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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte PIYAMANEE KOMOLWIT, QINGJUN ZHENG, and
JIM FAUST¹

Appeal 2015-006861
Application 13/594,262
Technology Center 1700

Before MICHAEL P. COLAIANNI, CHRISTOPHER C. KENNEDY, and
MONTÉ T. SQUIRE, *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 to reject claims 15, 18–21, and 44–52. We have jurisdiction under 35 U.S.C. § 6(b). We AFFIRM.

BACKGROUND

The subject matter on appeal relates to claddings having improved corrosion resistance, and associated manufacturing methods. *E.g.*, Spec. 1:3–4; Claim 15. Claim 15 is reproduced below from page 11 (Claims

¹ According to the Appellants, the real party in interest is Kennametal, Inc. App. Br. 3.

Appendix) of the Appeal Brief (some paragraph breaks and indentations added):

15. A composite article comprising:
 - a metal or alloy substrate; and
 - a cladding adhered to the substrate, the cladding comprising
 - a hard particle component and
 - an alloying additive comprising copper and molybdenum dispersed in a nickel-based alloy matrix,
 - wherein the copper is present in an amount ranging from 3.4 to 15 weight percent of the cladding, and
 - the molybdenum is present in an amount of 0.1 to 1.7 weight percent of the cladding,

wherein the cladding demonstrates a corrosion rate of less than 140 mils per year in boiling 1 weight percent hydrochloric acid determined according to ASTM G31-72(2004).

REJECTIONS ON APPEAL

1. Claims 15, 18–21, and 44–49 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Knauf (US 2010/0112374 A1, published May 6, 2010) in view of Grebe et al. (US 2,146,732, issued Feb. 14, 1939).
2. Claim 50 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Knauf in view of Grebe, further in view of Overstreet (US 2009/0065260 A1, published Mar. 12, 2009).
3. Claims 50–52 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Knauf in view of Grebe, further in view of Scott et al. (US 4,726,432, issued Feb. 23, 1988).
4. Claims 15, 19–21, 44, 45, 47–49, 51, and 52 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Smiley et al. (US 3,149,411, issued Sept. 22, 1964) in view of Grebe.

ANALYSIS

The Appellants present separate arguments concerning only Rejections 1 and 4. For both rejections, the Appellants argue limitations appearing in claims 15, 44, and 45. We limit our discussion to those claims. Claims 18–21 and 48–52 depend, directly or indirectly, from claim 15 and will stand or fall with claim 15. Claims 46 and 47 depend from claim 45 and will stand or fall with claim 45.

After review of the cited evidence in the appeal record and the opposing positions of the Appellants and the Examiner, we determine that the Appellants have not identified reversible error in the Examiner’s rejections. Accordingly, we affirm the rejections for reasons set forth below, in the Final Action, and in the Examiner’s Answer. *See generally* Final Act. 2–10; Ans. 2–19.

I. Rejection 1

A. Claim 15

The Examiner finds, *inter alia*, that Knauf teaches a composite article comprising each element of claim 15, including the use of copper and molybdenum in the cladding, but that (1) “Knauf does not teach a specific example of a cladding comprising *both* copper and molybdenum” (emphasis added), and (2) “Knauf does not disclose the cladding’s performance” in the ATSM G31-72(2004) corrosion resistance test. *See* Ans. 2–3. However, the Examiner concludes that it would have been obvious to include both copper and molybdenum in a cladding because Knauf expressly teaches the individual inclusion of copper and molybdenum in a cladding. *Id.* at 3. The Examiner determines that, because Knauf teaches or otherwise renders

obvious claddings that are the same as those recited by claim 15, “the cladding of Knauf is expected to possess substantially similar properties to that of the instant claims, including having a sufficiently similar corrosion resistance in hydrochloric acid.” *Id.* at 4.

The Appellants first argue that “Knauf fails to provide a single example of a matrix alloy having copper combined with molybdenum.” App. Br. 4.

That argument is not persuasive. Knauf teaches claddings having two “components.” *See* Knauf at Abstract. The first component is a metal “matrix,” and the second component is “a hard phase embedded in the matrix.” *Id.* Knauf teaches that the first component may be a nickel-based matrix. *Id.* at Abstract, ¶¶ 5, 17. Knauf teaches that “iron and/or copper” may be part of the matrix. *E.g., id.* ¶ 17. Knauf further teaches that molybdenum may “alternatively or additionally” be added to the first component; i.e., to the nickel-based matrix comprising iron and/or copper. *Id.* ¶ 26. In view of those teachings, a cladding comprising both copper and molybdenum would have been obvious to a person of ordinary skill in the art. The Appellants’ argument that Knauf does not explicitly teach an embodiment including both copper and molybdenum is not indicative of reversible error in the Examiner’s obviousness rejection. *Cf. In re Mills*, 470 F.2d 649, 651 (CCPA 1972) (“[A] reference is not limited to the disclosure of specific working examples.”).

