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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte EIZO YOSHITAKE

Appeal 2019-004641
Application 14/010,646
Technology Center 1700

Before ROMULO H. DELMENDO, MICHAEL P. COLAIANNI, and
JULIA HEANEY, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellant¹ appeals under 35 U.S.C. § 134(a) from the Primary Examiner's final decision to reject claims 1–4.² We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42—namely, “AK Steel Properties, Inc.” (Application Data Sheet filed August 27, 2013), which is also identified as the real party in interest (Appeal Brief filed January 11, 2019 (“Appeal Br.”) at 3).

² See Appeal Br. 6–13; Reply Brief filed May 23, 2019 (“Reply Br.”) at 5–10; Final Office Action entered August 3, 2018 (“Final Act.”) at 4–8; Examiner's Answer entered March 28, 2019 (“Ans.”) at 4–16.

I. BACKGROUND

The subject matter on appeal relates to a ferritic stainless steel with added titanium and low aluminum concentration to provide room temperature formability, added columbium (i.e., niobium) and copper for high temperature strength, and added silicon and manganese for improved oxidation resistance (Specification filed August 27, 2013 (“Spec.”) ¶¶ 2–3). Representative claim 1, the sole independent claim on appeal, is reproduced from the Claims Appendix to the Appeal Brief, as follows:

1. A ferritic stainless steel comprising the following elements by weight percent:
0.020% or less carbon;
0.020% or less nitrogen;
15-20% chromium;
0.30% or less titanium;
0.50% or less columbium;
1.0-2.00% copper;
1.27-1.7% silicon;
0.8-1.0% manganese;
0.050% or less phosphorus;
0.01 % or less sulfur;
less than 0.020% aluminum;
wherein ***the product of the concentration of titanium and the concentration of nitrogen divided by the concentration of aluminum is at least 0.08;*** and
the balance comprising iron and unavoidable impurities.

(Appeal Br. 14 (emphases added)).

II. REJECTIONS ON APPEAL

The claims on appeal stand rejected under 35 U.S.C. § 103(a) (pre-AIA), as follows:

- A. Claims 1–4 as unpatentable over Kobayashi et al.³ (“Kobayashi”); and
- B. Claims 1–4 as unpatentable over Oku et al.⁴ (“Oku”).
- (Ans. 4–16; 4–8).

III. DISCUSSION

Rejection A. The Examiner finds that Kobayashi (US ’231) describes a ferritic stainless steel composition that contains the same elements in the same or similar amounts as recited in claim 1 (Ans. 4; Final Act. 4). The Examiner’s findings, which include a comparison between the claimed ferritic stainless steel and Kobayashi’s ferritic stainless steel, are reproduced from a table in the Examiner’s Answer (Ans. 4), as follows:

Element	Instant Claims (wt. %)	US’231 (mass %)
C	≤ 0.020	≤ 0.03
N	≤ 0.020	≤ 0.04
Cr	15 – 20	11 – 20
Ti	≤ 0.30	0.2 – 1.0
Nb	≤ 0.50 0.28 – 0.50 claim 3	Nb + Ta: 8 (C+N) – 1.0 ∴ Nb + Ta: 0 – 1.0
Cu	1.0 – 2.00	≤ 2
Si	1.27 – 1.7	≤ 3
Mn	0.8 – 1.0	≤ 3
P	≤ 0.050	≤ 0.04
S	≤ 0.01	≤ 0.02
Al	< 0.020	0.02 – 2.0
Fe + impurities	Balance	Balance
At least one of Mo B V Ni	At least one of claim 2 Mo: ≤ 3.0 B: ≤ 0.010 V ≤ 0.5 Ni ≤ 1.0	Mo: ≤ 3 B: ≤ 0.02 V: ≤ 0.5 Ni: ≤ 2

³ US 2006/0163231 A1, published July 27, 2006. The Examiner refers to this document as “US’231” (Ans. 4; Final Act. 4).

⁴ CA 2 762 899 A1, published December 23, 2010. The Examiner refers to this document as “CA’899” (Ans. 6; Final Act. 5).

The table reproduced above compares the elemental compositions of the claimed ferritic stainless steel and Kobayashi's ferritic stainless steel (*id.*).

With respect to aluminum (Al), the table above shows that Kobayashi's disclosed aluminum content (i.e., 0.02–2.0 mass%) differs from that recited in claim 1 (i.e., < 0.020 wt.%) (*id.*). The Examiner finds, however, that Kobayashi's "lower limit of 0.02 mass% of the prior art is close to the upper limit of the claimed range" (*id.* at 5). Based on this finding, the Examiner concludes that "[a] prima facie case of obviousness exists [because] the claimed . . . amounts do not overlap with the prior art [amounts] but are merely close" (*id.*).

The Appellant contends, *inter alia*, that Kobayashi teaches away from the aluminum concentration recited in claim 1 (Appeal Br. 11). Specifically, the Appellant argues that Kobayashi teaches "[w]hen the content of Al is below 0.02 mass % and that of Ti is lower than 0.2 mass %, the [deoxidizing] effect [of Al and Ti] cannot be obtained" (*id.* at 11–12 (quoting Kobayashi ¶ 29)).

We agree with the Appellant that Kobayashi teaches away from modifying the aluminum content in Kobayashi's stainless steel to a level below 0.02 mass%. Unlike the situation in, e.g., *In re Brandt*, 886 F.3d 1171, 1177 (Fed. Cir. 2018), where no evidence of criticality of the claimed numerical range was offered to rebut a prima facie case of obviousness based on closeness between the prior art range and the claimed range, the Appellant identifies evidence in the form of an explicit teaching in Kobayashi that would have discouraged a person having ordinary skill in the art from reducing the aluminum amount in Kobayashi to below 0.02 mass% (Kobayashi ¶ 29, Table 1).

The Examiner posits that Kobayashi does not teach away from reducing the Al content *per se* to below 0.02 mass% but rather **both** Al content below 0.02 mass% **and** Ti content lower than 0.2 mass% (Ans. 14). That position is not sound for the reasons given by the Appellant (Reply Br. 9), which we adopt as our own.

The Examiner also states that an Al content of, for example, 0.01999 wt.% is “extremely close” to 0.02 mass%, and, therefore, a prima facie case of obviousness exists (Ans. 15). Again, however, Kobayashi explicitly teaches away from any Al content below 0.02 mass% (Kobayashi ¶ 29). Other than speculation based on a hypothetical Al content of 0.01999 wt.%, the Examiner fails to direct us to sufficient evidence that would support a conclusion that Kobayashi would have suggested that values that are not “below 0.02 mass %” would in fact include values within the claimed range of “less than 0.020% aluminum,” as recited in claim 1.

Therefore, we do not sustain the Examiner’s rejection over Kobayashi as maintained against independent claim 1 and claims 2–4 dependent thereon. *See Brandt*, 886 F.3d at 1177 (distinguishing and explaining *In re Patel*, 566 Fed. Appx. 1005 (Fed. Cir. 2014), where an obviousness rejection based on numerical closeness was not sustained because the prior art did not suggest that a broader range based on a flexible application of the disclosed range would be suitable).

Rejection B. We reach a different result with respect to the Examiner’s rejection based on Oku (CA ’899). Because the Appellant does not argue any dependent claim separately from independent claim 1 (Appeal Br. 13), we confine our discussion to claim 1, which we select as representative pursuant to 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Oku describes a ferritic stainless steel composition that contains the same elements in amounts that overlap or fall within the ranges recited in claim 1 (Ans. 6–7; Final Act. 5–6). The Examiner’s findings, which include a comparison between the claimed ferritic stainless steel and Oku’s ferritic stainless steel, are reproduced from a table in the Examiner’s Answer (Ans. 6), as follows:

Element	Instant Claims (wt.%)	CA'899 (mass%)
C	≤ 0.020	≤ 0.03
N	≤ 0.020	≤ 0.03
Cr	15 – 20	10 – 35
Ti	≤ 0.30	0.5 % or less of either Ti and/or Zr
Nb	≤ 0.50 0.28 – 0.50 claim 3	0.2 – 0.8
Cu	1.0 – 2.00	4% or less - the total content of at least one of Mo, Cu, V and W
Si	1.27 – 1.7	> 0.1 – 3
Mn	0.8 – 1.0	0.1 – 2
P	≤ 0.050	–
S	≤ 0.01	–
Al	< 0.020	0.01 – 6
Fe + impurities	Balance	Balance
At least one of	At least one of claim 2	
Mo	Mo: ≤ 3.0	4% or less - the total content of at least one of Mo, Cu, V and W
B	B: ≤ 0.010	
V	V ≤ 0.5	
Ni	Ni ≤ 1.0	5% or less – the total content of at least one of Ni and Co

The table reproduced above compares the elemental compositions of the claimed ferritic stainless steel and Oku’s ferritic stainless steel (*id.*). Based on these findings, the Examiner concludes that “[a]s the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness is established as it would have been obvious . . . to a person

having ordinary skill in the art to . . . select the [amounts for the elements as recited in the] claimed composition over the prior art disclosure” (*id.* at 7).

The Appellant contends that Oku does not teach or suggest the limitation “the product of the concentration of titanium and the concentration of nitrogen divided by the concentration of aluminum is at least 0.08” in claim 1 (Appeal Br. 6). According to the Appellant, this limitation “establishes a critical relationship for achieving different properties” (*id.* at 7 (citing Spec. ¶ 7)). The Appellant argues further that the Examiner failed to consider secondary considerations for nonobviousness (*id.* at 8–13). Specifically, the Appellant contends that the limitation “0.8–1.0% manganese,” as recited in claim 1, provides unexpected results in terms of high temperature oxidation resistance and that “manganese compositions falling below the minimum value of manganese recited in independent claim 1, exhibited ‘severe’ or ‘very severe’ spalling” (*id.* at 8–9 (citing Example 3 (Spec. ¶ 34))).⁵ Additionally, the Appellant argues that Oku does not teach or suggest a concentration of “less than 0.020% aluminum,” as recited in claim 1, because “Oku . . . teaches away by encouraging the intentional addition of aluminum, rather than minimizing its content” (*id.* at 11).

