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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RICKEY L. WILLIAMS¹

Appeal 2017-003069
Application 14/217,984
Technology Center 3700

Before JAMES P. CALVE, WILLIAM A. CAPP, and
BRANDON J. WARNER, *Administrative Patent Judges*.

CALVE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant appeals under 35 U.S.C. § 134(a) from the Final Office Action rejecting claims 1–6 and 10–22. Br. 1. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

¹ Ford Global Technologies, LLC is identified as the applicant, pursuant to 37 C.F.R. § 1.46, and the real party in interest. *See* Br. 3.

CLAIMED SUBJECT MATTER

Claims 1, 13, and 18 are independent. Claim 1 is shown below.

1. A compression ring for an engine piston comprising:
 - an upper face and a lower face;
 - an inner face positioned between the upper and lower faces along an inner diameter of the ring, wherein the upper face, the lower face, and the inner face cooperate with an annular groove in the piston; and
 - an outer face positioned between the upper and lower faces along an outer diameter of the ring for cooperation with a bore in a cylinder, the outer face formed by a smooth continuous curve along an axial direction of the ring, the curve having first and second convex surfaces connected by a concave surface;
 - wherein a first radius of the first convex surface is equal to a second radius of the second convex surface; and
 - wherein the concave surface has a third radius, the third radius being less than half of the first radius.

Br. 12 (Claims Appendix, 1).

REJECTIONS²

Claims 1–6 and 12–20 are rejected under 35 U.S.C. § 103 as unpatentable over Anderson (US 2,554,289, iss. May 22, 1951) and Bärenreuter (DE 102009036240 A1, pub. Feb. 17, 2011).

Claims 10, 11, 21, and 22 are rejected under 35 U.S.C. § 103 as unpatentable over Anderson, Bärenreuter, and Higuchi (US 8,739,753 B2, iss. June 3, 2014).

² Appellant's Amendment Under 37 C.F.R. § 1.116, filed May 2, 2016, was entered by the Examiner and overcame the rejection of claims 16 and 20 under 35 U.S.C. § 112(b). Adv. Act., mailed May 13, 2016, at 3; Ans. 2–10 (grounds of rejection on appeal are the rejections under 35 U.S.C. § 103).

ANALYSIS

*Claims 1–6 and 12–20
Rejected Over Anderson and Bärenreuter*

The Examiner finds that Anderson teaches the compression ring of independent claims 1, 13, and 18 with convex surfaces 7, 8 (sections, claim 18) with a radius of curvature that is greater than the radius of curvature of a concave surface/section 9 connecting convex surfaces or sections 7, 8. Final Act. 5–6, 7–8, 10. The Examiner relies on Bärenreuter to teach piston ring 1 with convex sections 6, 7 connected by concave groove 8 with radius r_2 that is less than half of radius r_1 of convex surfaces 6, 7. *Id.* at 6, 8, 10. The Examiner reasons that making Anderson’s piston ring concave surface 9 with less than half of the radius of convex surfaces 7, 8 would “provid[e] more of a contact surface between the piston ring and the cylinder.” *Id.*

Appellant argues that Anderson’s compression ring has convex and concave surfaces with equivalent radii of curvature, and Bärenreuter teaches a ring having three different radii of curvature. Br. 5. Appellant argues that decreasing the concave radius of curvature of Anderson would increase the radius of curvature and contact area of the convex regions with a piston wall, thereby increasing frictional drag and reducing oil cavity 10. *Id.* at 7–8.

We agree with the Examiner that Anderson teaches convex surfaces 7, 8 having the same radius of not greater than about .045 inches. Anderson, 2:7–11. We also agree with the Examiner that Bärenreuter teaches convex surfaces 6, 7 having radii of curvature F_{rad1} , F_{rad2} that are greater than the radius of curvature of the concave surface that connects convex surfaces 6, 7 in Figure 3, as the Examiner illustrates with annotations on Figure 3 of Bärenreuter in the Final Office Action. Final Act. 5.

We cannot say, however, that Figure 3 of Bärenreuter, as relied on by the Examiner, evidences the claimed ratio of a radius of the convex surfaces to a radius of the concave surface of more than two to one. The “patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000). Here, as to such a specific relationship between the depicted radii, we have no disclosure of any dimensions of the convex or concave surfaces or that Figure 3 of Bärenreuter is drawn to scale. Nor is there an English language translation of Bärenreuter on which to rely.

Even if Bärenreuter taught the claimed ratio, we are not persuaded that a skilled artisan would use this ratio in Anderson “to facilitate providing *more of a contact surface* between the piston ring and the cylinder,” as the Examiner reasons. Final Act. 6, 8, 10 (emphasis added); Ans. 12. Anderson teaches a radius of curvature for convex surfaces 7, 8 that provides a *hair-line contact 12* with cylinder wall 1 to provide larger pockets 13 for oil on either side of hair-line contact 12, facilitate high pressure of the ring element against wall 1, and reduce frictional drag. Anderson, 2:4–41. Anderson thus teaches to *minimize* the contact surface between convex surfaces 7, 8 of piston ring 4 and cylinder wall 1 rather than to increase the contact surface, as the Examiner proposes to do. Br. 7–8; Final Act. 6; Ans. 12.

We are not persuaded by Appellant’s argument that decreasing the concave radius of curvature in Anderson would require an increase to the convex radius. Br. 7. A decrease in the radius of curvature of the inwardly curved (concave) surface 9 could result in a reduction of the axial thickness of Anderson’s ring 4 by bringing convex surfaces 7, 8 closer together.

In either case, we are not persuaded that it would have been obvious to modify Anderson so that outwardly curved (convex) surfaces 7, 8 have a radius of curvature that is more than twice the radius of curvature of inwardly curved (concave) surface 9 to “provid[e] more of a contact surface between the piston ring and the cylinder” as the Examiner proposes. Final Act. 6, 8, 10. Thus, we do not sustain the rejection of claims 1–6 and 12–20.

*Claims 10, 11, 21, and 22
Rejected Over Anderson, Bärenreuter, and Higuchi*

The Examiner’s reliance on Higuchi to teach tangent lines as recited in dependent claims 10, 11, 21, and 22 does not cure the above-noted deficiency in the articulated combination of Anderson and Bärenreuter as to claims 1 and 13 from which these claims depend. Thus, we do not sustain the rejection of claims 10, 11, 21, and 22.

DECISION

We reverse the prior art rejections of claims 1–6 and 10–22.

REVERSED