface of the conical portion of a twist drill, or otherwise thought to apply the teachings of a step drill to a twist drill. (*Id.* ¶¶184-185.) This strongly suggests that twist drill innovators had no reasonable expectations of success in making such a combination or believing that such a combination would be as beneficial and commercially successful as Mr. Wang's innovation is today. (*Id.*)

It is unsurprising that prior to the introduction of Mr. Wang's novel and nonobvious drill configuration, no one combined a cone portion on the front of a twist drill and formed a plurality of stepped surfaces on the cone's exterior that define a plurality of major and minor cutting edges that intersect and intersect a spiral flute to form a plurality of cutting tips in a spiral arrangement as recited in the claims of the '583 Patent, all for the purposes and benefits described in the Wang '900 application and the '583 Patent. The fact that both a step drill and twist drill had been available and in use in the marketplace for over 50 years prior to Wang '900 application and the '583 Patent, in a metal-cutting industry that is arguably more than 150 years old, in my opinion, strongly supports the non-obviousness of their combination as described in the Wang '900 application and the '583 Patent. (Ex. 2034 ¶185.)

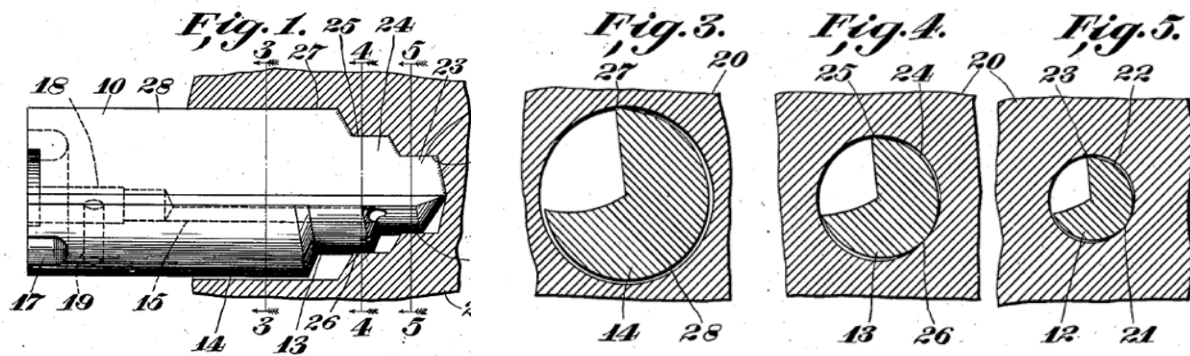
C. Claims 1, 2, 7, 19 and 22 Are not Obvious Based on Welty in View of Bannister and Durfee and/or Korb

Like Zhou, Welty does not afford Viking the patent claim invalidating configuration that Viking seeks. As an initial matter, Viking acknowledges that Welty does not contain the following limitations: (1) the spiral flute limitation; (2) the major cutting edge defined by the sidewall of the spiral flute limitation; (3) the minor cutting edge defined by the sidewall of the spiral flute limitation; (4) cutting tips arranged spirally on a cone portion exterior. For the reasons discussed below, a POSA would not combine Welty with Bannister, Durfee, and/or Korb.

Welty is a gun drill, which is its own class of specialty tool for drilling very deep holes on the order of 100:1, and these days, up to a 300:1 depth-to-diameter. (Ex. 2034, Endres Decl., ¶88). Gun drills evolved from the very early days in the late 19th century when twist drills were welded to a long shaft. (*Id.*). In the early 20th century tubes were used with a single-edge blade at the cutting end so that coolant could be delivered through the tube to the cutting end and then backflow to flush chips out and up the tube. (*Id.*). Having a single blade allows large chip evacuation space while maintaining strength of the drill. (*Id.*). Welty achieves the same, including oil delivery, but introduced the three cutting edges at their respective diameters. (*Id.*).

Welty is focused on providing a cutting edge and a heel opposite the cutting edge, with noticeable radial relief in between, to, according to Welty, greatly

reduce breakage of drill bits due to freezing up. (*Id.* ¶89.) Specifically, Welty teaches a top blade 12 having a cutting edge 23 and a heel 24 with regions of radial relief on either side of the heel 24, and an intermediate blade 13 having a cutting edge 25 and heel 26 with regions of radial relief on either side of the heel 26. The body 10, on the other hand, has a cutting edge 27, but no heel. Unlike the top blade and the intermediate step, the drill bit body has a true circular cross-section:



Viking admits that Welty does not disclose a spiral flute and Petitioner fails to convincingly argue any motivation to combine Welty with the spiral flute of Bannister, Durfee or Korb. (Ex. 2034 ¶91).

This is because Welty already teaches a suitable method for swarf removal, and there is no reason to think that the spiral flutes of Durfee or Korb (which are not used for deep drilling) would be effective in the applications contemplated by Welty. (*Id.* ¶92.) As Welty provides: “[o]ne of the objects of my invention is to provide a drill for boring accurate diameters of great depth.” (Ex. 1008, Welty, p.

1, col. 1:3-5) (emphasis added). “A duct 15 is provided to furnish oil for lubricating the drill and cleaning the chips from the drill.” (*Id.*, p. 1, col. 1:41-43) (emphasis added). The drill 10 includes “a single flute 11 for removing chips, which are used by the boring operation.” (*Id.*, p. 1, col. 1:36-39). “The cutting edge 27 of the boring portion 14 then comes into operation and contacts the work as shown in Figures 1 and 3, the body portion 28 being retained out of contact with the work due to the heel portions 26 and 26 of the boring portions 12 and 13, respectively, contacting with the walls of the bore.” (*Id.*, p. 1, col. 2:43-50) (emphasis added).

A POSA would understand that deep-hole drilling has its own set of associated techniques for swarf removal, which are not compatible with the spiral flute designs taught by Bannister, Durfee, or Korb. (Ex. 2034 ¶93). Indeed, techniques for deep-hole drilling have been discussed in detail in the industry. (*Id.* ¶¶93-100; Exs. 2099-2104). One of the defining challenges of deep-hole drilling is the removal of material from the drill. Gun drills solve this problem by utilizing “a single V-shaped flute” and using “a cutting fluid” which “cool[s] and lubricate[s] the cutting area and flush out chips.” (Ex. 2099 at 222-23.)

Substituting the straight flute taught in Welty for the spiral flute taught in Bannister, Durfee, and Korb would cause damage to the hole wall and decrease accuracy. (Ex. 2034 ¶101). The depth of a hole that the drill is intended for is

limited by the drill design. (*Id.*) Spiral twist drills are generally limited to a depth of approximately 10 times the drill diameter. Drilling deeper than this increases the opportunity for damaging the hole, because it requires the drill to be removed from the hole to extract chips. It is well accepted that the straight flute disclosed in Welty is excellent for and generally preferred for drill very deep holes. (*Id.*; see also Exs. 2099-2104).

On the other hand, a POSA would understand that spiral flute designs become ineffective in drilling deeper holes and have difficulty removing chips, resulting in the scouring of the hole walls, jamming, and heat build up. (Ex. 2034 ¶101). Adding a spiral flute to Welty would also create a longer path for the cooling/lubricant, thereby slowing chip removal, and increase the amount of contact between the drill and the hole wall, and the chance for damage along with that. Thus, modifying Welty to include the spiral flute of Bannister, Durfee, or Korb would render Welty's drill inoperable for its intended purpose and destroy its basic objective of "provid[ing] a drill for boring accurate diameters of great depth." (*Id.* ¶102; Ex. 1008, at p. 1, col. 1:3-5).

Not only would modifying Welty in this manner make Welty's drill inoperable for its intended purpose and destroy its basic objective, but there is no reason to modify Welty in this manner. Welty's disclosed system of using lubrication to cool the cutting edges and heels and flush the chips away rapidly

through the straight flute and exiting the hole, is perfectly suitable for its intended purpose. (Ex. 2034 ¶103).

Any such modification would add unwanted cost and complexity, be difficult to implement, and for little or no clear benefit. (Ex. 2034 ¶103). For instance, Welty teaches that the heels on a portion of the periphery of the body portion are approximately opposite to the cutting edge. (Ex. 1008, p. 1, col. 1:50-53, col:2:6-9.) This heel placement is critical to the operation of Welty, and Welty indicates that the placement of such heels should be opposite the cutting edges to counter the force of the cutting action. Modifying the steps at the tip of Welty to include a spiral flute would add complexity, as it would cause the cutting blades to be spiraled, which would also require the placement of the heels to be spiraled in design. This would add balance issues and other problems that only a complex analysis could determine.

As such, Viking's proposed modification of Welty to include a spiral flute (and cutting tips arranged in a spiral) is improper. *In re Schweickert*, 2016-1266, 8-11 (Fed. Cir. Jan. 26, 2017) (non-precedential) (vacating PTAB obviousness ruling for lack of substantial evidence; substitution would defeat purpose of primary reference's system, solve no problem in primary reference, add unwanted cost and complexity, and be difficult to implement); *Chemours Co. FC v. Daikin Indus.*, 4 *F.4th* 1370, 1376 (Fed. Cir. 2021) citing *Trivascular, Inc. v. Samuels*, 812 F.3d

1056, 1068 (Fed. Cir. 2016) “(finding no motivation to modify the prior art where doing so ‘would destroy the basic objective’ of the prior art).” *Cook Grp. v. Bos. Sci. Scimed, Inc.*, 2019-1370, 18-19 (Fed. Cir. Apr. 30, 2020) “In *DePuy*, however, we explained, ‘[a]n inference of nonobviousness is especially strong where the prior art’s teachings undermine the very reason being proffered as to why a person of ordinary skill would have combined the known elements,’ *i.e.*, where a prior art reference “teaches away” from the proposed modification.’” (citing *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009)).

Welty fails to teach several additional elements of the ‘583 Patent’s challenged claims.

Notably, because the chips are flushed away from the cutting tip as soon as they are formed, beyond any initial chip formation/chip breaking, there is no time nor desire to “crush cutting chips into finer chips” as claimed using any gundrill. In Welty, like most gundrills, a coolant duct 15 carries a large flow of coolant just below the front tip and opposite cutting edge 23 and 25. Any chips that are formed at the front tip or by cutting edges 23 and 25 are immediately flushed down the straight flute and out of the hole. In order for chips to be crushed into finer chips, the chips would need to be located at the front of the drill for a period of time sufficient for further crushing of the chips. Because Welty’s body portion 28 is

held out of contact with the bore wall by heels 24 and 26 (where only the cutting edge 27 contacts the bore wall), there is a space between the bore and body portion. If chips were to be retained unnecessarily for further crushing, the fine chips would find their way into the space between the bore wall and the body portion, thus damaging the finish and accuracy of the bore wall. If the cooling/lubricating fluid injection were to be removed from Welty for the purpose of retaining chips at the front portion, against Welty's teachings, the drill would need to be removed from the deep hole frequently to remove chips, which each removal cycle causing damage to the accuracy of the hole.

Thus, a POSA would not understand Welty's drill as being configured to crush cutting chips into finer chips nor even capable of crushing the chips.

Additionally, Welty does not disclose the "cylindrical second step" required by Claims 1 and 8, since heels 21 and 26 cause the second surfaces expressly to have non-circular cross-section. (Ex. 2034 ¶104). Rather, the second step surfaces have cross-sections that are oblong in shape, not substantially circular. The single cutting edge defining one side of the straight flute in Welty creates minimal contact between the drill and the hole. A POSA would understand that this is desirable for Welty's intended operation. (*Id.*)

And, as Viking acknowledges, Welty does not teach that the cutting tips be arranged in a spiral pattern, as required by Dependent Claims 18 and 22. (Ex. 2034

¶105). As explained in detail above, the swarf-evacuating flute is expressly straight, as shown in Figures 2-5. The leading surface of the flute, the surface that intersects the cutting edges 23, 25, and 27 to form the cutting tips, is clearly straight. This results in cutting tips that are not formed spirally. (*Id.*)

In sum, there is no reason a POSA would have modified a well-known device and process for deep hole drilling with an inferior device and process. Petitioner is employing hindsight by picking and choosing parts of the prior art to make a Frankenstein-like device out of the Welty drill. “*Ex post* reasoning” and “hindsight” are forbidden in the obviousness analysis. *DirectTV, LLC v. Qurio Holdings, Inc.*, IPR2015-02006, at *13-14 (P.T.A.B. Apr. 4, 2016) (Paper 6). Thus, one “must not pick and choose isolated elements from the prior art and combine them so as to yield the invention in question if such a combination would not have been obvious at the time of invention.” *Abbott Labs. v. Sandoz, Inc.*, 544 F.3d 1341, 1348 (Fed. Cir. 2008) (quoting *Dennison Mfg. Co. v. Panduit Corp.*, 475 U.S. 809, 810 (1986)). The fact is, Welty has a drill that is well designed for accurate deep hole drilling. (Exs. 2099-2104). Modifying Welty with the spiral flutes of Bannister, Durfee, or Korb would destroy this basic objective and make it inoperable for this purpose.

Notwithstanding the lack of motivation or reasonable expectations of success in making Viking’s proposed combinations, the strong objective evidence

of nonobviousness, discussed in Section II.B.2 above, further defeats any possible claim of obviousness.

