

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

McWANE, INC.,
Petitioner,

v.

TOM W. WAUGH,
Patent Owner.

Case IPR2016-00266
Patent RE45,329 E

Before BART A. GERSTENBLITH, JEFFREY W. ABRAHAM, and
TIMOTHY J. GOODSON, *Administrative Patent Judges*.

ABRAHAM, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318 and 37 C.F.R. § 42.73

I. INTRODUCTION

McWane, Inc. (“Petitioner”) filed a Petition seeking *inter partes* review of claims 10–13 of U.S. Reissue Patent No. RE45,329 E (Ex. 1001, “the ’329 reissue patent”). Paper 1 (“Pet.”). Tom W. Waugh (“Patent Owner”) filed a Patent Owner Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”). On May 25, 2016, we instituted an *inter partes* review (“IPR”) of claims 10–13. Paper 8 (“Dec. on Inst.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 12, “PO Resp.”) and Petitioner filed a Reply (Paper 28, “Pet. Reply”). Patent Owner also filed a Motion to Amend (Paper 20) and a Substitute Motion to Amend (Paper 21, “Mot.”) to correct errors in the original Motion to Amend. Petitioner filed an Opposition to Patent Owner’s Motion to Amend¹ (Paper 27, “Opp.”) and Patent Owner filed a Reply in support of its Motion to Amend (Paper 29, “PO Reply”).

We held an oral hearing for this case on February 23, 2017, and a transcript of the hearing has been entered into the record of the proceeding as Paper 38 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 10–13 are unpatentable. We also deny Patent Owner’s Motion to Amend.

¹ We use the term “Motion to Amend” herein to refer to the Substitute Motion to Amend (as opposed to the original Motion to Amend) for ease of reference. Thus, all citations and references to the “Motion to Amend” or “Mot.” are to Paper 21, the Substitute Motion to Amend.

II. BACKGROUND

A. *Related Proceedings*

Seamless Pole, Inc., the exclusive licensee of Patent Owner, sued Petitioner for infringement of the '329 reissue patent in the U.S. District Court for the Northern District of Alabama, Southern Division, Case No. 2:15-CV-00051-SLB (Jan. 13, 2015). Pet. 2; Paper 6, 2.

The '329 reissue patent is a reissue of U.S. Patent. No. 8,567,155 (“the '155 patent”). Ex. 1001, [64]. In 2013, Seamless Pole sued Petitioner for infringement of the '155 patent in the U.S. District Court for the Northern District of Alabama, Southern Division, Case No. 2:13-CV-2028. Pet. 1. On May 7, 2014, Patent Owner filed the application that issued as the '329 reissue patent, U.S. Patent Application No. 14/272,076. Ex. 1001, [22]. On May 16, 2014, Petitioner filed a petition for *inter partes* review of the '155 patent, and the Board issued a decision instituting review on October 24, 2014. Ex. 1013 (IPR2014-00777, Paper 8).

On November 25, 2014, Patent Owner and Petitioner filed a Joint Request for Adverse Judgment Against Patent Owner in IPR2014-00777 because, *inter alia*, during prosecution of the application leading to the '329 reissue patent, Patent Owner canceled the claims of the '155 patent that were the subject of the IPR, and the Patent Office issued a notice of allowance for the '329 reissue patent on November 14, 2014. Ex. 1014, 2 (IPR2014-00777, Paper 12). The Board entered adverse judgment in IPR2014-00777 on January 13, 2015. Ex. 1015 (IPR2014-00777, Paper 14). The U.S. District Court for the Northern District of Alabama dismissed the district court case involving the '155 patent on December 30, 2014. Pet. 1.

Petitioner also identifies currently pending U.S. Application No. 14/633,713, which claims the benefit of the application that issued as the '155 patent, as related to this proceeding. *Id.* at 2.

B. The '329 Reissue Patent

The '329 reissue patent relates generally to tapered, hollow structural members, such as utility poles. Ex. 1001, 1:13–16. The '329 reissue patent teaches that poles can be formed using a centrifugal casting process, which “offers additional benefits over alternative production techniques such as metal forming.” *Id.* at 2:14–15. The '329 reissue patent further teaches that by using a variable-speed, variable-infusion casting method, involving increasing or decreasing the metal-pouring rate and spin speed of the mold, “poles can be formed with walls that are thick at the bottom and thin at top, that vary in thickness at specified points, or that are substantially uniform in wall thickness along the long axis of the pole.” *Id.* at 2:38–46. According to the '329 reissue patent, the specific thickness requirements for a utility pole are tied to the intended application requirements for that pole. *Id.* at 2:47–52. The '329 reissue patent also discloses utilizing a mold with a textured interior wall surface to form poles having a “pimpled exterior surface” which “augments the strength of the pole.” *Id.* at 3:53–58.

C. Illustrative Claim

Petitioner challenges claims 10–13 of the '329 reissue patent. Claim 10 is the only independent claim challenged, and is reproduced below:

10. A centrifugally cast, hollow pole comprising:
an elongated, hollow pole member having a tapered outer diameter with a first end and a second end, the first end having a smaller outer diameter than the second end,

wherein the hollow pole member is formed by centrifugal casting such that it has a substantially uniform wall thickness from a first location adjacent the first end to a second location adjacent the second end, and wherein a wall thickness at the second end is larger than the wall thickness between the first and second locations, the hollow pole member further comprising a running ring that extends outward from the second end, and a plurality of asymmetric pimples extending away from an outer surface of the pole member.

Ex. 1001, 6:59–7:5 (emphasis omitted).

D. The Instituted Grounds of Unpatentability

We instituted trial based on the following grounds of unpatentability:

References	Statutory Basis	Claims Challenged
Waugh ² and Ludwig ³	§ 103	10–13
Waugh, Ludwig, and Clow ⁴	§ 103	10–13
Waugh, Ludwig, Ladd, ⁵ and Johnston ⁶	§ 103	10–13
Waugh, Ludwig, Ladd, Clow, and Johnston	§ 103	10–13

² Waugh, U.S. Patent No. 5,784,851, issued July 28, 1998 (“Waugh,” Ex. 1002).

³ Ludwig, et al., U.S. Patent No. 2,577,423, issued Dec. 4, 1951 (“Ludwig,” Ex. 1009).

⁴ *Pipe Economy*, Clow Corporation (1971) (“Clow,” Ex. 1007).

⁵ Ladd, U.S. Patent No. 1,551,827, issued Sept. 1, 1925 (“Ladd,” Ex. 1011).

⁶ Johnston, U.S. Patent No. 3,134,147, issued May 26, 1964 (“Johnston,” Ex. 1010).

III. ANALYSIS

A. *Claim Construction*

We interpret claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). In applying the broadest reasonable construction, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). We address the parties’ proposed construction of two claim terms.

1. “formed by centrifugal casting”

Independent claim 10 recites that its hollow pole member is “formed by centrifugal casting.” Petitioner argues that despite this language, claim 10 is directed to a product, a hollow pole, and not to a method of manufacturing the pole. Pet. 8–9. Petitioner thus contends that claim 10 and claims 11–13, which depend therefrom, are product-by-process claims and, for the purpose of patentability, should be construed such that the claimed product is not limited by the recited process. *Id.* at 8–10. Petitioner also asserts that no construction of this term is necessary, because “it is ultimately of no consequence given the widespread disclosure of centrifugal casting in the prior art of record in this proceeding.” Pet. Reply 4.

