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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SHAHRAM AMINI, CHRISTOPHER W. STROCK, SERGEI F. BURLATSKY, and DMITRI NOVIKOV

Appeal 2020-000285
Application 14/591,137
Technology Center 1700

Before JEFFREY T. SMITH, DEBRA L. DENNETT, and MERRELL C. CASHION, JR., *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject pending claims 1, 3, 4, and 8–11.[2] Pending claims 5–7 and 20 have been withdrawn and are not subject to this appeal. (Appeal Br. 2.) We have jurisdiction under 35 U.S.C. § 6(b).

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[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 United Technologies Corporation. Appeal Br. 2.

[2] Appellant submitted a response dated January 19, 2019 in which claim 21 was cancelled. The Advisory Action dated February 5, 2019 indicates that the amendment was not entered. However, the Advisory Action in section 15 (status of claims) indicates that claims 1, 3, 4, and 8–11 stand rejected and claims 5–7 and 20 have been withdrawn from consideration. In light of the statements in the Advisory Action, we determined claim 21 is not presented for our review.

We reverse.

STATEMENT OF THE CASE

Appellant's invention is generally directed to an article that includes a MAX phase solid having a formula $M_{n+1}AX_n$,where n=l–3, where M is an early transition metal, A is an A-group element and X includes at least one of carbon and nitrogen, and a high temperature melting point metallic material interspersed with the MAX phase solid. (Spec. ¶ 4.) Independent claim 1 is representative of the appealed subject matter and is reproduced below:

> 1. An article comprising:
>
> a MAX phase solid in the form of particles, the MAX phase solid having a formula $M_{n+1}AX_n$,where n=1–3, M is an early transition metal, A is an A-group element, and X includes at least one of carbon and nitrogen; and
>
> a high temperature melting point metallic material through which the particles of the MAX phase solid are dispersed such that the particles are spaced apart and the metallic material surrounds the particles, the high temperature melting point metallic material is a metal or an alloy having a base metal selected from the group consisting of Zr, Y, Sc, Be, Co, Fe, Ni, and combinations thereof, and a ratio, in volume percent, of the high temperature melting point metallic material to the MAX phase solid is from 70:30 to 95:5, wherein the high temperature melting point metallic material and the MAX phase solid together define a porosity of 50 vol% to 80 vol%.

Claims Appendix.

Appellant requests review of the Examiner's rejection of claims 1, 3, 4, and 8–11 under 35 U.S.C. § 103 as obvious over Barsoum (US 2010/0055492 A1; published Mar. 4, 2010) in view of Sun (Z.M. Sun et al.,

Microstructure and mechanical properties of porous Ti_3SiC_2, *Acta Materialia* 53 (2005) 4359–4366) or, alternatively, further in view of Liang (Y. Liang et al., Electrodeposition and characterization of Ni/$Ti_3Si(Al)C_2$ composite coatings, *J. Mater. Sci. Technol.*, 2011, 27(11), 1016–1024).[3]

OPINION

We review the appealed rejections for error based upon the issues Appellant identifies, and in light of the arguments and evidence produced thereon. *See In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011) ("[I]t has long been the Board's practice to require an applicant to identify the alleged error in the examiner's rejections," citing *Ex parte Frye*, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential)).

After review of the respective positions Appellant and the Examiner provide, we determine that Appellant has identified reversible error in the Examiner's rejection under 35 U.S.C. § 103.

We limit our discussion to the independent claim 1 as Appellant argues in the Appeal Brief. (Appeal Br. 3–6).

The Examiner finds Barsoum discloses a composite material comprising a $M_{n+1}AX_n$ phase particles, wherein M is an early transition metal, A is an A-group element, and X is one or both of C and N, and n ranges from 1 to 3, and "low melting point" material. (Final Act. 4; *see* Barsoum Abstr. ¶ 6.) The Examiner finds Barsoum suggests dispersing the MAX phase particles through a metallic material such that the particles are spaced apart and surrounded. (Final Act. 4; Barsoum ¶¶ 35, 74, 101.) The

[3] The complete statement of the rejection on appeal appears in the November 26, 2018 Final Action. (Final Act. 4–9.)