The Appellants also argue that Knauf “fails to disclose a cladding corrosion rate of less than 140 mils per year in boiling 1 weight percent hydrochloric acid determined according to ASTM G31-72(2004). Knauf,

therefore, cannot possibly be held to teach a cladding having the presently claimed HCl corrosion resistance” App. Br. 4.

That argument is not persuasive. Knauf discloses that its metal matrix “is characterized by a good corrosion resistance.” Knauf ¶ 17. It is not necessary for Knauf to expressly discuss the corrosion resistance test recited by claim 15 in order to render claim 15 obvious. *See 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.”); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007) (“[T]he [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”). Here, the Examiner reasonably determines that Knauf teaches or otherwise renders obvious articles comprising claddings that fall within the scope of claim 15. The Examiner’s determination that Knauf’s claddings would have possessed the same properties as the claddings of claim 15, including corrosion resistance, is likewise reasonable. *See Best*, 562 F.2d at 1255. The Appellants fail to provide persuasive evidence or technical reasoning sufficient to show that Knauf’s claddings would not possess the corrosion resistance recited by claim 15.

The Appellants also argue that a reference not relied upon by the Examiner, the ASM Handbook,² “makes clear that desirable HCl corrosion resistance is imparted by high molybdenum content and the absence of oxidizing species such as copper.” App. Br. 4 (citing the ASM Handbook, which the Appellants “provided in the Information Disclosure Statement filed December 2, 2014,” *see* App. Br. 4 n.3). The Appellants argue that “the presently claimed cladding does the exact opposite by employing high copper content and marginal molybdenum content.” App. Br. 4. They argue that the Examiner’s rationale “requires one of skill in the art to ignore and violate widely accepted ASM Handbook teachings,” and that the Examiner “fail[s] to advance any rationale” for why a person of ordinary skill in the art would have “intentionally disregarded” the teachings of the ASM Handbook. *Id.* at 4–5.

That argument is not persuasive. Even assuming the Appellants’ characterization of the ASM Handbook to be accurate, the motivation for making a cladding with the copper and molybdenum contents recited by claim 15 comes directly from Knauf. The Examiner finds, and the Appellants do not dispute, that Knauf teaches claddings having 6 to 28 weight percent copper and 0 to 8.5 weight percent molybdenum. *See* Ans. 3. Those amounts of copper and molybdenum overlap the claimed ranges. As the Appellants recognize, Knauf also teaches claddings comprising both iron and molybdenum. *See* App. Br. 3–4. Thus, notwithstanding the ASM Handbook’s suggestion that the presence of oxidizing ions such as Fe³⁺ or Cu²⁺ increases corrosion of a nickel-molybdenum alloy, Knauf—which was

² Paul Crook, *Corrosion of Nickel and Nickel-Base Alloys*, 13B ASM Handbook 228 (S.D. Cramer et al. eds., 2005).

filed several years after the ASM Handbook was published—expressly teaches nickel-molybdenum alloys that include iron and/or copper, and it nevertheless teaches that its composition “is characterized by a good corrosion resistance.” *See* Knauf ¶ 17.

Moreover, the portions of the ASM Handbook focused on by the Appellants appear principally to concern corrosion. *See* App. Br. 4. Knauf is concerned both with wear resistance and with corrosion resistance. *See, e.g.,* Knauf ¶¶ 5, 17. On this record, we are not persuaded that the ASM Handbook would have discouraged a person of ordinary skill in the art from pursuing the claddings of Knauf, where Knauf expressly suggests claddings having both copper and molybdenum, and where the Appellants do not dispute that Knauf teaches amounts of copper and molybdenum that overlap the ranges of claim 15.

Concerning the Examiner’s reliance on Grebe, the Appellants argue that “Grebe obviates any requirement for [a] corrosion resistant alloy in well drilling applications by employing a corrosion inhibitor in the acid solution.” *See* App. Br. 5. We are not persuaded by that argument. The Appellants fail to argue that a person of ordinary skill in the art would have understood Grebe’s method of reducing corrosion to be mutually exclusive with Knauf’s. The mere disclosure of an additional means by which corrosion could be reduced would not have discouraged a person of ordinary skill from pursuing the corrosion-resistant claddings of Knauf. *Cf. In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from any of the[] [disclosed] alternatives . . .”).

We have carefully considered the Appellants' arguments but are not persuaded of reversible error in the Examiner's rejection. We affirm the Examiner's rejection of claim 15.

B. Claim 44

Claim 44 depends from claim 15 and further recites "wherein the cladding demonstrates an erosion rate of less than 0.04 mm³/g according to ASTM G76-07 using a particle impingement angle of 90 degrees and a duration of 45 minutes."

The Examiner recognizes that Knauf does not expressly discuss the erosion rate test recited by claim 44. *See* Ans. 5. However, the Examiner finds that Knauf "explicitly teaches that the cladding is intended to be wear-resistant," and that, "as the cladding of Knauf comprises substantially the same composition as that of the instant claims, the cladding of Knauf is expected to possess substantially similar properties to that of the instant claims, including hav[ing] a sufficiently similar erosion resistance." *Id.*

The Appellants argue that "[t]he claddings of Knauf are deposited by fundamentally different techniques than the presently claimed claddings," and, therefore, that "there is no reason to expect the claddings of Knauf to exhibit the claimed erosion rate." App. Br. 6.