Patent Owner contends that the phrase “formed by centrifugal casting” is a positive limitation that should be considered as part of the patentability determination. PO Resp. 20–22. In this regard, Patent Owner

asserts that “centrifugal casting does impart significant structural and functional properties to the resulting pole that are not present in poles that are not centrifugally cast.” *Id.* at 20. As evidence of this, Patent Owner states:

When a hollow structure is cast using a static casting process, slag, gasses and other impurities can become trapped in the metal when it solidifies which, in turn, reduce the strength of the metal. [Podbel Decl.] at ¶ 26. In contrast, when a hollow structure is cast by centrifugal casting, the slag, gasses and other impurities are forced to the inside surface of the metal before it freezes (solidifies). The result is [a] metal wall with fewer voids and inclusions, which exhibits greater strength than the same structure formed by static casting. *Id.* at ¶ 27.

Id. at 20–21. Patent Owner also directs us to Wallace,⁷ which states that the mechanical properties of a centrifugally cast iron pipe “compare favorably” with the properties of an iron pipe cast by static methods. *Id.* at 21 (citing Ex. 1018, 4). Patent Owner further argues that the broadest reasonable interpretation of “formed by centrifugal casting” is “a casting process in which molten metal is poured inside a rotating mold while the rotating mold is translated.” *Id.* at 22.

After considering the parties’ arguments and evidence presented during the course of this trial, we determine that it is not necessary to construe this phrase for purposes of this Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”). As discussed in further detail

⁷ John F. Wallace, *Engineering Aspects of Centrifugal Casting*, 61 TRANSACTIONS OF THE AMERICAN FOUNDRYMEN’S SOCIETY, 701–18 (1953) (Ex. 1018).

below, whether we treat claim 10 as a product by process claim, as Petitioner suggests, or consider it to be a positive limitation and adopt Patent Owner's construction, the outcome is the same in view of the disclosure of centrifugal casting in the prior art references.

2. “running ring that extends outward from the second end”

Claim 10 recites that its hollow pole member comprises a “running ring that extends outward from the second end.” The '329 reissue patent describes “mold-induced flanging of the large-diameter end of the tapered pole,” and discloses that “[t]he flange is simply a larger based circle, or ring, cast at the pole's large-diameter end.” Ex. 1001, 4:3–10. According to the '329 reissue patent, “this flanged ring is engaged by a control rail such that the pole can be run through a straight annealing furnace.” *Id.* at 4:10–11. Figure 5 of the '329 reissue patent shows the running ring and the rail being used to control the tapered pole as it moves through an annealing furnace. *Id.* at 4:53–55, 5:66–6:7.

Petitioner argues that this phrase should be construed as requiring “a flange extending outwardly around the second end of the pole member.” Pet. 16 (emphasis omitted). Petitioner contends that, beyond the aforementioned disclosure in the Specification, “the specification offers no detail regarding the shape, size, or other necessary structural characteristics of the running ring. Additionally, neither the prosecution history of the '329 reissue patent nor that of the original '155 patent offers any clear definition of ‘running ring.’” *Id.* at 15–16.

In our Decision on Institution, we stated:

We are not persuaded by Petitioner's argument that “given the absence of detail in the specification, the '329 reissue patent suggests the inventor—Mr. Waugh—

believed that *any flange* extending outwardly around the large-diameter end of the pole would be a suitable ‘running ring.’” Pet. 16 (emphasis added). As noted above, the Specification explicitly refers to the running ring as a flange that is circular or ring shaped. Ex. 1001, 4:7–9. Additionally, Petitioner’s construction fails to account for the word “ring” in the claim itself. Accordingly, on this record, and for purposes of this Decision, we find that the broadest reasonable interpretation of “running ring that extends outward from the second end” is a circular or ring-shaped flange extending outwardly from the second end of the pole member.

Dec. on Inst. 8.

Patent Owner argues that the Specification explicitly sets forth the functionality of the running ring, which “necessarily result[s] in specific structural requirements for the running ring.” PO Resp. 26. For example, the Specification states that the running ring can engage a control rail as it runs through an annealing furnace to prevent the pole from inadvertently sliding or rolling, and also allows the tapered pole to be placed inside a straight pole which is then rolled through the annealing furnace. *Id.* at 26–27 (citing Ex. 1001, 4:7–16, 6:1–7). Patent Owner’s declarant, Mr. Podbel, testified that a person of ordinary skill in the art would have understood that the running ring must be designed to have a specific thickness and diameter to properly engage and withstand the forces exerted on the running ring via a running rail or the pipe bell throat of a pipe, as the tapered pole moves through the annealing furnace either on its own or inside of another straight pipe, respectively. Ex. 2003 ¶¶ 51–55; PO Resp. 28–30. Patent Owner contends that Petitioner’s declarant, Mr. Jones, provided consistent testimony during his deposition. PO Resp. 30–33.

In view of this, Patent Owner submits that the phrase “running ring that extends outward from the second end” should be construed as:

a circular or ring-shaped flange, formed during the centrifugal casting process, that extends outwardly from the second end of the pole member, wherein the . . . flange is configured such that: (1) if the hollow pole member is rolled through an annealing oven, an inside surface of the flange engages a running rail in the annealing oven such that flange does not ride over the running rail; or (2) if the hollow pole member is placed in a cylindrical pipe for transport through an annealing oven, the flange engages the cylindrical pipe such that the hollow pole member does not slide out of the cylindrical pipe as the cylindrical pipe is rolled through the annealing oven.

Id. at 33 (emphasis omitted).

Petitioner argues that the Board should not adopt Patent Owner's proposed construction because it is unclear and improperly imports limitations into the claims. Reply 5. Petitioner also argues that claim 10 is a product claim, but Patent Owner's construction "improperly focuses on what the running [ring] *does* . . . as opposed to what it *is*." *Id.* at 6.

We agree with Petitioner that Patent Owner's proposed construction imports limitations into the claims. The claim language itself does not limit a running ring to a flange having a surface that engages a running rail in an annealing oven or allows the pole on which it is formed to be placed in a cylindrical pipe for transport through an annealing oven. If Patent Owner intended for the claim to include these alleged "specific structural requirements" of the running ring, it could have done so by explicitly claiming the subject matter (as it proposes in its Motion to Amend). Not having done so, Patent Owner may not import the various limitations based on desired functions into the single term "running ring" to impart a meaning different from what is indicated by the plain language of the claims and the written description. *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F. 3d 898,

904 (Fed. Cir. 2004) (“[I]t is improper to read a limitation from the specification into the claims.”); *E-Pass Techs., Inc. v. 3Com Corp.*, 343 F.3d 1364, 1369 (Fed. Cir. 2003) (“The problem is to interpret claims ‘in view of the specification’ without unnecessarily importing limitations from the specification into the claims.”); *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (“Generally speaking, we indulge a ‘heavy presumption’ that a claim term carries its ordinary and customary meaning.”).

Furthermore, the intrinsic evidence of record does not present a “clear indication . . . that the patentee intended the claims to be” limited to the embodiments identified by Patent Owner. *Liebel-Flarsheim*, 358 F.3d at 913. Patent Owner derives its proposed construction from structural features associated with a “post-cast annealing process,” but claim 10 does not mention annealing at all. Instead, it is directed to a centrifugally cast, hollow pole. And, as Petitioner points out, the portions of the Specification upon which Patent Owner relies relate to what the running ring does, not what it is. Reply 6. The Specification does contain a description of what the running ring is, stating that “[t]he flange is simply a larger based circle, or ring, cast at the pole’s large diameter end.” Ex. 1001, 4:7–9.

