

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MINNESOTA**

Tsteigen, Inc. d/b/a Tec-Spiral; Hongjia
Wang,

Plaintiffs,

v.

Viking Drill & Tool, Inc. a/k/a
Consolidated Toledo Drill,

Defendant.

Case No. 0:21-cv-02759 KMM HB

**PLAINTIFFS TSTEIGEN AND HONGJIA WANG’S
SUPPLEMENT TO ITS AMENDED RESPONSE TO
DEFENDANT’S PATENT INVALIDITY CONTENTIONS**

Plaintiffs Tsteigen, Inc. and Hongjia Wang’s (collectively, “Tsteigen”) hereby supplement their amended prior art patent claims chart and statement in response to Defendant Viking Drill & Tool, Inc.’s (“Viking”) patent invalidity prior art charts and statement. This supplement is intended to supersede only Tsteigen’s Exhibits C, D, and E of its amended prior art patent claims charts and statement, not the statement itself.

Supplemental Exhibits C, D, and E are being served concurrently herewith.

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Dated: November 4, 2022

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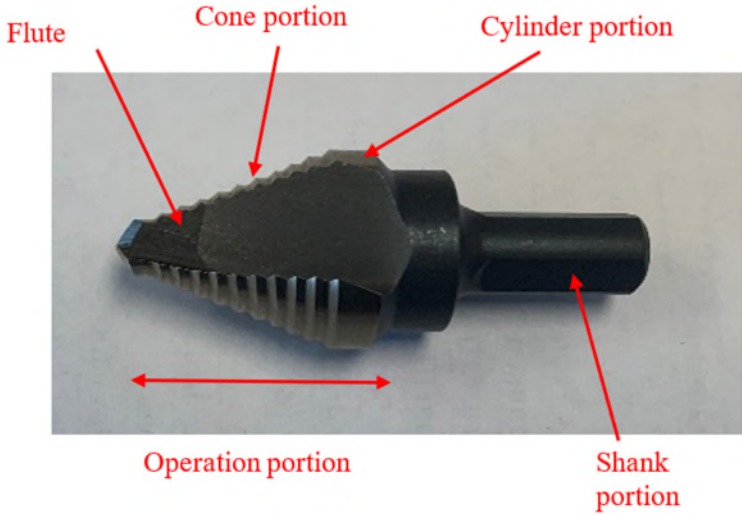
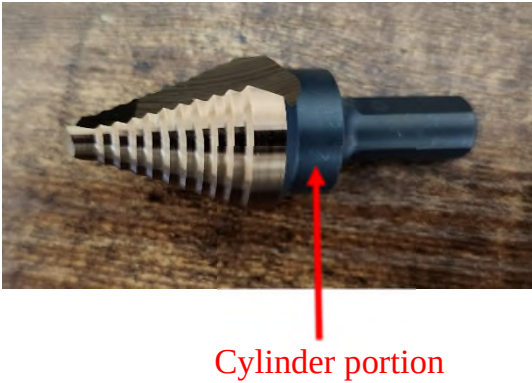
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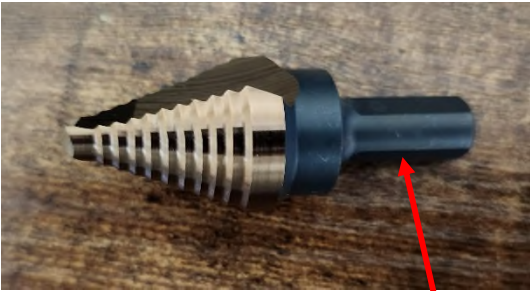
Attorneys for Plaintiffs

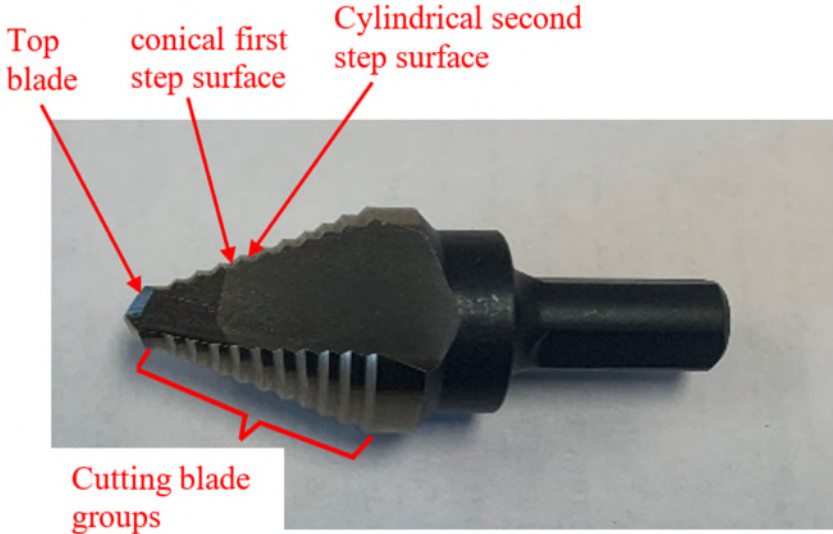
Tsteigen, Inc. and Hongjia Wang

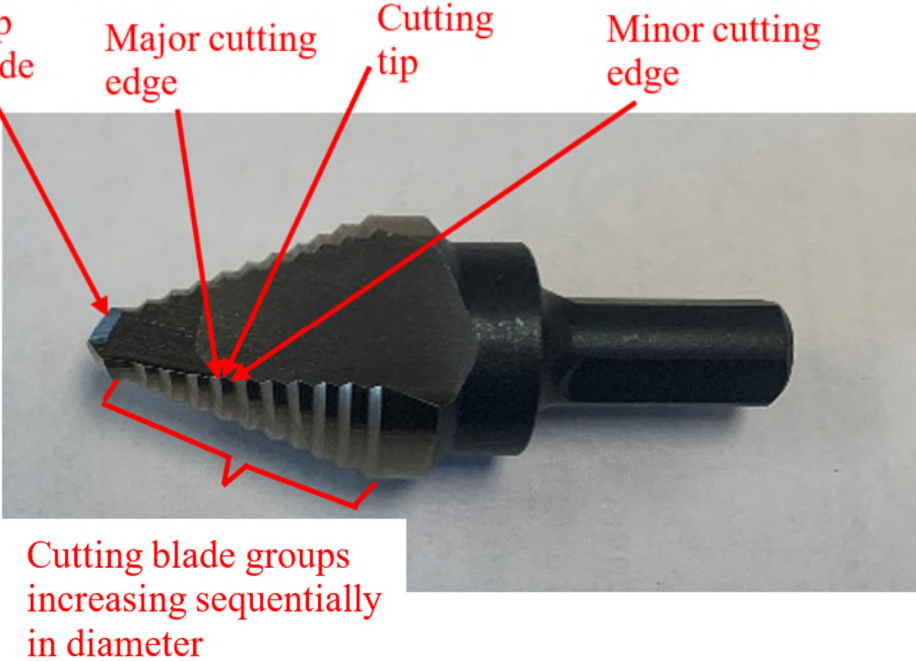
Exhibit C

'583 Patent		
Claim 1	Defendant's Contentions Viking 00714 Drill	Plaintiffs' Response
['583: 1.pre] A twist drill, comprising:	The preamble carries no patentable weight. The Viking 00714 drill has a flute that extends from a cone portion to a cylinder portion.	It is unclear whether or not the Viking 00714 drill disclosure constitutes prior art since Tsteigen is unaware of any evidence in the record that the Viking 00714 drill disclosure precedes the priority date of Tsteigen's asserted patent claims. The preamble does carry weight in the question of patentability. The Viking 00714 appears to disclose a step drill, not a twist drill.
['583: 1.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	The Viking 00714 drill includes an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion. 	The Viking 00714 has¹ an operating portion that comprises a cone portion, but the cylinder portion has a significantly reduced diameter, as shown below: 

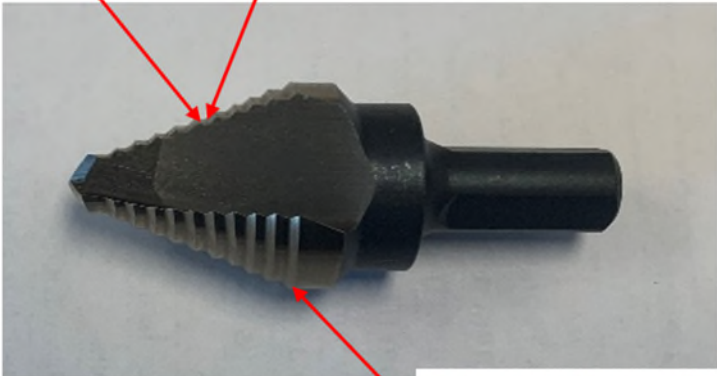
¹ Viking's invalidity contentions pertaining to this prior art reference contained only the few images in the middle column of this prior art claim chart. Plaintiffs requested actual samples of this step drill bit and reserved their right to supplement their response statement and prior art charts once physical samples could be examined. Plaintiffs ultimately produced one such sample (shown in the right-hand column).

[’583: 1.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00714 drill has a shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> annotated photo of an exemplary Viking 00714 drill in [’583: 1.a].	The Viking 00714 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Shank portion
[’583: 1.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall;	The Viking 00714 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00714 drill in [’583: 1.a]. The Viking 00714 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> U.S. Patent No. 10,328,499 (“Durfee I”), 1:33-39 and 3:57 – 6:32; U.S. Patent No. 2,193,186 (“Bannister”), <i>see</i> FIG. 2; U.S. Patent App. Pub. No. 2005/0053438 (“Wetzel”), <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], U.S. Patent App. Pub. No. 2011/0116884 (“Li”), FIGs. 1-8; U.S. Patent App. Pub. No. 2018/0133808 (“Wang I”), FIGs. 5-12 and ¶¶ [31, 32, 35, 36]; U.S. Patent No. D840,449 (“Wang II”), FIGs. 1-4, and 6-8; U.S. Patent No. 4,582,458 (“Korb”), FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386.	The Viking 00714 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Straight flute

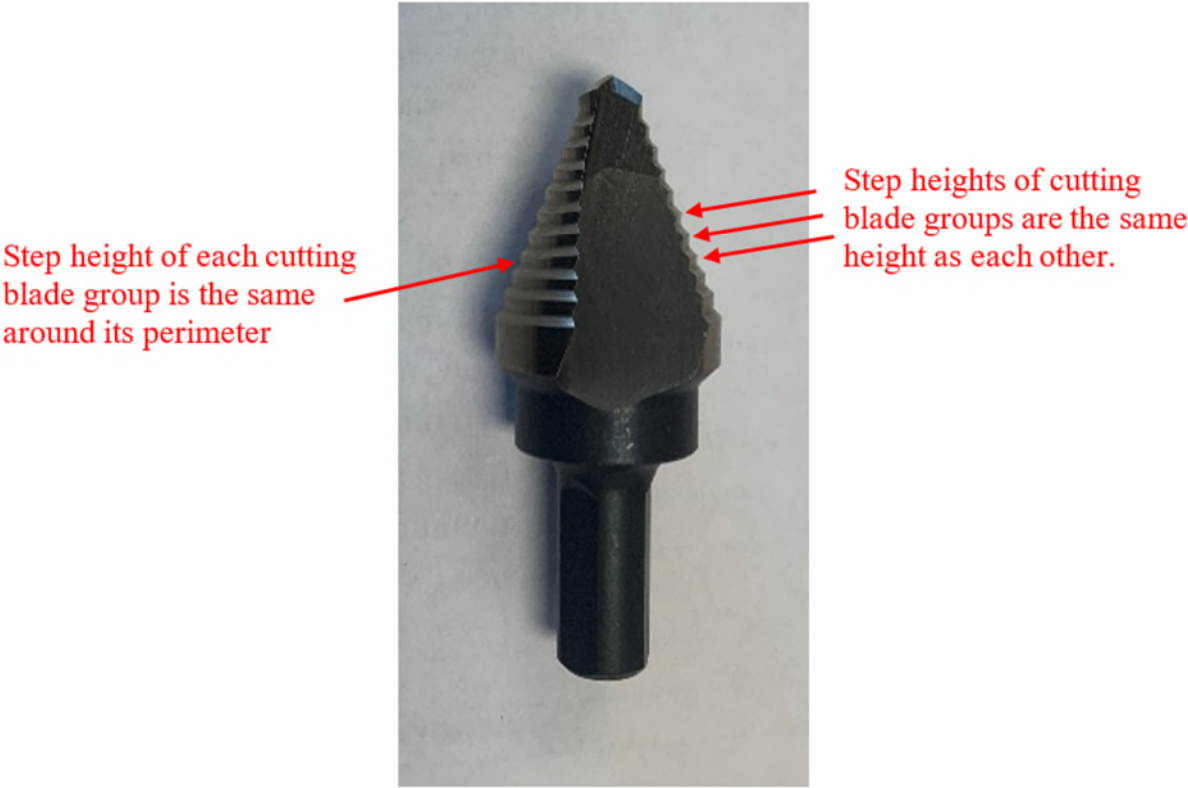
	It would have been obvious to one of ordinary skill to modify the straight flute of Vikings 00714 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’583: 1.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	The Viking 00714 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.  Plaintiff’s infringement allegations appear to be based on the contention that the presence of axial relief on the Accused Products results in composite cutting blades groups that are formed “spirally.” While Viking disagrees with this contention, to the extent the claims are construed such that the Accused Products meet this limitation, then it is also present in the Viking 00714 drill. The Viking 00714 drill has greater axial relief than the Accused Products.	The Viking 00714 discloses a plurality of composite cutting blade groups formed sequentially from a front end to the rear end of the exterior surface of the cone portion. The composite cutting blade groups do not appear to be oriented spirally. As shown above, the Viking 00714 discloses a flute that is straight, not spiral. It extends on an exterior surface of the operating portion from a front end of the cone portion, but it does not extend at least partway up the cylinder portion. The flute has a sidewall.
[’583: 1.e] a conical first step surface;	The Viking 00714 has a conical first step surface. See annotated photo of an exemplary Viking 00714 drill in [’583: 1.d].	Each of the plurality of composite cutting blade groups in Viking 00714 comprises a conical first step surface.

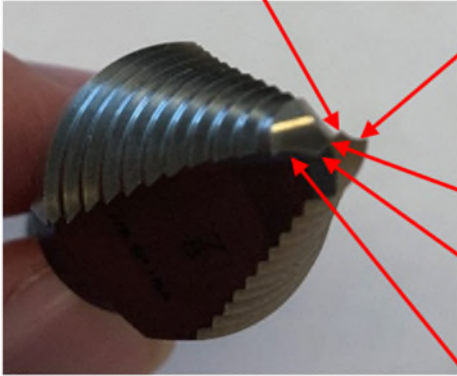
[’583: 1.f] a cylindrical second step surface adjacent to the conical first step surface,	Plaintiffs’ infringement allegations appear to be based on a contention that the presence of axial, radial and back taper relief does not prevent the second step surfaces from being considered “cylindrical.” While Viking disagrees with this contention, based on Plaintiffs’ assertion, the Viking 00714 drill has a cylindrical second step surface adjacent to the conical first step surface. <i>See</i> annotated photo of an exemplary Viking 00714 drill in [’583: 1.d].	Each of the plurality of composite cutting blade groups in Viking 00714 comprises a cylindrical second step surface adjacent to a conical first step surface.
[’583: 1.g] a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute;	The Viking 00714 drill has a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute.  The image shows a close-up of the cutting end of a drill bit. Red arrows point to various features: 'Top blade' points to the upper cutting edge, 'Major cutting edge' points to the primary cutting surface, 'Cutting tip' points to the very front edge, and 'Minor cutting edge' points to the secondary cutting surface. A bracket at the bottom indicates 'Cutting blade groups increasing sequentially in diameter'.	The “first step surface” of Viking 00714, appears to intersect the sidewall of the flute, defining a major cutting edge.
[’583: 1.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute	The Viking 00714 drill has a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00714 drill in [’583: 1.g].	The “second step surface” of Viking 00714 appears to intersect the sidewall of the flute, defining a minor cutting edge.

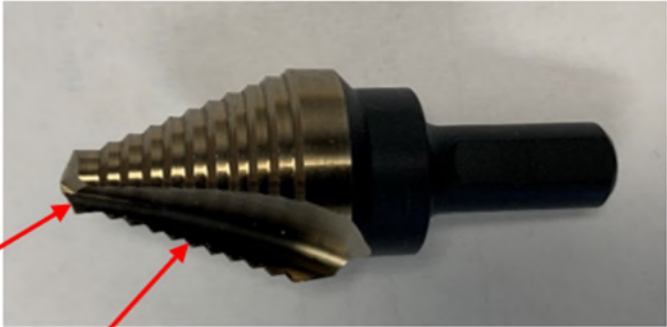
and the sidewall of the spiral flute; and		
[’583: 1.i] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute; and	The Viking 00714 drill has a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00714 drill in [’583: 1.g].	The Viking 00714 appears to disclose a cutting tip defined by the intersection of the “major cutting edge,” the “minor cutting edge,” and the sidewall of the flute, but the flute is not spiral.
[’583: 1.j] a top blade provided on the front end of the cone portion;	The Viking 00714 drill has a top blade provided on the front end of the cone portion. <i>See</i> annotated photo of exemplary Viking 00714 drill in [’583: 1.g].	The Viking 00714 discloses a top blade on the front end of the cone portion.
[’583: 1.k] wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and	With the Viking 00714 drill, a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion. <i>See</i> annotated photo of a Viking 00714 drill in [’583: 1.g].	In the Viking 00714, the diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion.
[’583: 1.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into	Plaintiff’s infringement allegations appear to be based on the contention that crushing of cutting chips into finer chips inherently results from having multiple composite blade cutting groups. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00714 drill.	Each of the plurality of composite cutting blade groups in Viking 00714 appears to be configured to cut a hole in a thin workpiece of a desired diameter.