We are not persuaded by that argument. As discussed above, a preponderance of the evidence supports the Examiner's determination that Knauf teaches or suggests claddings that fall within the scope of claim 15. Knauf expressly teaches that those claddings are wear (i.e., erosion) resistant. Knauf ¶ 5. Thus, the Examiner reasonably concludes that a person of ordinary skill in the art would have expected Knauf's claddings to possess an erosion resistance that falls within the scope of claim 44. *See Best*, 562

F.2d at 1255. The Appellants' argument that Knauf's claddings are deposited by a different technique than that disclosed by the Appellants' Specification fails to provide any explanation as to why a person of ordinary skill in the art would have expected Knauf's technique to cause the erosion resistance of its cladding to fall beyond the scope of claim 44. The claims do not appear to limit application of the cladding to any particular technique, and the Appellants do not identify any teaching in the Specification suggesting that Knauf's technique would be undesirable. On this record, a preponderance of the evidence supports the Examiner's determination that a person of ordinary skill in the art would have expected claddings rendered obvious by Knauf to possess erosion rates that fall within the scope of claim 44. *See id.*

C. Claim 45

Claim 45 depends from claim 15 and further recites "wherein the hard particle component comprises cemented tungsten carbide particles."

The Examiner finds that Knauf teaches the use of cemented tungsten carbide particles in the hard phase component of its composition. *See* Ans. 4. The Appellants do not dispute the Examiner's findings on that point. *See* App. Br. 6. Instead, they argue that neither Knauf nor Grebe "provide[s] any teaching of a cladding employing cemented carbide particles, the cladding being resistant to corrosion in boiling 1 weight percent HCl." App. Br. 6. They argue that a reference not relied on by the Examiner, the ASM Specialty Handbook, teaches that "cemented carbides exhibit poor to no corrosion resistance in strong acids," and that a person of ordinary skill in the art, therefore, would not have been motivated to use cemented carbides. *Id.* at 6–7.

That argument is not persuasive. As noted above, the Appellants do not meaningfully dispute the Examiner's finding that Knauf teaches the use of cemented carbide particles. Knauf does not teach the use of those particles in isolation, but as one component of a composition that is taught to exhibit corrosion resistance. *See* Knauf ¶ 17. Even assuming the Appellants' characterization of the ASM Specialty Handbook to be accurate, the Appellants' argument provides no basis to find that a person of ordinary skill in the art would have been discouraged from using cemented carbide particles in the context of Knauf, which plainly teaches that its compositions are corrosion resistant notwithstanding inclusion of cemented carbide particles. *See id.* The Appellants' argument that cemented carbides in isolation may exhibit poor corrosion resistance is not persuasive of reversible error in view of the prior art as a whole. We affirm the Examiner's rejection of claim 45.

II. Rejection 4

Rejection 4 is similar to Rejection 1, except that the Examiner relies on Smiley instead of Knauf. The Examiner finds that Smiley teaches "nickel-based matrices for [] cladding comprising 0 to 26.25 wt. % copper and 0 to 6 wt. % molybdenum." Ans. 7. Similar to Rejection 1, the Examiner finds that Smiley does not disclose the corrosion resistance or erosion resistance of its claddings, but that Smiley's claddings would be expected to possess the claimed properties because "Smiley comprises substantially the same composition as that of the instant claims." *Id.* at 8, 9.

The Appellants' arguments concerning Rejection 4 are largely the same as their arguments concerning Rejection 1, discussed above. We are not persuaded by those arguments for reasons discussed above.

Concerning claim 15, the Appellants also argue that “Smiley fails to provide a single example of nickel-based alloy employing copper and molybdenum in the presently claimed ranges. . . . [N]one of [Smiley’s] specific examples overlap with the presently claimed ranges of Cu and Mo.” App. Br. 8.

That argument is not responsive to the Examiner’s rejection. The Examiner does not assert that Smiley teaches any specific embodiment that falls within the scope of claim 15. The Examiner finds that, because Smiley teaches (1) nickel alloys that comprise both copper and molybdenum, *see, e.g.*, Smiley at 3:33–35 (alloy (i)), and (2) teaches “amounts of copper and molybdenum . . . [that] are expected to overlap the claimed ranges,” that the cladding of claim 15 would have been obvious to a person of ordinary skill in the art. *Ans. 7; see also In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) (“A prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art.”). The Appellants’ argument does not meaningfully address that rationale or otherwise provide a basis to reject it. *See KSR*, 550 U.S. at 418–19 (“[T]he [obviousness] analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”); *cf. Mills*, 470 F.2d at 651 (“[A] reference is not limited to the disclosure of specific working examples.”). We affirm the Examiner’s rejection of claim 15.

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CONCLUSION

We AFFIRM the Examiner's rejections of claims 15, 18–21, and 44–52.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED