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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TATSUYA MORIKAWA, TAKANORI KADOKURA, and
KENSUKE OSAWA

Appeal 2019-001772
Application 15/327,269
Technology Center 1700

Before ROMULO H. DELMENDO, CHRISTOPHER L. OGDEN, and
JANE E. INGLESE, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION ON APPEAL¹

Appellant² appeals under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–10. We affirm.

¹ The appeal record includes the following: Specification, Jan. 18, 2017 (“Spec.”); Final Office Action, Nov. 16, 2017 (“Final Action”); Appeal Brief, June 15, 2018 (“Appeal Br.”); Examiner’s Answer, Oct. 24, 2018 (“Answer”); and Reply Brief, Dec. 21, 2018 (“Reply Br.”).

² Appellant is A.L.M.T. Corp., which is the applicant as defined in 37 C.F.R. § 1.42. Appellant also identifies this entity as the real party in interest. *See* Appeal Br. 1.

BACKGROUND

According to the Specification, the invention at issue “relates to a composite material in which diamond and metal are composited together, . . . “which is excellent in thermal conductivity, suitable as a material for a heat radiating member, and dense.” Spec. 1:6–10. Representative of the invention is claim 1, the sole independent claim:

1. A diamond composite material comprising:
a coated diamond particle including a diamond particle and a carbide layer covering a surface of the diamond particle and *including an element of group 4 of the periodic table*; and
silver or a silver alloy binding such coated diamond particles together,
with an oxygen content of 0.1 mass% or less.

Appeal Br. 20 (emphasis of key phrases added). Claims 2–10 depend from claim 1. *Id.* at 20–21.

The Examiner rejects claims 1–10 under 35 U.S.C. § 102(a)(1) as being anticipated by Abyzov.³ Final Action 2–5.

DISCUSSION

Appellant argues the claims together. *See* Appeal Br. 7–18. Therefore, we focus our decision on independent claim 1, and the remaining claims fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

Abyzov discloses high-thermal-conductivity materials “which can be used as heat exchangers, heat sinks, [and] heat spreaders for electronics.” Abyzov, Abstr. The material “comprises coated diamond particles in a metal or metal alloy matrix,” in which the coating comprises “a metal and/or carbide of a carbide-forming element selected from IV–VI Groups of the

³ Abyzov, US 2010/0319900 A1, published Dec. 23, 2010 (“Abyzov”).

Periodic Table.” *Id.* Abyzov also discloses that the matrix material may be silver or a silver alloy. *Id.* ¶ 114.

The Examiner finds that Abyzov discloses each limitation recited in claim 1. *See* Final Action 2–3. In particular, according to the Examiner, Abyzov teaches that “the metal/carbide coating includes carbides of Hf, Ti and Zr” (i.e., group 4 elements on the periodic table), that the matrix is “silver, or copper silver,” and that “the composites are manufactured in vacuum or non-oxidizing atmospheres of inert gas . . . with exclusion of oxygen,” and “use of pure matrix materials.” *Id.* (citing Abyzov ¶¶ 58, 62, 68, 73, 85, 114–15). With regard to the limitation “oxygen content of 0.1 mass% or less,” the Examiner relies on inherency. *See id.* at 5–6; Answer 7.

When an examiner provides a prima facie basis to expect that the claimed product is substantially the same as a product found in the prior art, the burden shifts to the applicant to present evidence that the prior art product is not inherently within the scope of the claim. *See In re Spada*, 911 F.2d 705, 709 (Fed. Cir. 1990) (“When the PTO shows a sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.”); *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (“Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product.”).

The Examiner has made a sufficient initial showing that Abyzov necessarily discloses the “0.1 mass% or less” limitation of claim 1. As the Examiner explains, Abyzov discloses that the silver is “commercially pure,”

with the weight content of silver at “99.9% or above.” Answer 6 (citing Abyzov ¶ 114). The Examiner also correctly notes that Abyzov teaches performing the process in an environment that excludes oxygen. *Id.* at 6–7 (citing Abyzov ¶ 115 (“[O]xygen may oxidize the diamond, the coating and the metal of the matrix, and so the process is carried out in a vacuum or in an inert or reducing atmosphere.”)). Thus, the Examiner has shown, sufficiently to put the burden on Appellant to provide rebuttal evidence, that Abyzov discloses a process and starting materials that would produce a composite with no more than 0.1 mass% oxygen.

