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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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Ex parte YOSHITAKA TSURUTA

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Appeal 2019-001844
Application 15/075,119
Technology Center 1700

———————

Before MICHAEL P. COLAIANNI, GEORGE C. BEST, and DEBRA L. DENNETT, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge.*

DECISION ON APPEAL

The Examiner rejected claims 1–6 of Application 15/075,119 under 35 U.S.C. § 103 as obvious. Non-Final Act. 2, 4 (Nov. 24, 2017). Pursuant to 35 U.S.C. § 134(a), Appellant[1] seeks reversal of the rejections. Because at least one of the appealed claims has been twice rejected, we have jurisdiction under 35 U.S.C. § 6(b).

For the reasons set forth below, we ***affirm***.

[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as JX Nippon Mining & Metals Corp. Appeal Br. 2.

I. BACKGROUND

The ’119 Application describes a ceramic cylindrical sputtering target joined to a cylindrical substrate. Spec. ¶ 2. According to the Specification, the joining material’s improved performance prevents the joined cylindrical layers from delaminating during thermal contraction. *Id.* at ¶¶ 12, 13.

Claim 1 is representative of the ’119 Application’s claims and is reproduced below from the claims listing in the Claims Appendix to the Appeal Brief:

> 1. A cylindrical sputtering target, comprising:
>
> a cylindrical substrate and a cylindrical sputtering target member joined together with *a joining material that is in contact with the cylindrical substrate and the cylindrical sputtering target member from one end of the cylindrical sputtering target member to the other end of the cylindrical sputtering target member*;
>
> wherein where the joining material has a thickness, estimated from a difference between an inner diameter of the cylindrical sputtering target member and an outer diameter of the cylindrical substrate, of d (μm), the joining material has a coefficient of thermal expansion of α_1 (μm/μmK), and a melting point of the joining material and room temperature have a difference of ΔT (K), *a surface of the cylindrical sputtering target member on the side of the joining material has concave and convex portions having a value of ten-point average roughness (R_z) fulfilling:*
>
> $$d\ (\mu m) \times \alpha_1\ (\mu m/\mu mK) \times \Delta T\ (K) \leq R_z\ (\mu m)$$, and
>
> wherein *the joining material is in contact with the concave and convex portions*.
>
> Appeal Br. (Claims App.) 13 (emphasis added).

II. REJECTIONS

On appeal, the Examiner maintains the following rejections:

1. Claims 1 and 3–5 are rejected under 35 U.S.C. § 103 as unpatentable over the combination of Itoh,[2] Schnappenberger,[3] and Wurczinger,[4] with evidence from GPS.[5] Answer 4.
2. Claims 2 and 6 are rejected under 35 U.S.C. § 103 as unpatentable over the combination of Itoh, Schnappenberger, Wurczinger, and Todoko,[6] with evidence from GPS. Answer 6.

III. DISCUSSION

Appellant argues for the reversal of the obviousness rejections of claims 1–6 on the basis of limitations present in independent claim 1. Appeal Br. 6–11. We select claim 1 as representative. Accordingly, we limit our discussion to claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

A. Rejection of claims 1 and 3–5 as unpatentable over the combination of Itoh, Schnappenberger, and Wurczinger, with evidence from GPS.

In rejecting claim 1, the Examiner found that Itoh's cylindrical target and cylindrical substrate describes each component and limitation of the claimed cylindrical sputtering target, except that Itoh is silent regarding two limitations. Answer 4 (citing Itoh ¶¶ 7, 17, 20). According to the Examiner,

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[2] US 2006/0151321 A1, published July 13, 2006.

[3] US 2011/0005923 A1, published Jan. 13, 2011.

[4] US 2014/0124365 A1, issued May 8, 2014.

[5] *Geometrical Product Specifications*, Japanese Standards Association 1167–68 (2003) (hereinafter "GPS").

[6] US 2010/0326823 A1, published Dec. 30, 2010.

Itoh does not disclose: (i) any roughness value for the cylindrical sputtering target's interior surface; and (ii) that the entire cylindrical substrate's exterior and the cylindrical target's interior surfaces are soldered together. Answer 4.

With respect to Itoh's first missing limitation, the Examiner found Schnappenberger teaches that a target roughness (i.e., R_z) greater than 100 improves the heat transfer between the target and a substrate. Answer 5 (citing Schnappenberger Abstract; Figs. 2–4; ¶ 37). The Examiner determined that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine Itoh's low melting solder, in the disclosed thickness, with Schnappenberger's high roughness because doing so would have provided improved heat transfer. Answer 5 (citing Schnappenberger ¶ 37).

Regarding Itoh's second missing limitation, the Examiner found that Wurczinger teaches use of solder to join a cylindrical target and a backing structure. Answer 5 (citing Wurczinger Abstract; Figs. 1, 2; ¶ 24). According to the Examiner, Wurczinger further teaches that roughening surfaces and completely filling gaps with solder improves thermal contact between two surfaces. Answer 5 (citing Wurczinger Abstract; ¶ 28). The Examiner determined that "it would have been obvious to one of ordinary skill in the art at the time of the invention to completely fill the target and backing gap with solder, as disclosed by Wurczinger, in the structure of Itoh, because this allows for good thermal contact." Answer 5 (citing Wurczinger ¶¶ 4, 8).

