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Paper No. 10
Entered: April 8, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AXIOMA METERING UAB,
Petitioner,

v.

KAMSTRUP A/S,
Patent Owner.

IPR2019-01640
Patent 8,806,957 B2

Before MICHELLE N. ANKENBRAND, SCOTT B. HOWARD, and AARON W. MOORE, *Administrative Patent Judges.*

ANKENBRAND, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Axioma Metering UAB ("Petitioner") requests an *inter partes* review of claims 1–15 of U.S. Patent No. 8,806,957 B2 ("the '957 patent," Ex. 1001). Paper 1 ("Pet."). Kamstrup A/S ("Patent Owner") filed a Preliminary Response. Paper 6 ("Prelim. Resp.").

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). We may not institute an *inter partes* review "unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a).

Applying that standard, and upon considering the information presented in the Petition and the Preliminary Response, we determine Petitioner shows a reasonable likelihood that it would prevail in proving the unpatentability of at least one challenged claim. Accordingly, we institute an *inter partes* review of all claims and all grounds asserted in the Petition.

II. BACKGROUND

A. Related Matters

Petitioner identifies an ongoing district court proceeding involving the '957 patent, captioned *Kamstrup A/S v. Axioma Metering UAB*, No. 1:19-cv-01669-WJM-SKC (D. Colo. June 10, 2019). Pet. vii.

B. The '957 Patent

The '957 patent, titled "Ultrasonic Flow Meter Housing Formed by a Monolithic Polymer Structure," issued on August 19, 2014. Ex. 1001, at [45], [54]. The '957 patent relates to an ultrasonic flow meter housing and an ultrasonic flow meter comprising a housing that can be produced and assembled in fewer steps. *Id.* at 1:20–23, 1:55–57. The written description explains that ultrasonic consumption meters for calculating a consumed

quantity of water, heat, cooling, gas or the like typically have a metal flow passage and a housing with a cavity around the flow passage. *Id.* at 1:27–32. The housing protects electronic components. *Id.* at 1:30–38. Fabricating these ultrasonic flow meters typically requires multiple production steps. *Id.* at 1:39–51. The '957 patent purportedly reduces the number of production steps and the production cost by providing a monolithic polymer housing structure that may be cast in one piece. *Id.* at 1:39–42, 1:55–60. The monolithic polymer housing structure includes a straight flow tube separated from a cavity such that the straight flow tube and the cavity share a wall. *Id.* at 1:58–67, 2:1–15. According to the written description, this particular housing structure enables the flow meter housing to be cast in a single step. *Id.* at 2:6–15.

C. Illustrative Claim

Of the challenged claims, claims 1 and 11 are independent. Claim 1 is illustrative of the claimed subject matter and recites:

> 1. An ultrasonic flow meter housing comprising:
>
> a monolithic polymer structure being cast in one piece, the monolithic structure includes a flow tube and a cavity separated from the flow tube, wherein the flow tube defines a through-going straight flow section arranged for passage of a fluid between an inlet and an outlet, wherein a part of a wall of the flow section is part of an inside surface of the cavity, so that the flow section and the cavity has a shared wall area; and
>
> wherein the cavity is arranged for housing
>
> at least one ultrasonic transducer, at the shared wall area; and
>
> a measurement circuit operationally connected to the at least one ultrasonic transducer so as to allow measurement of a flow rate of the fluid.

Ex. 1001, 6:41–55.

D. The Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–15 of the '957 patent based on the following grounds:

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)
1–5, 7, 9–13	102(b)	Will[2]
1–5, 7, 9–13	103	Will, Hiss,[3] Ueki,[4] Buckberry,[5] and/or Bignell[6]
6, 8	103	Will, Elson[7] and/or Barker[8]
14	103	Will, Drachmann[9]
15	103	Will, Drachmann and/or Goertz[10]
1–5, 7, 9, 11–13	102(b)	Hiss
6	103	Hiss, Buckberry
6, 8	103	Hiss, Elson and/or Barker
10	103	Hiss, Will and/or Buckberry

[1] Because the claims at issue have an effective filing date before March 16, 2013, the effective date of the applicable provisions of the Leahy Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) ("AIA"), we apply the pre-AIA version of 35 U.S.C. §§ 102 and 103 in this decision.
[2] WO 2009/129885 A1, published Oct. 29, 2009 (Ex. 1002). In this decision, we rely on the certified English translation of Will that Petitioner provides as Exhibit 1003.
[3] DE 100 51 534 A1, published Apr. 25, 2002 (Ex. 1004). In this decision, we rely on the certified English translation of Hiss that Petitioner provides as Exhibit 1005.
[4] EP 1 482 284 A1, published Dec. 1, 2004 (Ex. 1006).
[5] WO 2008/053193 A1, published May 8, 2008 (Ex. 1007).
[6] WO 94/20822, published Sept. 15, 2004 (Ex. 1008).
[7] US 6,248,077 B1, issued June 19, 2001 (Ex. 1012).
[8] US 4,476,877, issued Oct. 16, 1984 (Ex. 1013).
[9] EP 2 083 250 A1, published July 29, 2009 (Ex. 1009).
[10] EP 0 972 171 B1, issued Oct. 29, 2003 (Ex. 1010). In this decision, we rely on the certified English translation of Goertz that Petitioner provides as Exhibit 1011.

Claim(s) Challenged	35 U.S.C. §[1]	Reference(s)
14	103	Hiss, Drachmann
15	103	Hiss, Drachmann and/or Goertz
1–2, 5, 7, 9, 11–13	102(b)	Ueki
3–4	103	Ueki, with or without Will
6 and 8	103	Ueki, Elson and/or Barker
10	103	Ueki, Will and/or Buckberry
14	103	Ueki, Drachmann
15	103	Ueki, Drachmann and/or Goertz
1–7, 9–13, and 15	102(b)	Buckberry
8	103	Buckberry, Elson and/or Barker
14	103	Buckberry, Drachmann

Pet. 1–3. Petitioner relies on the Declaration of Michael C. Johnson, Ph.D., P.E. (Ex. 1021) to support its asserted grounds of unpatentability. In arguing against the asserted grounds of unpatentability, Patent Owner relies on Declarations from Darren Robert Cairns, Ph.D. (Ex. 2002) and Steven L. Barfuss (Ex. 2004).

III. ANALYSIS

A. 35 U.S.C. § 325(d)

Patent Owner argues in the Preliminary Response that we should exercise discretion under 35 U.S.C. § 325(d) to deny institution of the proceeding because the Examiner considered three of Petitioner's primary references during prosecution of the '957 patent. Prelim. Resp. 19–20, 38–39, 46. We authorized the parties to file supplemental briefs addressing how § 325(d) applies to this proceeding, specifically under the framework set forth in *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte*

GmbH, IPR2019-01469, Paper 6 (PTAB Feb. 13, 2020) (precedential).[11] Paper 7. Both parties filed supplemental briefs. Paper 8 ("Pet. Suppl. Br."); Paper 9 ("PO Suppl. Br.").

Section 325(d) provides that in determining whether to institute an *inter partes* review, "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." The Board uses a two-part framework in determining whether to exercise its discretion under § 325(d), specifically:

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, Paper 6 at 8. In applying the two-part framework, we consider several non-exclusive factors, including: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art; (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the

[11] *Advanced Bionics* was designated precedential subsequent to our order authorizing supplemental briefing.

asserted prior art; and (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph). If, after review of factors (a), (b), and (d), we determine that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner demonstrates that the Office erred in a manner material to the patentability of the challenged claims. *Advanced Bionics*, Paper 6 at 10.

For the reasons set forth below, under the facts presented and arguments made, we decline to exercise our discretion under 35 U.S.C. § 325(d) to deny instituting trial. Before turning to the two-part framework, we briefly discuss the prosecution history of the '957 patent.

1. '957 patent prosecution history

The '957 patent issued from U.S. Application No. 13/515,488 (the "'488 application"). The '488 application was filed on August 8, 2012, as a U.S. National Phase Application of PCT International Application Number PCT/DK2010/050339, filed December 15, 2010 (the "PCT application"), and claims the benefit of priority to the PCT application. Ex. 1001, 1:8–10; *see* Ex. 1019, 7[12] (providing the '488 application's filing date). The PCT application claims the benefit of priority to European Patent Application No. 09179317.4, filed on December 15, 2009. Ex. 1001, 1:13–14.

The '957 patent issued on August 19, 2014, after the Office issued a first action allowance. Ex. 1019, 1 (Issue Notification), 18–19 (Notice of

[12] We cite to the page numbers Petitioner added to the top right corner of the exhibit.

Allowability). The Examiner provided the following statement of reasons for allowing the claims:

> The references cited have failed to teach and to make obvious an ultrasonic flow meter housing comprising where a part of a wall of the flow section is part of an inside surface of the cavity; wherein the cavity is arranged for housing at least one ultrasonic transducer, at the shared wall area; and a measurement circuit operationally connected to the at least one ultrasonic transducer so as to allow measurement of a flow rate of the fluid.

Id. at 19. The front cover of the '957 patent lists several references cited, including Hiss and Ueki, which appear in the list of Foreign Patent Documents. Ex. 1001, at [56] (listing DE 100 51 534 A1 (Hiss) and EP 1 482 284 A1 (Ueki)); *see also* Ex. 1019, 22 (the applicant's June 12, 2012 information disclosure statement ("IDS") listing Hiss and Ueki as Foreign Patent Documents and identifying the Abstract as the relevant portion of Hiss), 57–60 (German-language version of Hiss), 61–82 (Ueki).

2. Whether the same or substantially the same art previously was presented to the Office

Patent Owner argues that "Hiss and Ueki were fully and properly before the Examiner." PO Suppl. Br. 1. Petitioner does not dispute that the patent applicant identified Hiss and Ueki on an IDS[13] submitted to the Office during prosecution of the '957 patent. Pet. Suppl. Br. 3–4. Petitioner, however, argues that the relevant disclosure of Hiss was not before the Examiner because the patent applicant provided an English-language translation only of Hiss's abstract. *Id.*

[13] Under the first part of the framework, previously presented art includes "art made of record by the Examiner, and art provided to the Office by an applicant, such as on an Information Disclosure Statement (IDS), in the prosecution history of the challenged patent." *Advanced Bionics*, Paper 6 at 7–8.

Further, as noted above in Petitioner's asserted grounds of patentability, Petitioner asserts twenty grounds of unpatentability and relies on seven references in addition to Hiss and Ueki. *See supra* § II.D (asserting Will, Buckberry, Bignell, Elson, Barker, Drachmann, and Goertz, in addition to Hiss and Ueki). Neither party argues that the Office considered any of the other seven references during the '957 patent's prosecution.[14] *See, e.g.*, Pet. Suppl. Br. 2–3 (arguing that Will was not of record during the '957 patent's prosecution); PO Suppl. Br. 1 (referencing Hiss and Ueki only). Indeed, Patent Owner at least implicitly acknowledges that the Office did not consider the seven additional references in requesting that we use our discretion to deny institution under § 325(d) only "as to Grounds 6-7 [based on Hiss as the primary reference] and 12-17 [based on Ueki as the primary reference]." PO Suppl. Br. 1. However, we "evaluate the challenges and determine whether § 325(d) is sufficiently implicated that its statutory purpose would be undermined by instituting on all challenges." SAS Q&A's, Part D, Effect of *SAS* on Future Challenges that Could Be Denied for Statutory Reasons, D1 (June 5, 2018) ("SAS Q&A's, Part D"), available at https://www.uspto.gov/sites/default/files/documents/sas_qas_20180605.pdf; *see* 35 U.S.C. § 325(d) (explaining that the Director may reject the *petition* because the same or substantially the same prior art or arguments

[14] Patent Owner argues in its Preliminary Response that the Examiner considered Will during the '957 patent's prosecution. Prelim. Resp. 20–21. However, Patent Owner concedes that although the applicant's "agent attempted to cite Will in an [IDS] submitted on June 14, 2012[,] . . . Will was mistakenly identified" in the IDS. *Id.* at 21. Further, Patent Owner's supplemental briefing identifies only Hiss and Ueki as having been considered by the Office during the '957 patent's prosecution. PO Suppl. Br. 1.

previously were presented to the Office); *see also SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1355–56 (2018) (holding that a decision to institute under 35 U.S.C. § 314 may not institute review on less than all claims challenged in the petition).

In evaluating the Petition as a whole, we find that the Petition relies on seven references that were not previously presented to the Office—Will, Buckberry, Bignell, Elson, Barker, Drachmann, and Goertz. Further, of the twenty asserted grounds, Petitioner relies on Hiss or Ueki alone in three grounds—one ground based on Hiss as anticipating prior art, one ground based on Ueki as anticipating prior art, and one obviousness ground based on Ueki. *See* Pet. 2 (summary of asserted grounds). And none of Petitioner's grounds rely on the combination of Hiss and Ueki. *See id.* In addition, Petitioner asserts seven grounds that do not involve Hiss or Ueki at all. Pet. 1–3. On balance, and considering *Becton* factors (a), (b), and (d) and the particular circumstances of this case, we determine that the Petition does not raise the same or substantially the same prior art previously presented to the Office such that § 325(d) is sufficiently implicated.