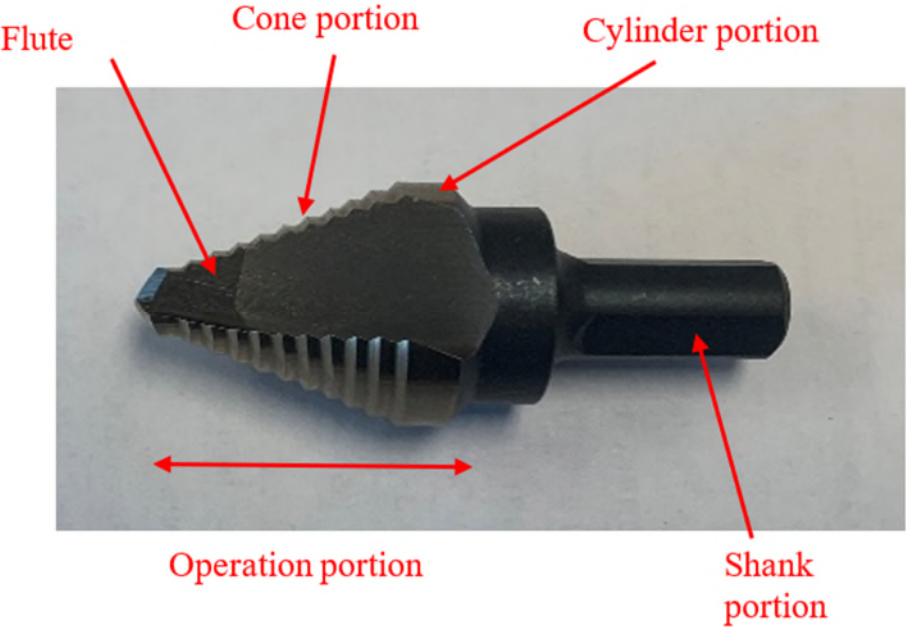
finer chips and the spiral flute is configured to shunt the finer chips; and	A person of ordinary skill will understand that the flute of the Viking 00714 drill, either alone or modified with spiral flutes, will shunt chips from the cutting surface out of the drilled hole.	
[’583: 1.m] wherein at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and	In the Viking 00714 drill, at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	At least one cylindrical second step surface in the Viking 00714 appears to be immediately adjacent to the conical first step surface of the next composite cutting blade group.
[’583: 1.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the	Plaintiffs’ infringement allegations appear to be based on designating an arbitrary length of the upper end of the cylinder portion to be part of the last composite cutting blade group. While Viking disagrees with this contention, based on Plaintiffs’ assertion, the diameter of the last composite cutting blade group located at the rear end of the cone portion in the Viking 00714 drill immediately adjacent to the cylinder portion is equal to the cylinder portion diameter. See annotated photo of exemplary Viking 00714 drill in [’583: 1.m].	The diameter of the last composite cutting blade group in the Viking 00714 drill bit, located at the rear end of the cone portion immediately adjacent to

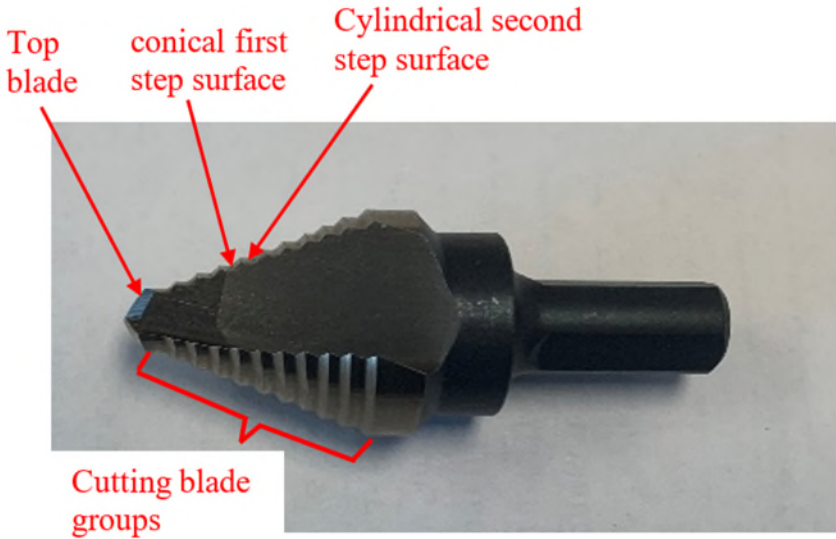
cylinder portion is equal to the cylinder portion diameter.		the cylinder portion, is not equal to the cylinder portion diameter:  Height of the last composite cutting blade group Cylinder portion
Claim 2 [’583: 2] The twist drill of claim 1 wherein, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	Viking 00714 Drill Plaintiffs’ infringement allegations appear to be based on the contention that the claimed smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00714 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.

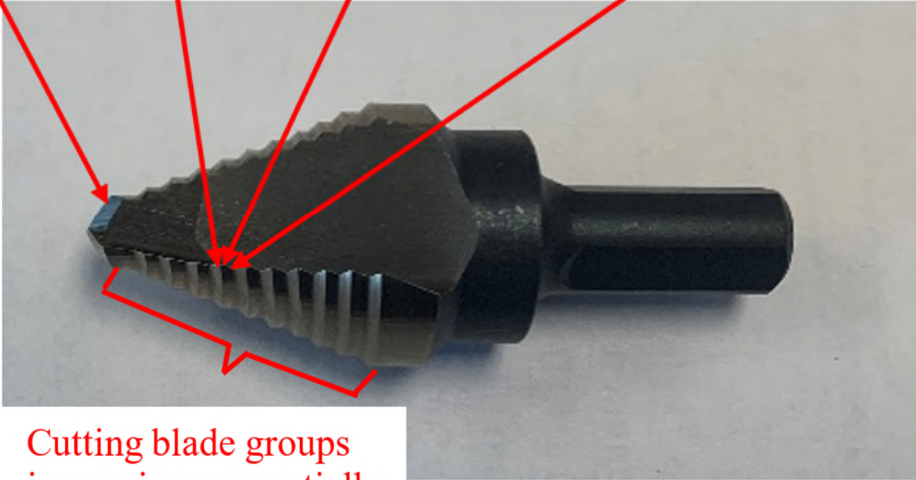
Claim 3	Viking 00714 Drill	
[’583: 3] The twist drill of claim 1 wherein, a height of each composite cutting blade group is uniform.	In the Viking 00714 drill, the height of each composite cutting blade group is the same around its perimeter and the step heights are the same as each other. Thus, if claim 3 is found to not be indefinite, it is met by the Viking 00714 drill. 	Tsteigen is not asserting this Claim against Viking.
Claim 5	Viking 00714 Drill	
[’583: 5] The twist drill of claim 1 wherein, the top blade comprises a chisel edge, two	The Viking 00714 drill has a split point tip, having a chisel edge, two auxiliary cutting edges and two straight major cutting edges, where the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	Tsteigen is not asserting this Claim against Viking.

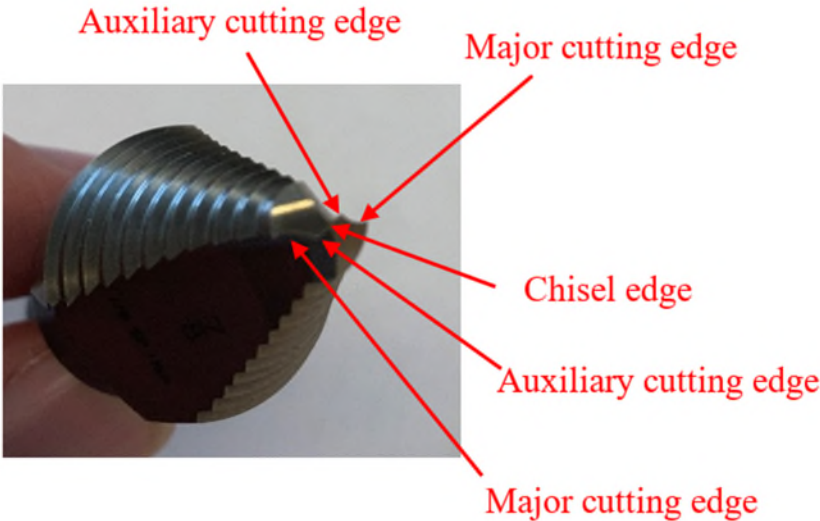
auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	 The image shows a close-up of the tip of a metal drill bit. Red arrows point to specific features: 'Auxiliary cutting edge' (top left), 'Major cutting edge' (top right), 'Chisel edge' (center), 'Auxiliary cutting edge' (bottom right), and 'Major cutting edge' (bottom left).	
Claim 6	Viking 00714 Drill	
[’583: 6] The twist drill of claim 1 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	Plaintiffs’ infringement allegations appear to be based on a contention that the presence of axial and radial relief does not prevent composite cutting edge groups from being coaxial with the cone portion. While Defendant disagrees with this contention, based on Plaintiffs’ assertion, then this limitation is also present in the Viking 00714 drill.	Tsteigen is not asserting this Claim against Viking.
Claim 7	Viking 00714 Drill	
[’583: 7] The twist drill of claim 1 wherein, a straight major cutting edge	In the Viking 00714, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See the annotated photo of a Viking 00714 drill below.	The straight major cutting edge length of the top blade in the Viking 00714 drill bit appears to be greater than each of the major cutting edges of the plurality of composite cutting blade groups.

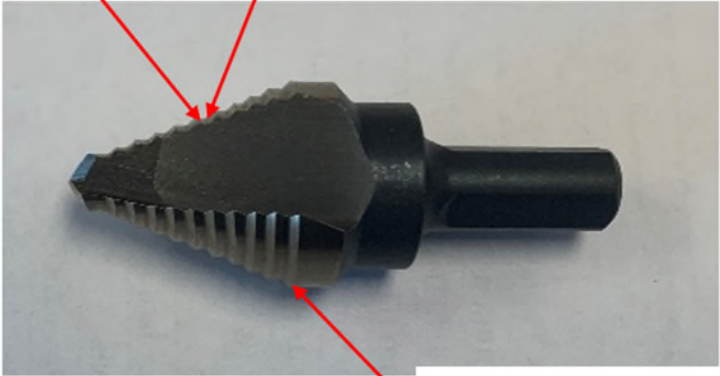
length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 8	Viking 00714 Drill	
[’583: 8.pre] A twist drill, comprising:	The preamble carries no patentable weight. The Viking 00714 drill is a drill having a flute that extends from a cone portion to a cylinder portion.	See Tsteigen’s response to Viking’s allegation under [’583: 1.preamble], above.
[’583: 8.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	See [’583: 1.a].	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.

		
[’583: 8.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	See [’583: 1.b] and [’583: 8.a].	See Tsteigen’s response to Viking’s allegation under [’583: 1.b], above.
[’583: 8.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the	See [’583: 1.c] and [’583: 8.a]. The Viking 00714 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. See annotated photo of an exemplary Viking 00714 drill in [’583: 8.a]. The Viking 00714 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. See <i>e.g.</i>	See Tsteigen’s response to Viking’s allegation under [’583: 1.c], above.

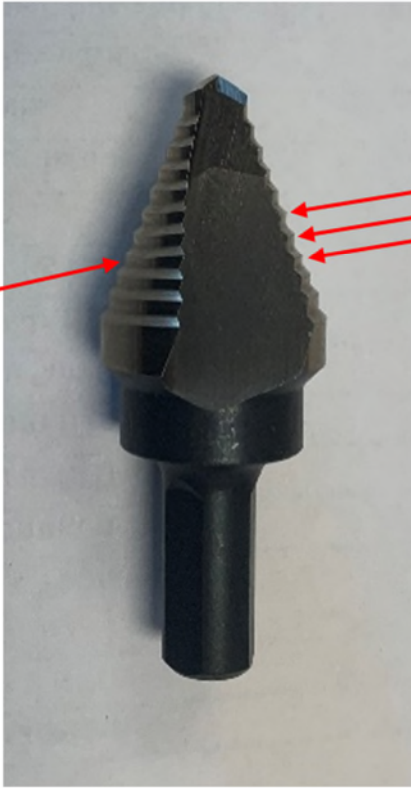
cylinder portion, the spiral flute having a sidewall;	Durfee I, 1:33-39 and 3:57 – 6:32; US Patent No. 9,687,915 (“Durfee II”), 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of Vikings 00714 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’583: 8.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	See [’583: 1.d]. 	See Tsteigen’s response to Viking’s allegation under [’583: 1.d], above.
[’583: 8.e] a conical first step surface;	See [’583: 1.e] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’583: 8.f] a cylindrical second step surface adjacent	See [’583: 1.f] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.

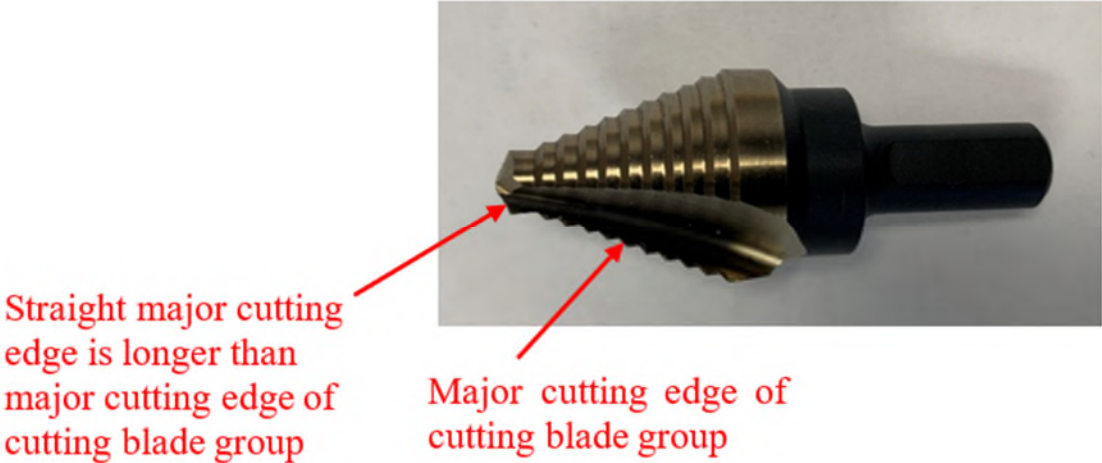
to the conical first step surface,		
[’583: 8.g] a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute;	See [’583: 1.g] and [’583: 8.d].  The image shows a close-up of a drill bit. Red arrows point to various features: 'Top blade' points to the upper cutting edge, 'Major cutting edge' points to the lower cutting edge, 'Cutting tip' points to the very front point, and 'Minor cutting edge' points to the edge of the flute. A bracket at the bottom points to the series of cutting edges along the length of the bit, labeled 'Cutting blade groups increasing sequentially in diameter'.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.
[’583: 8.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute, the minor cutting edge being configured to	See [’583: 1.h], [’583: 2], and the annotated photo of an exemplary Viking 00714 drill in [’583: 8.g].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.

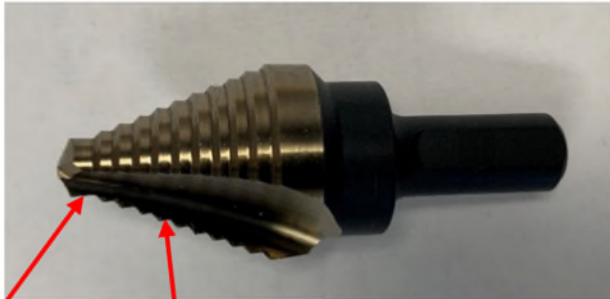
smooth the machined surface of the workpiece to improve surface quality; and		
[’583: 8.i] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute;	See [’583: 1.i] and the annotated photo of an exemplary Viking 00714 drill in [’583: 8.g].	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.
[’583: 8.j] a top blade provided on the front end of the cone portion, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge;	See [’583: 1.j], [’583: 5], the annotated photo of an exemplary Viking 00714 drill in [’583: 8.g] and the annotated photo of an exemplary Viking 00714 drill below.  The image shows a close-up of the tip of a drill bit. Red arrows point to specific edges: two 'Auxiliary cutting edges' on the left and right sides, two 'Major cutting edges' on the left and right sides, and a 'Chisel edge' at the very tip. The labels are in red text.	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.

[’583: 8.k] wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and	See [’583: 1.k], [’583: 8.g], and the annotated photo of an exemplary Viking 00714 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.
[’583: 8.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and	See [’583: 1.l].	See Tsteigen’s response to Viking’s allegation under [’583: 1.l], above.

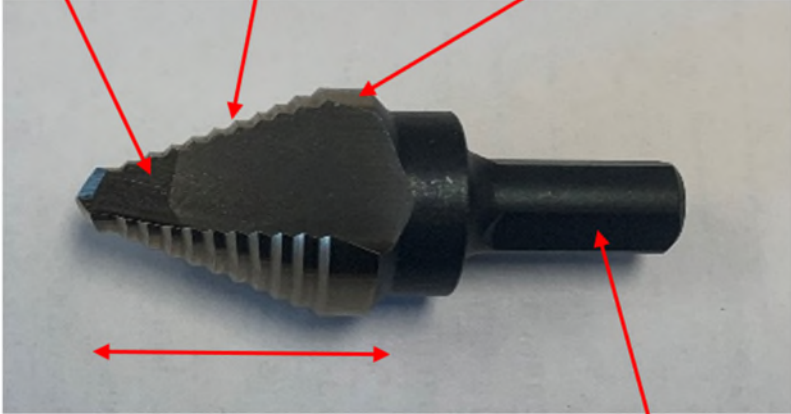
[’583: 8.m] wherein at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00714 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’583: 8.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	See [’583: 1.n], [’583: 8.g], and the annotated photo of an exemplary Viking 00714 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.k], above.
Claim 9	Viking 00714 Drill	
[’583: 9] The twist drill of claim 8 wherein, a height of each composite cutting blade group is uniform.	See [’583: 3].	See Tsteigen’s response to Viking’s allegation under [’583: 3], above.

	 Step height of each cutting blade group is the same around its perimeter Step heights of cutting blade groups are the same height as each other.	
Claim 11	Viking 00714 Drill	
[’583: 11] The twist drill of claim 8 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	See [’583: 6].	Tsteigen is not asserting this Claim against Viking.

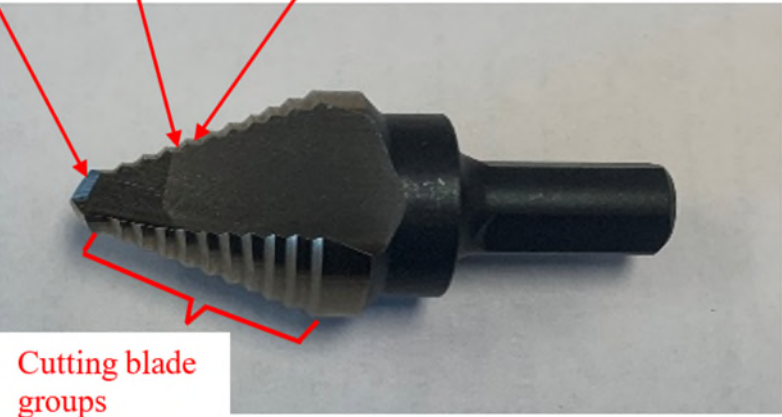
Claim 12	Viking 00714 Drill	
[’583: 12] The twist drill of claim 8 wherein, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	See [’583: 7].  The image shows a close-up of the tip of a drill bit. Two red arrows point to specific features: one points to the 'Straight major cutting edge' and the other points to the 'Major cutting edge of cutting blade group'. The text is in red and matches the labels in the image.	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.
Claim 13	Viking 00714 Drill	
[’583: 13] The twist drill of claim 8 wherein, a straight minor cutting edge length of the top blade is greater than each of the minor cutting edges of the plurality of composite cutting blade groups.	This claim is invalid because it is indefinite. Defendant is unable to determine what a “straight minor cutting edge” is and so cannot determine whether this element is present in the prior art. Defendant reserves the right to update this chart if the meaning of “straight minor cutting edge” is clarified during the course of this litigation. Plaintiffs have proposed that “a straight minor cutting edge” is a cutting edge parallel to the drill axis and descending from the outermost point of the “straight major cutting edge” of the top blade in a direction away from the tip of the drill. Defendant disagrees with this construction. If, however, this construction is correct, then Viking’s 00714 drill has a straight minor cutting edge length of the top blade that is greater than each of the minor cutting edges of the plurality of composite cutting blade groups. See the annotated photo of the 00714 drill below.	The Viking 00714 does not disclose a “top blade” whose minor cutting edge is longer than the “minor cutting edges” of each of the “composite cutting blade groups.” The minor cutting edge of the last composite cutting blade group appears longer than the minor cutting edge of the top blade in the Viking 00714. A person of ordinary skill would readily know that the “straight minor cutting edge length of the top blade” is in the ‘583 patent. Just as the United States Patent Office’s assigned Patent Examiner, as well as each of the three Patent Examiners the Patent Trial and Appeal Board assigned to the

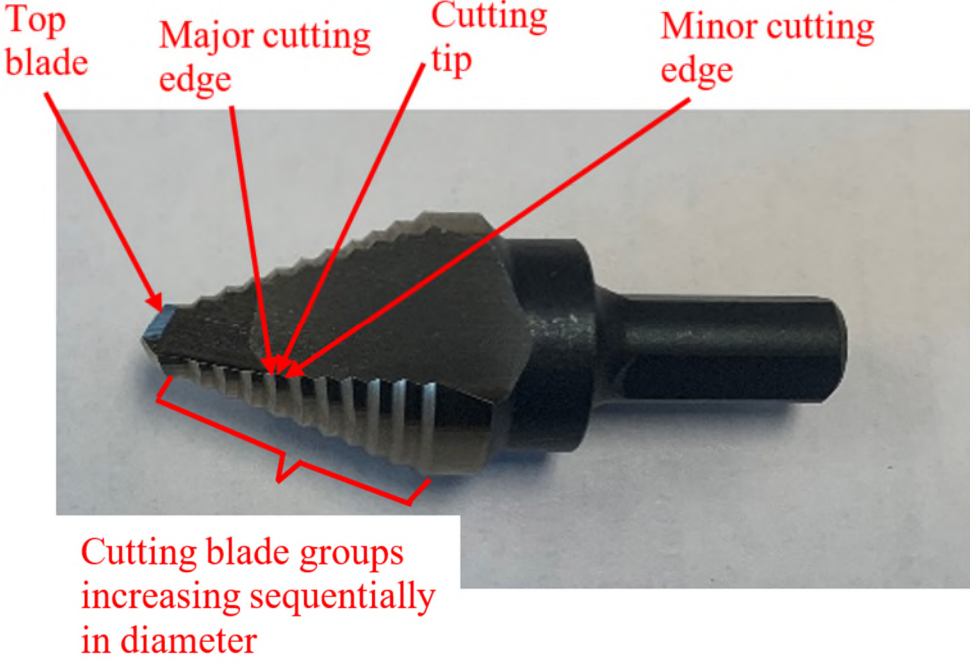
	 Plaintiffs' proposed straight minor cutting edge is longer than minor cutting edge of cutting blade groups Minor cutting edge of cutting blade group	panel for reexamining the '583 patent all readily determined from the '583 patent. In fact, the three Patent Examiners on the Reexamination proceeding panel specifically called out claim 13 in their first Office Action, finding the claim 13 was one of three patent claims in the '583 that were allowable in the first Office Action.
Claim 14	Viking 00714 Drill	
['583: 14] The twist drill of claim 8 wherein, the operation portion is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder	The operation portion of the Viking 00714 drill is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.	The operation portion of the Viking 00714 is configured to drill into thin workpieces. It is not configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.