D. Claims 5, 8, 12-15 and 18 Are not Obvious Based on Welty in View of Bannister and Durfee and/or Korb and further in View of Zhou

For its fourth alleged Ground for rejection, Viking admits that Welty does not teach or suggest either a chisel tip or a minor cutting edge of the top blade that is longer than the minor cutting edge of the intermediate blade (as recited in Wang's Claims 5, 8, 12, 13, and 18). Viking proposes combining Welty with Zhou to overcome this deficiency.

However, as explained above, Welty is a gun barrel bore cutting tool. Zhou is a twist drill that, according to Viking, discloses a chisel edge, etc. Welty is not a twist drill, and not combinable with twist drills. (**Ex. 2034**, ¶107). Given the vastly different purposes served by each, a POSA would have no motivation or reasonable expectation of success in combining a gun drill with features of a twist drill or a step drill. (*Id.*)

This too is supported by the strong secondary considerations of nonobviousness present here, discussed in Section II.B.2 above.

III. CONCLUSION

For the foregoing reasons, Mr. Wang respectfully requests the Board find that Viking failed to demonstrate by a preponderance of evidence that the challenged claims are unpatentable.

Dated: November 7, 2023 **ERVIN COHEN & JESSUP LLP**

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §§ 42.24(a)(1)(i), 42.24(b)(1), and 42.24(d), the undersigned certifies that, according to the “Word Count” tool in Microsoft Word, which was used to prepare this paper, the number of words in this **PATENT OWNER’S CORRECTED RESPONSE TO VIKING DRILL & TOOL’S PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 11,007,583** is 10,906.

/Kelly W. Cunningham/

Kelly W. Cunningham

Reg. No. 43,570

Customer No.: 188741

Lead Counsel for the Patent Owner,
Hongjia Wang

CERTIFICATE OF SERVICE UNDER 37 CFR § 42.6(e)

I hereby certify that a true copy of the foregoing **PATENT OWNER'S CORRECTED RESPONSE TO VIKING DRILL & TOOL'S PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 11,007,583** has been served in its entirety this 7th day of November, 2023, by electronic mail on Petitioner's lead counsel, as follows:

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ATTACHMENT B

Proposed Redactions to Exhibit 2034 – Corrected and Supplemental Declaration of
William J. Endres in Support of Patent Owner’s Corrected Response To Viking
Drill & Tool’s Petition for *Inter Partes* Review of U.S. Patent No. 11,007,583

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKING DRILL & TOOL, INC.

Petitioner

v.

HONGJIA WANG

Patent Owner

IPR2023-00474

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

**CORRECTED AND SUPPLEMENTAL DECLARATION OF WILLIAM J.
ENDRES IN SUPPORT OF PATENT OWNER'S RESPONSE TO
VIKING DRILL & TOOL'S PETITION FOR
INTER PARTES REVIEW OF U.S. PATENT NO. 11,007,583**

DECLARATION OF WILLIAM J. ENDRES

I, William J. Endres, Ph.D., declare as follows:

1. I am an Associate Professor of Mechanical Engineering, holding a Richard and Elizabeth Henes Endowed Professorship, at Michigan Technology University, in Houghton, Michigan and have held this position for over 21 years. Before that, I was an Assistant Professor in the Mechanical Engineering Department at the University of Michigan in Ann Arbor, Michigan. I attach my CV at **Exhibit 2038** to this declaration.

2. As can be seen from my CV, I have been deeply immersed in cutting tool technology for over 34 years, since my graduate research in cutting mechanics, machining dynamics, and mechanistic process modeling techniques from 1988 to 1992 at the University of Illinois at Urbana-Champaign, Illinois.

3. I am the founder and president of Endres Machining Innovations, LLC, of Houghton, Michigan, which designs and consults on advanced cutting tools of various types, <https://endresmachining.com/about-us/>. In that capacity I have led, many times as the creative impetus, multiple highly innovative (i.e., beyond ordinary skill in the art) cutting-tool development and commercialization projects with both commercial and government funding (for example, some results of which that are publicly disclosable can be seen at <https://revocut.com/>, https://www.youtube.com/channel/UCQaG6ntd7ZBO4ILKunwNA_w, and as a

contracted R&D source for Rotary Technologies Corp. at <https://www.rotarytech.com/>). Approximately 25 years ago, I was hired by Vermont American Corp. (<https://vermontamerican.com/>) to prepare and deliver a short course on designing twist drills, some of the content from which is the basis for a chapter in my book entitled Machining Processes: Model-based Planning and Diagnostics (self/company-published).

4. I hold roughly nine patents, most of which are specifically directed to cutting tools.

I. The Grounds Viking Asserts to Invalidate the '583 Patent Are Flawed

C. Viking's Grounds Based on Zhou Alone or in View of Bannister and Gentry and/or Durfee Are Erroneous

52. Viking argues that Zhou anticipates Claims 1, 2, 5, 8, 13-15, and 19 of the '583 Patent. Viking further argues that Zhou renders Claims 1, 2, 5, 7, 8, 12-15, 18, 19, and 22 of the '583 Patent obvious in view of Bannister and/or Gentry and/or Durfee. In my opinion, Zhou does not anticipate the challenged patent claims of the '583 Patent, nor does it render the challenged claims obvious in view of Bannister and/or Gentry and/or Durfee.¹

¹ Paragraph numbers 5–51 intentionally omitted.

(a) Anticipation

53. In my opinion, Zhou does not anticipate Claims 1, 2, 5, 8, 13-15, and 19 of the '583 Patent, because it fails to disclose a number of claimed features in independent claims 1 and 8, as discussed below. I understand that a patent claim cannot be anticipated by references that do not teach every element of that claim. Anticipation requires that all claim elements and their limitations be shown in a single prior art reference, in complete detail as contained in the patent claim. Furthermore, I understand that each claim element must be shown in a single reference, arranged or combined in the same way as recited in the claims.

54. The several elements in Claims 1 and 8 that are not found in Zhou, include, but are not limited to, that:

- “a plurality of composite cutting blade groups formed sequentially;”
- “at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group;” and
- “each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips;

55. In my opinion, Zhou fails to disclose, among other limitations recited in claim 1, the “sequentially” element of “a plurality of composite cutting blade

groups formed sequentially.” Instead, for every one major cutting blade, or cutting blade group as Wang calls it, Zhou does not have a sequential cutting blade group given that the next/sequential edge is not a cutting edge, rather is an edge specifically and intentionally suppressed from the cutting action of the drill bit as described in the following paragraphs. For the same reason, Zhou fails to disclose the “immediately adjacent” element of “at least one cylindrical second step surface is immediately adjacent to a conical first step of a next composite cutting blade group.” Since there is no cutting blade group immediately adjacent to a next cutting blade group, there is no cylindrical second step surface of one cutting blade group that is immediately adjacent to a conical first step of a next composite cutting blade group.

56. Upon further inspection of Zhou since my first inspection for my June 14, 2023 declaration in connection with Mr. Wang’s preliminary response, I have discovered how Zhou’s drill works. In my prior inspection, the asymmetrical nature was viewed by me as unfavorable as it is in contradiction to what is normally attempted in grinding drill points. In fact, Zhou even states such, that “international standards all stipulate that the edge heights of the two main cutting edges of a twist drill should be symmetrical; the height difference thereof is generally less than 0.03 mm.” (See **Ex. 1007**, Zhou, para. 0002:5-8). When the antisymmetric nature becomes larger than, say, 0.03mm, the loading on the two (or

more) main cutting edges of a twist drill becomes imbalanced causing the potential for wobble, wandering, and uneven wear.

57. Now, in my second inspection, I discern that in fact what I had identified as cutting edges, segmented outer sunken edge 2 and segmented inner sunken edge 3, are actually not

cutting edges per se. (See **Ex.**

1007, Zhou, Figs. 1 and 2,

especially Fig. 1, reproduced

here). The potential for

imbalance actually is not

present because cutting happens only on edges 1 and 4, equally on each. Being on

opposite sides of the drill point, this equal cutting action on edges 1 and 4

effectively balance out to all practical purposes, torque aside due to the different

radius at which those edges lie. Zhou's drill functions as a result of grinding the

other two edges back to a large extent, when measured relative to the typical

maximum feed per revolution, such that they do not even cut a nominal chip; that

is, edges 2 and 3 are suppressed from participating in the cutting action, short of

pushing the drill to a feed rate higher than what is commonly recommended for

that drill diameter and what is clearly, from the numbers, the maximum feed for

which Zhou's drill is designed. The counterparts to segmented outer sunken edge 2

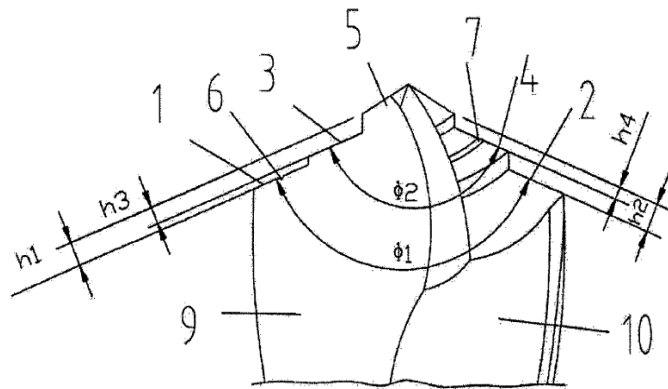


Fig. 1

and segmented inner sunken edge 3, that is, segmented outer protruding edge 1 and segmented inner protruding edge 4, respectively, do all the cutting, forming chips of cut material that are half the width and twice the thickness as they would be in their respective chip-evacuation flutes for a nominal twist drill without the geometry of Zhou.

58. Perusing the internet will uncover recommended maximum feed per revolution for a twist drill, a high-speed steel one for instance, to be about 0.5 mm for a drill of the size in embodiment 1 of Zhou — 30 mm in diameter. Some recommendations are even less than that. Noting that the axial difference in height, measured from edge 5 as a reference, between edges 1 and 2 is 0.25 mm ($h_2 - h_1 = 0.25 \text{ mm}$), and between 3 and 4 ($h_3 - h_4 = 0.25 \text{ mm}$). As such, once edges 1 and 4 remove material at an instant in time, meaning at a particular instant of drill rotation angle, after another 180 degrees of drill rotation (for the two-fluted drill considered), the drill bit has moved/fed axially (upward in Zhou's Fig. 1) by one-half the feed per revolution, so no more than 0.25 mm based on the recommended maximum feed per revolution (i.e., per 360 deg of rotation) being 0.5 mm. As such, edges 2 and 3, rotating in the shadow of the cuts made by edges 1 and 4, respectively, would be at most skimming the surface created by their predecessor counterpart 1 and 4. Note that a cutting edge requires a minimum penetration below the unmachined surface to actually create/remove a chip versus burnishing

the surface by way of sliding contact. All said, any feed per revolution less than 2×0.25 mm, or 0.5 mm, would result in edges 2 and 3 not even skimming, rather having no contact, and “skimming” or not, no chip would be formed by way of cutting the workpiece material; that is, no cutting done by edges 2 or 3. For this reason, Zhou does not even include major cutting edges, that is, edges that cut, at locations 2 and 3 despite the words used to describe them in the claims.

59. Further support of the design intent to support a maximum feed per revolution of 0.5 mm is that the depth of Zhou’s added chip-splitting grooves, or swarf separation grooves 6 and 7 as they call them, are specified to be 0.5 mm deep. Pushing the feed to beyond 0.5 mm per revolution would cause malfunction — the chip (or swarf) formed on either of the two cutting edges, edge 1 and edge 4, would not be fully split/separated. These numerical analyses can be performed for the other embodiments where, for the noted drill diameters of 15 mm and 4 mm, the differences in edge position (h_1 vs. h_2 and h_3 vs. h_4) relative to edge 5, specified respectively to be 0.15 mm and 0.05 mm, are consistent with common maximum recommended feed per revolution for those sizes of twist drills. In fact, the presence of swarf separation grooves on only edges 1 and 4, and absent on edges 2 and 3, further supports the understanding that edges 2 and 3 are not cutting material and, thus, have no need for swarf separation grooves, and as such are not actually “cutting edges,” rather simply inactive surfaces on the tool body.

60. Consequently, Zhou discloses only a top blade 5, an inner cutting blade 4 and an outer cutting blade 1. It teaches no other cutting blade groups because edges 2 and 3 do not perform any cutting. Since cutting blades 4 and 1 are not on the same side of top blade 5, they are not arranged sequentially as that term is defined in the '583 Patent. Also, since these are not immediately adjacent to one another, no “cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group.”

61. Further, in my opinion, Zhou fails to disclose, among other limitations recited in claim 1, the “spirally” elements of “a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion.” There is no evidence in Zhou of spiral formation of cutting blade groups given the straightness of the segmented (cutting) edges 1 and 4 and the alignment of tips along a line. (See **Ex. 1007**, Zhou, Fig. 2, reproduced here and colored red).