We limit our discussion to the same or substantially the same prior art because neither party contends that the Petition raises the same or substantially the same arguments previously presented to the Office. *See generally* Pet. Suppl. Br.; *see* PO Suppl. Br. 1 (addressing "the same/substantially the same art" under *Advanced Bionics* step 1) (emphasis omitted). In fact, the '957 patent issued in a first action allowance, such that the Petition naturally raises arguments not previously presented to the Office during prosecution. *See* Ex. 1019, 1, 18–19. Accordingly, having determined that the same or substantially the same art was not previously presented to the Office, we need not consider step 2 of the *Advanced Bionics*

framework. *Advanced Bionics*, Paper 6 at 8 (second step of the framework only applies "*if* either condition of the first part of the framework is satisfied") (emphasis added).

3. Conclusion

After considering the framework set forth in *Advanced Bionics* and the appropriate *Becton* factors, the particular circumstances of this case do not indicate that we should exercise our discretion under § 325(d) to deny institution.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art in and around 2009 "would have had a bachelor of science degree in a field of engineering or a closely related discipline, and at least one year of practical academic or industrial experience designing, testing, and/or manufacturing flowmeters." Pet. 8 (citing Ex. 1021 ¶ 25).

Patent Owner asserts that, in addition to the experience identified by Petitioner, a person of ordinary skill in the art would also have had "at least one year of practical academic or industrial experience designing and/or molding molded polymer structures." Prelim. Resp. 12–13 (citing Ex. 2002 ¶¶ 23–24; Ex. 2004 ¶¶ 23–24). Patent Owner disputes that Dr. Johnson has the experience required for a person of ordinary skill in the art with respect to the '957 patent. *Id.* at 13 (citing Ex. 2002 ¶¶ 42–43).

We find Patent Owner's arguments unpersuasive at this stage of the proceeding. First, although the claims of the '957 patent are directed to an ultrasonic flowmeter with a polymer housing, the '957 patent discloses that the object of the invention is to produce an ultrasonic flow meter which can be produced and assembled with a limited number of steps. Ex. 1001, 1:39–42, 1:47–51, 1:55–57. We find Petitioner's proposed level of ordinary skill

in the art, which includes "experience designing . . . and/or manufacturing flowmeters" to be consistent with the object of the '957 patent. Pet. 8.

Second, the prior art of record indicates that experience in designing and manufacturing flow meters is sufficient. *See, e.g.*, Ex. 1007, 1:29–31 (describing the object of the invention as providing an ultrasonic flow-rate measurement device that can be simply and economically manufactured and assembled); Ex. 1006 ¶ 96 (providing a detection section of a flow sensor that can be molded in one piece for ease of manufacturing and cost reduction); Ex. 1005 ¶ 4 (stating that the object of the invention is to provide a sensor system and its method of production that avoids disadvantages of known sensor systems); *see also Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that the prior art, itself, can reflect the appropriate level of ordinary skill in art).

Although we generally agree with Petitioner regarding the level of skill in the art, we delete the qualifier "at least" to eliminate vagueness as to the amount of practical experience. The qualifier expands the range indefinitely without an upper bound, and thus precludes a meaningful indication of the level of ordinary skill in the art. Therefore, for purposes of this decision, a person of ordinary skill in the art at the time of the invention would have had a Bachelor of Science degree in a field of engineering or a closely related discipline, and one year of practical academic or industrial experience designing, testing, and/or manufacturing flowmeters.

Further, based on the information presented at this stage of the proceeding, we consider Dr. Johnson qualified to opine from the perspective of an ordinary artisan at the time of the invention. *See* Ex. 1021 ¶¶ 1–3; Ex. 1022 (Dr. Johnson's curriculum vitae). Indeed, Patent Owner

acknowledges that Dr. Johnson "appears to have significant experience with flowmeters and related technology." Prelim. Resp. 13.

C. Claim Construction

For petitions requesting an *inter partes* review filed on or after November 13, 2018, we interpret a claim "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b)." 37 C.F.R. § 42.100(b) (2019). The present Petition was filed on September 23, 2019, so we construe the claims of the '957 patent using the federal district court standard. Under that standard, we construe claims "in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b). Furthermore, at this stage in the proceeding, we expressly construe the claims only to the extent necessary to determine whether to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only 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))).

Petitioner proposes a construction for the term "structure being cast in one piece" recited in claims 1 and 11. Pet. 9–10. Patent Owner proposes constructions for the terms "monolithic polymer structure being cast in one piece" and "through-going straight flow section." Prelim. Resp. 14–18. For purposes of this decision, the following claim terms merit discussion: (1) "cast in one piece" and (2) "through-going straight flow section." We also discuss the term "cavity" in addressing some of Petitioner's asserted grounds, but do not specifically discuss that term in this section.

1. "Cast in one piece"

Petitioner proposes that we construe the recited "structure being cast in one piece" as a "molded one-piece structure." Pet. 9. Patent Owner contends that a person of ordinary skill in the art would have understood a "monolithic polymer structure being cast in one piece" to mean a "monolithic polymer structure cast in a single mold." Prelim. Resp. 14. At this stage of the proceeding, we agree with Petitioner.

Petitioner asserts that the claim only requires a structure cast in one piece and does not provide any additional details regarding the molding process. Pet. 9. Petitioner contends that Patent Owner recognized a distinction between "cast in one piece" and "cast in a single step" in the PCT application. *Id.* (citing Ex. 1018, 5). Petitioner also contends that its proposed construction is consistent with the understanding of those of ordinary skill in the art prior to December 2009. *Id.* (citing Ex. 1021 ¶ 27–30). On the current record, we agree that "cast in one piece" only requires a "molded one-piece structure." Turning first to the claim language, we note first that independent claims 1 and 11 are apparatus claims not method claims. The phrase "cast in one piece," as used in the claims, does not define the number of steps in the molding process or the type of mold used during the molding process. *See* Ex. 1001, 6:41–55 (claim 1). Indeed, the claim language does not provide a connection between the number of steps and the resulting one-piece apparatus. Further, we find that the current record reflects that the patent applicant recognized the distinction between being "cast in one piece" and being "cast in a single step" or "cast in a single mold." For example, during prosecution of the priority European Application that contained similar claim language, the patent applicant

amended the PCT application to change the language "cast in one piece" to "cast in a single step." *See* Ex. 1018, 5.

Patent Owner's arguments do not persuade us that "cast in one piece" means "cast in a single mold." In particular, Patent Owner argues that claiming a housing structure to be both "monolithic" and "cast in one piece" requires the limitations to have different meanings, and that one of ordinary skill in the art would have understood these terms to have different meanings. Prelim. Resp. 15–16. In support, Patent Owner relies on the '957 patent's background discussion and Figures 5A and 5B. *Id.* (citing Ex. 1001, 1:43–51; 6:12–24; Figs. 5A–B; Ex. 2002 ¶¶ 30–34). Although the '957 patent's background states that the prior art's purported shortcoming is the number of molding steps required to produce an ultrasonic assembly, nothing in this discussion requires the claimed invention to be cast in a single mold. Moreover, the requirement to be "cast in a single mold" that the written description of the '957 patent discloses with respect to Figures 5A and 5B is narrower than the language of "cast in one piece." At this stage in the proceeding, we decline to read the narrower "cast in a single mold" into the broader language of "cast in one piece." *See SuperGuide Corp. v. DirecTV Enter., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) ("[A] particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment." (citing *Electro Med. Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994))).

Patent Owner also asserts that a housing structure that is "cast in one piece" is distinguishable from a housing structure that is "integrally formed." Prelim. Resp. 15–16, 16 nn.34, 37 (citing Ex. 2002 ¶¶ 30, 42–44). But even if we were to determine that being "cast in one piece" requires being "cast in

a single mold," the limitation appears to be a process limitation that does not impart patentable weight to the claim unless the resulting product (i.e., the claimed product) has "structural and functional differences" that distinguish the claimed product from the prior art. *Greenliant Sys., Inc. v. Xicor LLC*, 692 F.3d 1261, 1268 (Fed. Cir. 2012); *see also In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) ("The patentability of a product does not depend on its method of production."). At this stage of the proceeding, neither Petitioner nor Patent Owner addresses whether the limitation "cast in one piece" is a product-by-process limitation, or whether a monolithic polymer structure cast in a single mold has structural or functional differences from monolithic polymer structure that is integrally formed but not cast in a single mold. We invite the parties to further brief this issue during trial, if desired.

2. "Through-going straight flow section"

Patent Owner proposes that we construe a "through-going straight flow section" as a "straight section of a flow tube that traverses the monolithic polymer structure." Prelim. Resp. 17. Patent Owner asserts that this construction is consistent with the plain and ordinary meaning of the '957 patent's claim language and written description. *Id.* at 17–18 (citing Ex. 2002 ¶¶ 35–38; Ex. 2004 ¶ 30–32; Ex. 1001, 2:9–15, 3:15–18, 6:19–24, Figs. 5A–B.). Petitioner does not expressly address the meaning of "through-going straight flow section." *See* Pet. 8–10. For purposes of this decision, we adopt Patent Owner's construction of a "through-going straight flow section."

The '957 patent consistently describes having a straight-flow section between an inlet and an outlet. For example, the '957 patent describes "a straight flow passage 2 or flow tube in the form of a through-going opening between openings 3 and 4, i.e. between an inlet 3 and an outlet 4."

Ex. 1001, 3:15–18, Fig. 1A. The cross-sectional areas of the inlet and outlet are "parallel along the flow passage." *Id.* at 3:18–20, Fig. 1A. The '957 patent also states that the flow tube defines "a through-going straight flow section arranged for passage of a fluid between an inlet and an outlet." *Id.* at 2:9–15. Additionally, the housing has a "straight flow section between the inlet and outlet." *Id.* at 6:19–24. Independent claims 1 and 11 reflect the written description's use of the phrase, as both recite that the flow tube "*defines* a through-going straight flow section . . . between an inlet and an outlet." *Id.* at 6:44–46, 7:22–24 (emphasis added). On this record, we find Patent Owner's proposed construction of "through-going straight flow section" to be consistent with the disclosure of the '957 patent. Therefore, we construe a "through-going straight flow section" to mean a "straight section of a flow tube that traverses the monolithic polymer structure."

D. Asserted Prior Art

Before turning to Petitioner's asserted grounds of unpatentability, we provide a brief summary of the asserted references.

1. Will (Ex. 1003)

Will relates to an ultrasonic measuring assembly that "can be easily and economically produced" and "avoids the disadvantages of components of the assembly that have to be joined subsequently." Ex. 1003, 2.[15] Figure 3 depicts the ultrasonic measuring assembly, which we reproduce below.

[15] The parties cite to the page and line number of the reference, but we cite to the page number displayed at the bottom center of the page.

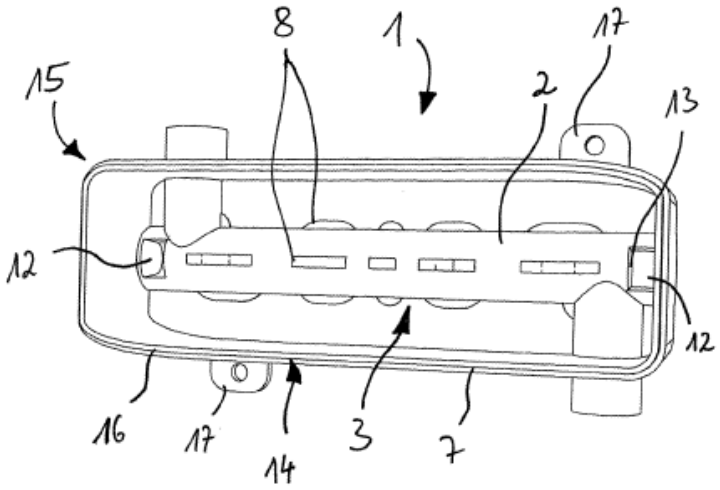

Fig. 3

Figure 3 shows the ultrasonic measuring assembly with measurement tube 2. *Id.* at 8. Measurement housing 7 is joined to the measurement tube 2. *Id.* at 8–9. Ultrasound sensors may be placed in retainers 12 behind wall region 13 at ends of measurement tube 2. *Id.* at 7–8.

The ultrasonic measuring assembly has a housing that is injection molded onto the measurement tube. *Id.* at 2. A first injection molding process forms measurement tube 2. *Id.* at 5. A second injection molding process forms shared wall 13 and measurement housing 7. *Id.* at 5, 8–9. Measurement tube 2 and measurement housing 7 are joined without seams or capillaries between the two components. *Id.* at 5. The ultrasonic measuring assembly may be made of a plastic, such as polyethylene (PE) or some other polyolefin, or a suitable polymer fluorocarbon, e.g. perfluoroalkoxy alkane (PFA). *Id.* at 5.