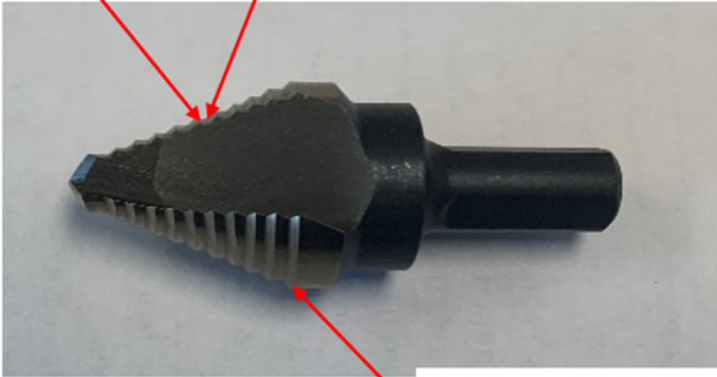
portion is also within the workpiece.		
'584 Patent		
Claim 1	Defendant's Contentions Viking 00714 Drill	Plaintiffs' Response
['584: 1.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	Viking's 00714 drill is a drill having a flute that extends from a cone portion to a cylinder portion. It was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00714 drill, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. <i>See</i> Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	The Viking 00714 drill is not a twist drill, and it is not a method for improving centering accuracy of a twist drill. Its multiple diameters comprise a method for making holes of different sizes in thin workpieces with a single drill bit. It is not a method for “drilling a drill hole in a workpiece .. using both a cone portion and a cylinder portion.”
['584: 1.a] providing a twist drill comprising: a shank portion;	The Viking 00714 has a shank portion. <i>See</i> ['583: 1.b] and ['584: 1.pre].	It appears to disclose a shank.

	 The image shows a Viking 00714 drill bit. Red arrows point to various parts: 'Flute' points to the cutting edge, 'Cone portion' points to the front tip, 'Cylinder portion' points to the middle section, 'Operation portion' points to the entire front section (cone and cylinder), and 'Shank portion' points to the rear handle section. A red double-headed arrow indicates the length of the operation portion.	
[’584: 1.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an exterior surface of the operating portion	The Viking 00714 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00714 drill reproduced in [’584: 1.a]. The Viking 00714 has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00714 drill in [’584: 1.a].	The Viking 00714 drill appears to have an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion -- although the cylinder portion is not what Viking identifies in the annotated photo Viking inserted above and to the left for [’584: 1.a]. Also, the flute is not spiral and is extends from a front end of the cone portion only, not along any portion of the cylinder portion. The shank portion appears to be axially fixed to the cylinder portion, opposite the cone portion.

extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00714 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of Vikings 00714 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’584: 1.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of	The Viking 00714 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> [’583: 1.d], [’583: 1.k], and the annotated photograph of a Viking 00714 shown below.	The Viking 00714 drill appears to have a plurality of composite cutting blade groups formed sequentially, but not spirally, on the exterior of the cone portion from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion.

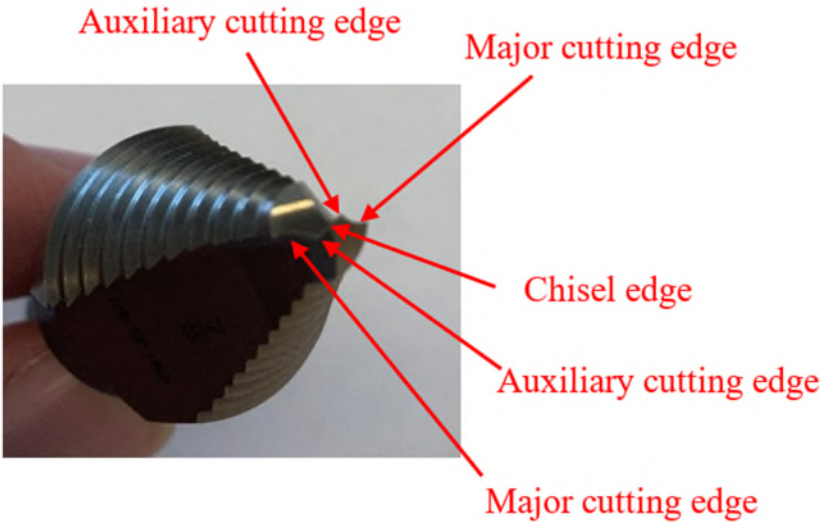
composite cutting blade groups comprising:	 Under Plaintiffs’ construction, the composite cutting blade groups of the Viking 00714 drills are formed “spirally.” See [’583: 1.d].	
[’584: 1.d] a conical first step surface;	See [’583: 1.e] and the annotated photograph of a Viking 00714 drill shown in [’584: 1.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’584: 1.e] a cylindrical second step surface adjacent to the conical first step surface,	See [’583: 1.f] and the annotated photograph of a Viking 00714 drill shown in [’584: 1.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’584: 1.f] a major cutting edge defined by the intersection of the conical first step surface and the	See [’583: 1.g] and the annotated photo of an exemplary Viking 00714 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

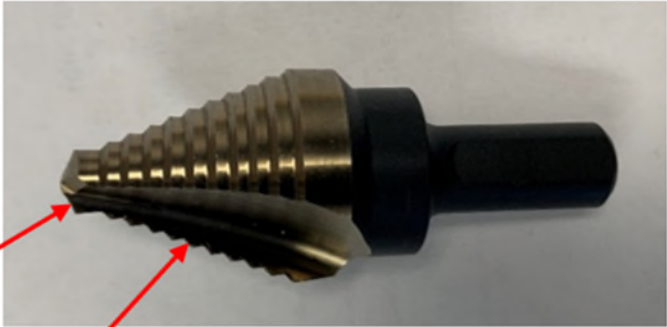
sidewall of the spiral flute;		
[’584: 1.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583: 1h] and the annotated photo of an exemplary Viking 00714 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 1.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting	See [’583: 1i] and the annotated photo of an exemplary Viking 00714 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

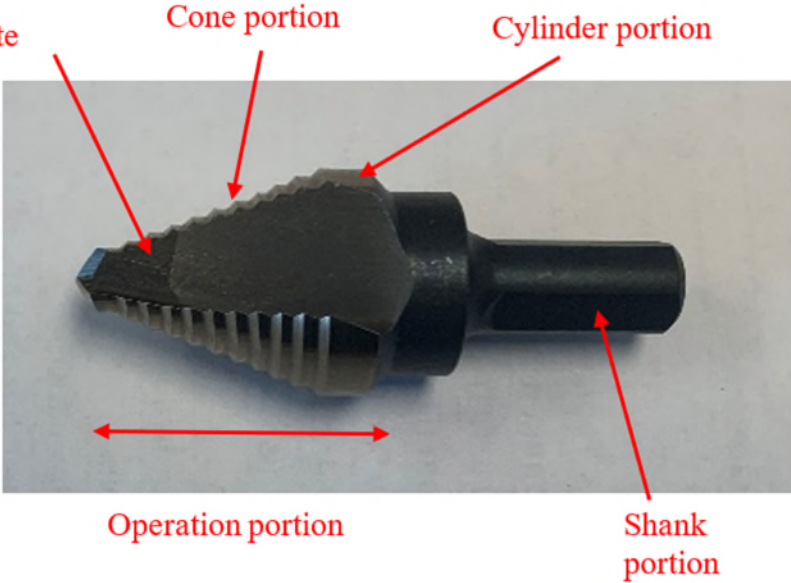
edge, and the sidewall of the spiral flute; and		
[’584: 1.i] a top blade provided on the front end of the cone portion;	See [’583: 1j] and the annotated photo of an exemplary Viking 00714 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 1.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00714 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 1.k] wherein the diameter of the last composite cutting blade group located at the rear	Assuming the Accused Products are found to meet this limitation, then the Viking 00714 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of an exemplary Viking 00714 drill in [’584: 1.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter;		
[’584: 1.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step of the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using a Viking 00714 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. See Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	From the photo, it appears likely that a person of ordinary skill would position the Viking 00714 step drill (not twist drill) atop the workpiece and apply a torque and an axial drilling force to the step drill.
[’584: 1.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill would cut the workpiece with the top blade to create a drill hole in the workpiece;
[’584: 1.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end;	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality of composite cutting blade groups situated closest to the front end;
[’584: 1.o] continuing cutting the workpiece using	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality

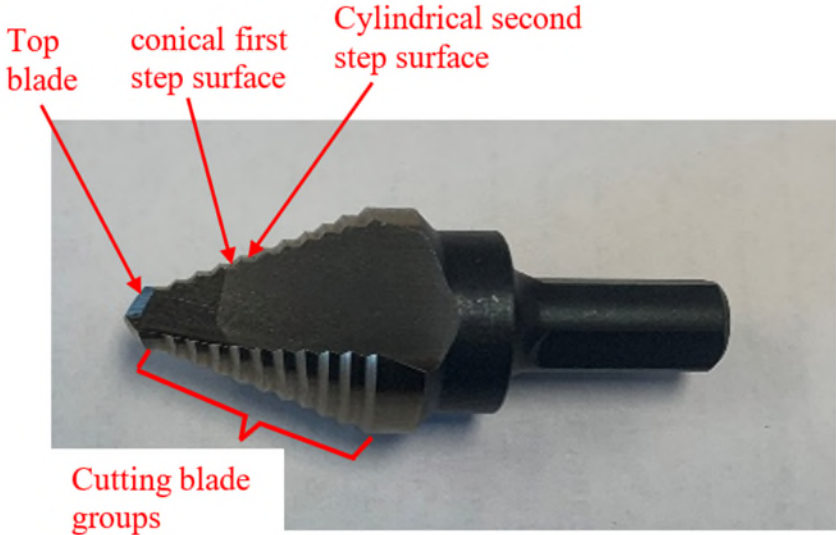
one or more of the plurality of composite cutting blade groups situated closest to the cylinder portion,		of composite cutting blade groups situated closest to the cylinder portion,
[’584: 1.p] wherein a cutting allowance of the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut; and	This is a natural outcome of the geometry of the cone portion of the Viking 00714 drill.	The method of using the Viking 00714 is as a step drill, it does not involve distributing the cutting allowance of the workpiece according to a drill hole diameter so that the workpiece is gradually cut.
[’584: 1.q] continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.	See [’584: 1.l].	The method of using the Viking 00714 is as a step drill, it does not involve continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.
Claim 2	Viking 00714 Drill	
[’584: 2] The method of claim 1 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of	Plaintiffs’ infringement allegations appear to be based on the contention that this smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00714 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.

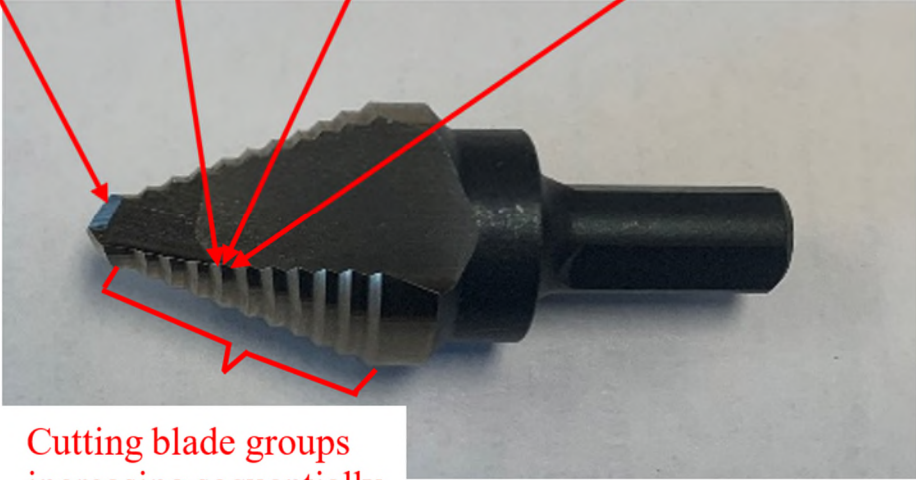
the workpiece to improve surface quality.		
Claim 4	Viking 00714 Drill	
[’584: 4] The method of claim 1 wherein, in the step of providing a twist drill, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	The Viking 00714 drill has a top blade comprising a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge. See [’583: 5] and the annotated photograph of a Viking 00714 drill shown below. 	Tsteigen is not asserting this Claim against Viking.
Claim 5	Viking 00714 Drill	
[’584: 5] The method of claim 1 wherein, in the step of providing a twist drill, a straight major cutting edge length	The Viking 00714 has a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See [’583: 7] and the annotated photo of a Viking 00714 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

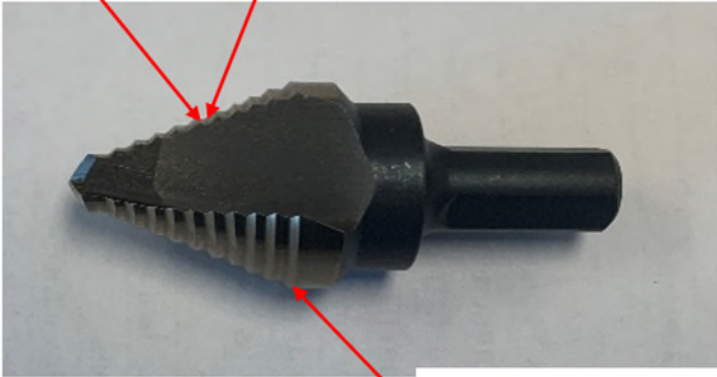
of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 6	Viking 00714 Drill	
[’584: 6.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	Viking’s 00714 drill has a flute that extends from a cone portion to a cylinder portion. It was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00714 drill, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. See Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	See Tsteigen’s response to Viking’s allegation under [’581: 1.preamble], above.
[’584: 6.a] providing a twist drill comprising:	The Viking 00714 drill has a shank portion. See [’583: 1.b] and [’584: 6.pre].	See Tsteigen’s response to Viking’s allegation under [’584: 1.a], above.

a shank portion;	 The image shows a Viking 00714 drill bit. Red arrows point to various parts: 'Flute' points to the cutting edge, 'Cone portion' points to the tapered front, 'Cylinder portion' points to the main body, 'Operation portion' points to the entire cutting area with a double-headed arrow, and 'Shank portion' points to the cylindrical handle.	
[’584: 6.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an exterior surface of the operating portion	The Viking 00714 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00714 drill reproduced in [’584: 6.a]. The Viking 00714 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00714 drill in [’584: 6.a].	See Tsteigen’s response to Viking’s allegation under [’584: 1.b], above.

extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00714 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of Vikings 00714 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’584: 6.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of	<i>See</i> [’583: 1.d], [’583: 1.k], and [’584: 1.c]. The Viking 00714 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> the annotated photo of an exemplary Viking 00714 drill reproduced below.	See Tsteigen’s response to Viking’s allegation under [’584: 1.c], above.

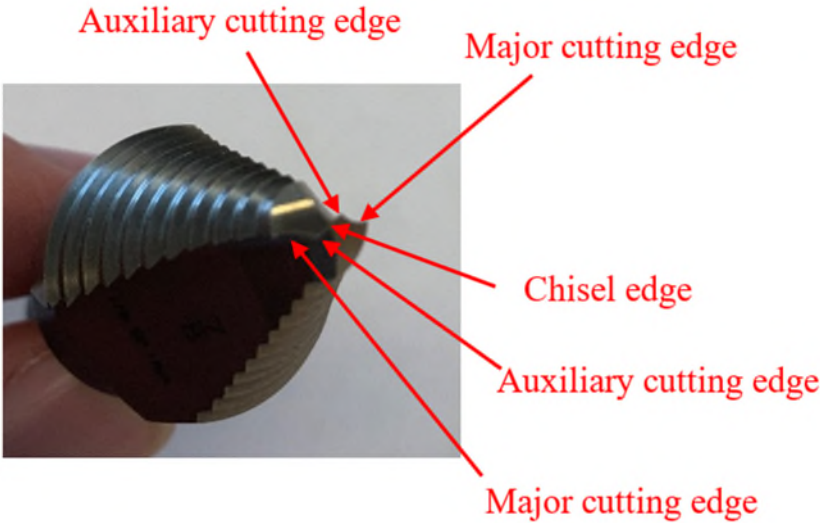
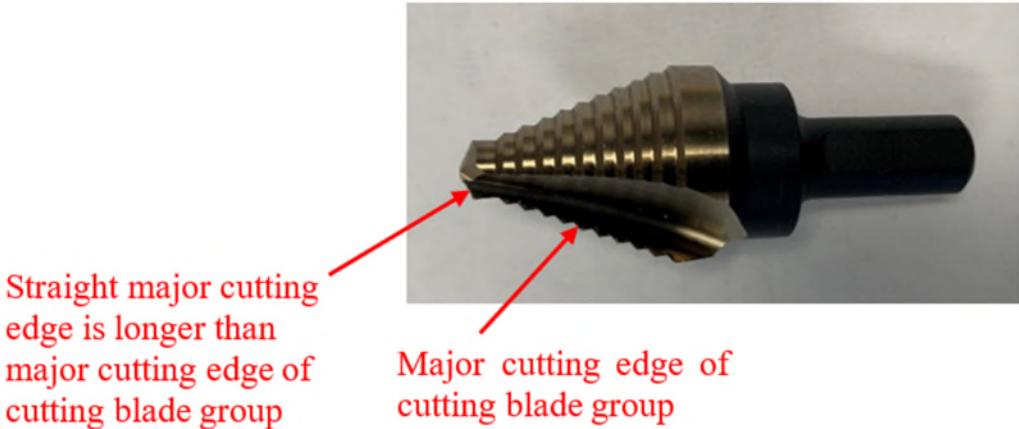
composite cutting blade groups comprising:	 Under Plaintiffs’ construction, the composite cutting blade groups of the Viking 00714 drills are formed “spirally.” See [’583: 1.d].	
[’584: 6.d] a conical first step surface;	See [’583: 1.e] and the annotated photograph of a Viking 00714 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’584: 6.e] a cylindrical second step surface adjacent to the conical first step surface,	See [’583: 1.f] and the annotated photograph of a Viking 00714 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’584: 6.f] a major cutting edge defined by the intersection of the conical first step surface and the	See [’583: 1.g] and the annotated photo of an exemplary Viking 00714 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

sidewall of the spiral flute;	Top blade Major cutting edge Cutting tip Minor cutting edge  Cutting blade groups increasing sequentially in diameter	
[’584: 6.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583: 1h] and the annotated photo of an exemplary Viking 00714 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 6.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting	See [’583: 1i] and the annotated photo of an exemplary Viking 00714 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

edge, and the sidewall of the spiral flute; and		
[’584: 6.i] a top blade provided on the front end of the cone portion;	See [’583: 1j] and the annotated photo of an exemplary Viking 00714 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 6.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00714 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 6.k] the diameter of the last composite cutting blade group located at the rear end of the	Assuming the Accused Products are found to meet this limitation, then the Viking 00714 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of a Viking 00714 drill in [’584: 6.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

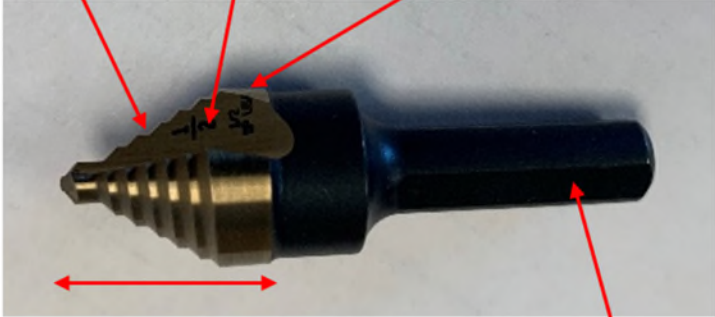
cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter;		
[’584: 6.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step of the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using a Viking 00714 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. See Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	See Tsteigen’s response to Viking’s allegation under [’584: 1.l], above.
[’584: 6.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	See [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.m], above.
[’584: 6.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end; and	See [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.n], above.
[’584: 6.o] continuing cutting the workpiece using one or more of the	See [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.o], above.

plurality of composite cutting blade groups situated closest to the cylinder portion,		
[’584: 6.p] wherein a cutting allowance of the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut.	This is a natural outcome of using a Viking 00714 drill and is, therefore, inherent to the use of the drill.	See Tsteigen’s response to Viking’s allegation under [’584: 1.p], above.
Claim 7	Viking 00714 Drill	
[’584: 7] The method of claim 6 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	See [’584: 2].	Tsteigen is not asserting this Claim against Viking.
Claim 9	Viking 00714 Drill	
[’584: 9] The method of claim 6 wherein, in the step of providing a twist	See [’583: 5] and the annotated photograph of a Viking 00714 drill shown below.	Tsteigen is not asserting this Claim against Viking.

drill, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.		
Claim 10	Viking 00714 Drill	
[’584: 10] The method of claim 6 wherein, in the step of providing a twist drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	See [’583: 7] and the annotated photo of a Viking 00714 drill below. 	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.
Claim 11	Viking 00714 Drill	

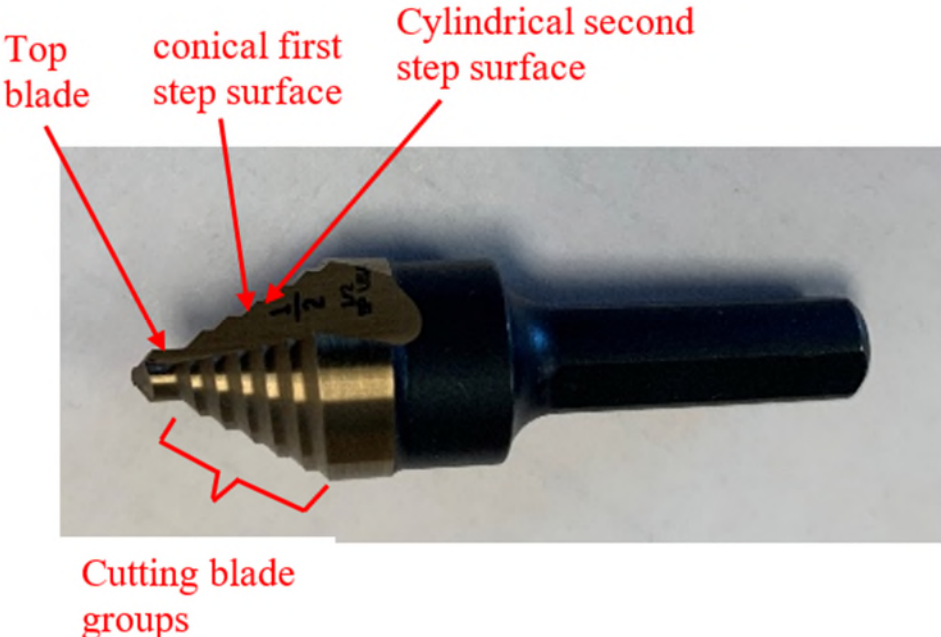
[’584: 11] The method of claim 6 further: dispersing a cutting force on all of the plurality of composite cutting blade groups within a drill hole of a workpiece when a portion of the cylinder portion is also within the workpiece.	This is a natural outcome of using a Viking 00714 drill and is, therefore, inherent to the use of the drill.	See Tsteigen’s response to Viking’s allegation under [’583: 14], above.
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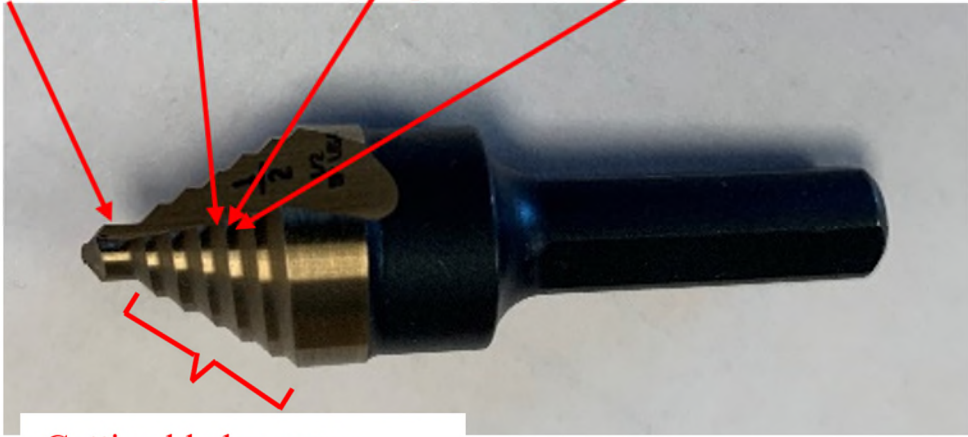
Exhibit D

'583 Patent		
Claim 1	Defendant's Contentions Viking 00693 Drill	Plaintiff's Response
['583: 1.pre] A twist drill, comprising:	The preamble carries no patentable weight. The Viking 00693 drill is a drill having a flute that extends from a cone portion to a cylinder portion.	It is unclear whether or not the Viking 00693 drill disclosure constitutes prior art since Tsteigen is unaware of any evidence in the record that the Viking 00693 drill disclosure precedes the priority date of Tsteigen's asserted patent claims. The preamble does carry weight in the question of patentability. The Viking 00693 appears to disclose a step drill, not a twist drill.
['583: 1.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	The Viking 00693 drill includes an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion. 	The Viking 00693 has¹ an operating portion that comprises a cone portion, but the cylinder portion has a significantly reduced diameter, as shown below: 

¹ Viking's invalidity contentions pertaining to this prior art reference contained only the few images in the middle column of this prior art claim chart. Plaintiffs requested actual samples of this step drill bit and reserved their right to supplement their response statement and prior art charts once physical samples could be examined. Plaintiffs ultimately produced one such sample (shown in the right-hand column).

[’583: 1.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00693 drill has a shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> annotated photo of an exemplary Viking 00693 drill in [’583: 1.a].	The Viking 00693 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Shank portion
[’583: 1.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall;	The Viking 00693 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00693 drill in [’583: 1.a]. The Viking 00693 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> U.S. Patent No. 10,328,499 (“Durfee I”), 1:33-39 and 3:57 – 6:32; U.S. Patent No. 2,193,186 (“Bannister”), <i>see</i> FIG. 2; U.S. Patent App. Pub. No. 2005/0053438 (“Wetzel”), <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], U.S. Patent App. Pub. No. 2011/0116884 (“Li”), FIGs. 1-8; U.S. Patent App. Pub. No. 2018/0133808 (“Wang I”), FIGs. 5-12 and ¶¶ [31, 32, 35, 36]; U.S. Patent No. D840,449 (“Wang II”), FIGs. 1-4, and 6-8; U.S. Patent No. 4,582,458 (“Korb”), FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386.	The Viking 00693 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Straight flute

	It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00693 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’583: 1.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	The Viking 00693 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion.  Plaintiff’s infringement allegations appear to be based on the contention that the presence of axial relief on the Accused Products results in composite cutting blades groups that are formed “spirally.” While Viking disagrees with this contention, to the extent the claims are construed such that the Accused Products meet this limitation, then it is also present in the Viking 00693 drill. The Viking 00693 drill has greater axial relief than the Accused Products.	The Viking 00693 discloses a plurality of composite cutting blade groups formed sequentially from a front end to the rear end of the exterior surface of the cone portion. The composite cutting blade groups do not appear to be oriented spirally. As shown above, the Viking 00693 discloses a flute that is straight, not spiral. It extends on an exterior surface of the operating portion from a front end of the cone portion, but it does not extend at least partway up the cylinder portion. The flute has a sidewall.

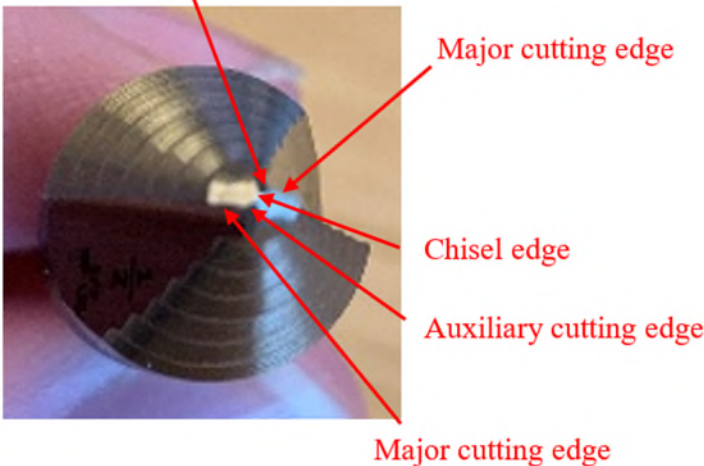
[’583: 1.e] a conical first step surface;	The Viking 00693 drill has a conical first step surface. See annotated photo of an exemplary Viking 00693 drill in [’583: 1.d].	Each of the plurality of composite cutting blade groups in Viking 00693 comprises a conical first step surface.
[’583: 1.f] a cylindrical second step surface adjacent to the conical first step surface,	Plaintiffs’ infringement allegations appear to be based on a contention that the presence of axial, radial, and back taper relief does not prevent the second step surfaces from being considered “cylindrical.” While Viking disagrees with this contention, based on Plaintiffs’ assertion, the Viking 00693 drill has a cylindrical second step surface adjacent to the conical first step surface. See annotated photo of an exemplary Viking 00693 drill in [’583: 1.d].	Each of the plurality of composite cutting blade groups in Viking 00693 comprises a cylindrical second step surface adjacent to a conical first step surface.
[’583: 1.g] a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute;	The Viking 00693 drill has a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute.  Top blade Major cutting edge Cutting tip Minor cutting edge Cutting blade groups increasing sequentially in diameter	The “first step surface” of Viking 00693, appears to intersect the sidewall of the flute, defining a major cutting edge.

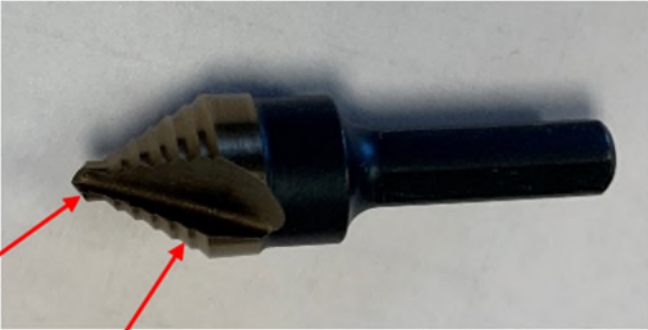
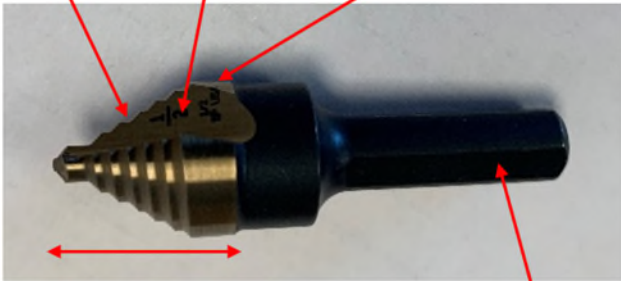
[’583: 1.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	The Viking 00693 drill has a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00693 drill in [’583: 1.g].	The “second step surface” of Viking 00693 appears to intersect the sidewall of the flute, defining a minor cutting edge.
[’583: 1.i] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute; and	The Viking 00693 drill has a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00693 drill in [’583: 1.g].	The Viking 00693 appears to disclose a cutting tip defined by the intersection of the “major cutting edge,” the “minor cutting edge,” and the sidewall of the flute, but the flute is not spiral.
[’583: 1.j] a top blade provided on the front end of the cone portion;	The Viking 00693 drill has a top blade provided on the front end of the cone portion. <i>See</i> annotated photo of exemplary Viking 00693 drill in [’583: 1.g].	The Viking 00693 discloses a top blade on the front end of the cone portion.
[’583: 1.k] wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and	With the Viking 00693 drill, a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion. <i>See</i> annotated photo of exemplary Viking 00693 drill in [’583: 1.g].	In the Viking 00693, the diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion.

[’583: 1.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and	Plaintiff’s infringement allegations appear to be based on the contention that crushing of cutting chips into finer chips inherently results from having multiple composite blade cutting groups. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00693 drill. A person of ordinary skill will understand that the Viking 00693 drill modified with spiral flutes will shunt chips from the cutting surface out of the drilled hole.	Each of the plurality of composite cutting blade groups in Viking 00693 appears to be configured to cut a hole in a thin workpiece of a desired diameter.
[’583: 1.m] wherein at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and	In the Viking 00693 drill, at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	At least one cylindrical second step surface in the Viking 00693 appears to be immediately adjacent to the conical first step surface of the next composite cutting blade group.

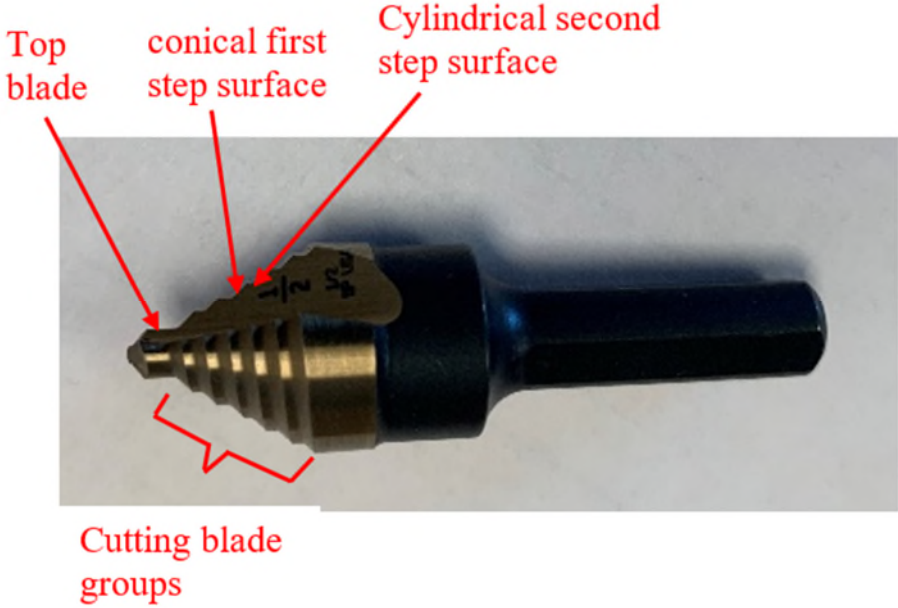
[’583: 1.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	Plaintiffs’ infringement allegations appear to be based on designating an arbitrary length of the upper end of the cylinder portion to be part of the last composite cutting blade group. While Viking disagrees with this contention, based on Plaintiffs’ assertion, the diameter of the last composite cutting blade group located at the rear end of the cone portion in the Viking 00693 drill immediately adjacent to the cylinder portion is equal to the cylinder portion diameter. <i>See</i> annotated photo of exemplary Viking 00693 drill in [’583: 1.m].	The diameter of the last composite cutting blade group in the Viking 00693 drill bit, located at the rear end of the cone portion immediately adjacent to the cylinder portion, is not equal to the cylinder portion diameter: An annotated photograph of a Viking 00693 drill bit. The drill bit is shown from a side-on perspective, lying on a wooden surface. It has a dark blue body and a silver-colored cutting edge. Two red arrows point to specific parts of the drill bit: one points to the 'Height of the last composite cutting blade group' and the other points to the 'Cylinder portion'. Height of the last composite cutting blade group Cylinder portion
Claim 2 [’583: 2] The twist drill of claim 1 wherein, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	Viking 00693 Drill Plaintiffs’ infringement allegations appear to be based on the contention that this smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00693 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.
Claim 3	Viking 00693 Drill	

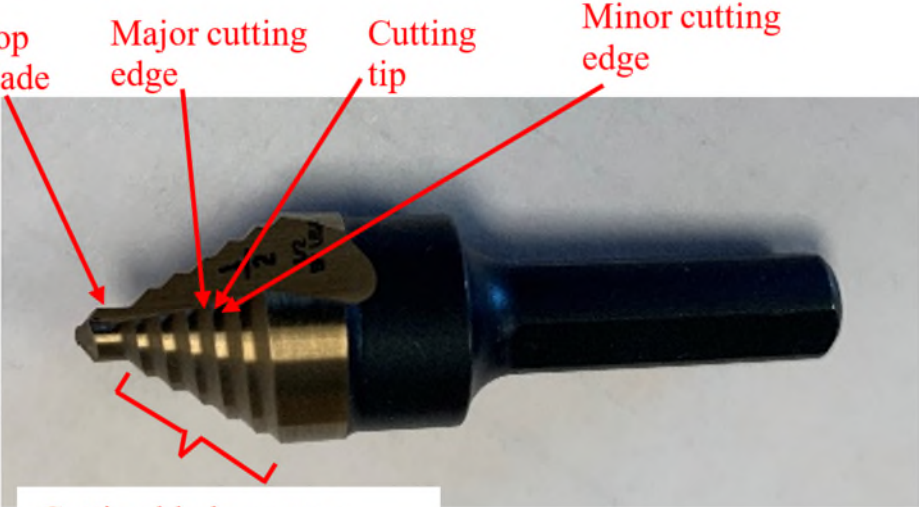
[’583: 3] The twist drill of claim 1 wherein, a height of each composite cutting blade group is uniform.	In the Viking 00693 drill, the height of each composite cutting blade group the same around its perimeter and the step heights are the same as each other. Thus, if claim 3 is found to not be indefinite, it is met by the Viking 00693 drill.  Step height of each cutting blade group is the same around its perimeter Step heights of cutting blade groups are the same height as each other.	Tsteigen is not asserting this Claim against Viking.
Claim 5 [’583: 5] The twist drill of claim 1 wherein, the top blade comprises a	Viking 00693 Drill Viking 00693 drill has a split point tip, having a chisel edge, two auxiliary cutting edges and two straight major cutting edges, where the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	Tsteigen is not asserting this Claim against Viking.

