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OBLON, MCCLELLAND, MAIER & NEUSTADT, L.L.P.
1940 DUKE STREET
ALEXANDRIA, VA 22314

EXAMINER
PARK, LISA S

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ahudgens@oblon.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte SATORU TAKADA,
JUN SUZUKI, and TOSHIKI SATO

Appeal 2015-007640
Application 13/982,411
Technology Center 1700

Before KAREN M. HASTINGS, GEORGE C. BEST, and
N. WHITNEY WILSON, *Administrative Patent Judges*.

HASTINGS, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellants[1] appeal from the Examiner's decision finally rejecting claims 1–7 and 11–15 under 35 U.S.C. § 103(a). We have jurisdiction over the appeal under 35 U.S.C. § 6(b).

We AFFIRM.

Claim 1 is illustrative of the appealed subject matter (emphasis added to highlight key limitations):

1. A fuel cell separator comprising:

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[1] The real party in interest is stated to be Kabushiki Kaisha Kobe Seiki Sho (Kobe Steel, LTD.) (Appeal Br. 2).

> *a substrate, which is a titanium substrate* as defined by JIS H 4600 Class 1 to Class 4;
>
> *a conductive carbon layer covering a surface of the substrate; and*
>
> *an intermediate layer comprising titanium carbide and carbon dissolved titanium*, wherein the intermediate layer is *disposed between the substrate and the conductive carbon layer.*

(Appeal Br., Claims App. i)

The Examiner maintains, and Appellants appeal, the following rejections[2] under 35 U.S.C. § 103(a):

(a) Claims 1–7, 14, and 15 are rejected as unpatentable over Yoshitake et al. (US 6,761,990 B1, issued July 13, 2004) (hereinafter "Yoshitake") in view of Aoyama et al. (US 2009/0087558 A1, published Apr. 2, 2009) (hereinafter "Aoyama"); and

(b) Claims 11–13 are rejected as unpatentable over Yoshitake in view of Aoyama, and further in view of Matsuno (JP 2001-283872, published Oct. 12, 2001) (hereinafter "Matsuno").

With the exception of claims 11–13 (Appeal Br. 25–28), Appellants' arguments urging reversal of the rejections of claims 1–7 and 11–15 focus on limitations recited in independent claim 1 (Appeal Br. 7–25; Reply Br. 2–

[2] In rejection (a), the Examiner finally rejected "[c]laims 1 and 3–7 . . . ." (Final Act. 3; Ans. 2). The Examiner, however, included grounds for rejecting claims 2, 14, and 15 (Final Act. 5–6; Ans. 4). There is no dispute that the finally rejected claims are 1–7 and 11–15 (Final Act. 1; Appeal Br. 1) and that rejection (b) is directed to claims 11–13 (Final Act. 6; Appeal Br. 25). Thus, claims 2, 14, and 15 are included in rejection (a).

13).[3] In the absence of arguments specific to their patentability, dependent claims 2–7, 14, and 15 stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

ANALYSIS

Upon consideration of the evidence and each of Appellants' contentions, we find that the preponderance of evidence on this record supports the Examiner's conclusion that independent claim 1 and all of its dependent claims are unpatentable over the applied prior art. Appellants have failed to show that the Examiner erred reversibly. We sustain the Examiner's § 103 rejections, as listed in (a) and (b) above, of all the appealed claims for essentially the reasons set out by the Examiner in the Final Office Action and the Answer.

We add the following primarily for emphasis.

Rejection (a)

The Examiner finds that Yoshitake's disclosure of a fuel cell separator (Final Act. 3; Ans. 2) discloses all the limitations of claim 1 except "Yoshitake does not disclose that the intermediate layer comprises titanium carbide (TiC) *and* carbon dissolved titanium" (Final Act. 3 (emphasis in

[3] With respect to rejection (a), Appellants do not explicitly urge the reversal of the rejection of claim 2 (Appeal Br. 24–25; Reply Br. 14). With respect to rejection (b), Appellants urge the reversal of the rejection of claims 13–17 (Appeal Br. 28; Reply Br. 14). For the reasons set forth above in footnote 2 (*see also* Claims App. i–iii (listing claims 1–7 and 11–15 as rejected)), we review Appellants' arguments as: (i) also urging the reversal of the rejection of claim 2 in rejection (a); and (ii) only arguing the reversal of the rejection of claims 11–13 in rejection (b).