2. Hiss (Ex. 1005)

Hiss relates to a sensor structure that may be used to monitor fluid flow. Ex. 1005 ¶¶ 1–2, 4. The sensor structure "avoids the disadvantages"

of high production costs and requiring different seals. *Id.* ¶¶ 2, 4. Figure 3 depicts the sensor structure, which we reproduce below.

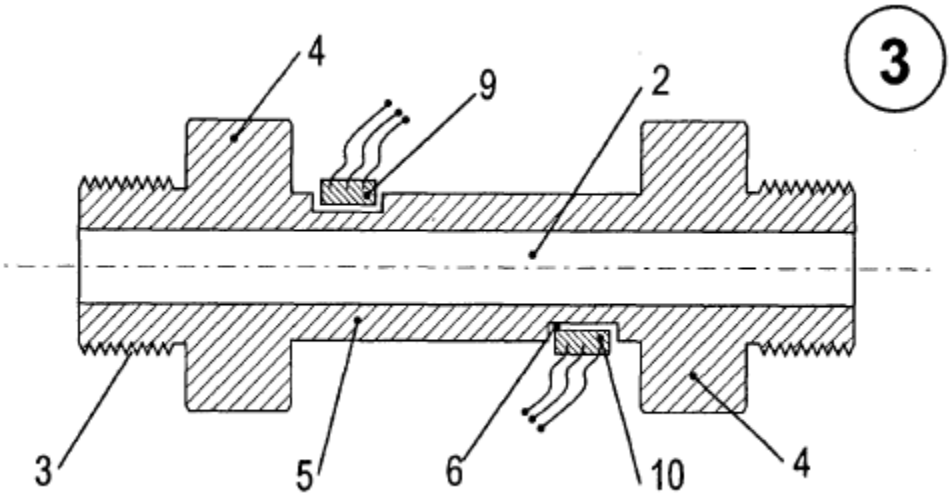

Figure 3 shows a sensor structure with bore 2, intermediate component 5, and key parts 4. *Id.* ¶¶ 11, 13. Acoustic transducers 9 and 10 are placed next to key parts 4. *Id.* ¶¶ 8, 13. The sensor structure is made of homogenous material and has an integral, barbell-shaped design without any penetrations or welds. *Id.* ¶ 6. The sensor structure is "produced integrally and preferably in a single work process." *Id.* ¶ 4.

A two-part housing (not shown) surrounds the sensor structure to accommodate evaluation electronics and protect the interior of the sensor structure from environmental effects. *Id.* ¶ 8. The sensor structure may be made from "materials that are difficult to weld, comprising plastics or mineral-based materials such as ceramics in particular." *Id.* ¶ 6.

3. Ueki (Ex. 1006)

Ueki relates to a fluid flow sensor. Ex. 1006 ¶¶ 1–2. Figure 11 depicts the fluid flow sensor, which we reproduce below.

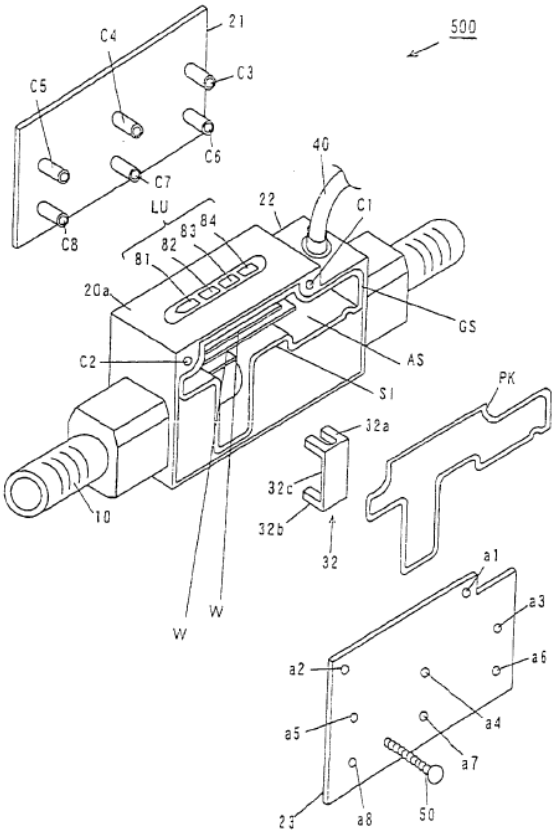

Figure 11 shows a flow sensor with detection section 500. *Id.* ¶¶ 86–87. Detection section 500 is made up of casing members 21, 22, and 23 and through water pipe line 10, in addition to other features. *Id.* Casing member 22 has internal circuit/sensor housing area AS. *Id.* ¶ 88.

Figure 12B, also reproduced below, shows a side view of the flow sensor of Figure 11.

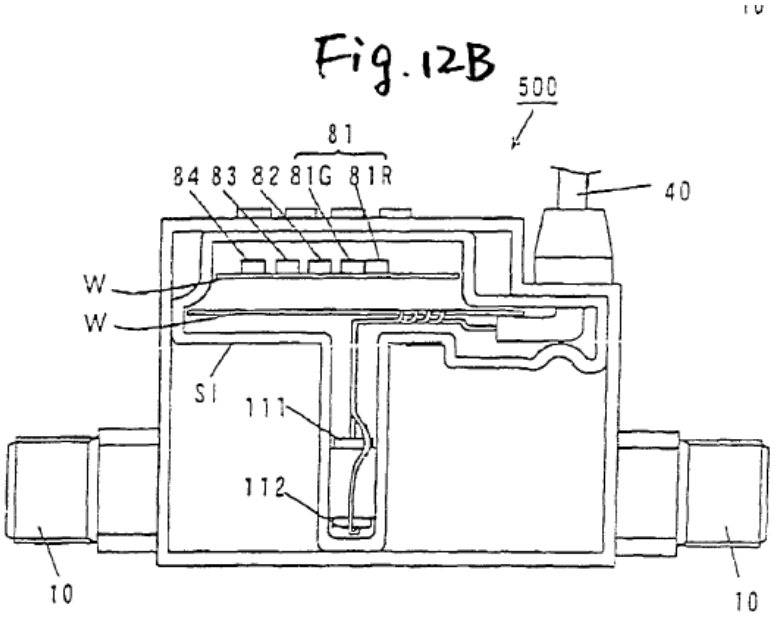

Figure 12B shows a side view of detection section 500. *Id.* ¶ 86. The side view includes a view of cavity AS from Figure 11 above. *Id.* ¶ 86, 88. Transmitter 111 and receiver 112 are attached to through water pipe line 10 inside cavity AS. *Id.* ¶ 90. Casing member 22 and through water pipe line 10 are integrally formed and can be molded of the same material in one piece. *Id.* ¶¶ 87, 96.

4. Buckberry (Ex. 1007)

Buckberry relates to an ultrasonic flow-rate measurement device that can be simply and economically manufactured and assembled. Ex. 1007, 1:2–3, 1:29–30. Figure 4 shows ultrasonic flow-rate measurement device 10, which we reproduce below.

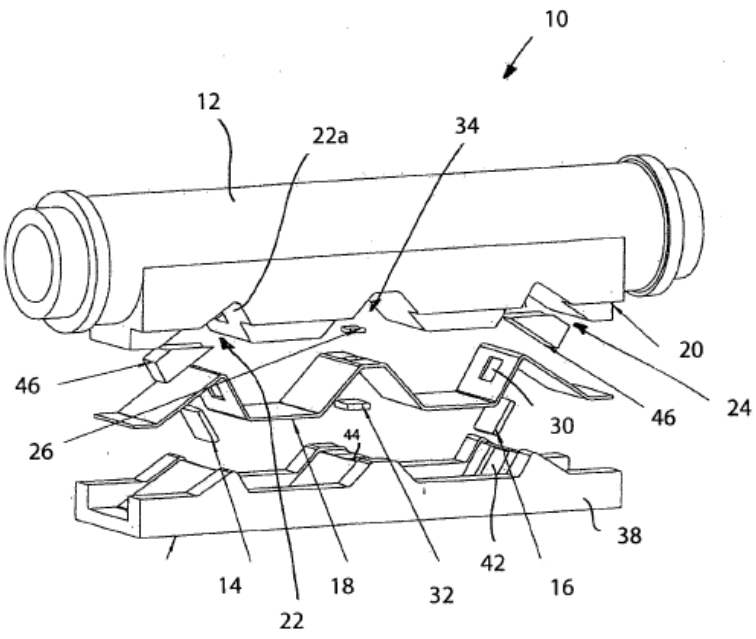

Fig 4

Figure 4 shows a measurement device 10 with measurement conduit 12 and transducer housing 20. *Id.* at 13:18–20. The transducer housing is preferably integrally formed with the external wall of the measurement conduit. *Id.* at 6:8–9. Transducer housing 20 has recesses 22 and 24 with external recesses 22a and 24a. *Id.* at 13:20–26. At external recesses 22a and 24a are ultrasonic transducers 14 and 16. *Id.* at 13:10–11, 14:1–2. Flexible PCB (printed circuit board) 18 is shaped to conform with and be located over the lowermost face of transducer housing 20. *Id.* at 14:23–25.

5. Bignell (Ex. 1008)

Bignell relates to the construction of electronic fluid flow meters for measuring liquids and gases, and in particular a housing for the meter. Ex. 1008, 1:3–5, 6:12–13. The fluid flow meter uses ultrasonic transducers. *Id.* at 1:10–15. Figure 3 shows the housing of the fluid flow meter, which we reproduce below.

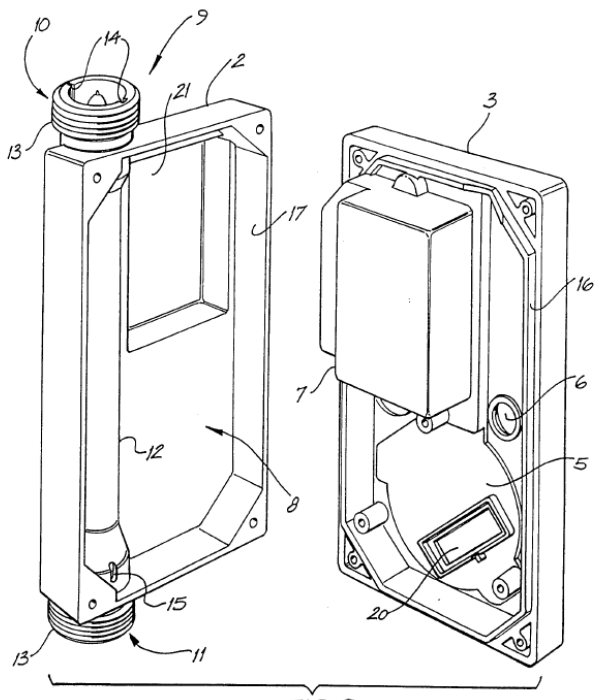

FIG.3

Figure 3 shows a meter with casing base 2 and casing lid 3. *Id.* at 7:13–14. Integrally formed in the base 2 is a measuring tube 9. *Id.* at 7:28–31. The measuring tube 9 has two ends 10 and 11, and an intermediate portion 12 which permits flow. *Id.* at 7:28–31. The base 2 also includes a void 8, which provides a space for an electronics module. *Id.* at 7:21–24.

6. Elson (Ex. 1012)

Elson relates to a system for sensing a characteristic of fluid flowing to or from the body of a human or animal. Ex. 1012, Abstract, 1:52–56. The system includes a conduit having two ends with a flow passage between the two ends. *Id.* at 1:63–67. The system also includes a probe for sensing a desired characteristic. *Id.* at 1:67–2:2. The sensed characteristic may be temperature, pressure, or any characteristic that can be determined by an optical scan. *Id.* at 1:56–59.

7. Barker (Ex. 1013)

Barker relates to a fluid temperature sensor. Ex. 1013, 1:6–8. The temperature sensor has a flow-through housing and reusable temperature sensing means. *Id.* at 1:52–55. The temperature sensor has a through lumen for conducting fluid through. *Id.* at 1:64–66. A thermally conductive enclosure projects transversely into the lumen. *Id.* at 1:66–68. A reusable temperature sensor may be removably installed into the enclosure to measure temperature through the lumen. *Id.* at 2:2–5.

8. Drachmann (Ex. 1009)

Drachmann relates to a consumption meter for measuring the value of a consumed quality. Ex. 1009 ¶ 2. The consumption meter has a transparent cover that is impermeable to water. *Id.* ¶ 11. The transparent cover protects electronic parts from being exposed to moisture while permitting a display to be visible. *Id.* ¶ 12. The consumption meter is cost efficient, simple to fabricate, and capable of being used in different environments. *Id.* ¶¶ 7, 12.