Accordingly, we see no reason to modify our prior determination in light of the record developed at trial. We, therefore, maintain that the broadest reasonable interpretation of “running ring that extends outward from the second end” is a circular or ring-shaped flange extending outwardly from the second end of the pole member.

B. Principles of Law

To prevail in this *inter partes* review of the challenged claims, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We analyze the instituted ground of unpatentability in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

Petitioner's declarant, Mr. Jones, testifies that a person of ordinary skill in the art at the time of the alleged invention would have had "(i) an undergraduate degree in engineering or a technical field (e.g., mechanical engineering or materials science) and (ii) approximately three years of work experience in the design and manufacture of hollow structural members (e.g., ductile iron pipe), including specific experience with centrifugal casting using the de Lavaud process." Ex. 1004 ¶ 13 (emphasis omitted).

Patent Owner's declarant, Mr. Podbel, testifies that a person of ordinary skill in the art would have "(1) a B.S. degree in mechanical

engineering, materials science or equivalent training; and (2) approximately 3 years or more of direct experience in the design and manufacture of centrifugally cast ductile iron hollow members.” Ex. 2003 ¶ 16.

We credit the testimony provided by the declarants for both parties and find that one of skill in the art would possess an undergraduate degree in mechanical engineering, materials science, or a related discipline, and at least three years of work experience in the design and manufacture of centrifugally cast, hollow structural members (e.g., ductile iron pipe). This level of ordinary skill is reflected not only by the information presented by the parties, but also by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art itself can reflect the appropriate level of ordinary skill in the art).

D. Claims 10–13 — Obviousness over Waugh and Ludwig

1. Waugh (Ex. 1002)

Waugh discloses a hollow, tapered utility pole formed using “conventional centrifugal casting” that “provides for a gradually increasing wall thickness along the entire length of the pole from the top of the pole to its butt.” Ex. 1002, Abstract. According to Waugh, one object of the invention is to provide a pole “having a wall thickness which can be varied to accommodate virtually any application and any strength requirement.” *Id.* at 2:6–10. Waugh explains that increasing the wall thickness towards the bottom end of the pole “provides greater cross sectional strength to the pole in its bottom portion where the greatest pole strength is desired.” *Id.* at 3:16–24 (internal reference numbers omitted); *see also id.* at 3:27–31 (stating that “depending on the particular application and strength required of the pole, the overall wall thickness of the pole may be varied during the

casting operation by the amount of casting material allowed to enter the centrifugal casting mold” (internal reference numbers omitted)). Waugh discloses embodiments of its tapered pole having a flange at its bottom, larger-diameter end. *Id.* at 3:32–36, 4:43–44 (claim 2), Fig. 2.

2. Ludwig (Ex. 1009)

Ludwig relates generally to molds used in the manufacture of cast iron pipes by the centrifugal casting process. Ex. 1009, 1:1–4. Ludwig states that “the pipe is formed by pouring molten pipe metal onto the inner surface of the rotating mold from a stationary delivery spout which extends through the mold while simultaneously moving the mold in a longitudinal direction.” *Id.* at 1:9–13. According to Ludwig, “[c]entrifugal forces arising from rotation of the mold distribute the molten metal to a substantially uniform thickness around the bore.” *Id.* at 1:14–16. Ludwig further teaches using a mold surface that is “characterized by indiscretely arranged and irregularly contoured indentations.” *Id.* at 3:45–48, Figs. 2, 3.

3. Analysis

Petitioner argues that the subject matter of claims 10–13 would have been obvious in view of Waugh and Ludwig. Pet. 18–41. Petitioner provides detailed explanations, including claim charts and the declaration of Mr. Jones, to show how Waugh and Ludwig disclose or suggest each limitation of claims 10–13, and that a person of ordinary skill in the art would have had a reason to combine the teachings of these references with a reasonable expectation of success. *Id.*; Ex. 1004.

In its Response, Patent Owner argues that Waugh and Ludwig fail to disclose a running ring based on Patent Owner’s construction of the term. PO Resp. 34–36; *see, e.g., id.* at 35 (focusing on the lack of an annealing

oven in Waugh). Patent Owner does not dispute that Waugh and Ludwig disclose every other limitation of claim 10, and does not argue that Waugh and Ludwig fail to disclose a running ring under our interpretation of the phrase as set forth in the Decision on Institution. *Id.* at 34–36. Nor does Patent Owner challenge Petitioner’s arguments regarding the reasons for combining the teachings of Waugh and Ludwig. *Id.*

For the reasons discussed above, we do not adopt Patent Owner’s proposed construction of running ring. Because Patent Owner’s arguments are based on a claim construction we did not adopt (*id.* at 34–36), we are left with Petitioner’s unchallenged arguments and evidence demonstrating that the subject matter of claims 10–13 would have been obvious in view of the combined teachings of Waugh and Ludwig, which we find to be persuasive.

Claim 10 recites a “centrifugally cast, hollow pole comprising: an elongated, hollow pole member having a tapered outer diameter with a first end and a second end, the first end having a smaller outer diameter than the second end.” As discussed above, Patent Owner argues that “centrifugally cast” is a positive limitation that should require “a casting process in which molten metal is poured inside a rotating mold while the rotating mold is translated.” PO Resp. 22. Patent Owner, however, does not argue that Waugh and/or Ludwig fail to disclose this limitation. And even though Petitioner disagrees that “centrifugally cast” is a positive limitation, Petitioner notes that Waugh discloses its pole member as being formed “utilizing conventional centrifugal casting methods,” and further includes a “detailed explanation of a centrifugal casting machine and a method of centrifugally casting its tapered pole member.” Pet. 20–21 (citing Ex. 1002, 2:1–5, 3:3–31, 3:49–4:18).

Therefore, the parties do not dispute that Waugh discloses a pole formed using centrifugal casting, or that Waugh's conventional centrifugal casting includes a casting process in which molten metal is poured inside a rotating mold while the rotating mold is translated. For example, in describing Waugh, Patent Owner refers to the "*mold travel speed*" used in Waugh. PO Resp. 11. Patent Owner's declarant, Mr. Podbel, likewise testifies that "the only centrifugal casting process described . . . in the Waugh '851 patent[] is a casting process in which metal is poured into a rotating mold while the rotating mold is translated." Ex. 2003 ¶ 41; PO Resp. 23.

Moreover, Ludwig teaches using a "well known centrifugal casting process" that includes "pouring molten pipe metal onto the inner surface of the rotating mold from a stationary delivery spout . . . while simultaneously moving the mold in the longitudinal direction." Ex. 1009, 1:5–13. Thus, the evidence of record demonstrates that Waugh and Ludwig disclose or suggest a "centrifugally cast, hollow pole" under either party's interpretation of the claim phrase.

The evidence of record also supports a finding that Waugh discloses a "hollow pole comprising: an elongated, hollow pole member having a tapered outer diameter with a first end and a second end, the first end having a smaller outer diameter than the second end." As Petitioner points out, Waugh expressly discloses "an elongated, hollow pole member which is formed by centrifugal casting so as to have an externally tapered shape." Ex. 1002, 4:29–31; Pet. 40. Waugh's figures illustrate an elongated, hollow, tapered utility pole that is "nearly identical" to those shown in the '329

reissue patent. *Compare* Ex. 1002, Figure 1 *with* Ex. 1001, Figure 1; Pet. 19–21.

Claim 10 further recites that “the hollow pole member is formed by centrifugal casting such that it has a substantially uniform wall thickness from a first location adjacent the first end to a second location adjacent the second end.” Waugh discloses a pole having “a wall thickness which can be varied to accommodate virtually any application or strength requirement.” Ex. 1002, 2:6–9; Pet. 23. Ludwig expressly discloses a hollow iron pipe having a substantially uniform wall thickness formed by centrifugal casting. Ex. 1009, 1:1–16. We agree with Petitioner that although Ludwig refers to pipes, not poles, a person of ordinary skill in the art would have been motivated to consider Ludwig in combination with Waugh because both references relate to centrifugal casting of elongated, hollow, cast iron products (Pet. 24, 40) and because “Waugh itself recognizes the analogous qualities of iron pipes” (*id.* at 25 (citing Ex. 1002, 1:55–62 (which states that “many 100+ year old cast iron water mains are still in use”))). We are persuaded by Petitioner’s argument that in view of Waugh’s disclosure that wall thickness can be varied to accommodate any application and strength requirement, and Ludwig’s disclosure of uniform wall thickness, it would have been obvious to a person of ordinary skill in the art to modify Waugh’s utility pole to have a substantially uniform thickness from a first location adjacent the first end to a second location adjacent the second end. *Id.* at 26 (citing Ex. 1004 ¶¶ 52–55). As we noted above, Patent Owner does not challenge Petitioner’s evidence or arguments that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Waugh and Ludwig as proposed by Petitioner.

Claim 10 requires that “a wall thickness at the second end is larger than the wall thickness between the first and second locations.” As discussed above, Waugh discloses that wall thickness can be varied for a particular application or strength requirement. Ex. 1002, 2:6–9, 3:28–31. Waugh also teaches that increasing wall thickness towards the bottom of the pole “provides greater cross sectional strength to the pole in its bottom portion where the greatest pole strength is desired.” *Id.* at 3:21–24 (internal reference number omitted). Petitioner directs us to these disclosures to support its argument that “[i]t would have been obvious to a person of ordinary skill in the art to provide an increased wall thickness at the larger-diameter end of Waugh’s utility pole independently from the flange (20) (e.g., for the purpose of increasing strength at that location).” Pet. 39 (citing Ex. 1004 ¶ 77). Patent Owner does not challenge Petitioner’s argument, which we find to be persuasive in view of Waugh’s disclosures.

Claim 10 also requires “a running ring that extends outward from the second end of the hollow pole.” Under our construction of this term, the running ring is a circular or ring-shaped flange extending outwardly from the second end of the pole member. Petitioner argues that Waugh’s flange (20), located at the larger-diameter end of its pole, corresponds to the running ring recited in claim 10. Pet. 35–38, 41 (citing Ex. 1002, 2:54–56, 3:32–36, Fig. 2); Reply 12. Figure 2 of Waugh shows a utility pole having a flange (20) extending from its lower, wider end. Figure 2 does not show any discontinuities in the outer surface of flange 20 such as would be present in a square, hexagonal, or other non-circular flange; rather, the shading indicates an evenly curved outer surface for flange 20. Ex. 1002, Fig. 2. According to Waugh, this flange is cast as part of the pole during the centrifugal casting

process. Ex. 1002, 4:60–63. Patent Owner does not dispute that Waugh discloses or suggests a circular or ring-shaped flange that extends from the pole member. Based on Waugh’s Figure 2, and because the flange is cast as part of the pole itself, which has a circular outer perimeter, we find that a person of ordinary skill in the art would understand from Waugh’s disclosure that the flange is circular or ring-shaped. *Id.*; *see also* Ex. 1004 ¶¶ 37 (stating that a “flange extending around the larger diameter end of the pole would be a ring-shaped flange.”).

Lastly, claim 10 requires “a plurality of asymmetric pimples extending away from an outer surface of the pole member.” As Petitioner points out, Ludwig discloses a mold for centrifugal casting of iron pipes having “‘indiscreetly arranged and irregularly contoured’ [indentations], (e.g., such that they are asymmetric),” which would impart a similar pattern on the surface of the cast pipe. Pet. 32–33 (citing Ex. 1009, 3:39–63), 41; Ex. 1004 ¶¶ 65–69. Ludwig also discloses various advantages of the indentations, including their ability to “hold the molten material as it comes in contact with rotating mold surface,” which Ludwig correctly characterizes as being of “great importance,” and their ability to pre-stress and strengthen the mold. Ex. 1009, 2:24–3:12; Ex. 1004 ¶ 69. We agree with Petitioner that in view of these advantages, a person of ordinary skill in the art would have been motivated to modify Waugh to include a textured molding surface as disclosed in Ludwig. Pet. 34.

We thus find Petitioner has demonstrated sufficiently that Waugh and Ludwig disclose or suggest all of the limitations of claim 10, and has provided evidence demonstrating a reason, based on a rational underpinning,

that a person of ordinary skill in the art would have combined the teachings of Waugh and Ludwig.

With regard to dependent claims 11–13, Petitioner presents evidence in the form of a claim chart to support its argument that Waugh discloses the additional limitations recited in each dependent claim. *Id.* at 57. Patent Owner does not contest any of Petitioner’s evidence or arguments. Upon review of Petitioner’s evidence, we adopt Petitioner’s analysis and find that Petitioner has met its burden of establishing that Waugh and Ludwig disclose or suggest each limitation of claims 11–13.

Having considered the parties’ contentions and supporting evidence developed during the trial, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 10–13 are unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Waugh and Ludwig.

E. Claims 10–13 — Obviousness over Waugh, Ludwig, and Clow

1. Clow (Ex. 1007)

Clow is a “complete catalog and reference book for engineers, buyers, and users of cast iron pipe.” Ex. 1007, 2. Clow discloses that its pipes are formed by centrifugal casting which “permits the thickness of the pipe wall to be varied to meet individual job requirements.” *Id.* at 13. Clow also discloses pipes containing ring-shaped flanges as part of “mechanical joints” and “flanged joints” on the end of pipes. *Id.* at 22–23, 37–40, 62–64.

2. Analysis

Petitioner argues that claims 10–13 are unpatentable under 35 U.S.C. § 103(a) as obvious over Waugh, Ludwig, and Clow. Pet. 42–49.

With regard to this challenge, Petitioner relies on the same arguments and evidence discussed above to demonstrate that Waugh and Ludwig

disclose or suggest all of the limitations of claims 10–13. *See id.* at 48–49. Petitioner acknowledges, however, that Waugh does not provide a clear three-dimensional image of its flange. *Id.* at 42. In view of this, Petitioner argues that Clow discloses circular or ring-shaped flanges extending outwardly from the end of cast iron pipes. *Id.* at 42–43. We agree, and Patent Owner does not dispute, that Clow discloses circular or ring-shaped flanges extending outwardly from the end of cast iron pipes. *See, e.g.*, Ex. 1004, 22–23.

Petitioner also relies on arguments similar to those discussed above regarding the combination of prior art references, namely that a person of ordinary skill in the art would have been motivated to consider Clow in combination with Waugh and Ludwig because all three relate to centrifugal casting of elongated, hollow iron products, and Waugh itself recognizes similarities between qualities of pipes and poles. Pet. 46. As an additional reason for combining Clow and Waugh, Petitioner argues that the flanges of Clow’s flanged and mechanical joints are configured to secure the flange to another object, much like Waugh’s flange is configured to enable a pole to be secured to a foundation. *Id.* at 47 (citing Ex. 1002, 3:32–36; Ex. 1007, 22–23, 37–40, 62–65; Ex. 1004 ¶¶ 86–88).

Patent Owner does not challenge Petitioner’s evidence or arguments that it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Waugh, Ludwig, and Clow as proposed by Petitioner. *See* PO Resp. 36–38 (relying on the argument that Waugh and Ludwig do not disclose a running ring, as construed by Patent Owner, and asserting that Clow fails to remedy that alleged deficiency).

For the same reasons discussed above in Section III.D.3, we find Petitioner has demonstrated sufficiently that Waugh, Ludwig, and Clow disclose or suggest all of the limitations of claims 10–13, and has provided evidence demonstrating a reason, based on a rational underpinning, that a person of ordinary skill in the art would have combined the teachings of Waugh, Ludwig, and Clow. Having considered the parties’ contentions and supporting evidence developed during the trial, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 10–13 are unpatentable under 35 U.S.C. § 103(a) over the combined teachings of Waugh, Ludwig, and Clow.

F. Claims 10–13 — Obviousness over Waugh, Ludwig, Ladd and Johnston; Obviousness over Waugh, Ludwig, Ladd, Clow, and Johnston

Petitioner argues that claims 10–13 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of (1) Waugh, Ludwig, Ladd, and Johnston; and (2) Waugh, Ludwig, Ladd, Clow, and Johnston. Pet. 49–56.

Although Petitioner maintains that “the end-use of the recited ‘running ring’ is immaterial to the patentability of claim 10 as it is an apparatus claim,” Petitioner acknowledges that Waugh, Ludwig, and Clow do not disclose the use of flanges for guiding a pole along rails in an annealing furnace. *Id.* at 49. Petitioner, therefore, cites Ladd as “evidence that it was well-known to use rails to support and guide pipes through an annealing furnace” (Reply 15–16; Pet. 53), and Johnston as “evidence that it was well-known to use ring-shaped, outwardly extending flanges to guide an elongated round object along rails in a straight path” (Reply 16; Pet. 53). Patent Owner’s arguments with regard to these combinations of references

are again based solely on Patent Owner’s proposed construction of “running ring.” PO Resp. 38–43.

We need not address these issues because (1) they are contingent on Patent Owner’s claim construction, requiring a flange having a surface that engages a running rail in an annealing oven or allows the pole on which it is formed to be placed in a cylindrical pipe for transport through an annealing oven, which we do not adopt, and (2) we have determined that Petitioner has shown by a preponderance of evidence that claims 10–13 are unpatentable in view of the combined teachings of Waugh and Ludwig, either alone or in combination with Clow, under our construction of the term running ring, which does not require a specific end use.

IV. CONTINGENT MOTION TO AMEND

Patent Owner filed a Substitute Motion to Amend, requesting substitution of claims in the event certain claims in the ’329 reissue patent were found to be unpatentable. Paper 21 (“Mot.”); *see also* Paper 35 (confirming that Patent Owner’s Motion to Amend is contingent on the outcome of the trial). Patent Owner’s Motion to Amend included an appendix of proposed substitute claims. Mot., Appendix A; 37 C.F.R. § 42.121 (requiring a motion to amend to include a claim listing, which may be contained in an appendix to the motion, to show the proposed changes clearly). As noted previously, we have determined that Petitioner has demonstrated by a preponderance of the evidence that claims 10–13 are unpatentable. Accordingly, we consider Patent Owner’s Motion to Amend.

Patent Owner has the burden of proving patentability of a proposed substitute claim. *See Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1334 (Fed. Cir. 2015) (“[T]he Board permissibly interpreted [37 C.F.R. § 42.20(c)] as

imposing the burden of proving patentability of a proposed substitute claim on the movant: the patent owner.’’). Accordingly, at a minimum, Patent Owner has the burden of showing that (1) the substitute claims overcome all the grounds under which independent claims 10–13 were determined to be unpatentable, namely, 35 U.S.C. § 103(a), and (2) its request meets all the procedural requirements concerning motions to amend set forth, for example, in our rules, in *Idle Free Systems, Inc. v Bergstrom, Inc.*, Case IPR2012-00027 (PTAB June 11, 2013) (Paper 26) (informative), and in *MasterImage 3D, Inc. v. RealD Inc.*, Case IPR2015-00040 (PTAB July 15, 2015) (Paper 42) (precedential). See *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1306 (Fed. Cir. 2015) (indicating 37 C.F.R. § 42.20(c) is “plainly applicable to motions to amend filed during [*inter partes* reviews]”); but see *In re Aqua Prods.*, 833 F.3d 1335 (Fed. Cir. 2016) (order granting rehearing *en banc* to address burdens of persuasion and production regarding motions to amend under 35 U.S.C. § 316(d) and vacating *In re Aqua Products*, 823 F.3d 1369 (Fed. Cir. 2016)).

A. Proposed Substitute Claims

Patent Owner proposes to substitute independent claim 14 for independent claim 10, and dependent claims 15 and 16 for dependent claims 11 and 13, respectively. Patent Owner cancels claim 12.

Proposed substitute claim 14 is reproduced below, with strikethrough showing the subject matter deleted from claim 10 and underlining showing the subject matter added to claim 10:

14. (Proposed substitute for original claim 10) A centrifugally cast, hollow pole member, comprising:

an elongated, hollow pole member having a tapered outer diameter with a first end and a second end, wherein the outer

diameter of the hollow pole member is tapered from the first end to the second end, the first end having a smaller outer diameter than the second end, wherein the hollow pole member is formed by a centrifugal casting process in which molten metallic casting material is poured into a rotating mold while the rotating mold is translated, and in which at least one of a pouring rate of molten metallic casting material, the revolutions per minute (RPM) of the rotating mold and the translation travel speed of the rotating mold is varied during the casting operation such that the hollow pole member has a substantially uniform wall thickness from a first location adjacent the first end to a second location adjacent the second end, and wherein a wall thickness at the second end is larger than the wall thickness between the first and second locations, the hollow pole member further comprising a running ring that extends outward from the second end, and a plurality of asymmetric pimples extending away from an outer surface of the pole member,

wherein the running ring comprises a circular or ring-shaped flange, formed during the centrifugal casting process, that extends outwardly from the second end of the pole member, wherein the flange is configured such that an inside surface of the flange will engage a running rail in an annealing furnace in such a manner that the hollow, tapered pole member may be rolled along a substantially straight passage through the annealing furnace.

Mot. 26–27 (Appendix A). Proposed dependent claims 15 and 16 merely change the dependency from original claims 10 and 12, respectively, to substitute amended claim 14. *Id.* at 27.

B. Analysis

1. Scope and Written Description

Patent Owner contends that substitute claim 14 retains or narrows all of the limitations of claim 10. *Id.* at 1–2. Specifically, Patent Owner asserts that substitute claim 14 is limited by the additional language directed to,

inter alia, (1) varying the pouring rate of molten metallic casting material, the RPM of the rotating mold, or the travel speed of the rotating mold during the casting operation, and (2) the configuration of the running ring. *Id.* Patent Owner points to where support for proposed amended claims 14–16 may be found in U.S. Application Serial No. 11/458,407 (Ex. 2007, “the ’407 application”), which is the application from which the ’155 patent issued.⁸ Mot. 2–4.