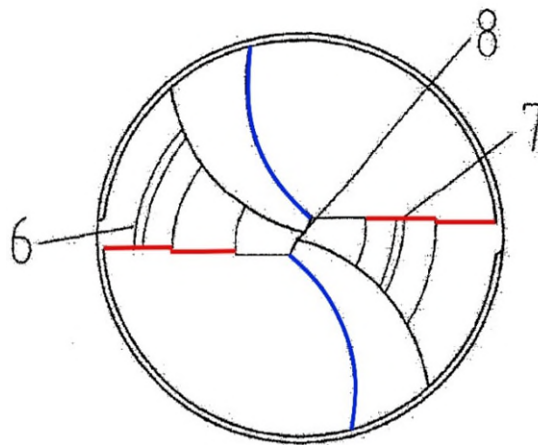


Fig. 2

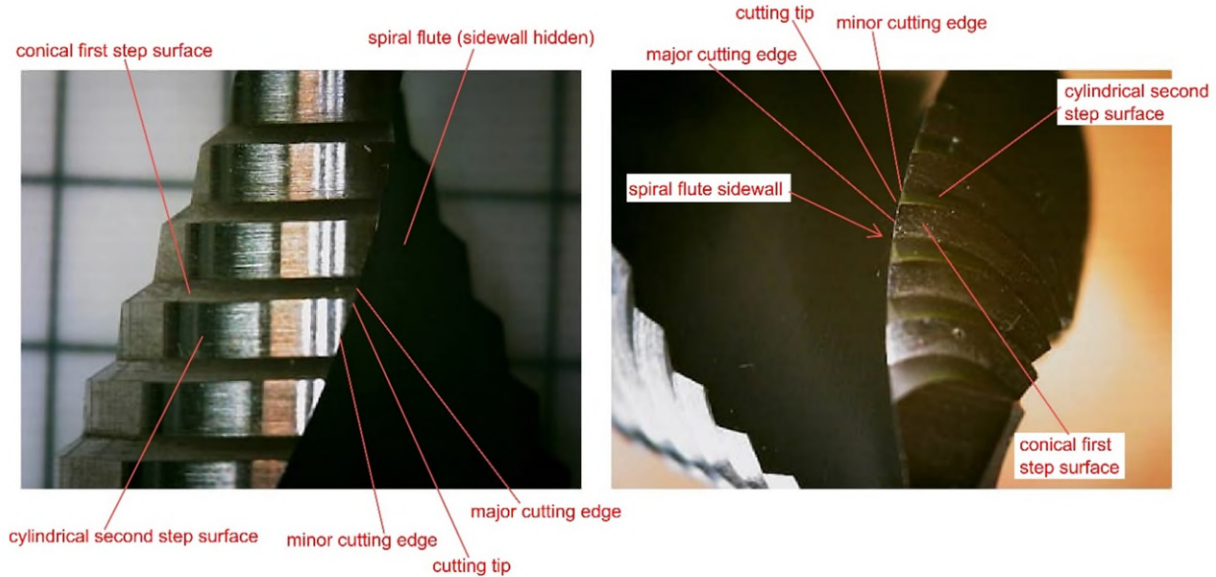
62. Further, in my opinion, Zhou fails to disclose, among other limitations recited in claim 1, that “each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips.” The chips produced by the cutting edges 1 and 4 are twice the thickness as typical twist drill chips because of Zhou’s novel design. The chips, being half the width and twice the thickness as they would be for a nominal twist drill, result in an improved cross-sectional aspect ratio for flow in the chip-evacuation flute than for a standard twist drill. However, thicker chips are less prone to breaking in such applications.

63. That is, Zhou’s cutting blade groups are configured to produce cutting chips that are less likely to be crushed into finer chips. I would add that, if anything, the fact that Zhou’s design makes chips thicker will also reduce the mechanical energy associated with the respective volumes of material removed, by way of what is referred to as specific energy being nonlinearly related to chip thickness in such a way that increasing chip thickness decreases specific energy thus increasing force at a less than proportional rate relative to the increase in chip thickness; this is called the “size effect in metal cutting.” In other words, when Zhou mentions “An object of the present utility model is to provide a twist drill which exhibits a further significant reduction in drilling axial resistance and torque and thereby achieves significantly increased drilling efficiency and drill life.” (emphasis added) (*See Zhou*, para. 0005) The potential for size-effect induced

reduction of the tangential cutting force component, and by way of that the torque associated with it, is further evidence that Zhou's intents are consistent with his methods, specifically, that increasing the thickness of chip as a necessary outcome of apportioning the full width of each standard twist-drill cutting lip to be half that width on each of the two sides will not tend to increase torque.

64. The Wang '583 Patent, in contrast, claims the means of "crushing" the chips which occurs by forming very thin and very narrow chips. For larger-diameter drills, the chips can be formed narrower by more than a factor of 10, while not thickening them, the combined effect being to make the chips quite fragile such that they break up into shorter pieces as they are formed and enter into and traverse the chip-evacuation flute, or "crushing."

65. Zhou also discloses and illustrates major and minor cutting edges that are entirely straight. (See **Ex. 1007**, Zhou, Figs. 1 and 2, reproduced above). Zhou does not teach or suggest major or minor cutting edges that are curved as in the '583 Patent. Below, these photographs of the ¾" Matco Tools Hyper-Step Part No. DBHS48, which embodies the claims of the '583 Patent (see, Section II.A) show the curvature of the major cutting edge and the minor cutting edge due to being "defined by the sidewall of the spiral flute":



66. To summarize, Zhou does not actually anticipate a composite cutting blade group immediately adjacent to another composite cutting blade group because edges 3, and 2 are not cutting blades, thus Zhou anticipates neither “composite cutting blade groups formed sequentially” nor arranged “immediately adjacent.” Also, Zhou does not anticipate “spirally formed” as the cutting tips are aligned linearly, and does not anticipate “the plurality of composite cutting blade groups [to be] configured to crush cutting chips into finer chips.”

(b) Obviousness

67. In its second alleged Ground for rejection, Viking admits that Zhou does not teach or suggest composite cutting blade groups that are formed spirally (as recited in Claims 1 and 8), a top blade major cutting edge that is longer than the major cutting edge of the composite cutting blade groups (as recited in Wang’s Claims 7 and 12) or a plurality of cutting tips that are arranged spirally (as recited

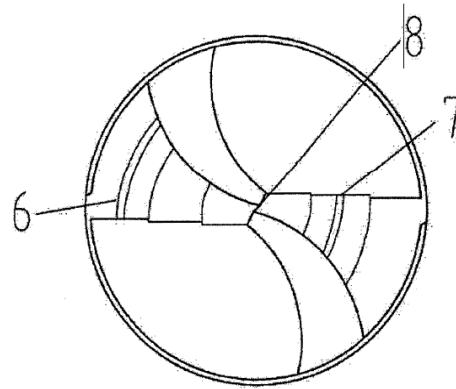
in Wang's Claims 18 and 22). To overcome these limitations, Viking argues that Zhou renders the '583 Patent obvious in combination with Bannister and Gentry or Durfee. Viking also attempts to combine Zhou with Korb, although not specifically stated in its obviousness grounds. Viking's assertion fails for two main reasons: (1) a combination of Zhou with Bannister would not result in several additional limitations of the '583 Patent; and (2) a POSA would not have combined Zhou with Gentry, Durfee, or Korb.

68. Zhou discloses a twist drill with a top blade, intermediate cutting edges 3 and 4 (on opposite sides of the flute 9) and outer cutting edges 1 and 2 (on opposite sides of flute 9). The innovation Zhou describes is that his cutting edges 1 and 3 are offset axially from each other and his cutting edges 2 and 4 are offset axially from each other. (**Ex. 1007**, pp. 8-9, ¶¶ [0022]-[0024] and Fig. 1).

69. That is, as Figures 1 and 2 of Zhou show, the top blade 5 is flanked by intermediate cutting edges 3 (on one side of flute 9) and 4 (on the other side). The drop from top blade 5 to intermediate cutting edge 3 is greater than the drop from top blade 5 to intermediate cutting edge 4. (*Id.*). Then, the drop from edge 4 to edge 2 is greater than the drop from edge 3 to edge 1, and overall, the drop from top blade 5 to outer cutting edge 2 is greater than the drop from top blade 5 to outer cutting edge 1 (i.e., the cutting edges are simply asymmetrical, with $h_3 > h_4$ and yet $h_1 < h_2$). (*Id.*).

70. In addition to the above-mentioned admissions by Viking and the failure of Zhou to disclose the major and minor cutting edges, a POSA also would not be motivated to modify Zhou's straight cutting tips with the cutting tips of Gentry or Durfee to create the claimed cutting tips formed spirally on a cone portion exterior. Claims 1 and 8 require:

- 1) a spiral flute with a sidewall "extending from a front end of the cone portion and at least partway up the cylinder portion",
- 2) "a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute",
- 3) "a minor cutting edge defined by the intersection of the cylindrical second step and the sidewall of the spiral flute" and
- 4) "a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute."



71. Dependent claims 18 and 22 add to claims 1 and 8, respectively, the limitation "the cutting tips of the plurality of composite cutting blade groups are formed spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion."

72. Zhou teaches an obtuse point angle for the protruding and sunken edges (1, 2, 3, 4), ranging between “a point angle of $90^\circ - 160^\circ$ ”. See Zhou, paras. 0008-9. In Zhou’s Fig. 1, the point angle between edges 1 and 2 is 135° ($\Phi 1$); and the point angle between edges 3 and 4 is 140° ($\Phi 2$). See *Id.*, para. 0024 and Fig. 1.

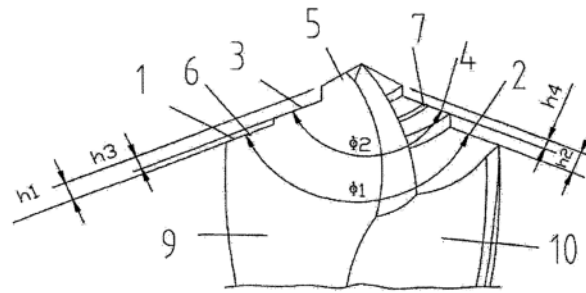


Fig. 1

73. Zhou expresses a strong desire to take a standard twist drill and improve its performance. Zhou states “In order to increase drilling efficiency and drill bit life, experts in various countries have many methods of grinding the drill tips (i.e. chisel edges) and main cutting edges of twist drills in increasing drilling efficiency which help considerably and drill bit life; examples are the Chinese “multi-facet drill”, and cross-sharpened drill types commonly used in America.” Zhou, para. 0003. Zhou posits “[w]ould it be possible to take advantage of progress in modern processing techniques to achieve a further reduction in the drilling axial resistance and torque of a twist drill by precisely changing the technical parameters of the main cutting edges thereof, so that swarf is separated and expelled more

smoothly, and the new drill type is suitable for large-scale industrial production?”

Id. at para. 0004 (emphasis added).

74. Zhou further states “[a]n object of the present utility model is to provide a twist drill which exhibits a further significant reduction in drilling axial resistance and torque and thereby achieves significantly increased drilling efficiency and drill life. *Id.* at para. 0004. To further emphasize the desire to make specific modifications to standard twist drills, Zhou also states “Compared with world standard twist drills, and cross-sharpened twist drills in common use throughout the world, the most notable distinguishing features of the present utility model are the main cutting edge segmentation and the asymmetrical edge heights, which are intended to achieve a further reduction in the drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability.” *Id.* at para. 0014; *see also* para. 0029.

75. It is clear that Zhou took the straight main cutting edges of a standard drill within the standard obtuse point angle range and made them segmented with asymmetrical edge heights (that is, the step heights on one side do not match those on the other side). This addition to standard drill bits creates the benefits of a “reduction in the drilling axial resistance and torque, so that swarf is separated and

expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability”. *Id.*

76. Nevertheless, Petitioner argues that a POSA would have modified Zhou to create the claimed invention. However, Zhou would require a substantial redesign to include cutting tips formed spirally on a cone portion exterior and such a redesign would defeat Zhou’s principle of operation. Given the analysis earlier noting how Zhou’s drill functions (with two of the four edges not serving to cut material, causing the cutting blade to in fact cut thicker chips), its fundamental difference in approach to that of Wang makes this argument of forming a plurality of much smaller cutting tips (to in fact cut thin chips that can then break into finer chips) nonsensical in this context.

77. Each of Zhou, Bannister, and Welty seem to have appreciated these difficulties and yet, Welty determined to avoid spiral flutes altogether, Bannister chose to interrupt the typical twist drill cutting edge with two flattened edges, and Zhou opted to alternate the cutting edges on opposite sides of the top blade.

78. Furthermore, Zhou ***already*** includes the advantage of efficiently removing swarf from the hole. Zhou describes the [b]eneficial effects of the present utility model: [which include] reduced drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, further increasing drilling efficiency and drill bit durability. *Zhou*, Abstract. Zhou elaborates that “the most

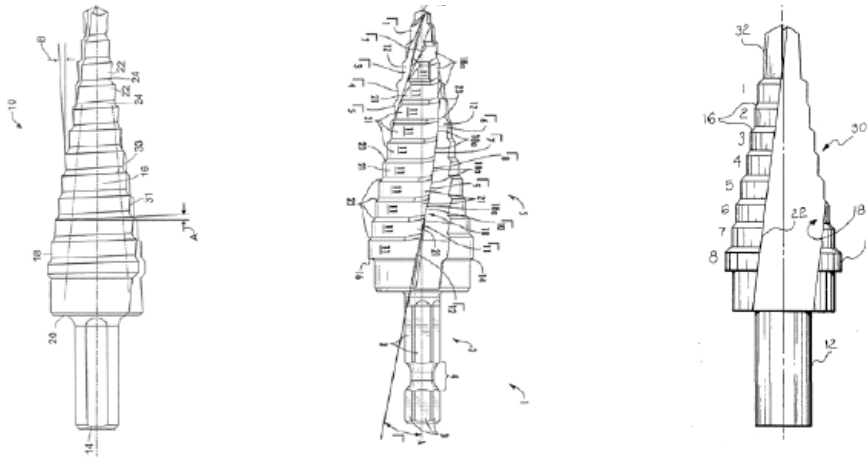
notable distinguishing features of the present utility model are the main cutting edge segmentation and the asymmetrical edge heights, which are intended to achieve a further reduction in the drilling axial resistance and torque, so that swarf is separated and expelled more smoothly, making it possible to further increase drilling efficiency and drill bit durability.” (Ex. 1007, Para. 0014).

79. Petitioner failed to describe **how** the proposed modifications would provide an advantage over and above the advantages already described in Zhou about Zhou’s drill bit. Petitioner failed to explain how Bannister, Gentry, and Durfee’s swarf removal is not merely redundant with that of Zhou. Zhou, Bannister, Gentry, and Durfee each operates effectively with respect to swarf removal. In my opinion, therefore, a POSA would have no reason to combine the features of Gentry and Durfee with Zhou into a single device. Petitioner has not provided any justification for why its proposed modification of the Zhou drill bit would have been an improvement over what Zhou already provides. Modifying Zhou with Gentry and Durfee to make it look more like Wang ignores the function and purpose of Zhou, Gentry, and Durfee. Yet, it is the function and purpose of a reference, not its appearance, that are the driver of tool design and that a POSA would consider when combining any tool designs and tool design features.

80. Further, Petitioner provided no evidence that forming the cutting tips spirally on the cone portion as illustrated by Gentry and Durfee would further

improve swarf removal, or that swarf removal is a problem with Zhou's existing drill bit. In my opinion, modifying Zhou with Gentry and Durfee for this supposed advantage is likewise superficial and purely the product of hindsight.

81. Moreover, as Viking admits, Zhou and Bannister describe twist drills. By contrast, Gentry, Durfee, and Korb each describe step drills.



U.S. 8,029,215 (Gentry) U.S. 10,058,929 (Durfee) U.S. 4,582,458 (Korb)
(FIG. 1) (FIG. 1) (FIG. 7)

82. Twist drills and step drills have different purposes and different applications. Specifically, twist drills, such as those disclosed by Zhou and Bannister, are configured to bore deep into relatively thick workpieces. On the other hand, a step drill, such as those disclosed by Gentry, Durfee, and Korb, are configured to drill holes of any one of the drill bit's different diameters in sheet metal or other relatively thin workpieces, the desired diameter dictating how many "steps" of the step drill the user pushes through the sheet metal or the like. Because

step drills are configured to create smooth, round holes of various diameters in thin material, the step height is configured to be taller than the material thickness.

83. It 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. Twist drill innovators have had no motivation to add a plurality of steps to the exterior surface of the cone portion of a twist drill.

84. In my opinion as set forth in my October 31, 2023 Declaration, there is strong objective evidence of secondary considerations of non-obviousness, including: (1) copying; (2) industry praise; (3) commercial success; and (4) long-felt but unmet need.

D. Viking's Grounds Based on Welty in View of Bannister and Durfee and/or Korb and/or Zhou Are Erroneous

85. As its Third Ground for Invalidity in IPR2023-00474, Viking argues that Claims 1, 2, 7, 19, and 22 of the '583 Patent would have been obvious based on Welty in view of Bannister, Durfee, and/or Korb. And, as its Fourth Ground for Invalidity in IPR2023-00474, Viking argues that Claims 5, 8, 12-15, and 18 of the '583 Patent would have been obvious based on Welty in view of Bannister, Durfee, and/or Korb, in further view of Zhou.

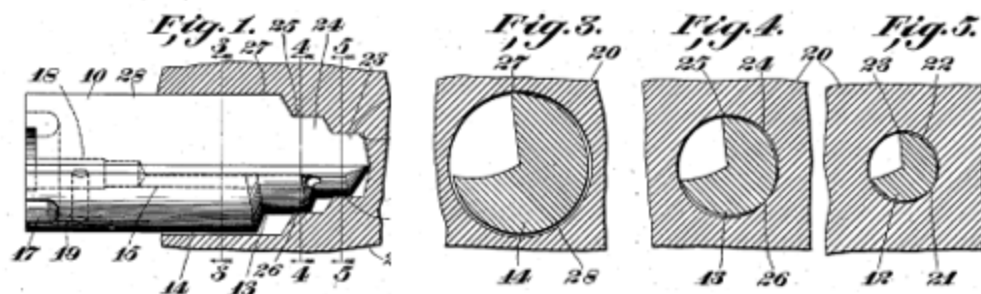
86. For the reasons below, I disagree with Viking's position.

87. Like Zhou, Welty does not afford Viking the patent claim invalidating configuration that Viking seeks. Welty fails to disclose, among other limitations

recited in the Claim 1, a spiral flute, either along the cone portion or the cylinder portion, major or minor cutting edges, or a cylindrical second step surface.

88. As background, Welty is a gun drill, which is its own class of specialty tool for drilling very deep holes on the order of 100:1, and these days, up to a 300:1 depth-to-diameter. Gun drills evolved from the very early days in the late 19th century when twist drills were welded to a long shaft. In the early 20th century tubes were used with a single-edge blade at the cutting end so that coolant could be delivered through the tube to the cutting end and then backflow to flush chips out and up the tube. Having a single blade allows large chip evacuation space while maintaining strength of the drill. Welty achieves the same, including oil delivery, but introduced the three cutting edges at their respective diameters.

89. Welty is focused on providing a cutting edge and a heel opposite the cutting edge, with noticeable radial relief in between, to, according to Welty, greatly reduce breakage of drill bits due to freezing up. Specifically, Welty teaches a top blade 12 having a cutting edge 23 and a heel 24 with regions of radial relief on either side of the heel 24, and an intermediate blade 13 having a cutting edge 25 and heel 26 with regions of radial relief on either side of the heel 26. The body 10, on the other hand, has a cutting edge 27, but no heel. Unlike the top blade and the intermediate step, the drill bit body has a true circular cross-section:



90. As an initial matter, Viking acknowledges that Welty does not contain the following limitations: (1) the spiral flute limitation; (2) the major cutting edge defined by the sidewall of the spiral flute limitation; (3) the minor cutting edge defined by the sidewall of the spiral flute limitation; (4) cutting tips arranged spirally on a cone portion exterior; and (5) the chisel tip.

91. In my opinion, Petitioner fails to convincingly argue motivation to combine Welty with the spiral flute of Durfee, Korb, or Bannister.

92. This is because Welty already teaches a suitable method for swarf removal, and there is no reason to think that the spiral flutes of Durfee or Korb (which are not used for deep drilling) would be effective in the applications contemplated by Welty. As Welty provides: “[o]ne of the objects of my invention is to provide a drill for boring accurate diameters of great depth.” (**Ex. 1008**, *Welty*, p. 1, col. 1:3-5) (emphasis added). “A duct 15 is provided to furnish oil for lubricating the drill and cleaning the chips from the drill.” (*Id.*, p. 1, col. 1:41-43) (emphasis added). The drill 10 includes “a single flute 11 for removing chips, which are used by the boring operation.” (*Id.*, p. 1, col. 1:36-39). “The cutting edge

27 of the boring portion 14 then comes into operation and contacts the work as shown in Figures 1 and 3, the body portion 28 being retained out of contact with the work due to the heel portions 26 and 26 of the boring portions 12 and 13, respectively, contacting with the walls of the bore.” (*Id.*, p. 1, col. 2:43-50) (emphasis added).

93. A POSA would understand that deep-hole drilling has its own set of associated techniques for swarf removal. Techniques for deep-hole drilling have been discussed in detail in the industry. As these references show, a POSA would understand that the spiral flutes of Bannister, Durfee and Korb are incompatible with the application of Welty.

94. “The rapid removal of chips from the drilling operation becomes necessary to ensure the proper operation and accuracy of the drill. ... To overcome these problems, deep-hole drilling machines have been developed. ... Normally, the drill is stationary and the work is rotated in a chuck with steady rests providing support along its length, but where it is difficult to rotate the work, the situation is reversed (Fig. 11). ... Equipment of this type requires an efficient cooling system to pump the coolant in large volume and high pressure for cooling the tool and flushing the chips.” (**Ex. 2099**, *ASM Metals Handbook*, Ninth Ed., Vol. 16, Machining (1989), p. 216). “Gun drills ..., which are used in horizontal deep-hole drilling machines (see the section ‘Deep-Hole Drilling Machines’ in this article),

have a single V-shaped flute; the single cutting face is sharpened offset to form two cutting angles. When drilling, these angles form two chips broken into short lengths for easier expulsion. The drill body is usually a steel tube through which a cutting fluid passes under pressure and in sufficient volume to cool and lubricate the cutting area and flush out chips.” (*Id.* at 222-23)

95. To counter the unbalanced cutting force of the single cutting edge, wear pads (usually carbide) are provided in the drill opposite the cutting face to keep the drill on center. Gun drills are used to drill soft as well as hard material. ... Gun drills are increasing in use because they can frequently produce holes as accurate as reamed holes in one pass. ... For maximum efficiency in gun drilling, the cutting fluid should provide a fluid film between wear pads and work material, prevent welding of chips to the cutting edge of the drill, cool the drill and the work, and dispose of chips by flushing out the hole.” (*Id.* at 222-3). “Gun drills operate at much smaller feeds than conventional twist drills, but the cutting speeds are higher.

96. Each type of drill has only a single cutting edge with a straight flute running throughout its length. The chips are carried out of the hole along the flute of the drill as rapidly as they are formed. ... Gun drilling is especially well suited to producing long holes to close tolerances. In some applications, such as the drilling of deep blind holes, gun drilling may be the only practical method of drilling a hole to concentricity tolerances. Hole straightness, roundness, and size

can be held within closer limits with a gun drill than with a twist drill ... A gun drill was compared with a standard twist drill ... the gun drill not only produced markedly better finish and dimensional accuracy than the twist drill but also drilled twice as many pieces per grind ...” (*Id.*). (Emphasis added).

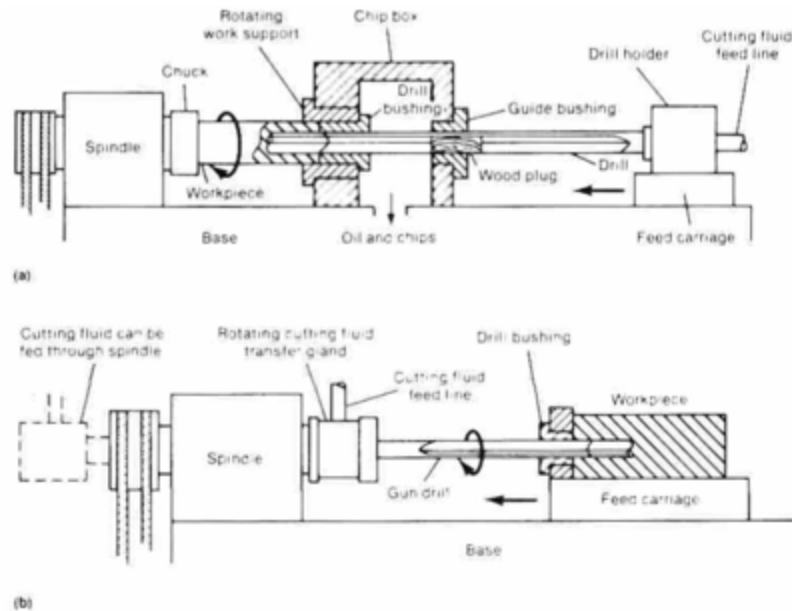


Fig. 11 Two methods of gun drilling: (a) Workpiece rotates while the tool is held stationary. Cutting fluid is fed directly through the drill from the back end. (b) Tool rotates while the workpiece is held stationary. Cutting fluid is fed through a rotating oil gland from the fluid feed line or through the machine spindle.

97. “During the process the cooling lubricant is delivered through one or more holes which pass through the tool shank (Fig. 20). The mixture of chips and cooling lubrication is removed along a flute The resulting surface quality of the bore hole can be decreased when the chip get in contact with the bore hole wall.” (**Ex. 2101**, *Deep hole drilling, CIRP Annals Manufacturing Technology* at 3.1.1) (emphasis added). “Deep hole drilling is a metal-cutting method used for producing new as well as for machining of existing bore holes. Deep bore holes ... refer to bore holes, which are machined by classical deep hole drilling methods

and/or drilling methods with a length-to-diameter ratio larger than 10.” (*Id.* at 1.2 and Fig. 1, below). “In general, the tool structure of single-lip deep hole drills consists of the three elements: drill head, tool shank and clamping sleeve (Fig. 21).” (*Id.* at 3.1.2). “Deep hole drilling processes, which differ significantly from conventional drilling processes, are relevant for a lot of different applications where holes with high length-to-diameter-ratios and very good qualities are necessary.” (*Id.* at Abstract).

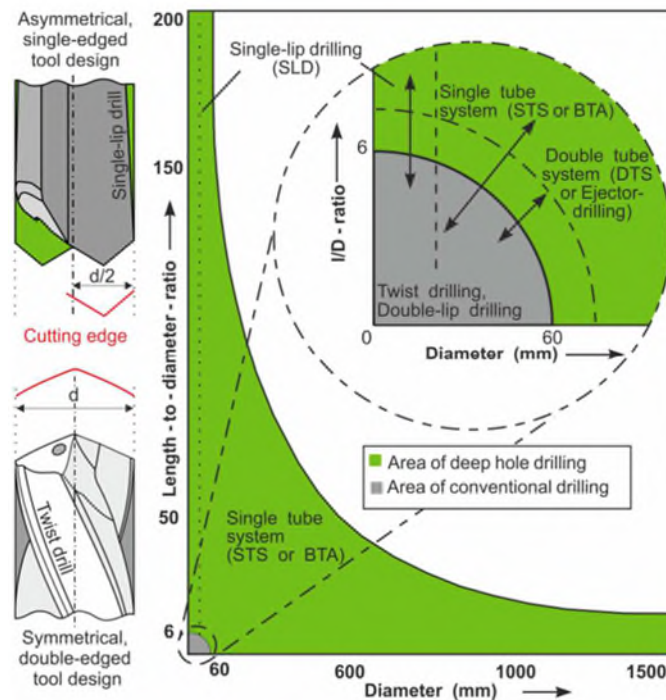


Fig. 1. Field of application of conventional and deep hole drilling [189]

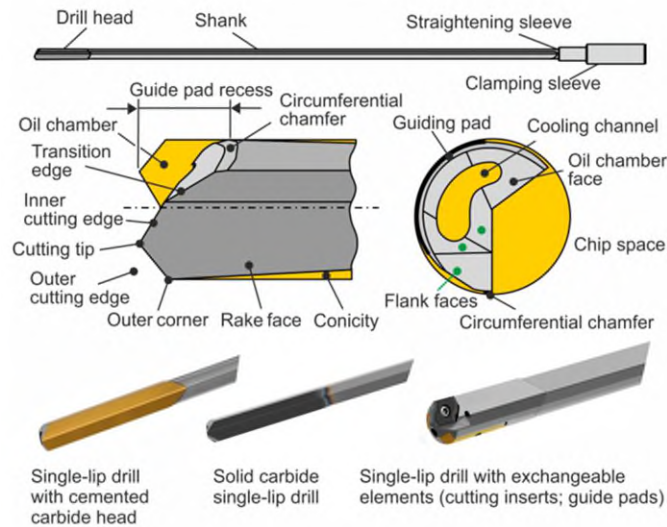


Fig. 21. Schematic tool design of single-lip deep hole drills [117,176,187]

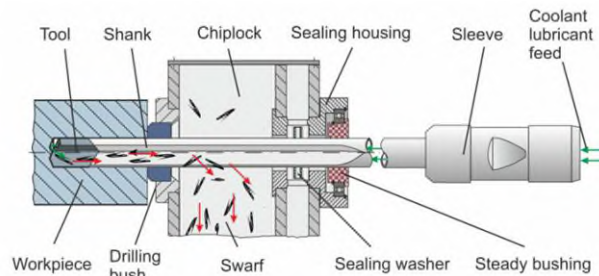
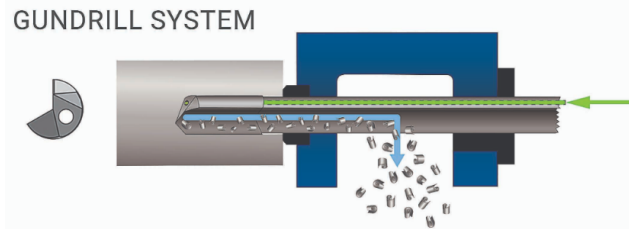


Fig. 20. Schematic process principle single-lip drilling [70,189]

98. “Deep holes generally are defined as having a depth-to-diameter ratio of greater than 10-1 and thus require special techniques and equipment to ensure reliable results. ... The term gundrilling routinely is used to describe deep-hole drilling ... A true gundrill is a single-flute, self-piloting tool that also burnishes the hole that it generates. Unlike the spiral flutes of twist drills, the straight flute of a gundrill extends for the length of the drill, and through-tool coolant reaches the cutting zone via an outlet at the drill tip. High-pressure coolant then pushes chips up the bore, along the straight flute and out of the hole.” (Ex. 2100, *Cutting Tool Engineering*, Vol. 75, Issue 3, March 2023, p. 34).



99. “To use twist drills for deep holes one must first drill a spot hole, then drill using a ‘pecking’ cycle with the drill bit lubricated by a spray mist, followed by a ream to set the final diameter. ... The highest-quality deep holes are drilled with another approach called gun drilling. In this the lubrication is provided by high-pressure oil that flows through a channel inside the drill bit and out its tip. Drilling is continuous (no ‘pecking’) and single pass (no spotting or reaming). Typical tolerances are straightness of 0.001” per foot, holes diameters to 0.0005”, and hole taper to less than 0.0005”. Hole centering to 0.0005” is obtained by drilling through a bushing to contain the whipping of the long gun-drill bit.” (**Ex. 2102**, *Deep Hole Drilling for the Rear Endplate of the BaBar Drift Chamber*, McDonald, April 13, 1996, p. 1).

100. As commentators have agreed, deep hole boring/drilling using a gundrill, such as the one described in Welty, includes a large, straight, single flute, with the purpose of flushing chips out as unencumbered as possible, flushed out with a large volume of lubricant/coolant provided through an axial bore in the drill. Because the chips are flushed away from the cutting tip as soon as they are formed, beyond any initial chip formation/chip breaking, there is no time nor desire to

“crush cutting chips into finer chips” as claimed using any gundrill. In Welty, like most gundrills, a coolant duct 15 carries a large flow of coolant just below the front tip and opposite cutting edge 23 and 25. Any chips that are formed at the front tip or by cutting edges 23 and 25 are immediately flushed down the straight flute and out of the hole.

101. Substituting the straight flute taught in Welty for the spiral flute taught in Bannister, Durfee, and Korb would cause damage to the hole wall and decrease accuracy. The depth of a hole that the drill is intended for is limited by the drill design. Spiral twist drills are generally limited to a depth of approximately 10 times the drill diameter. Drilling deeper than this increases the opportunity for damaging the hole, because it requires the drill to be removed from the hole to extract chips. It is well accepted that the straight flute disclosed in Welty is excellent for and generally preferred for drill very deep holes. On the other hand, a POSA would understand that spiral flute designs become ineffective in drilling deeper holes and have difficulty removing chips, resulting in the scouring of the hole walls, jamming, and heat build up. Adding a spiral flute to Welty would also create a longer path for the cooling/lubricant, thereby impeding chip removal, and increase the amount of contact between the drill and the hole wall, and the change for damage along with that.

102. Thus, in my opinion, modifying Welty to include the spiral flute of Bannister, Durfee, or Korb would render Welty's drill inoperable for its intended purpose and destroy its basic objective of "provid[ing] a drill for boring accurate diameters of great depth." (Ex. 1008, at p. 1, col. 1:3-5). A POSA would interpret this statement to mean a deep hole drilling operating using a deep-hole drilling machine.

103. Not only would modifying Welty in this manner make Welty's drill inoperable for its intended purpose and destroy its basic objective, but there is no reason to modify Welty in this manner. Welty's disclosed system of using lubrication to cool the cutting edges and heels and flush the chips away rapidly through the straight flute and exiting the hole, is perfectly suitable for its intended purpose.

104. Additionally, Welty does not disclose the "cylindrical second step" required by Claims 1 and 8, since heels 21 and 26 cause the second surfaces expressly to have non-circular cross-section. Rather, the second step surfaces have cross-sections that are oblong in shape, not substantially circular. The single cutting edge defining one side of the straight flute in Welty creates minimal contact between the drill and the hole. In my opinion, a POSA would understand that this is desirable for Welty's intended operation.

105. Welty also does not teach that the cutting tips be arranged in a spiral pattern, as required by Dependent Claims 18 and 22. As explained in detail above, the swarf-evacuating flute is expressly straight, as shown in Figures 2-5. The leading surface of the flute, the surface that intersects the cutting edges 23, 25, and 27 to form the cutting tips, is clearly straight. This results in cutting tips that are not formed spirally.

106. Viking admits that Welty does not teach or suggest “composite cutting blades formed sequentially and spirally” limitation recited by independent claims 1 and 8 of the ‘583 Patent. As such, Viking attempts to combine Welty with Bannister to overcome this limitation. However, the cutting surface of Bannister is not “configured to crush cutting chips into finer chips, then shunt the finer chips.”

107. Furthermore, Viking admits that Welty does not teach or suggest either a chisel tip or a minor cutting edge of the top blade that is longer than the minor cutting edge of the intermediate blade (as recited in Claims 5, 8, 12-15 and 18). Viking proposes combining Welty with Zhou (in further view of Bannister, Durfee, and Korb) to overcome this limitation. However, as noted in detail, Welty is a gun barrel bore cutting tool. Zhou and Bannister are twist drills. And, Durfee and Korb are step drills. Given the vastly different purposes served by each, a POSA would have no motivation or reasonable expectation of success in

combining a gun drill with features of a twist drill or a step drill. My opinion is supported by the strong evidence of secondary considerations, discussed below.

II. There is a Nexus Between the Secondary Considerations and the Patent Claims

A. The Matco Hyper-Step, Astro ONYX TurboStep, Viking Vortex Point, Steel Vision Stepped Tip, and VIM HSSC29 Drill Bits Embody The Claims Of The '583 Patent

121. I have reviewed Paragraphs 7-9 of the Declaration of David Fisher concerning the Easy-Boost drill bits manufactured by Tsteigen and sold in the United States by Matco (under the Hyper-Step private label) and by Astro (under the ONYX TurboStep private label).²

122. I understand that there are eight variations of the Easy-Boost drill bits sold in the United States: (1) Matco Hyper-Step High-Speed Steel; (2) Matco Hyper-Step High-Speed Steel, Reduced Shank; (3) Matco Hyper-Step High-Speed Steel Large Sizes; (4) Matco Hyper-Step High-Speed Steel Extra-Large Sizes; (5) Matco Hyper-Step Cobalt; (6) Matco Hyper-Step Cobalt, Reduced Shank; (7) Matco Hyper-Step Cobalt, Reduced Shank, Stubby; and (8) Astro ONYX TurboStep (collectively, the “Easy-Boost drill bits”)

123. I further understand that Patent Owner contends that all but the smallest six sizes of these Easy-Boost drill bits practice the claims of the '583

² Paragraphs numbers 108-120 intentionally omitted.

Patent. That is, the six smallest sizes of the drill bits contain a top blade and only one composite cutting blade group or none. But, Patent Owner correctly contends that the remaining drill bit sizes, those from 5/32" to 1/2" (by increments of 1/64th") found in the standard set of 29 drill bits, as well as the 17/32", 9/16", 19/32", 5/8", 1/16", 3/4", 7/8" and 1" found in the "large" and "extra large" drill bit sets each practice the claims of the '583 Patent.

1. Wang's Evidence of Nexus Patent Claims Charts

124. I closely inspected and analyzed the "Nexus" patent claim charts submitted with this Declaration, and agree with their conclusions. These charts compare the asserted claims of the '583 Patent with the Easy-Boost product embodiments. For each variation of the Easy-Boost drill bits above, I compared the '583 Patent claims to: (1) the smallest drill bit size that Patent Owner contends practices the claims of the '583 Patent; and (2) the largest drill bit size that Patent Owner contends practices the claims of the '583 Patent.

125. Based on my close analyses, it is my opinion that each of the Easy-Boost drill bits from size 5/32" and up embodies each of the asserted claims of the '583 Patent.

126. Namely, submitted with this Declaration as **Ex. 2074** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 5/32" Matco Hyper-Step High-Speed Steel drill bit.

127. Submitted with this Declaration as **Ex. 2075** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 1/2" Matco Hyper-Step High-Speed Steel drill bit.

128. Submitted with this Declaration as **Ex. 2076** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 5/32" Matco Hyper-Step High-Speed Steel, reduced shank drill bit.

129. Submitted with this Declaration as **Ex. 2077** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 1/2" Matco Hyper-Step High-Speed Steel, reduced shank drill bit.

130. Submitted with this Declaration as **Ex. 2081** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 1" Matco Hyper-Step drill bit.

131. Submitted with this Declaration as **Ex. 2082** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 5/32" Matco Hyper-Step Cobalt drill bit.

132. Submitted with this Declaration as **Ex. 2083** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 3/8" Matco Hyper-Step Cobalt drill bit.

133. Submitted with this Declaration as **Ex. 2086** is a nexus patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to

the 5/32” Matco Hyper-Step Cobalt, reduced shank, stubby drill bit. I understand that the MATDB29HSRM is identical to this design, in all but the length of the cylindrical portion. Therefore, this analysis applies equally to the MATDB29HSRM.

134. Submitted with this Declaration as **Ex. 2087** is a nexus patent claim chart that I closely evaluated and agree with, comparing the ‘583 Patent claims to the 1/2” Matco Hyper-Step Cobalt, reduced shank, stubby drill bit. I understand that the MATDB29HSRM is identical to this design, in all but the length of the cylindrical portion. Therefore, this analysis applies equally to the MATDB29HSRM.

135. Submitted with this Declaration as **Ex. 2088** is a nexus patent claim chart that I closely evaluated and agree with, comparing the ‘583 Patent claims to the 5/32” Astro ONYX TurboStep drill bit.