9. Goertz (Ex. 1011)

Goertz relates to an ultrasonic flow meter that measures a flowing fluid. Ex. 1011 ¶ 1. The ultrasonic flow meter includes a housing assembly 1, which is comprised of a housing structure 2, a housing neck 3, and a housing head 4 covered by a cap 5. *Id.* ¶ 23; Ex. 1010, Fig. 1. The housing structure 2 forms a measurement tube with its inner surfaces. Ex. 1011 ¶ 24; Ex. 1010, Fig. 1. Transducers may be placed in the inner surface of the measurement tube. *Id.*

E. The Will Grounds (Grounds 1–5)

Petitioner asserts that Will anticipates claims 1–5, 7, and 9–13 of the '957 patent (Ground 1). Pet. 10–20. As an alternative to Ground 1, Petitioner asserts that the subject matter of claims 1–5, 7, and 9–13 would

have been obvious over Will, Hiss, Ueki, Buckberry, and/or Bignell (Ground 2). *Id.* at 20–24. Petitioner also asserts three obviousness grounds over Will and additional references against the remaining dependent claims, relying on: (1) Will, Elson, and/or Barker for claims 6 and 8 (Ground 3), *id.* at 24–27; (2) Will and Drachmann for claim 14 (Ground 4), *id.* at 27–28; and (3) Will, Drachmann, and/or Goertz for claim 15 (Ground 5), *id.* at 28–32.

Patent Owner argues that Will does not anticipate claims 1–5, 7, and 9–13. Prelim. Resp. 22–30. Patent Owner also disputes that claims 1–5, 7, and 9–13 would have been obvious over Will and Hiss, Ueki, Buckberry, and/or Bignell. *Id.* at 30–35. Patent Owner further argues that the subject matter of claim 6 would not have been obvious over Will and Elson and/or Barker. *Id.* at 35–38. At this stage of the proceeding, Patent Owner does not separately contest Petitioner's obviousness assertions as to claims 8, 14, and 15 over Will, Elson, Barker, Drachmann, and/or Goertz. *See generally id*.

1. Ground 1: anticipation by Will – claims 1–5, 7, and 9–13

Petitioner contends that Will anticipates claims 1–5, 7, and 9–13 of the '957 patent. Pet. 10–20. Patent Owner disagrees, arguing that Will does not disclose a monolithic polymer structure cast in one piece, a through-going straight flow section, or a shared wall area. Prelim. Resp. 22–30.

To establish anticipation, each limitation in a claim must be found in a single prior art reference, arranged as recited in the claim. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). Having considered the parties' arguments and the record, we have substantial doubt that Will discloses the "through-going straight flow section" recited in claims 1 and 11 and that claims 2–5, 7, 9, 10, 12, and 13 also require.

In arguing that Will anticipates claims 1 and 11, Petitioner relies on Will's measurement tube 2 as corresponding to the recited flow tube.

Pet. 10–11, 14–15 (citing Ex. 1002, Fig. 3; Ex. 1003, 7:25–27). For the recited "through-going straight flow section," Petitioner asserts that Will discloses an ultrasonic flowmeter housing that includes a straight flow section for passage of fluid between connectors 5 and each end 4, i.e., an inlet and an outlet. *Id.* at 10–11, 15 (citing Ex. 1002, Fig. 1, Fig. 3; Ex. 1003, 4:15–18, 7:1–6, 7:25–27). We reproduce Figures 1 and 3 of Will below.

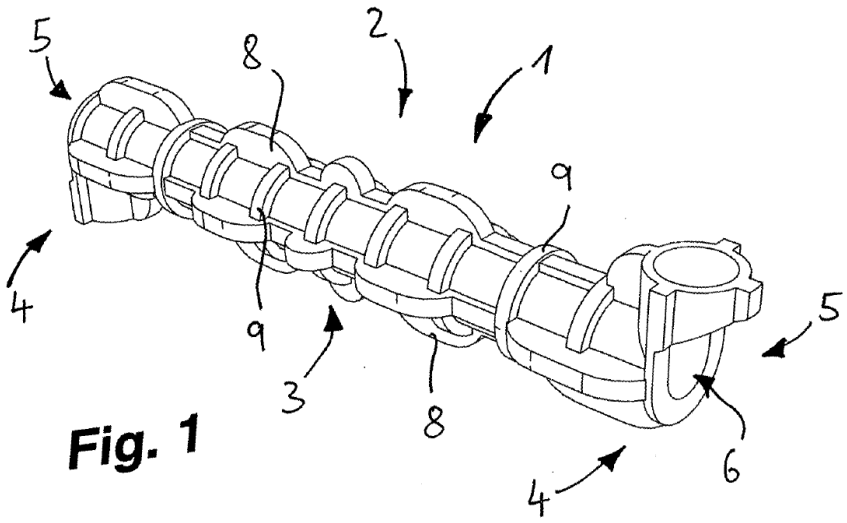

Fig. 1

Figure 1 depicts a perspective view of a measurement tube of the ultrasonic flowmeter with connectors in its ends. Ex. 1003, 6. Measurement tube 2 is produced in a first injection molding process. *Id.* at 7. It has connectors 5 at each end 4, "which form the intake and discharge for the flowing medium that is to be transported and measured." *Id.*

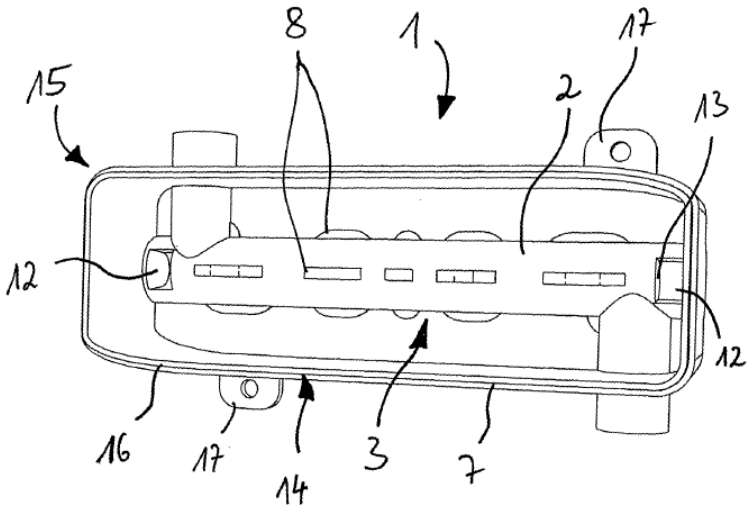

Fig. 3

Figure 3 depicts measurement tube 2 inside housing component 15. *Id.* Measurement tube 2 forms a "Z" or a "double-L" shape. *Id.*

As discussed above, we construe a "through-going straight flow section" as a "straight section of a flow tube that traverses the monolithic polymer structure." *See supra* § III.C.2. Will's measurement tube 2 does not define a straight section that traverses the monolithic polymer structure. Instead, as shown in Figure 3 above, Will's measurement tube 2 includes two vertical components that form the "Z" or "double-L" shape. Ex. 1003, 7. Because Will does not disclose a "through-going straight flow section," we have substantial doubt that Will discloses each limitation recited in claims 1 and 11 of the '957 patent.

Claims 2–5, 7, 9–10, and 12–13 depend directly or indirectly from claims 1 and 11, and also require "a through-going straight flow section." Accordingly, we also have substantial doubt that Will anticipates claims 2–5, 7, 9–10, and 12–13.

2. Ground 2: obviousness over Will, Hiss, Ueki, Buckberry, and/or Bignell – claims 1–5, 7, and 9–13

As an alternative to Ground 1, Petitioner asserts that if we construe the term "cast in one piece" as limited to a single molding step, the subject matter of claims 1–5, 7, and 9–13 would have been obvious over Will and any one of any of Hiss, Ueki, Buckberry, and/or Bignell. Pet. 20–24. Particularly, Petitioner argues that each of Hiss, Ueki, Buckberry and Bignell teaches or suggests producing the polymer structure as an integrally formed piece. *Id.* at 20–23. Petitioner further asserts that an ordinarily skilled artisan would have produced the polymer structure using a single step molding technique because it was easy to manufacture, would reduce construction costs, and would result in a more mechanically stable structure. *Id.* at 21–24; Ex. 1021 ¶¶ 35–43. In this ground, however, Petitioner does not rely on Hiss, Ueki, Buckberry or Bignell as teaching or disclosing "a through-going straight flow section," to cure the deficiency we identify in Will. Rather, Petitioner's analysis is limited to showing how the references "each teach producing the structure (flow tube and cavity with a shared wall) as an integrally formed piece." Pet. 20.

Patent Owner asserts that Will in view of Hiss, Ueki, Buckberry, and/or Bignell would not disclose a polymer structure "cast in one piece," a through-going straight flow section, or a shared wall area. Prelim. Resp. 30–32, 34–35. Patent Owner also asserts that a person of ordinary skill in the art would not have been motivated to modify Will to include a monolithic structure being cast in one piece. *Id.* at 33–34.

Because this combination also does not include "a through-going straight flow section," we have substantial doubt that claims 1–5, 7, and 9–

13 would have been obvious over Will combined with any of Hiss, Ueki, Buckberry or Bignell.

3. Grounds 3–5: obviousness over Will, Elson, Barker, Drachmann, and/or Goertz – claims 6, 8, 14, and 15

Claims 6, 8, 14, and 15 depend from claims 1 and 11 and also require "a through-going straight flow section." In arguing that claims 6, 8, 14, and 15 would have been obvious, Petitioner additionally relies on Will combined with: (1) Elson and/or Barker for claims 6 and 8 challenged in Ground 3 (*id.* at 24–27); (2) Drachmann for claim 14 challenged in Ground 4 (*id.* at 27–28); and (3) Drachmann and/or Goertz for claim 15 challenged in Ground 5 (*id.* at 28–32). Petitioner, however, does not rely on any of Elson, Barker, Drachmann, or Goertz to teach or disclose "a through-going straight flow section" to cure the deficiency we identify in Will for claims 1 and 11. Rather, in these grounds, Petitioner asserts that Elson, Barker, Drachmann, or Goertz, combined with Will's teachings, disclose the additional limitations recited in claims 6, 8, 14, and 15. *Id.* at 24–32. Thus, we have substantial doubt that claims 6, 8, 14, and 15 would have been obvious over Will combined with any of Elson, Barker, Drachmann, and/or Goertz.

4. Conclusion

In sum, at this stage of the proceeding, we have substantial doubt that: (1) Will anticipates claims 1–5, 7, and 9–13; (2) the subject matter of claims 1–5, 7, and 9–13 would have been obvious over Will and Hiss, Ueki, Buckberry, and/or Bignell; (3) the subject matter of claims 6 and 8 would have been obvious over Will and Elson and/or Barker; (4) the subject matter of claim 14 would have been obvious over Will and Drachmann; and (5) the subject matter of claim 15 would have been obvious over Will and Drachmann and/or Goertz.

F. The Hiss Grounds (Grounds 6–11)

Petitioner asserts that Hiss anticipates claims 1–5, 7, 9, and 11–13 of the '957 patent (Ground 6). Pet. 32–42. Petitioner also asserts five obviousness grounds against the remaining dependent claims: (1) Hiss and Buckberry for claim 6 (Ground 7), *id.* at 42–43; (2) Hiss, Elson, and/or Barker for claims 6 and 8 (Ground 8), *id.* at 43–44; (3) Hiss, Will, and/or Buckberry for claim 10 (Ground 9), *id.* at 44; (4) Hiss and Drachmann for claim 14 (Ground 10), *id.* at 45–46; and (5) Hiss, Drachmann and/or Goertz for claim 15 (Ground 11), *id.* at 46.

Patent Owner argues that Hiss does not anticipate claims 1–5, 7, 9, and 11–13. Prelim. Resp. 40–43. At this stage of the proceeding, Patent Owner does not separately contest Petitioner's obviousness assertions as to claims 6, 8, 10, 14, and 15 over Hiss, Buckberry, Elson, Barker, Will, Drachmann, and/or Goertz. *Id.* at 45–46.

1. Ground 6: anticipation by Hiss – claims 1–5, 7, and 9–13

Petitioner contends that Hiss anticipates claims 1–5, 7, and 9–13 of the '957 patent. Pet. 32–42. Patent Owner disagrees, arguing that Hiss does not disclose the recited "cavity" or "housing." Prelim. Resp. 40–43.

Having considered the parties' arguments and the record, we have substantial doubt that Hiss discloses the "cavity" recited in claims 1 and 11 and that claims 2–5, 7, 9, 12, and 13 also require.

Petitioner asserts that Hiss discloses an ultrasonic flowmeter housing with a monolithic structure having a flow tube and a circumferential cavity around the flow tube. Pet. 32–33 (citing Ex. 1004, Fig. 3; Ex. 1005 ¶¶ 1, 11, claim 1). To show that Hiss teaches a "cavity," Petitioner relies on Figure 3, which we reproduce below.

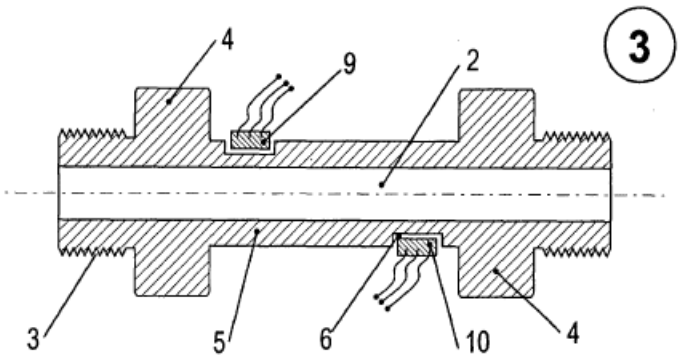

Figure 3 depicts a sensor structure with key parts 4 and intermediate region 5 that forms the inner region of the sensor structure. Ex. 1005 ¶ 11. Intermediate component 5 contains bore 2. *Id.* Petitioner asserts that bore 2 is the recited flow tube. Pet. 32. Petitioner further asserts that Hiss discloses a "circumferential cavity around the flow tube between the left and right key parts 4." *Id.* To show how Hiss discloses such a cavity, Petitioner provides its own illustration (labeled Illustration 1), which we reproduce below.

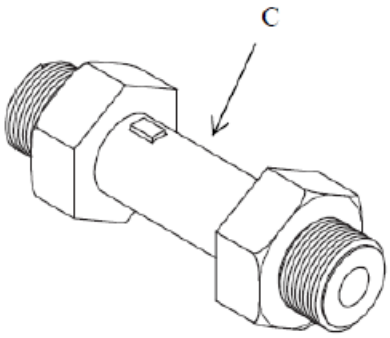

Illustration 1

Petitioner's Illustration 1 is a three-dimensional visualization of Hiss's Figure 3 that Petitioner annotates with the "circumferential cavity **C**." *Id.* at 33. According to Petitioner, the recited "cavity" may be a circumferential space around a flow tube between two vertical boundaries.

Id. at 32–33. Petitioner also asserts that "Hiss discloses that this [the figure in Illustration 1] is a polymeric housing." *Id.* at 33.

Hiss's circumferential space, however, appears to be unbounded open space surrounding and outside an object, which is not a cavity. *See* Prelim. Resp. 41. The term "cavity" typically refers to "[a] hollow place; a void or empty space within a solid body." Oxford-English Dictionary (accessed Mar. 12, 2020), https://oed.com/view/Entry/29299?redirectedFrom=cavity#eid. Petitioner fails to explain sufficiently how Hiss's unbounded, circumferential space around the flow tube is a cavity. Nor does Petitioner explain why we should depart from the ordinary meaning of the term "cavity."

To the extent Petitioner asserts that Hiss discloses a cavity when the two-part housing encompasses the sensor structure, we find that argument inconsistent with Petitioner's assertion that Hiss's circumferential area alone is a cavity. *Compare* Pet. 37 (setting forth support for the two-part housing that partially encompasses the key part), *with id.* at 32–33, 35 (describing Hiss's circumferential space without the housing as a cavity). Further, as Patent Owner argues, a two-part housing around the circumferential cavity appears to be a "three-piece structure" that the sensor structure and the two parts of the housing form. Prelim. Resp. 42. Petitioner does not explain sufficiently why a multiple part housing around the circumferential space teaches a "monolithic polymer structure" including a cavity as claims 1 and 11 of the '957 patent recite. Thus, we have substantial doubt that Hiss anticipates claims 1 and 11.

Claims 2–5, 7, 9, 12, and 13 depend directly or indirectly from claims 1 and 11 and also require the recited "cavity." Accordingly, we also have substantial doubt that Hiss anticipates claims 2–5, 7, 9, 12, and 13.

2. Grounds 7–11: obviousness over Hiss and Buckberry, Elson, Barker, Will, Drachmann, and/or Goertz – claims 6, 8, 10, 14, and 15

Claims 6, 8, 10, 14, and 15 depend from claims 1 and 11 and also require "a cavity." In arguing that the subject matter of claims 6, 8, 10, 14, and 15 would have been obvious, Petitioner additionally relies on: (1) Buckberry for claim 6 challenged in Ground 7, Pet. 42–43; (2) Elson and/or Barker for claims 6 and 8 challenged in Ground 8, *id.* at 43–44; (3) Will and/or Buckberry for claim 10 challenged in Ground 9, *id.* at 44; (4) Drachmann for claim 14 challenged in Ground 10, *id.* at 45–46; and (5) Drachmann and/or Goertz for claim 15 challenged in Ground 11, *id.* at 46. Petitioner, however, does not rely on Buckberry, Elson, Barker, Will, Drachmann, or Goertz to teach or disclose "a cavity" to cure the deficiency we identify in Hiss for claims 1 and 11. *See* Pet. 42–46. Rather, in these grounds, Petitioner asserts that Buckberry, Elson, Barker, Will, Drachmann, or Goertz, combined with Hiss's teachings, disclose the additional limitations recited in claims 6, 8, 10, 14, and 15. *Id.* at 42–46. Thus, we also have substantial doubt that claims 6, 8, 10, 14, and 15 would have been obvious over Hiss combined with any of Buckberry, Elson, Barker, Will, Drachmann, and/or Goertz.

3. Conclusion

For the reasons above, we have substantial doubt that: (1) Hiss anticipates claims 1–5, 7, 9, and 11–13, (2) the subject matter of claim 6 would have been obvious over Hiss and Buckberry, (3) the subject matter of claims 6 and 8 would have been obvious over Hiss and Elson and/or Barker, (4) the subject matter of claim 10 would have been obvious over Hiss and Will and/or Buckberry, (5) the subject matter of claim 14 would have been

obvious over Hiss and Drachmann, and (6) the subject matter of claim 15 would have been obvious over Hiss and Drachmann and/or Goertz.

G. The Ueki Grounds (Grounds 12–17)

Petitioner asserts that Ueki anticipates claims 1, 2, 5, 7, 9, and 11–13 of the '957 patent (Ground 12). Pet. 47–54. Petitioner also asserts five obviousness grounds against the remaining dependent claims: (1) Ueki, with or without Will, for claims 3 and 4 (Ground 13), *id.* at 54–55; (2) Ueki, Elson, and/or Barker for claims 6 and 8 (Ground 14), *id.* at 55–56; (3) Ueki, Will, and/or Buckberry for claim 10 (Ground 15), *id.* at 56; (4) Ueki and Drachmann for claim 14 (Ground 16), *id.* at 57; and (5) Ueki, Drachmann, and/or Goertz for claim 15 (Ground 17), *id.* at 58.

Patent Owner asserts that Ueki does not anticipate claims 1–2, 5, 7, 9, and 11–13. Prelim. Resp. 47–55. Patent Owner argues that claim 6 would not have been obvious over Ueki in view of Elson and/or Barker. *Id.* at 58–59. At this stage of the proceeding, Patent Owner does not separately contest Petitioner's obviousness assertions as to claims 3, 4, 8, 10, 14, and 15 over Ueki, Will, Elson, Barker, Buckberry, Drachmann and/or Goertz. *Id.* at 60.

1. Ground 12: anticipation by Ueki – claims 1, 2, 5, 7, 9, and 11–13

Petitioner contends that Ueki anticipates claims 1, 2, 5, 7, 9, and 11–13 of the '957 patent. Pet. 47–54 (citing Ex. 1006 ¶¶ 1, 22, 36, 49, 66, 81, 85, 87–90, 92, 96, Fig. 9, Fig. 10, Fig. 11, Fig. 12B). Patent Owner disagrees, arguing that Ueki does not disclose a shared wall area, a monolithic polymer structure being cast in one piece, or a transducer at a shared wall. Prelim. Resp. 47–55 (citing Ex. 1006 ¶¶ 85, 87, Fig. 11, 12B;

Ex. 1021 ¶¶ 40, 123–124; Ex. 2002 ¶¶ 66–68, 70–73).[16] Having considered the parties' arguments and the record, we determine that Petitioner establishes a reasonable likelihood of prevailing in its assertion that Ueki anticipates claims 1, 2, 5, 7, 9, and 11–13.

The nub of the parties' arguments centers on three limitations: (1) cast in one piece (claims 1 and 11); (2) a shared wall area (claims 1 and 11); and (3) at least one transducer at a shared wall (claims 1, 5, 11, and 13).[17, 18] Accordingly, we focus our discussion on those limitations first and then turn to the remaining limitations of claims 1 and 11 and to claims 2, 7, 9, 12, and 13, which Patent Owner does not contest separately at this stage of the proceeding. *See generally* Prelim. Resp.

a) "cast in one piece"

Petitioner asserts that Ueki discloses a monolithic polymer structure being cast in one piece. Pet. 48–49. Specifically, Petitioner asserts that Ueki discloses through water pipe line 10 that is formed integrally with casing member 22. Pet. 48 (citing Ex. 1006 ¶ 87). Petitioner also asserts

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[16] Patent Owner also argues that Ueki does not anticipate the additional limitations of claims 3, 4, and 14. Prelim. Resp. 56. Petitioner's Ground 12, however, does not challenge claims 3, 4, or 14. *See, e.g.*, Pet. 2 (setting forth Ground 12). As such, we do not address claims 3, 4, and 14 in our discussion of Ground 12.

[17] Claim 13 requires at least two transducers. The parties' arguments, however, do not differentiate between claim 13 and claims 1, 5, and 11, which require "at least one transducer at the shared wall." And, as we explain below, Petitioner asserts that Ueki discloses at least two transducers at a shared wall. Thus, we treat claims 1, 5, 11, and 13 the same for purposes of this decision.

[18] Patent Owner includes claim 10 in its arguments that Ueki does not disclose "at least one transducer at a shared wall." *See* Prelim. Resp. 55. Petitioner's Ground 12, however, does not challenge claim 10 of the '975 patent. As such, we do not address claim 10 in our discussion of Ground 12.

that Ueki provides a sensor with detection section 500 that can be molded of the same material in one piece. *Id.* (citing Ex. 1006 ¶ 96, Fig. 10).

Patent Owner argues that Ueki's water pipe line 10 and casing 20 are not cast in one piece because Ueki does not disclose how water pipe line 10 and casing 20 could be integrated or how these parts may be cast in the same mold. Prelim. Resp. 52. Supporting Patent Owner's arguments, Dr. Cairns testifies that one of ordinary skill in the art would understand that parts being molded of a single piece does not mean they would be "cast in one piece," i.e. "cast in a single mold." Ex. 2002 ¶ 71. Dr. Cairns also testifies that one of ordinary skill in the art would understand that Ueki's casing and water pipe 10 could not be "cast in one piece" in any commercially viable way, if at all. *Id.* ¶ 72.

At this stage of the proceeding, we are persuaded that Ueki discloses a monolithic polymer structure being cast in one piece. As described above, we construe "cast in one piece" to mean "a molded one-piece structure." *See supra* § III.C.1. That is, we do not adopt Patent Owner's proposed construction. Ueki discloses a molded one piece structure. In particular, Ueki discloses detection section 500 that is made up of casing members 21, 22, 23, and through water pipe line 10. Ex. 1006 ¶ 87. Ueki further discloses that "water pipe line 10 is formed integrally with the casing member 22." *Id.* Ueki also discloses that detection section 500 "can be molded of the same material in one piece and can be easily manufactured" for cost reduction. *Id.* ¶ 96. Therefore, Ueki discloses a flow sensor housing that is a molded one-piece structure, i.e. cast in one piece. Accordingly, Petitioner shows sufficiently that Ueki discloses a monolithic polymer structure being cast in one piece. However, we invite the parties to further

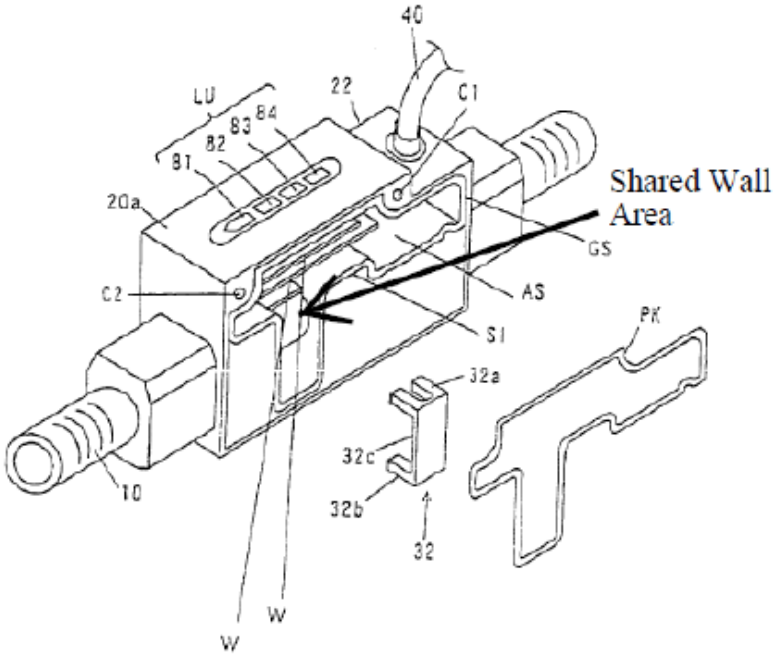
brief this issue and our claim construction of "cast in one piece" during trial, if desired.

b) "a shared wall area"

Petitioner asserts that Ueki discloses a shared wall area. Pet. 47, 50. Specifically, Petitioner contends that Ueki discloses an ultrasonic flow meter with flow tube 10 and casing 22 with cavity AS around the flow tube. *Id.* at 47 (citing Ex. 1006 ¶¶ 87–88, Fig. 11). Petitioner points to the outer surface of flow tube 10 as the shared wall area that is part of the inside surface of cavity AS. *Id.* (citing Ex. 1006, Fig. 11).

Patent Owner responds that Ueki does not disclose the recited "shared wall area," which Patent Owner defines as a "part of a wall of the flow section [that] is part of an inside surface of the cavity." Prelim. Resp. 55; *see id.* at 48–52. Patent Owner argues that Ueki's water pipe 10, spaced away from the wall of the housing and interior walls defining the housing, is not a shared wall. *Id.* at 48–49 (citing Ex. 1006, Fig. 11, Fig. 12B; Ex. 2002 ¶ 66). Patent Owner also contends that the '957 patent differentiates the claimed invention from pipes centered within a housing with a through-going pipe such as the one Ueki discloses. *Id.* at 50–52 (citing Ex. 1001, 6:6–24, Fig. 5A, Fig. 5B; Ex. 2002 ¶¶ 67–68). Patent Owner also argues that the outer surface of the flow tube cannot be a "shared wall" with the cavity because the cavity is not "separated from" the flow tube as recited in the claims. *Id.* at 52.

On this record and at this stage of the proceeding, Petitioner sufficiently shows that Ueki discloses the recited "shared wall area." Petitioner points us to its annotated Figure 11, which we reproduce below.



Petitioner's Annotated Figure 11 shows a flow sensor housing with casing member 22 and through water pipe line 10. Ex. 1006 ¶ 87, Fig. 11. Figure 11 also shows circuit/sensor housing area AS. *Id.* ¶ 88. Petitioner identifies and annotates the exterior of surface of flow tube 10 within circuit/sensor housing area AS as the shared wall area. Pet. 47.

As noted above, Patent Owner defines a "shared wall area" as a "part of a wall of the flow section [that] is part of an inside surface of the cavity." Prelim. Resp. 55. Under this definition, we agree with Petitioner that Ueki's exterior surface of flow tube 10 may be a "shared wall area." As shown in Figure 11, the exterior surface of through water pipe line 10 forms part of a wall of water pipe line 10, i.e. the flow section. The exterior surface of through water pipe line 10 also forms part of an inside surface of the cavity AS. Therefore, it appears that Ueki discloses a "shared wall area" as recited claims 1 and 11 of the '957 patent.

On this record, we are not persuaded by Patent Owner's arguments to the contrary. Although Patent Owner contends that the '957 patent

differentiates the claimed invention from pipes centered within a housing with a through-going pipe such as the one in Ueki, these arguments rely on the fact that the claimed invention may be "cast in one piece." *See* Prelim. Resp. 50–52. It is unclear how arguments directed to being "cast in one piece" are relevant to whether Ueki discloses "a shared wall area." Similarly, it is unclear how Patent Owner's arguments about a cavity "separated from" the flow tube are relevant to whether Ueki discloses "a shared wall area." *See id.* at 52. Neither of these arguments persuade us that Ueki's water pipe line exterior fails to form part of a wall of water pipe line 10 and part of an inside surface of cavity AS, i.e. a shared wall.

Therefore, at this stage of the proceeding, Petitioner shows sufficiently that Ueki discloses a shared wall area. However, we invite the parties to further brief this issue during trial, if desired.

c) "at least one ultrasonic transducer, at the shared wall"

Petitioner asserts that Ueki discloses at least one ultrasonic transducer at the shared wall. Specifically, Petitioner relies on transmitter 111 and receiver 112, which may be ultrasonic devices, as corresponding to the claimed "at least one ultrasonic transducer." Pet. 51 (citing Ex. 1006 ¶ 36). Petitioner asserts that transmitter 111 and receiver 112 are attached to through water pipe line 10. *Id.* at 50–51 (citing Ex. 1006 ¶ 90, Fig. 9). Petitioner points to Figure 12B, which we reproduce below.

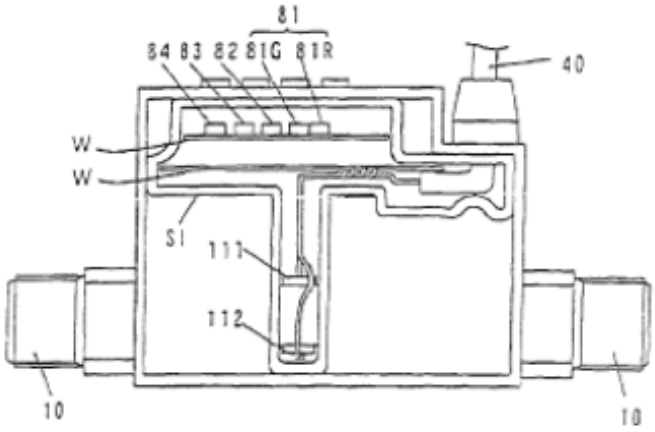


Figure 12B is an exploded side view of the detection section of the flow sensor and shows transmitter 111 and receiver 112 attached to an exterior of through water pipe line 10. Ex. 1006 ¶¶ 31, 90.

Patent Owner argues that Ueki does not disclose at least one transducer at the shared wall area because the wall of water flow pipe 10 is spaced apart from and not shared by the cavity of the housing. Prelim. Resp. 55.

On this record and at this stage of the proceeding, we find that Petitioner has the better position. Patent Owner's arguments to the contrary are based on its argument that Ueki does not disclose the recited "shared wall area." *Id.* At this stage of the proceeding and as discussed above, however, we find that Ueki discloses a shared wall area. *See supra* § III.G.1.b. Further, Ueki discloses a transmitter 111 and a receiver 112 attached to an exterior of through water pipe line 10. Ex. 1006 ¶ 90, Fig. 12B. Transmitter 111 and receiver 112 may be ultrasonic devices. *Id.* ¶ 36. When the transmitter 111 and receiver 112 are attached to the through water pipe line 10, they are attached to the exterior of the through water pipe line 10 at a shared wall area between the flow section of the water pipe line 10

and the cavity AS. *Id.* ¶ 90. Thus, Ueki discloses at least one ultrasonic transducer at the shared wall area.

Therefore, at this stage of the proceeding, Petitioner shows sufficiently that Ueki discloses at least one ultrasonic transducer at the shared wall area.

d) Remaining limitations and claims

Petitioner asserts that Ueki discloses the remaining limitations of claims 1 and 11. Pet. 47–51, 53 (citing Ex. 1006 ¶¶ 1, 36, 49, 81, 87–90, Fig. 11). Petitioner further asserts that Ueki anticipates dependent claims 2, 5, 7, 9, 12, and 13 because Ueki discloses the additional limitations those claims recite. *Id.* at 51–54 (citing Ex. 1006 ¶¶ 22, 36, 66, 87, 90, 92, Fig. 10, Fig. 11, Fig. 12B). At this stage of the proceeding, Patent Owner does not separately contest Petitioner's arguments or evidence as to the remaining limitations of claims 1 and 11, or the additional limitations of claims 2–4, 6–7, 9–10, 12, and 15. *See generally* Prelim. Resp. On the current record, Petitioner shows sufficiently that Ueki discloses those limitations. Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertion that Ueki anticipates claims 1, 2, 5, 7, 9, 11, 12, and 13.

2. Ground 13: obviousness over Ueki or Ueki and Will – claims 3 and 4

Claim 3 requires that the cavity of the flow meter housing "has a single opening." Ex. 1001, 6:59–60. Claim 4 depends from claim 3 and additionally recites that the "rim of the cavity is arranged for sealed connection with a cover, so that the cover and the cavity define an enclosure with only one sealing area." *Id.* at 6:61–64. Petitioner asserts that the subject matter of claims 3 and 4 would have been obvious over Ueki. Pet. 54–55. Specifically, Petitioner asserts that Ueki discloses a housing 500 that may have either two openings or no openings. *Id.* Dr. Johnson testifies

that modifying Ueki to have an opening on one side would have been obvious to one of ordinary skill in the art in light of Ueki's two disclosed embodiments for its housing. Ex. 1021 ¶¶ 133–134 (Dr. Johnson's testimony that the modification would have been "a simple matter of design choice to integrally mold case side 21 with casing 22 and flow tube 10 . . . to simplify assembly and reduce leaking, while still permitting access to internal housing area AS with one coverable opening"). Petitioner further contends that, although a single-opening housing would have been obvious based on Ueki's disclosure and the ordinarily skilled artisan's knowledge alone, Will also supports the obviousness of the modification because Will teaches that a single opening in the cavity is sufficient to access the electronic components in the cavity. *Id.* (citing Ex. 1002, Fig. 2; Ex. 1003, 4:14–18; Ex. 1021 ¶ 135).

In opposing Petitioner's Ground 12 (anticipation by Ueki), Patent Owner argues that Ueki does not disclose a cavity with a single opening or a single sealing area. Prelim. Resp. 56–57. At this stage of the proceeding, however, Patent Owner does not contest Petitioner's arguments or evidence that it would have been obvious to an ordinarily skilled artisan to modify Ueki to have an opening on one side, either in view of Ueki's teachings and the knowledge of the skilled artisan or as Will evidences. *See generally* Prelim. Resp. On the current record, Petitioner shows sufficiently that a person of ordinary skill in the art would have had reasons to modify Ueki's structure to arrive at a cavity with a single opening and a single sealing area with a reasonable expectation of success. Pet. 55; Ex. 1021 ¶¶ 133–135. Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertion that the subject matter of claims 3 and 4 would have been obvious over Ueki or Ueki and Will.

3. Ground 14: obviousness over Ueki, Elson, and/or Barker – claims 6 and 8

Claim 6 recites the flow meter housing of claim 1 "wherein the flow section has one or more protrusions or indentions at the inside of the flow section serving to engage with an associated measurement tube element or an ultrasonic reflector arrangement." Ex. 1001, 7:3–7. Claim 8 recites that the flow meter housing further comprises "a metal pocket cast into the flow tube." *Id.* at 7:11–12. Petitioner asserts that the subject matter of claims 6 and 8 would have been obvious over Ueki in view of Elson and/or Barker. Pet. 24–27, 55–56. Specifically, Petitioner points to Elson's metal receiver 95 mounted in polymeric tube 87 with fluid flow passage 89. Pet. 25, 55–56 (citing Ex. 1012, 4:62–66; Fig. 4). Petitioner asserts that Elson discloses receiver 95 as attached to tube section 87 by insert molding. *Id.* at 25 (citing Ex. 1012, 5:15–17). Petitioner further asserts that receiver 95 accommodates thermistor 115. *Id.* (citing Ex. 1012, 4:62–66). Alternatively, Petitioner points to Barker's thermally conductive enclosure 28 within housing 22 for accommodating temperature sensor 32. *Id.* at 26, 55–56 (citing Ex. 1013, 3:37–53). Petitioner asserts that Elson's receiver 95 and/or Barker's thermally conductive enclosure 28, both metal pockets, are protrusions at the inside of the flow section to engage with a temperature sensor, i.e., an associated measurement tube element. Pet. 26–27, 55–56.

Patent Owner asserts, and Mr. Barfuss testifies, that modifying Ueki with Elson or Baker would not include the recited protrusion at the inside of the flow section. Prelim. Resp. 35–38, 58 (citing Ex. 1012, 5:15–17, Ex. 2004 ¶¶ 73–75). Patent Owner also asserts that one of ordinary skill in the art would not have had a reason to combine the teachings of Elson or Barker with Ueki because Elson and Barker are directed to unrelated fields

and an ordinarily skilled artisan would not consider them in modifying a flowmeter. Prelim. Resp. 58 (citing Ex. 1012, Abstract; Ex. 1013, Abstract).

On this record, we find that Petitioner has the better position. Both Elson and Barker disclose the recited protrusions at the inside of the flow section serving to engage with an associated measurement tube element or an ultrasonic reflector arrangement. Specifically, Elson discloses receiver 95, i.e., a protrusion or metal pocket, attached to tube section 87, i.e. a flow tube. Ex. 1012, 5:15–17. The receiver 95 accommodates a probe 23, which may be a thermistor 115. Ex. 1012, 4:61–66, 5:26–28, 6:1–5. Additionally, Barker discloses thermally conductive enclosure 28, i.e., a protrusion or metal pocket, within housing 22, i.e. a flow tube, for accommodating a temperature sensor 32. Ex. 1013, 3:37–53, 3:59–62. Therefore, we find that Petitioner shows sufficiently that Ueki's teachings combined with those of Elson and/or Barker teach or suggest the limitations of claims 6 and 8.