Appellant argues that the Examiner has applied the wrong standard of proof, by requiring Appellant to “prove that Abyzov necessarily has an oxygen content of greater than 0.1 mass%.” Reply Br. 14. However, the Examiner clearly finds that “Appellant has not provided evidence that the product of Abyzov does not necessarily or inherently possess the claimed less than 0.1 mass% oxygen.” Answer 8–9 (emphasis omitted). The evidence of record supports the Examiner’s finding under this correct articulation of the standard. *Best*, 562 F.2d at 1255. Thus, any of the Examiner’s other statements that might suggest a different standard are harmless error.

To rebut the Examiner’s inherency rationale, Appellant cites Table 1 of the Specification, which shows comparative examples, using “so[-]called **pure silver**” and a coating of Ti, Zr, or Hf, performed in a vacuum or non-oxidizing atmosphere, in which the oxygen content is greater than 0.1 mass%. Appeal Br. 9 (quoting Spec. 17, Table 1), 11–13. According to Appellant, this is “clear evidence of so-called ‘pure silver’ that contains oxygen, and therefore, the ‘pure silver’ disclosed by Abyzov does **not** necessarily mean ‘no oxygen silver’ as incorrectly assumed by the

Examiner.” *Id.* at 10; *see also id.* at 11–13 (arguing that the comparative examples in Table 1 were made under a non-oxidizing atmosphere using “pure silver”). Responding to the Examiner’s observation that the comparative examples in Table 1 use different carbide-forming materials than the working examples in Table 1, Appellant also cites Tables 2–4, which contain comparative examples using the same carbide-forming materials as the working examples. Reply Br. 9–13.

We do not find this evidence sufficient to rebut the Examiner’s inherency rationale. Appellant does not point to any disclosure in the Specification, or other evidence, as to the actual oxygen content of the “so-called pure silver” (Spec. 17) used in the examples. *See* Spec. 19 (stating that silver and silver alloys may be a source of oxygen, but not providing a concentration for the silver used in the examples). Thus, the evidence of record does not establish that the silver used in the comparative examples of Tables 1–4 is comparable in purity with the silver used in Abyzov, which could have an oxygen content from 0–0.1%. Abyzov ¶ 114 (“commercially pure silver (weight content of the basic substance—Cu or Ag—99.9% or above)”); *see also* Answer 8 (“Abyzov teaches commercially pure silver and silver alloys, including silver of 99.9% or greater purity . . .”).⁴ In addition, in the case of the comparative examples in Tables 2–4, the diamond particle

⁴ In the Reply Brief, Appellant argues that “one of ordinary skill in the art would understand that a composition ratio, such as 99.9% silver, indicates a ratio of solid components only,” and thus, would not include “adhering oxygen.” Reply Br. 7. This argument is not entitled to persuasive weight, because Appellant cites no supporting evidence. *See In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (“Attorney’s argument in a brief cannot take the place of evidence.”).

size is 0.1 μm , *id.*; Spec. 45–50, which is outside Abyzov’s particle size range of 50–1000 μm , *see* Abyzov ¶ 103. Thus, based on the evidence of record, the comparative examples in Tables 1–4 are insufficiently comparable to Abyzov’s composite material to show that its oxygen content can be greater than 0.1 mass% under Abyzov’s disclosure.

Appellant also argues that diamond raw materials are a potential source of oxygen. Appeal Br. 10–11 (citing Spec. 19 (“It is believed that sources of oxygen [that] can be included in diamond composite material 1 are a powder 20 of diamond of a raw material (see Fig. 4)”). Thus, Appellant argues that the Examiner incorrectly assumed “that the diamond raw material[s] of Abyzov are oxygen free.” *Id.* at 11.

We disagree. As the Examiner notes, “Abyzov teaches the use of high-quality synthetic diamond with low impurity content.” Answer 10 (citing Abyzov ¶ 103).⁵ Thus, the evidence suggests that the diamond powder used in Abyzov is at least as oxygen-free as the low-purity industrial diamond that, according to the Specification, one may successfully use to produce the claimed composite. *See* Spec. 25:1–8 (“[I]ndustrial diamond is relatively inexpensive and easily available although it is low in purity,” but the disclosed manufacturing process “can use even industrial diamond as a raw material”).