136. Submitted with this Declaration as **Ex. 2089** is a nexus patent claim chart that I closely evaluated and agree with, comparing the ‘583 Patent claims to the 1/2” Astro ONYX TurboStep drill bit.

2. Wang’s Evidence of Infringement by Viking Patent Claims Charts

137. I also inspected and evaluated “infringement” patent claim charts comparing the Viking’s accused Type 250-VT and Type 280-VT Vortex Point drill bits to the claims of the ‘583 Patent.

138. Submitted with this Declaration as **Ex. 2090** is an infringement patent claim chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 1/2" Viking Type 250-VT Vortex Point drill bit. Based on my analysis of the Matco Hyper-Step drill bits, above, and my analysis of Viking's own Cross-Reference comparing their models to the Matco's models (**Exhibit 2064**), in my opinion, this chart is representative of Viking's Vortex Point drill bits.

139. I have reviewed the Deposition of Scott Roussin and understand that Viking's Type 250-VT drill bits are identical to Norseman Drill & Tool's Type 175-VT Vortex Point drill bits. I also understand that Viking's Type 280-VT drill bits are identical to Norseman's Type 130-VT Vortex Point drill bits.

140. I understand that Viking manufactures the Vortex Point drill bits and sells them to at least the following distributors under the following private labels: (1) Kimball Midwest Ultra Step drill bits; (2) KnKut Step Point drill bits; (3) Winzer Cyclone drill bits; and (4) Cornwell Tools Tempest Point drill bits. I understand that these private label drill bits are identical to the Type 250-VT Vortex Point drill bits that Viking manufactures in all but branding. Therefore, the same analysis will apply. I will refer to the following drill bits collectively as the "Vortex Point drill bits": (1) Viking Type 250-VT; (2) Viking Type 280-VT; (3) Norseman Type 175-VT; (4) Norseman Type-130 VT; (5) Kimball Midwest Ultra

Step; (6) KnKut Step Point; (7) Winzer Cyclone; and (8) Cornwell Tools Tempest Point drill bits.

141. Based on the foregoing analysis, it is my opinion that the Vortex Point drill bits (sizes 5/32” and up) embody the claims of the ‘583 Patent.

3. Wang’s Evidence of More Infringement Patent Claims Charts

142. I also analyzed the Steel Vision Stepped Tip drill bit and the VIM HSSC29 drill bits and the “third-party copying” patent claims charts.

143. Submitted with this Declaration as **Ex. 2094** is a “third-party copying” patent claims chart that I closely evaluated and agree with, comparing the ‘583 Patent claims to the 11/64” Steel Vision Stepped Tip drill bit. This is the smallest Steel Vision Stepped Tip drill bit that contains a top blade and at least two steps.

144. Submitted with this Declaration as **Ex. 2095** is a “third-party copying” patent claims chart that I closely evaluated and agree with, comparing the ‘583 Patent claims to the 1/2” Steel Vision Stepped Tip drill bit. All intervening sizes of the Steel Vision Stepped Tip drill bit contain the top blade and at least two steps.

145. Based on the foregoing, it is my opinion that the Steel Vision Stepped Tip drill bits from 11/64” to 1/2” (by increments of 1/64”) embody the claims of the ‘583 Patent.

146. Submitted with this Declaration as **Ex. 2096** is a “third-party copying” patent claims chart that I closely evaluated and agree with, comparing the ‘583

Patent claims to the 11/64" VIM HSSC29 drill bit. This is the smallest VIM HSSC29 drill bit that contains a top blade and at least two steps.

147. Submitted with this Declaration as **Ex. 2097** is a "third-party copying" patent claims chart that I closely evaluated and agree with, comparing the '583 Patent claims to the 1/2" VIM HSSC29 drill bit. All intervening sizes of the VIM HSSC29 drill bit contain the top blade and at least two steps.

148. Based on the foregoing, it is my opinion that the VIM HSSC29 drill bits from 11/64" to 1/2" (by increments of 1/64") embody the claims of the '583 Patent.

B. The Matco Hyper-Step, Astro ONYX TurboStep, Viking Vortex Point, Steel Vision Stepped Tip, and VIM HSSC29 Drill Bits Are Co-Extensive With The Claims Of The '583 Patent

149. The asserted claims of the '583 Patent are coextensive with the entire twist drill bit. Each of the foregoing drill bits discussed above practices the asserted patent claims with the entire drill bit. There are no significant features of the foregoing drill bits that are not part of the patent claim elements. That is, the claimed invention is not merely a subcomponent of the practicing products, but rather is coextensive with the entire drill bit for each of the foregoing drill bits.

150. In my opinion, other than drill bit size and the color of the index/box containing the drill bits, there are no significant unclaimed features in the (1) Matco Hyper-Step High-Speed Steel (MATDB13HS, MATDB21HS,

MATDB21HSG, MATDB29HS, MATDB29HSG); (2) Matco Hyper-Step High-Speed Steel Large Sizes (MATDB4HSL); (3) Matco Hyper-Step High-Speed Steel Extra-Large Sizes (MATDB4HSXL, MATDBHS44, MATDBHS48, MATDBHS56, and MATDBHS64); and (4) Astro ONYX TurboStep drill bits (TS21 and TS29).

151. In my opinion, other than drill bit size, there are no significant unclaimed features in the Viking Drill & Tool Vortex Point drill bits; the Steel Vision Stepped Tip drill bits; or the VIM HSSC29 drill bits.

152. In my opinion, drill bit size is also an insignificant feature in connection with both the claimed invention and the function of the foregoing drill bits. Persons of ordinary skill in the art (“POSA”) would understand that drill bits very commonly come in sets, those sets often containing 29 standard incremental sizes, from 1/16” to 1/2” in increments of increments of 1/64”, as well as the eight larger silver and deming (reduced shank) sizes above 1/2” (17/32", 9/16", 19/32", 5/8", 1/16", 3/4", 7/8" and 1"). This is because customers and POSAs require twist drill bits of multiple drill bit sizes, depending on the size of holes the customers and POSAs expect to want to drill at the time of purchase and in the future.

153. In my opinion, the color of the index/box containing the drill bits and the private label branding of the drill bits are likewise insignificant features. Such features have nothing to do with the performance or functioning of the drill bits.

154. The Matco Hyper-Step High-Speed Steel, Astro ONYX TurboStep, Viking Type 250-VT and Type 175-VT, Steel Vision Stepped Tip, and VIM HSSC29 drill bits are drill bits that come in the standard 29 incremental sizes.

155. The Matco Hyper-Step Large and Extra-Large and Viking Type 280-VT and Type 130-VT drill bits are simply drill bits that come in the eight standard silver and deming sizes.

156. Matco sells variations of the Easy-Boost drill bits that include additional unclaimed features: (1) MATDB29HSR and MATDB29HSRG have a reduced shank; (2) MATDB21HSM are cobalt; (3) MATDB29HSRM are cobalt with a reduced shank; (4) MATDB29HSRMS are cobalt, with a reduced shank, and a stubby length (i.e., a length that is 1/2 to 2/3 the length of the typical drill bit).

157. In my opinion, the size of the drill bit shank (standard or reduced) is likewise an insignificant feature. A POSA would understand that the size of the drill bit shank is a standard variation on drill bits in the industry, commonly needed so as to accommodate a 1/2" maximum capacity chuck found on many drills. This variation impacts only the type of drill chucks with which the drill bits are compatible. It does not significantly impact the drill bit's functionality. I note that Matco's advertising materials (**Ex. 2041**) do not suggest that the reduced shank impacts the drill bit's functionality.

158. In my opinion, the length of the drill bit (jobber, mechanics, or stubby) is also an insignificant feature. A POSA would understand that drill bits typically come in different standard lengths, depending on the field of application. It does not significantly impact functionality, although stubby drill bits offer slightly greater rigidity than standard length drill bits for obvious reasons of length versus diameter considerations. In my experience, companies routinely offer standard and stubby sized models of essentially the same products. I note that claims 15 and 19 of the '583 Patent contemplate variations in the length of the cylinder portion.

159. In my opinion, the material of the drill bit (steel or cobalt) is also an insignificant feature. Although drill bit material does have an impact on functionality, that impact relates to the cutting-edge temperature the tool material can withstand, meaning the rotational speed it can run, while keeping wear rate acceptably low and tool life acceptably high. Drill bits manufactured from high-speed steel and cobalt are common-place throughout the industry; bits made from tungsten carbide are common in production settings and could be offered in these same patented geometries.

160. The cobalt drill bits do, however, have a shorter cone portion at the tip compared to the high-speed steel version of the same final diameter. This shorter cone portion also results in a measurably larger apex angle of the cone portion.

This is why separate “nexus” patent claim charts were prepared by Mr. Wang or his attorneys and why I closely evaluated it as I attested to above. Both configurations, high speed steel and cobalt, equally practice the asserted patent claims as I attested to above.

161. Thus, in my opinion, each of the Easy-Boost drill bits, the Vortex Point drill bits, the Steel Vision Stepped Tip drill bits, and the VIM HSSC29 drill bits embody the claims of the ‘583 Patent and are coextensive with them. Each of the embodying drill bits is essentially the claimed invention. Therefore, it is my understanding that the embodying drill bits are entitled to a presumption of nexus. Regardless of whether the drill bits are entitled to this presumption, the evidence shows that there is a nexus between the merits of the claimed invention and the objective evidence.

C. Merits of the Claimed Invention / Unexpected Results

162. Hongjia Wang’s innovation claimed by the ‘583 Patent is his combination of a twist drill but with a modified tip geometry in which the cone portion comprises a plurality of ridges or steps that, in combination with the helical/spiral flute, comprise a plurality of cutting edges that form a plurality of cutting tips.

163. The ‘583 Patent describes a novel twist drill bit that offers (1) easier drilling due to the fact that it disperses the cutting force across a plurality of cutting

edges thereby requiring a smaller overall drilling force than in conventional twist drill tips; (2) increased “precision of the drilling,” (3) “smoother drilling,” and (4) increased “lifetime of the drill bit” due to the fact that the drilling force and consequently the cutting heat are evenly distributed across a plurality of cutting tips; and (5) reduced accidents to the operator, tool, and workpiece as a result of the increased stability due to the even distribution of the cutting force. (**Ex. 1001**, col. 9:14-31, 48-61). Mr. Wang’s innovation distributes the cutting forces of the twist drill across multiple cutting edges and cutting tips, which (unlike in a standard twist drill and unlike a standard step drill) are simultaneously engaged with the workpiece to disperse relatively small cutting forces upon each of the cutting edges and cutting tips.

164. This configuration thus leads to (1) a faster penetration rate and thus reduced time to produce a given hole; (2) improved durability due to better distribution of the thermal load (heat) and mechanical load (force) generated at the cutting edge during cutting; (3) improved chip evacuation as a result of a plurality, and for larger bits many, chips having narrower width than for a standard twist drill where the chip width is approximately equal to the cutting lip length where the narrower chips are also weaker and have a tendency to fracture into short lengths; (4) reduced or eliminated bit walking during cutting; and (5) allowing users to drill large-diameter holes in thin workpieces like sheet metal with a twist drill, meaning

with a drill that has many other uses (versus resorting to a step drill that is only practically applicable for making through holes in thin workpieces), without the need to first drill a pilot hole (and thus eliminating the need to switch drill bits).

D. Direct Evidence of Copying

165. In my opinion, there is significant direct evidence of a nexus between the asserted patent claims and copying of the claimed invention when Viking and Kimball Midwest expressly copied Matco's Hyper-Step drill bits.

166. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

167. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

168. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

170. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

171. Similarly, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

172. The document concludes: [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

173. The evidence indicates that [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

174. It is my opinion that it is the novel tip configuration described and recited in the asserted claims of the '583 Patent.

E. Evidence of Industry Praise

175. In my opinion, there is a nexus between the industry praise for the Easy-Boost drill bits and the merits of the claimed invention.

176. Most notably, Kimball Midwest and Viking’s internal documents, described in the section above, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

177. I have also reviewed the examples of industry praise submitted with David Fisher’s declaration. In my opinion, there is a nexus between the praise for the Hyper-Step drill bits and the merits of the claimed invention.

178. As with [REDACTED], the user reviews, YouTube videos, and forum comments refer to the unique tip geometry claimed by the ‘583

patent and the key benefits of the patented invention, i.e., (1) a faster penetration rate and thus reduced time to produce a given hole; (2) improved durability due to better distribution of the thermal load (heat) and mechanical load (force) generated at the cutting edge during cutting; (3) improved chip evacuation as a result of a plurality, and for larger bits many, chips having narrower width than for a standard twist drill where the chip width is approximately equal to the cutting lip length where the narrower chips are also weaker and have a tendency to fracture into short lengths; (4) reduced or eliminated bit walking during cutting; and (5) allowing users to drill large-diameter holes in thin workpieces like sheet metal with a twist drill, meaning with a drill that has many other uses (versus resorting to a step drill that is only practically applicable for making through holes in thin workpieces), without the need to first drill a pilot hole (and thus eliminating the need to switch drill bits).

