



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/629,381	02/23/2015	Nathan K. Meckel	39831-505C01US	8067
64046	7590	10/02/2020	EXAMINER	
Mintz Levin/San Diego Office One Financial Center Boston, MA 02111			WILLIAMS, THOMAS J	
			ART UNIT	PAPER NUMBER
			3657	
			NOTIFICATION DATE	DELIVERY MODE
			10/02/2020	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

IPDocketingBOS@mintz.com  
IPFilerombos@mintz.com  
mintzdocketing@cpaglobal.com

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

*Ex parte* NATHAN K. MECKEL

---

Appeal 2019-003533  
Application 14/629,381  
Technology Center 3600

---

Before BIBHU R. MOHANTY, BRADLEY B. BAYAT, and  
TARA L. HUTCHINGS, *Administrative Patent Judges*.

HUTCHINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant<sup>1</sup> appeals under 35 U.S.C. § 134(a) from the Examiner’s  
final rejection of claims 9–17. We have jurisdiction under 35 U.S.C. § 6(b).<sup>2</sup>

We REVERSE.

---

<sup>1</sup> We use the term “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Our decision references Appellant’s Appeal Brief (“Appeal Br.,” filed Dec. 17, 2018), Reply Brief (“Reply Br.,” filed Apr. 1, 2019), and Specification (“Spec.,” filed Feb. 23, 2015), and the Examiner’s Answer (“Ans.,” mailed Jan. 30, 2019), and Final Office Action (“Final Act.,” mailed Nov. 17, 2017). Appellant identifies Tech M3, Inc. as the real party in interest. Appeal Br. 2.

<sup>2</sup> Claims 1–8 are withdrawn. *Id.*

### CLAIMED INVENTION

Appellant's invention relates generally to "coated brake disks and drums and methods for coating brake disks." Spec. ¶ 2.

Claims 9 and 16 are the independent claims on appeal. Claim 9, reproduced below, is representative of the subject matter on appeal:

9. A coated brake disk comprising:

a brake disk substrate having parallel surfaces, the brake disk substrate comprising a combination of light weight ceramic materials and ceramic composite materials, the brake disk substrate having a coating overlying at least a portion of the brake disk, the coating comprising:

a first coating layer comprising a first coating material having a crystalline structure, and

a second coating layer comprising a second coating material selected from the group of coating materials consisting of a metal Nitride, a metal Oxide, a metal Boride and a metal Carbide, the first and second coating layers comprising coating particles that combine to construct a pattern of repetition that is consistent with a lattice structure when applied over the parallel surfaces of the brake disk substrate.

### REJECTIONS

Claims 9, 11, and 15–17 are rejected under 35 U.S.C. § 103(a) as unpatentable over Martino (US 5,901,818, iss. May 11, 1999), Yu et al., Vapor Deposition of Platinum Allowed Nickel Aluminide Coatings, 201 *Surface & Coatings Tech.* 2326 (2006) ("Yu"), Greppi (US 2005/0056495 A1, pub. Mar. 17, 2005), and Khambekar et al. (US 7,261,192 B2, iss. Aug. 28, 2007) (Khambekar).

Claims 10 and 12–14 are rejected under 35 U.S.C. § 103(a) as unpatentable over Martino, Yu, Greppi, Khambekar, and Reinsch et al. (US 2007/0234929 A1, pub. Oct. 11, 2007) ("Reinsch").

## ANALYSIS

We are persuaded by Appellant's argument that the Examiner erred in rejecting claims 9 and 16 under 35 U.S.C. § 103(a), at least because the proposed combination of Martino, Yu, and Khambekar does not teach "the first and second coating layers comprising coating particles that combine to construct a pattern of repetition that is consistent with a lattice structure when applied over the parallel surfaces of the brake disk substrate," as recited in claim 9, and similarly recited in claim 16. Reply Br. 5–9

In rejecting claims 9 and 16 under 35 U.S.C. § 103(a), the Examiner relies primarily on Martino. *See* Final Act. 2–3. The Examiner finds that Martino teaches a brake disk substrate (titanium) having a coating comprising a first coating layer 19 (nickel aluminide) and a second coating layer 21 (zirconium oxide). Final Act. 2.

Martino teaches a titanium brake rotor 1 having two opposite braking surfaces 3 oriented parallel to one another. Martino 3:62–66, 4:40–44, Fig. 1. Each braking surface 3 is coated with bonding layer 19, and thermal barrier layer 21 is formed on each bonding layer 19. *Id.* at 6:45–48, Fig. 3. Bonding layer 19 is a thin layer of nickel aluminide, and thermal barrier layer 21 is a mixture of nickel and zirconium oxide. *Id.* at 6:51–55, 10:14–17, claim 9 (reciting a bond coat of nickel and aluminum). The layers are formed using plasma spraying techniques. *Id.* at 6:55–58. Bonding layer 19 has a thickness of about 0.005 inches. *Id.* at 9:25–28. Thermal barrier layer 21 preferably has a thickness between 0.01 inches and 0.03 inches, and more preferably 0.005 to 0.015 inches. *Id.* at 9:36–39.

The Examiner correctly finds that Martino does not teach the following claim limitations: 1) the first coating material (bonding layer 19

of nickel aluminide) having a crystalline structure; and 2) the first and second layers combine to construct a pattern of repetition that is consistent with a lattice structure. Final Act. 2–3. The Examiner turns to a separate secondary reference to cure each of these deficiencies.

Specifically, with reference to the first missing element, the Examiner finds that Yu teaches vapor deposition for applying a bond coating of nickel aluminide. *Id.* at 3 (citing Yu, p. 2332). The Examiner finds that Yu teaches that the resulting layer of nickel aluminide is a crystalline structure. Final Act. 3. The Examiner determines that it would have been obvious to form Martino’s bonding layer 19 of nickel aluminide by vapor deposition (instead of plasma spraying), as taught by Yu, resulting in Martino’s bonding layer 19 of nickel aluminide having a crystalline structure. *Id.*

Turning to the second missing element, the Examiner finds that Khambekar teaches a coating layer applied to a brake disk body in thin layers. Final Act. 4 (citing Khambekar 5:53–6:6). Khambekar teaches that a coating on a brake disc can be applied by arc spraying. Khambekar 5:53–55. The Examiner determines that it would have been obvious to “have applied Martino’s second coating layer onto the bond layer of the brake disk body of Martino . . . in multiple thin layers as taught by Khambekar.” Final Act. 4. The Examiner finds “using multiple thin layers to make up each coating layer would result in the recited lattice structural features.” Final Act. 4; *see also* Ans. 5 (“using multiple thin layers to make up each coating layer would result in the recited lattice structural feature”).

The Examiner’s interpretation of the claimed “lattice structure” as multiple thin layers of a single material is unreasonably broad, and inconsistent with the claim language. Claim 9, for example, recites that the

first coating layer of a first material and a second coating layer of a second material “combine to construct a pattern of repetition that is consistent with a lattice structure.” Claim 16 recites similar language.<sup>3</sup> Put simply, the claim language requires that the first and second layers “combine” to construct “a pattern of repetition” that is consistent with a lattice structure.

Appellant argues that the term “lattice structure” is generally understood by those of ordinary skill in the art to refer a structure of a crystalline solid in which a unit cell (i.e., a simplest repeating unit having lattice points that represent the location of atoms or ions) repeats. Reply Br. 8 (citing <https://opentextbc.ca/chemistry/chapter/10-6-lattice-structures-in-crystalline-solids/>). Appellant’s Specification explains that the lattice structure is configured by “alternatively depositing” first layer 28 (titanium) and second layer 30 (titanium nitride). Spec. ¶ 24. Multiple alternating layers form lattices, and “[m]ultilayers become superlattices when the period of the different layers is less than 100Å.” *Id.* By alternatively depositing the layers in this manner, their particles combine to construct a pattern of repetition. Put in terms of the definition proffered by Appellant, the combining creates a repeating unit cell of the combined material.

Here, none of the various modifications to Martino teach or suggest combining bonding layer 19 and thermal barrier layer 21 in a manner to construct a pattern of repetition, as called for by claims 9 and 16. Instead, the Examiner proposes modifying the techniques for separately forming the

---

<sup>3</sup> We interpret claim 16’s recitation for a second material as having inadvertently omitted the term “first material” after the phrase “combines with the.”

two layers (namely, vapor deposition for bond layer 19, as taught by Yu, and arc spraying for thermal barrier layer 21, as taught by Khambekar).

In view of the foregoing, we do not sustain the Examiner's rejection of independent claims 9 and 16, and dependent claims 11, 15, and 17 under 35 U.S.C. § 103(a).

The Examiner's rejection of dependent claims 10 and 12–14 does not cure the deficiency in the rejection of claims 9 and 16. Therefore, we also do not sustain the Examiner's rejection of dependent claims 10 and 12–14.

### CONCLUSION

In summary:

<b>Claims Rejected</b>	<b>35 U.S.C. §</b>	<b>Basis/References</b>	<b>Affirmed</b>	<b>Reversed</b>
9, 11, 15–17	103(a)	Martino, Yu, Greppi, Khambekar		9, 11, 15–17
10, 12–14	103(a)	Martino, Yu, Greppi, Khambekar, Reinsch		10, 12–14
<b>Overall Outcome</b>				<b>9–17</b>

REVERSED