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Paper 30
Entered: February 4, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARROWS UP, LLC,
Petitioner,

v.

OREN TECHNOLOGIES, LLC,
Patent Owner.

IPR2018-01233
Patent 9,914,602 B2

Before MITCHELL G. WEATHERLY, JAMES A. TARTAL, and PAUL J. KORNICZKY, *Administrative Patent Judges.*

TARTAL, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Arrows Up, LLC ("Petitioner")[1] filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of all claims (claims 1–10) of U.S. Patent No. 9,914,602 B2 ("the '602 patent"). Pet. 1. We issued a decision to institute an *inter partes* review of these claims. Paper 7 ("Inst. Dec."). After institution, Oren Technologies, LLC ("Patent Owner")[2] filed a Patent Owner Response (Paper 16, "PO Resp."), to which Petitioner filed a Reply (Paper 19, "Pet. Reply"). Patent Owner further filed a Sur-Reply. Paper 20 ("PO Sur-Reply"). Oral argument was held on October 25, 2019, and a transcript of the hearing appears in the record. Paper 26.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 (2017). Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the evidence. *See* 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2017). For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–10 of the '602 patent are unpatentable. *See* 35 U.S.C. § 316(e).

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[1] Petitioner identifies itself, Broe Management Company LLC d/b/a The Broe Group, OmniTRAX, Inc., OmniTRAX Sand Holdings LLC, Omni AU, LLC, OES Holdings, LLC, and OmniTRAX Holdings Combined, Inc., as real parties in interest. Pet. 74.

[2] Patent Owner identifies itself, SandBox Logistics, LLC, and U.S. Silica Company as real parties in interest. Paper 3, 1.

II. BACKGROUND

A. Related Proceedings

Petitioner identifies as related proceedings the following *inter partes* review cases that involve patents that claim priority to the same applications as the '602 patent: *Proppant Express Investments, LLC v. Oren Technologies, LLC*, Case Nos. IPR2017-01917, IPR2017-01918, IPR2017-02103, and IPR2018-00914. Pet. 74–75. Petitioner has also challenged related patents in *inter partes* review proceedings in Case Nos. IPR2018-01230, IPR2018-01231, and IPR2018-01232.

Petitioner identifies as related proceedings the following district court cases: *SandBox Logistics LLC v. Grit Energy Solutions, LLC*, No. 3:16-cv-00012 (S.D. Tex.), and *SandBox Logistics LLC v. Proppant Express Investments, LLC*, No. 4:17-cv-00589 (S.D. Tex.). *Id.* The only related proceeding identified by Patent Owner is a district court case captioned: *Arrows Up, LLC v. US Silica Holdings, Inc., and Sandbox Logistics, LLC*, No. 4:17-cv-1945 (S.D. TX). Paper 3, 2.

B. The '602 Patent

The'602 patent, titled "Methods of Storing and Moving Proppant at Location Adjacent Rail Line," issued March 13, 2018, from U.S. Application No. 15/589,185, filed May 8, 2017. Ex. 1001, codes (21), (22), (45), (54). The '602 patent generally relates to a method of delivering proppant to a well site following a series of steps. *Id.* at Abstract.

Hydraulic fracturing is the propagation of fractures in rock layers to release for extraction fossil fuels such as petroleum, natural gas, and coal seam gas. *Id.* at 2:11–16. Fracturing (also referred to as "fracking" or "fracing") is done by injecting highly-pressurized fluid through a wellbore to

create new channels in the rock. *Id.* at 2:16–20. "The fracture width is typically maintained after the injection by introducing a proppant into the injected fluid." *Id.* at 2:20–22. Fracking proppant is a material, "such as grains of sand, ceramic, or other particulates," used in hydraulic fracturing. *Id.* at 2:22–24. The injection of proppant into the rock fractures prevents the fractures from closing when the injection is stopped. *Id.*

According to the '602 patent, there is typically a need to ensure a large amount of high quality proppant is available during fracturing operations so that the fracturing operation does not stall and is not forced to use lower quality proppant. *Id.* at 3:6–17. Prior methods of transporting and storing proppant have involved dumping proppant on site and storing proppant in costly silos. *Id.* at 2:50–51, 2:64–66. The '602 patent describes a system for the storage and transport of proppant that purports to enhance productivity, reduce liabilities, improve safety, and increase profits. *Id.* at 5:25–42. The '602 patent includes only three figures to illustrate the claimed invention, each of which is reproduced below.

To illustrate an embodiment of the ’602 patent, Figure 3 is reproduced below:

