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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte TSUYOSHI MATSUMOTO and KAZUMASA KAITOKU

Appeal 2019-005750
Application 14/763,651
Technology Center 3700

Before JENNIFER D. BAHR, MICHAEL J. FITZPATRICK, and
WILLIAM A. CAPP, *Administrative Patent Judges*.

CAPP, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellant¹ seeks our review under 35 U.S.C. § 134(a) of the final rejection of claims 8, 9, 11, 16, and 17. We have jurisdiction under 35 U.S.C. § 6(b).²

We AFFIRM.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42(a). Appellant identifies Kobe Steel, Ltd. as the Applicant and real party in interest. Appeal Br. 2.

² This case came before the Board for regularly scheduled telephonic oral hearing on August 18, 2020.

THE INVENTION

Appellant's invention relates to welding. Spec. ¶ 1. Claim 8, reproduced below with paragraph indentation added, is illustrative of the subject matter on appeal.

8. A method for producing a material welded structure comprising an aluminum material or an aluminum alloy material and a steel material, the method comprising:

applying a flux so that an applied amount of the flux to at least one of the aluminum material or the aluminum alloy material and the steel material is 0.5 mg/cm³ to 10 mg/cm³;

forming a joint part with the aluminum material or the aluminum alloy material and the steel material; and

laser welding the aluminum material or the aluminum alloy material and the steel material, while feeding a flux cored wire to the joint part, the flux cored wire comprising a sheath and a flux, wherein

the sheath comprises an aluminum alloy comprising at least 1.0% by mass to 3.0% by mass of Si and 0.05% by mass to 0.25% by mass of Ti with a remainder being aluminum and inevitable impurities, and

the flux comprises 20% by mass to 60% by mass of cesium fluoride with the remainder substantially made of potassium aluminum fluoride-based flux.

THE REJECTIONS

The Examiner relies upon the following as evidence in support of the rejections:

NAME	REFERENCE	DATE
Tanaka	US 5,906,897	May 25, 1999
Keegan	US 2003/0098296 A1	May 29, 2003
Katoh	US 2009/0017328 A1	Jan. 15, 2009
Matsumoto	US 2012/0125900 A1	May 24, 2012

The following rejections are before us for review:

1. Claims 8, 11, and 17 are rejected under 35 U.S.C. § 103 as being unpatentable over Matsumoto, Keegan, and Tanaka.³
2. Claims 9 and 16 are rejected under 35 U.S.C. § 103 as being unpatentable over Katoh, Keegan, and Tanaka.

OPINION

Unpatentability of Claims 8, 11, and 17 over Matsumoto, Keegan, and Tanaka

Appellant argues claims 8, 11, and 17 as a group. Appeal Br. 8–16. We select claim 8 as representative. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Matsumoto discloses the invention substantially as claimed except for the specific material composition of the sheath of the flux core weld wire, for which the Examiner relies on Keegan and Tanaka. Final Act. 2–3. The Examiner concludes that it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Matsumoto’s aluminum alloy sheath with the claimed aluminum alloy. *Id.* at 3. According to the Examiner, a person of ordinary skill in the art would have done this to provide a high quality weld. *Id.*

Appellant first argues that Keegan deals with welding aluminum, not welding dissimilar materials such as aluminum and steel and, thus, is not “germane” to modifying Matsumoto. Appeal Br. 8. Appellant argues that the Examiner relies on a faulty underlying rationale that all flux compositions are interchangeable without regard to the substrate being

³ Matsumoto is the United States published patent application that is the U.S. equivalent to Matsumoto (JP 2011-045926 A1, pub. Mar. 10, 2011).

welded. *Id.* at 9. Appellant further argues that Tanaka deals with brazing, not welding, which constitutes non-analogous art. *Id.* 12.

In response, the Examiner notes that Appellant's arguments regarding Keegan are directed to the composition of the flux material whereas the Examiner relies on Keegan for the composition of the sheath material. Ans. 6–7.

In reply, Appellant repeats the argument that Keegan uses a flux material for welding aluminum-to-aluminum. Reply Br. 2. Appellant also argues that brazing, as taught by Tanaka, is “very” different from welding. *Id.* at 3.