F. Evidence of Commercial Success

179. I have also reviewed the product pages for the Matco Hyper-Step, the Astro ONYX TurboStep, Viking Vortex Point, Norseman Vortex Point, Kimball Midwest Ultra Step, KnKut Step Point, Winzer Cyclone, Cornwell Tools Tempest Point, Steel Vision Stepped Tip, and VIM HSSC29 drill bits.

180. The marketing materials for the products embodying the claims of the ‘583 Patent advertise the unique tip geometry claimed by the ‘583 Patent and/or

some or all of the key benefits of the '583 Patent, i.e., (1) a faster penetration rate and thus reduced time to produce a given hole; (2) improved durability due to better distribution of the thermal load (heat) and mechanical load (force) generated at the cutting edge during cutting; (3) improved chip evacuation as a result of a plurality, and for larger bits many, chips having narrower width than for a standard twist drill where the chip width is approximately equal to the cutting lip length where the narrower chips are also weaker and have a tendency to fracture into short lengths; (4) reduced or eliminated bit walking during cutting; and (5) allowing users to drill large-diameter holes in thin workpieces like sheet metal with a twist drill, meaning with a drill that has many other uses (versus resorting to a step drill that is only practically applicable for making through holes in thin workpieces), without the need to first drill a pilot hole (and thus eliminating the need to switch drill bits).

G. Evidence of Long-Felt But Unmet Need

181. Twist drills have existed since the 1800s and step drills have existed since the mid-1900s.

182. Twist 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. This is confirmed by the

[REDACTED]
[REDACTED] . Ex. 2059, Exs. 2055, 2056, 2057, 2060, and 2061.

183. Furthermore, when drilling large diameter holes through metal with a twist drill, it has historically been necessary to first drill a pilot hole with a smaller-diameter drill bit, or else experience tells the operator that the larger-diameter drill bit would or could too easily “walk” off the desired location for the drill hole. Yet, using a starter bit to first form a pilot hole would require users to switch drill bits during cuts, creating a two-step process. Many twist-drill innovators have also attempted to solve this problem.

184. Yet, in my opinion, despite all these years of innovating, twist drill innovators had never thought to combine or had never successfully combined a plurality of composite cutting blade groups on the surface of the conical portion of a twist drill, or otherwise thought to apply the teachings of a step drill to a twist drill. This strongly suggests that twist drill innovators had no reasonable expectations of success in making such a combination or believing that such a combination would be as beneficial and commercially successful as Mr. Wang’s innovation is today.

185. Thus, in my opinion, it is unsurprising that prior to the introduction of Mr. Wang’s novel and nonobvious drill configuration, no one combined a cone portion on the front of a twist drill and formed a plurality of stepped surfaces on

the cone's exterior that define a plurality of major and minor cutting edges that intersect and intersect a spiral flute to form a plurality of cutting tips in a spiral arrangement as recited in the claims of the '583 Patent, all for the purposes and benefits described in the Wang '900 application and the '583 Patent. The fact that both a step drill and twist drill had been available and in use in the marketplace for over 50 years prior to Wang '900 application and the '583 Patent, in a metal-cutting industry that is arguably more than 150 years old, in my opinion, strongly supports the non-obviousness of their combination of stepped features and twist-drill features as described in the Wang '900 application and the '583 Patent.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this day, November 6, 2023 at Houghton, Michigan.
(city) (state)


Digitally signed by
William J. Endres (WJE)
Date: 2023.11.06
22:39:39 -05'00'
William J. Endres, Ph.D.

ATTACHMENT C

Proposed Redactions to Exhibit 2036 – Corrected Declaration of David Fisher in
Support of Patent Owner’s Corrected Response To Viking Drill & Tool’s Petition
for *Inter Partes* Review of U.S. Patent No. 11,007,583

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIKING DRILL & TOOL, INC.

Petitioner

v.

HONGJIA WANG

Patent Owner

IPR2023-00473

IPR2023-00474¹

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

**CORRECTED DECLARATION² OF DAVID FISHER IN SUPPORT
OF PATENT OWNER'S RESPONSE TO THE
PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,007,583**

¹ A word-for-word identical declaration is being submitted in support of IPR2023-00473 and IPR2023-00474.

² This Declaration has been revised to correct formatting only. The content and signature date have been preserved.

DECLARATION OF DAVID FISHER

I, David Fisher, declare as follows:

1. I am the President of Astro Pneumatic Tool Co. (“Astro”), Tsteigen, Inc.’s exclusive distributor in the United States. I have been the President of Astro at all times relevant to this declaration and patent office challenge. I have personal knowledge of the facts set forth herein, except as to those stated on information and belief and, as to those, I am informed and believe that they are true. If called as a witness, I could and would competently testify to the matters stated herein.

I. Objective Indicia of Nonobviousness

A. The Product Embodiments in the United States

2. Astro is the exclusive distributor of the Easy-Boost drill bits for Tsteigen, Inc. (“Tsteigen”) in the United States, which I understand embody the claims of the ‘583 Patent.

3. Matco Tools Corp. (“Matco”), in turn, distributes the Easy-Boost drill bits for Astro. Matco is one of the largest automotive tool distributors in the country, with over 13,000 different tool lines. Matco was the exclusive distributor of the Easy-Boost drills for Astro for over five years.

4. The Easy-Boost drill bits supplied by Tsteigen are sold in the United States under private labels. Matco sells the Easy-Boost drill bits under a private label known as “the Hyper-Step drill bits.”

5. Recently, Astro has also begun to offer the Easy-Boost drill bits under its own private label, known as “the ONYX Turbo Step drill bits.”

6. A true and correct copy of a spreadsheet showing Astro’s sales of the Easy-Boost drill bits from June 2018 through March 2023 is attached hereto as **Exhibit 2039**.

7. I prepared a description of the model numbers reflected in **Exhibit 2039**, in the table below. Astro’s sales in **Exhibit 2039** of the drill bits beginning with “MATDB” are sales to Matco. Astro’s sales of the drill bits beginning with “TS” are Astro’s direct sales.

Product Code	Description
MATDB13HS	Matco Hyper-Step, high-speed steel, 13-piece index (1/16" through 1/4" by increments of 1/64th")
MATDB21HS	Matco Hyper-Step, high-speed steel, 21-piece index (1/16" through 3/8" by 64ths)
MATDB21HSG	Matco Hyper-Step, high-speed steel, 21-piece green index
MATDB29HS	Matco Hyper-Step, high-speed steel, 29-piece index (1/16" through 1/2" by 64ths)
MATDB29HSG	Matco Hyper-Step, high-speed steel, 29-piece green index
MATDB29HSR	Matco Hyper-Step, high-speed steel, reduced shank, 29-piece index

MATDB29HSRG	Matco Hyper-Step, high-speed steel, reduced shank, 29-piece green index
MATDB4HSL	Matco Hyper-Step, high-speed steel, large sizes (17/32", 9/16", 19/32" and 5/8")
MATDB4HSXL	Matco Hyper-Step, high-speed steel, extra-large sizes (11/16", 3/4", 7/8" and 1")
MATDBC21HS	Matco Hyper-Step, cobalt, 21-piece index
MATDBC21HSM	Matco Hyper-Step, cobalt, 21-piece orange index
MATDBC29HSRM	Matco Hyper-Step, cobalt, reduced shank, 29-piece orange index
MATDBC29HSRMS	Matco Hyper-Step, cobalt, stubby length (1/2 to 2/3 the length of traditional drill bits), reduced shank, 29-piece orange index
MATDBHS44	Matco Hyper-Step, high-speed steel, 11/16" drill bit
MATDBHS48	Matco Hyper-Step, high-speed steel, 3/4" drill bit
MATDBHS56	Matco Hyper-Step, high-speed steel, 7/8" drill bit
MATDBHS64	Matco Hyper-Step, high-speed steel, 1" drill bit
TS21	Astro ONYX TurboStep, high-speed steel, mechanic's length, 21-piece index

TS29	Astro ONYX TurboStep, high-speed steel, mechanic's length, 29-piece index
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8. The only difference between the following sets of drill bits is the color of the index that the drill bits are contained in: (1) MATDB29HS and MATDB29HSG; (2) MATDB29HSR and MATDB29HSRG; and (3) MATDBC21HS and MATDBC21HRM.

9. The overlapping drill bit sizes in the 13-piece, 21-piece, and 29-piece indexes of the same style are identical, as in: (1) MATDB13HS, MATDB21HS, MATDB21HSG, MATDB29HS, and MATDB29HSG; and (2) TS21 and TS29. Similarly, the MATDBHS44, MATDBHS48, MATDBHS56, and MATDBHS64 are identical to the drill bits contained in the MATDBHSXL set, but sold individually instead of packaged together.

10. The only difference between the cobalt (MATDBC21HSM) and cobalt reduced shank drill bits (MATDBC29HSRM) is the size of the shank. Similarly, the only difference between the cobalt reduced shank (MATDBC29HSRM) and cobalt reduced shank stubby (MATDBC29HSRMS) drill bits is the length of the cylindrical portion of the drill bit.

B. Commercial Success

11. The Easy-Boost drill bits have been extremely commercially successful in the United States, despite their relatively high asking price. From June 5, 2018 (when sales to Matco began) through March 30, 2023, Astro's sales of the Easy-Boost drill bits have totaled over \$15 million.

12. Sales of the Easy-Boost drills have steadily increased since they were introduced and are consistently among Matco's top ten best selling products across all product lines.

13. For example, both Astro and Matco noticed a significant drop in business with the start of COVID in 2020.

14. The Easy-Boost drill bits were some of the few items that did not see a decrease in sales, even in that situation. In fact, sales grew in 2020, and Astro had its best year in company history.

15. Based on my many years of experience in the sales of drill bits and related tools, it is my sincere belief that the commercial success of the Easy-Boost drill bits is due to their outstanding function of their unique tip design. My emails with Matco from February 2020—before anyone had copied the Easy-Boost / Hyper-Step design—confirm this. Submitted herewith as **Exhibit 2040** is a true and correct copy of an email exchange between myself and Nicholas Haitz of Matco, from January 23, 2020 to February 3, 2020, which was produced in the litigation at Bates numbers TS023581-TS023584. [REDACTED]

[REDACTED]

16. Attached to my prior declaration as **Exhibit 2011** is a true and correct copy of print outs for the product page for Matco's MATDB29HSG Hyper-Step drill bits.

17. Submitted herewith as **Exhibit 2041** is a true and correct copy of a print out for the product page for Matco's MATDB29HSRG Hyper-Step reduced shank drill bits.

18. Submitted herewith as **Exhibit 2042** are true and correct copy of print outs for the product page for Matco's MATDB4HSL and MATDB4HSXL Hyper-Step large and extra-large drill bits.

19. Submitted herewith as **Exhibit 2043** is a true and correct copy of a print out for the product page for Matco's MATDBC21HSM Hyper-Step cobalt drill bits.

20. Submitted herewith as **Exhibit 2044** is a true and correct copy of a print out for the product page for Matco's MATDBC29HSRM Hyper-Step cobalt, reduced shank drill bits.

21. Submitted herewith as **Exhibit 2045** is a true and correct copy of a print out for the product page for Matco's MATDBC29HSRMS Hyper-Step cobalt, reduced shank, stubby drill bits.

22. Submitted herewith as **Exhibit 2046** are true and correct copy of Astro's Marketing Flyer and Product Information sheet for Astro's TS21 and TS29 ONYX TurboStep drill bits.

23. In their advertising materials for the Hyper-Step drill bits, Matco specifically advertises the following aspects or advantages of the Hyper-Step drill bits that I understand are claimed by the '583 Patent: "SUPERIOR DESIGN. Patented Hyper-Step design cuts 45% faster and are the best drill bits for sheet metal, steel and hardened metals like broken fasteners; ELIMINATES THE NEED FOR PILOT HOLES. Hyper-Step design in large sizes eliminates the need for up to two pilot holes that traditional drill bits require; LONG LASTING. Stays sharp up to 4X longer compared to conventional and other specialty tip designs; INNOVATIVE. The multi-stepped tip acts like a step drill, allowing for laser like holes through sheet metal and prevents walking on curved surfaces; ELIMINATES SLIPPAGE. Three-flatted shanks to reduce slippage common with keyless chucks." Notably, Matco specifically advertises the unique combination of a twist drill with the tip configuration of a step drill.

24. Astro's marketing materials likewise highlight the unique combination of a twist drill with the tip configuration of a step drill, the performance of the drill bit, and the elimination of bit walk and the need for pilot holes. highlights the unique tip design.

C. Copying

25. Since the release of the Hyper-Step drill bits, we have encountered numerous "knock offs" from other drill manufacturers. In May 2019, following the release of the Hyper-Step drill bits, I was approached by Scott Hollander of Kimball Midwest, who asked me if Astro could manufacture a line of drill bits for Kimball Midwest in line with the Hyper-Step drill bits. We had samples of the patented Hyper-Step drill bits sent to Kimball Midwest so that they could perform testing to compare with their existing products. However, negotiations fell through in November 2019.

26. Submitted herewith as **Exhibit 2047** is a true and correct copy of my May 16, 2019 to June 21, 2019 email exchange with Scott Hollander of Kimball Midwest, which was produced in the litigation at Bates numbers TS008754-TS008758.

27. In October 2020, Rick Henry of Matco emailed me that Kimball Midwest had begun selling a line of products with the same tip geometry design as the Hyper-Step Drill Bits.

28. Submitted with my prior declaration as **Exhibit 2023** is a print-out for the product page for the Kimball Midwest Ultra Step Drill Bit Set. Kimball Midwest describes the Ultra Step drill bit as follows: “MICRO-CENTER STEPPED DRILL POINT - Eliminates the need for center punching or pilot holes. LONG LASTING - Tip geometry helps reduce heat buildup, helping the cutting edges stay sharp. SUPERIOR PERFORMANCE - Reduced risk of damage to the drill bit while enlarging holes. . . . 3 FLATS ON SHANK* - Eliminates chuck slippage.”

29. Numerous others followed. **Exhibit 2024** is a true and correct copy of a print-out for the product page for the Norseman Drill & Tool VORTEX-POINT Mechanics Length split point drill. Norseman Drill & Tool advertises the following advantages or features of the VORTEX-POINT drill bit: “Unique tip geometry reduces heat generation & cutting tool wear increasing tool life. Easily enlarges existing holes without damaging the point. 3-Flat on Shank, eliminates slippage. Stay sharp up to 4x longer compared to conventional and other specialty tip designs.”

30. **Exhibit 2025** is a true and correct copy of a print-out of the product page for the Viking Drill VORTEX-POINT Mechanics Length drill bit. Viking Drill advertises the following advantages or features of the VORTEX-POINT drill bit: “Stays sharp up to 4X longer compared to conventional and other specialty tip designs. Multi-stepped tip acts like a step drill, allowing for laser like holes through sheet metal and prevents walking on curved surfaces. VORTEX-POINT tip design

cuts 45% faster & excels at sheet metal and hardened metals like broken fasteners. Three-flatted shanks to reduce slippage common with keyless chucks.”

31. **Exhibit 2026** is a true and correct copy of a print-out of the product page for the KnKut Step Point Drill Bits. KnKut advertises the following advantages or features of the Step Point drill bit set: “KnKut USA Made Step Point drill bits combine a split tip point with a step drill design for accurate starting without the need of a center punch. This distinctive design reduces heat to increase the tool life of the drill bit and can be used to enlarge existing holes without damaging the drill bit point. The shorter Mechanics Length gives you a sturdier drill bit with 3-Flats on the shanks, sizes 3/16" and above, to help eliminate slippage in your chuck.” The description goes on to note “Split point step design starts on contact, self-centers and eliminates the need for a center punch. Can be used to enlarge existing holes without damaging the point.” KnKut even refers to the patented combination of features, “a split tip point with a step drill design” as a “distinctive design.”

32. **Exhibit 2027** is a true and correct copy of a print-out of the product page for the Winzer Cyclone drill bits. Winzer advertises the following advantages or features of the Cyclone drill bits: “Split-point design gives accurate starting and is selfcentering eliminating the need for the use of a center punch; Unique tip geometry reduces heat generation cutting tool wear increasing tool life; Step drill design easily enlarges existing holes without damaging the point . . . Three flats

ground onto sides of shank to reduce the slippage of the bit when used in drill chucks.” Winzer even refers to the patented combination of features as a “unique tip geometry.”

33. **Exhibit 2028** is a true and correct copy of a print-out of the product page for the Steel Vision Tool’s Stepped Tip drill bits, which can now be accessed at <https://steelvisiontools.com/products/29-pc-stepped-drill-bit-set-63200/>. Steel Vision advertises the following advantages or features of the Stepped drill bit set: “New from Steel Vision Tools comes these new groundbreaking drill bit sets. One of the very first to hit the market of its kind is the stepped tip drill bit design. Each drill bit has a small step bit tip. Each fluted step tip is in proportion to the bit size. Even on round, curved or uneven surfaces the stepped cutter bits will glide through metal without a pilot hole and drastically reduce walking.” Steel Vision even refers to the patented combination of features as a “groundbreaking.”

34. **Exhibit 2029** is a true and correct copy of a print-out of the product page for the VIM’s HSSC29 drill bits. VIM advertises the following advantages or features of HSSC29 drill bits: “Twice the life of a standard drill bit set; self-centering.”

35. Submitted herewith as **Exhibit 2048** is a true and correct copy of a print-out of the product page for Cornwell Tool’s Tempest Point Mechanic’s Length Drill Bit set, accessed at <https://webcat.cornwelltools.com/CTD29TMS-29-Piece->

Tempest-Point-Mechanics-Length-Drill-Bit-Set-p542918265. Cornwell Tools advertises the following advantages or features of the Tempest Point drill bits: “Tempest drill bit design runs cooler with less friction. ... Drills 2x faster than traditional drill bits while lasting 4x longer. Stepped tip prevents drill bit walking on rounded surfaces. Easily drills complete holes or enlarges existing holes through hardened steel, stainless steel, aluminum, & grade 8 bolts.”

36. On the other hand, based on my review of the website of Guehring KG, <https://guehring.com/en/products/drilling-tools/>, Guehring still does not appear to sell a drill bit with the tip configuration of the Easy-Boost drill bits.

D. Praise by Others

37. After hitting the market, the Easy-Boost drill bits were immediately met by praise in the industry. Matco’s DH29HSG Hyper-Step drill bits have 120 customer reviews, 112 of which are five-star reviews. These reviews are included in the product page for Matco’s DH29HSG Hyper-Step drill bits, in **Exhibit 2011**.

38. As can be seen, numerous of the reviews comment on the “unique point design” and “steps feature” which eliminate the need to drill pilot holes, as well as Easy-Boost drill bit’s durability and cutting speed. As some examples:

- The step bit feature saves so much time and eliminates the need to keep changing bits!

- The unique point design allows for smooth start with no walking. The steps feature eliminates drilling pilot holes.
- The stepped tip makes it very fast to dig in the metal. Also is very easy to start, it fits perfect to the center punch hole.
- These drill bits will drill through anything and everything without slowing down. The steps will make it easy to start without a pilot hole as well.
- Didn't think there could be much innovation in drill bits, but these changed the way I drill. I like how they don't grab the work piece at the bottom of the hole like conventional drills.

39. The Hyper-Step drill bits have also garnered positive reviews in tech journals, such as TechShop magazine. **Exhibit 2012** is a true and correct copy of a printout of the TechShop review of the Matco Cobalt Hyper-Step Drill Bits, praising that “[t]hese drill bits act like a step drill, spreading the job of cutting across multiple levels, which keeps the drill bit cooler, resulting in less wear and maybe best of all, there’s no more need for a pilot hole.”

40. I have also come across numerous positive reviews on YouTube for the Hyper-Step drill bits from industry insiders. **Exhibit 2013** is a true and correct copy of the page for a video made by user TechShop titled “Tool Showcase: Matco Cobalt Hyper-Step Drill Bits,” accessed at the link <https://www.youtube.com/watch?v=c5Ja394lQCg&t=4s>.

41. Submitted herewith as **Exhibit 2049** is a true and correct copy of the video at the above link. In the YouTube video in question, the user notes: “Now take a look at the patented Hyper-Step tip design. These drill bits act like a step drill, spreading the job of cutting across multiple levels, which keeps the drill bit cooler, resulting in less wear and maybe best of all, there’s no more need for a pilot hole. The Matco exclusive Hyper-Step tip design cuts 45% faster and stays sharp 4 times longer.”

42. **Exhibit 2014** is a true and correct copy of the page for a video made by user The506Garage titled “All this hype true about the Matco Hyper Step Drill bits??? Walker/master-craft/Matco,” accessed at the link <https://www.youtube.com/watch?v=h--zz9y8zSg>.

43. Submitted herewith as **Exhibit 2050** is a true and correct copy of the video at the above link. In the video, the user compares the Matco Hyper-Step drill bits to competitor drill bits from Walker and Master-Craft, showing that the Matco drill bits are able to cut through a rotor substantially faster than the competitor drill bits, without the need for a pilot hole.

44. **Exhibit 2015** is a true and correct copy of the page for a video made by user Flat Rate Master titled “Matco Hyper-Step Drill Bits DB29HS,” accessed at the link <https://www.youtube.com/watch?v=uDO-UZ59MSo>.

45. Submitted herewith as **Exhibit 2051** is a true and correct copy of the video at the above link. In the video, the user notes “What these are are drill bits with a step bit point on the end of them. . . . [Other mechanic] bought this set after he broke a rethreading die in the block of an engine. These went through it like butter. . . . As simple as it is, when a tool saves your bacon, you gotta talk about it. . . . It starts with this step bit and then just goes. And once you get through it, you’re done.” The user then demonstrates the Matco Hyper-Step drill bit’s performance on a control arm.

46. **Exhibit 2016** is a true and correct copy of the page for a video made by user Mustang Aficionado titled “Matco Hyper-Step Drill Bits Have No Chill,” accessed at the link <https://www.youtube.com/watch?v=qA7Vrfv-1Yc>

47. Submitted herewith as **Exhibit 2052** is a true and correct copy of the video at the above link. In the video, the user demonstrates the Matco Hyper-Step drill bits are capable of drilling holes through sheet metal, a lug bolt, and a wrench—all without the need for a pilot hole.

48. **Exhibit 2017** is a true and correct copy of the page for a video made by user Koon Trucking titled “Matco Tools: Cobalt HyperStep Drill Bits VS Standard HyperStep Drill Bits HEAD TO HEAD,” accessed at the link <https://www.youtube.com/watch?v=KnOkJynRC1s>.

49. Submitted herewith as **Exhibit 2053** is a true and correct copy of the video at the above link. In the video, the users demonstrate drilling through a variety of materials with Matco's Hyper-Step drill bits and Cobalt Hyper-Step drill bits.

50. **Exhibit 2018** is a true and correct copy of the page for a video made by user BVC OFFROAD titled "The BEST drill bits I've ever used?! MATCO Hyper Step Drill Bit Review TOOL Tuesday," accessed at the link https://www.youtube.com/watch?v=sUAWZUTQ2_0

51. Submitted herewith as **Exhibit 2054** is a true and correct copy of the video at the above link. In the video, the user demonstrates drilling through a ¾ inch thick piece of material, quickly and without using a pilot hole. The user comments "It just comes down to the way the head works and the way it evacuates the chips. You're not recutting chips the whole time, so it pushes them away and out of the hole. As you can see, it makes a really fine chip. That's how it drills so fast." He goes on to say "These will actually hold dead center as you're drilling. They aren't going to walk, they aren't going to wander."

52. User discussions on technical forums also praise the unique (and patented) design of the drill bits. Submitted as **Exhibit 2019** is a true and correct copy of the forum discussion of the Matco Hyper-Step Drill Bits on The Garage Gazette forum, accessed at <https://garagegazette.com/index.php?topic=2888.0>. In the *Matco Hyper-Step Drill bits* discussion, the thread starter notes that "Recently

Matco has come out with a unique design for drill bits. Alit (sic) of mechanics are raving about them. (Hear this personally not just from my dealer).”

53. Submitted as **Exhibit 2020** is a true and correct copy of a forum discussion from the forum The Hobby Mechanist, titled “A ‘New Style’ Drill Bit”, accessed at <https://www.hobby-machinist.com/threads/a-new-style-drill-bit.80485/>. The thread starter comments on the unique design of the Hyper-Step drill bits: “Hard to design a new geometry drill bit these days, everything has been done. Well these is a new one, sort of. Not really new but a combination of drill types that I have not seen before. Matco came out with their Hyper Step drills . . . As the name implies, it’s a conventional spiral flute with a unibit, or should I say step point.”

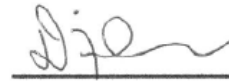
54. Submitted as **Exhibit 2021** is a true and correct copy of a forum discussion from the forum The Garage Journal, titled “Co-worker gets Matco’s new ‘Hyper-Step’ drill bits: ‘These drill though everything’”, accessed at <https://www.garagejournal.com/forum/threads/co-worker-gets-matcos-new-hyper-step-drill-bits-these-drill-though-everything.394706/>. The thread starter links to the YouTube video by user Mustang Aficionado titled “Matco Hyper-Step Drill Bits Have No Chill,” discussed above. Several users comment directly on the tip geometry of the Hyper-Step bits. For instance, “A sheet metal step drill's geometry is designed to enlarge holes and not break, but they are very limited to depth of cut unless you can go to the major OD of the drill. These Matco bits look to be a blend

between the two. I think these would be a good way to drill out existing holes or drill a larger hole out of position with no pilot.” Another user commented “Interesting design, a step drill incorporated in a normal drill bit. Good for thinner materials I would say.”

55. As set forth above, the Easy-Boost drill bits were soon copied by others, due to their outstanding performance, including the Norseman Vortex-Point drill bits. Submitted as **Exhibit 2022** is a true and correct copy of a forum discussion from the forum The Garage Journal discussing the Norseman Vortex Point, accessed at <https://www.garagejournal.com/forum/threads/norseman-vortex-point.477503/>, and comparing the performance to Matco’s Hyper-Step drill bits. As one user (2ndGearRubber) comments: “whoever came up with that tip geometry had to have patented it. Perhaps Matco gets exclusive rights to distribute via the patent holder, and got someone in taiwan to make them? Or the patent ran out, but they last 20 years.... it's a mystery for sure.” That same user observed the advantages of the Hyper-Step drill bits: “No need to pilot drill, smaller amount of material removal per cutting ‘level’ on the bit. If you’ve ever seen the Matco hyper step bits, they just plunge through material.”

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this day, October 30, 2023, at Los Angeles, CA.
(city) (state)



David Fisher