Examiner finds Barsoum discloses the metal component is made of a low melting point metal —i.e., having a melting point of less than about 1800°C. (Final Act. 4–5; Barsoum ¶ 26.) In light of this disclosure, the Examiner determines a person of ordinary skill in the art would have reasonably been able to envisage the selection of Y, Sc, Be, Co, Fe, or Ni from the group of metals disclosed by Barsoum. (Final Act. 5.) The Examiner further determines that Barsoum discloses Mg and Co are art-recognized equivalents for the purpose of achieving solid materials with high damping capabilities. (Final Act. 5; Barsoum ¶ 88.) Based on this, the Examiner concludes it would have been obvious to select Co as the metal material. (Final Act. 5.) The Examiner alternatively cites Liang as evidence suggesting the selection of Ni as the low melting point metal in Barsoum would have been obvious. (Final Act. 5.)

Addressing the claim requirement for the porosity of the composite to be between 50 to 80 volume percent, the Examiner turns to Sun for disclosing "a MAX phase having a porosity of *approximately* 43% by volume" which provides a high energy dissipation property as compared to fully dense articles. (Final Act. 6; *see* Sun 4362–4364.) Alternatively, the Examiner determines Sun establishes that the porosity of an article is a result-effective variable which affects the overall entry dissipation by a MAX phase material. (Final Act. 6.) The Examiner determines that it would have been obvious to one of ordinary skill in the art to modify the article from the combined teachings of the cited art to include the porosity level disclosed by Sun to achieve desirable energy dissipation properties, as Sun teaches. (Final Act. 6–7.)

As Appellant argues (Appeal Br. 5–6), the Examiner does not provide evidence supporting the conclusion that it would have been obvious to modify the porosity of Barsoum's composite material ("the high temperature melting point metallic material and the MAX phase solid together") to be between 50 vol% to 80 vol% as required by independent claim 1. The Examiner has not identified where Sun discloses the porosity is a property of the Max phase material and matrix metal. Sun is silent with regard to a porosity of a metal matrix and therefore fails to support the Examiner's position. (*See* Abstract). On this record, the Examiner has not explained adequately or directed us to any portion of Sun or other objective evidence that Sun's disclosed porosity of approximately 43% by volume is sufficiently close to the claimed porosity of 50 vol% to 80 vol% to render obvious the claimed invention.

The Examiner's alternative determination that Sun recognizes porosity as a result-effective variable is also not supported by the present record. It is well established that optimization of a prior art range flows from the normal desire of scientists or artisans to improve upon what is already generally known. *Pfizer, Inc. v. Apotex, Inc.,* 480 F.3d 1348, 1366–68 (Fed. Cir. 2007). But it is equally well established that when the parameter optimized was not recognized to be a result-effective variable, optimization would not have been obvious. *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977). The Examiner has not identified evidence in the present record that the prior art recognized the need for the porosity of the composite ("the high temperature melting point metallic material and the MAX phase solid together") to be between 50 vol% to 80 vol% as required by independent claim 1. Furthermore, as discussed above, the Examiner has not

identified where Sun discloses the porosity is a property of the Max phase material and matrix metal. Because the disclosed porosity of Sun is different than the claimed porosity, there is no basis to conclude that the claimed porosity is a result-effective variable.

For the foregoing reasons, we do not sustain the Examiner's rejection of claims 1, 3, 4, and 8–11 rejected under 35 U.S.C. § 103 as unpatentable over the combination of Barsoum and Sun, or the alternative combination with Liang.

CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1, 3, 4, 8–11	103	Barsoum, Sun,		1, 3, 4, 8–11
1, 3, 4, 8–11	103	Barsoum, Sun, Liang		1, 3, 4, 8–11
Overall Outcome				1, 3, 4, 8–11

REVERSED