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YANG, JIE	

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANDREW PHILIP WOODFIELD,
ERIC ALLEN OTT, and CLIFFORD EARL SHAMBLEN

Appeal 2018-008287
Application 13/950,883
Technology Center 1700

Before LINDA M. GAUDETTE, MONTÉ T. SQUIRE, and MERRELL C. CASHION, JR., *Administrative Patent Judges*.

CASHION, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF CASE

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from a Final Action rejecting claims 1–6 and 9–20. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

[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 the General Electric Company. App. Br. 3.

The invention is directed to articles having titanium-based metallic compositions, and more specifically to articles made of titanium-based compositions having titanium boride particles dispersed therein. App. Br. 7; Spec. ¶ 2. Claim 1 illustrates the subject matter claimed and is reproduced below:

> 1. An article comprising a microscale composite material, the microscale composite material comprising:
>
> a titanium-based matrix;
>
> grains including dispersion of intragranular titanium boride particles at a first volume fraction; and
>
> additional grains including dispersion of intragranular titanium boride particles at a second volume fraction,
>
> wherein the grains and the additional grains are dispersed together, and the first volume fraction is higher than the second volume fraction, and
>
> wherein the intragranular titanium boride particles are crystallographically orientated relative to the matrix; and the intragranular titanium boride particles are coherent or partially coherent with the matrix; and at least 50 volume percent of the intragranular titanium boride particles in the first volume fraction include a maximum dimension of less than 2 micrometers.

App. Br. 18 (Claims Appendix).

Independent claims 9 and 15 do not recite a number of features in claim 1. However, independent claim 9 recites a specific titanium-based matrix, while independent claim 15 recites two titanium-based matrices. Further, all independent claims recite that at least 50 volume percent of the

intragranular titanium boride particles include a maximum dimension of less than 2 micrometers.

Appellant requests review of the following rejections[2] maintained by the Examiner:

I. Claims 1, 4–6, 9, 12–15, and 18–20 rejected under 35 U.S.C. § 103(a) as unpatentable over Panda (*Titanium-Titanium Boride (Ti-TiB) Functionally Graded Materials through Reaction Sintering: Synthesis, Microstructure, and Properties* Vol. 34A METALLURGICAL AND MATERIALS TRANSACTIONS A pp.1993–2003 (September 2003)); Jech (US 3,052,538, issued September 4, 1962); and Li (*Characterization of the microstructure in TiB-whisker reinforced Ti alloy matrix composite*, Vol.16, 6 Materials Letters, pp. 322–325 (1993)).

II. Claims 2, 3, 10, 11, 16, and 17 rejected under 35 U.S.C. § 103(a) as unpatentable over Panda, Jech, and Saito (US 6,117,204, issued September 12, 2000).

OPINION[3]

After review of the respective positions the Appellant provides in the Appeal Brief and the Examiner provides in the Final Action and the Answer, we reverse the Examiner's prior art rejections of claims 1–6 and 9–20 under 35 U.S.C. § 103(a) essentially for the reasons the Appellant presents in the Appeal Brief. We add the following for emphasis.

The Examiner finds that Panda teaches articles comprising a Ti-TiB functionally graded material (FGM), where the Ti-TiB FGM comprises a titanium-based matrix comprising titanium boride particles. Non-Final Act.

[2] The Examiner withdrew all rejections based on the ground of nonstatutory obviousness type double patenting. Ans. 3. Accordingly, these rejections are not before us for review on appeal.

[3] We limit our discussion to independent claim 1 for both rejections. The Appellant's persuasive arguments regarding claim 1 are equally applicable the rejection of claims 9 and 15.

3–4. Panda's articles differ from the subject matter of claim 1 in that Panda does not teach the limitation of at least about 50 volume % of the TiB particles including a maximum dimension of less than about 2 micrometers as claimed. *Id.* The Examiner finds that Jech teaches a titanium-based alloy with intermetallic compounds of titanium having an intermetallic compound TiB_2 with a particle size of 0.6 micrometers alloyed with titanium. Non-Final Act. 4; Jech col. 1, ll. 10–13, cols. 2–3 (Example IV). The Examiner further finds that Li discloses that TiB whiskers have an orientation relationship with Ti matrix substrate. Final Act. 3; Li Figure 5, Abst., 325. The Examiner determines that it would have been obvious to one of ordinary skill in the art at the time the invention was made to choose the proper TiB particle with proper particle size for Panda's Ti-TiB FGM to improve the mechanical properties of the material, as taught by Jech. Non-Final Act. 4; Jech col.1, ll. 55–57.

Appellant argues that the Examiner has not provided a logical reason for one skilled in the art to combine the teachings of the prior art because Panda specifically uses TiB_2 powders, beta phase stabilizing elements, and Ti powders in a size ratio in microns of 2:10:45 to achieve the required FGM layers. App. Br. 16; Panda 1994.

We agree with Appellant that there is reversible error in the Examiner's determination of obviousness. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006), *quoted with approval in KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Panda discloses making titanium-titanium boride (Ti-TiB) functionally graded material (FGM) composites FGM1 and FGM2 from multiple layers comprising 2 micron-sized TiB_2 particles at varying volume percentages. Panda 1993–1994, 1995 (Table 1). Panda discloses that each layer results in a specific volume percentage of TiB. *Id*. at 1995. However, as acknowledged by the Examiner (Non-Final Act. 4), Panda does not teach that at least about 50 volume % of the TiB particles include a maximum dimension of less than about 2 micrometers as claimed. The Examiner's reliance on Jech and Li (Non-Final Act. 4; Final Act. 3) does not remedy this deficiency. Moreover, the Examiner has not directed us to any portions of the cited art that would have led one skilled in the art to an article (composite) comprising at least about 50 volume % of the TiB particles including a maximum dimension of less than about 2 micrometers as claimed. Further, the Examiner has not provided an adequate technical explanation of why or how one skilled in the art would have arrived at the claimed article from the combined teachings of the cited art.

Thus, the Examiner does not provide the requisite rational underpinning explaining why a person of ordinary skill in the art would have arrived at the claimed invention from the teachings of the cited art.

Accordingly, we reverse the Examiner's prior art rejections under 35 U.S.C. § 103(a) for the reasons presented by Appellant and given above.

ORDER

The Examiner's prior art rejections of claims 1–6 and 9–20 under 35 U.S.C. § 103(a) are reversed.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1, 4–6, 9, 12–15, and 18–20	§ 103(a) Panda, Jech, Li		1, 4–6, 9, 12–15, and 18–20
2, 3, 10, 11, 16, and 17	§ 103(a) Panda, Jech, Saito		2, 3, 10, 11, 16, and 17
Overall Outcome			1–6 and 9–20

REVERSED