Appellant further argues that, unlike the inventors’ disclosure, “Abyzov does not provide any steps to reduce or remove oxygen present in

⁵ In the Reply Brief, Appellant argues that “[o]ne of ordinary skill in the art would . . . understand that ‘low impurity content’ of a synthetic diamond does not reflect adhering oxygen.” Reply Br. 13. This argument is not entitled to persuasive weight, because Appellant cites no supporting evidence. *See Pearson*, 494 F.2d at 1405.

the diamond.” Appeal Br. 13–14 (citing Spec. 10, 23). This argument is not persuasive of reversible error, because claim 1 recites a product, not the process for making it. The claim itself does not require a process that reduces oxygen in the diamond powder. Thus, any means for limiting the composite material’s oxygen content (such as selecting oxygen-free starting materials and making the material in an oxygen-free atmosphere) is permissible under the claims, so long as the final composite material has an oxygen content of 0.1 mass% or less.

Next, Appellant argues that Abyzov is not enabling. According to Appellant, “Abyzov merely provides a generic disclosure of an element of group 4 of the periodic table, but provides no working embodiments including an element of group 4.” Appeal Br. 15. Moreover, Appellant argues that Abyzov discloses an example including titanium (a group 4 element) that was inoperable. *Id.* at 15–16 (citing Abyzov ¶¶ 122, 128 (Examples 1 and 2 with a titanium carbide coating)); *see also id.* at 17 (“Abyzov provides no embodiments to show that Group IV elements such as titanium are suitable to form a carbide layer coating of a diamond composite material.”); Reply Br. 15–17 (arguing that Abyzov’s non-working example was inoperable even when the impregnation step occurred in a vacuum, and that the working examples only disclose tungsten carbide coatings).

Appellant’s arguments as to the generality of Abyzov’s disclosure of group 4 elements is not persuasive of reversible error. A prior art printed publication, such as Abyzov, “is presumptively enabling barring any showing to the contrary by a patent applicant.” *In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012). To rebut this presumption, the applicant

must show “that undue experimentation would be needed to practice the claimed invention.” *Id.* at 1292.

However, Appellant’s proposed evidence of inoperability is not commensurate with the broad scope of the claimed invention. As the Examiner notes, claim 1 encompasses other group 4 elements than just titanium. *See* Answer 12. Claim 1 also does not require any particular amount of the group 4 element, or that the group 4 element is the only element in the carbide layer. *See id.* at 14 (“[A] diamond particle whose carbide coating also includes tungsten is not excluded by the instant claims”).

Likewise, despite the inoperable titanium-based example, Abyzov explicitly discloses that the carbide layer may include any group 4 element, as well as combinations of group 4 elements and other elements. *See* Abyzov ¶ 37. Thus, we agree with the Examiner that Appellant’s reliance on the inoperability of Abyzov’s titanium-based embodiment “ignores all other teachings of Abyzov including broader, non-preferred and/or non-exemplified embodiments set forth therein.” Answer 15. Abyzov’s non-working example is also insufficient evidence of non-enablement because, as the Examiner points out, the example uses copper as the binder, rather than silver or a silver alloy as recited in claim 1. *See id.* at 14; Abyzov ¶¶ 120–122, 127, 128.

In sum, Appellant has not provided evidence sufficient to show that a person of ordinary skill in the art would have been unable, without undue experimentation, to make the broadly claimed composite material based on the disclosure of Abyzov and the general knowledge available in the field.

Finally, Appellant argues that “Abyzov provides no embodiments showing a coated diamond particle including a diamond particle and a carbide layer covering a surface of the diamond particle and including an element of group 4 of the periodic table, and silver or a silver alloy binding such coated diamond particles together.” Appeal Br. 17. This is not persuasive of reversible error. “[A] reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (second alteration in original) (quoting *In re Petering*, 301 F.2d 676, 681 (1962)). We agree with the Examiner that Abyzov’s disclosure of group 4–6 elements is a finite list, *see* Answer 14, and so is the short list of possible binders. Thus, a person of ordinary skill in the art would at once envisage the combination of the diamond particles with a carbide layer containing a group 4 element and a silver or silver alloy binder.

For the above reasons, and based on the Examiner’s findings and conclusions as a whole, which we find persuasive, the preponderance of the evidence supports the Examiner’s rejection, and Appellant has not shown reversible error. Therefore, we affirm the Examiner’s decision as to all claims.

CONCLUSION

In summary,

Claims Rejected	35 U.S.C. §	References	Affirmed	Reversed
1-10	102(a)(1)	Abyzov	1-10	

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended. *See* 37 C.F.R. §§ 1.136(a)(1)(iv), 41.50(f) (2018).

AFFIRMED