Petitioner asserts that one of ordinary skill in the art would have had a reason to combine a temperature sensor in a thermowell (i.e., metal pocket or protrusion) in Ueki's flow sensor. Pet. 55. In particular, Petitioner asserts, and Dr. Johnson testifies, that measuring temperature of fluid while measuring flow was typically desirable and common in the art. *Id.* (citing Ex. 1021 ¶ 61). Dr. Johnson further testifies that it would have been obvious to modify Ueki to include a metal pocket, such as a thermowell, to measure temperature of the fluid in a flow tube. Pet. 55–56 (citing Ex. 1021 ¶¶ 137–138).

At this stage of the proceeding, Petitioner articulates sufficient reasoning with a rational underpinning to support its combination. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Specifically, adding Elson and/or Barker's

metal pocket or protrusion into the wall of Ueki's flow tube would have been "a well-known way of measuring the temperature of fluid" prior to December 2009. Ex. 1021 ¶ 138. Patent Owner's arguments that Elson and Barker are directed to unrelated fields and would not be considered in modifying a flowmeter are not persuasive on the current record. Prelim. Resp. 58. Patent Owner admits that "Elson is *a system for sensing a characteristic of fluid flowing* to or from the body of a human" and "Barker is a fluid temperature sensor for use in a cardiovascular *flow measuring system*." *Id.* (emphasis added). Therefore, Patent Owner admits that Elson and Barker are directed to measuring fluid flow and fluid flow characteristics such as temperature. At this stage of the proceeding, we find that Elson and Barker are in the same field of endeavor as the '957 patent, i.e., fluid flow measuring systems. *See In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (setting forth the tests that define the scope of analogous prior art).

Patent Owner also asserts, and Mr. Barfuss testifies, that one of ordinary skill in the art would not have had a reason to add a measurement tube or reflector to Ueki because Ueki's transducers are positioned directly opposite one another on opposing sides of the flow tube, so no modification or reflection would be necessary or desired. Prelim. Resp. at 58–59 (citing Ex. 2004 ¶ 76). At this stage of the proceeding, Patent Owner does not explain why the positions of the transducers would affect the skilled artisan's desire to include a temperature sensor. Additionally, Patent Owner's argument appears to be based on bodily incorporation because Petitioner does not rely on Elson and Barker as teaching adding a reflector. *See* Pet. 26–27, 55–56. The test for obviousness, however, "is not whether the features of a secondary reference can be bodily incorporated into the

structure of the primary reference." *MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1294 (Fed. Cir. 2015) (quoting *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)).

Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertions that the subject matter of claims 6 and 8 would have been obvious over Ueki and Elson and/or Barker.

4. Grounds 15–17: obviousness over Ueki, Will, Buckberry, Drachmann, and/or Goertz – claims 10, 14, and 15

Petitioner asserts that: (1) the subject matter of claim 10 would have been obvious over Ueki, Will, and/or Buckberry (Ground 15), Pet. 56; (2) the subject matter of claim 14 would have been obvious over Ueki and Drachmann (Ground 16), *id.* at 57; and (3) the subject matter of claim 15 would have been obvious over Ueki, Drachmann, and/or Goertz (Ground 17), *id.* at 58. For each ground, Petitioner explains how the asserted art discloses the additional limitations of each claim and sets forth why one of ordinary skill in the art would have had a reason to combine the references' disclosures with a reasonable expectation of success in achieving the claimed inventions. *Id.* at 56–58.

At this stage of the proceeding, Patent Owner does not separately contest Petitioner's arguments or evidence as to these obviousness grounds. *See generally* Prelim. Resp. Rather, Patent Owner contends that Grounds 15–17 do not warrant institution because they "do not address or redress the various deficiencies in Ueki" regarding the limitations "a shared wall area," "cast in one piece," and "a transducer at the shared wall area." *Id.* at 60. Thus, Patent Owner argues that Petitioner's obviousness grounds fail for the same reasons as Petitioner's ground asserting that Ueki anticipates. *Id.*

On the current record, Petitioner's arguments and evidence regarding the teachings of Ueki, Will, Buckberry, Drachmann, and Goertz show sufficiently that the combined teachings relied upon in each asserted ground disclose the limitations of claims 10, 14, and 15. *See* Pet. 54–58 (and evidence cited therein). Petitioner also shows sufficiently that a person of ordinary skill in the art would have had reasons to modify the prior art to arrive at the claimed inventions with a reasonable expectation of success. *Id.* Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertions that the subject matter of claims 10, 14, and 15 would have been obvious over the combined teachings of the asserted prior art.

5. Conclusion

In sum, we determine that Petitioner establishes a reasonable likelihood of prevailing in its assertions that (1) Ueki anticipates claims 1, 2, 5, 7, 9, and 11–13, (2) the subject matter of claims 3 and 4 would have been obvious over Ueki alone or Ueki and Will; (3) the subject matter of claims 6 and 8 would have been obvious over Ueki, Elson, and/or Barker; (4) the subject matter of claim 10 would have been obvious over Ueki, Will, and/or Buckberry; (5) the subject matter of claim 14 would have been obvious over Ueki and Drachmann; and (6) the subject matter of claim 15 would have been obvious over Ueki, Drachmann, and/or Goertz.

H. The Buckberry Grounds (Grounds 18–20)

Petitioner asserts that Buckberry anticipates claims 1–7, 9–13, and 15 of the '957 patent (Ground 18). Pet. 58–68. Petitioner also asserts that the subject matter of claim 8 would have been obvious over Buckberry, Elson, and/or Barker (Ground 19), *id.* at 68–69, and that the subject matter of claim 14 would have been obvious over Buckberry and Drachmann (Ground 20), *id.* at 69–70.

Patent Owner argues that Buckberry does not anticipate claims 1–7, 9–13, and 15. Prelim. Resp. 62–71. At this stage of the proceeding, Patent Owner does not separately contest Petitioner's obviousness assertions as to claims 8 and 14 over Buckberry, Elson, Barker, and/or Drachmann. *Id.* at 72.

1. Ground 18: anticipation by Buckberry – claims 1 and 11

Petitioner contends that Buckberry anticipates claims 1–4, 6, 7, 9–12, and 15 of the '957 patent. Pet. 58–68 (citing Ex. 1007, 1:2–3, 4:1–2, 4:9, 6:6–9, 6:15–22, 7:21–23, 8:19–24, 9:1–4, 9:24–29, 10:3–4, 13:9–10, 13:18–22, 14:27–29, 15:1–2, 15:11–12, 23:8–9, Fig. 1, Fig. 3, Fig. 4). Patent Owner disagrees, arguing that Buckberry does not disclose a monolithic polymer structure cast in one piece, a cavity housing a transducer, or a transducer at a shared wall. Prelim. Resp. 62–69 (citing Ex. 1007, 4:4–8, 6:7–27, 13; Ex. 2002 ¶¶ 30–34, 77–85, 87; Ex. 2004 ¶¶ 80–85; Pet. 62; Ex. 1021, 81, ¶ 155). Having considered the parties' arguments and the record, we determine that Petitioner establishes a reasonable likelihood of prevailing in its assertions that Buckberry anticipates claims 1–4, 6, 7, 9–12 and 15.

As with the Ueki grounds, the nub of the parties' arguments centers on three limitations: (1) cast in one piece; (2) a cavity housing a transducer; and (3) a transducer at a shared wall. Accordingly, we focus our discussion on those limitations first and then turn to the remaining limitations of claims 1 and 11 and to claims 2–4, 6, 7, 9, 10, 12, and 15, which Patent Owner does not contest separately. *See generally* Prelim. Resp.

a) "cast in one piece"

Petitioner asserts that Buckberry discloses a monolithic polymer structure that is cast in one piece. Pet. 59–60. In particular, Petitioner

directs us to Buckberry's disclosure of an ultrasonic flow-rate measurement device that includes measurement conduit 12 with transducer housing 20 that is "integrally molded" and "integrally formed" with conduit 12. *Id.* (citing Ex. 1007, 6:8–9, 13:18–20, Fig. 3).

Patent Owner asserts that Buckberry's measurement conduit 12 and transducer housing 20 are not cast in one piece because they are not cast in a single mold. Prelim. Resp. 62–64 (citing Ex. 1007, 6:7–27; Ex. 2002 ¶¶ 30–34, 77–85. In particular, Patent Owner argues that one of ordinary skill in the art would have recognized that Buckberry's measurement conduit could not be made in a single mold. *Id.* at 64–65 (citing Ex. 1007, 4:4–8, 6:27–27, 13; Ex. 2002 ¶¶ 80, 82–83). Patent Owner's arguments, therefore, rely on its claim construction of "cast in one piece."

At this stage of the proceeding, we are persuaded that Buckberry discloses a monolithic polymer structure being cast in one piece. As described above, we construe "cast in one piece" to mean "a molded one-piece structure." *See supra* § III.C.1. That is, we do not adopt Patent Owner's proposed construction. Petitioner shows sufficiently that Buckberry discloses a monolithic polymer structure cast in one piece. Specifically, Buckberry discloses that the ultrasonic flow-rate measurement device's measurement conduit 12 and transducer housing 20 are "integrally molded" and "integrally formed." Pet. 60 (citing Ex. 1007, 6:8–9, 13:18–20). Therefore, Buckberry discloses an ultrasonic flow-rate measurement device with a measurement conduit 12 and transducer housing 20 that is a molded one piece structure, i.e. cast in one piece. Accordingly, at this stage of the proceeding, Petitioner shows sufficiently that Buckberry discloses monolithic polymer structure cast in one piece. As discussed above,

however, we invite the parties to further brief this issue and our claim construction of "cast in one piece" during trial, if desired.

b) "the cavity is arranged for housing at least one ultrasonic transducer"

Petitioner asserts that Buckberry discloses a cavity housing at least one ultrasonic transducer. Pet. 58–62. Specifically, Petitioner relies on Buckberry's Figure 4, which we reproduce below.

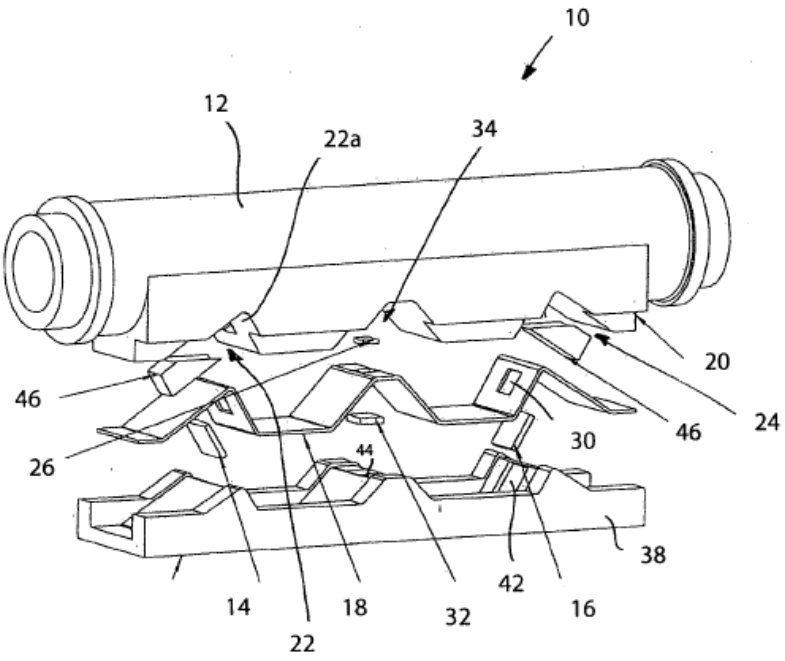


Fig 4

Figure 4 shows transducer housing 20 with recesses 22, 34, and 24 and ultrasonic transducers 14 and 16. Ex. 1007, 13:19–22, 15:1–2. Petitioner associates recesses 22, 34, and 24 with the cavity of the '957 patent. Pet. 60–62 (citing Ex. 1007, 13:9–10, 13:18–22, 15:1–2, Fig. 4). Petitioner also relies on Buckberry's Figure 3, which we reproduce below.

