

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

Patent 11,007,583

**PATENT OWNER'S CORRECTED 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 28); (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 Motion for Entry of a Protective Order (Paper 27).

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, and the Board has entered, the Parties’ proposed Stipulated Protective Order. Paper 27; 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 28 and Exhibits 2034 and 2036)

Patent Owner also moves to seal the portions of Patent Owner's Corrected Response to the Petition (Paper 28) and the Declarations of William Endres (Exhibit 2034) and David Fisher (Exhibit 2036). The portions of Paper 28, 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 28, 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 previously granted Viking's Unopposed Motion for Entry of a Protective Order (Paper 27). Thus, the Parties' Stipulated Protective Order (Exhibit 1028) has been entered in these proceedings and 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,

/Kelly W. Cunningham/

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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

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HONGJIA WANG
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IPR2023-00473

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 drilling,” and (4) increased “lifetime of the

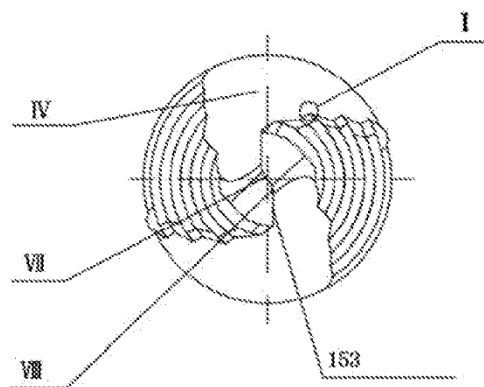
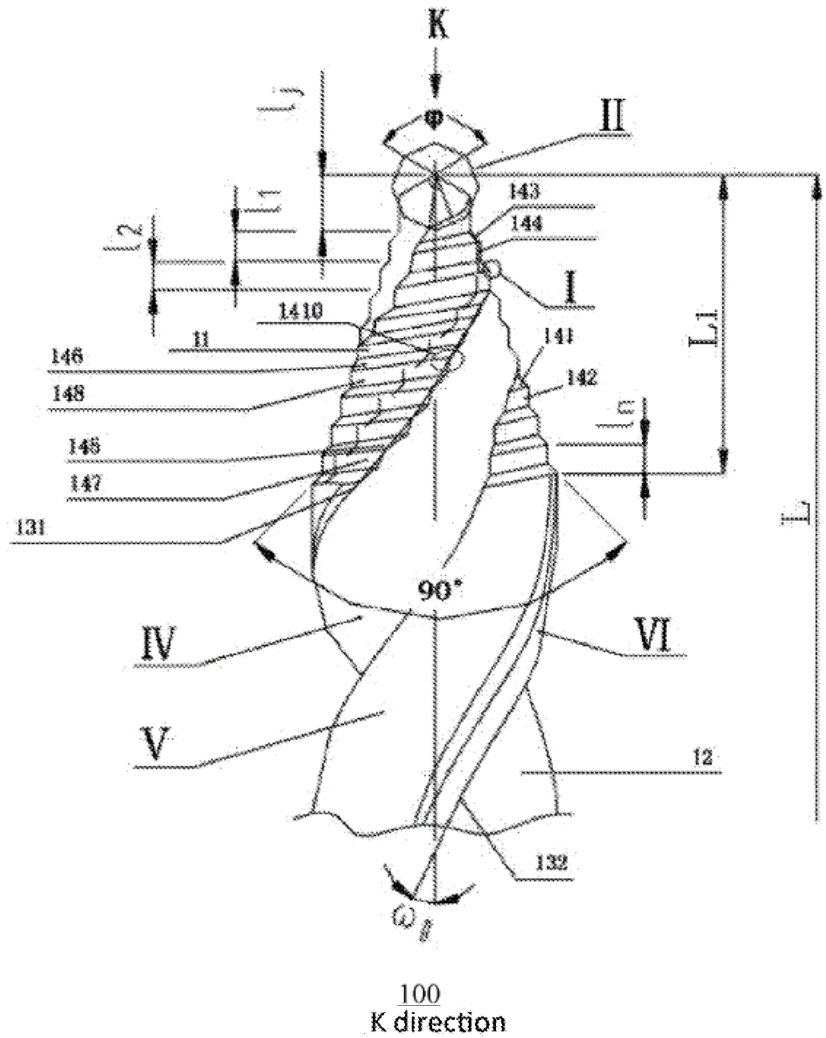


FIG. 4A

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.

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, 7, 8, 12-15, 18, 19, and 22 Are Not Rendered Obvious By Wang in View of Gentry and/or Durfee

For its Ground 1 in its first Petition, Viking argues that the '583 Patent is invalid based on U.S. Patent Application No. 15/847,900 ("the Wang '900" or "the '900 Application," Ex. 1009) in combination with U.S. Patent No. 8,029,215 ("Gentry") and/or U.S. Patent No. 10,058,929 ("Durfee"). Wang is the United States national stage patent application of Mr. Wang's Chinese-language PCT patent application (PCT Patent Application No. PCT/CN2016/073767, "the '767 PCT Application," Ex. 1019), and the parent of the application that matured into the '583 Patent. However, because the '767 Application and the '900 Application provide written description support for each of the claims of the '583 Patent, the '583 Patent

is entitled to its claimed priority date of February 14, 2016. As such, the ‘900 Application is not prior art.

In order to claim the benefit of an earlier filing date, “the specification of the [earlier-filed applications] must ‘contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms,’ 35 U.S.C. § 112 ¶ 1, to enable an ordinarily skilled artisan to practice the invention claimed in the [later-filed] application.” *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Notably, the claimed subject matter need not be described “*in haec verba*” in the original specification in order to satisfy the written description requirement. *In re Wright*, 866 F.2d 422, 425 (Fed. Cir. 1989). Rather, “the test . . . is whether a person of ordinary skill in the art would recognize that the applicant possessed what is claimed in the later filed application as of the filing date of the earlier filed application.” *Noelle v. Lederman*, 355 F.3d 1343, 1348 (Fed. Cir. 2004). “Substantial evidence supports a finding that the specification satisfies the written description requirement when ‘the essence of the original disclosure’ conveys the necessary information—‘regardless of how it’ conveys such information, and regardless of whether the disclosure’s ‘words [a]re open to different interpretation[s].’” *Inphi Corp. v. Netlist, Inc.*, 805 F.3d 1350, 1354–55 (Fed. Cir. 2015).

In the context of predictable arts, such as drill bit design, a less detailed written description is required to demonstrate that the patent owner had possession of the invention. “The written description does not require that every claimed element be illustrated in the figures, particularly in predictable arts and where the element not depicted is conventional and not ‘necessary for the understanding of the subject matter sought to be patented.’” *Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1362–63 (Fed. Cir. 2018) (holding written description supported broader genus claims based on disclosure of single species, and despite the fact that the figures did not illustrate either the genus or the species) (citing 35 U.S.C. § 113 (requiring only that the “applicant shall furnish a drawing where necessary for the understanding of the subject matter sought to be patented”); 37 C.F.R. § 1.81(a); *see also In re Hayes Microcomputer Prods., Inc. Patent Litig.*, 982 F.2d 1527, 1536 (Fed. Cir. 1992) (concluding substantial evidence supports the finding that a “microprocessor” illustrated in a figure was sufficient written description support for claimed timing means and other claim elements not depicted in figures)).

As discussed below, the Wang Priority Applications both provide sufficient written description support for each recited element of the challenged claims of the ‘583 Patent. (Ex. 2034 (Endres Decl.) ¶¶38-40, Ex. 2073.) As an initial matter, Viking acknowledges that the Wang Priority Applications provide sufficient written description support for each of the elements of the challenged claims of the ‘583

Patent, except for the limitation “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.” (Pet. at 25-33, 46-64.) Indeed, this is Viking’s basis for arguing that the ’900 Application renders the challenged claims of the ’583 Patent obvious.

Viking construes this “spirally” limitation in this context to mean that the cutting blades are not perpendicular to the drill bit’s rotational axis, but rather have a “slant” creating axial relief behind the cutting edges. Patent Owner agrees with this construction in this context. (Ex. 2034, ¶10).

First, as Viking acknowledges, providing an axial relief to the drill bit behind the cutting edges “is common and well-known in the industry.” (Pet. at 49-50; Ex. 2034, ¶11). Indeed, axial relief is so ubiquitous and such a conventional element that a POSA would readily infer it or assume it with or without an illustration or a thorough explanation that a given drill bit would contain some axial relief following the cutting edges. (Ex. 2034, ¶11.) This is the case with the ’900 Application. As discussed below, a POSA would interpret the description in the ’900 Application to include axial relief and recognize that Mr. Wang had possession of that aspect (and all other claimed features) of his invention based on the specification of the ’900 Application. (*Id.*)

In particular, both the '767 PCT Application and the '900 Application describe that the line that connects two adjacent flutes 4 can be a spiral in shape:

“The flutes in the present invention may be curved flutes adapted to the curvature of the rear surface, or the connecting line of the flutes is of a spiral structure.”

(Ex. 1019, p.5:20-21).

“The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, or the connecting lines of the flutes form a spiral structure[.]”

(Ex. 1009, p.16, ¶[0034]).

The “flutes 4” in the Wang Priority Applications refer to parallel grooves on the cone portion as shown below. Given that such grooves had never before been formed on the cone portion of a twist drill, it is understandable that Mr. Wang’s patent attorney would not have known what to call them in the first instance. (Ex. 2034, ¶13.)

These flutes 4 are described and illustrated in the Wang Priority Applications as “a plurality of flutes 4 arranged in parallel and spaced apart from each other are provided symmetrically along a surface 3 of the cutting portion.” Whereas, without flutes 4, there would be a main cutting blade along the spiral edge of the large spiral chip-evacuating flute, the flutes 4 “divide [this] main cutting blade into a plurality of first cutting blades 5 and second cutting blades 6”:

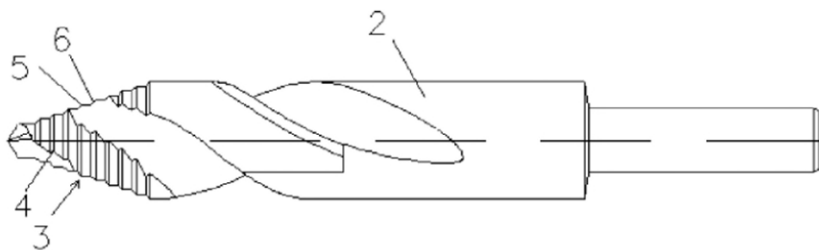
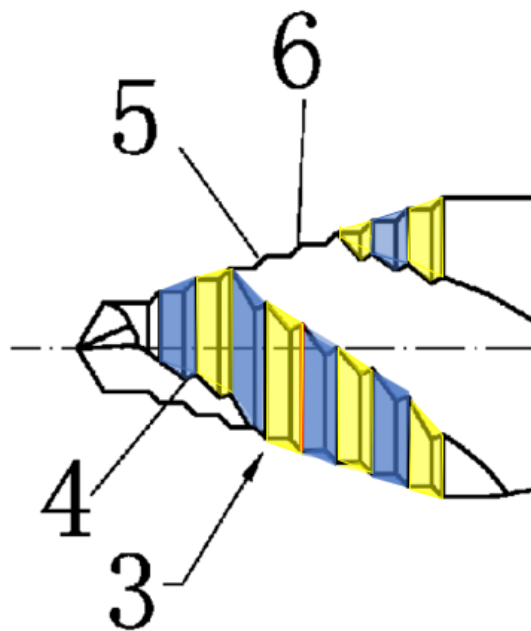


FIG. 5

(Ex. 1019, p.4:24-25).

As shown in Figure 5, the plurality of flutes 4 are parallel and adjacent to one another. Below is a copy of the cone portion of the same Figure 5 (essentially) of the ‘900 Application, in which the flutes 4 are highlighted in alternating colors, blue and yellow (Ex. 2034, ¶15.)

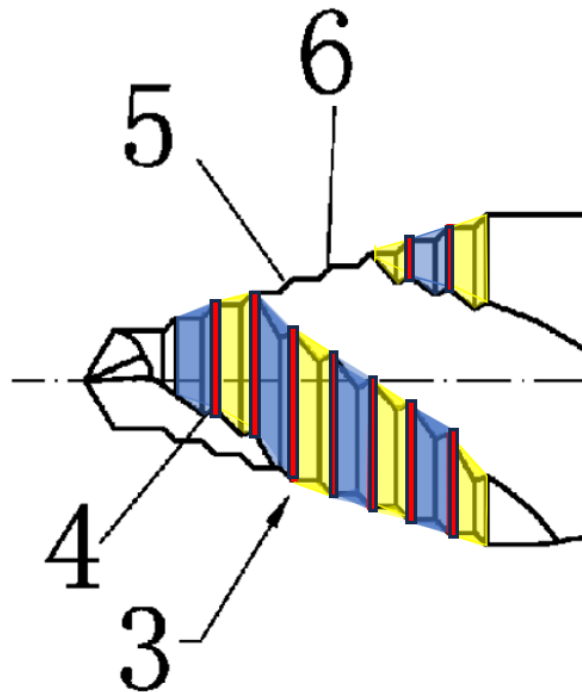


Because each flute 4 is parallel and touching the adjacent flute 4, each shares an edge – a line – that connects them, literally, “connecting lines of the flutes 4.” (*Id.*, ¶16.) As the ‘900 Application states:

“The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, or the connecting lines of the flutes form a spiral structure[.]”

(Ex. 1009, p.16, ¶[0035]).

A POSA would understand the phrase, “the connecting lines of the flutes” to mean the lines that connect the flutes. (Ex. 2034, ¶17.) Again, each flute 4 is a curved triangular prism cutout from the cone’s surface. Each successive curved triangular prism cutout has a curved long edge that borders the curved long edge of the next flute 4. The line that these two long edges share is the “connecting line” of those two flutes 4. (*Id.*) In the blown-up view of Figure 5 below, the flutes 4 are highlighted in blue and yellow, with the connecting lines of the flutes 4 highlighted in red (and outlined in black for visibility). (*Id.* ¶18.)



These are the only structures that the phrase “connecting lines of the flutes” could plausibly refer to. (*Id.* ¶19.)

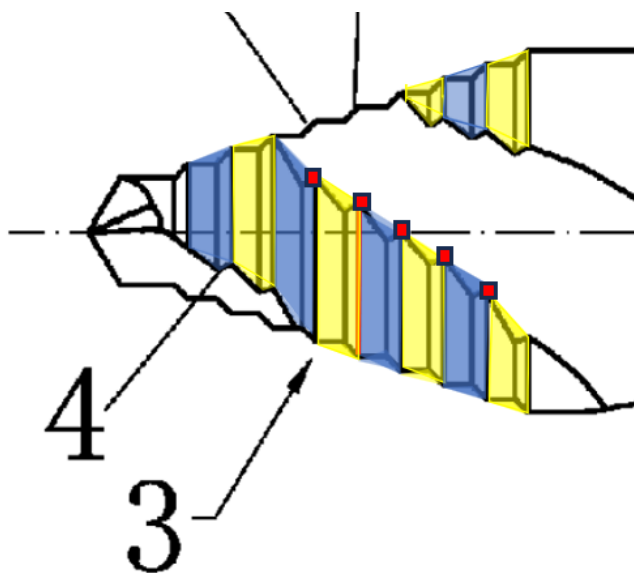
Thus, the POSA would understand the sentence “The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, **or** the connecting line of the flutes form a spiral structure” to mean that the flutes 4 either: (1) leave circular grooves directly around cone surface, *i.e.*, with very little or no axial relief; **or** (2) form a spiral structure, ***i.e., technically, not an arc of a circle around the cone surface, but rather spirals the are oriented both down and around the cone surface.*** (Ex. 2034 ¶20.) A POSA would interpret the corresponding paragraph of the ‘900 Application in the same manner. (*Id.* ¶21; Ex. 1009, p.16, ¶[0034].)

Viking and its “expert”¹ appear to acknowledge that Patent Owner’s interpretation is reasonable, instead arguing that a POSA would not understand that

¹ Notably, Dr. Schmid does not qualify as a POSA under his own definition. Viking defined a POSA as an individual educated in mechanical engineering with a bachelor’s degree and at least one or two years of experience in the development of drill bits, or an associate’s degree and at least five years of experience in the development of drill bits. (Pet. at 25; Ex. 1004 at 14.) But, as Dr. Schmid

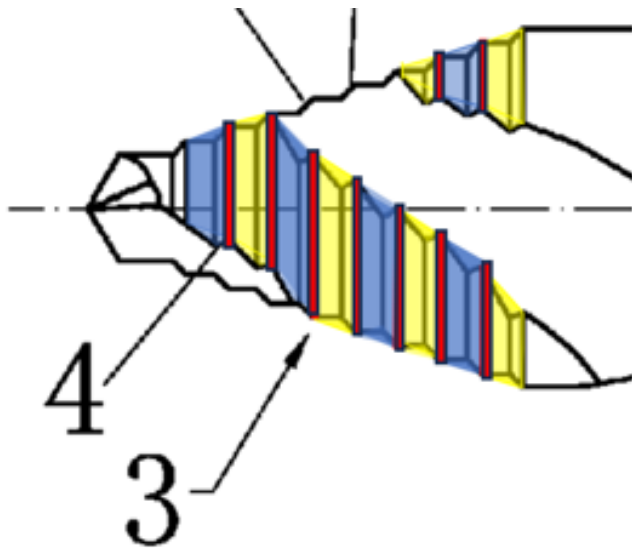
the Patent Owner “necessarily possessed” the claimed slanted cutting blade groups. This is not the standard for demonstrating priority—ambiguity in the application does not defeat a priority claim. *Inphi Corp.*, 805 F.3d at 1354–55. But in any case, the Wang Priority Applications unambiguously disclose axial relief.

Viking and its expert argue that a POSA could interpret “connecting lines of the flutes” as the lines along the leading edges of the cutting blade groups. Under this interpretation, Viking would interpret “connecting lines of the flutes” as referring to the cutting tips of the composite cutting blade groups, highlighted in red below in the annotation of Figure 5 of the ‘900 Application, below. (Ex. 2034 ¶24.)



acknowledged, he has no experience whatsoever in the development of drill bits. (Ex. 2072, 18:14-15, 25:4-26:8, 30:3-31:4.)

As can be readily seen, however, the cutting tip of a composite cutting blade group is a **point**, not a **line**. A POSA would have no reason to interpret “connecting **line**” to refer to a point. (Ex. 2034 ¶25.) This is particularly true, because there is only one connecting line for any two adjacent flutes 4. It is not at the ends of the grooves. At the ends of the grooves, where they intersect the large spiral chip-removing feature, the two grooves connect only at a point, namely, the cutting tip between two adjacent cutting blades 5 and 6. The only actual line that connects two adjacent flutes 4 in the Wang Priority Applications is the line where the conical surface formed by one flute 4 intersects the cylindrical surface formed by the next flute 4. (*Id.* ¶26). When that connecting line forms a spiral structure, this is the definition of common axial relief.



The context of the Wang Priority Application’s disclosures also supports this interpretation. Mr. Wang twice described this spiral shape that the flutes 4 can make, once in the “Summary of the Invention,” paragraph [0010], and again in the

“Detailed Description of the Embodiments,” paragraph [0035] (of the ’900 Application; it is likewise, in the ’767 Application, although without paragraph numbering). In each instance, the drafter had just described the other distinct set of connecting lines, those formed by the cutting blades:

“[0006] ... and connecting lines of the first cutting blades and the second cutting blades form a step-like structure.”

and

“[0031] ... A plurality of flutes 4 distributed in parallel and at intervals are symmetrically arranged along a flank surface 3 of the cutting portion; the flutes 4 divide main cutting blades into a plurality of first cutting blades 5 and second cutting blades 6; and connecting lines of the first cutting blades 5 and the second cutting blades 6 form a step-like structure (which can also be called a ladder-like structure), i.e., the main cutting blades of the present disclosure are step-like structures.”

(Ex. 1009, ¶¶[0006], [0010], [0031], [0035]; Ex. 1019 at pp. 2-3, 4-5.)

The connecting line (singular in the ’767 PCT Application) of the flutes **cannot** be the same connecting line as the connecting lines (plural) of the first and second cutting blades because, in each instance, the patent drafter had just gotten done describing that the **decidedly different** connecting lines of the cutting blades form a step-like structure. (Ex. 2034 ¶28.)

These two separate sets of connecting lines are defined differently. The connecting lines described in paragraphs 10 and 35 are defined by the flutes 4; whereas the connecting lines described in paragraphs 6 and 31 are defined by the plurality of first and second cutting blades 5 and 6. (*Id.* ¶29). Furthermore, these two sets of connecting lines are described as being shaped differently. (*Id.* ¶30). The connecting line described in paragraphs 10 and 35 forms either a circular or spiral structure, whereas the connecting lines described in paragraphs 6 and 31 form a step-like structure. As a result, it would be evident to a POSA that there are two different set of connecting lines that arise from different landmark features and that have different geometrical shapes. A POSA simply would not interpret paragraphs 6 and 31, on the one hand, and 10 and 35, on the other hand, as all referring to just one set of connecting lines. (*Id.* ¶31.)

Moreover, the large helical/spiral chip-evacuating flute is always helical/spiral in all of the drawings and in most high-speed twist drills. There would be no need to express that the ends of the flutes 4 form a spiral structure. Indeed, it is the large helical/spiral chip-evacuating flute that forms the spiral structure at its edge, not the flutes 4. The drafter described the flutes 4 as not forming it, but instead breaking up this spiral cutting blade, “divid[ing] [the] main blade into a plurality of first cutting blades 5 and second cutting blades 6.” (*Id.* ¶32.) (**Ex. 1019**, p. 3:24-25).

In addition, the large spiral chip-evacuating flute is always spiral in all of the drawings and in most high-speed twist drills. (*Id.* ¶32.) There would be no need to express that the ends of the flutes 4 form a spiral structure. Moreover, it is the spiral chip-evacuating flute that forms the spiral step-like pattern at its surfaces. (*Id.*). No one would say that it is the flutes 4 that form this spiral surface, especially just after saying that it is the “flutes 4 divide [the] main cutting blade into a plurality of first cutting blades 5 and second cutting blades 6 [to] form step-like structure.” (Ex. 1009, p. 2, col. 1, ¶ [0031]. For this reason, it is clear that the Wang Priority Applications were describing that the lines between the flutes 4 (parallel grooves) can form a spiral structure, namely, one that creates axial relief. (Ex. 2034, Endres Decl., ¶¶29-32 and 38-40).

During prosecution in the U.S., Mr. Wang patent attorneys recited, “The drill bit of claim 1, wherein the connecting lines of the flutes form a spiral structure” as a claim 5 (Ex. 1018 at p.9), and the patent examiner rejected this claim citing Fig. 3 of J.P. Patent No. 63,016,912 (“Shibata”) (Ex. 1018 at p.145). The patent examiner repeated this three times, but each time, the patent attorney argued only to overcome the independent patent claim 1, from which dependent claims 5 depended. Mr. Wang’s attorney never directly addressed the examiner’s rejection of claim 5. As such, Mr. Wang never conceded nor acquiesced to this rejection or any interpretation

of Shibata. Indeed Shibata's Fig. 3 does not illustrate either a connecting line or a spiral structure:

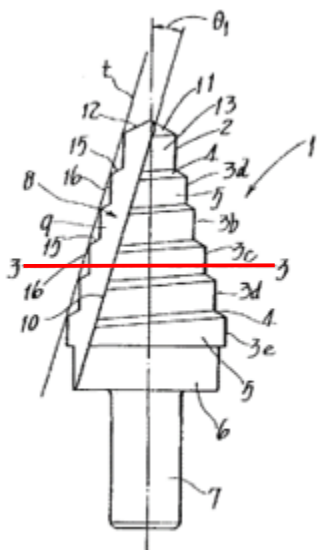


Fig. 1

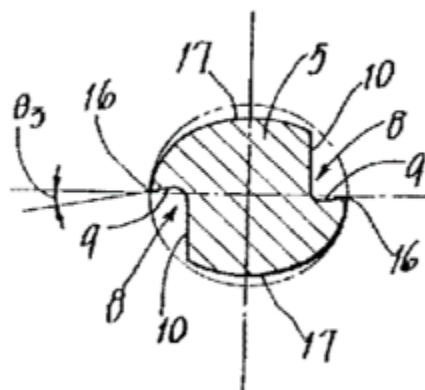


Fig. 3

(Ex. 1015, Shibata, p. 5, Figs. 1 and 3).

Fig. 3 of Shibata is a cross-section taken from the red horizontal line 3-3 in Fig. 1. From these two Figures, it is undeniable that arrow 17 does not point to any actual line, but rather a surface. (Ex. 2034 ¶35). Also, it is undeniable that that surface is not a spiral. It is an oval because the radius gets smaller from major axis (the broken horizontal line) to minor axis (the broken vertical line), but then it grows again once on the other side of the minor axis. This is a hallmark of an oval or ellipse, not a spiral. So, Fig. 3 illustrates neither a connecting line nor a spiral structure. (*Id.*)

More importantly, flutes 8 in Shibata's Figs. 1 and 3 are nothing like the flutes 4 of the '900 Application. Flutes 8 in Shibata are the large chip-evacuating flutes; they are not the plurality of parallel grooves or notches that form the steps of the step

drill. Thus, the surface shown in Fig. 3 is not a line, it forms a cross-section that is oval, not spiral, and it connects two chip-evacuating flutes, not the flutes (or grooves) recited in claim 5 of the '900 Application. Shibata, therefore, was completely misapplied by the patent examiner, and Mr. Wang's patent attorney never once addressed that rejection directly because it was a rejection of a dependent patent claim, and he was focused on attempting to overcome the rejection of the independent patent claim. That was his prerogative, and should not and cannot constitute any sort of admission or waiver, or the like, by Mr. Wang. (*Id.* ¶36.)

And, even Viking's other interpretation of "connecting lines of the flutes" would equally cause the '900 Application to sufficiently support the "spirally" claim term of the '583 Patent. In its Petition, Viking argues that this misunderstanding of Shibata in the prosecution history dictates that the "spiral structure" in the '900 Application should be construed as radial relief, Yet, Radial relief just as readily gives rise to a spiral formation as axial relief. (*Id.* ¶37).

Moreover, the '900 Application describes that the cutting blades and their flank surfaces are similarly step-like or ladder-like in cross-sectional geometry (i.e., the same shape), where the flank surface for each composite cutting blade group is configured so that it does not touch the workpiece:

"connecting lines of the first cutting blades 5 and the second cutting blades 6 form a step-like structure (which can also be called a ladder-like structure), i.e., the main

cutting blades of the present disclosure are step-like structures. ... Meanwhile, a cross section of the entire flank surface 3 is also a step-like structure. Certainly, except the main cutting blades, all flank surface portions can also be of other shapes. The flank surface adopts a ladder-like [described as a step-like structure], structure so that the flank surface does not touch workpieces during cutting ...”

(Ex. 1009, ¶[0031]).

It is a common desire in drill design to prevent the flank surface from touching the workpiece to prevent unnecessary rubbing with the wall of the hole. Thus, the conical and cylindrical flank surfaces are each prevented from touching the wall. A POSA would understand this to mean that axial and radial reliefs provides this gap between the flank surfaces and the wall of the hole.

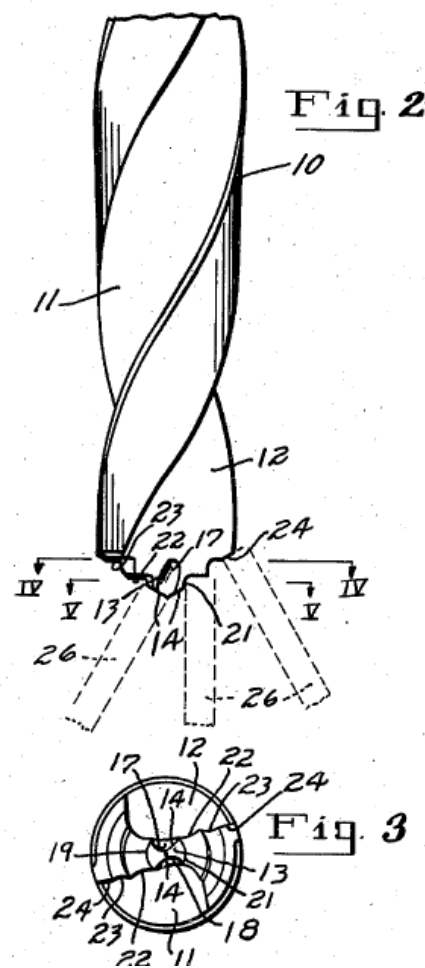
Thus, the ‘900 Application provides written description support for the limitation “a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.” A POSA would recognize that Mr. Wang had possession of the claimed invention as of the date of the ‘900 Application. (Ex. 2034 ¶38, Ex. 2073.) It simply does not matter that the figures of the ‘900 Application do not illustrate axial relief. *Hologic, Inc.*, 884 F.3d at 1362–63. Axial relief is ubiquitous in the industry (and notoriously difficult to illustrate); a POSA would not need to see it

illustrated to understand what was being claimed. *Id.* The multiple descriptions of axial relief in the Wang Priority Applications—both in the context of the connecting lines of the flutes 4 and the second cutting blades 6—are sufficient to enable the POSA to understand that Mr. Wang possessed what is being claimed as of February 14, 2016. (Ex. 2034 ¶¶39-40). As such, the ‘900 Application is not prior art and Viking’s first ground must fail.

B. Claims 1, 2, 5, 7, 8, 12, 14, 15, and 19 Are Not Rendered Obvious By Bannister in View of Zhou and/or Welty

Contrary to Viking’s Petition, Ground 2, the combination of Bannister in view of Zhou and/or Welty does not render obvious any of the asserted claims of Wang’s ‘583 Patent.

Bannister discloses a pilot point drill bit with an additional normal-ground surface and a beveled outer shoulder 24 on the cutting blade. (Ex. 1006, Fig. 2). It explains that this additional beveled outer shoulder is included to produce long chips, especially when working on soft metals. Production of long chips by this outer shoulder is important, according to Bannister, to entangle and carry out any fine chips created by the straight intermediate cutting blades 22. (*Id.*, p. 2, col. 1:10-19). Otherwise, the fine chips



could remain behind and cause the drill bit to jam and freeze during operation. (*Id.*, col. 2:7-12).

Importantly, Bannister discloses that the intermediate major cutting edge **22** is “preferably” normal (perpendicular) to the axis, not non-normal as is the case when the CE flue intersects a conical surface (**141** in the ‘583 Patent). (**Ex. 1006**, at 3, col. 1:7-10 and 1:74-75). These normal cutting edges are shown in Fig. 2 where grinding wheel **26** is specifically oriented parallel to the drill bit axis when forming cutting edge **22** (cutting edge **23** is likewise shown as normal). By contrast, the grinding wheel is illustrated as angled from parallel where forming the first cutting edge **14** and the additional shoulder **24**. (*Id.* at 3, col. 2:19-22).

The only element for which Viking introduces Zhou and Welty is the purported concept that the intermediate cutting edges **22** and **23** could be conical. Thus, even if a POSA combined Bannister with Zhou and Welty (which they would not do), they would not arrive at the claimed invention of the ‘583 Patent. (**Ex. 2034**, **Endres Decl.**, ¶ 43).

Specifically, a POSA would not consider Wang’s ‘583 Patent claims obvious in light of Bannister. Bannister fails to disclose, among other limitations recited in Claim 1, a conical first step surface, a major cutting edge, a minor cutting edge, or a cutting tip as recited in Claim 1. Viking admits in its Petition that there is no conical first step surfaces. (*Petition*, p. 68). Moreover, there is no motivation in the art to

form the first steps surfaces conically. Bannister in fact expressly states the importance that such surfaces be normal to the cutting axis.

There is no major cutting edge as recited in Claim 1 because the first step surfaces are normal, not conical, and because the flute is not spiral where it intersects the first step surfaces, but is rather straight as can be seen in Fig. 3 (reproduced here). (Ex. 2034, ¶45).

For these same reasons, Bannister does not disclose any minor cutting edge as recited in Claim 1 since, where the flute intersects the second step surface, the flute surface is straight, not spiral. Since Bannister does not disclose a major cutting edge or a minor cutting edge as recited in Claim 1, it follows necessarily, that Bannister also does not disclose a cutting tip as recited in Claim 1. (*Id.* ¶46).

Additionally, each composite cutting blade group is not configured to crush cutting chips into finer chips. In particular, the beveled cutting edges, according to Bannister, are intentional. They are designed specifically to form long chips that are not to be broken into finer chips. (*Id.* ¶47). Bannister expresses the importance of keeping these chips long for its overall configuration when he states, “the outer or largest drill unit [is] preferably ground to a beveled or conical cutting edge whereby, when drilling soft metals, such as soft steel, copper and the like, long spiral chips are produced. These long spiral chips thus formed take with them the short chips formed

by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it.” (*Id.* at 2, col. 1:10-19).

The beveled cutting edge has a single job as described by Bannister, which is to produce long spiral chips that carry the short chips. If the shorter chips are crushed to finer chips as claimed, then the long chips could have difficulty carrying the fine chips, as there is less chip length to engage. (*Id.* ¶48). The petition asserts Bannister inherently teaches crushing chips into finer chips, and does not argue that Zhou or Welty teaches this feature in an obviousness analysis. Viking cannot change their original argument from inherency in just Bannister to obviousness/inherency in view of secondary references. Thus, showing that Bannister does not inherently teach this feature could defeat the entire rejection.

“a drill ... which shall be effective to clear the hole being drilled of chips as they are formed.” (**Ex. 1006** at 1, col. 1:9-11). Thus, Bannister seeks to provide a drill that evacuates the chips “as they are formed,” and does not crush chips into finer chips. Another object of Bannister was “to reduce to a minimum the metal to be crushed during the drilling operation.” (*Id.* at 1, col. 1:16-17). Again, this is Bannister directly stating the desire to reduce the amount of chips being crushed.

“Use of inherency in the context of obviousness must be carefully circumscribed ...” *Honeywell* (Fed. Cir. 08/01/17) (rev’g PTAB obviousness decision in IP Reexam). “A party must ... meet a high standard in order to rely on

inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis—the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.” *Knauf Insulation* (Fed. Cir. 02/27/17) (non-precedential) (aff’g PTAB obviousness decision). “Anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must *necessarily* include the unstated limitation.” *Transclean* (Fed. Cir. 05/21/02) (no inherent anticipation despite possibility that limitation of equalizing flow rates would be met under some circumstances). “The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *White* (Fed. Cir. 02/19/16) (non-precedential). “The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic.” *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art). *MPEP* 2112(IV). “[I]n order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis – the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.” *PAR Pharmaceutical, Inc. v. TWI Pharmaceuticals, Inc.*, 773 F.3d 1186, 1195-96 (Fed. Cir. 2014) A petitioner arguing obviousness under 35 U.S.C. § 103 must demonstrate

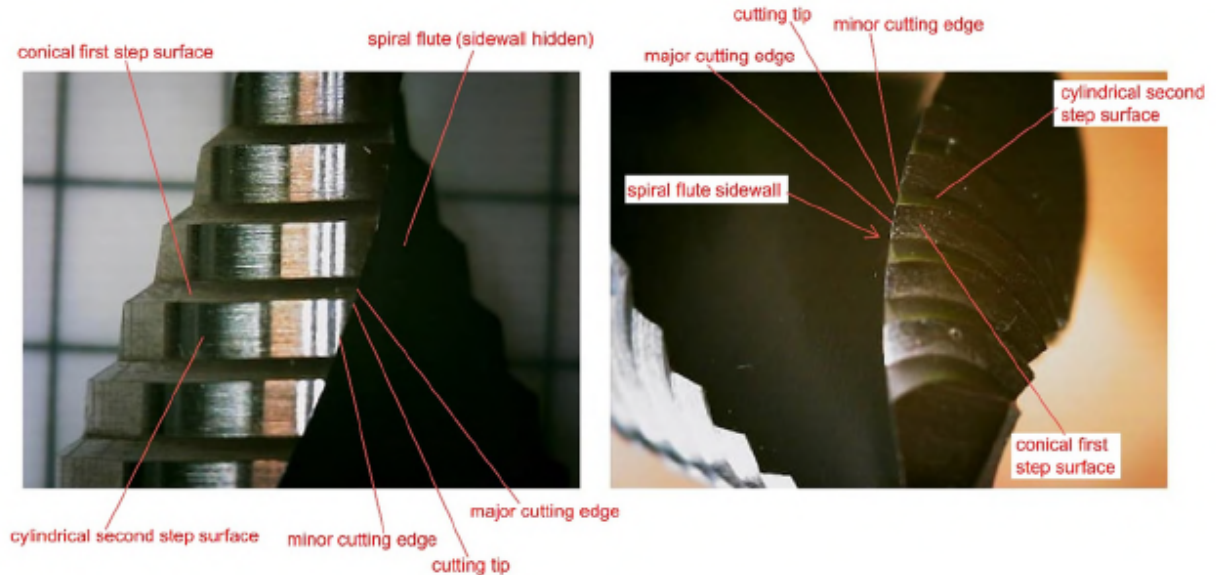
that the cited references disclose or render obvious each element of a challenged claim. *See, e.g., Google LLC v. At Home Bondholders' Liquidating Tr.*, 722 F. App'x 1044, 1048 (Fed. Cir. 2018) (affirming Board finding of non-obviousness because principal prior art reference missed claim limitation).

Claims 1 and 8, by contrast, 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 the context of the present specification, the term “spiral” here is defined as “[a] three-dimensional curve traced by a point moving round and simultaneously advancing along a ... cone.” *The Shorter Oxford Dictionary*, Oxford University Press, 2007. 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”. (**Ex. 1006**, 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).

Without sufficient analysis, Petitioner argued that “Bannister shows a major cutting edges defined by the intersection of a step surface and the sidewall of the

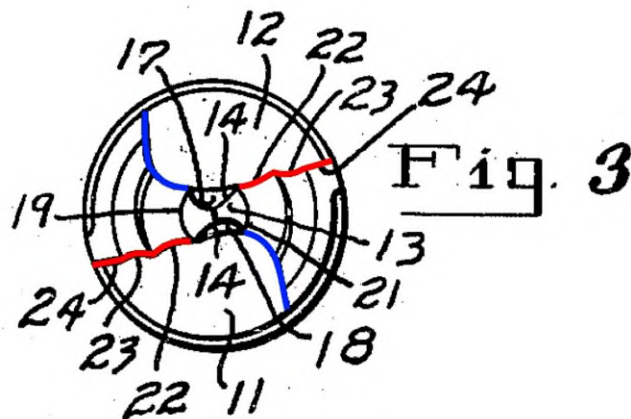
spiral flute.” In his report, Dr. Schmid opined that “[s]imply viewing Bannister Figure 2 and observing the intersection of the sidewall of the flute and the conical first step surface is sufficient to show that this element is present.” (Ex. 1004, ¶ 209). And “[s]imply viewing Bannister Figure 2 and observing the intersection of the sidewall of the flute and the cylindrical second step surface is sufficient to show that this element is present. (*Id.*, at ¶ 212). Dr. Schmid goes on to argue the presence generally of cutting edges.

Below are photographs of the ¾” Matco Tools Hyper-Step Part No. DBHS48 (within the scope of at least claims 1 and 8 of the ‘583 Patent) showing the uninterrupted curvature of the major cutting edges and the minor cutting edges along a spiral line of the flute due to being, in-part, defined by the sidewall of the spiral flute (where the sidewall must also be spiral). Although the major cutting edge and the minor cutting edge being curved rather than straight is not explicitly recited in the claims, the curved major and minor cutting edges are necessarily present when the claim limitations are met. This analysis is not meant to introduce new words into the claims, but rather is a tool to analyze whether Bannister discloses the limitations of Claims 1 and 8 (and their respective dependent claims). (Ex. 2034 ¶51).



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 plane. Petitioner’s Expert, Dr. Schmid, 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. 1004 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. And therefore, 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. That is, the major and minor cutting edges, as defined in the claims, cannot be individually scalloped with radii differing

from the spiral curve. The supposed major cutting edges as proposed by Petitioner are indicated in red highlight. The flank edge is indicated in blue highlight, where the flank edge is defined by the intersection of the spiral flute sidewall and the flank face. It can be readily seen that the flank edges are curved (due to the curvature and spiral of the flute) and the supposed major cutting edges are individually radiused (or scalloped) and extending generally normal to the rotational axis of the drill bit. A POSA would understand that these individually radiused cutting edges are not the result of the step surfaces intersecting the spiral wall of the flute, but must be ground into that shape instead (e.g., a facet or concavity is ground into the sidewall of the flute, eliminating the flute sidewall beneath the cutting edges). Essentially, the wall defining Bannister's cutting edges is not spiral. Therefore, Bannister fails to disclose 1) a major cutting edge that is defined by defined by the intersection of the conical first step surface and the sidewall of the spiral flute nor 2) a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute.



A POSA would not be motivated to modify Bannister's beveled cutting edge with the angled segmented edges of Zhou or with the angled steps of Welty.

The advantages petitioner asserts are provided to Bannister's drill by the structures of Zhou or Welty are redundant to the advantages already described in Bannister and/or advantages not needed by Bannister. Petitioner describes a long list of advantages that are supposedly bestowed by the Zhou or Welty, but are already described in the text of Bannister. (Ex. 2034 ¶108).

The supposed advantages of "reduced drilling axial resistance and torque" and "increased drilling efficiency" is redundant to and not needed in Bannister: "a drill which shall be operable with much less power." (Ex. 1006 at 1, col. 1:1-5). Because the first or smallest drill unit is of substantially the same diameter for all diameter drills" ... "power requirement for drilling large holes is thus reduced to the amount required for driving the cutting edges through the metal and the amount heretofore required for crushing the large central cores is eliminated. (*Id.* at 2, col. 2:20-30). "In grinding my improved drill, ... the last cutting edge 24 [is] formed within an angle of approximately 59° to the axis of the drill, or an included angle of 118°, which is considered the most efficient angle in grinding twist drills." (*Id.* at 2, col. 2:56-62). "As seen in Figs. 3 and 5, the provision of the auxiliary flutes reduces the central core area at the point to where it is negligible, so that the amount of metal to be crushed in drilling is reduced to a minimum and the feeding pressure for the drill is

greatly reduced. I have found, in actual tests with a one inch drill, that the feeding pressure required, as compared with a standard conical point drill, was reduced more than 42%.” (*Id.* at 2, col. 2:27-36).

A drill bit that has reduced power requirements will, as a result, will be more efficient and have reduced drilling axial resistance and torque. These advantages are already provided by existing structure in the Bannister device, such as the small first drilling unit and the single bevelled cutting edge. (Ex. 2034 ¶110). Petitioner has failed to describe how the proposed modifications would provide an advantage over and above the advantages already inherent to Bannister’s drill bit, and how they are not redundant thereto. Since Bannister and either Zhou or Welty disclose drill bits that serve the same function and “[b]ecause each device independently operates effectively, 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 Bannister “would have been an improvement on what [Bannister’s drill bit] already

provides.” *See Sony Corp. v. Fujifilm Corp.*, IPR2018-01751, Paper 14, 11 (PTAB April 12, 2019).

The supposed advantage of “improved separation and expulsion of swarf” is redundant to and not needed in Bannister: (Ex. 2034 ¶111). A metal working twist drill is disclosed “which shall be effective to clear the hole being drilled of chips as they are formed.” (Ex. 1006 at 1, col. 1:3-12). “The chips from the small drill unit are carried up the auxiliary flutes into the main flutes and thence off with the chips from the other drill units.” (*Id.* at 1, col. 2:54 - 2, col 1:2). “These long spiral chips thus formed take with them the short chips formed by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it.” (*Id.* at 2, col. 1:15-19). “As is well known, bevelled cutting edges, in drilling soft metal, such as copper or soft steel, produce long chips, whereas cutting edges normal to the axis of the drill produce short chips, and the short chips are liable to jamb the drill in the hole and cause it to break off. By providing the bevelled cutting edges 14 on the central drilling unit 13, and the bevelled cutting edges 24 on the outer drill unit, I am enabled to produce long chips along with the short ones, which long chips entangle with the short ones and carry them out of the hole being drilled.” (*Id.* at 2, col. 2:7-18).

The advantage of separating and removing chips/swarf is already provided in Bannister by the single bevelled cutting edge and by the auxiliary flutes. (Ex. 2034

¶112). Bannister does not require modification by Zhou or Welty for this advantage. There is no need in Bannister 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.

The supposed advantage of “reduced binding” is redundant to and not needed in Bannister: “The sides 19 and 21 of the drilling unit 13 are made vertical, and are ground without radial clearance, whereby they have a snug bearing with the walls of the hole at all times, which holds the drill steady and insures a round hole. The central unit is so short that the absence of radial clearance does not cause the unit to bind and heat is not generated due to the absence of radial clearance.” (**Ex. 1006** at 2, col. 1:62-71). The advantage of reduced binding is already provided in Bannister by keeping the vertical wall height short. (**Ex. 2034** ¶113).

There is no evidence provided by Petitioner that making each step a conical step as taught by Zhou or Welty would further reduce binding; and there is no indication that binding is a problem with Bannister’s already operationally effective drill bit. *See Ex parte Saiki*, Appeal No. 2000-0373, Ser. No. 08/450,245 (Jan. 31, 2002).

The supposed advantage of “more accurate and round drilling holes” is redundant to and not needed in Bannister: A metal working twist drill is disclosed “which shall be effective to drill a round hole” (**Ex. 1006** at 1, col. 1:1-6). “The first drill unit, and each succeeding drill unit, acts as a guide for the following drill unit

so that the drill runs true and drills a straight round hole.” (*Id.* at 1, col. 2:46-49). “The sides 19 and 21 of the drilling unit 13 are made vertical, and are ground without radial clearance, whereby they have a snug bearing with the walls of the hole at all times, which holds the drill steady and insures a round hole.” (*Id.* at 2, col. 1:62-67). “I grind the drill so that the point presents a series of drilling units. The first unit corresponds to a drill of relatively small diameter, say 3/8 inch, having a central core of minimum area which may readily be entered into the ordinary center punch mark of the metal to be drilled, and which therefore maintains its proper starting position. The hole is thus centered to start and there is no necessity of raising the drill and employing a hand tool to center it.” (*Id.* at 1, col. 2:34-43). (Ex. 2034 ¶114).

The supposed advantages of “drill bit durability” and “cutting edge wears more slowly” is redundant to and not needed in Bannister: “There being less crushing of the material, there is less heat generated, and a drill made in accordance with my Invention will do much more work without regrinding.” (Ex. 1006 at 2, col. 2:45-47). (Ex. 2034 ¶115).

Proposed modification to replace Bannister’s perpendicular steps with the angled steps of Zhou or Welty defeats Bannister’s principle of operation. (Ex. 2034 ¶116). “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). Petitioner argues a POSA would have been motivated to modify Bannister with the angled step as taught by Zhou or Welty to create a plurality of composite cutting blade groups, with each group having a conical first step surface. The petitioner must also establish that one of ordinary skill at the time of invention would have had sufficient (i) reason to combine the cited references, and (ii) reasonable expectation of success in making the combination. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418-19 (2007); *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018). This requires a persuasive showing of the “why” and “how” for the alleged obvious combination. *See Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-00582, at *32 (P.T.A.B. Aug. 5, 2019) (Paper 34) (informative). Instead, Petitioner made conclusory statements that “conical first step surfaces were well known in similar prior art drills with stepped tips, such as those shown in Zhou and Welty”. There is no description of how or why a POSA would have converted Bannister’s bevelled cutting edge from a bevel (or chamfer) design (*i.e.*, to cut away a square edge) to the claimed conical first step surface (*i.e.*, slating the entire distance between two cylindrical second step surfaces), in each of a plurality of composite

cutting blade groups. That is, instead of one bevel as described in Bannister, Petitioner suggests extensive modification to expand the bevel and eliminate all the perpendicular steps.

Bannister describes a metal working twist drill “which shall be effective to clear the hole being drilled of chips as they are formed.” (**Ex. 1006** at 1, col. 1:3-12). “The chips from the small drill unit are carried up the auxiliary flutes into the main flutes and thence off with the chips from the other drill units.” (*Id.* at 1, col. 2:54 - 2, col. 1:2). “These long spiral chips thus formed take with them the short chips formed by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it.” (*Id.* at 2, col. 1:15-19). “As is well known, bevelled cutting edges, in drilling soft metal, such as copper or soft steel, produce long chips, whereas cutting edges normal to the axis of the drill produce short chips, and the short chips are liable to jamb the drill in the hole and cause it to break off. By providing the bevelled cutting edges 14 on the central drilling unit 13, and the bevelled cutting edges 24 on the outer drill unit, I am enabled to produce long chips along with the short ones, which long chips entangle with the short ones and carry them out of the hole being drilled.” (*Id.* at 2, col. 2:7-18). “The drill is next ground ... with a series, or plurality of steps, of cutting edges 22 and 23 which are normal to the axis of the main drill ...” (*Id.* at 2, col. 1:72-75).

Bannister's basic design principle is that small chips are created by the central drilling unit 13 and the square cutting edges 22 and 23 of successively larger drill units. The bevelled cutting edges have an importance and central task in Bannister's design, namely to carry off smaller chips created by the perpendicular steps of cutting edges 22 and 23. Further, the bevelled cutting edges have an important position – at the very back, nearest the body of the twist drill, so that the small chips transported by the auxiliary and main flute are carried further back and out of the hole by the long spiral chips created by the bevelled cutting edges. To change this design as proposed would completely change the operation of Bannister's drill. (Ex. 2034 ¶118).

Likewise, neither Zhou nor Welty provide any motivation for a POSA to combine a conical cutting edge from Zhou or Welty with the drill bit taught in Bannister. (Ex. 2034 ¶119).

Zhou teaches a twist drill with a top blade, intermediate cutting edges 3 and 4 (on opposite sides of flute 9) and outer cutting edges 1 and 2 (on opposite sides of flute 9). The innovation Zhou attempts to disclose is that his cutting edges 1 and 3 are offset axially from each

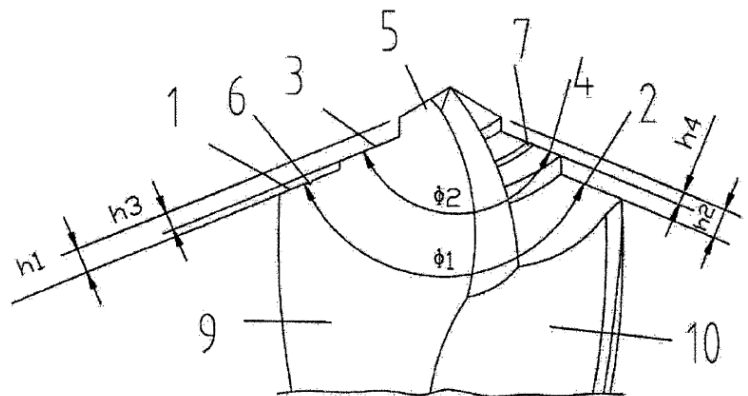


Fig. 1

other and that 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). Then, the drop from top blade 5 to cutting edge 2 is greater than the drop from top blade 5 to edge 1 (i.e., the cutting edges are simply asymmetrical, with $h_3 > h_4$ and yet $h_1 < h_2$). (*Id.*).

Zhou's focus is on reducing drilling axial resistance, increasing swarf separation and removal, drilling efficiency and drill bit durability with asymmetrical edge heights. (*Id.*, p. 7, ¶ [0014]). There is nothing in Zhou to suggest any motivation or reason to expect a one

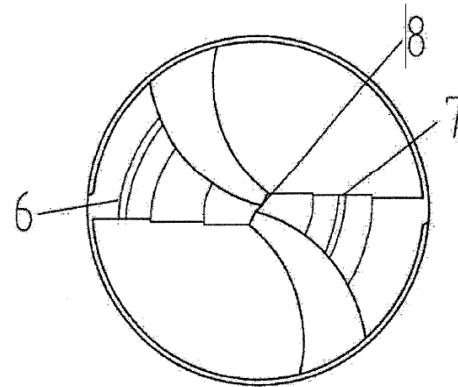


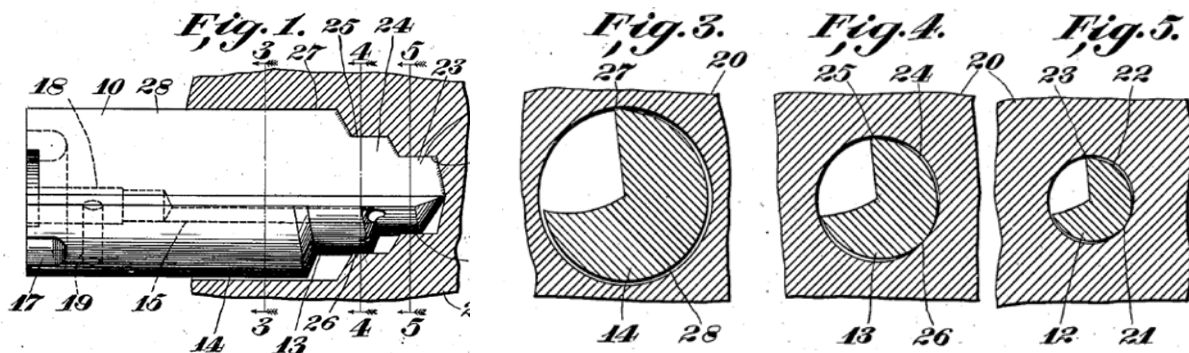
Fig. 2

could take the angled cutting edge of Zhou, which is not a major focus or teaching of Zhou, to modify Bannister where Bannister teaches against using all angled cutting edges, and the combination still does not cover the claims of the '583 Patent. The modification suggested by Viking would in fact defeat the main stated function and purpose and teaching of Bannister.

Welty, likewise, does not afford Viking the patent claim invalidating configuration that Viking seeks. 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., ¶119). Gun drills use a single-edge blade at the cutting end and pressured coolant to flush chips out and up the single flute. (Exs. 2099-2104). 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. (**Ex. 1008**, p. 2, col. 1:50-col. 2:4, col. 2:4-11, and col. 2:50-54).

Specifically, Welty discloses 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. (*Id.*). The body 10, on the other hand, has a cutting edge 27, but no heel. (*Id.* at p. 2, col. 2:14-25). Unlike the top blade and the intermediate step, the drill bit body has a true circular cross-section:

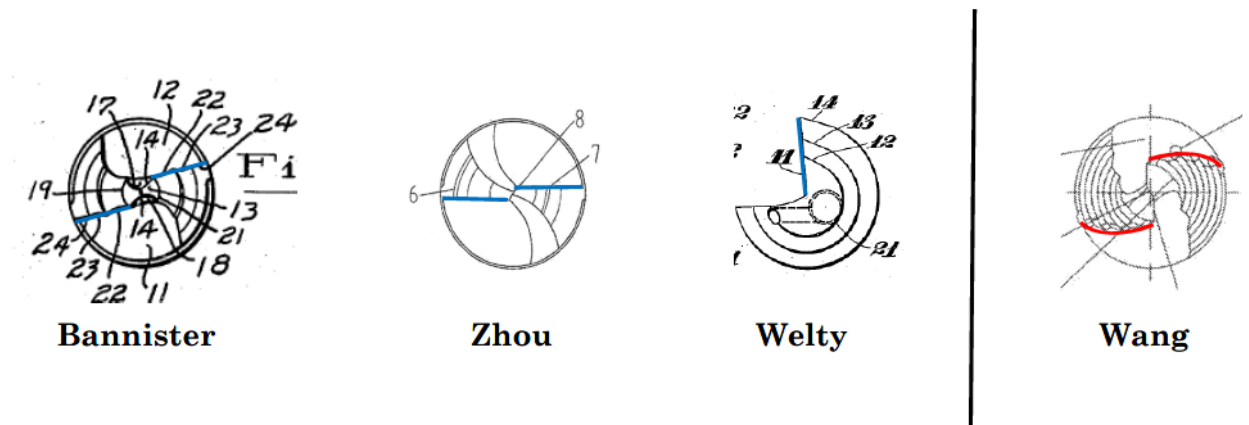


Welty teaches that it angled cutting edges to reduce axial resistance, nota focus of Bannister, and Welty’s focus and teaching is to provide a single cutting edge per each of the three diameters (23, 25, and 27) and “heels” (21 and 23) that “also serve as bearing supports for the cutting edges” by being placed roughly opposite the cutting edge in the direction of the resultant force in that axial-normal plane. (*See, id.*).A POSA using Bannister would not think to combine any teaching of Welty, or vice versa. (*Id.*).

C. Claims 13, 18, and 22 Are Not Rendered Obvious By Bannister in View of Zhou and Welty and/or Korb

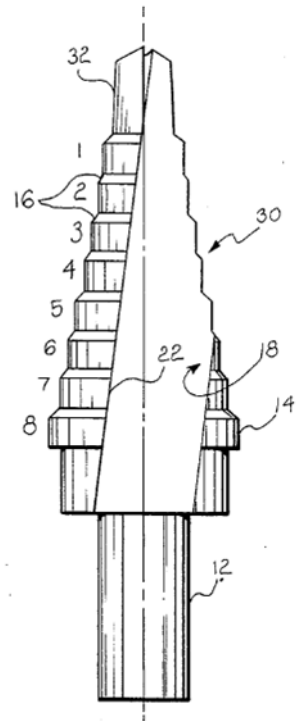
a. Primary Considerations Demonstrate Non-Obviousness

Claims 18 and 22 of Wang’s ’583 Patent recite the addition that the plurality of cutting tips formed by the plurality of CCBGs are arranged spirally. Bannister, Zhou, and Welty do not teach or suggest this combination since each has a straight, not spiral, arrangement of the cutting tips (shown in blue below); by contrast, Wang’s cutting tips, in Claims 19 and 22, are formed spirally (shown in red below):



(**Ex. 2003**, Endres Decl., ¶ 41; **Ex. 1003**, p. 535, col. 2:8-22). Also, merely two cutting tips behind the top blade, as taught by Bannister, Zhou, and Welty cannot, by themselves, actually form a spiral arrangement. (**Ex. 2003**, Endres Decl., ¶ 42). A plurality of cutting tips would have to number four or five to arguably form a spiral of any sort. (*Id.*)

Viking attempts to combine the teaching of Figure 7 of Korb (U.S. Patent No. 4,582,458), (**Ex. 1012**, p. 4; reproduced here to the right) of a long top blade atop a step drill (in the case of claim 13) and for a spiral arrangement of cutting tips (in the case of claims 18 and 22). Korb, however, is a step drill (*see*, **Ex. 1012**, p. 1, ¶ [54] and p. 5, col. 1:30-34), and it was not at all obvious to combine features of a step drill disclosure to the structure of a twist drill.



As a step drill, Korb is configured to be able to drill holes of different diameters in a metal sheet, I-beam webbing, or other relatively thin workpieces. (*Id.*, at p. 2, col 1:34-42; **Ex. 2003**, Endres Decl., ¶ 43). This is a far different application from that of Bannister and Zhou (which are twist drills) and Welty (a gun drill), configured to bore deep into (a blind hole) or through a relatively thick workpiece. (**Ex. 2003**, Endres Decl., ¶ 43). Step drills have evolved over decades for the sole purpose of making any one of many sizes of holes in thin

material. Like gun drills, they are a specialty class of drill in contrast to twist drills being the commonplace baseline type of drill. A twist drill, including that of Mr. Wang's, is of a whole other class of tools, intended for making a single sized hole for that given drill's size/diameter. Further, if Mr. Wang's conical portion is really thought to be a step drill, it would be relatively useless as the axial dimension of each step would be constrained to cutting through such thin material that the material will have little structural stiffness and strength to keep it from being not destroyed. Of course, given the length of the drill behind the conical portion, this would be nonsensical to consider it as a step drill. (*Id.*)

Twist drill innovators apparently have had no motivation to combine the teachings of step drills with the structure of a twist drill. Twist drills have existed since the 1800s and step drills have existed since the mid-1900s. (**Ex. 2034**, Endres Decl., ¶¶ 162-164, 181-185). Yet, prior to the introduction of Mr. Wang's patented drill configuration, no one combined a cone portion on the front of the structure of a twist drill and formed a plurality of stepped surfaces on the cone's exterior that define a plurality of cutting tips in a spiral arrangement for the purposes and benefits described in the Wang '900 and the '583 Patent. (*Id.*)

Thus, when drilling large diameter holes through metal with a twist drill, it was necessary to first drill a pilot hole with a smaller-diameter drill bit, or else experience drill "walking." (**Ex. 2034**, ¶ 183). This would require users to switch

drill bits during cuts. (*Id.*) The unique tip geometry of Mr. Wang’s patented design enabled users to drill large-diameter holes with a twist drill, without the need to first drill a pilot hole (and thus eliminating the need to switch drill bits). (*Id.*) Mr. Wang’s patented drill configuration came with numerous unexpected benefits as well, including: (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. 1001**, p. 14, col. 9:14-31; **Ex. 2034**, ¶ 164).

b. Objective Evidence of Secondary Considerations Also Overcomes 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.

1. 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.² 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 the ‘583 Patent. (Ex. 2034, ¶¶138-141; 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).

² 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.)

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.* ¶¶151, 154-155.) 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) MATDB29HSR³ (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.* ¶159.) 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 impact on patentability or functionality. (*Id.*) The cobalt drill bits are still “essentially the claimed invention.” (*Id.*)

³ 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.)

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.

2. 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.

(a) Copying

(i) *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]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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[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]

[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.

(ii) 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.

(b) **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.)

(c) **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] sets 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

[REDACTED]

[REDACTED] (Fisher Decl., ¶15, Ex. 2040 at pp. 1, 4.)

[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] do the same for the Vortex Point drill bits. (*Supra*, §II.B.2.b.i.A.)

(d) **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.)

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 RESPONSE TO VIKING DRILL & TOOL’S PETITION I FOR INTER PARTES REVIEW OF U.S. PATENT NO. 11,007,583** is 13,025.

/Kelly W. Cunningham/
Kelly W. Cunningham
USPTO 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 RESPONSE TO VIKING DRILL & TOOL'S PETITION I 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

IPR2023-00473

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

A. The Wang '900 Application Is Not Prior Art Because It Was Filed After the Priority Date for Each of the Challenged Patent Claims

5. For its Ground 1 in its first Petition, Viking argues that the '583 Patent is invalid based on U.S. Patent Application No. 15/847,900 ("the Wang '900" or "the '900 Application," **Ex. 1009**) in combination with U.S. Patent No. 8,029,215 ("Gentry") and/or U.S. Patent No. 10,058,929 ("Durfee"). Wang, filed on is the United States national stage patent application of Mr. Wang's Chinese-language PCT patent application (PCT Patent Application No. PCT/CN2016/073767, "the '767 PCT Application," **Ex. 1019**), and the parent of the application that matured into the '583 Patent. Collectively, I will refer to Mr. Wang's '900 Application and '767 PCT Application as "the Wang Priority Applications."

6. I understand that, in order to be entitled to the priority date of an earlier-filed application, the specification of the earlier-filed application must contain a written description of the invention and the manner and process of making and using it, in such full, clear, concise, and exact terms, to enable a person of ordinary skill in the art to practice the invention claimed in the later-filed application. I understand that the test is whether a POSA would recognize that the applicant possessed what is claimed in the later filed application as of the filing date of the earlier-filed application.

7. In my opinion, the Wang Priority Applications both provide sufficient written description support for each recited element of the challenged claims of the '583 Patent.

8. Viking argues that the Wang Priority Applications do not provide support for the claim limitation “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.” Viking fully acknowledges that the Wang Priority Applications provide sufficient written description support for each of the remaining elements of the challenged claims of the '583 Patent. Indeed, this is Viking's basis for arguing that the '900 Application renders the challenged claims of the '583 Patent obvious, that it discloses all of the elements of the challenged patent claims except for the above-quoted claim element, “a plurality of

composite cutting blade groups formed ... spirally.” I agree with Viking that the Wang Priority Applications provide sufficient written description support for these other patent claim elements. I only disagree with Viking in that it is my opinion that the Wang Priority Applications further provide sufficient support for this claim element, “a plurality of composite cutting blade groups formed ... spirally,” as well.

9. Viking construes this “spirally” limitation in this context to mean that the cutting blades are not perpendicular to the drill bit’s rotational axis, but rather have a “slant” creating axial relief behind the cutting edges.

10. I agree with Viking’s construction of the term “spirally” in this context, and it is my opinion, for the reasons stated below, that a POSA would interpret the Wang Priority Applications as disclosing that the stepped surfaces could or should exhibit axial relief, that is, could or should be formed spirally. A POSA would know that drill bits have axial relief at the least; a drill bit simply will not penetrate without axial relief, and, in terms of radial relief, the drill bit will likely experience some rubbing on the surface of the hole if there is no radial relief of some sort.

11. First, providing an axial relief to the drill bit behind the cutting edges is well-known in the industry. Indeed, axial relief is so ubiquitous and such a conventional element that a POSA would readily infer it or assume it with or

without an illustration or a thorough explanation that a given drill bit would contain some axial relief following the cutting edges. This is the case with the '900 Application. It is my opinion that a POSA would interpret the description in the '900 Application to include axial relief and recognize that Mr. Wang had possession of that aspect of his invention from reading the '900 Application.

12. Moreover, it is my opinion that a POSA would interpret the Wang Priority Applications as providing sufficient written description support for axial relief and this “spirally” limitation. In particular, both the '767 PCT Application and the '900 Application describe that the line that connects two adjacent flutes 4 can be a spiral in shape:

“The flutes in the present invention may be curved flutes adapted to the curvature of the rear surface, or the connecting line of the flutes is of a spiral structure.”

(Ex. 1019, p. 4:20-21, which Viking renumbered the page as p. 5).

“The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, or the connecting lines of the flutes form a spiral structure[.]”

(Ex. 1009, p. 2, ¶ [0035], which Viking renumbered the page as p. 16).

13. The “flutes” in the Wang Priority Applications are what we would now call parallel grooves. It is understandable that Mr. Wang or his patent attorney

would not know what to call them -- these grooves had never ever been formed before on the cone portion of a twist drill, and thus no one had ever had to describe them before Mr. Wang's invention.

14. In any event, these flutes 4 are described and illustrated in the Wang Priority Applications as “a plurality of flutes 4 arranged in parallel and spaced apart from each other are provided symmetrically along a [conical] surface 3 of the cutting portion.” Whereas, without flutes 4, there would be a main cutting blade at the intersection of the conical surface 3 with the chip-evacuation flute, that intersection line being of spiral form, the presence of flutes 4 “divide [this] main cutting blade into a plurality of first cutting blades 5 and second cutting blades 6”:

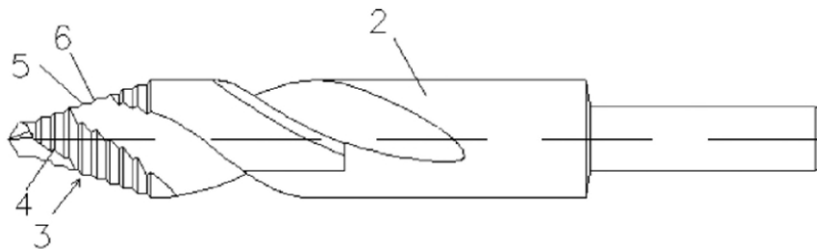
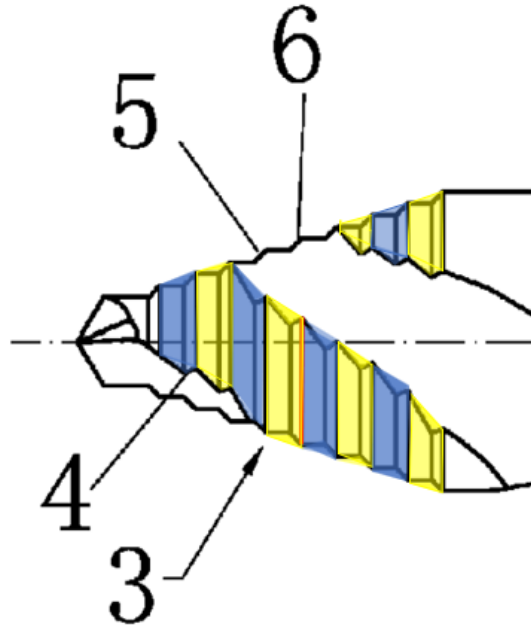


FIG. 5

(Ex. 1019, p. 3:24-25, which Viking renumbered the page as p. 4).

15. As shown in Figure 5, the plurality of flutes 4 are parallel and adjacent to one another. Below is a copy of the cone portion of the same Figure 5 (essentially) of the '900 Application, which I have enlarged and have highlighted the flutes 4 in alternating colors, blue and yellow:



16. Since each flute 4 is parallel and touching the adjacent flutes 4, each shares an edge -- a line -- that connects them, literally “connecting lines of the flutes 4”:

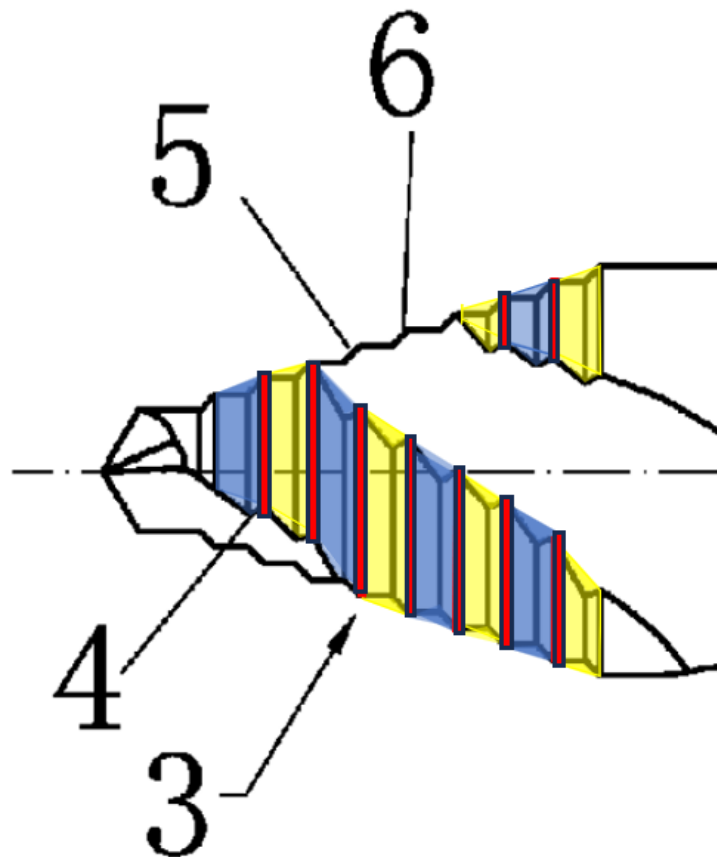
“The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, or the connecting lines of the flutes form a spiral structure[.]”

(Ex. 1009, p. 2, ¶ [0035], which Viking renumbered the page as p. 16).

17. A POSA would understand the phrase, “the connecting lines of the flutes” to mean the lines that connect the flutes. Again, each flute 4 is a curved triangular prism cutout from the cone’s surface. Each successive curved triangular prism cutout has a curved long edge that borders the curved long edge of the next

flute 4. The line that the long edges of the two adjacent flutes share is, indeed, “the connecting line” of those two flutes.

18. Below is a blown up view of just the cone portion end of the drill bit of Figure 5 of the ‘900 Application, in which I have highlighted the “plurality of flutes 4 arranged in parallel and spaced apart from each other” in blue and yellow, with the connecting lines of the flutes 4 highlighted in red (and outlined in black for visibility).



19. These are the only structures that the “connecting lines of the flutes” could plausibly refer to in this context.

20. Notice that the first part of the sentence, “The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface” means that the flutes (grooves) could be an arc directly around the cone, *i.e.*, with very little axial relief, if any. The second part of the sentence, separated by a word, “or,” indicates an alternative configuration in which “the connecting line of the flutes form a spiral structure,” *i.e., technically not an arc of a circle around part of the cone, but rather slanted down and around the cone along a spiral line.*

21. A POSA would interpret the corresponding paragraph of the ‘900 Application in the same manner, too.

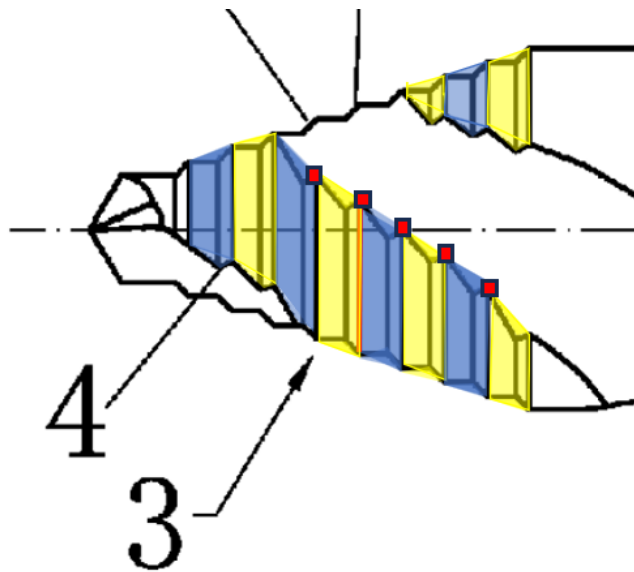
“The flutes of the present disclosure may be arc-shaped flutes adapted to a radian of the flank surface, or the connecting lines of the flutes form a spiral structure[.]”

(Ex. 1009, p. 2, ¶ [0034], which Viking renumbered the page as p. 16).

22. I note that Viking argues only that a POSA could potentially interpret the “connecting lines of the flutes” to refer to different structures of the Wang Priority Applications, other than the composite cutting blade groups being slanted. Viking appears to concede that Patent Owner’s interpretation is reasonable, but argues instead that a POSA would not understand that the Patent Owner “necessarily possessed” the claimed slanted cutting blade groups.

23. In my opinion, Viking’s alternative interpretations of this language are non-sensical in context.

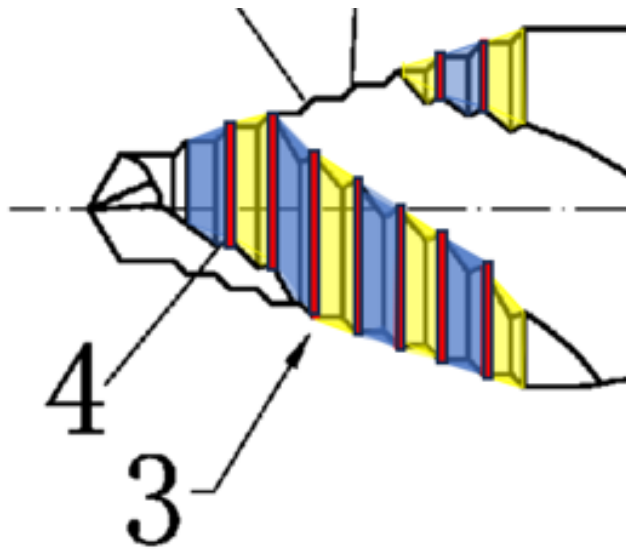
24. For Viking’s first offered interpretation, Viking and its expert argue that “connecting lines of the flutes” could be the lines along the leading edges of the cutting blade groups. Under this interpretation, Viking would interpret “connecting lines of the flutes” as referring to the cutting tips of the composite cutting blade groups, which I have highlighted in red below in the annotation of Figure 5 of the ‘900 Application, below.



25. As can be readily seen, however, the cutting tip of a composite cutting blade group is a **point**, not a **line**. A POSA would have no reason to interpret “connecting **line**” to refer to a point.

26. Moreover, there is only one connecting line for any two adjacent flutes 4. It is not at the ends of the grooves. At the ends of the grooves, where they

intersect the large spiral chip-evacuation feature, the two adjacent grooves connect only at a point, namely, the cutting tip between two adjacent cutting blades 5 and 6. The only actual line that connects two adjacent flutes 4 in the Wang Priority Applications is the line where the conical surface formed by one flute 4 intersects the cylindrical surface formed by the adjacent flute 4.



27. The context of these disclosures also supports this interpretation. Mr. Wang or his patent attorney twice described this spiral shape that the flutes 4 can make, once in their Summary of the Invention, paragraph [0010] , and again in their Detailed Description of the Embodiments, paragraph [0035] (of the '900 Application, that is; the paragraphs of the '767 PCT Application are not numbered, but are in the exact same place in both applications). In each instance, they had just described the separate set of connecting lines, those formed by the cutting blades:

“[0006] ... and connecting lines of the first cutting blades and the second cutting blades form a step-like structure.”

and

“[0031] ... A plurality of flutes 4 distributed in parallel and at intervals are symmetrically arranged along a flank surface 3 of the cutting portion; the flutes 4 divide main cutting blades into a plurality of first cutting blades 5 and second cutting blades 6; and connecting lines of the first cutting blades 5 and the second cutting blades 6 form a step-like structure (which can also be called a ladder-like structure), i.e., the main cutting blades of the present disclosure are step-like structures.”

