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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RODNEY G. WHITBECK, DAVID ALAN STEPHENSON,
KEITH RAYMOND BARTLE, and DAVID GARRETT COFFMAN

Appeal 2020-000360
Application 13/913,871
Technology Center 3700

Before JOHN C. KERINS, MICHAEL J. FITZPATRICK, and
LISA M. GUIJT, *Administrative Patent Judges*.

GUIJT, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant¹ seeks our review under 35 U.S.C. § 134(a) of the rejection of claims 1–18, 21–33, and 37–43. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies Ford Global Technologies, LLC as the real party in interest. Appeal Br. 1.

THE INVENTION

Appellant’s invention relates to “a cylindrical surface cutting tool and process.” Spec. ¶ 1. Claims 1, 15, 22, and 30 are the independent claims on appeal. Claim 1, reproduced below, is illustrative of the subject matter on appeal.

1. A method of mechanically roughening a cylindrical surface, the method comprising:

simultaneously rotating a cylindrical cutting body rotatably mounted in a spindle about (a) a spindle axis and (b) an axis of the cylindrical surface into an axial portion of the cylindrical surface to form a profile having discrete, discontinuous, flat-bottom grooves, flat-top peaks of constant height and a flat-bottom pocket having side walls and a radius greater than the cylindrical surface prior to the simultaneous rotating step and less than each of the grooves.

THE REJECTIONS²

The Examiner relies upon the following as evidence in support of the rejections:

NAME	REFERENCE	DATE
Wackenhuth	US 841,830	Jan. 22, 1907
Hunter	US 2,451,089	Aug. 20, 1945
Vogelsang	DE 103 16 919 A1	Oct. 21, 2004
Doerfler	US 2010/0326270 A1	Dec. 30, 2010
Weisel	US 2012/0321405 A1	Dec. 20, 2012
Klump	US 2013/0149474 A1	June 13, 2013

² The Examiner’s rejection of claim 35 is moot because claim 35 has been cancelled. *See* Ans. 12; Appeal Br. 2–3; Adv. Act. 2; June 19, 2019 Amendment under 37 C.F.R. § 41.33(b).

The following rejections are before us for review:

- I. Claims 1, 5–9, 14, 21, 30–33, 37–39, 42, and 43 stand rejected under 35 U.S.C. § 103 as being unpatentable over Wackenhuth and Weisel.
- II. Claims 2, 10–13, 15–18, and 22–29 stand rejected under 35 U.S.C. § 103 as being unpatentable over Wackenhuth, Weisel, Klumpp, and Doerfler.
- III. Claim 3 stands rejected under 35 U.S.C. § 103 as being unpatentable over Wackenhuth, Weisel, Klumpp, and Hunter.
- IV. Claim 4 stands rejected under 35 U.S.C. § 103 as being unpatentable over Wackenhuth, Weisel, Klumpp, and Vogelsang.
- V. Claims 40 and 41 stand rejected under 35 U.S.C. § 103 as being unpatentable over Wackenhuth, Weisel, Klumpp, Doerfler, and Vogelsang.