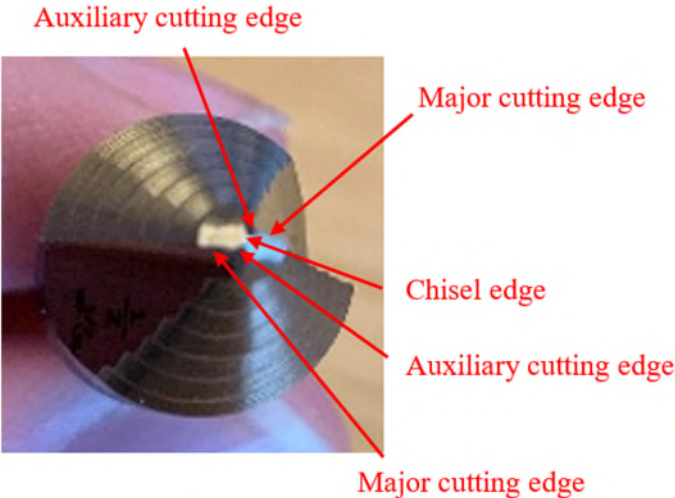
chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	 The image shows a close-up of the tip of a drill bit. Red arrows point to specific features: 'Auxiliary cutting edge' (top left), 'Major cutting edge' (top right), 'Chisel edge' (center), 'Auxiliary cutting edge' (bottom right), and 'Major cutting edge' (bottom left).	
Claim 6	Viking 00693 Drill	
[’583: 6] The twist drill of claim 1 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	Plaintiffs’ infringement allegations appear to be based on a contention that the presence of axial and radial relief does not prevent composite cutting edge groups from being coaxial with the cone portion. While Defendant disagrees with this contention, based on Plaintiffs’ assertion, then this limitation is also present in the Viking 00693 drill.	Tsteigen is not asserting this Claim against Viking.
Claim 7	Viking 00693 Drill	
[’583: 7] The twist drill of claim 1 wherein, a straight major cutting edge length of the top	In the Viking 00693 drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See the annotated photo of a Viking 00693 drill below.	The straight major cutting edge length of the top blade in the Viking 00693 drill bit appears to be greater than each of the major cutting edges of the plurality of composite cutting blade groups.

blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 8	Viking 00693 Drill	
[’583: 8.pre] A twist drill, comprising:	The Viking 00693 drill is a drill having a flute that extends from a cone portion to a cylinder portion. See [’583: 1.pre].	See Tsteigen’s response to Viking’s allegation under [’583: 1.preamble], above.
[’583: 8.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	See [’583: 1.a].  Cone portion Flute Cylinder portion Operation portion Shank portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.

[’583: 8.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	See [’583: 1.b] and [’583: 8.a].	See Tsteigen’s response to Viking’s allegation under [’583: 1.b], above.
[’583: 8.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall;	See [’583: 1.c] and [’583: 8.a]. The Viking 00693 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00693 drill in [’583: 8.a]. The Viking 00693 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; US Patent No. 9,687,915 (“Durfee II”), 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00693 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	See Tsteigen’s response to Viking’s allegation under [’583: 1.c], above.
[’583: 8.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the	See [’583: 1.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.d], above.

cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:		
[’583: 8.e] a conical first step surface;	See [’583: 1.e] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’583: 8.f] a cylindrical second step surface adjacent to the conical first step surface,	See [’583: 1.f] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’583: 8.g] a major cutting edge defined by the intersection of the conical first step surface and the	See [’583: 1.g] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

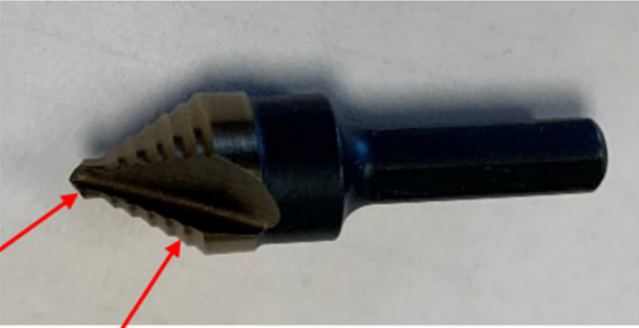
sidewall of the spiral flute;	 Top blade Major cutting edge Cutting tip Minor cutting edge Cutting blade groups increasing sequentially in diameter	
[’583: 8.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute, the minor cutting edge being configured to smooth the machined surface of the workpiece to improve surface quality; and	See [’583: 1.h], [’583: 2], and the annotated photo of an exemplary Viking 00693 drill in [’583: 8.g].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.

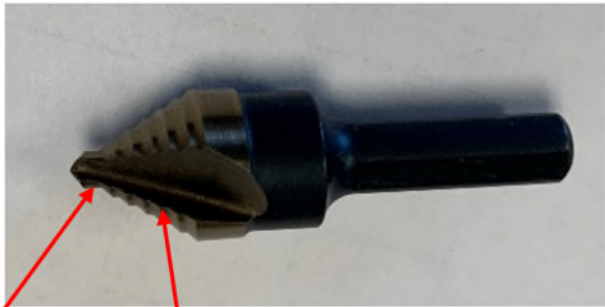
['583: 8.i] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute;	See ['583: 1.i] and the annotated photo of an exemplary Viking 00693 drill in ['583: 8.g].	See Tsteigen's response to Viking's allegation under ['583: 1.a], above.
['583: 8.j] a top blade provided on the front end of the cone portion, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge;	See ['583: 1.j], ['583: 5], the annotated photo of an exemplary Viking 00693 drill in ['583: 8.g] and the annotated photo of an exemplary Viking 00693 drill below.  The image shows a close-up of the tip of a drill bit. Red arrows point to specific features: two 'Auxiliary cutting edges' (top and bottom), two 'Major cutting edges' (left and right), and a central 'Chisel edge'.	See Tsteigen's response to Viking's allegation under ['583: 1.a], above.
['583: 8.k] wherein a diameter of each of the plurality of composite cutting blade groups increases	See ['583: 1.k], ['583: 8.g], and the annotated photo of an exemplary Viking 00693 below.	See Tsteigen's response to Viking's allegation under ['583: 1.a], above.

sequentially from the front end of the cone portion to the rear end of the cone portion; and	Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	
[’583: 8.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and	See [’583: 1.l].	See Tsteigen’s response to Viking’s allegation under [’583: 1.l], above.
[’583: 8.m] wherein at least one cylindrical second step surface is immediately	See [’583: 1.m] and the annotated photo of an exemplary Viking 00693 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.

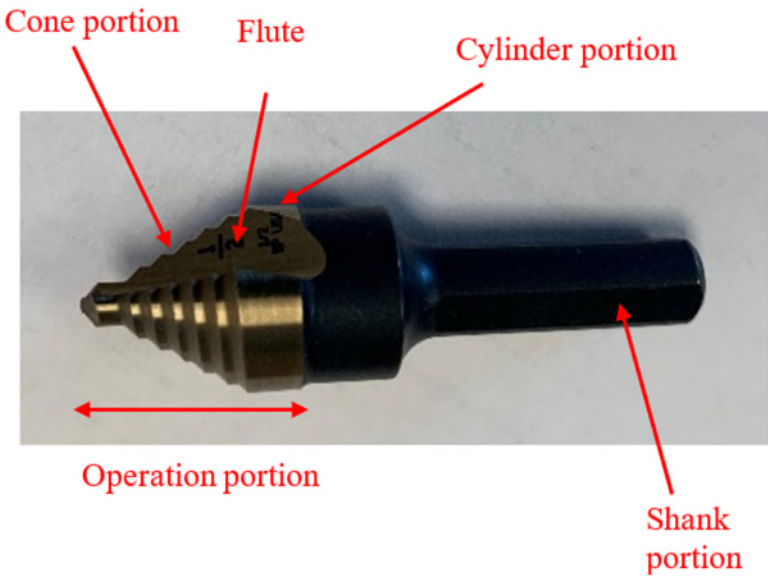
adjacent to a conical first step surface of a next composite cutting blade group; and		
[’583: 8.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	See [’583: 1.n], [’583: 8.g], and the annotated photo of an exemplary Viking 00693 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.k], above.
Claim 9	Viking 00693 Drill	
[’583: 9] The twist drill of claim 8 wherein, a height of each composite cutting blade group is uniform.	See [’583: 3].	See Tsteigen’s response to Viking’s allegation under [’583: 3], above.

	Step height of each cutting blade group is the same around its perimeter  Step heights of cutting blade groups are the same height as each other.	
Claim 11	Viking 00693 Drill	
[’583: 11] The twist drill of claim 8 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	See [’583: 6].	Tsteigen is not asserting this Claim against Viking.

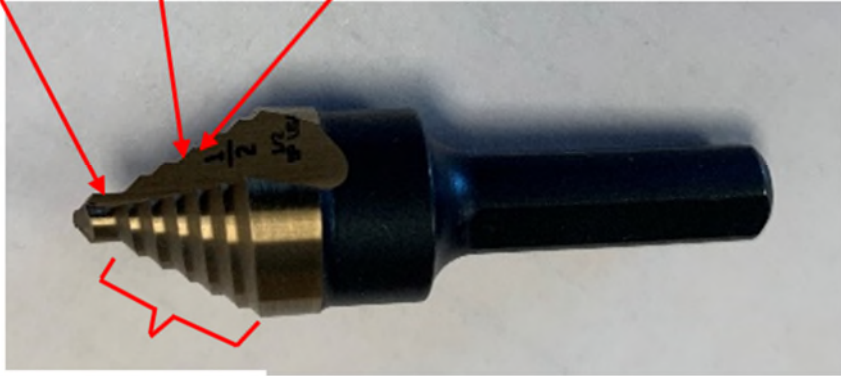
Claim 12 [’583: 12] The twist drill of claim 8 wherein, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	Viking 00693 Drill See [’583: 7].  Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.
Claim 13 [’583: 13] The twist drill of claim 8 wherein, a straight minor cutting edge length of the top blade is greater than each of the minor cutting edges of the plurality of composite cutting blade groups.	Viking 00693 Drill This claim is invalid because it is indefinite. Defendant is unable to determine what a “straight minor cutting edge” is and so cannot determine whether this element is present in the prior art. Defendant reserves the right to update this chart if the meaning of “straight minor cutting edge” is clarified during the course of this litigation. Plaintiffs have proposed that “a straight minor cutting edge” is a cutting edge parallel to the drill axis and descending from the outermost point of the “straight major cutting edge” of the top blade in a direction away from the tip of the drill. Defendant disagrees with this construction. If, however, this construction is correct, then the Viking 00693 drill has a straight minor cutting edge length of the top blade that is greater than each of the minor cutting edges of the plurality of composite cutting blade groups. See the annotated photo of the Viking 00693 drill below.	The Viking 00693 does not disclose a “top blade” whose minor cutting edge is longer than the “minor cutting edges” of each of the “composite cutting blade groups.” The minor cutting edge of the last composite cutting blade group appears longer than the minor cutting edge of the top blade in the Viking 00693. A person of ordinary skill would readily know that the “straight minor cutting edge length of the top blade” is in the ‘583 patent. Just as the United States Patent Office’s assigned Patent Examiner, as well as each of the three Patent Examiners the Patent Trial and Appeal Board assigned to the panel for

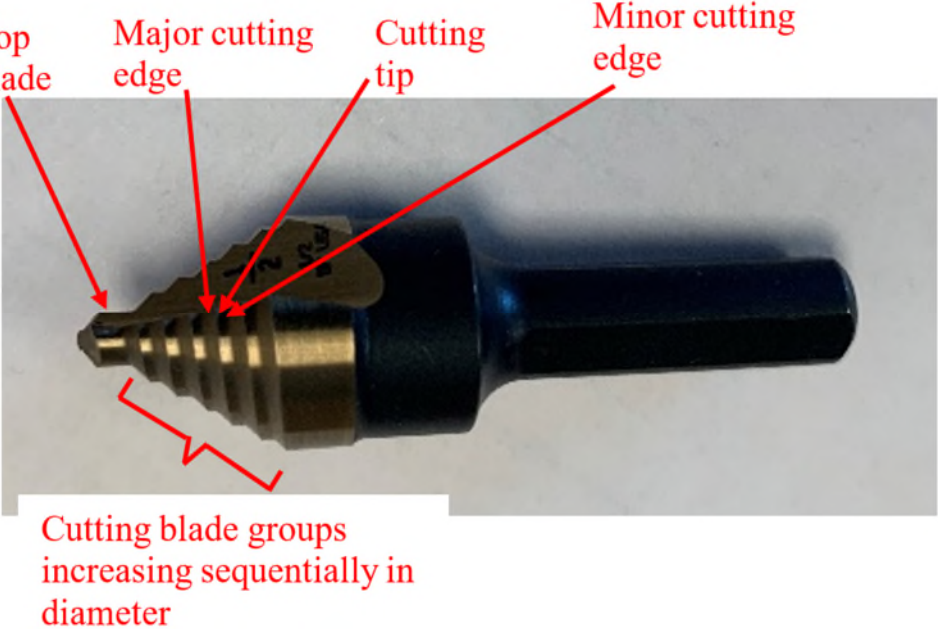
	 Plaintiffs' proposed straight minor cutting edge is longer than minor cutting edge of cutting blade groups Minor cutting edge of cutting blade group	reexamining the '583 patent all readily determined from the '583 patent. In fact, the three Patent Examiners on the Reexamination proceeding panel specifically called out claim 13 in their first Office Action, finding the claim 13 was one of three patent claims in the '583 that were allowable in the first Office Action.
Claim 14	Viking 00693 Drill	
['583: 14] The twist drill of claim 8 wherein, the operation	The operation portion of the Viking 00693 drill is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.	The operation portion of the Viking 00693 is configured to drill into thin workpieces. It is not configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.

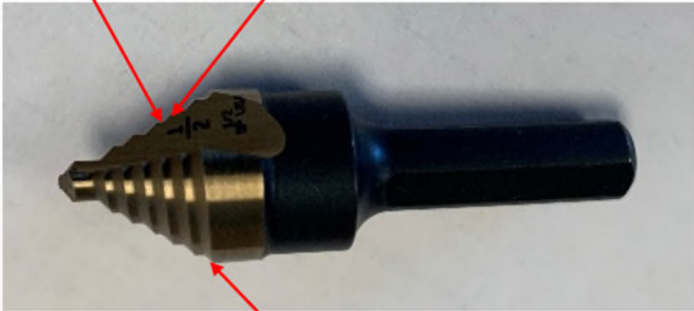
portion is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.		
'584 Patent		
Claim 1	Defendant's Contentions Viking 00693 Drill	Plaintiffs' Response
['584: 1.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	The Viking 00693 drill is a drill having a flute that extends from a cone portion to a cylinder portion. However, it was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00693 drill, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. <i>See</i> Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	The Viking 00693 drill is not a twist drill, and it is not a method for improving centering accuracy of a twist drill. Its multiple diameters comprise a method for making holes of different sizes in thin workpieces with a single drill bit. It is not a method for “drilling a drill hole in a workpiece .. using both a cone portion and a cylinder portion.”
['584: 1.a] providing a twist drill comprising: a shank portion;	The Viking 00693 drill has a shank portion. <i>See</i> ['583: 1.b] and ['584: 1.pre].	It appears to disclose a shank.

	 The image shows a side view of a drill bit. Red arrows point to various parts: 'Cone portion' points to the tip, 'Flute' points to the spiral groove on the cone, 'Cylinder portion' points to the cylindrical body behind the cone, 'Operation portion' points to the entire front section (cone and cylinder), and 'Shank portion' points to the hexagonal base of the drill.	
[’584: 1.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an exterior surface of the operating portion	The Viking 00693 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. See [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00693 drill reproduced in [’584: 1.a]. The Viking 00693 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. See annotated photo of an exemplary Viking 00693 drill in [’584: 1.a]. The Viking 00693 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute.	The Viking 00693 drill appears to have an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion -- although the cylinder portion is not what Viking identifies in the annotated photo Viking inserted above and to the left for [’584: 1.a]. Also, the flute is not spiral and is extends from a front end of the cone portion only, not along any portion of the cylinder portion. The shank portion appears to be axially fixed to the cylinder portion, opposite the cone portion.

extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	<i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 608; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of Viking 00693 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’584: 1.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting	The Viking 00693 has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> [’583: 1.d], [’583: 1.k], and the annotated photograph of a Viking 00693 drill shown below.	The Viking 00693 drill appears to have a plurality of composite cutting blade groups formed sequentially, but not spirally, on the exterior of the cone portion from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion.

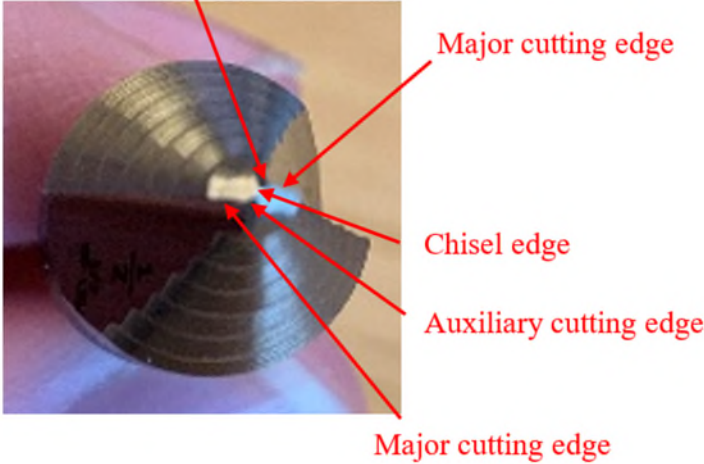
blade groups comprising:	Top blade conical first step surface Cylindrical second step surface  Cutting blade groups Under Plaintiffs’ construction, the composite cutting blade groups of the Viking 00693 drills are formed “spirally.” See [’583: 1.d].	
[’584: 1.d] a conical first step surface;	See [’583:1.e] and the annotated photograph of a Viking 00693 drill shown in [’584: 1.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’584: 1.e] a cylindrical second step surface adjacent to the conical first step surface,	See [’583:1.f] and the annotated photograph of a Viking 00693 drill shown in [’584: 1.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’584: 1.f] a major cutting edge defined by the intersection of the conical first step surface and the	See [’583:1.g] and the annotated photograph of an exemplary Viking 00693 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

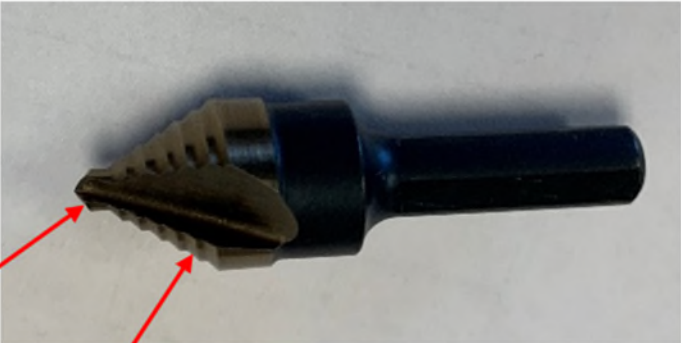
sidewall of the spiral flute;		
[’584: 1.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583.1h] and the annotated photo of an exemplary Viking 00693 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 1.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the	See [’583.1i] and the annotated photo of an exemplary Viking 00693 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

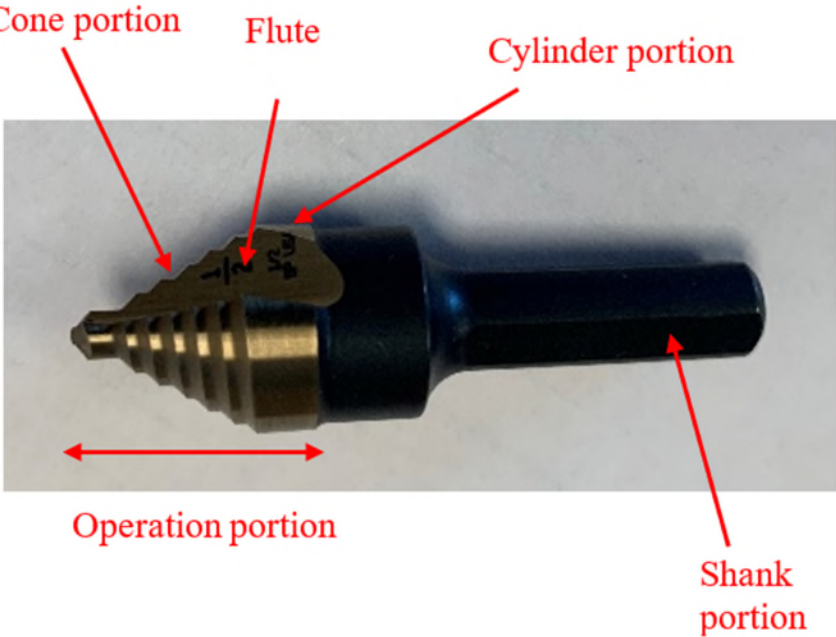
sidewall of the spiral flute; and		
[’584: 1.i] a top blade provided on the front end of the cone portion;	See [’583.1j] and the annotated photo of an exemplary Viking 00693 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 1.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00693 drill below.  Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 1.k] wherein the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the	Assuming the Accused Products are found to meet this limitation, then the Viking 00693 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of an exemplary Viking 00693 drill in [’584: 1.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

cylinder portion is equal to the cylinder portion diameter;		
[’584: 1.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step of the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using a Viking 00693 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. <i>See</i> Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	From the photo, it appears likely that a person of ordinary skill would position the Viking 00693 step drill (not twist drill) atop the workpiece and apply a torque and an axial drilling force to the step drill.
[’584: 1.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	<i>See</i> [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill would cut the workpiece with the top blade to create a drill hole in the workpiece;
[’584: 1.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end;	<i>See</i> [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality of composite cutting blade groups situated closest to the front end;
[’584: 1.o] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated	<i>See</i> [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality of composite cutting blade groups situated closest to the cylinder portion,

closest to the cylinder portion,		
[’584: 1.p] wherein a cutting allowance of the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut; and	This is a natural outcome of the geometry of the cone portion of the Viking 00693 drill.	The method of using the Viking 00693 is as a step drill, it does not involve distributing the cutting allowance of the workpiece according to a drill hole diameter so that the workpiece is gradually cut.
[’584: 1.q] continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.	See [’584: 1.l].	The method of using the Viking 00693 is as a step drill, it does not involve continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.
Claim 2	Viking 00693 Drill	
[’584: 2] The method of claim 1 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	Plaintiffs’ infringement allegations appear to be based on the contention that this smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00693 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.