Appellant argues, *inter alia*, that: (1) without any teaching of the claimed R_z unit of μm, Schnappenberger fails to disclose a roughness value that satisfies the formula of claim 1, Appeal Br. 7; (2) Wurczinger does not

make up for Schnappenberger's failure to disclose a roughness value, *id.* at 7–8; (3) Schnappenberger's structure includes an air gap between the target and the backing tube and, thus, cannot teach concave and convex portions in contact with the joining material, *id.* at 8–10; and (4) because Schnappenberger roughens the surface in contact with an air gap, the Examiner cannot combine Schnappenberger's roughening with Itoh's and Wurczinger's structures, which do not have air gaps between components. *Id.* at 10.

Appellant's arguments are not persuasive.

First, we agree with the Examiner that the relied-upon GPS provides evidence that the ordinarily skilled artisan would have used a μm as the standard unit for R_z. Answer 5 (*see* GPS 1167). As the Examiner found, the formula recited in claim 1 requires that R_z is greater than an expression and Schnappenberger's R_z range extends to any value greater than 100. Answer 8. Thus, the Examiner persuasively found that Schnappenberger necessarily discloses a roughness value that satisfies the formula of claim 1. *Id.*

Second, the Examiner does not rely upon Wurczinger to render obvious the requisite roughening of the cylindrical sputtering target member's surface on the side of the joining material. Rather, the Examiner relied upon Wurczinger for disclosing that completely filling gaps with solder and roughening surfaces, in general, improves thermal contact between two surfaces. *Id.* at 5 (citing Wurczinger Abstract; ¶ 28).

Third, Appellant argues in connection with argument (3) that the Examiner unreasonably construed the term "in contact" as encompassing Schnappenberger's air gap. Reply Br. 8.

Appellant's arguments, however, are not dispositive because the Examiner's relied-upon primary reference, Itoh, explicitly discloses a

cylindrical substrate and a cylindrical sputtering target without an air gap therebetween. *See* Itoh ¶¶ 7, 17. We, furthermore, agree with the Examiner that Schnappenberger's roughened target surface with an R_z greater than 100 inherently possesses concave and convex portions. *See* Answer 5.

Fourth, Appellant's argument (4) is unpersuasive because it is not directed to the Examiner's rationale for modifying Itoh to incorporate: (i) Schnappenberger's R_z roughened target surface having an $R_z > 100$; and (ii) Wurczinger's solder-filled gaps and surface roughening, in general. Rather, Appellant's argument is directed to whether it was improper for the Examiner to combine Schnappenberger's roughened surface in contact with an air gap with Itoh and Wurczinger when Itoh's and Wurczinger's structures do not have air gaps between components.

> The test for obviousness[, however,] is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.

In re Keller, 642 F.2d 413, 425 (CCPA 1981). In this case, the Examiner did not rely upon Schnappenberger to teach modifying Itoh based on the structure of Schnappenberger because Itoh already teaches the structure recited in claim 1. Answer 3 (citing Itoh ¶¶ 7, 17, 20).

Thus, Appellant's arguments (1)–(4) fail to identify reversible error in the Examiner's determination that it would have been obvious to confer improved heat transfer and thermal contact for Itoh's cylindrical target, solder, and cylindrical substrate according to the teachings of Schnappenberger and Wurczinger, namely, by incorporating: (i) Schnappenberger's roughened target surface having an $R_z > 100$ on the

interior surface of Itoh's cylindrical target; and (ii) Wurczinger's soldering of the entire surfaces between Itoh's substrate and target with Itoh's low melting solder. *See* Answer 4–5.

In view of the foregoing, we determine that the Examiner did not reversibly err in rejecting claim 1 as unpatentable over the combination of Itoh, Schnappenberger, and Wurczinger. Accordingly, we also affirm the rejection of claims 3–5, which depend from claim 1.

B. Rejection of claims 2 and 6 as unpatentable over the combination of Itoh, Schnappenberger, Wurczinger, and Todoko, with evidence from GPS.

Appellant argues that the rejection of claims 2 and 6 as unpatentable over the combination of Itoh, Schnappenberger, Wurczinger, and Todoko should be reversed for the reasons set forth in arguing for reversal of the rejection over the combination of Itoh, Schnappenberger, and Wurczinger. *See* Appeal Br. 10 ("Todoko was not applied in a manner that attempts to make up for the above-identified deficiencies.").

For the reasons set forth above, we have affirmed the rejection of independent claim 1 as unpatentable over the combination of Itoh, Schnappenberger, and Wurczinger. We, therefore, also affirm the rejection of claims 2 and 6 as unpatentable over the combination of Itoh, Schnappenberger, Wurczinger, and Todoko.

IV. CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3–5	103	Itoh, Schnappenberger, Wurczinger, GPS	1, 3–5	
2, 6	103	Itoh, Schnappenberger, Wurczinger, GPS, Todoko	2, 6	

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
Overall Outcome			1–6	

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