original)). The Examiner, however, finds that Aoyama teaches "forming a TiC layer on a passive film on a titanium fuel cell separator by reacting a carbon (rolling mill lubricant or other suitable carbon-containing material) layer with a JIS Class 1 titanium substrate under heat (300°C–700°C) and under inert conditions (Ar or He gas) . . ." (Final Act. 3 (citing Aoyama ¶¶ 9, 19–22, 43); Ans. 2).

The Examiner determines that it would have been obvious for the ordinary skilled artisan

> to form the TiC layer of Yoshitake, while retaining enough of [Yoshitake's] graphite layer . . . to fulfill its intended benefit—improved conductivity—by subjecting [Yoshitake's] carbon coated JIS Class 1 titanium substrate . . . to [Aoyama's] heat under inert gas . . . in order to remove the passive layer on the titanium substrate.

(Final Act. 4; Ans. 3).

The Examiner acknowledges that Yoshitake and Aoyama do not "disclose that the intermediate layer will further comprise carbon dissolved titanium" (Final Act. 4; Ans. 3). According to the Examiner, however, because the Specification "discloses that the same temperature range and non-oxidizing atmosphere [taught by Aoyama] gives both TiC and carbon dissolved titanium . . . , then the formation of both components is considered an inherent property . . ." (Final Act. 4 (citing Spec. ¶¶ 21, 27); Ans. 3; *see also* Spec. ¶ 34).

Appellants' main argument is that there is "no disclosure in either Yoshitake or Aoyama for the [Examiner's] proffered modification", which is based on her "improper reliance on the . . . [S]pecification and hindsight . . ." (Appeal Br. 10). Appellants argue that Aoyama's teaching that "'[g]old bonds to titanium carbide more strongly than to titanium oxide'" cannot

suggest the claimed invention because Aoyama discloses that this strong bonding makes it "'*possible for rare metal plating to be carried out* ***on surfaces of titanium***'" (Reply Br. 6 (citing Aoyama ¶ 6 (emphasis added)); *see also* Appeal Br. 11–13). According to Appellants, this "has no significance where the underlying metal substrate is bonded to a conductive carbon layer as claimed" or as taught by Yoshitake (Appeal Br. 12–13). Appellants further argue that "Aoyama polishes the TiC surface layer with an abrasive ***to remove any carbonized rolling mill lubricant before plating the gold on the TiC layer***" (*id.* at 13 (emphasis in original) (citing Aoyama ¶ 23)).

Appellants' arguments are not persuasive because they do not fully address the inferences of the references that are presented on this record for our review. As set forth above, in the Final Office Action, and in the Answer, the Examiner supports the prima facie case of obviousness based on the combined teachings of Yoshitake and Aoyama (Final Act. 3–7; Ans. 2–4). Appellants' arguments, however, fail to consider this prior art as a whole, and do not directly address the Examiner's position (*e.g.*, *id.*). *See, e.g.*, *In re Preda*, 401 F.2d 825, 826 (CCPA 1968) (it is well established that in evaluating references it is proper to take into account not only the specific teachings of the references but also the inferences which one skilled in the art would reasonably be expected to draw therefrom).

Appellants have not sufficiently refuted, and thus have not shown reversible error in, the Examiner's determination that it would have been prima facie obvious to combine the known method of forming a TiC layer on a passive film, which is on a titanium fuel cell separator, as suggested by

Aoyama, while retaining enough of a graphite layer, as suggested by Yoshitake, to improve conductivity (*e.g.*, Final Act. 3–4; Ans. 2–3).

Appellants have also not provided persuasive technical reasons or evidence that demonstrate reversible error in the Examiner's determination that it would have been prima facie obvious to combine Yoshitake's and Aoyama's teachings (*e.g.*, Final Act. 3–4; Ans. 2–3), to achieve, with the use of no more than ordinary creativity, the known desirable results of providing a fuel separator comprised of a titanium substrate, a conductive carbon layer covering the substrate surface, and an intermediate layer comprising TiC and carbon dissolved titanium disposed between the substrate and the conductive carbon layer (*generally* Final Act.; Ans.; Appeal Br.; Reply Br.). *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) ("A person of ordinary skill is also a person of ordinary creativity, not an automaton."). Therefore, Appellants' arguments that Aoyama is only concerned with carrying out: (i) rare metal plating on titanium surfaces; and (ii) removing any carbonized rolling mill lubricant on such surfaces are unpersuasive. The record evidence provides that it was known to the ordinary skilled artisan that Yoshitake's TiC layer may be formed by Aoyama's process of heating under inert gas and that retaining Yoshitake's graphite layer would improve conductivity (*see* Final Act. 4; Ans. 3).

Appellants argue that the Examiner's position with respect to the inherent formation of TiC and carbon dissolved titanium in the proposed combination "is based purely on speculation . . . [a]nd patentability should never be denied based on speculation" (Appeal Br. 16). Appellants further argue that this alleged inherency is based on "a hypothetical combination with no support for its combination" (*id.*). According to Appellants, "[t]he

Examiner appears to confuse the distinction between anticipation and obviousness" (*id.* at 15).

It is, however, well established that when claimed and prior art products 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. *In re Best*, 562 F.2d 1252, 1255 (CCPA 1977). This is true whether the rejection is under 35 U.S.C. § 102 (anticipation) or 35 U.S.C. § 103 (obviousness), and is based on the fact that the PTO is not in a position to manufacture products or to obtain and compare prior art products. *Id.*

Appellants' arguments are not persuasive because the Examiner has explained why Aoyama's heating of a titanium substrate at 300°C–700°C under inert Ar or He gas conditions for the production of the claimed TiC and carbon dissolved titanium is substantially similar to the process described in Appellants' Specification (Ans. 3; *see also*, *id.* at 10–11 (citing Aoyama ¶¶ 9, 19–22, 43); *see also* Spec. ¶ 34 ("[t]he heat treatment temperature is preferably in a range of 300 to 850°C" under a "low oxygen atmosphere such as nitrogen (N_2) or Ar atmosphere . . . .")). Placing the burden on Appellants is appropriate under these circumstances. *Best*, 562 F.2d at 1255. Appellants have not met this burden—the record evidence is silent as to any demonstration that Aoyama's process would not form the claimed TiC and carbon dissolved titanium in the intermediate layer.

Appellants filed the Rule 132 Declaration of Jun Suzuki, M.S. ("Suzuki Declaration") to show "that the particularly claimed conductive carbon layer, intermediate layer, and titanium substrate unexpectedly provide a higher corrosion resistance as compared to a stainless steel base

material that underwent the same surface treatment for forming the intermediate and conductive carbon layers" (Appeal Br. 27). Appellants argue that the Suzuki Declaration "demonstrate[s] that [Yoshitake's] stainless steel . . . and []titanium alloy . . . were not equivalent and interchangeable when coated with a carbon layer and an intermediate layer as claimed" (*id.* at 16–17).

On the other hand, the Examiner finds that it was "known in the art that titanium has superior fuel cell properties compared with stainless steel, such as higher corrosion resistance and better processability . . . , which would lead the skilled artisan to expect better results from a titanium separator compared to stainless steel" (Adv. Act. 2 (citing "evidentiary reference" Uchiyama et al. (US 2007/0243429 A1, published Oct. 18, 2007) ¶ 33) (hereinafter "Uchiyama")).

Appellants respond by asserting that the Examiner maintains the rejection "in view <u>of a new and previously uncited reference</u>" (Appeal Br. 4 (emphasis in original)). According to Appellants, because Uchiyama "is clearly being used as more than an evidentiary reference and the claims were not amended, this should have been designated as a new ground of rejection" (*id.*). We, however, discern no reversible error in the Examiner's reliance on Uchiyama because the Examiner cited the reference "strictly to provide evidence that titanium is known by the skilled artisan as a material with higher resistance to corrosion when used as a separator plate . . ." (Ans. 7–8).

Appellants' assertion that the Suzuki Declaration demonstrates that the claimed invention unexpectedly provides a higher corrosion resistance as compared to Yoshitake's 0.2 mm thick stainless steel (SUS316) (Reply Br.

10) subjected to the same surface treatment (Appeal Br. 27), is likewise unpersuasive. The burden of showing unexpected results rests on the person who asserts them by establishing that the difference between the claimed invention and the closest prior art was an unexpected difference. *See In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). The Suzuki Declaration, however, contains no comparisons with Yoshitake's exemplified titanium substrate having a purity of 99.4% in the disclosed dimensions (Yoshitake 9:66–10:1), nor any comparisons throughout Yoshitake's disclosed titanium purity ranges of at least 80% (*id.* at 3:57–59; claim 3) or the preferable 90–98% (*id.* at 4:5–6). Appellants have not shown reversible error in the Examiner's finding that the experimental data set forth in the Specification and the Suzuki Declaration do not compare the claimed invention and the closest prior art of Yoshitake and, therefore, is not persuasive evidence of nonobviousness (Ans. 6–7).

Thus, we affirm the rejection of claims 1–7, 14, and 15.

Rejection (b)

The Examiner relies on Yoshitake modified by Aoyama for suggesting all the limitations of claims 11–13, with the exception that the applied prior art "fails to specifically disclose that the carbon layer covers 40% or 50% or more of the entire surface of the substrate, or that it covers the entire surface of the substrate" (Final Act. 6; Ans. 5). The Examiner, however, finds Matsuno teaches forming "a carbon coating on a metal substrate, and . . . that the amount of carbon on the substrate layer should be increased for improved contact resistance . . ." (Final Act. 6 (citing Matsuno Table 2; ¶ 21)). The Examiner determines, therefore, that "coverage is considered a result effective variable" and that it would have been obvious

to the ordinary skilled artisan "to form the carbon coating of Yoshitake modified by Aoyama with coverage on the substrate greater than 40%, 50%, and at 100%, in order to optimize the separator's contact resistance" (Final Act. 6–7).

Appellants' main argument is that Matsuno teaches away from the present invention because Matsuno teaches that "'with less than 5 mass % [Cr content], sufficient chromium carbide layer is not formed by the heat treatment, but a Cr content becomes the cause of the adhesion force of carbon system particles being not only deteriorated, but raising contact resistance'" (Appeal Br. 26 (citing Matsuno ¶ 12)).

Whether a reference teaches away from a claimed invention is a question of fact. *In re Harris*, 409 F.3d 1339, 1341 (Fed. Cir. 2005). For a reference to "teach away," it must criticize, discredit, or otherwise discourage the claimed solution. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Appellants' arguments are not persuasive because they fail to identify any teaching in the applied prior art that criticizes, discredits, or discourages a fuel separator comprised of a titanium substrate as claimed. Furthermore, Appellants acknowledge that "Matsuno discloses that the base material may be an alloy and include Ti . . ." (Appeal Br. 26). Therefore, we are not persuaded by Appellants' arguments that Matsuno teaches away from claims 11–13.

Appellants further argue that the "Examiner's failure to consider [Appellants'] evidence of unexpected results" is reversible error because the Suzuki Declaration "demonstrate[s] that [Matsuno's] stainless steel . . . and [Yoshitake's] titanium alloy . . . were not equivalent and interchangeable

when coated with a carbon layer and an intermediate layer as claimed" (Appeal Br. 16–17). Appellants' arguments, however, are not persuasive. For the reasons set forth above, the experimental data in the Specification and the Suzuki Declaration relied upon by Appellants are not persuasive evidence of nonobviousness (Ans. 6–7).

Indeed, as pointed out by the Examiner, even without relying on Matsuno, Yoshitake shows that metal layer **2** is completely covered by carbon layer **1b** on two opposing sides (*see id.* at 11 (citing Yoshitake Fig. 1b; 5:32–39)). Therefore, the combination of Yoshitake and Aoyama in the absence of Matsuno renders Appellants' claimed invention obvious.

Thus, we affirm the rejection of claims 11–13.

DECISION

The Examiner's § 103 rejections are affirmed.

TIME PERIOD

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