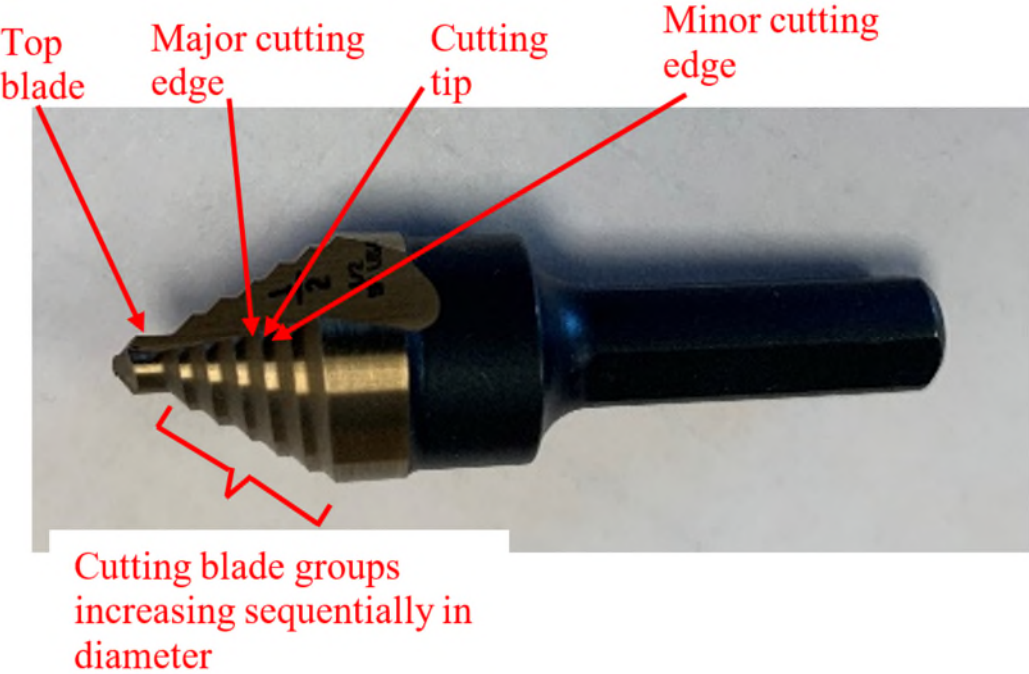
Claim 4	Viking 00693 Drill	
[’584: 4] The method of claim 1 wherein, in the step of providing a twist drill, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge. See [’583: 5] and the annotated photograph of a Viking 00693 drill shown below.	The Viking 00693 drill has a top blade comprising a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge. See [’583: 5] and the annotated photograph of a Viking 00693 drill shown below. 	Tsteigen is not asserting this Claim against Viking.
Claim 5	Viking 00693 Drill	
[’584: 5] The method of claim 1 wherein, in the step of providing a twist drill, a straight major cutting edge length of the top blade is greater than each of the major cutting	The Viking 00693 has a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See [’583: 7] and the annotated photo of a Viking 00693 below.	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

edges of the plurality of composite cutting blade groups.	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 6 [’584: 6.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	Viking 00693 Drill The Viking 00693 drill is a drill having a flute that extends from a cone portion to a cylinder portion. It was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00693, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. See Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	See Tsteigen’s response to Viking’s allegation under [’581: 1.preamble], above.

[’584: 6.a] providing a twist drill comprising: a shank portion;	The Viking 00693 drill has a shank portion. See [’583: 1.b] and [’584: 6.pre].  The image shows a side view of a twist drill. Red arrows point to various parts: 'Cone portion' points to the tip, 'Flute' points to the spiral groove, 'Cylinder portion' points to the middle section, 'Operation portion' points to the entire length from tip to the start of the shank, and 'Shank portion' points to the hexagonal tail. A red double-headed arrow is also shown under the 'Operation portion' label.	See Tsteigen’s response to Viking’s allegation under [’584: 1.a], above.
[’584: 6.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an	The Viking 00693 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. See [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00693 drill reproduced in [’584: 1.a]. The Viking 00693 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. See annotated photo of an exemplary Viking 00693 drill in [’584: 6.a].	See Tsteigen’s response to Viking’s allegation under [’584: 1.b], above.

exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00693 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 608; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00693 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’584: 6.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of	<i>See</i> [’583: 1.d], [’583: 1.k], and [’584: 1.c]. The Viking 00693 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> the annotated photo of an exemplary Viking 00693 drill reproduced below.	See Tsteigen’s response to Viking’s allegation under [’584: 1.c], above.

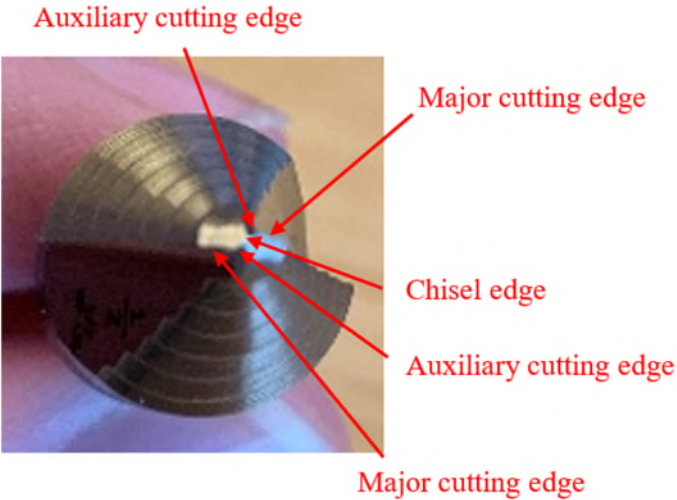
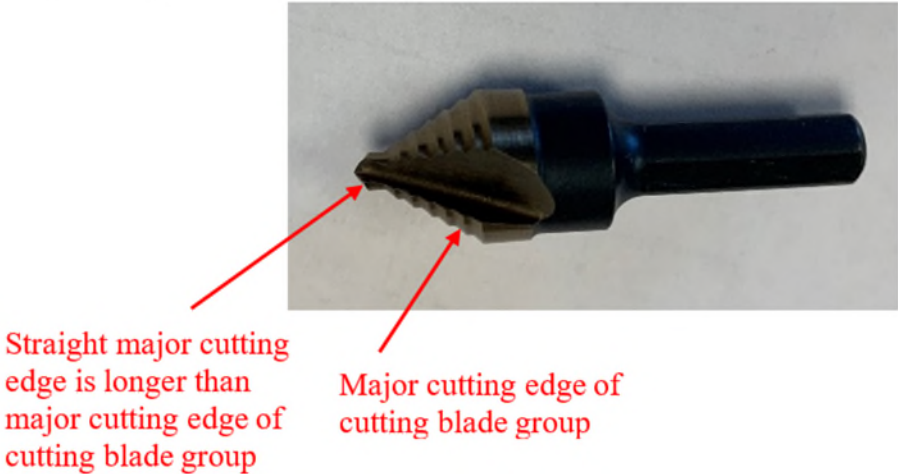
the plurality of composite cutting blade groups comprising:	Top blade conical first step surface Cylindrical second step surface  Cutting blade groups Under Plaintiffs’ construction, the composite cutting blade groups of the Viking 00693 drills are formed “spirally.” See [’583: 1.d].	
[’584: 6.d] a conical first step surface;	See [’583:1.e] and the annotated photograph of a Viking 00693 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’584: 6.e] a cylindrical second step surface adjacent to the conical first step surface,	See [’583:1.f] and the annotated photograph of a Viking 00693 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’584: 6.f] a major cutting edge defined by the intersection of	See [’583:1.g] and the annotated photo of an exemplary Viking 00693 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

the conical first step surface and the sidewall of the spiral flute;	 The image shows a close-up of a drill bit with several labels pointing to its features. 'Top blade' points to the very tip. 'Major cutting edge' points to the outer edge of the top blade. 'Cutting tip' points to the intersection of the major and minor cutting edges. 'Minor cutting edge' points to the inner edge of the top blade. A bracket labeled 'Cutting blade groups increasing sequentially in diameter' points to the series of flutes along the length of the bit.	
[’584: 6.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583.1h] and the annotated photo of an exemplary Viking 00693 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 6.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting	See [’583.1i] and the annotated photo of an exemplary Viking 00693 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

edge, and the sidewall of the spiral flute; and		
[’584: 6.i] a top blade provided on the front end of the cone portion;	See [’583.1j] and the annotated photo of an exemplary Viking 00693 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 6.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00693 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 6.k] the diameter of the last composite cutting blade group located at the rear end of the cone portion	Assuming the Accused Products are found to meet this limitation, then the Viking 00693 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of a Viking 00693 drill in [’584: 6.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

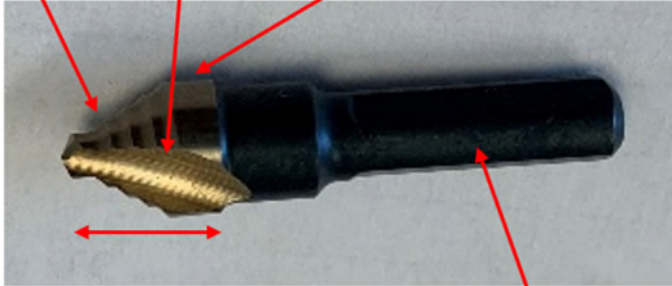
immediately adjacent to the cylinder portion is equal to the cylinder portion diameter;		
[’584: 6.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step of the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using a Viking 00693 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. <i>See</i> Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	See Tsteigen’s response to Viking’s allegation under [’584: 1.l], above.
[’584: 6.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	<i>See</i> [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.m], above.
[’584: 6.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end; and	<i>See</i> [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.n], above.
[’584: 6.o] continuing cutting the workpiece using one or more of the plurality of	<i>See</i> [’584: 6.l].	See Tsteigen’s response to Viking’s allegation under [’584: 1.o], above.

composite cutting blade groups situated closest to the cylinder portion,		
[’584: 6.p] wherein a cutting allowance of the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut.	This is a natural outcome of using a Viking 00693 drill and is, therefore, inherent to the use of the drill.	See Tsteigen’s response to Viking’s allegation under [’584: 1.p], above.
Claim 7	Viking 00693 Drill	
[’584: 7] The method of claim 6 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	See [’584: 2].	Tsteigen is not asserting this Claim against Viking.
Claim 9	Viking 00693 Drill	
[’584: 9] The method of claim 6 wherein, in the step of providing a twist drill, the top blade	See [’583: 5] and the annotated photograph of a Viking 00693 drill shown below.	Tsteigen is not asserting this Claim against Viking.

comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.		
Claim 10	Viking 00693 Drill	
[’584: 10] The method of claim 6 wherein, in the step of providing a twist drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	See [’583: 7] and the annotated photo of a Viking 00693 drill below. 	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

Claim 11	Viking 00693 Drill	
[’584: 11] The method of claim 6 further: dispersing a cutting force on all of the plurality of composite cutting blade groups within a drill hole of a workpiece when a portion of the cylinder portion is also within the workpiece.	This is a natural outcome of using a Viking 00693 drill and is, therefore, inherent to the use of the drill.	See Tsteigen’s response to Viking’s allegation under [’583: 14], above.

Exhibit E

'583 Patent		
Claim 1	Defendant's Contentions Viking 00694 Drill	Plaintiffs' Response
['583: 1.pre] A twist drill, comprising:	The preamble carries no patentable weight. The Viking 00694 drill is a drill having a flute that extends from a cone portion to a cylinder portion.	It is unclear whether or not the Viking 00694 drill disclosure constitutes prior art since Tsteigen is unaware of any evidence in the record that the Viking 00694 drill disclosure precedes the priority date of Tsteigen's asserted patent claims. The preamble does carry weight in the question of patentability. The Viking 00694 appears to disclose a step drill, not a twist drill.
['583: 1.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	The Viking 00694 drill includes an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion. 	The Viking 00694 has¹ an operating portion that comprises a cone portion, but the cylinder portion has a significantly reduced diameter, as shown below: 

¹ Viking's invalidity contentions pertaining to this prior art reference contained only the few images in the middle column of this prior art claim chart. Plaintiffs requested actual samples of this step drill bit and reserved their right to supplement their response statement and prior art charts once physical samples could be examined. Plaintiffs ultimately produced one such sample (shown in the right-hand column).

[’583: 1.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00694 drill has a shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> annotated photo of an exemplary Viking 00694 drill in [’583: 1.a].	The Viking 00694 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Shank portion
[’583: 1.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the spiral flute having a sidewall;	The Viking 00694 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00694 drill in [’583: 1.a]. The Viking 00694 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> U.S. Patent No. 10,328,499 (“Durfee I”), 1:33-39 and 3:57 – 6:32; U.S. Patent No. 2,193,186 (“Bannister”), <i>see</i> FIG. 2; U.S. Patent App. Pub. No. 2005/0053438 (“Wetzel”), <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], U.S. Patent App. Pub. No. 2011/0116884 (“Li”), FIGs. 1-8; U.S. Patent App. Pub. No. 2018/0133808 (“Wang I”), FIGs. 5-12 and ¶¶ [31, 32, 35, 36]; U.S. Patent No. D840,449 (“Wang II”), FIGs. 1-4, and 6-8; U.S. Patent No. 4,582,458 (“Korb”), FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of	The Viking 00694 comprises a shank portion that is axially fixed to this cylinder portion, opposite the cone portion:  Straight flute

	the Viking 00694 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’583: 1.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	The Viking 00694 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion. Top blade conical first step surface Cylindrical second step surface  Cutting blade groups Plaintiff’s infringement allegations appear to be based on the contention that the presence of axial relief on the Accused Products results in composite cutting blades groups that are formed “spirally.” While Viking disagrees with this contention, to the extent the claims are construed such that the Accused Products meet this limitation, then it is also present in the Viking 00694 drill. The Viking 00694 drill has greater axial relief than the Accused Products.	The Viking 00694 discloses a plurality of composite cutting blade groups formed sequentially from a front end to the rear end of the exterior surface of the cone portion. The composite cutting blade groups do not appear to be oriented spirally. As shown above, the Viking 00694 discloses a flute that is straight, not spiral. It extends on an exterior surface of the operating portion from a front end of the cone portion, but it does not extend at least partway up the cylinder portion. The flute has a sidewall.
[’583: 1.e] a conical first step surface;	The Viking 00694 drill has a conical first step surface. See annotated photo of an exemplary Viking 00694 drill in [’583: 1.d].	Each of the plurality of composite cutting blade groups in Viking 00694 comprises a conical first step surface.
[’583: 1.f] a	Plaintiffs’ infringement allegations appear to be based on a contention that the	Each of the plurality of composite cutting blade groups in

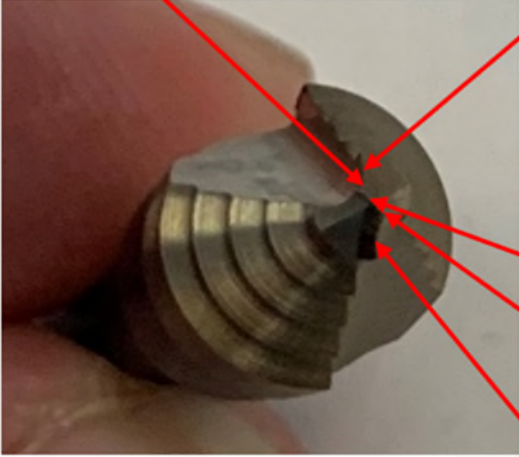
cyindrical second step surface adjacent to the conical first step surface,	presence of axial, radial, and back taper relief does not prevent the second step surfaces from being considered “cylindrical.” While Viking disagrees with this contention, based on Plaintiffs’ assertion, the Viking 00694 drill has a cylindrical second step surface adjacent to the conical first step surface. <i>See</i> annotated photo of an exemplary Viking 00694 drill in [’583: 1.d].	Viking 00694 comprises a cylindrical second step surface adjacent to a conical first step surface.
[’583: 1.g] a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute;	The Viking 00694 drill has a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute.  Top blade Major cutting edge Cutting tip Minor cutting edge Cutting blade groups sequentially increasing in diameter	The “first step surface” of Viking 00694, appears to intersect the sidewall of the flute, defining a major cutting edge.
[’583: 1.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	The Viking 00694 drill has a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00694 drill in [’583: 1.g].	The “second step surface” of Viking 00694 appears to intersect the sidewall of the flute, defining a minor cutting edge.
[’583: 1.i] a cutting	The Viking 00694 drill has a cutting tip defined by the intersection of the major	The Viking 00694 appears to discloses a cutting tip

tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute; and	cutting edge, the minor cutting edge, and the sidewall of the spiral flute. <i>See</i> annotated photo of exemplary Viking 00694 drill in [’583: 1.g].	defined by the intersection of the “major cutting edge,” the “minor cutting edge,” and the sidewall of the flute, but the flute is not spiral.
[’583: 1.j] a top blade provided on the front end of the cone portion;	The Viking 00694 drill has a top blade provided on the front end of the cone portion. <i>See</i> annotated photo of exemplary Viking 00694 drill in [’583: 1.g].	The Viking 00694 discloses a top blade on the front end of the cone portion.
[’583: 1.k] wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and	With the Viking 00694 drill, a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion. <i>See</i> annotated photo of exemplary Viking 00694 drill in [’583: 1.g].	In the Viking 00694, the diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion.
[’583: 1.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and	Plaintiff’s infringement allegations appear to be based on the contention that crushing of cutting chips into finer chips inherently results from having multiple composite blade cutting groups. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00694 drill. A person of ordinary skill will understand that the Viking 00694 drill modified with spiral flutes will shunt chips from the cutting surface out of the drilled hole.	Each of the plurality of composite cutting blade groups in Viking 00694 appears to be configured to cut a hole in a thin workpiece of a desired diameter.
[’583: 1.m] wherein at least one	In the Viking 00694 drill, at least one cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting	At least one cylindrical second step surface in the Viking 00694 appears to be immediately adjacent to the conical

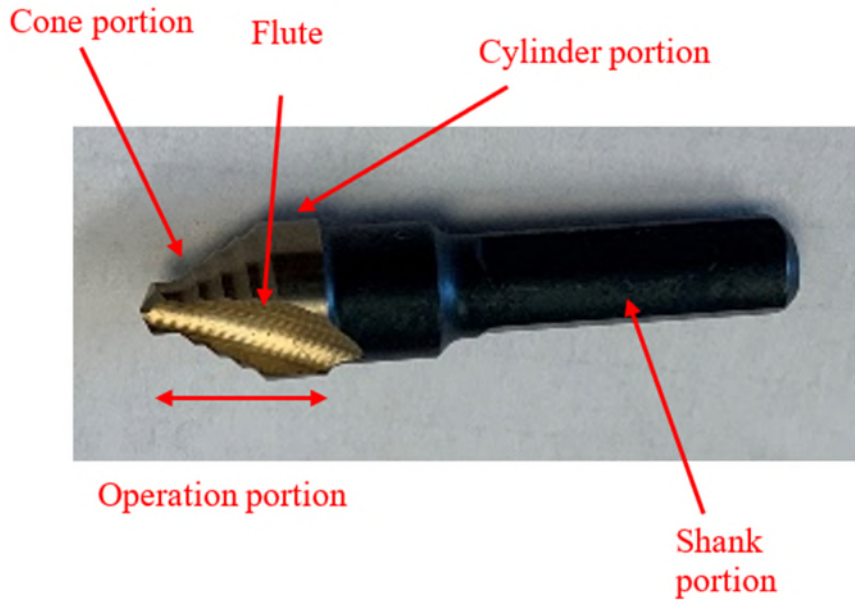
cylindrical second step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and	blade group. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	first step surface of the next composite cutting blade group.
[’583: 1.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	Plaintiffs’ infringement allegations appear to be based on designating an arbitrary length of the upper end of the cylinder portion to be part of the last composite cutting blade group. While Viking disagrees with this contention, based on Plaintiffs’ assertion, the diameter of the last composite cutting blade group located at the rear end of the cone portion in the Viking 00694 drill immediately adjacent to the cylinder portion is equal to the cylinder portion diameter. See annotated photo of exemplary Viking 00694 drill in [’583: 1.m].	The diameter of the last composite cutting blade group in the Viking 00694 drill bit, located at the rear end of the cone portion immediately adjacent to the cylinder portion, is not equal to the cylinder portion diameter:

		 Height of the last composite cutting blade group Cylinder portion
Claim 2	Viking 00694 Drill	
[’583: 2] The twist drill of claim 1 wherein, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	Plaintiffs’ infringement allegations appear to be based on the contention that this smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00694 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.