The Appellant’s arguments fail to identify reversible error in the Examiner’s rejection. *In re Jung*, 637 F.3d 1356, 1365 (Fed. Cir. 2011).

Except for the finding that Oku discloses a lower limit of 0.01 mass% for the Al content, we adopt the Examiner’s findings regarding Oku’s disclosure and the differences between it and the claimed subject matter as

⁵ It appears that the Appellant intends to refer to Example 2 and Table 2 (Spec. ¶ 33)—not Example 3.

our own (Oku Abstract, ¶¶ 13, 24–35).⁶ When, as here, the prior art amount ranges encompass, fall within, and overlap those recited in the claim, a prima facie case of obviousness typically exists. *In re Peterson*, 315 F.3d 1325, 1329–30 (Fed. Cir. 2003); *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 782 (Fed. Cir. 1985). Therefore, the burden of production was properly shifted to the Appellant to rebut the prima facie case of obviousness. *Peterson*, 315 F.3d at 1330 (“[T]he existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious.”).

Regarding the limitation “the product of the concentration of titanium and the concentration of nitrogen divided by the concentration of aluminum is at least 0.08,” as recited in claim 1, the Appellant argues that “[a]lthough [a certain] combination [within the prior art disclosure] meets the above-referenced limitation, the Office ignores other possible combinations that may not meet the above-referenced limitation” (Appeal Br. 7). But the mere fact “[t]hat the [reference] discloses a multitude of effective combinations does not render any particular formulation less obvious.” *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989).

In this case, other than a conclusory statement in the Specification (Spec. ¶ 7), the Appellant does not direct us to objective evidence establishing any unexpected criticality for the specified Ti, N, and Al relationship. *In re Lindner*, 457 F.2d 506, 508 (CCPA 1972) (“[M]ere conclusory statements in the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements.”).

⁶ Oku discloses an Al content that “should be suppressed to a range of 6% or less” (Oku ¶ 33).

Regarding the manganese content of “0.8-1.0%” recited in claim 1, we are in complete agreement with the Examiner’s well-stated position (Ans. 12) that “the reference samples [i.e., comparative examples] having Mn of 0.28 and 0.35 [as shown in Example 2 and Table 2 (Spec. ¶ 33)]. . . are too far away from the claimed lower limit . . . 0.8,” and, therefore, the proffered showing is insufficient. Specifically, Samples V3918, V3920, V3922, V3921, and 444, which included 0.28 or 0.35 wt.% manganese—i.e., amounts outside the range recited in claim 1, are reported as exhibiting severe or very severe spalling (scale off) (Spec. ¶ 33 (Table 2)). But, as the Examiner correctly observes, 0.28 and 0.35 wt.% are not close to (i.e., just outside) the lower end of the range recited in claim 1 (i.e., 0.8 wt.%). *In re Inland Steel Co.*, 265 F.3d 1354, 1365–66 (Fed. Cir. 2001) (“Inland offered only a few data points from one experiment comparing antimony within and below its claimed ranges.”).

As a corollary, Appellant does not direct us to comprehensive test results demonstrating the criticality of all Mn contents encompassed by the specified range (including 0.8 wt.%), because the lowest Mn content described as “Invention” in Table 2 is 0.98 wt.%—a Mn level far removed from the lower limit of 0.8 wt.%. *Inland*, 265 F.3d at 1366 (“Inland did not offer comprehensive test results for the magnetic properties of steel produced under the ’574 claims at antimony levels greater than 0.02%.”).

Lastly, we discern no persuasive merit in the Appellant’s argument that Oku does not teach or suggest a concentration of “less than 0.020% aluminum,” as recited in claim 1 (Appeal Br. 11). According to the Appellant, “Oku . . . teaches away by encouraging the intentional addition of aluminum, rather than minimizing its content” (*id.*). Contrary to the

Appellant’s belief, Oku explicitly teaches that “Al should be *suppressed* to a range of 6% or less” (Oku ¶ 33 (emphasis added)). See also Oku’s Table 1, which includes examples with Al contents as low as 0.06 mass%, which differs from the upper limit of the range recited in claim 1 by only 0.04 mass%.

For these reasons, and those well-stated by the Examiner, we uphold the Examiner’s rejection based on Oku.

IV. CONCLUSION

In summary:

Claims Rejected	35 U.S.C. §	Reference(s)/Basis	Affirmed	Reversed
1-4	103(a)	Kobayashi		1-4
1-4	103(a)	Oku	1-4	
Overall Outcome			1-4	

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