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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GERRIT SCHEICH, FRANK NUERNBERG,
ANDREAS GOETZENDORFER, NADINE TSCHOLITSCH,
BERNHARD FRANZ, URSULA KLETT, and MATTHEW DONELON¹

Appeal 2021-003495
Application 16/077,005
Technology Center 1700

Before GEORGE C. BEST, CHRISTOPHER C. KENNEDY, and
MERRELL C. CASHION, JR., *Administrative Patent Judges*.

KENNEDY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1–4, 6, 8, 13, 15–18, and 22–24. A hearing was held on January 11, 2022.² 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. The Appellant identifies the real party in interest as Heraeus Quartzglas GmbH & Co. KG, which is a division of Heraeus Holding GmbH. Appeal Br. 1.

² A transcript of the hearing will be entered into the record when available.

BACKGROUND

The subject matter on appeal relates to diffuser materials, which “are used as solid bodies or coatings in optical components for providing a uniform diffuse illumination.” *E.g.*, Spec. 1:14–15; Claim 1. Claim 1 is reproduced below from page 13 (Claims Appendix) of the Appeal Brief (paragraph breaks added) (key disputed limitation italicized):

1. A diffuser material of pore-containing quartz glass with a chemical purity of at least 99.9% SiO₂, a cristobalite content of not more than 1 %, and a density in the range of 2.0 to 2.18 g/cm³, whereby at least 80% of the pores have a maximum pore dimension of less than 20 μm, wherein the quartz glass is produced synthetically, has a hydroxyl group content in the range of more than 200 wt. ppm, and *contains hydrogen in a concentration in the range of 10¹⁷ molecules/cm³ to 10¹⁹ molecules/cm³.*

ANALYSIS

Claims 1–4, 6, 8, 13, 15–18, and 22–24 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Moritz (US 5,674,792, issued Oct. 7, 1997) and Ohama (US 7,074,731 B2, issued July 11, 2006). The dispositive issue on appeal is whether a person of ordinary skill in the art would have expected the quartz glass of Moritz as modified by Ohama to contain “hydrogen in a concentration in the range of 10¹⁷ molecules/cm³ to 10¹⁹ molecules/cm³,” as recited by claim 1.

In the Final Action, the Examiner finds that Moritz teaches a material that meets each limitation of claim 1 except that “Moritz does not teach the

hydrogen molecule concentration” of claim 1. Final Act. 3. The Examiner finds that Ohama teaches a similar synthetic quartz glass material used for the same purpose (forming crucibles) as Moritz’s material, and that the silica powder used to form Ohama’s crucible material has a hydrogen concentration that overlaps the hydrogen concentration range of claim 1. *Id.* at 3. The Examiner determines that a person of ordinary skill in the art would have been motivated to use Ohama’s silica starting material to form an inner layer of Moritz’s crucibles to reduce peeling and flaking of the crucible. *Id.*

In the Appeal Brief, the Appellant argues that, although Ohama’s starting material may possess a hydrogen concentration that falls within the scope of claim 1, “Ohama does not teach that the final product (e.g., the crucible) contains any hydrogen, especially not [a concentration that falls within the scope of claim 1].” Appeal Br. 9. The Appellant argues that Ohama’s sintering process would have been expected to reduce or remove any hydrogen from Ohama’s final product. *Id.* at 8–9. The Appellant also notes that, in contrast to Ohama, the Appellant’s Specification discloses hydrogen doping *after* sintering, because “[o]nly then can it be guaranteed that no significant share of the doped hydrogen concentration diffuses out of the material.” *Id.* at 9–10.

In the Answer, the Examiner does not dispute that the Examiner is relying on the hydrogen concentration of a pre-sintering starting material (as opposed to a final crucible product) in Ohama. Instead, the Examiner asserts that the hydrogen concentration of the final crucible product would be expected to be the same as that in the starting material because “[n]o evidence is given” to the contrary and “Ohama provides no teaching or

suggestion that the hydrogen is removed from the powder prior to or during formation of the inventive quartz material.” Ans. 8, 10.

In the Reply Brief, the Appellant provides a persuasive technical explanation, with citations to Ohama, as to why a person of ordinary skill in the art would have expected Ohama’s hydrogen concentration to be reduced in Ohama’s final product relative to Ohama’s starting materials. Reply Br. 3. In particular, the Appellant cites a portion of Ohama that describes how the hydrogen in Ohama’s silica powder starting material “react[s] with free oxygen to form OH groups, and the OH groups are fixed in the glass to suppress pore expansion from occurring.” Ohama at 3:33–37. The Appellant argues that it is “these very properties of hydrogen content decreasing during high heat treatment (e.g., sintering) [that] necessitate[s] a separate step of hydrogen loading that follows sintering,” as disclosed by the Appellant’s Specification. Reply Br. 4.

As is evident from the foregoing description of the positions of the Appellant and the Examiner, the Examiner’s position hinges on the Examiner’s finding that a person of ordinary skill in the art would not have expected Ohama’s final product to have a reduced hydrogen concentration relative to Ohama’s starting materials. Ans. 8, 10. For reasons explained by the Appellant, Appeal Br. 8–10; Reply Br. 3–4, that finding is not supported by the record. In particular, we agree with the Appellant that Ohama discloses that the hydrogen in Ohama’s starting material reacts with oxygen in a way that would consume Ohama’s hydrogen, such that Ohama’s final quartz glass product would not have the same hydrogen concentration as its silica powder starting material. *See* Ohama at 3:33–45. The record contradicts the Examiner’s finding that the record “does not persuasively

show that the hydrogen content in the Ohama formed quartz material would be anything other than the concentration in the starting powder.” Ans. 10. The Examiner did not address the portions of Ohama relied on by the Appellant or otherwise attempt to explain how those portions of Ohama are consistent with the Examiner’s rationale.³

Accordingly, on this record, we are constrained to reverse the Examiner’s rejection of claim 1. Because all other claims on appeal include, either directly or through claim dependency, the same hydrogen concentration range recited by claim 1, we likewise reverse the Examiner’s rejection of claims 2–4, 6, 8, 13, 15–18, and 22–24.

³ We recognize that Ohama teaches a broad range for the hydrogen concentration in its starting material, i.e., 1×10^{17} to 5×10^{19} molecules/cm³. Ohama at 3:17. As is evident from that disclosure, the upper end of Ohama’s range is two orders of magnitude greater than the lower end of Ohama’s range. *Id.* This indicates that, if Ohama’s starting material possessed a hydrogen concentration at the upper end of its range (10^{19}), the amount of hydrogen in its final quartz glass product would have to decrease by 99% or more relative to the starting material to fall beyond the scope of claim 1. Although we acknowledge that the decrease required for Ohama’s hydrogen concentration to fall beyond the scope of claim 1 is significant, as noted above, the Examiner erroneously finds that Ohama does not evidence that *any* decrease in hydrogen concentration would occur; consequently, the Examiner makes no findings as to the expected magnitude of the decrease of hydrogen concentration. Therefore, the record does not provide a basis to reject the Appellant’s contention that “Ohama does not teach that the final product (e.g., the crucible) contains any hydrogen, especially not [a concentration that falls within the scope of claim 1].” Appeal Br. 9.

CONCLUSION

In summary:

| Claims Rejected | 35 U.S.C. § | References | Affirmed | Reversed |
|-----------------------------|--------------------|-------------------|-----------------|-----------------------------|
| 1-4, 6, 8, 13, 15-18, 22-24 | 103 | Moritz, Ohama | | 1-4, 6, 8, 13, 15-18, 22-24 |

REVERSED