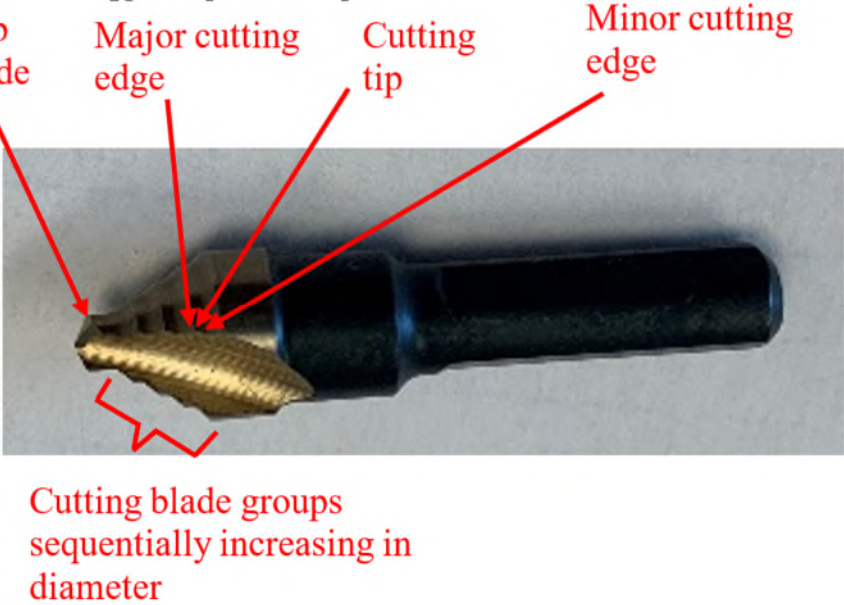
Claim 3	Viking 00694 Drill	
[’583: 3] The twist drill of claim 1 wherein, a height of each composite cutting blade group is uniform.	In the Viking 00694 drill, the height of each composite cutting blade group is the same around its perimeter and the step heights are the same as each other. Thus, if claim 3 is found to not be indefinite, it is met by the Viking 00694 drill. 	Tsteigen is not asserting this Claim against Viking.
Claim 5	Viking 00694 Drill	
[’583: 5] The twist drill of claim 1 wherein, the top blade comprises a chisel edge, two auxiliary cutting edges and two	Viking 00694 drill has a split point tip, having a chisel edge, two auxiliary cutting edges and two straight major cutting edges, where the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	Tsteigen is not asserting this Claim against Viking.

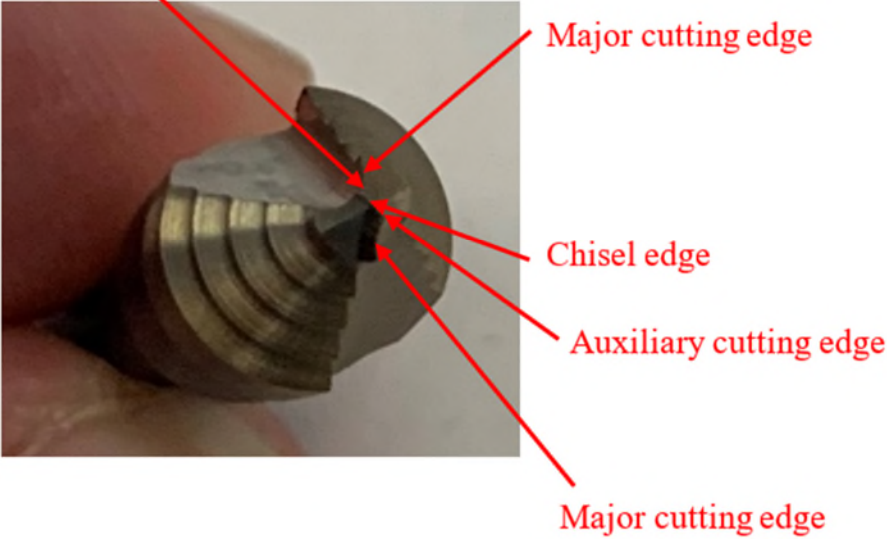
straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.	 The image shows a close-up of a drill bit with red arrows pointing to its edges. The labels are: 'Auxiliary cutting edge' (top left), 'Major cutting edge' (top right), 'Chisel edge' (middle right), 'Auxiliary cutting edge' (bottom right), and 'Major cutting edge' (bottom left).	
Claim 6	Viking 00694 Drill	
[’583: 6] The twist drill of claim 1 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	Plaintiffs’ infringement allegations appear to be based on a contention that the presence of axial and radial relief does not prevent composite cutting edge groups from being coaxial with the cone portion. While Defendant disagrees with this contention, based on Plaintiffs’ assertion, then this limitation is also present in the Viking 00694 drill.	Tsteigen is not asserting this Claim against Viking.
Claim 7	Viking 00694 Drill	
[’583: 7] The twist drill of claim 1 wherein, a straight major cutting edge	In the Viking 00694 drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See the annotated photo of a Viking 00694 drill below.	The straight major cutting edge length of the top blade in the Viking 00694 drill bit appears to be greater than each of the major cutting edges of the plurality of composite cutting blade groups.

length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 8	Viking 00694 Drill	
[’583: 8.pre] A twist drill, comprising:	The preamble carries no patentable weight. The Viking 00694 drill has a flute that extends from a cone portion to a cylinder portion. <i>See</i> [’583: 1.pre].	See Tsteigen’s response to Viking’s allegation under [’583: 1.preamble], above.
[’583: 8.a] an operation portion comprising a cone portion and a cylinder portion axially fixed to the cone portion;	<i>See</i> [’583: 1.a].	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.

		
[’583: 8.b] a shank portion axially fixed to the cylinder portion opposite the cone portion;	See [’583: 1.b] and [’583: 8.a].	See Tsteigen’s response to Viking’s allegation under [’583: 1.b], above.
[’583: 8.c] a spiral flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the	See [’583: 1.c] and [’583: 8.a]. The Viking 00694 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. See annotated photo of an exemplary Viking 00694 drill in [’583: 8.a]. The Viking 00694 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a	See Tsteigen’s response to Viking’s allegation under [’583: 1.c], above.

cylinder portion, the spiral flute having a sidewall;	spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; US Patent No. 9,687,915 (“Durfee II”), 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00694 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’583: 8.d] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from a front end of the cone portion to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	<i>See</i> [’583: 1.d]. 	<i>See</i> Tsteigen’s response to Viking’s allegation under [’583: 1.d], above.
[’583: 8.e] a conical first step surface;	<i>See</i> [’583: 1.e] and [’583: 8.d].	<i>See</i> Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.

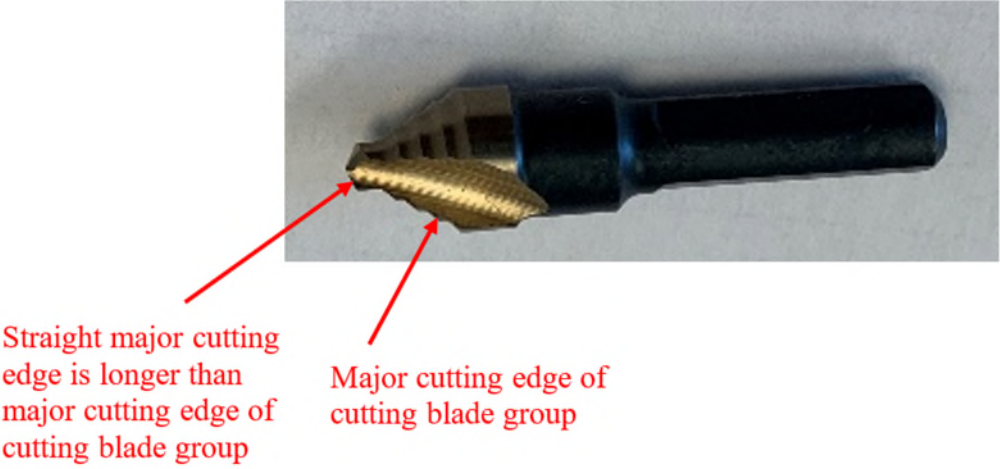
[’583: 8.f] a cylindrical second step surface adjacent to the conical first step surface,	See [’583: 1.f] and [’583: 8.d].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’583: 8.g] a major cutting edge defined by the intersection of the conical first step surface and the sidewall of the spiral flute;	See [’583: 1.g] and [’583: 8.d].  The image shows a close-up of a drill bit's cutting edge. Red arrows point to specific features: 'Top blade' points to the upper edge of the cutting edge, 'Major cutting edge' points to the main edge of the cutting edge, 'Cutting tip' points to the very tip of the cutting edge, and 'Minor cutting edge' points to the lower edge of the cutting edge. A red bracket at the bottom indicates 'Cutting blade groups sequentially increasing in diameter'.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.
[’583: 8.h] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute, the minor cutting edge being	See [’583: 1.h], [’583: 2], and the annotated photo of an exemplary Viking 00694 drill in [’583: 8.g].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.

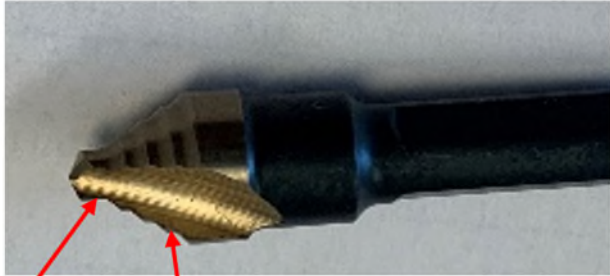
configured to smooth the machined surface of the workpiece to improve surface quality; and		
[’583: 8.i] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute;	See [’583: 1.i] and the annotated photo of an exemplary Viking 00694 drill in [’583: 8.g].	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.
[’583: 8.j] a top blade provided on the front end of the cone portion, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge;	See [’583: 1.j], [’583: 5] the annotated photo of an exemplary Viking 00694 drill in [’583: 8.g] and the annotated photo of an exemplary Viking 00694 drill below.  The image shows a close-up of the tip of a drill bit. Red arrows point to specific features: the top-left edge is labeled 'Auxiliary cutting edge', the top-right edge is labeled 'Major cutting edge', the central point is labeled 'Chisel edge', the bottom-left edge is labeled 'Auxiliary cutting edge', and the bottom-right edge is labeled 'Major cutting edge'.	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.

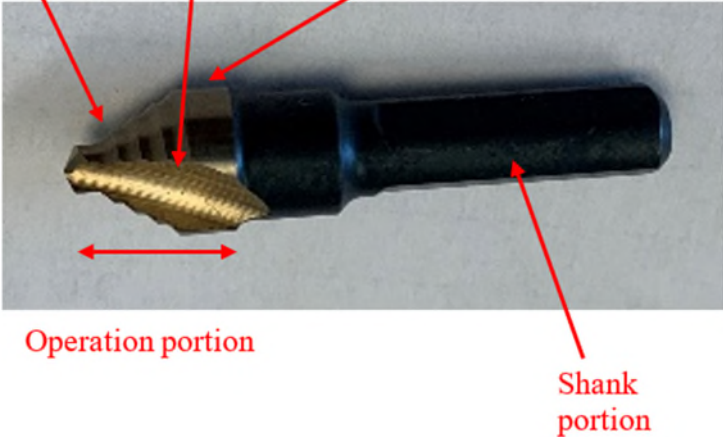
[’583: 8.k] wherein a diameter of each of the plurality of composite cutting blade groups increases sequentially from the front end of the cone portion to the rear end of the cone portion; and	See [’583: 1.k], [’583: 8.g] and the annotated photo of an exemplary Viking 00694 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.a], above.
[’583: 8.l] each of the plurality of composite cutting blade groups is configured to crush cutting chips into finer chips and the spiral flute is configured to shunt the finer chips; and	See [’583: 1.l].	See Tsteigen’s response to Viking’s allegation under [’583: 1.l], above.
[’583: 8.m] wherein at least one cylindrical second	See [’583: 1.m] and the annotated photo of an exemplary Viking 00694 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.

step surface is immediately adjacent to a conical first step surface of a next composite cutting blade group; and		
[’583: 8.n] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the cylinder portion diameter.	See [’583: 1.n], [’583: 8.g], and the annotated photo of an exemplary Viking 00694 drill in [’583: 8.k].	See Tsteigen’s response to Viking’s allegation under [’583: 1.k], above.
Claim 9	Viking 00694 Drill	
[’583: 9] The twist drill of claim 8 wherein, a height of each composite cutting blade group is uniform.	See [’583: 3].	See Tsteigen’s response to Viking’s allegation under [’583: 3], above.

	Step height of each cutting blade group is the same around its perimeter  Step heights of cutting blade groups are the same height as each other.	
Claim 11	Viking 00694 Drill	
[’583: 11] The twist drill of claim 8 wherein, each of the plurality of composite cutting blade groups is coaxial with the cone portion.	See [’583: 6].	Tsteigen is not asserting this Claim against Viking.
Claim 12	Viking 00694 Drill	
[’583: 12] The twist drill of claim 8 wherein, a straight major cutting edge	See [’583: 7].	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

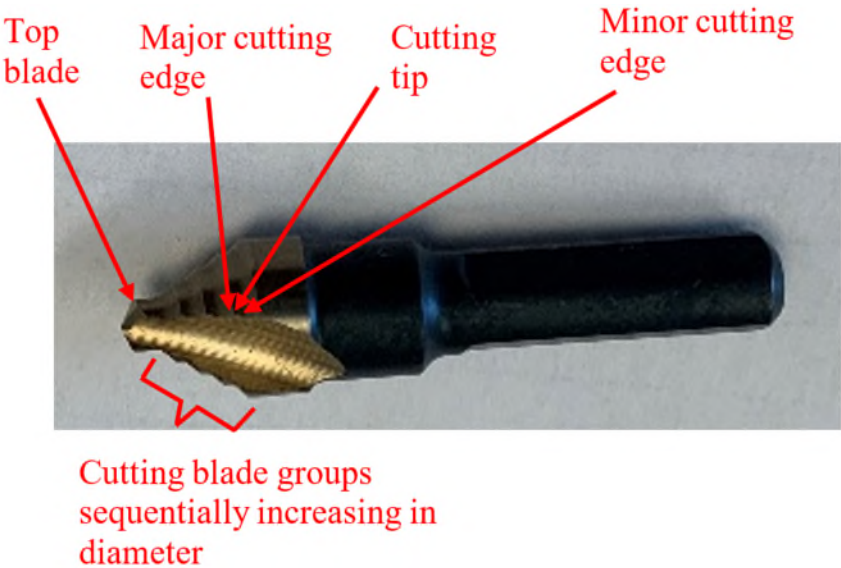
length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.		
Claim 13	Viking 00694 Drill	
[’583: 13] The twist drill of claim 8 wherein, a straight minor cutting edge length of the top blade is greater than each of the minor cutting edges of the plurality of composite cutting blade groups.	This claim is invalid because it is indefinite. Defendant is unable to determine what a “straight minor cutting edge” is and so cannot determine whether this element is present in the prior art. Defendant reserves the right to update this chart if the meaning of “straight minor cutting edge” is clarified during the course of this litigation. Plaintiffs have proposed that “a straight minor cutting edge” is a cutting edge parallel to the drill axis and descending from the outermost point of the “straight major cutting edge” of the top blade in a direction away from the tip of the drill. Defendant disagrees with this construction. If, however, this construction is correct, then the Viking 00694 drill has a straight minor cutting edge length of the top blade that is greater than each of the minor cutting edges of the plurality of composite cutting blade groups. See the annotated photo of the 00694 drill below.	The Viking 00694 does not disclose a “top blade” whose minor cutting edge is longer than the “minor cutting edges” of each of the “composite cutting blade groups.” The minor cutting edge of the last composite cutting blade group appears longer than the minor cutting edge of the top blade in the Viking 00694. A person of ordinary skill would readily know that the “straight minor cutting edge length of the top blade” is in the ‘583 patent. Just as the United States Patent Office’s assigned Patent Examiner, as well as each of the three Patent Examiners the Patent Trial and Appeal Board assigned to the panel for reexamining the ‘583 patent all readily determined from the ‘583 patent. In fact, the three Patent Examiners on the Reexamination proceeding panel

	 Plaintiffs' proposed straight minor cutting edge is longer than minor cutting edge of cutting blade groups Minor cutting edge of cutting blade group	specifically called out claim 13 in their first Office Action, finding the claim 13 was one of three patent claims in the '583 that were allowable in the first Office Action.
Claim 14	Viking 00694 Drill	
['583: 14] The twist drill of claim 8 wherein, the operation portion is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within	The operation portion of the Viking 00694 drill is configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.	The operation portion of the Viking 00694 is configured to drill into thin workpieces. It is not configured to disperse a cutting force on each of the plurality of composite cutting blade groups within a drill hole of a workpiece when at least a portion of the cylinder portion is also within the workpiece.

the workpiece.		
'584 Patent		
Claim 1	Defendant's Contentions Viking 00694 Drill	Plaintiffs' Response
['584: 1.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	The Viking 00694 drill is a drill having a flute that extends from a cone portion to a cylinder portion. However, it was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00694 drill, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. See Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right :32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	The Viking 00694 drill is not a twist drill, and it is not a method for improving centering accuracy of a twist drill. Its multiple diameters comprise a method for making holes of different sizes in thin workpieces with a single drill bit. It is not a method for “drilling a drill hole in a workpiece .. using both a cone portion and a cylinder portion.”
['584: 1.a] providing a twist drill comprising: a shank portion;	The Viking 00694 drill has a shank portion. See ['583: 1.b] and ['584: 1.pre]. 	It appears to disclose a shank.

[’584: 1.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	The Viking 00694 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00694 drill reproduced in [’584: 1.a]. The Viking 00694 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00694 drill in [’584: 1.a]. The Viking 00694 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00694 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	The Viking 00694 drill appears to have an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion -- although the cylinder portion is not what Viking identifies in the annotated photo Viking inserted above and to the left for [’584: 1.a]. Also, the flute is not spiral and is extends from a front end of the cone portion only, not along any portion of the cylinder portion. The shank portion appears to be axially fixed to the cylinder portion, opposite the cone portion.
[’584: 1.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone	The Viking 00694 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> [’583: 1.d], [’583: 1.k], and the	The Viking 00694 drill appears to have a plurality of composite cutting blade groups formed sequentially, but not spirally, on the exterior of the cone portion from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade

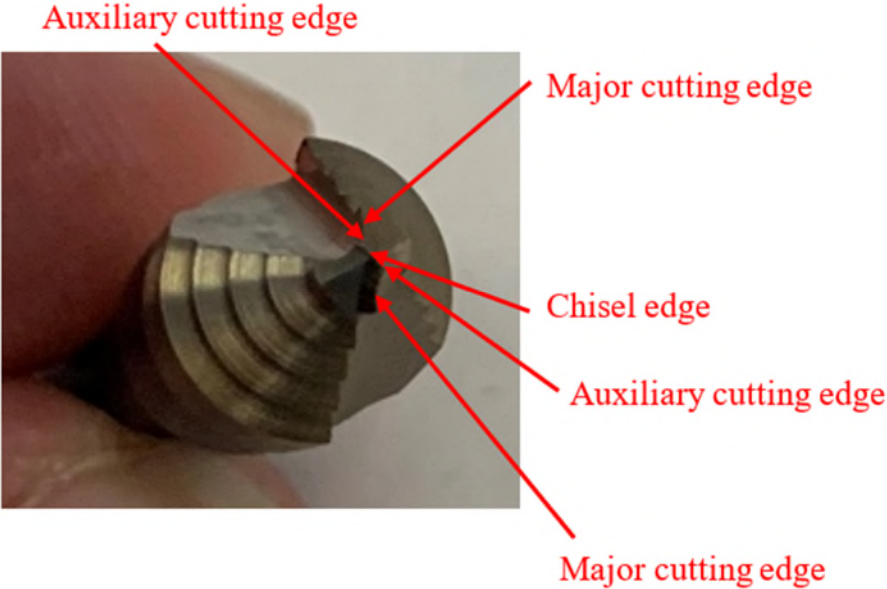
portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups comprising:	annotated photograph of a Viking 00694 drill shown below.  Under Plaintiffs' construction, the composite cutting blade groups of the Viking 00694 drills are formed "spirally." See ['583: 1.d].	groups sequentially increase from the front end to a rear end of the cone portion.
['584: 1.d] a conical first step surface;	See ['583:1.e] and the annotated photograph of a Viking 00694 drill shown in ['584: 1.c].	See Tsteigen's response to Viking's allegation under ['583: 1.e], above.
['584: 1.e] a cylindrical second step surface adjacent to the conical first step surface,	See ['583:1.f] and the annotated photograph of a Viking 00694 drill shown in ['584: 1.c].	See Tsteigen's response to Viking's allegation under ['583: 1.f], above.
['584: 1.f] a major cutting edge defined by the intersection of the conical first step	See ['583:1.g] and the annotated photo of an exemplary Viking 00694 drill below.	See Tsteigen's response to Viking's allegation under ['583: 1.g], above.

surface and the sidewall of the spiral flute;	 Top blade Major cutting edge Cutting tip Minor cutting edge Cutting blade groups sequentially increasing in diameter	
[’584: 1.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583.1h] and the annotated photo of an exemplary Viking 00694 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 1.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall of the spiral flute; and	See [’583.1i] and the annotated photo of an exemplary Viking 00694 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

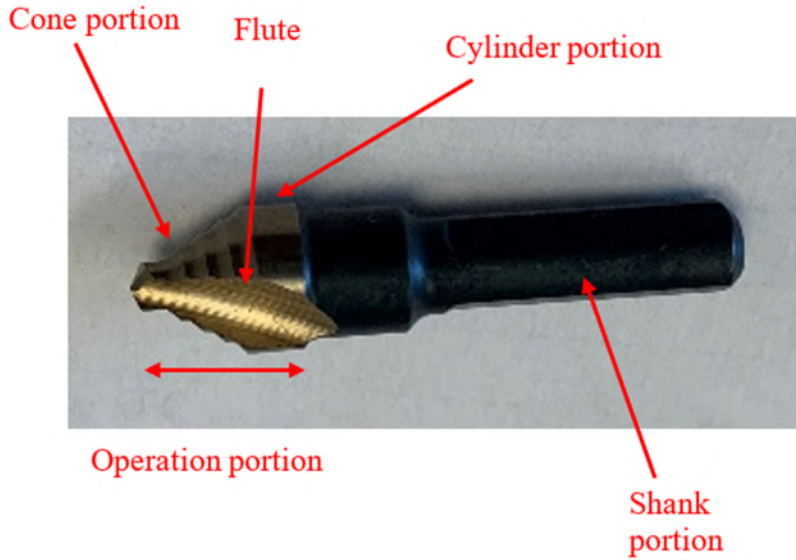
[’584: 1.i] a top blade provided on the front end of the cone portion;	See [’583.1j] and the annotated photo of an exemplary Viking 00694 drill in [’584: 1.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 1.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00694 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 1.k] wherein the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion is equal to the	Assuming the Accused Products are found to meet this limitation, then the Viking 00694 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of an exemplary Viking 00694 drill in [’584: 1.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

cylinder portion diameter;		
[’584: 1.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using a Viking 00694 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. See Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left :1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	From the photo, it appears likely that a person of ordinary skill would position the Viking 00694 step drill (not twist drill) atop the workpiece and apply a torque and an axial drilling force to the step drill.
[’584: 1.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill would cut the workpiece with the top blade to create a drill hole in the workpiece;
[’584: 1.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end;	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality of composite cutting blade groups situated closest to the front end;
[’584: 1.o] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the cylinder portion,	See [’584: 1.l].	From the photo, it appears likely that a person of ordinary skill could continue cutting the workpiece using only one (not more than one) of the plurality of composite cutting blade groups situated closest to the cylinder portion,
[’584: 1.p] wherein a cutting allowance of	This is a natural outcome of the geometry of the cone portion of the Viking 00694 drill.	The method of using the Viking 00694 is as a step drill, it does not involve distributing the cutting allowance of the

the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut; and		workpiece according to a drill hole diameter so that the workpiece is gradually cut.
[’584: 1.q] continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.	See [’584: 1.l].	The method of using the Viking 00694 is as a step drill, it does not involve continuing cutting the workpiece while at least a portion of the cylinder portion is within the workpiece.
Claim 2	Viking 00694 Drill	
[’584: 2] The method of claim 1 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	Plaintiffs’ infringement allegations appear to be based on the contention that this smoothing of the machined surface of the workpiece inherently results from having a minor cutting edge along the flute. While Viking disagrees with this contention, based on Plaintiffs’ assertion, this limitation is also inherent in the Viking 00694 drill because it has minor cutting edges.	Tsteigen is not asserting this Claim against Viking.
Claim 4	Viking 00694 Drill	
[’584: 4] The method of claim 1 wherein, in the step of providing a twist drill, the top blade comprises a chisel edge, two auxiliary cutting	The Viking 00694 drill has a top blade comprising a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge. See [’583: 5] and the annotated photograph of a Viking 00694 drill shown below.	Tsteigen is not asserting this Claim against Viking.

edges and two straight major cutting edges, the auxiliary cutting edge is respectively intersected with the straight major cutting edge and the chisel edge.		
Claim 5 [’584: 5] The method of claim 1 wherein, in the step of providing a twist drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	Viking 00694 Drill The Viking 00694 drill has a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups. See [’583: 7] and the annotated photo of a Viking 00694 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

	 Straight major cutting edge is longer than major cutting edge of cutting blade group Major cutting edge of cutting blade group	
Claim 6	Viking 00694 Drill	
[’584: 6.pre] A method for improving centering accuracy of a twist drill when drilling a drill hole in a workpiece using multistage centering and using both a cone portion and a cylinder portion, the method comprising:	The Viking 00694 drill is a drill having a flute that extends from a cone portion to a cylinder portion. It was well known to one of ordinary skill that the provision of a conical cutting tip to a drill, such as is present in the Viking 00694 drill, would improve centering accuracy when drilling a workpiece using multistage centering and using both a cone portion and a cylinder portion. See Wang I at ¶¶ [13, and 39-47]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	See Tsteigen’s response to Viking’s allegation under [’581: 1.preamble], above.
[’584: 6.a] providing a twist drill comprising: a shank portion;	The Viking 00694 drill has a shank portion. See [’583: 1.b] and [’584: 6.pre].	See Tsteigen’s response to Viking’s allegation under [’584: 1.a], above.

	 The image shows a Viking 00694 drill bit. Red arrows point to various parts: 'Cone portion' points to the front tip; 'Flute' points to the spiral groove; 'Cylinder portion' points to the middle section; 'Operation portion' points to the entire front section with a double-headed arrow; and 'Shank portion' points to the long handle at the back.	
[’584: 6.b] an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a spiral flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone	The Viking 00694 drill has an operating portion axially fixed to the shank portion, the operating portion comprising the cone portion axially fixed to the cylinder portion and a flute having a sidewall and being formed into an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion. <i>See</i> [’583: 1.a], [’583: 1.c], and the annotated photo of an exemplary Viking 00694 drill reproduced in [’584: 1.a]. The Viking 00694 drill has a flute formed on an exterior surface of the operating portion extending from a front end of the cone portion and at least partway up the cylinder portion. The flute has a sidewall. <i>See</i> annotated photo of an exemplary Viking 00694 drill in [’584: 6.a]. The Viking 00694 drill does not have a spiral flute, rather it has a straight flute. It was known that drills having stepped front portions could have a straight flute or a	See Tsteigen’s response to Viking’s allegation under [’584: 1.b], above.

portion and at least partway up the cylinder portion, the shank portion axially fixed to the cylinder portion opposite the cone portion;	spiral flute. <i>See e.g.</i> Durfee I, 1:33-39 and 3:57 – 6:32; Durfee II, 4:58-60; Bannister, <i>see</i> FIG. 2; Wetzl, <i>see</i> FIGs. 1 and 2, and ¶¶ [8, 27, 37, 38, 46-50], Li, FIGs. 1-8. Wang II, FIGs. 1-4, and 6-8; Korb, FIGs. 1, 2 and 7, 1:33-35, and 2:37-44. Korb suggests equivalency between a flute cut helically, and a flute cut at about zero degrees to the drill axis. Step drills with helical flutes were also known in CN1021260039, CN103084629, DE202011106232U1, WO2012/167448, and WO2008/092386. It would have been obvious to one of ordinary skill to modify the straight flute of the Viking 00694 drill because they are known to be easier, quicker and less expensive to manufacture in a drill than a straight flute.	
[’584: 6.c] a plurality of composite cutting blade groups formed sequentially and spirally on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups	<i>See</i> [’583: 1.d], [’583: 1.k], and [’584: 1.c]. The Viking 00694 drill has a plurality of composite cutting blade groups formed sequentially on a cone portion exterior from the front end of the cone portion to a rear end of the cone portion, and diameters of the composite cutting blade groups sequentially increase from the front end to a rear end of the cone portion, each of the plurality of composite cutting blade groups. <i>See</i> the annotated photo of an exemplary Viking 00694 drill reproduced below.	<i>See</i> Tsteigen’s response to Viking’s allegation under [’584: 1.c], above.

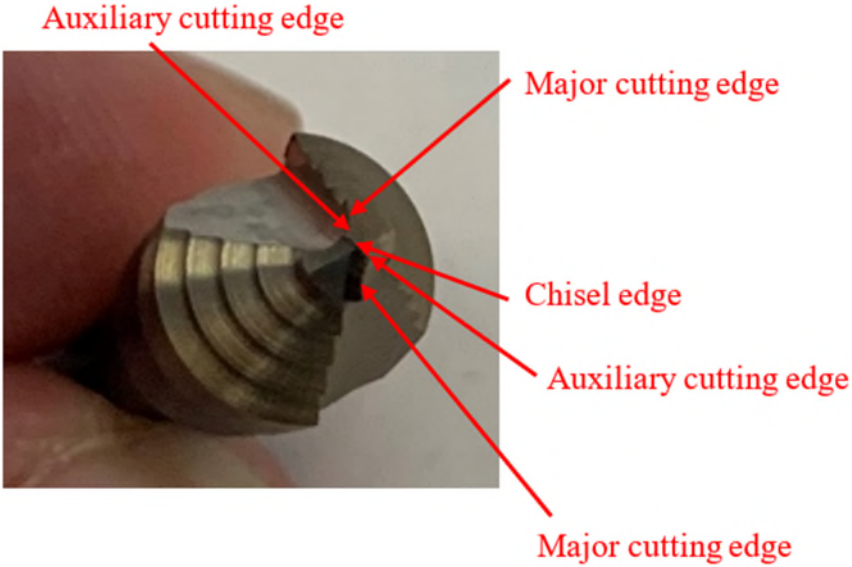
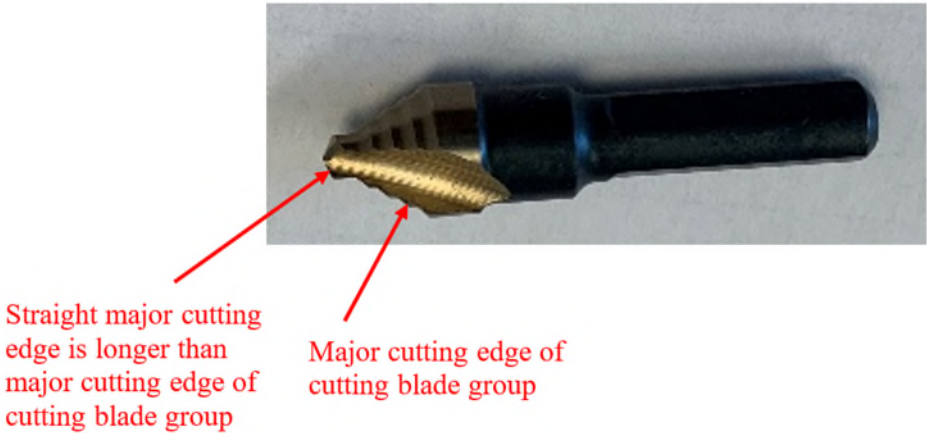
comprising:	 Top blade conical first step surface Cylindrical second step surface Cutting blade groups Under Plaintiffs’ construction, the composite cutting blade groups of the Viking 00694 drills are formed “spirally.” See [’583: 1.d].	
[’584: 6.d] a conical first step surface;	See [’583:1.e] and the annotated photograph of a Viking 00694 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.e], above.
[’584: 6.e] a cylindrical second step surface adjacent to the conical first step surface,	See [’583:1.f] and the annotated photograph of a Viking 00694 drill shown in [’584: 6.c].	See Tsteigen’s response to Viking’s allegation under [’583: 1.f], above.
[’584: 6.f] a major cutting edge defined by the intersection of the conical first step surface and the	See [’583:1.g] and the annotated photograph of an exemplary Viking 00694 drill below.	See Tsteigen’s response to Viking’s allegation under [’583: 1.g], above.

sidewall of the spiral flute;	 Top blade Major cutting edge Cutting tip Minor cutting edge Cutting blade groups sequentially increasing in diameter	
[’584: 6.g] a minor cutting edge defined by the intersection of the cylindrical second step and the and the sidewall of the spiral flute; and	See [’583.1h] and the annotated photo of an exemplary Viking 00694 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.h], above.
[’584: 6.h] a cutting tip defined by the intersection of the major cutting edge, the minor cutting edge, and the sidewall	See [’583.1i] and the annotated photo of an exemplary Viking 00694 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.i], above.

of the spiral flute; and		
[’584: 6.i] a top blade provided on the front end of the cone portion;	See [’583.1j] and the annotated photo of an exemplary Viking 00694 drill in [’584: 6.f].	See Tsteigen’s response to Viking’s allegation under [’583: 1.j], above.
[’584: 6.j] wherein the cylindrical second step surface of at least one composite cutting blade group is immediately adjacent to the conical first step surface of a next composite cutting blade group; and	See [’583: 1.m] and the annotated photo of an exemplary Viking 00694 drill below. Cylindrical second step surface is adjacent conical first step surface of next cutting blade group Conical first step surface  Diameter of last cutting blade group is same as cylindrical portion	See Tsteigen’s response to Viking’s allegation under [’583: 1.m], above.
[’584: 6.k] the diameter of the last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion	Assuming the Accused Products are found to meet this limitation, then the Viking 00694 drill also has a last composite cutting blade group located at the rear end of the cone portion immediately adjacent to the cylinder portion whose diameter is equal to the cylinder portion diameter. See [’583: 1.n] and the annotated photo of a Viking 00694 drill in [’584: 6.j].	See Tsteigen’s response to Viking’s allegation under [’583: 1.n], above.

is equal to the cylinder portion diameter;		
[’584: 6.l] positioning the twist drill atop the workpiece; applying a torque and an axial drilling force to the twist drill;	This claim is simply one step of the drilling process that a person of ordinary skill would have known could be used to drill a hole in a workpiece using the Viking 00694 drill. Such a drilling process, that includes positioning the rotating drill and progressing it through the workpiece, was commonly known. <i>See</i> Wang I at ¶¶ [5, 6, 13, and 37-39]; Bannister at p. 1, Left:1-11, 25-34, Right:32-49; Wetzl at ¶¶ [6-8]; and Li at ¶¶ [3, 24, 37, 44].	<i>See</i> Tsteigen’s response to Viking’s allegation under [’584: 1.l], above.
[’584: 6.m] cutting the workpiece with the top blade to create a drill hole in the workpiece;	<i>See</i> [’584: 6.l].	<i>See</i> Tsteigen’s response to Viking’s allegation under [’584: 1.m], above.
[’584: 6.n] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the front end; and	<i>See</i> [’584: 6.l].	<i>See</i> Tsteigen’s response to Viking’s allegation under [’584: 1.n], above.
[’584: 6.o] continuing cutting the workpiece using one or more of the plurality of composite cutting blade groups situated closest to the cylinder portion,	<i>See</i> [’584: 6.l].	<i>See</i> Tsteigen’s response to Viking’s allegation under [’584: 1.o], above.
[’584: 6.p] wherein a	This is a natural outcome of using a Viking 00694 drill and is, therefore, inherent to	<i>See</i> Tsteigen’s response to Viking’s allegation under

cutting allowance of the workpiece is distributed according to a drill hole diameter so that the workpiece is gradually cut.	the use of the drill.	[’584: 1.p], above.
Claim 7	Viking 00694 Drill	
[’584: 7] The method of claim 6 wherein, in the step of providing a twist drill, the minor cutting edge is configured to smooth the machined surface of the workpiece to improve surface quality.	See [’584: 2].	Tsteigen is not asserting this Claim against Viking.
Claim 9	Viking 00694 Drill	
[’584: 9] The method of claim 6 wherein, in the step of providing a twist drill, the top blade comprises a chisel edge, two auxiliary cutting edges and two straight major cutting edges, the auxiliary cutting edge is respectively	See [’583: 5] and the annotated photograph of a Viking 00694 drill shown below.	Tsteigen is not asserting this Claim against Viking.

intersected with the straight major cutting edge and the chisel edge.		
Claim 10 [’584: 10] The method of claim 6 wherein, in the step of providing a twist drill, a straight major cutting edge length of the top blade is greater than each of the major cutting edges of the plurality of composite cutting blade groups.	Viking 00694 Drill See [’583: 7] and the annotated photo of a Viking 00694 drill below. 	See Tsteigen’s response to Viking’s allegation under [’583: 7], above.

Claim 11	Viking 00694 Drill	
[’584: 11] The method of claim 6 further: dispersing a cutting force on all of the plurality of composite cutting blade groups within a drill hole of a workpiece when a portion of the cylinder portion is also within the workpiece.	This is a natural outcome of using a Viking 00694 drill and is, therefore, inherent to the use of the drill.	See Tsteigen’s response to Viking’s allegation under [’583: 14], above.

PROOF OF SERVICE

I am over the age of eighteen (18) years, employed in the County of Los Angeles, and not a party to the above-entitled action. My business address is 9401 Wilshire Blvd., Ninth Floor, Beverly Hills, CA 90212.

On November 4, 2022, I served the following document:

**PLAINTIFFS TSTEIGEN AND HONGJIA WANG'S SUPPLEMENT
TO ITS AMENDED RESPONSE TO DEFENDANT'S PATENT
INVALIDITY CONTENTIONS**

☒ **BY ELECTRONIC MAIL:** I caused a copy of such document to be sent via electronic mail to the addressee(s) shown below:

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I declare, under penalty of perjury under the laws of the United States that the foregoing is true and that I am employed in the office of a member of the Bar of this Court at whose direction the service was made.

Executed on November 4, 2022 at Beverly Hills, California.

/s/ Edward Bustillos
Edward Bustillos