OPINION

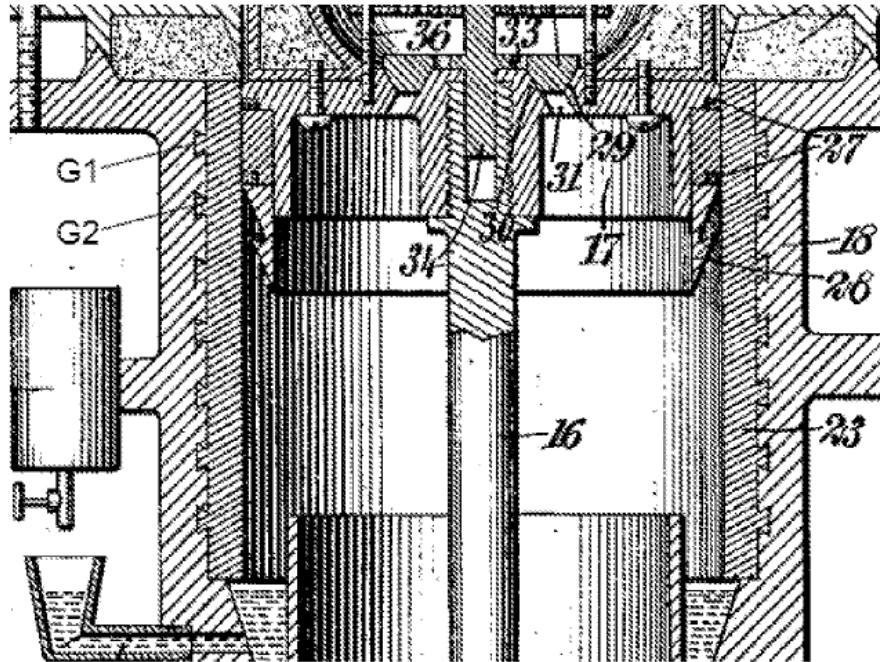
Rejection I

Independent claim 1 and dependent claims 5–9, 14, 21, 38, and 42

Appellant argues claims 1, 5–9, 14, 21, 38, and 42 as a group. Appeal Br. 2–4. We select independent claim 1 as representative, and claims 5–9, 14, 21, 38, and 42 stand or fall therewith. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Regarding independent claim 1, the Examiner finds that Wackenhuth’s Figure 1 “suggests” that more than one discrete and

discontiguous grooves are depicted in the inner surface of cylinder 18, and also that Wackenhuth expressly depicts that such grooves have a flat-bottom, as claimed. Ans. 3 (citing Wackenhuth, p. 1, ll. 45–50). The Examiner’s annotated Figure 1 of Wackenhuth is reproduced below.



Wackenhuth Fig 1

Ans. 4. The Examiner’s annotated Figure 1 of Wackenhuth discloses lining 23 formed in the inner surface of cylinder 18, wherein the inner surface is depicted, in cross-section, as having trapezoidal indentations identified by the Examiner as separate grooves G1, G2.

Alternatively, the Examiner finds that “[a]ssuming arguendo that the grooves of Wackenhuth are not necessarily [discrete] and discontiguous,” the Examiner reasons that “it would have been obvious to one of ordinary skill in the art to configure the grooves shown as parallel and continuous around inner wall of cylinder 18 for consistent and even connection of lining 23 to cylinder 18.” Ans. 5.

The Examiner determines that Wackenhuth fails to disclose a method for making the grooves, and the Examiner relies on Weisel for teaching machining using “a cylindrical cutting body 10 rotatably received in a tool (via chuck or spindle) to cut the inner surface of a cylinder to produce multiple parallel inner grooves.” Final Act. 4 (citing Weisel ¶¶ 19, 34). In particular, the Examiner finds that “Weisel teaches a rotatable machine tool 10 having cutting inserts 22 disposed thereon, the cutting inserts each comprising two flat-topped cutting edges” and further, that “with the tool inserted in a cylinder, simultaneously rotating the cutter about its axis and an axis of the cylindrical surface . . . would necessarily form corresponding flat-bottomed grooves.” Ans. 13–14 (citing Weisel ¶¶ 4, 19, 34, Fig. 6). The Examiner reasons that it would have been obvious “to incorporate the method of eccentric, or interpolating, tool rotation, as taught by Weisel . . . to effectively produce the series of inner grooves taught by Wackenhuth.” Final Act. 4–5.

The Examiner determines that Wackenhuth also fails to disclose a flat-bottom pocket, as claimed, and the Examiner relies on Klumpp for disclosing “providing a step 10, 11 in the bottom corners of the grooves to relieve stress on the tool.” Final Act. 5 (citing Klumpp ¶¶ 7, 13, Fig. 1). The Examiner reasons that it would have been obvious “to incorporate the corner steps in the grooves described [in Klumpp] to [relieve] stress on the corner tip of the tool, thereby decreasing chance of fracture and prolonging the working life of the tool.” *Id.* The Examiner proposes “providing the corner relief” on the grooves of Wackenhuth by using the “cutting edge of [cutting insert] 22,” as depicted in Weisel’s Figure 1. Ans. 14–15. In particular, the Examiner states that “steps 10, 11” (i.e., Klumpp’s flat-bottom

pocket) “are created via the *relieved* tool bit.” *Id.* at 15 (emphasis added). Thus, we understand that the Examiner proposes modifying Weisel’s tool to have a cutting insert that relieves stress on the corner tip of the tool, which will produce a pocket and groove as shown in Klumpp, and as required by claim 1. *Cf.* Spec. ¶ 4 (“the groove cutting teeth may be rectangular pocket and groove cutting teeth”); *id.* ¶ 11 (“Figure 2B depicts an interpolating step in which a travel area is machined using a cutting tool to produce a recessed inner surface with a pocket and annular surface grooves”).

First, Appellant argues correctly that “Wackenhuth is silent as to whether the unnumbered projections shown in cross section in Figure 1 are annular or continuous,” and as such, does not disclose “flat-bottom grooves and flat-top peaks [that] are discontinuous,” as claimed. Appeal Br. 3. Appellant concludes that the Examiner’s finding that Wackenhuth’s unnumbered projections are discrete and discontinuous is speculative. Reply Br. 2. Appellant also argues that, alternatively, the Examiner’s rationale for modifying Wackenhuth’s unnumbered projections (or trapezoidal indentations) to be annular, discrete, discontinuous grooves is speculative, because Wackenhuth does not disclose that “[a] [c]onsistent and even connection of lining 23 and cylinder 18” is an objective of Wackenhuth’s unnumbered projections (or trapezoidal indentations). Reply Br. 2.

Claim 1 requires the profile formed in the cylindrical surface to have “discrete, discontinuous, flat-bottom grooves” and “flat-top peaks of constant height.” The claim terms “discrete” and “discontinuous” do not appear in the Specification. Claim 1, as originally filed, recited “a plurality of annular grooves,” however, Appellant amended claim 1 by replacing the original language, “a plurality of annular,” with the terms “discrete,

discontiguous.” May, 22, 2017 Amendment. Appellant remarked that the limitation “discrete, discontiguous grooves resid[ing] in planes parallel to each other” has written description support in paragraphs 31 and 43, and Figure 2B of the Specification as originally filed, and is distinguishable from a profile having a screw-like, continuous thread or groove. May, 22, 2017 Amendment 8–9.

We find that a preponderance of the evidence supports the Examiner’s finding that Figure 1 of Wackenhuth reasonably *suggests* to a person of ordinary skill in the art that each pair of horizontally opposing trapezoidal indentations may be the cross-section of an annular, flat-bottom groove that is discrete and discontiguous from an adjacent annular, flat-bottom groove represented by another pair of opposing trapezoidal indentations. Notably, *both* discrete, discontiguous, flat-bottom grooves (as evidenced by the cylindrical inner surface formed by Weisel’s cutter³), *and* a single, continuous, helical groove (as evidenced by Klumpp’s cylindrical inner surface⁴), are known profiles for roughening the inner cylindrical surface of a bore.

Moreover, we are not persuaded by Appellant’s argument that the Examiner’s alternative reasoning for interpreting (or modifying) Wackenhuth’s trapezoidal indentations to be annular, discrete, discontiguous grooves lacks rational underpinning. The Examiner reasons that such a modification would provide for a consistent and even connection of lining 23 to cylinder 18, which is recognized in the prior art as particularly desirable: “[g]rooves in a surface of a cylindrical component are known to

³ See Weisel ¶ 9, Fig. 1.

⁴ See Klumpp ¶ 10.

have various geometries to improve the retention of coatings applied to the surface of the cylindrical component” (Klumpp ¶ 3), wherein, as set forth *supra*, annular and helical grooves are known geometries.

Second, Appellant argues that “Weisel does not disclose or suggest the structural details of the grooves that are formed,” and also that “there is no reason to combine these two references,” as proposed by the Examiner, because Wackenhuth does not disclose the claimed profile, as argued *supra*. Appeal Br. 3–4. Appellant submits that, “[a]t best, Weisel discloses ‘a grooving tool assembly for use in forming one or more grooves in a wall of a bore when the tool body is rotated about a first axis and simultaneously circularly interpolated about a second axis,’” and that “Weisel cannot inform a skilled artisan of how to produce the three-dimensional profile of Wackenhuth because Wackenhuth only discloses a cross-sectional view of unnumbered protrusions.” Reply Br. 3. Appellant concludes that the Examiner improperly relies on hindsight and speculates as to whether Weisel’s tool forms Wackenhuth’s structure. Appeal Br. 4.