Petitioner does not challenge Patent Owner’s contention that the substitute claims do not expand the scope of the original claims or that the specification supports the new limitations of the substitute claims.

2. Patentability

Patent Owner contends that the proposed substitute claims are patentable over the prior art of record, including art Petitioner identified in the Petition and in its opposition to Patent Owner’s motion, as well as other material prior art known to Patent Owner. *Id.* at 13–24. Specifically, Patent Owner contends that the prior art of record fails to disclose or suggest the “running ring” and “centrifugal casting” limitations in substitute claim 14. *Id.*

Petitioner contends that the Board should deny Patent Owner’s motion because the substitute claims are unpatentable under the grounds of invalidity included in our Decision on Institution, and the substitute claims are unpatentable in view of additional prior art references identified in Petitioner’s Opposition to the Motion to Amend. Opp. 1.

⁸ As noted above, the ’329 reissue patent is a reissue of the ’155 patent.

a. Obviousness in View of Waugh, Ludwig, and Clow

i. The “running ring” Limitation

Substitute claim 14 recites:

a running ring that extends outward from the second end . . . wherein the running ring comprises a circular or ring-shaped flange, formed during the centrifugal casting process, that extends outwardly from the second end of the pole member, wherein the flange is configured such that an inside surface of the flange will engage a running rail in an annealing furnace in such a manner that the hollow, tapered pole member may be rolled along a substantially straight passage through the annealing furnace.

Mot. 26–27.

1. Claim Construction

Based on descriptions of the running ring in the ’407 application (Ex. 2007 ¶¶ 25, 40), Patent Owner contends that the broadest reasonable construction of this claim term is:

a circular or ring-shaped flange, formed during the centrifugal casting process, that extends outwardly from the second end of the pole member, wherein the . . . flange is configured such that a surface of the flange that faces the smaller diameter end of the hollow pole member will engage a running rail in an annealing furnace in such a manner that the flange will not ride over the running rail and will thus allow the hollow, tapered pole member to be rolled through the annealing furnace along a substantially straight path.

Mot. 12–13 (emphasis omitted). Patent Owner’s proposed construction largely mirrors the claim language itself, but further specifies that the “inside surface of the flange” recited in claim 14 is the surface of the flange that faces the smaller diameter end of the hollow pole member, and that the flange is configured to engage a running rail in an annealing furnace so that it will not ride over the running rail. *Id.* In light of these differences, we are

not persuaded by Petitioner’s argument that Patent Owner’s proposed construction is “entirely redundant as the same language is expressly added to the end of Claim 14.” Opp. 12. And although we recognize that Patent Owner could have proposed substitute claims that explicitly recited the language it now seeks to add through claim construction, in the absence of any substantive objection from Petitioner, we adopt Patent Owner’s proposed construction.

2. *Obviousness Analysis*

Patent Owner argues that Waugh fails to disclose or suggest the running ring limitation because Waugh is “completely silent as to the use of an annealing furnace to anneal the centrifugally cast pole.” Mot. 13. Patent Owner argues that Waugh’s flange is intended to enable the pole to be mounted to a foundation, and a person of ordinary skill in the art would understand that there are different design requirements for a running ring adapted to engage a running rail in an annealing furnace and a flange adapted for mounting the pole to a foundation. *Id.* at 13–14 (citing Ex. 2003 ¶ 62).

Patent Owner also argues that Ludwig does not “remedy the deficiencies” in Waugh because Ludwig’s pipes “are cylindrical and will roll straight through an annealing oven. Accordingly, a [person of ordinary skill in the art] would no[t] look to Ludwig to solve the problems that arise when a tapered pole is pushed through an annealing furnace.” *Id.* at 17 (citing Ex. 2003 ¶ 67). As a result, Patent Owner argues that “there is no need for a running ring in the pipes cast using Ludwig’s mold.” *Id.*

Patent Owner similarly argues that Clow fails to disclose the running ring limitation. *Id.* at 18. Specifically, Patent Owner asserts that Clow

discloses flanges used to attach two pipes together, which have design requirements that are different from a running ring adapted to engage a running rail in an annealing furnace. *Id.* Patent Owner further asserts that Clow's pipes are cylindrical, and will, therefore, roll straight through an annealing furnace without the need for a running ring. *Id.*

Petitioner contends that despite arguing that there are differences between the design requirements of a flange used to attach a pole to something and the design requirements for the claimed running ring, Patent Owner never explains what those differences are. Opp. 15. According to Petitioner, Patent Owner "never provides a single example of a structural difference between Waugh's flange 20 and Claim 14's 'running ring,' [and] never explains in any structural terms how the running ring would be 'configured' as claimed." *Id.* To the contrary, Petitioner asserts that Waugh's flange 20 has the same structural features as the claimed running ring, namely it extends outward, is centrifugally cast, and is circular or ring shaped. Further, to the extent any differences exist, "the process of selecting the characteristics of a flange for the purpose of engaging a running rail in the manner recited in Claim 14 would have been a basic engineering task well within the level of ordinary skill in the art." *Id.* at 16 (citing Ex. 1004 ¶¶ 14–16). Petitioner contends that Patent Owner never actually asserts that the claimed configuration of the running ring would not have been obvious to a person of ordinary skill in the art. *Id.* at 15.

After considering the parties' arguments and evidence, we find that Patent Owner has failed to demonstrate that the "running ring" limitation patentably distinguishes claim 14 over the prior art. Rather, the evidence of

record demonstrates that the claimed configuration of the running ring would have been obvious to a person of ordinary skill in the art.

It is undisputed that Waugh discloses a circular flange formed during centrifugal casting that extends away from the second end of the pole member. Tr. 63:23–64:9. Even though Waugh depicts its flange as being used to attach the pole to another structure, “[c]ommon sense teaches . . . that familiar items may have obvious uses beyond their primary purposes.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007); *see also id.* at 421 (“A person of ordinary skill is also a person of ordinary creativity, not an automaton.”). Waugh does not impose any limitations, structural or functional, on its flange, and despite Patent Owner’s argument that the design requirements are not the same for different types of flanges, the record developed during trial is devoid of any evidence of structural differences (e.g., thickness or diameter) between Waugh’s flange and the claimed running ring. In addition, the ’329 reissue patent describes the running ring as “simply a larger based circle, or ring, cast at the pole’s large-diameter end” (Ex. 1001, 4:7–9), which is what Waugh discloses.

Moreover, claim 14 does not require use of a flange in an annealing oven. Rather, claim 14 requires only that the running ring *is configured* to engage a running rail in an annealing furnace in a certain way. It is undisputed that annealing was known to a person of ordinary skill in the art, as was the presence of running rails inside annealing furnaces. *See, e.g.*, Ex. 1010; Ex. 1011. The evidence of record supports the conclusion that a person of ordinary skill in the art would have known how to make a flange that is configured to engage a running rail in an annealing furnace to allow it to roll through the furnace along a substantially straight path, as required in

claim 14, once that person had certain information about the running rail. Opp. 16; Tr. 65:8–15; PO Reply 9; Ex. 1026 ¶ 15; *see also KSR*, 550 U.S. at 418 (“[A] court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”). Furthermore, testimony from Petitioner’s declarant, Mr. Jones, suggests that a flange can operate as a “running ring” and also serve as a flange for mounting the pole. Ex. 2006, 68:16–23 (“I could also say, well, do I want to make this running ring serve as a flange for mounting the pole when I do that? There are, you know, a lot of design considerations that I think could be looked into from a running ring standpoint.”).

In view of the structural similarities of Waugh’s flange and the claimed running ring, we agree with Petitioner that “Waugh’s flange 20 is ‘the same structural feature as the running ring (25) disclosed in the ’329 reissue patent’” (Opp. 16 (quoting Ex. 1026 ¶ 12)), especially considering the lack of evidence regarding any meaningful structural differences between the two. Combined with the evidence of record establishing what a person of ordinary skill in the art would have known regarding how to configure flanges to engage running rails in annealing furnaces, we find that not only has Patent Owner failed to meet its burden of establishing patentability, but also the evidence of record demonstrates that the subject matter of the running ring limitation would have been obvious to a person of ordinary skill in the art.

ii. The “variable casting” Limitation

Substitute claim 14 recites:

the hollow pole member is formed by a centrifugal casting process in which molten metallic casting material is poured into a rotating mold while the rotating mold is translated, and in

which at least one of a pouring rate of molten metallic casting material, the revolutions per minute (RPM) of the rotating mold and the translation travel speed of the rotating mold is varied during the casting operation.

Mot. 26.

1. Claim Construction

Similar to the arguments made with respect to claim 10, Patent Owner acknowledges that claim 14 is a product-by-process claim, but argues this is a positive limitation because centrifugal casting imparts significant structural and functional properties to the resulting pole that would not be present if the poles are not centrifugally cast. Mot. 6–8. Petitioner again argues that centrifugal casting is not a positive limitation, and further maintains that “it is ultimately of no consequence given the widespread disclosure of centrifugal casting in the prior art of record in this proceeding.” Opp. 11.

As discussed in more detail below, whether we treat claim 14 as a product by process claim, as Petitioner suggests, or consider it to be a positive limitation and adopt Patent Owner’s construction, the outcome is the same in view of the disclosure of centrifugal casting in the prior art references.

2. Obviousness Analysis

Patent Owner asserts that Waugh does not disclose varying the metal pour rate, mold travel speed, or mold rotational speed during the casting process. Patent Owner directs us to the ’329 reissue patent, which characterizes Waugh as disclosing a “[s]ingle-speed casting method.” Mot. 14 (citing and quoting Ex. 1001, 2:30–32). According to Patent Owner, “[t]here is no better evidence as to what the Waugh ‘851 Patent

would convey to a person of ordinary skill in the art than the statement of the inventor himself characterizing his own prior invention.” PO Reply 10.

Mr. Podbel interprets the phrase “[s]ingle-speed casting method” to mean that no changes are made to the material pour rate, the mold travel speed, or mold rotational speed during the pole casting cycle.” Ex. 2003 ¶ 33. Mr. Podbel also testifies that it is possible to produce Waugh’s tapered pole having a gradually increasing wall thickness from the tip of the pole to the base using a constant mold travel speed, constant mold rotational speed, and constant pour rate. *Id.* ¶¶ 34–37. According to Mr. Podbel:

If the centripetal and frictional forces holding the metal in place against the tapered mold is not sufficient, the loss of friction between the metal and mold can allow the forces of gravity and the downhill component (towards the base end of the mold) of centripetal force (arising as a result of the tapered shaped of the mold) could push the molten metal towards the larger diameter end (base) of the mold.

Id. at ¶ 36. Patent Owner contends that Petitioner’s declarant, Mr. Jones, agreed that it is possible that “sufficiently large g-forces” could result in the wall thickness actually being thicker at the butt end of the pole and thinner at the top when using a constant pour rate. Mot. 16 (citing Ex. 2006,⁹ 59:25–60:12).

Petitioner argues that “[t]he proper question is not how the ’329 reissue patent itself describes Waugh, but what the actual disclosure of Waugh would have fairly conveyed to a person of ordinary skill at the time of the invention.” Opp. 18. Petitioner notes that Waugh never characterizes its own method as “single speed.” *Id.* (citing Ex. 1024, 75:3–8, 76:12–15;

⁹ In the Motion to Amend, Patent Owner mistakenly cites to Ex. 2005, which is the Declaration of Tom W. Waugh. The proper citation is to Ex. 2006, which is the transcript of the deposition of Mr. Jones.

Ex. 1026 ¶ 20). Petitioner also points out that “Patent Owner never asserts that adjusting the pour rate, travel speed, or spin speed *would not have been obvious* to a person of ordinary skill in view of Waugh or any other prior art reference.” *Id.* As to Mr. Podbel’s testimony regarding the downhill component of centripetal forces, Petitioner asserts that Mr. Podbel offers only a hypothetical example, and does not offer an opinion as to whether these types of forces actually would be insufficient to hold the material against the mold. *Id.* at 19. According to Petitioner, Mr. Podbel never made any calculations of, and was unsure about, the magnitude of the downhill component of centripetal force. *Id.* at 19–20 (citing Ex. 1024, 84:3–24).

To the contrary, Petitioner argues that if these forces are indeed sufficient to hold the material against the mold, then it would be necessary to use a variable casting method in Waugh to produce Waugh’s tapered pole having a gradually increasing wall thickness from the tip of the pole to the base. *Id.*; Pet. 27–29. Petitioner further argues that Mr. Podbel admitted that a person of ordinary skill in the art would have known that pour rate, spin speed, and translation speed could have been varied during the casting process. Opp. 20 (citing Ex. 1024, 50:18–52:5). Petitioner contends that adjusting these variables is “basic physics.” *Id.* (citing Ex. 1026 ¶ 18). In this regard, Petitioner’s declarant, Mr. Jones, testifies:

the resulting wall thickness of a cast elongate member is generally dependent on the pour rate of the molten material and the speed at which the mold carriage moves relative to the spout depositing molten material. Individually or in combination, varying these parameters controls the amount of molten material deposited per unit length on the interior of the mold These are basic engineering principles and would have been readily appreciated by a person of ordinary skill in the art in the mid-2000’s.

Ex. 1004 ¶ 23.

We agree with Petitioner that the variable casting limitation does not distinguish claim 14 over the prior art. We are not persuaded by the characterization of Waugh in the '329 reissue patent as a “single speed” process. Waugh does not expressly state that it uses a single speed casting process, and Waugh is silent with regard to whether it uses a constant or variable metal pour rate, spin speed, and translation speed.

Waugh, however, does state that its poles are “centrifugally cast in a manner which imparts a tapered shape to the external linear dimensions of the pole 10 from pole butt 16 to pole top 12” (Ex. 1002, 4–6), and that “[t]he overall thickness of the walls 18 of the pole 10 is controlled by the quantity of casting material allowed to enter the mold 50 during the casting operation (*id.* at 4:14–18). Waugh also states that thickness can vary in order to accommodate “virtually any application and any strength requirement.” *Id.* at 1:6–9.

We credit Mr. Jones’ testimony that a person of ordinary skill in the art would have known that pour rate and translation speed can control the quantity of molten material deposited per unit length on the interior of the mold, which, in turn, affects the thickness of a cast elongate member, as it is consistent with teachings from other prior art references Petitioner identifies. For example, U.S. Patent No. 4,095,643 discloses that “[t]he pouring rate and the travel rate of the casting machine determines the thickness of the resultant cast pipe.” Ex. 1019, 1:49–51. Additionally, it is undisputed that a person of ordinary skill in the art would have known that it was possible to control and vary pour rate, spin speed, and translation speed during the casting process. Ex. 1024, 50–52.

Accordingly, we find that it would have been obvious to a person of ordinary skill reviewing the disclosure of Waugh to control the quantity of molten material deposited per-unit-length along Waugh's mold by varying the material pour rate and/or mold travel speed. Thus, despite Patent Owner's characterization of Waugh as disclosing a "single speed" casting process, we find that a person of ordinary skill in the art, reviewing Waugh, would not have understood Waugh to be limited to such a casting process. The fact that it *may be possible* to achieve Waugh's desired gradually increasing wall thickness from top to bottom using a "single speed" casting process does not detract from what a person of ordinary skill in the art would have understood upon reviewing Waugh. *Syntex (U.S.A.) LLC v. Apotex, Inc.*, 407 F.3d 1371, 1380 (Fed. Cir. 2005) ("What a reference teaches or suggests must be examined in the context of the knowledge, skill, and reasoning ability of a skilled artisan."); *see also* Ex. 1004 ¶ 59 (stating that a person of ordinary skill in the art would have known that the same technique used to prepare Waugh's uniformly varying wall thickness could be used to impart a uniform wall thickness to Waugh's tapered utility pole).

Furthermore, Petitioner is correct that Patent Owner never argues that variable casting would not have been obvious to a person of ordinary skill in the art in view of Waugh. Opp. 18; Tr. 63:7–16.

Based upon our review of the arguments and evidence developed during trial, we find that not only has Patent Owner failed to meet its burden of proving patentability, but that the evidence of record demonstrates that the subject matter of the variable casting limitation would have been obvious to a person of ordinary skill in the art over the combined teachings of Waugh, Ludwig, and Clow.

iii. Remaining Limitations in Claims 14–16

Aside from the additional language specifying that “the outer diameter of the hollow pole member is tapered from the first end to the second end,” the remaining elements of claim 14 are the same as those recited in claim 10. It is undisputed that Waugh discloses an elongated hollow pole member tapered from the first end to the second end. Ex. 1002, Abstract, 1:65–67, Figs. 1, 2.

Having determined the obviousness of the newly added aspects of the proposed substitute independent claims, we rely on the above discussion addressing the common limitations of claim 10 and substitute claim 14 (Sections III.D and III.E) to show the obviousness of the substitute claims overall. Pet. 18–49.

iv. Conclusion

For the reasons explained above, we are persuaded that the subject matter of claims 14–16 would have been obvious over the combination of Waugh, Ludwig, and Clow, as discussed above, with a similar rationale applied to combine the teachings and suggestions of the references meeting all of the elements of claims 14–16.

b. Obviousness over Waugh, Ludwig, Clow, and Pierrel or Clark

In response to the claim amendments in Patent Owner’s Motion to Amend, Petitioner identifies two new prior art references that purportedly disclose the variable casting features recited in substitute claim 14. Opp. 23–25.

i. Clark (Ex. 1027)

Clark is directed to a method for casting pipes that includes “increasing the rotative speed of the mold during the final stages of the pipe

casting operation.” Ex. 1027, 1:63–67. According to Clark, increasing the speed reduces the production of defective pipes. *Id.* at 1:89–91. These defects include thin or defective final ends of cast pipes. *Id.* at 1:43–47; *see also id.* at 1:29–32 (describing “the thinning down” of the end of the pipe “to an objectionable extent”). Clark discloses an electric system for controlling the rotating speed of the mold. *Id.* at 2:41–74.

ii. Pierrel (Ex. 1028)

Pierrel is also directed to a method for centrifugal casting, in particular the De Lavaud casting method, which includes pouring molten cast iron into a rotating mold via a feed channel. Ex. 1028, 1:1–14. Pierrel explains that:

It is often necessary to vary the rate of flow of the molten iron poured into the mold. This is the case because in a given mold, when the output of the ladle is constant and the cast iron flows with a constant translational speed, certain irregularities in the thickness of the pipes occur always in the same spot.

Id. at 1:25–30. Pierrel aims to “provide a casting method . . . which allows the flow rate of the molten iron poured into the mold to be varied in a simple and precise manner.” *Id.* at 1:55–58. Pierrel achieves this by varying the inclination of the feed channel. *Id.* at 1:58–60.

iii. Obviousness Analysis

Petitioner argues that Clark and Pierrel disclose increasing the RPM of the casting mold and varying the pour rate during the casting operation, respectively. Opp. 23–25. Petitioner further argues that it would have been obvious to a person of ordinary skill in the art to vary the RPM of Waugh’s mold during casting in order maintain a consistent wall profile, as Clark

teaches, or to vary the pour rate to help avoid irregularities in the thickness of the pipe as Pierrel teaches. *Id.* at 24–25.

Petitioner thus asserts that the subject matter of substitute claims 14–16 would have been obvious in view of the combined teachings of Waugh, Ludwig, Clow, and Clark or Pierrel. *Id.*

In response, Patent Owner states only that Clark and Pierrel fail to disclose the running ring limitation of substitute claim 14. PO Reply 12.

It is thus undisputed that Clark and Pierrel disclose a casting process in which molten metallic casting material is poured into a rotating mold while the mold is translated in which at least the pouring rate of molten metallic casting material or the RPM of the rotating mold is varied during the casting operation. We, therefore, agree with Petitioner that “Patent Owner has not established that the variable casting features added to Claim 14 patentab[ly] distinguish Claim 14 from the prior art.” Opp. 24–25. Petitioner also has provided a valid reason why a person of ordinary skill in the art would have modified Waugh’s casting method in view of Clark or Pierrel, namely to maintain a consistent wall profile, as Clark teaches, or to help avoid irregularities in the thickness of the pipe, as Pierrel teaches.

We refer to our discussion above regarding the remaining limitations in claim 14, including the running ring limitation. We thus find that the subject matter of claims 14–16 would have been obvious over the combination of Waugh, Ludwig, Clow, and Clark or Pierrel.

C. Other Challenges to the Proposed Substitute Claims

Petitioner contends that (1) Patent Owner failed to meet its burden of establishing that it is entitled to the relief requested under Rule 42.20(c), (2) the substitute claims are indefinite, and (3) the proposed substitute claims

are unpatentable in view of Ladd and Johnston in combination with Waugh, Ludwig, and Clow. Opp. 1. Because we deny Patent Owner's Motion to Amend on the basis that claims 14–16 are unpatentable under 35 U.S.C. § 103(a) as obvious over Waugh, Ludwig, and Clow, either alone or alternatively in combination with Clark or Pierrel, we do not reach or decide Petitioner's other challenges with respect to the substitute claims.

V. CONCLUSION

Based on the information presented, we conclude that Petitioner has shown by a preponderance of the evidence that claims 10–13 of the '329 reissue patent are unpatentable under 35 U.S.C. § 103(a). Patent Owner's Motion to Amend is denied.

VI. ORDER

For the reasons given, it is hereby
ORDERED that claims 10–13 are unpatentable under 35 U.S.C.
§ 103(a);
FURTHER ORDERED Patent Owner's Motion to Amend is denied;
and
FURTHER ORDERED that, because this is a Final Written Decision,
parties to the proceeding seeking judicial review of the Decision must
comply with the notice and service requirements of 37 C.F.R. § 90.2.

Case IPR2016-00266
Patent RE45,329 E

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