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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KEVIN PAUL TRUMBLE[1]

Appeal 2016-008557
Application 13/441,611
Technology Center 1700

Before KAREN M. HASTINGS, GEORGE C. BEST, and WESLEY B. DERRICK, *Administrative Patent Judges*.

DERRICK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134 from the Examiner's maintained rejection of claims 1, 3–5, 14, 16, and 18–22 under 35 U.S.C. § 103 over Schievenbusch[2] in view of Ueda[3] as evidenced by Applicant admitted prior art ("AAPA").[4] We have jurisdiction under 35 U.S.C. § 6.

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[1] The real party in interest is Purdue Research Foundation. Appeal Br. 3.
[2] Schievenbusch et al., *Directional Solidification of Near-azeotropic CuMn-alloys: a Model System for the Investigation of Morphology and Segregation Phenomena*, ISIJ Int'l 35 (1995), 619–23.
[3] Ueda et al., US patent 4,402,906, issued September 6, 1983.
[4] Claims 6–9 and 11–13 stand withdrawn from examination. Non-Final Office Action mailed August 27, 2015 ("Non-Final Act."), 1.

CLAIMED SUBJECT MATTER

The subject matter on appeal is directed to cast products or articles formed from a copper-manganese alloy in which manganese comprises at least 32 weight percent and no more than 40 weight percent of the combined total amount of copper and manganese and which have a cast microstructure free of dendritic growth and multidirectional columnar grains. Claims 1, 14 (the independent claims on appeal).

Independent claim 14 is representative.

> 14. An article cast by solidifying a copper-manganese alloy consisting of copper and manganese and having an amount of manganese that is at least 32 weight percent and not more than 40 weight percent of a combined total amount of the copper and manganese in the copper manganese alloy, the article being formed by multidirectional solidification and having a cast microstructure free of dendritic growth and microporosity attributable thereto, and having multidirectional columnar grains.

Appeal Br. (Claims Appendix) 31.

We decide the appeal as to all appealed claims on the basis of claim 14, which we find representative. 37 C.F.R. § 41.37(c)(1)(iv) (2012).

DISCUSSION[5]

Upon consideration of the evidence on this record and each of Appellant's contentions, we find that a preponderance of the evidence supports the Examiner's determination that one of ordinary skill in the art,

[5] We refer to the Non-Final Office Action mailed August 27, 2015, the Appeal Brief filed January 20, 2016, the Examiner's Answer mailed July 15, 2016, and the Reply Brief filed September 15, 2016.

armed with the knowledge provided in the applied prior art, would have been led to the subject matter recited in claims 1–14 and 20–35.

"[T]he Examiner bears the initial burden, on review of the prior art or on any other ground, of presenting a *prima facie* case of unpatentability." *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992).

To prevail in an appeal to this Board, Appellant must adequately explain or identify reversible error in the Examiner's rejection. *See* 37 C.F.R. § 41.37(c)(1)(iv); *see also In re Jung*, 637 F.3d 1356, 1365–66 (Fed. Cir. 2011) (explaining that even if the Examiner had failed to make a prima facie case, it has long been the Board's practice to require an Appellant to identify the alleged error in the examiner's rejection); *In re Chapman*, 595 F.3d 1330, 1338 (Fed. Cir. 2010) ("[T]he burden of showing that the error is harmful normally falls upon the party attacking the agency's determination." (quoting *Shinseki v. Sanders*, 556 U.S. 396, 409 (2009))).

The Examiner relies on Schievenbusch for its disclosure of a cast copper-manganese binary alloy with a manganese component of ±5 wt% of the azeotropic (i.e. congruent melting point) concentration of 32.75 wt%. Non-Final Act. 3 (citing Schievenbusch sec. 2, p. 618, sec. 32, p. 621). As noted by the Examiner, depending on the Mn content and rate of solidification of the alloy, cellular rather than dendritic microstructure can be obtained. Non-Final Act. 3 (citing Schievenbusch sec. 2, p. 619; Fig. 7, p. 621).

The Examiner relies on Ueda for its disclosure of a Cu-Mn cast product made by conventional casting in a metal mold. Non-Final Act. 3 (citing Ueda col. 4, ll. 25–32).

Citing to AAPA, the Examiner maintains, and Appellant does not contest, that conventional casting provides multidirectional solidification resulting in microstructure comprising multidirectional columnar grains. Non-Final Act. 34 (citing Applicant arguments, filed April 1, 2015, pp. 16–18, Exhibits A–D).

The Examiner concludes that it would have been obvious to use a known Cu-Mn alloy composition taught by Schievenbusch in a conventional casting method as taught by Ueda with the predictable result of obtaining a cast alloy product formed by multidirectional solidification and exhibiting a microstructure with multidirectional columnar grains. The Examiner reasons that one of ordinary skill would have been motivated to use the conventional technique of casting—rather than the unidirectional solidification in Bridgman-type gradient furnace, as in Schievenbusch—to obtain a cast product more cheaply and efficiently. Non-Final Act. 4.

Further, the Examiner concludes that "a cast alloy product with substantially the same composition and made by substantially the same method as instantly disclosed in the specification, would be expected to necessarily possess the same properties, including those claimed." Non-Final Act. 4.

Appellant argues the claims together on the basis of limitations common to independent claims 1 and 14. *Generally* Appeal Br.; Reply Br.

Appellant's arguments are grounded on directional solidification and conventional casting techniques differing in the velocity at which the alloy solidifies and in the temperature gradient of liquid alloy undergoing solidification and that these differences would have been expected to result in different microstructure. Appeal Br. 12–25. Appellant maintains that

"[t]he growth velocity in conventional casting is typically much higher than in the directional solidification techniques and decreases somewhat during casting, and in conventional casting the temperature gradient in the liquid starts high and decreases by orders of magnitude from the beginning to the end of solidification of the casting." Appeal Br. 16. Appellant maintains that the cited phase change diagram (Exhibit C) suggests dendritic growth would result when casting at the relatively high solidification velocities associated with multidirectional solidification that occurs during conventional casting. Appeal Br. 13–17.

Appellant explains that in Schievenbusch, "[t]he castings formed at low solidification rates generally showed planar and/or cellular microstructures" (Appeal Br. 18), but that "Schievenbusch appears to disclose that as solidification rate (velocity) increases, it becomes more and more likely that dendritic growth will occur" (Appeal Br. 21).

As to Ueda, Appellant maintains that "Ueda does not disclose anything that contradicts the classic schematic diagram of Exhibit C, namely, that dendritic growth occurs when casting at high growth velocities and uncontrolled temperature gradients associated with multidirectional solidification." Appeal Br. 20.

Appellant contends that "it is clear that Schievenbusch obtained [cellular morphology] under conditions intrinsically not possible to achieve in conventional casting." Appeal Br. 22. Appellant further argues "that it would not have been obvious to further increase the solidification velocity of the alloy by more than an order of magnitude beyond what was already reported as producing dendritic growth if cellular or planar microstructures were desired." Appeal Br. 23–24.

Appellant contends that he "solidified Cu-Mn alloys by conventional multidirectional casting and therefore at velocities significantly faster than those reported in Schievenbusch as producing dendritic growth; however, the microstructure of Appellant's solidified alloys were free of dendritic growth." Appeal Br. 24. Appellant points to "micrographs [Spec. Figs. 4 and 5] representing an alloy formed in accordance with Appellant's claimed invention (under 'typical' casting conditions per Appellant's paragraph [0021])." Appeal Br. 15 n.2.

On this record, we do not find Appellant's arguments persuasive of harmful, reversible error. As highlighted by the Examiner, "[n]either the claims, nor the specification, provide any limitation or disclosure relating to the temperature gradient, growth velocity, or solidification rate." Ans. 4. There is, accordingly, no evidence that the solidified alloy depicted in Figures 4 and 5 of the Specification was solidified at velocities faster than that which led to solidified alloys free of dendritic growth in Schievenbusch. *In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) ("Attorney's argument . . . cannot take the place of evidence.").

We similarly are directed to no persuasive argument or evidence that "conventional casting" techniques do not encompass or allow for control of solidification velocity and/or maintaining low temperature gradients such that conditions similar to those in Schievenbusch could not have been provided by the skilled artisan. *Generally* Appeal Br.; Reply Br. Rather, Appellant relies on a Figure (Exhibit C) from "Fundamentals of Solidification by Kurz and Fisher," 4th ed. (1998)" and maintains that it "represents the conventional wisdom at the time of the invention" without sufficiently explaining how that schematic representation would have led

one of ordinary skill away from the claimed subject matter where what it depicts is only argued to be what is *typically* the case in conventional casting. Appeal Br. 16. An obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for [an Examiner] can take account of the inferences and creative steps that a person of ordinary skill in the art would employ" in overcoming difficulties (*KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007)) and Appellant fails to direct us to any persuasive evidence that overcoming any difficulty raised would not have been well within the ambit of the person of ordinary skill in the art (*generally* Appeal Br.; Reply Br.). As to Appellant's assertion that the conditions used by Schievenbusch are "intrinsically not possible to achieve in conventional casting" (Appeal Br. 22), we find it unsupported by any persuasive evidence—except as to the solidification being multidirectional rather than unidirectional—for the reasons set forth above. Appellant fails, further, to provide any persuasive argument or evidence that that difference, that solidification is multidirectional rather than unidirectional, would have been expected to result in any difference as to dendritic growth. *Generally* Appeal Br.; Reply Br.

For these reasons, on this record, we are not persuaded that the Examiner erred in concluding that one of ordinary skill in the art at the time of the invention, armed with the knowledge of the cited prior art, would have been led to the claimed subject matter.

Accordingly, we sustain the Examiner's obviousness rejection.

CONCLUSION

We affirm the Examiner's obviousness rejection of claims 1, 3–5, 14, 16, and 18–22.

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

AFFIRMED