

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MITSUBISHI CABLE INDUSTRIES, LTD. and
MITSUBISHI CABLE AMERICA, INC.,
Petitioners,

v.

GOTO DENSHI CO., LTD.,
Patent Owner.

Case IPR2015-01108
Patent 7,238,888 B2

Before JAMESON LEE, JAMES B. ARPIN, and SCOTT C. MOORE,
Administrative Patent Judges.

MOORE, *Administrative Patent Judge.*

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

I. INTRODUCTION

Mitsubishi Cable Industries, Ltd., and Mitsubishi Cable America, Inc. (collectively, “Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–8 (Paper 1; “Pet.”) of U.S. Patent No. 7,238,888 B2 (Ex. 1001; “the ’888 Patent”). Pursuant to 35 U.S.C. § 314, we instituted this proceeding as to each of the challenged claims. Paper 8 (“Dec.”)

After institution of this review, Patent Owner filed a Patent Owner’s Response (Paper 11, “PO Resp.”). Pursuant to our Scheduling Order, any patentability arguments that Patent Owner did not include in the Patent Owner Response are waived. Paper 9, 3. Petitioner also filed a Reply (Paper 14, “Reply”) to the Patent Owner Response. A hearing was held on June 14, 2016, and a transcript of that hearing is included in the record. See Paper 19 (“Tr.”).

Petitioner relies on declaration testimony from Dr. Richard W. Klopp (Ex. 1006) regarding the patentability of the challenged claims, and also submitted an affidavit from Mr. Christopher Butler to authenticate certain documents (Ex. 1013). Patent Owner has not submitted declaration testimony. No motions are pending currently in this proceeding.

We have jurisdiction under 35 U.S.C. § 6. This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the challenged claims. Based on the record before us, Petitioner has demonstrated by a preponderance of the evidence that claims 1–8 of the ’888 Patent are unpatentable.

II. BACKGROUND

A. *Related Proceedings*

On December 23, 2014, Patent Owner filed a lawsuit against Petitioner alleging infringement of the '888 Patent: *Goto Denshi Co., Ltd. v. Mitsubishi Cable Industries, Ltd.*, Case No. 2:14-cv-09815 (C.D. Cal.). Pet. 58; Paper 6 § III. That case currently is stayed pending the outcome of this proceeding. Paper 18, 1.

B. *The '888 Patent*

The '888 Patent is titled “Wire for Coil,” and discloses an “improvement in a coil wire having a square sectional shape” that provides “a higher-performance and higher-quality coil . . . at a price almost equal to that of a conventional round wire.” Ex. 1001, Title, 2:3–8.

The '888 Patent indicates that coils manufactured from wires having square cross-sections (“square” wires) have a higher “packing factor” than coils manufactured from wires having circular cross-sections (“round” wires). Ex. 1001, 1:10–22. The higher packing factor that can be obtained from using square wires results in a coil having improved performance characteristics. *See, e.g., id.* at 1:65–67, 2:49–64.

To improve the packing factor, it is preferable that a coil wire have an “ideal square” cross-section, i.e., “a shape in which chamfers (including arc-shaped chamfers . . . and linear chamfers) are not provided at all the corners” of the square wire’s cross-section. *Id.* at 1:35–39. Large chamfers also can result in an undesirable “rolling phenomenon” that can further decrease the packing factor of a coil constructed of square wire. *Id.* at 1:62–67.

However, there are drawbacks associated with using square wires that are not chamfered. Square wires without chamfers are difficult to manufacture because it is difficult to provide an insulating layer of uniform thickness on a square wire. *Id.* at 1:43–55. Moreover, the insulating layers of square wires without chamfers tend to become damaged during the process of winding a coil. *Id.* at 1:55–60.

The '888 Patent's solution to the above problems is a wire having a square sectional shape with chamfers at all four corners, wherein the dimensions of the chamfers are "optimized for the length of one side of a square." Ex. 1001, 2:3–15, 25–34, 49–52. According to the Specification, these optimal dimensions avoid undesirable variations in the thickness of the insulating wire, and also avoid the undesirable rolling phenomenon during the coil winding process. *Id.* at 2:52–55.

C. Challenged Claims

Challenged claims 1 and 3 are independent. Each of challenged claims 2, 5, and 6 depends directly or indirectly from claim 1. Each of challenged claims 4, 7, and 8 depends directly or indirectly from claim 3.

Independent claims 1 and 3 are reproduced below.

1. A wire for use in a coil, said wire having a square sectional shape,

wherein chamfers are provided at four comers in the section of the square, and sectional area of said wire having the chamfers is at least 1.15 times as large as that of a circle having a diameter which is the same as the length of one side of said square.

3. A wire for use in a coil, said wire having a square sectional shape,

wherein chamfers are provided at four corners in the section of the square, and overall length of an outer circumference of the section of said wire having said chamfers is at least 1.09 times as long as circumference of a circle having a diameter which is the same as the length of one side of said square.

Ex. 1001, 8:2–8, 16–24.

D. References Relied Upon

Petitioner relies on the following references in support of the instituted grounds of unpatentability:

References and Materials	Exhibit No.
Japanese Pat. Pub. No. 2003-245711 (publ'd Sept. 2, 2003) ("Sugita")	1002
Japanese Pat. Pub. No. 2002-260461 (publ'd Sept. 13, 2002) ("Harada")	1005
MWS Wire Industries Web Pages ("MWS Wire")	1011–1012

Dec. 4–5, 20.

Petitioner asserts that Sugita, Harada, and MWS Wire are prior art under 35 U.S.C. §§ 102(a) and 102(b). Pet. 9–10. Patent Owner does not dispute this assertion.

Based on the evidence of record concerning Sugita and Harada, and, in particular, the publication dates set forth on the faces of those references (see Ex. 1002, 2; Ex. 1005, 2), we are persuaded that Sugita and Harada qualify as prior art under 35 U.S.C. §§ 102(a) and 102(b). Based on the evidence of record concerning MWS Wire, and, in particular, the testimony of Dr. Klopp that he downloaded MWS Wire from the "Wayback Machine"

(Ex. 1006 ¶ 203), the footers of MWS Wire (see Exs. 1011, 1012), and the Butler Affidavit explaining the significance of those footers (Ex. 1013), we are persuaded that MWS Wire qualifies as prior art under 35 U.S.C. §§ 102(a) and 102(b).

E. Instituted Grounds of Unpatentability

Challenged Claims	Statutory Basis	References
1–8	35 U.S.C. §§ 102(a) and 102(b)	Sugita
1–8	35 U.S.C. §§ 102(a) and 102(b)	Harada
1–8	35 U.S.C. § 103(a)	Sugita and MWS Wire

Dec. 20.

III. ANALYSIS

A. *Claim Construction*

1. Claim Construction Standard

We interpret claims of an unexpired patent using the broadest reasonable interpretation in light of the specification of the patent. 37 C.F.R. § 42.100(b); see *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (concluding the broadest reasonable construction “regulation represents a reasonable exercise of the rulemaking authority that Congress delegated to the Patent Office”). There is a presumption that claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art in the context of the specification. See *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An

applicant may rebut that presumption by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

In our Decision to Institute, we construed five claim terms: “chamfer,” “length of one side of said square,” “arc-shaped,” “a wire for use in a coil,” and “a coil wire.” Dec. 6–10. Petitioner does not dispute any of the claim constructions that we adopted in our Decision on Institution. *See* Reply 4–7. Patent Owner disputes our constructions of “a wire for use in a coil” and “a coil wire,” but does not dispute our constructions of “chamfer,” “length of one side of said square,” or “arc-shaped.” *See* PO Resp. 5–8.

2. Confirmation of Undisputed Claim Constructions

As discussed above, neither party disputes the constructions we adopted for the claim terms “chamfer,” “length of one side of said square,” or “arc-shaped.” Consequently, on this record and to the extent necessary for our Final Written Decision, we now confirm our constructions of these three claim terms as follows.

a. “chamfer”

“Chamfer” means “any corner break, including linear or arc-shaped, on the corner of an otherwise square wire.” Dec. 7.

b. “length of one side of said square”

“Length of one side of said square” means “the length of the side of the smallest circumscribing square surrounding the square wire with chamfers.” Dec. 8.

c. “arc-shaped”

“Arc-shaped” means “a curved shape such that the radius of curvature is the same at all points along the curve.” Dec. 8.

3. Disputed Claim Terms

As to the disputed claim terms, the issue is whether the broadest reasonable interpretation of “a wire for use in a coil” and “a coil wire” encompasses a wire intended for use in a coil. In our Decision on Institution, we construed the terms “a wire for use in a coil” and “a coil wire,” which appear in the preambles of the challenged claims, as non-limiting statements of intended use. Dec. 9. We rejected Patent Owner’s argument that the claim language “a wire for use in a coil” was “added during prosecution to demonstrate patentability.” Dec. 9 (internal quotation omitted). As we noted in our Decision on Institution, the February 5, 2007, Amendment indicates that the language “a wire for use in a coil” was added to the claims to make clear that the claims are “directed to a wire with a square section, *not necessarily a coil.*” *Id.* (quoting Ex. 3001, 4, emphasis added).

Patent Owner argues in its Response that “a wire for use in a coil” and “a coil wire” would have been understood by a person of ordinary skill in the art to refer to a “wire formed into a winding structure.” PO Resp. 6. But this argument is directly contrary to the clear and unambiguous statement in

the February 5, 2007 Amendment that the preamble language “a wire for use in a coil” was added to the claims to make clear that the claims are “directed to a wire with a square section, *not necessarily a coil.*” Ex. 3001, 4 (emphasis added). Patent Owner also does not offer persuasive evidence that a person of ordinary skill in the art would have interpreted the claims in the manner it proposes. In particular, Patent Owner’s citations to column 1, lines 23–27, and column 2, lines 61–64, of the ’888 Patent (see PO Resp. 6–7) are unavailing. The Specification indicates that a “winding method” can be used “for obtaining a coil shape” from a “square wire,” but does not state or imply that the claim terms “a wire for use in a coil” or “a coil wire” would require a wire that had already been formed into a winding structure. See Ex. 1001, 1:23–27. The Specification also describes a “coil winding structure using the coil wire,” but does not indicate that the term “coil wire” necessarily refers to a wound structure. See Ex. 1001, 2:61–64. In addition, a different portion of the Specification describes a “coil wire” as being a wire from which a “coil can be obtained.” Ex. 1001, 2:3–8. This intrinsic evidence makes clear that a “coil wire” need not necessarily be formed into a “coil.” Accordingly, on this record, we are not persuaded that a person of ordinary skill in the art would read the preamble terms “a wire for use in a coil” and “a coil wire” as limited to a “wire formed into a winding structure.” Instead, we conclude as follows:

a. “a wire for use in a coil”

The recitation of “for use in a coil” in the preamble term “a wire for use in a coil” is a non-limiting statement of intended use. See Dec. 9.

b. “a coil wire”

The recitation of “coil” in the preamble term “a coil wire” is a non-limiting statement of intended use. *See* Dec. 9.

4. Preambles of Claims 1–8

Patent Owner argues separately that the preambles of claims 1–8 should be construed as claim limitations. *See* PO Resp. 7–8. In particular, Patent Owner asserts that the preambles of claims 1–8 give “life, meaning, and vitality” to the claims because the Specification “discloses, unequivocally, that the claims relate to a ‘coil wire,’” and because it is an “object” of the invention “to provide a coil wire by which a . . . **coil** can be obtained.” PO Resp. 7–8 (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). Having reviewed the evidence cited by Patent Owner, however, we are not persuaded that the Specification limits the scope of the claimed invention to a wire that is formed into a winding structure. In addition, as discussed above, the recitations of “for use in a coil” and “coil” in the preambles do not require “a wire formed into a winding structure.” Thus, treating the preambles as claim limitations would not narrow the scope of the claims in the manner that Patent Owner argues is necessary in order to align the claims with the Specification. *See* PO Resp. 7–8.

We note, however, that the preambles of claims 1 and 3 also recite “[a] wire . . . said wire having *a* square sectional shape” (emphasis added). This language provides the antecedent basis for the recitations of “*the* square” (emphasis added) in the bodies of claims 1 and 3. “[W]hen the limitations in the body of the claim rely upon and derive antecedent basis

from the preamble, then the preamble may act as a necessary component of the claimed invention.” *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952 (Fed. Cir. 2006) (internal quotation omitted).

For the foregoing reasons and to the extent necessary for our Final Written Decision, we construe the recitations of “[a] wire . . . said wire having a square sectional shape” in preambles of claims 1 and 3 as claim limitations. This construction does not alter our previous determination that the recitations of “for use in a coil” in the preambles of claims 1 and 3 are non-limiting statements of intended use. On this record, we also are not persuaded that any portions of the preambles of claims 2 and 4–8 are claim limitations.

5. Other Claim Terms

Neither Patent Owner nor Petitioner has asserted that we need to construe any additional claim terms in order to resolve the parties’ dispute. *See* PO Resp. 5–8; Reply 3–5. On this record, we find that it is not necessary to construe any additional claim terms in order to resolve the parties’ disputes. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

B. *Asserted Grounds of Unpatentability*

1. Overview

Petitioner argues that challenged claims 1–8 are unpatentable under 35 U.S.C. §§ 102(a) and 102(b) because each is anticipated by two separate references. Pet. 10. A patent claim is unpatentable under 35 U.S.C. 102 if

“the four corners of a single, prior art document describe every element of the claimed invention, either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation.” *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000).

Petitioner also argues that each of the challenged claims is unpatentable under 35 U.S.C. § 103(a) over a combination of references. *See supra* Section I.E. 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 such subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness under 35 U.S.C. § 103 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, i.e., secondary considerations.¹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

¹ Neither party makes arguments or directs us to evidence concerning the presence or absence of secondary considerations. Accordingly, neither party has shown that secondary considerations are present that would bear on the issue of obviousness. Further, to the extent that Patent Owner bears the burden of making such arguments or producing such evidence of secondary considerations, Patent Owner has waived such arguments. Paper 9, 3; *see In re Applied Materials*, 692 F.3d 1289, 1299 (Fed. Cir. 2012) (“The party seeking the patent bears the burden to overcome the prima facie case of obviousness with evidence of secondary considerations, such as commercial

Petitioner argues, based on testimony from Dr. Klopp, that a person of ordinary skill in the art would have “a minimum of a two-year technical degree in the mechanical or electrical arts” and “a minimum of one or two years of professional experience in the mechanical, electrical, or other engineering field involving wire, coil, or cable construction.” Pet. 12 (citing Ex. 1006 ¶ 26). Patent Owner argues that a person of ordinary skill in the art would have “had a degree in the mechanical arts or equivalent experience, and would have a minimum of two years professional experience in the mechanical and electrical arts involving coil wire construction.” PO Resp. 5. We note that Petitioner’s and Patent Owner’s assessments of the level of ordinary skill in the art are similar, and neither party has argued that the disputed issues turn on whose assessment we adopt. Patent Owner, however, did not cite any evidence in support of its assessment, and admitted during the hearing that Petitioner’s declarant, Dr. Klopp, qualifies as a person of ordinary skill in the art. Tr. 35:8–15. Accordingly, on this record, and to the extent necessary for purposes of this Final Written Decision, we adopt Petitioner’s assessment of the level of ordinary skill in the art to which the ’888 Patent pertains.

success.”); *see also Medtronic Inc. v. NuVasive Inc.*, Case IPR2014-00087, slip op. at 20–21 (PTAB Apr. 3, 2015) (Paper 44) (“Although it is Patent Owner’s burden to introduce evidence supporting such objective indicia, *see In re Huang*, 100 F.3d 135, 139 (Fed. Cir. 1996), the ultimate burden of persuasion never shifts to Patent Owner, *see* 35 U.S.C. § 316(e).”).

2. Anticipation of Claims 1–8 by Sugita

a. Overview of Sugita

Sugita relates to a die capable of drawing a wire into a deformed wire.

Ex. 1002, Abstract. Figures 2 and 3 of Sugita are reproduced below.

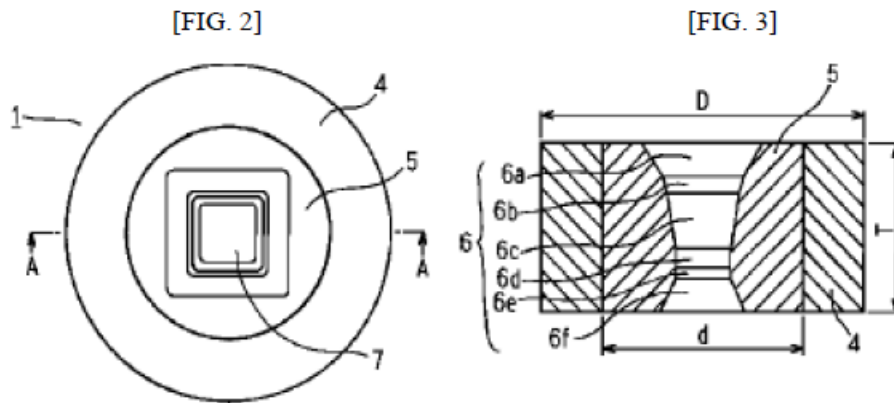


Figure 2 is a front view illustrating die body 1, and Figure 3 is a cross-sectional view of the die body 1 along line A-A of Figure 2. *Id.* ¶ 12. Die body 1 includes a cemented carbide support ring 4 and sintered diamond 5. *Id.* The center section of die body 1 includes inclined section 6 and hole 7, through which wire is passed. *Id.* The inclined section of die body 1 includes bell section 6a, approach section 6b, reduction section 6c, bearing section 6d, back relief section 6e, and exit section 6f. *Id.*

b. Analysis

Independent Claims 1 and 3:

The preambles of claims 1 and 3 recite “said wire having a square sectional shape.” Ex. 1001, 8:2–3, 16–17. Petitioner has made a sufficient showing to persuade us that Sugita discloses a wire having a square cross-sectional shape. *See* Pet. 27 (citing Ex. 1002, ¶¶ 1, 2, 16, & Figs. 2, 4; Ex. 1006 ¶¶ 73–75). Patent Owner does not dispute that Sugita discloses a wire

having a square cross-sectional shape. *See* PO Resp. 9–10. Patent Owner argues, however, that Sugita does not disclose “using such a chamfered wire in a coil.” PO Resp. 10–11. This argument is not persuasive because, for the reasons set forth above, the preamble term “a wire for use in a coil” is a non-limiting statement of intended use. Thus, the preambles of claims 1 and 3 do not require a wire that actually has been formed into a coil.

Claims 1 and 3 also recite “chamfers . . . at four corners in the section of the square.” Ex. 1001, 8:4–5, 18–19. Petitioner argues that this claim limitation is disclosed in portions of Sugita that describe the “R” of the corner sections of a wire, and relies upon supporting testimony from Dr. Klopp. Pet. 27–28 (citing Ex. 1002, Abstract, ¶¶ 5, 6, 10, 11, 31, and 34; Ex. 1006, 76–77). In particular, Dr. Klopp testifies that the term “R” in Sugita “must mean radius based on the Sugita disclosures.” Ex. 1006 ¶ 95; *see also id.* ¶¶ 143–144 (testifying that the term “R” is used to refer to a “radius” in mathematical and engineering formulas, and is commonly used to denote a “radiused corner” in Japanese patents). Patent Owner argues that Dr. Klopp’s conclusions are unreliable because they rely on the “assumption” that Sugita’s use of the term “R” refers to the radius of an arc-shaped corner section. PO Resp. 11. Patent Owner, however, does not offer any persuasive evidence that the term “R” in Sugita would have been ambiguous to a person of ordinary skill in the art. We further note that the Specification of the ’888 Patent uses the terms “R” and “radius” synonymously, and also uses the phrase “R Part” to refer to an “arc-shaped chamfer.” *See, e.g.,* Ex. 1001, 1:35–39, 4:26–30. As noted above, Patent Owner admits that Dr. Klopp qualifies as a person of ordinary skill in the art (Tr. 35:8–15), and we credit Dr. Klopp’s testimony.

On this record, we are persuaded that Sugita discloses a wire having “chamfers . . . at four corners in the section of the square,” as recited in claims 1 and 3. We also are persuaded that the term “R” in Sugita refers to the radius of an arc-shaped chamfer.

Independent claim 1 further recites that the “sectional area of said wire having the chamfers [be] at least 1.15 times as large as that of a circle having a diameter which is the same as the length of one side of said square” (hereinafter, the “claim 1 area limitation”). Ex. 1001, 8:5–8. Petitioner argues that Sugita describes the use of a die to create a wire, the die having a hole with a size at the bearing section 6d of 0.35 mm on a side and an R of the corner sections of the hole of 30 μ m, so that the R of the corner is 30 μ m. Petitioner asserts that Sugita’s embodiments inherently satisfy the claim 1 area limitation. Pet. 28 (citing Ex. 1002 ¶¶ 31, 34). Petitioner supports this argument with testimony from Dr. Klopp that the resulting wire would have a square cross-sectional shape and a “length of one side of said square” of 0.35 mm. Pet. 28 (citing Ex. 1006 ¶¶ 80–81). Petitioner also cites testimony that the cross-sectional area of such a wire would be 0.121727 mm², and that the cross-sectional area “of a circle having a diameter which is the same as the length of one side of said square would be 0.0962113 mm². Pet. 28 (citing Ex. 1006 ¶¶ 82–83). Thus, according to Dr. Klopp’s calculations, the “sectional area” of the wire described in Sugita is 1.265 “times as large as that of a circle having a diameter which is the same as the length of one side of said square.” Ex. 1006 ¶ 84. Patent Owner does not offer any persuasive evidence that Dr. Klopp’s calculations are inaccurate. See PO Resp. 9–10.

As discussed above, we are not persuaded that Dr. Klopp erred in concluding that the term “R” in Sugita refers to a radius. We have reviewed Dr. Klopp’s calculations, and we credit his testimony.

Independent claim 3 further recites that the “overall length of an outer circumference of the section of said wire having said chamfers is at least 1.09 times as long as circumference of a circle having a diameter which is the same as the length of one side of said square” (hereinafter, the “claim 3 circumference limitation.”) Ex. 1001, 8:19–23. Petitioner argues that embodiments described in Sugita also inherently satisfy the claim 3 circumference limitation. See Pet. 30 (citing Ex. 1002 ¶¶ 31, 34). Petitioner supports this argument with testimony from Dr. Klopp that the section of the wire described in these portions of Sugita would have a circumference of 1.3485 mm. Pet. 30 (citing Ex. 1006 ¶ 103). Petitioner also cites testimony that a circle having a diameter of 0.35 mm would have a circumference of 1.0996 mm. Pet. 30 (citing Ex. 1006 ¶ 104). Thus, according to Dr. Klopp’s calculations, the “outer circumference of the section” of the wire described in Sugita is 1.226 “times as long as the circumference of a circle having a diameter which is the same as the length of one side of said square.” Ex. 1006 ¶ 105. Patent Owner does not offer any persuasive evidence that Dr. Klopp’s calculations are inaccurate. See PO Resp. 10–11.

Accordingly, for the reasons discussed above, we are not persuaded that Dr. Klopp erred in concluding that the term “R” in Sugita refers to a radius. We have reviewed Dr. Klopp’s calculations, and we credit his testimony.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Sugita anticipates claims 1 and 3 of the '888 Patent.

Dependent Claims 2 and 4:

Claims 2 and 4 depend from claims 1 and 3, respectively, and further require “arc-shaped chamfers . . . at four corners in the section of the square.” Ex. 1001, 8:9–11, 24–26. Petitioner argues that this limitation is disclosed in Sugita, and cites supporting testimony from Dr. Klopp. See Pet. 29–31 (citing Ex. 1002 ¶¶ 31, 34; Ex. 1006 ¶¶ 95, 111). We are persuaded by Petitioner’s arguments concerning the claim limitation, and we credit Dr. Klopp’s testimony.

Claim 2 additionally recites that the “length of the radius of an arc of said arc-shaped chamfer is set so that the sectional area of said wire having said chamfers is at least 1.15 times as large as that of a circle having a diameter which is the same as the length of one side of said square.” This limitation requires that the radius of an arc of the arc-shaped chamfer be set so that the claim 1 area limitation is satisfied. As discussed above, we find that Sugita discloses a wire with arc-shaped chamfers that inherently satisfies the area 1 claim limitation. We are persuaded by Petitioner’s argument that such a wire would necessarily have a radius that satisfies claim 2. See Pet. 25; Ex. 1006 ¶¶ 80–84.

Claim 4 additionally recites:

[the] length of the radius of an arc of said arc-shaped chamfer is set so that the overall length of an outer circumference of the section of said wire having said chamfers is at least 1.09 times as long as the circumference of a circle having a diameter which is the same as the length of one side of said square

This limitation requires that the radius of an arc of the arc-chamfer be set, so that the claim 3 circumference limitation is satisfied. In view of our findings that Sugita discloses a wire with arc-shaped chamfers that satisfies the claim 3 circumference limitation, we are persuaded by Petitioner’s argument that the disclosed wire would necessarily have a radius that satisfies claim 4. *See* Pet. 26–27; Ex. 1006 ¶¶ 102–107.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Sugita anticipates claims 2 and 4 of the ’888 Patent.

Dependent Claims 5–8:

Claim 5 depends from claim 1, and further requires that the “length of one side of said square [be] 1 mm or less.” Ex. 1001, 8:33–34. Claims 6, 7, and 8 are identical to claim 5, except that claims 6, 7, and 8 depend from claims 2, 3, and 4, respectively. *Id.* at 8:35–40.

Petitioner argues that embodiments described in Sugita also satisfy this additional limitation, and cites supporting testimony from Dr. Klopp. *See* Pet. 31–32 (citing Ex. 1002 ¶¶ 31, 34; Ex. 1006 ¶¶ 116–19). We credit Dr. Klopp’s testimony, and are persuaded by Petitioner’s arguments. Patent Owner does not make separate patentability arguments regarding claims 5–8. *See* PO Resp. 3.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Sugita anticipates claims 5–8 of the ’888 Patent.

3. Anticipation of Claims 1–8 by Harada

a. Overview of Harada

Harada relates to a method of manufacturing an angular conductor to be used as an insulated wire for coil winding. Ex. 1005, ¶ 1.

b. Analysis

Independent Claims 1 and 3:

With respect to the preambles of claims 1 and 3, which recite “said wire having a square sectional shape,” Petitioner relies upon a description in Harada of “an angular conductor that has a vertical and horizontal cross-sectional dimension ratio of between 1:1 and 1:2,” and embodiments described in Harada, in which an “essentially square wire” is produced. Pet. 41 (citing Ex. 1005 ¶¶ 5, 14). Petitioner also cites supporting testimony from Dr. Klopp that these embodiments disclose a wire having a square cross-sectional shape. Pet. 41 (citing Ex. 1006 ¶¶ 123–26). Petitioner has made a sufficient showing to persuade us that Harada discloses a “wire having a square sectional shape.” Patent Owner does not dispute that Harada discloses a wire having a square cross-sectional shape. See PO Resp. 12. Patent Owner argues, however, that Harada does not disclose “using such a chamfered wire in a coil” (PO Resp. 12–13), but this argument is not persuasive because the preamble term “a wire for use in a coil” is a non-limiting statement of intended use.

Petitioner argues that “chamfers . . . at four corners in the section of the square,” as required by claims 1 and 3, are disclosed by descriptions in Harada of the “R parts of the corner portions” of a wire. Pet. 41–42 (citing Ex. 1005 ¶ 14). Petitioner supports this argument with testimony from Dr.

Klopp. Pet. 41 (citing Ex. 1006 ¶¶ 127–28); *see* Ex. 1006 ¶¶ 142–146. Patent Owner contends that Dr. Klopp’s opinions are unreliable because Dr. Klopp “assumes in a conclusory manner that [the term] R Parts [in Harada] refers to a radius.” PO Resp. 13. Patent Owner, however, does not cite testimony or other persuasive evidence that the term “R parts of the corner portions” of a wire, as used in Harada, would have been ambiguous to a person of ordinary skill in the art. *See* PO Resp. 13. As discussed in Section III.B.2.b., *supra*, the ’888 Patent itself uses the term “R” as a synonym for radius. We credit Dr. Klopp’s testimony that Harada uses the phrase “R parts of the corner portions” to refer to arc-shaped corners with a radius R. *See* Ex. 1006 ¶¶ 142–146.

On this record, we are persuaded that Harada discloses “chamfers . . . at four corners in the section of the square,” as recited in claims 1 and 3. We also are persuaded that the term “R parts of the corner portions” in Harada refers to arc-shaped corners with a radius R.

Petitioner argues that the above-described embodiment of Harada also inherently satisfies the claim 1 area limitation and the claim 3 circumference limitation. In particular, Petitioner points to the fact that the wire described in paragraph 14 of Harada (i.e., a wire with a square cross-section and “R parts at the corner portions”) has a “space factor” of “about 99%.” Pet. 42, 44 (citing Ex. 1005 ¶ 14). Dr. Klopp calculates that a square wire having arc-shaped chamfers and a “space factor” of 99% would necessarily satisfy both the claim 1 area limitation and the claim 3 circumference limitation. Ex. 1006 ¶¶ 133–35, 158–60. We have reviewed Dr. Klopp’s calculations and credit his testimony. In response, Patent Owner repeats its argument

that Harada's use of the term "R parts at the corner portions" is ambiguous, but this argument is not persuasive for the reasons discussed above.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Harada anticipates claims 1 and 3 of the '888 Patent.

Dependent Claims 2 and 4:

Petitioner argues that Harada discloses "arc-shaped chamfers," as required by claims 2 and 4, on the basis of Dr. Klopp's testimony that the "R parts of the corner portions of a wire" described in Harada are arc-shaped chamfers. Pet. 42, 44 (citing Ex. 1005 ¶ 14; Ex. 1006 ¶¶ 142–46, 168). We credit Dr. Klopp's testimony. For the reasons set forth above, we are not persuaded that Harada's use of the term "R parts of the corner portions of a wire" is ambiguous.

As discussed above, the remaining limitations of claims 2 and 4 merely require that the radii of the arc-shaped chamfers be set so that the resulting wires satisfy the claim 1 area limitation and the claim 3 circumference limitation, respectively. Patent Owner argues that Dr. Klopp's calculations concerning claims 2 and 4 are not reliable because "Dr. Klopp never uses an actual radius magnitude in his calculations." PO Resp. 13. Nevertheless, as Dr. Klopp explains, the calculations he performed to demonstrate that the radii of the arc-shaped chamfers satisfy claims 2 and 4 do not depend on the length of the radii. Ex. 1006 ¶ 136. We have reviewed Dr. Klopp's calculations (see Ex. 1006 ¶¶ 130–138, 148–150, 156–163, 170–171), and we are persuaded by his testimony that Harada discloses all elements of claims 2 and 4.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Harada anticipates claims 2 and 4 of the '888 Patent.

Dependent Claims 5–8:

Petitioner argues that the embodiment described in Harada—a wire measuring 0.2 mm on one side—satisfies the “length of one side of said square is 1 mm or less” limitation of claims 5–8. Pet. 45–46 (citing Ex. 1005 ¶ 14). Petitioner also cites supporting testimony from Dr. Klopp. Pet. 45–46 (citing Ex. 1006 ¶¶ 175–178). Patent Owner does not make any separate patentability arguments regarding claims 5–8. See Paper 9, 3. We credit Dr. Klopp’s testimony, and are persuaded that Harada discloses all of the additional elements recited in claims 5–8.

On this record and for the foregoing reasons, we find that Petitioner has shown by a preponderance of the evidence that Harada anticipates claims 5–8 of the '888 Patent.

4. Obviousness of Claims 1–8 over Sugita and MWS Wire

a. Overview of MWS Wire

MWS Wire is a printout of pages from the Internet website of MWS Wire Industries. See Exs. 1011, 1012. Petitioner asserts that MWS Wire was archived by the Internet Archive on October 13, 1999. Pet. 10.

b. Analysis

In its anticipation argument regarding Sugita (discussed above), Petitioner relies on inherency to argue that Sugita discloses a wire that satisfies the claim 1 area limitation and claim 3 circumference limitation.

See Pet. 18–22; Ex. 1006 ¶¶ 87, 107. In particular, Petitioner’s declarant’s calculations regarding these limitations depend on Petitioner’s assertion that the description in Sugita of “the R of the corner was 30 μm ” *inherently* discloses arc-shaped chamfers having a radius of 30 μm . See Ex. 1006, ¶¶ 82–86, 95, 103–107. Petitioner’s declarant’s calculations also depend on the assertion that the copper wire described on paragraphs 31 and 34 of Sugita would inherently have a side length the same as the width of the bearing section of the die, i.e., 0.35 mm. See Ex. 1006 ¶¶ 80–81, 102.

In its obviousness argument, Petitioner contends that, even if we were to find that Sugita does not inherently disclose the “length of the side of the square and . . . radius” that Petitioner used in its calculations, the challenged claims still would have been obvious in view of the combined disclosures of Sugita and MWS Wire. Pet. 51–52. In particular, Petitioner asserts that MWS Wire discloses multiple wires having dimensions that would satisfy the claim 1 area limitation, the claim 3 circumference limitation, and all of the remaining limitations of the challenged claims. See *id.* For example, Petitioner asserts that wire “AWG 21” from MWS Wire has a length of 0.7239 mm and a corner radius of 0.1524 mm, resulting in a cross-section that satisfies both the claim 1 area limitation and the claim 3 circumference limitation. *Id.* at 53; see also Ex. 1006, p. 78 (Dr. Klopp’s calculations).

Patent Owner argues that MWS Wire does not disclose a “wire formed into a winding structure,” but does not otherwise dispute Petitioner’s assertion that wire AWG 21 from MS Wire would necessarily satisfy all of the limitations of challenged claims 1–8. See PO Resp. 14–18. As discussed above, the claims do not require a “wire formed into a winding structure,” so this argument is not persuasive. We have reviewed Dr.

Klopp’s testimony and calculations regarding the wire AWG 21 from MWS Wire (*see* Ex. 1006, p. 78, ¶¶ 203–207; Ex. 1012), and are persuaded that MWS Wire teaches or suggests that this wire would satisfy all limitations of claims 1–8. In particular, we are persuaded that this wire has a “square sectional shape” and “chamfers . . . provided at four corners in the section of the square” as recited in claims 1 and 3, and would also necessarily satisfy the claim 1 area limitation and claim 3 circumference limitation. *See* Ex. 1006, p. 78, ¶¶ 206–207. We also are persuaded that wire AWG 21 from MWS Wire has arc-shaped chamfers as recited in claims 2 and 4, and thus necessarily satisfies the remaining limitations of claims 2 and 4 (which require that the radii of the arc-shaped chamfers be set, so that the resulting wire satisfies the claim 1 area limitation and claim 3 circumference limitation, respectively). *See id.*; Ex. 1012. In addition, the length of the sides of wire AWG 21 is 0.0285 inches, which is equal to 0.7239 mm. Ex. 1012; Ex. 1006, p. 78. Accordingly, this wire also satisfies the additional limitations recited in claims 5–8.

Even though we have found that MWS Wire by itself discloses all of the limitations of claims 1–8, this does not end our analysis because Petitioner bases its obviousness argument on the combination of Sugita and MWS Wire. In particular, Petitioner argues that Sugita relates to dies for creating the types of wires described in MWS Wire, and that it would have been obvious to use Sugita’s die to create wires having the dimensions specified in MWS Wire because MWS Wire describes these wires as being useful to create compact coils and small motors “that deliver more power in less space.” Pet. 52 (citing Ex. 1011, 1; Ex. 1006, ¶ 206).

In *KSR*, the Supreme Court held:

Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

550 U.S. at 418. “[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

Here, Petitioner has pointed to both interrelated teachings and market demands that would have motivated a person of ordinary skill to combine the teachings of Sugita and MWS Wire. Sugita discloses a die capable of drawing a wire into a deformed wire. Ex. 1002, Abstract. Petitioner has offered testimony from Dr. Klopp that Sugita and MWS Wire both relate to the same field of technology (i.e., wires that are intended “for use in a coil”) and describe similar types of wires (i.e., “square shaped wire[s] with arc-shaped corners”). Ex. 1006 ¶¶ 205–207. Petitioner also has offered testimony that a person of ordinary skill in the art would have realized that Sugita’s die could be used to manufacture wires having the dimensions described in MWS Wire. Pet. 52–53; Ex. 1006 ¶¶ 205–208. In addition, Petitioner has offered evidence that market demand would have motivated a person of ordinary skill in the art to use Sugita’s die to manufacture wires having the specific dimensions set forth in MWS Wire because MWS Wire teaches that these dimensions result in wires that provide “more power in less space” when used to form coils. See Pet. 52–53; Ex. 1006 ¶ 206; Ex. 1011, 1. We credit Dr. Klopp’s testimony and find, on this record, that

Petitioner has articulated reasoning having a rational underpinning to support the legal conclusion of obviousness. *KSR*, 550 U.S. at 418.

Patent Owner contends that a person of ordinary skill in the art would have had no reason to combine Sugita and MWS Wire because the dimensions of the specific wires disclosed in MWS Wire already “fall[] within [the] range” of the dimensions disclosed in Sugita. PO Resp. 15. This argument is not persuasive. As discussed above, the evidence of record establishes that Sugita’s die can be used to deform (i.e., manufacture) wires of the type disclosed in MWS Wire. MWS Wire discloses wires having dimensions that advantageously provide “more power in less space” when used to form coils (Ex. 1011, 1), but MWS Wire does not disclose how such wires may be manufactured (*see* Ex. 1001). We are persuaded on this record that a person of ordinary skill in the art would have found it obvious to use Sugita’s die to manufacture the specific wires that MWS Wire describes as having advantageous properties. *See* Pet. 52–53; Ex. 1006 ¶ 206; Ex. 1011, 1. As discussed above, Petitioner has demonstrated that at least one of these wires—wire AWG 21—satisfies all limitations of challenged claims 1–8.

On this record and for the foregoing reasons, we determine that claims 1–8 are unpatentable under 35 U.S.C. § 103 as obvious over Sugita and MWS Wire.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–8 of the ’888 Patent are unpatentable under 35 U.S.C. § 102(a) and (b) as anticipated by Sugita;

FURTHER ORDERED that claims 1–8 of the '888 Patent are unpatentable under 35 U.S.C. § 102(a) and (b) as anticipated by Harada;

FURTHER ORDERED that claims 1–8 of the '888 Patent are unpatentable under 35 U.S.C. § 103(a) as obvious over Sugita and MWS Wire; and

FURTHER ORDERED that, because this is a final decision, the parties seeking judicial review of this decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 7,238,888 B2

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