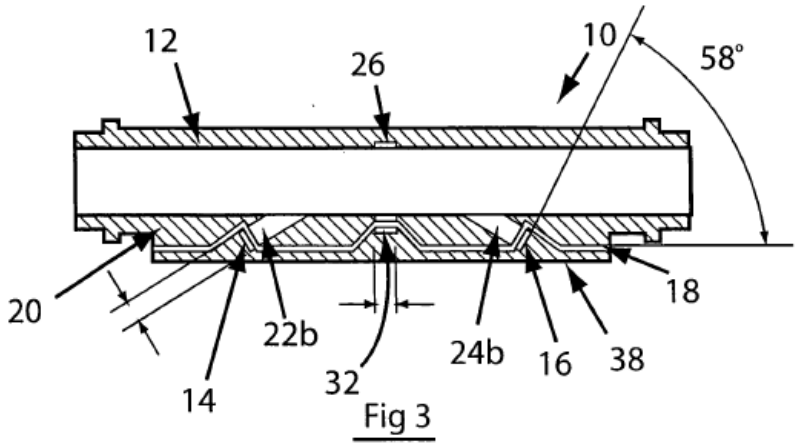


Fig 3

Figure 3 shows the placement of transducers 14 and 16 between transducer housing 20 and cover 38. Ex. 1007, 13:19–22, 15:11–15. Petitioner asserts that Buckberry's recesses 22 and 24 receive ultrasonic transducers 14 and 16. Pet. 62 (citing Ex. 1007, 13:20–22).

Patent Owner argues that, to the extent Buckberry discloses a cavity, it is Buckberry's cover 38 that forms the cavity and not the transducer housing 20. Prelim. Resp. 65–68. Patent Owner relies Mr. Barfuss's testimony that one of ordinary skill in the art would have recognized that transducer housing 20 does not house the transducers, and that instead the cover 38 houses the transducers. *Id.* (citing Ex. 2004 ¶¶ 80–82). Patent Owner further argues that the transducers are not in contact with transducer housing 20. *Id.* at 68 (citing Ex. 2004 ¶¶ 81–82).

On this record and at this stage of the proceeding, Petitioner shows sufficiently that Buckberry discloses the claimed cavity arranged for housing a transducer. As Petitioner points out, Buckberry discloses transducer housing 20 with recesses 22 and 24. Pet. 60 (citing Ex. 1007, 13:18–22). Buckberry discloses that recesses 22 and 24 are "for receiving the first and second [ultrasonic transducers] 14, 16 respectively." Ex. 1007, 13:20–22.

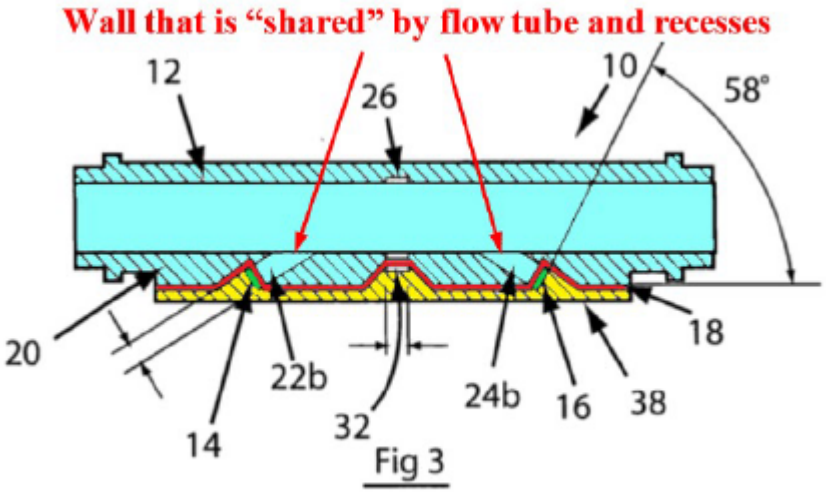
Patent Owner's argument that transducer housing 20 does not house the transducers because cover 38 includes recesses that protect and secure the transducers is not persuasive. Prelim. Resp. 67 (citing Ex. 2004 ¶ 80). Even if cover 38 includes recesses for the transducers, Buckberry's Figure 3 shows transducers 14 and 16 located in recesses 22 and 24, i.e. cavities, of transducer housing 20. Although transducers 14 and 16 do not appear to be in contact with transducer housing 20, we do not understand claims 1 and 11 to require the cavity to have direct contact with transducer in order to "house" the transducer. Therefore, we determine that Petitioner shows sufficiently that Buckberry discloses a cavity arranged for housing at least one ultrasonic transducer.

c) "at least one ultrasonic transducer, at the shared wall area" (claim 1), "wherein the shared wall comprises at least one area arranged to receive the at least one ultrasonic transducer" (claim 5), and "wherein the flow meter comprises at least two ultrasonic transducers positioned at the shared wall area" (claim 13)

Claims 1 and 5 require at least one ultrasonic transducer at the shared wall area (claim 1) or that an area of the shared wall is arranged to receive at least one ultrasonic transducer (claim 5). Ex. 1001, 6:51–52, 6:66–67. Claim 13 requires at least two ultrasonic transducers at the shared wall area. *Id.* at 8:10–11. Petitioner contends that Buckberry discloses transducer housing 20 with an elongated cavity in the form of recesses. Pet. 59 (citing Ex. 1007, Fig. 1, 4:9, 6:6–8). Petitioner asserts that "'transducer housing 20 is *integrally moulded* with the conduit 12,' such that the flow section and the cavity share a wall." *Id.* (quoting Ex. 1007, 13:19–20 and citing *id.* at 6:8–9). Petitioner also asserts that Buckberry discloses the placement of ultrasonic transducers 14 and 16 at a shared wall area. *Id.* (citing Ex. 1007,

13:9–10, 13:20–22). Specifically, Petitioner points to recesses 22 and 24 of transducer housing 20, which receive transducers 14 and 16. *Id.* at 62 (citing Ex. 1007, 13:20–22).

Patent Owner argues that Petitioner does not sufficiently point out the shared wall area in Buckberry. Prelim. Resp. 69. Relying on testimony from Mr. Barfuss, Patent Owner asserts that, to the extent Buckberry discloses a shared wall, the shared wall is located at the interface of recess 22b (or 24b) and conduit 12. *Id.* (citing Ex. 2004 ¶¶ 83–85). To illustrate its argument, Patent Owner provides an annotated version of Buckberry's Figure 3, which we reproduce below.



Patent Owner's annotation of Buckberry's Figure 3 shows Buckberry's flow tube 12 and transducer housing 20 in blue. *Id.* Transducers 14 and 16 are in green. Patent Owner uses red arrows to highlight its argument that Buckberry's shared wall is the wall shared between flow tube 12 and recesses 22b and 24b. *Id.* (citing Ex. 2004 ¶¶ 83–85).

On the current record, we find that Petitioner shows sufficiently that Buckberry discloses at least one ultrasonic transducer at a shared wall.

Specifically, Petitioner relies on Buckberry's transducer housing 20 as a shared wall area between cavities 22 and 24 and flow tube 12. Pet. 59; Ex. 1007, 6:8–9, 13:19–20. Buckberry discloses that recesses 22 and 24 of transducer housing 20 receive transducers 14 and 16. Ex. 1007, 13:20–22. Although Patent Owner points to the portion of wall between flow tube 12 and recesses 22b and 24b as the shared wall area, Petitioner does not rely on those recesses as the cavities recited in claims 1 and 11. Rather, Petitioner relies on the entire wall of the housing that is integrally molded with conduit. *See* Pet. 58–62. Patent Owner's annotated Figure 3, which highlights both the flow tube and housing in blue, appears to support Petitioner's position that the housing and flow tube have a shared wall. Therefore, Petitioner shows sufficiently, at this stage of the proceeding, that Buckberry discloses at least one ultrasonic transducer at a shared wall.

d) Remaining limitations and claims 2–4, 6, 7, 9, 10, 12, 15

Petitioner asserts that Buckberry discloses the remaining limitations of claims 1 and 11. Pet. 58–63, 67 (citing Ex. 1007, 1:2–3, 4:9, 6:6–9, 9:1–4, 9:24, 10:3–4, 13:9–10, 13:18–22, 14:27–29, 15:1–2, 23:8–9, Fig. 1, Fig. 3, Fig. 4). Petitioner also asserts that Buckberry discloses the remaining limitation of claim 5. *Id.* at 65–66 (citing Ex. 1007, 6:26–27, 13:20–22). And Petitioner asserts that Buckberry anticipates dependent claims 2–4, 6, 7, 9, 10, 12, and 15 because it discloses the additional limitations those claims require. *Id.* at 63–68 (citing Ex. 1007, 4:1–2, 6:15–22, 7:21–23, 8:19–24, 9:28–29, 10:3–4, 15:8–10, 15:11–15, 23:8–9, Fig. 4). At this stage of the proceeding, Patent Owner does not separately contest Petitioner's arguments or evidence as to the remaining limitations of claims 1, 5, and 11, or the additional limitations of claims 2–4, 6–7, 9–10, 12, and 15. *See generally* Prelim. Resp. On the current record, Petitioner shows sufficiently that

Buckberry discloses those limitations. Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertions that Buckberry anticipates claims 1–4, 6, 7, 9–12, and 15.

2. Grounds 19 and 20: obviousness over Buckberry, Elson, Barker, and Drachmann – claims 8 and 14[19]

Petitioner asserts that (1) the subject matter of claim 8 would have been obvious over Buckberry, Elson, and/or Barker, Pet. 24–27, 68–69; and (2) the subject matter of claim 14 would have been obvious over Buckberry and Drachmann, *id.* at 69–70. For each ground, Petitioner explains how the asserted art discloses the additional limitations of the claim and provides reasons why one of ordinary skill in the art would have had a reason to combine the references' disclosures with a reasonable expectation of success in achieving the claimed inventions. *Id.* at 68–70.

At this stage of the proceeding, Patent Owner does not separately contest Petitioner's arguments or evidence as to the obviousness grounds. *See generally* Prelim. Resp. Rather, Patent Owner contends that Petitioner's obviousness grounds fail because they "do not address or redress the various deficiencies in Buckberry" regarding the limitations of "cast in one piece" and a cavity that houses or is arranged for housing an ultrasonic transducer. *Id.* at 72. Thus, Patent Owner argues that Petitioner's obviousness grounds fail for the same reasons as Petitioner's ground asserting that Buckberry anticipates. *Id.*

[19] Although Patent Owner refers to Grounds 19 and 20 as addressing claims 8 and 9, Prelim. Resp. 72, we interpret Patent Owner's argument to refer to Grounds 19 and 20 as addressing claims 8 and 14. *See, e.g.*, Pet. 1–3 (Petitioner's summary of grounds).

On the current record, Petitioner's arguments and evidence regarding the teachings of Buckberry, Elson, Barker, and Drachmann show sufficiently that the combined teachings relied upon in each asserted ground disclose the limitations of claims 8 and 9. *See* Pet. 68–70 (and evidence cited therein). Petitioner also shows sufficiently that a person of ordinary skill in the art would have had reasons to modify the prior art to arrive at the claimed inventions with a reasonable expectation of success. *Id.* Accordingly, Petitioner establishes a reasonable likelihood of prevailing in its assertions that the subject matter of claims 8 and 14 would have been obvious over the combined teachings of the asserted prior art.

3. Conclusion

For the reasons above, we determine that Petitioner establishes a reasonable likelihood of prevailing in its assertions that (1) Buckberry anticipates claims 1–7, 9–13, and 15; (2) the subject matter of claim 8 would have been obvious over Buckberry, Elson and/or Barker; and (3) the subject matter of claim 14 would have been obvious over Buckberry and Drachmann.

IV. CONCLUSION

Taking account of the information presented in the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the '957 patent is unpatentable. "[E]ven when a petitioner demonstrates a reasonable likelihood of prevailing with respect to one or more claims, institution of review remains discretionary." *Deeper, UAB v. Vexilar, Inc.*, IPR2018-01310, Paper 7 at 42 (PTAB Jan. 24, 2019) (informative) (citing *SAS*, 138 S. Ct. at 1355–56; *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016)). As *Deeper* explains, "the

Board may consider the number of claims and grounds that meet the reasonable likelihood standard when deciding whether to institute an *inter partes* review under 35 U.S.C. § 314(a)." *Id.* (citing SAS Q&A's, Part D). We further consider the effect on "'the efficient administration of the Office [and] the ability of the Office to timely complete proceedings,' 35 U.S.C. § 316(b), as well as the requirement to construe our rules to 'secure the just, speedy, and inexpensive resolution of every proceeding,' 37 C.F.R. § 42.1(b)." *Deeper*, Paper 7 at 42.

Here, Petitioner challenges fifteen claims under twenty asserted grounds of patentability. Petitioner demonstrates a reasonable likelihood of prevailing with respect to all challenged claims and nine grounds (i.e., Grounds 12–20). On this record, and based on the particular facts of this proceeding, we find that instituting a trial with respect to all challenged claims and grounds is an efficient use of the Board's time and resources. Thus, we institute an *inter partes* review of all challenged claims on all grounds set forth in the Petition. Our findings and conclusions are not final and may change after considering the full record developed during trial.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is granted and an *inter partes* review is instituted as to claims 1–15 of the '957 patent with respect to the grounds set forth in the Petition; and

FURTHER ORDERED that notice is hereby given of the institution of a trial commencing on the entry date of this decision, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4.

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