28. The connecting line (singular in the '767 PCT Application) of the flutes cannot be the same connecting line as the connecting lines (plural) of the first and second cutting blades because, in each instance, the drafter of the '767 PCT Application had just gotten done describing the decidedly different connecting lines of the cutting blades as forming a step-like structure. A step-like structure is decidedly not conceivably a circular or spiral structure as formed by the other referenced connecting line.

29. In other words, these two separate sets of connecting lines are defined differently. The connecting lines described in paragraphs 10 and 35 are connecting

lines of the flutes 4, whereas the connecting lines described in paragraphs 6 and 31 are connecting lines of the first and second cutting blades 5 and 6.

30. Furthermore, the two sets of connecting lines are described as being shaped differently. The connecting line described in paragraphs 10 and 35 forms either a circular or spiral structure, whereas the connecting lines described in paragraphs 6 and 31 form a step-like structure.

31. As a result, it would be evident to a POSA that there are two different set of connecting lines that arise from different landmark features and that have different geometrical shapes. A POSA simply would not interpret paragraphs 6 and 31, on the one hand, and 10 and 35, on the other hand, as all referring to just one set of connecting lines.

32. Moreover, the large helical/spiral chip-evacuating flute is always helical/spiral in all of the drawings and in most twist drills, in fact being the foundational driver of the term “twist” drill. There would be no need to express that the ends of the flutes 4 form a spiral structure. Indeed, it is the large helical/spiral chip-evacuating flute that forms the spiral structure at its edge, in the absence of flutes 4, not the flutes 4. The drafter described the flutes 4 as not forming it, but instead breaking up this spiral cutting blade, “divid[ing] [the] main blade into a plurality of first cutting blades 5 and second cutting blades 6.” (**Ex. 1019**, p. 3:24-25).

33. Mr. Wang and his patent attorney were describing a spiral structure that flutes 4 can form, namely, one that creates axial relief.

34. During prosecution in the U.S., Mr. Wang's patent attorneys recited, "The drill bit of claim 1, wherein the connecting lines of the flutes form a spiral structure" as a claim 5 (**Ex. 1018** at p.9), and the patent examiner rejected this claim citing Fig. 3 of J.P. Patent No. 63,016,912 ("Shibata") (**Ex. 1018** at p.145). The patent examiner repeated this three times, but each time, the patent attorney argued only to overcome the independent patent claim 1, from which dependent claims 5 depended. Mr. Wang's attorney never directly addressed the examiner's rejection of claim 5. As such, Mr. Wang never conceded nor acquiesced to this rejection or any interpretation of Shibata. Indeed Shibata's Fig. 3 does not illustrate either a connecting line or a spiral structure:

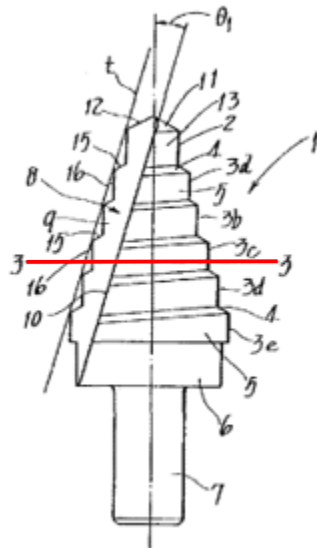


Fig. 1

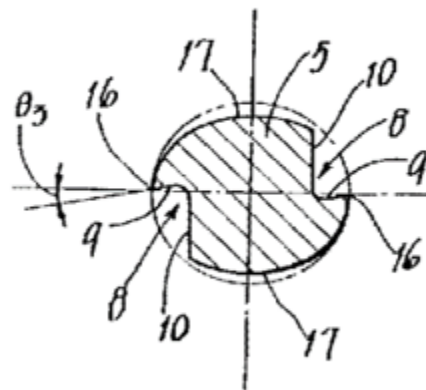


Fig. 3

(Ex. 1015, Shibata, p. 5).

35. Fig. 3 is a cross-section taken from the red horizontal line 3-3 in Fig. 1. From these two Figures, it is undeniable that feature 17 is not an actual line of Shibata's invention; it is created by the intersection of a section plane with the solid body of the bit shown in Fig. 1, meaning a figment of the illustrative sectioning and not a real geometric feature. And, it is furthermore undeniable, though irrelevant by the previous reality of non-existence of line 17 as a geometric feature of the bit, that the cross-sectional line 17 is not a spiral; it is an oval, largest at the major axis near point 16, then decreasing to its smallest at the minor axis (shown as the broken vertical line in Fig. 3) of the oval or ellipse, then increasing again to the right of the minor axis. So, Fig. 3 illustrates neither a connecting line nor a spiral structure.

36. More importantly, though, flutes 8 in Shibata's Fig. 3 are nothing like the flutes 4 of the '900 Application. Flutes 8 in Shibata are the large chip-evacuating flutes; they are not the plurality of parallel grooves or notches that form the steps of the step drill. Thus, the surface boundary (artificial line 17) shown in Fig. 3 is oval in shape, not spiral, and it connects two chip-evacuating flutes, not the flutes 4 (or grooves) recited in claim 5 of the '900 Application. Shibata was completely misapplied by the patent examiner back then, and Mr. Wang's patent attorney never once addressed that rejection directly because it was a rejection of a

dependent patent claim, and he was focused on attempting to overcome the rejection of the independent patent claim. That was his prerogative, and a very common one to devote one's energies at the independent claims (I say this as one who has authored claim sets **and prosecuted**, with the USPTO as a joint inventor representing all inventors and independent of an attorney or registered patent agent, the resultant office actions), and that should not and cannot constitute any sort of admission or waiver, or the like, by Mr. Wang.

37. On the other hand, in its Petition, Viking admitted that one of the ways a POSA would interpret the above-mentioned sentences that described that the flutes 4 could form a “spiral structure” is for the connecting line of the flutes to reflect a radial relief, not an axial relief. Although I disagree that anyone would come to this interpretation based on the Wang Priority Applications or their respective prosecution histories, I would believe this admission would support the “spirally” language in the challenged claims of the '583 Patent. Spiral formations can be created as two-dimensional in a plane, or three-dimensional. The former would yield radial relief, the latter would yield axial relief if it were helical (a special case of a spiral with no change in radius as angle changes), or both axial and radial relief if a general spiral (change of both radius and axial position with angle). Radial relief along with axial relief just as readily equates to a spiral formation as does axial relief.

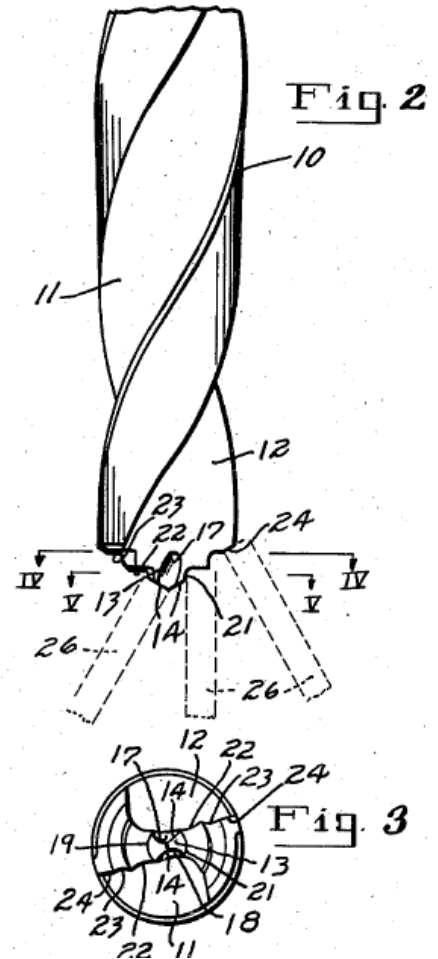
38. Thus, it is my opinion that the '900 Application provides written description support for the limitation “a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.” A POSA would recognize that Mr. Wang had possession of the claimed invention as of the date of the '900 Application.

39. Therefore, a POSA would understand that Mr. Wang possessed what is claimed by the challenged claims of the '583 Patent at least as of the filing date of the '900 Application, and thus, the '900 Application is not prior art for any of the challenged claims of the '583 Patent.

40. Submitted with this Declaration as **Ex. 2073** is a “priority” patent claims chart that I closely evaluated and agree with, comparing the '583 Patent claims to the specifications of the '900 Application and the '767 Application.

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

41. Bannister discloses a pilot point drill bit with an additional normal-ground surface and a beveled outer shoulder 24 on the cutting blade. (**Ex. 1006**, Fig. 2). It explains that this additional beveled outer shoulder is included to produce long chips, especially when working on soft metals. Production of long chips by this outer shoulder is important, according to Bannister, to entangle and carry out any fine chips created by the straight intermediate cutting blades 22. (*Id.*, p. 2, col. 1:10-19). Otherwise, the fine chips could remain behind and cause the drill bit to jam and freeze during operation. (*Id.*, col. 2:7-12).



42. Importantly, Bannister discloses that the intermediate major cutting edge **22** is “preferably” normal (perpendicular) to the axis, not non-normal as is the case when the chip evacuation flute intersects a conical surface (**141** in the ‘583 Patent). (**Ex. 1006**, at 3, col. 1:7-10 and 1:74-75). These normal cutting edges are shown in Fig. 2 where grinding wheel **26** is specifically oriented parallel to the drill bit axis when forming cutting edge **22** (cutting edge **23** is likewise shown as normal). By contrast, the grinding wheel is

illustrated as angled from parallel where forming the first cutting edge **14** and the additional shoulder **24**. (*Id.* at 3, col. 2:19-22).

43. The only element for which Viking introduces Zhou and Welty is the purported concept that the intermediate cutting edges **22** and **23** could be conical. Thus, even if a POSA combined Bannister with Zhou and Welty (which they would not do), they would not arrive at the claimed invention of the '583 Patent.

44. Specifically, a POSA would not consider Wang's '583 Patent claims obvious in light of Bannister. Bannister fails to disclose, among other limitations recited in Claim 1, a conical first step surface, a major cutting edge, a minor cutting edge, or a cutting tip as recited in Claim 1. Viking admits in its Petition that there is no conical first step surfaces. (*Petition*, p. 68). Moreover, there is no motivation in the art to form the first steps surfaces conically. Bannister in fact expressly states the importance that such surfaces be normal to the cutting axis.

45. There is no major cutting edge as recited in Claim 1 because the first step surfaces are normal, not conical, and because the flute is not spiral where it intersects the first step surfaces, but is rather straight as can be seen in Fig. 3 (reproduced here).

46. For these same reasons, Bannister does not disclose any minor cutting edge as recited in Claim 1 since, where the flute intersects the second step surface, the flute surface is straight, not spiral. Since Bannister does not disclose a major

cutting edge or a minor cutting edge as recited in Claim 1, it follows necessarily, that Bannister also does not disclose a cutting tip as recited in Claim 1.

47. Additionally, each composite cutting blade group is not configured to crush cutting chips into finer chips. In particular, the beveled cutting edges, according to Bannister, are intentional. They are designed specifically to form long chips that are not to be broken into finer chips. Bannister expresses the importance of keeping these chips long for its overall configuration when he states, “the outer or largest drill unit [is] preferably ground to a beveled or conical cutting edge whereby, when drilling soft metals, such as soft steel, copper and the like, long spiral chips are produced. These long spiral chips thus formed take with them the short chips formed by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it.” (*Id.* at 2, col. 1:10-19).

48. The beveled cutting edge has a single job as described by Bannister, which is to produce long spiral chips that carry the short chips. If the shorter chips are crushed to finer chips as claimed, then the long chips could have difficulty carrying the fine chips, as there is less chip length to engage. The petition asserts Bannister inherently teaches crushing chips into finer chips, but Bannister states, “a drill ... which shall be effective to clear the hole being drilled of chips as they are formed.” (**Ex. 1006** at 1, col. 1:9-11). Thus, Bannister seeks to provide a drill that

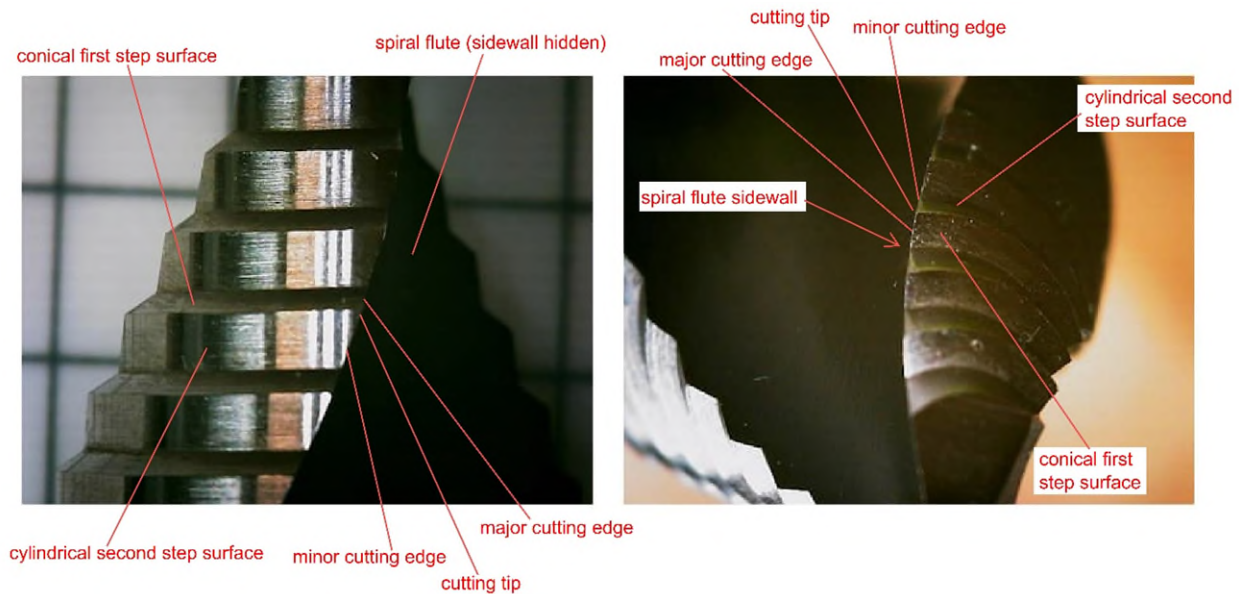
evacuates the chips “as they are formed,” and does not crush chips into finer chips. Another object of Bannister was “to reduce to a minimum the metal to be crushed during the drilling operation.” (*Id.* at 1, col. 1:16-17). Again, this is Bannister directly stating the desire to reduce

49. Claims 1 and 8, by contrast, 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 the context of the present specification, the term “spiral” here is defined as “[a] three-dimensional curve traced by a point moving round and simultaneously advancing along a ... cone.” *The Shorter Oxford Dictionary*, Oxford University Press, 2007. 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”. (**Ex. 1006**, 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).

50. Without sufficient analysis, Petitioner argued that “Bannister shows a major cutting edges defined by the intersection of a step surface and the sidewall of

the spiral flute.” In his report, Dr. Schmid opined that “[s]imply viewing Bannister Figure 2 and observing the intersection of the sidewall of the flute and the conical first step surface is sufficient to show that this element is present.” (Ex. 1004, ¶ 209). And “[s]imply viewing Bannister Figure 2 and observing the intersection of the sidewall of the flute and the cylindrical second step surface is sufficient to show that this element is present. (*Id.*, at ¶ 212). Dr. Schmid goes on to argue the presence generally of cutting edges.

51. Below are photographs of the ¾” Matco Tools Hyper-Step Part No. DBHS48 (within the scope of at least claims 1 and 8 of the ‘583 Patent) showing the uninterrupted curvature of the major cutting edges and the minor cutting edges along a spiral line of the flute due to being, in-part, defined by the sidewall of the spiral flute (where the sidewall must also be spiral). Although the major cutting edge and the minor cutting edge being curved rather than straight is not explicitly recited in the claims, the curved major and minor cutting edges are necessarily present when the claim limitations are met. This analysis is not meant to introduce new words into the claims, but rather is a tool to analyze whether Bannister discloses the limitations of Claims 1 and 8 (and their respective dependent claims).



B. Viking's Grounds Based on Bannister in View of Zhou and/or Welty and/or Korb Are Erroneous (Continued)

108. In my opinion,¹ a POSA would not be motivated to modify Bannister's beveled cutting edge with the angled segmented edges of Zhou or with the angled steps of Welty. In particular, the advantages petitioner asserts are provided to Bannister's drill by the structures of Zhou or Welty are redundant to the advantages already described in Bannister and/or advantages not needed by Bannister. Petitioner describes a long list of advantages that are supposedly bestowed by the Zhou or Welty. However, these advantages are already described in the text of Bannister, and there is no reason to think that the structures of Zhou and/or Welty would be an improvement, given the operational purpose of Bannister.

¹ Paragraph numbers 52–107 intentionally omitted.

109. The supposed advantages of “reduced drilling axial resistance and torque” and “increased drilling efficiency” is redundant to and not needed in Bannister. Bannister already teaches “a drill which shall be operable with much less power.” (**Ex. 1006** at 1, col. 1:1-5). Because the first or smallest drill unit is of substantially the same diameter for all diameter drills” ... “power requirement for drilling large holes is thus reduced to the amount required for driving the cutting edges through the metal and the amount heretofore required for crushing the large central cores is eliminated. (*Id.* at 2, col. 2:20-30). “In grinding my improved drill, ... the last cutting edge 24 [is] formed within an angle of approximately 59° to the axis of the drill, or an included angle of 118°, which is considered the most efficient angle in grinding twist drills.” (*Id.* at 2, col. 2:56-62). “As seen in Figs. 3 and 5, the provision of the auxiliary flutes reduces the central core area at the point to where it is negligible, so that the amount of metal to be crushed in drilling is reduced to a minimum and the feeding pressure for the drill is greatly reduced. I have found, in actual tests with a one inch drill, that the feeding pressure required, as compared with a standard conical point drill, was reduced more than 42%.” (*Id.* at 2, col. 2:27-36).

110. A drill bit that has reduced power requirements will, as a result, be more efficient and likely be accompanied by reduced drilling axial resistance and certainly torque (proportional to power, power being the product of torque and

rotational speed). In my opinion, these advantages are already provided by existing structure in the Bannister device, such as the small first drilling unit and the single beveled cutting edge. Petitioner has failed to describe how the proposed modifications would provide an advantage over and above the advantages already inherent to Bannister's drill bit, and how they are not redundant thereto. Since Bannister and either Zhou or Welty disclose drill bits that serve the same function and because each already operates effectively, a POSA would have no reason to combine these devices into a single device. Petitioner does not explain why modifying Bannister in this manner would be an improvement on what Bannister already provides.

111. The supposed advantage of "improved separation and expulsion of swarf" is redundant to and not needed in Bannister. Bannister already discloses a metal working twist drill "which shall be effective to clear the hole being drilled of chips as they are formed." (**Ex. 1006** at 1, col. 1:3-12). "The chips from the small drill unit are carried up the auxiliary flutes into the main flutes and thence off with the chips from the other drill units." (*Id.* at 1, col. 2:54 - 2, col 1:2). "These long spiral chips thus formed take with them the short chips formed by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it." (*Id.* at 2, col. 1:15-19). "As is well known, bevelled cutting edges, in drilling soft metal, such as copper or soft steel,

produce long chips, whereas cutting edges normal to the axis of the drill produce short chips, and the short chips are liable to jamb the drill in the hole and cause it to break off. By providing the bevelled cutting edges 14 on the central drilling unit 13, and the bevelled cutting edges 24 on the outer drill unit, I am enabled to produce long chips along with the short ones, which long chips entangle with the short ones and carry them out of the hole being drilled.” (*Id.* at 2, col. 2:7-18).

112. Thus, Bannister already provides separating and removing chips/swarf through its teachings of a singled beveled cutting edge and by the auxiliary flutes. Bannister does not require modification by Zhou or Welty for this advantage. In my opinion, the doubling up of advantages proposed by Petitioner—without justification on how it would be an improvement on the system already taught by Bannister—is purely the product of hindsight.

113. The supposed advantage of “reduced binding” is redundant to and not needed in Bannister. Bannister teaches that “The sides 19 and 21 of the drilling unit 13 are made vertical, and are ground without radial clearance, whereby they have a snug bearing with the walls of the hole at all times, which holds the drill steady and insures a round hole. The central unit is so short that the absence of radial clearance does not cause the unit to bind and heat is not generated due to the absence of radial clearance.” (**Ex. 1006** at 2, col. 1:62-71). The advantage of reduced binding is already provided in Bannister by keeping the vertical wall

height short. Petitioner provides no evidence that making each step a conical step as taught by Zhou or Welty would further reduce binding; and there is no indication that binding is a problem with Bannister's already operationally effective drill bit.

114. The supposed advantage of “more accurate and round drilling holes” is redundant to and not needed in Bannister. Bannister already discloses a metal working twist drill is disclosed “which shall be effective to drill a round hole” (**Ex. 1006** at 1, col. 1:1-6). “The first drill unit, and each succeeding drill unit, acts as a guide for the following drill unit so that the drill runs true and drills a straight round hole.” (*Id.* at 1, col. 2:46-49). “The sides 19 and 21 of the drilling unit 13 are made vertical, and are ground without radial clearance, whereby they have a snug bearing with the walls of the hole at all times, which holds the drill steady and insures a round hole.” (*Id.* at 2, col. 1:62-67). “I grind the drill so that the point presents a series of drilling units. The first unit corresponds to a drill of relatively small diameter, say 3/8 inch, having a central core of minimum area which may readily be entered into the ordinary center punch mark of the metal to be drilled, and which therefore maintains its proper starting position. The hole is thus centered to start and there is no necessity of raising the drill and employing a hand tool to center it.” (*Id.* at 1, col. 2:34-43).

115. The supposed advantages of “drill bit durability” and “cutting edge wears more slowly” is redundant to and not needed in Bannister: “There being less crushing of the material, there is less heat generated, and a drill made in accordance with my Invention will do much more work without regrinding.” (**Ex. 1006** at 2, col. 2:45-47).

116. In my opinion, Viking’s proposed modification to replace Bannister’s perpendicular steps with the angled steps of Zhou or Welty defeats Bannister’s principle of operation. Petitioner argues a POSA would have been motivated to modify Bannister with the angled step as taught by Zhou or Welty to create a plurality of composite cutting blade groups, with each group having a conical first step surface. Instead, Petitioner made conclusory statements that “conical first step surfaces were well known in similar prior art drills with stepped tips, such as those shown in Zhou and Welty”. There is no description of how or why a POSA would have converted Bannister’s beveled cutting edge from a bevel (or chamfer) design (*i.e.*, to cut away a square edge) to the claimed conical first step surface (*i.e.*, slating the entire distance between two cylindrical second step surfaces), in each of a plurality of composite cutting blade groups. That is, instead of one bevel as described in Bannister, Petitioner suggests extensive modification to expand the bevel and eliminate all the perpendicular steps. The perpendicular steps affect the direction of chip flow from the edge into the flute, to thus be different than the

direction of the chip forming at the beveled edge. Making such a change is contradictory to the net cutting mechanics captured in the Bannister design.

117. Bannister describes a metal working twist drill “which shall be effective to clear the hole being drilled of chips as they are formed.” (**Ex. 1006** at 1, col. 1:3-12). “The chips from the small drill unit are carried up the auxiliary flutes into the main flutes and thence off with the chips from the other drill units.” (*Id.* at 1, col. 2:54 - 2, col. 1:2). “These long spiral chips thus formed take with them the short chips formed by the cutting edges which are substantially normal to the axis of the drill and thus rid the hole of the short chips which might otherwise clog it.” (*Id.* at 2, col. 1:15-19). “As is well known, bevelled cutting edges, in drilling soft metal, such as copper or soft steel, produce long chips, whereas cutting edges normal to the axis of the drill produce short chips, and the short chips are liable to jamb the drill in the hole and cause it to break off. By providing the bevelled cutting edges 14 on the central drilling unit 13, and the bevelled cutting edges 24 on the outer drill unit, I am enabled to produce long chips along with the short ones, which long chips entangle with the short ones and carry them out of the hole being drilled.” (*Id.* at 2, col. 2:7-18). “The drill is next ground ... with a series, or plurality of steps, of cutting edges 22 and 23 which are normal to the axis of the main drill ...” (*Id.* at 2, col. 1:72-75).

118. Bannister's basic design principle is that small chips are created by the central drilling unit 13 and the square cutting edges 22 and 23 of successively larger drill units. The beveled cutting edges have an importance and central task in Bannister's design, namely to carry off smaller chips created by the perpendicular steps of cutting edges 22 and 23. Further, the beveled cutting edges have an important position – at the very back, nearest the body of the twist drill, so that the small chips transported by the auxiliary and main flute are carried further back and out of the hole by the long spiral chips created by the beveled cutting edges. To change this design as proposed would completely change the operation of Bannister's drill.

119. Likewise, neither Zhou nor Welty, discussed in detail above, provide any motivation for a POSA to combine a conical cutting edge from Zhou or Welty with the drill bit taught in Bannister. In my opinion, Viking's proposed combination of Bannister with Zhou or Welty is purely the combination of hindsight. Welty describes a gundrill, and given the vastly different operation, a twist drill innovator would not be motivated to apply the teachings of a gundrill to a twist drill, such as Bannister.

120. My opinion is further underscored by the strong evidence of secondary considerations set forth 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).

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 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]

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

initial testing of the Easy-Boost drill bits, and Kimball's strong desire to copy Hongjia Wang's innovation. **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
22:28:49 -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.”

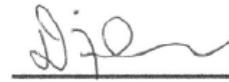
54. Submitted as **Exhibit 2021** is a true and correct copy of a forum discussion from the forum The Garage Journal, titled “Co-worker gets Matco’s new ‘Hyper-Step’ drill bits: ‘These drill though everything’”, accessed at <https://www.garagejournal.com/forum/threads/co-worker-gets-matcos-new-hyper-step-drill-bits-these-drill-though-everything.394706/>. 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