Matsumoto discloses a flux-cored wire for welding different materials such as welding aluminum to steel. Matsumoto Abstract. Thus, it is known in the prior art to weld aluminum to steel. Matsumoto also discloses that it was known in the prior art to weld aluminum to steel using a flux-cored wire where the composition of the flux material contains cesium fluoride in the range of 20 – 60 % by mass together with what Matsumoto refers to as “potassium aluminum fluoride-based compounds.” *Id.* ¶¶ 33–35.

Matsumoto also shows that it was known, in the prior art, to use a flux-cored weld wire with a sheath that is comprised of an aluminum alloy that included a concentration of silicon that falls within the claimed range. *Id.*⁴

The issue in the case, therefore, revolves around the constituent elements of the particular aluminum alloy used in the sheath and the relative concentrations thereof and, more particularly, whether it would have been

⁴ There is an overlap in inventorship between Matsumoto and the Application on Appeal. Tsuyoshi Matsumoto is a named co-inventor of the Matsumoto prior art reference and is also a named co-inventor of the Application on Appeal.

obvious to add from 0.05 to 0.25 % titanium to the known aluminum alloy of Matsumoto, which already contains an amount of silicon that falls within the claimed range. The relative concentrations, by mass, of the constituent elements of Matsumoto's sheath, Keegan's sheath, Tanaka's sheath, and the sheath of claim 8 are summarized in the following table:

Element	Claim 8	Matsumoto	Keegan	Tanaka
Si	1.0 – 3.0 %	0.8 – 1.9 %	0 – 15 %	0.05 – 14 %
Ti	.05 – .25 %		0 – 10 %	0.05 – 1.5 %
Mn		≤ 0.1 %	0 – 1.5 %	
Mg		≤ 0.1 %	0 – 5.5 %	
Fe		≤ 0.1 %		

Claims App.; Matsumoto Abstract; Keegan ¶¶ 16–17; Tanaka, col. 10, l. 65, col. 12, l. 3.

Thus, Keegan discloses an aluminum metal-core weld wire that features an aluminum alloy sheath with concentrations of silicon and titanium that fall within the claimed range. Claims App., Keegan ¶¶ 16–17. Appellant's argument that Keegan should be understood as restricted to welding aluminum-to-aluminum appears, in large part, to be predicated on the unfounded assumption that the rejection uses Keegan's flux core composition in addition to Keegan's alloy sheath. *See* Appeal Br. 9. However, Matsumoto already teaches the claimed flux-core composition. Matsumoto, Abstract. Appellant provides no persuasive technical discussion regarding a flux-core weld wire that combines: (1) Keegan's sheath; with (2) Matsumoto's flux-core. *See generally* Appeal Br. In particular, Appellant fails to address, much less address persuasively, why a person of ordinary skill in the art would not have had a reasonable expectation of success in combining the prior art in the manner proposed by the rejection.

The obviousness inquiry requires a determination whether a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and whether the skilled artisan would have had a reasonable expectation of success in doing so. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1360 (Fed. Cir. 2012). “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention.” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). In other words, “one must have a motivation to combine accompanied by a reasonable expectation of achieving what is claimed in the patent-at-issue.” *Id.* “For obviousness under § 103, all that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 904 (Fed. Cir. 1988); *see also Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007) (“the expectation of success need only be reasonable, not absolute”).

Here, Keegan teaches a sheath that is known to be effective in welding aluminum-to-aluminum. Matsumoto, in turn, teaches a flux core composition that may be used to weld aluminum-to-steel. Given that the number of aluminum alloy compositions disclosed in the art of record is a finite number of compositions, it is reasonable that a person of ordinary skill in the art would have been motivated to at least try Keegan’s alloy. Even if we augment the universe of aluminum alloy compositions by those that appear in weld-wire industrial catalogs and published commercial standards such as ASTM, we would still be talking about a finite number of sheath alloy compositions. This prospect implicates the “obvious to try” considerations discussed in *KSR*. *See KSR*, 550 U.S. at 420 (explaining that

trying a finite number of identified, predictable solutions might show that success is likely the product of mere ordinary skill and common sense). Given that the law merely requires that the expectation of success to be reasonable, not absolute, Appellant presents neither evidence nor persuasive technical reasoning as to why a person of ordinary skill in the art would not have had a reasonable expectation of success that Keegan's sheath could have been successfully used with Matsumoto's flux core in welding dissimilar materials.