Appellant’s argument, however, does not apprise us of error in the Examiner’s finding *supra* that Weisel discloses cutting inserts, with reference to Figure 6, that would *necessarily* form corresponding discrete, discontinuous, flat-bottomed grooves and also flat-top peaks of constant height between the grooves, as claimed.⁵ Appellant’s argument also does not apprise us of error in the Examiner’s reasoning, which we determine is

⁵ The Examiner relies on Doerfler for disclosing a second process for forming an undercut region (or trapezoidal shape) relative to each groove, such that the Examiner does not need to rely on Weisel’s machining method for forming Wackenhuth’s *trapezoid* indentations. Final Act. 6–7; Appeal Br., Claims App. 1 (claim 2).

supported by rational underpinning, as the Examiner applies Weisel's method as a *known* process for producing annular, discrete, discontinuous grooves in a cylindrical surface, i.e., grooves of the type disclosed in Wackenhuth or the proposed modification thereof."

Third, Appellant argues that the Examiner fails to explain "how the Weisel tool would be able to simultaneously rotate to provide the flat-bottom pocket having side walls along the discrete, discontinuous, flat-bottom grooves, and flat-top peaks of constant height." Appeal Br. 4. Appellant concludes that the Examiner improperly relies on hindsight and speculates as to whether Klumpp's pockets would be formed in Wackenhuth's profile using Weisel's tool. Appeal Br. 4.; Reply Br. 3 ("[i]t is improper for the Examiner to make a modification based on mere supposition").

We are not persuaded by Appellant's argument. As set forth *supra*, the Examiner proposes modifying Weisel's cutting insert 22 so as to form steps 10, 11, which have the benefit of relieving stress on the tool, as taught by Klumpp. The material removed by the modified cutting insert forms a pocket whose base is defined by the top surface of the steps, and a flat bottom groove extending radially further into the wall of the cylinder. *See* Ans. 15 ("The steps that are created via the relieved tool bit define the recited flat-bottomed pocket."). We find that the Examiner's proposed modification is sufficiently articulated and supported by rational underpinning, and based neither on hindsight nor speculation. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring an obviousness conclusion to be based on explicit articulated reasoning with rational underpinning), cited with approval in *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) .

Accordingly, we sustain the Examiner's rejection of independent claim 1, and claims 5–9, 14, 21, 38, and 42 fall therewith.

Independent claim 30 and dependent claims 31–33, 37, 39, and 43

Appellant argues claims 30–33, 37, 39, and 43 as a group. Appeal Br. 4–6. We select independent claim 30 as representative, and claims 31–33, 37, 39, and 43 stand or fall therewith. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Regarding independent claim 30, the Examiner makes the same findings and applies the reasoning with respect to Wackenhuth, Weisel, and Klumpp in the rejection of independent claim 30, as the Examiner made with respect to independent claim 1 *supra*. Final Act. 3–5; Ans. 3–6, 12–13.

Appellant repeats the arguments made *supra* with respect to claim 1 for the patentability of claim 30.

Accordingly, for the same reasons stated *supra*, we sustain the Examiner's rejection of independent claim 30, and claims 31–33, 37, 39, and 43 fall therewith.

Rejections II–V

Appellant repeats the arguments made *supra* with respect to claim 1 for the patentability of claims 2–4, 10–13, 15–18, 22–29, 40, and 41. Accordingly, we sustain the Examiner's rejections for the same reasons stated *supra* with respect to claim 1.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 5–9, 14, 21, 30–33, 37–39, 42, 43	103	Wackenhuth, Weisel	1, 5–9, 14, 21, 30–33, 37–39, 42, 43	
2, 10–13, 15–18, 22–29	103	Wackenhuth, Weisel, Klumpp, Doerfler	2, 10–13, 15–18, 22–29	
3	103	Wackenhuth, Weisel, Klumpp, Hunter	3	
4	103	Wackenhuth, Weisel, Klumpp, Vogelsang	4	
40, 41	103	Wackenhuth, Weisel, Klumpp, Doerfler, Vogelsang	40, 41	
Overall Outcome			1–18, 21–33, 37–43	

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED