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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte KEIICHI KONDO and YUJI ARAI

Appeal 2017-009837
Application 14/382,081
Technology Center 1700

Before TERRY J. OWENS, JEFFREY R. SNAY, and
MICHAEL G. McMANUS, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

The Applicant/Appellant (Nippon Steel & Sumitomo Metal Corp.)
appeals under 35 U.S.C. § 134(a) from the Examiner's rejection of claims 1–
10. We have jurisdiction under 35 U.S.C. § 6(b).

The Invention

The claims are to a method for making high-strength steel having
excellent sulfide stress cracking resistance. Claim 1 is illustrative:

1. A method for producing a high-strength steel material
excellent in sulfide stress cracking resistance, wherein a steel
that has a chemical composition consisting of, by mass percent,
C: 0.15 to 0.65%, Si: 0.05 to 0.5%, Mn: 0.1 to 1.5%, Cr: 0.2 to
1.5%, Mo: 0.1 to 2.5%, Ti: 0.005 to 0.50%, Al: 0.001 to

0.50%, and the balance of Fe and impurities, wherein Ni, P, S, N and O among the impurities are Ni: 0.1% or less, P: 0.04% or less, S: 0.01% or less, N: 0.01% or less, and O: 0.01% or less, and that has been hot-worked into a desired shape is sequentially subjected to the steps of the following [1] to [3]:

[1] a step of heating the steel to a temperature exceeding the Ac_1 transformation point and lower than the Ac_3 transformation point and cooling the steel;

[2] a step of reheating the steel to a temperature not lower than the Ac_3 transformation point and quenching the steel by rapid cooling; and

[3] a step of tempering the steel at a temperature not higher than the Ac_1 transformation point.

The References

Kondo	US 5,938,865	Aug. 17, 1999
Agazzi	US 2010/0068549 A1	Mar. 18, 2010

The Rejection

Claims 1–10 stand rejected under 35 U.S.C. § 103(a) over Agazzi in view of Kondo.

OPINION

We reverse the rejection. We need address only claim 1, which is the broadest independent claim.

Agazzi makes a seamless steel tube having isotropic toughness at low temperatures to be made into a hydraulic cylinder barrel (¶¶ 1, 3). The tube is made by 1) sequentially hot rolling steel at a temperature higher than Ac_3 , 2) heating the tube at a temperature between Ac_1 and Ac_3 , 3) quenching the tube to establish in the steel a dual-phase or multiphase microstructure composed of ferrite and martensite and optionally bainite and/or retained austenite, 4) cold drawing the quenched tube, and 5) stress relieving the tube to improve its toughness (¶¶ 24–30).

Kondo makes “a seamless steel pipe having high strength, good toughness and excellent corrosion resistance, especially sulfide stress cracking resistance, which is characterized by a combination of specified chemical composition of raw materials (steel billet) and specified thermo-mechanical treatment of the material” (col. 1, ll. 11–16). The pipe is made by 1) sequentially hot rolling at 40% or more of cross sectional reduction ratio a low alloy steel, 2) finishing the hot rolling in a temperature range of 800–1100 °C, 3) promptly heating the resulting steel pipe in a complementary heating apparatus at a temperature and for a time satisfying formula (a): $23500 \leq (T+273) \times (21 + \log t) \leq 26000$, where T (°C) is a temperature not lower than 850 °C and t is time in hours, 4) quenching the pipe immediately after taking it out of the complementary heating apparatus, 5) optionally performing at least one intermediate heat treatment consisting of quenching or quenching and tempering, where the reheating temperature for the intermediate heat treatment’s quenching should be in the range of A_{c3} to $A_{c3}+100$ °C, and 6) tempering the pipe at a temperature not higher than A_{c1} as the last heat treatment (col. 7, ll. 27–50; col. 8, ll. 4–25). “When the condition of the formula (a) is satisfied in the complementary heating step, excellent toughness and corrosion resistance of the steel is obtained” (col. 19, ll. 3–5), and “since the steel pipe, which has been subjected to the in-line quenching and only one time tempering [(steps 4 and 6 above)] has high strength, high toughness and excellent corrosion resistance, it can be used satisfactorily without any other heat treatment in a severe corrosive environment” (col. 18, ll. 40–44). The intermediate heat treatment (step 5 above) further improves the steel’s toughness and corrosion resistance by suppressing abnormal grain growth and inhibiting grain boundary movement

such that the grain structure is ultrafine and uniform (col. 18, ll. 45–54; col. 19, ll. 13–22).

The Examiner concludes that “[i]t would have been obvious to one of ordinary skill in the art at the time of invention to subject the steel pipe of Agazzi to reheating to a temperature not lower than A_{c3} and quenching [(Kondo’s step 5 above)] and final tempering at a temperature not higher than A_{c1} [(Kondo’s step 6 above)], in order to ensure high strength, high toughness and excellent corrosion resistance, as taught by Kondo et al. (Columns 15-19)” (Ans. 3).

Setting forth a prima facie case of obviousness requires establishing that the applied prior art would have provided one of ordinary skill in the art with an apparent reason to modify the prior art to arrive at the claimed invention. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

The Examiner does not establish that Kondo’s disclosure of intermediate heat treatment which improves the steel pipe toughness and corrosion resistance achieved by Kondo’s complementary heating would have provided one of ordinary skill in the art with an apparent reason to use that intermediate heat treatment in Agazzi’s method which lacks Kondo’s complementary heating and makes a steel tube having isotropic toughness at low temperature to be made into a hydraulic cylinder barrel which Agazzi does not indicate needs improved corrosion resistance.

Thus, the record indicates that the Examiner’s rejection is based upon impermissible hindsight in view of the Appellant’s disclosure. *See In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967) (“A rejection based on section 103 clearly must rest on a factual basis, and these facts must be interpreted

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without hindsight reconstruction of the invention from the prior art”).

Accordingly, we reverse the rejection.

DECISION

The rejection of claims 1–10 under 35 U.S.C. § 103(a) over Agazzi in view of Kondo is reversed.

The Examiner’s decision is reversed.

REVERSED