Although the foregoing discussion regarding Keegan arguably obviates the need for reliance on the Tanaka reference, we will discuss Tanaka in the interest of being thorough. Appellant argues that Tanaka teaches a method for joining dissimilar materials by brazing, not welding. Appeal Br. 12. Appellant argues that brazing is "very" different from welding. *Id.* Appellant argues that Tanaka is non-analogous art with respect to the claimed invention. *Id.*

In response, the Examiner points out that Tanaka uses an aluminum alloy sheath comprising 1-3 % silicon and 0.5-0.25 % titanium by mass. Ans. 7. The Examiner further points out that Tanaka is used with flux material. *Id.* The Examiner further points out that Tanaka teaches the joining of dissimilar materials. *Id.*

In reply, Appellant repeats the argument that Tanaka is focused on brazing which allegedly is "very" different from welding. Reply Br. 3.

A reference qualifies as prior art for an obviousness determination when it is analogous to the claimed invention. *Innovention Toys, LLC. v. MGA Entm't, Inc.*, 637 F.3d 1314, 1321 (Fed. Cir. 2011). "Two separate tests define the scope of analogous art: (1) whether the art is from the same

field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004). The “field of endeavor” test asks if the structure and function of the prior art is such that it would be considered by a person of ordinary skill in the art because of similarity to the structure and function of the claimed invention as disclosed in the application.” *Id.* at 1325–26.

Appellant argues, in essence, that “welding” and “brazing” are two separate fields of endeavor. Appellant’s briefing on this issue is cursory, abbreviated and conclusory. *See e.g.*, Appeal Br. 12–13. Appellant argues that “diffusion joining methods do not use flux,” but stops short of actually characterizing diffusion joining and brazing as identical. *Id.* at 12. Thus, Appellant’s “diffusion joining” argument is tangential, at best, to the case before us. The Examiner’s finding that Tanaka teaches brazing using flux is supported by the record before us.

We are not persuaded that Tanaka constitutes non-analogous art to Appellant’s invention. It is well-known that welding and brazing are both techniques to join pieces of metal together using heat. Both techniques can use a filler material and such filler material can take the form of a flux core wire. In particular, Tanaka explicitly discloses using flux in a brazing process. Tanaka col. 10, ll. 10–18. Welding takes place at a temperature that melts the base material causing fusion. Brazing takes place at a temperature that is sufficiently hot to melt the filler material so that it flows into the joint, but does not melt the base material. Thus, welding and brazing are both properly considered to be in the same field of endeavor,

namely, metal working and, more particularly metal joining using heat. *Bigio*, 381 F.3d at 1325–26. We expect that an artisan skilled in metal working would be familiar with the metal joining techniques of both welding and brazing. We also expect that the skilled artisan would be familiar with both similarities and differences between the two techniques and would be similarly familiar with what types of filler materials are used and whether use of such materials carry over from one technique to another. We discern no error in the Examiner’s reliance on Tanaka as analogous art.

The sum and substance of Appellant’s argument is that welding and brazing are “very” different. Appeal Br. 12, Reply Br. 3. The obviousness analysis contemplates that there will be differences between the prior art and the claimed invention. *See* 35 U.S.C. § 103. Appellant provides no evidence that the group of filler materials used in brazing is mutually exclusive to the group of filler materials used in welding. Appellant provides no evidence, persuasive technical reasoning, or other context by which we can meaningfully distinguish between the prior art being different and being “very” different. In the absence of evidentiary substantiation for this position, we view Appellant’s use of the word “very” as meaningless hyperbole that is entitled to no weight. *See In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997) (explaining that attorney arguments and conclusory statements that are unsupported by factual evidence are entitled to little probative value).

Appellant next raises an argument based on recitation of specific examples of the invention in Appellant’s Specification. Appeal Br. 13–16. As we understand the argument, Appellant is asserting that the elements recited in the claim, when combined, result in an overall improvement in

welding technology. *Id.* at 16. Appellant argues that “unexpected properties” can make an initially obvious composition unobvious. *Id.* Appellant finishes off the argument by asserting that — “the evidence in the specification should be considered an unexpected result rebutting the alleged prima facie rejections.” *Id.*

In response, the Examiner explains, in essence, that Appellant’s results are expected when viewed through the lens of the prior art. Ans. 7–8. In reply, Appellant embellishes its earlier argument concerning unexpected results.

The Examiner continues to misapprehend the evidentiary effect of unexpected results. In his understanding, if he believes that he has made a prima facie case, no results provided by the invention could possibly be unexpected because they “would have predictably yielded the high joint strength or quality” . . . In essence, the Examiner fails to understand the role of rebuttal evidence.

Reply Br. 4.

The record before us does not support Appellant’s “unexpected results” arguments. Appellant’s examples merely show that the invention works. At best, they may even show improvement over the prior art. However, that is not evidence that the results are “unexpected” or that the alleged improvement is patentable.

[E]ven though applicant’s modification results in great improvement and utility over the prior art, it may still not be patentable if the modification was within the capabilities of one skilled in the art, unless the claimed ranges “produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.”

In re Huang, 100 F.3d 135, 139 (Fed. Cir. 1996).

Here, there is no evidence that Appellant's reported results are different in kind and not merely in degree from the results of the prior art. *Id.* The prior art shows that aluminum alloy sheaths can be used in welding dissimilar materials and that the claimed sheath composition is known to be effective in welding aluminum and in brazing dissimilar materials. The Examiner finds that using the claimed sheath composition of Keegan and Tanaka would "predictably" yield a high quality weld joint. Final Act. 3. Appellant's only rejoinder to the Examiner's position is attorney argument. Appellant presents neither evidence nor persuasive technical reasoning that arranging the elements in the manner claimed requires more than ordinary skill or produces unexpected results. "It is well settled that unexpected results must be established by factual evidence. Mere argument or conclusory statements in the specification does not suffice." *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984); *see also In re Wood*, 582 F.2d 638, 642 (CCPA 1978) (explaining that lawyer's arguments and conclusory statements in the specification, unsupported by objective evidence, are insufficient to establish unexpected results).

In view of the foregoing discussion, we determine the Examiner's findings of fact are supported by a preponderance of the evidence and that the Examiner's legal conclusion of unpatentability is well-founded. We sustain the Examiner's unpatentability rejection of claims 8, 11, and 17.

*Unpatentability of Claims 9 and 16
over Katoh, Keegan, and Tanaka*

Claims 9 and 16 are independent claims. Claims App. Appellant argues claims 9 and 16 under the same heading and subheadings used in

arguing against the ground of rejection over Matsumoto above. *See generally* Appeal Br.

The Examiner finds that Katoh discloses the invention substantially as claimed except for the specific material composition of the sheath of the weld wire, for which the Examiner, once again, relies on Keegan and Tanaka. Final Act. 2–3.

Appellant first argues that Katoh, instead of supporting the Examiner’s position, actually illustrates that the technology of welding dissimilar materials is quite challenging. Appeal Br. 10–11 (citing Katoh ¶ 41). “Katoh teaches that to bond dissimilar materials, for instance steel and aluminum, there are considerable difficulties and challenges despite a considerable amount of effort and disclosure.” Reply Br. 2. This argument is not persuasive because the passage of Katoh relied on by Appellant relates to the composition of the flux, not the shield, of the weld wire. As previously discussed in the Matsumoto ground of rejection, the claimed flux material for welding dissimilar materials is known in the prior art. Katoh merely provides a teaching redundant to what is already acknowledged by Matsumoto.

Apart from the foregoing, Appellant relies on the same arguments regarding combining Katoh with Keegan and Tanaka that we previously considered and found unpersuasive in connection with the Matsumoto ground of rejection and find equally unpersuasive here. The findings and conclusions concerning composition of the weld wire shield that are set forth above under the Matsumoto ground of rejection apply with equal force to the instant ground of rejection under Katoh.

We sustain the rejection of claims 9 and 16.

CONCLUSION

In summary:

Claims Rejected	§	References	Affirmed	Reversed
8, 11, 17	103	Matsumoto, Keegan, Tanaka	8, 11, 17	
9, 16	103	Katoh, Keegan, Tanaka	9, 16	
Overall Outcome			8, 9, 11, 16, 17	

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