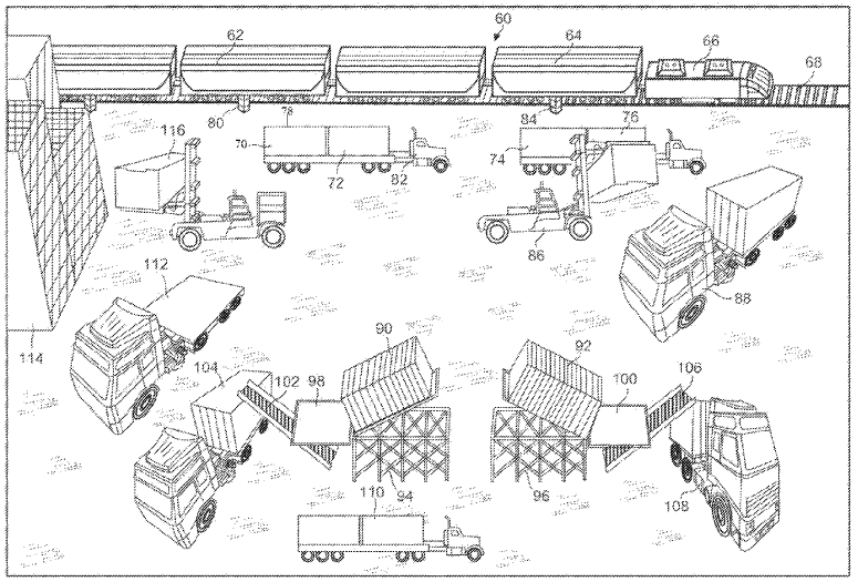

FIG. 3

Figure 3 is an illustration of system 60 of the claimed invention. Ex. 1001, 7:11–12, 8:48. Bulk material train 64 transports proppant to a desired location via vessel 62. *Id.* at 8:50–55. The proppant is then unloaded into containers 70, 72, 74, and 76 on trucks via conveyors 80 and 84. *Id.* at 8:59–9:12. Loader/unloader 86 moves containers 70, 72, 74, and 76 as needed and can remove containers from a truck and place them upon tilting mechanism 94 (or 96). *Id.* at 9:13–20. Tilting mechanism 94 includes a support panel pivotally connected to a frame, which allows the container to be tilted so that the end wall faces at an angle toward hopper 98 into which the proppant is discharged. *Id.* at 9:18–28. Conveyor 102 transports proppant from hopper 98 to pneumatic bulk trailer 104. *Id.* at 9:29–33. Figure 3 also shows empty containers 114 arranged in a stacked configuration and the ’602 patent further explains that filled containers may also be stacked until such time as proppant is needed. *Id.* at 9:50–61.

To illustrate container 12 of the ’602 patent, Figures 1 and 2 are reproduced below:

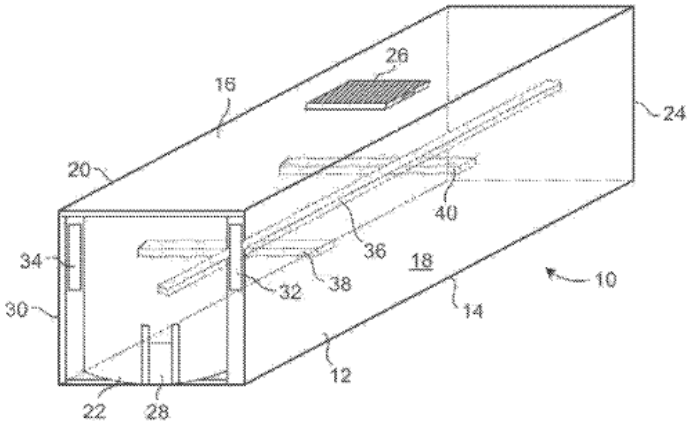

FIG. 1

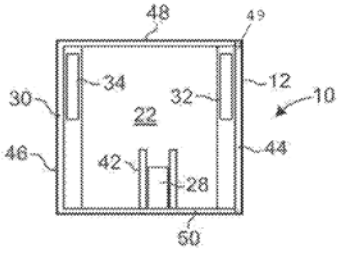

FIG. 2

Figures 1 and 2 of the ’602 patent are illustrations of proppant storage apparatus 10, including container 12. *Id.* at 7:7–10, 7:17–22, 8:25–26. As shown in the above Figures 1 and 2, container 12 has bottom wall 14, top wall 16, a pair of side walls 18 and 20, and a pair of end walls 22 and 24. *Id.* at 7:19–21. End surface 20 has structural uprights 44 and 46 thereon. *Id.* at 8:39–40. “Similarly, horizontal structural members 48 and 50 will extend between the structural uprights 44 and 46 at the top and bottom of the container 12.” *Id.* at 8:40–42.

According to the ’602 patent, the “structural members enhance the integrity of the container so that a large amount of weight can be stacked upon the container 12.” *Id.* at 8:42–45. Proppant may be introduced into container 12 through hatch 26 and may be discharged from container 12 through flow gate 28. *Id.* at 7:29–34. To enhance its integrity, container 12 includes longitudinal member 36 extending from end wall 22 to end wall 24, and cross members 38 and 40 extending from side wall 18 to sidewall 20. *Id.* at 7:67–8:24.

C. Illustrative Claim

Claim 1 is independent and claims 2–10 depend from claim 1.

Claim 1 is illustrative of the subject matter and is reproduced below:

> 1. A method of storing and moving fracking proppant at a desired location with a plurality of separate containers constructed to store fracking proppant therein, the method comprising:
>
> a) stacking one or more of the plurality of containers having proppant therein on top of one another adjacent a rail line;
>
> b) placing one or more of the plurality of containers from the stack adjacent the rail line onto one or more trailers of one or more vehicles at a desired location by use of a container loader/unloader;
>
> c) moving a first of the plurality of containers when positioned on the one or more trailers away from the desired location; and
>
> d) scaling a number of the plurality of containers according to an amount of proppant required at a particular location, each of the plurality of containers positioned to include an outlet to allow discharge of proppant therefrom, an opening adjacent a top of the container to load proppant therein, a pair of spaced-apart end walls connected to and extending between a bottom of the container and the top, a pair of side walls connected to and extending between the pair of end walls and the top and the bottom, one or more structural support members positioned to support each of the side walls of the pair of side walls and each of the end walls of the pair of end walls, and a flow gate positioned adjacent the outlet to control flow of proppant through the outlet of each of the plurality of containers.

Ex. 1001, 11:64–12:25.

D. References and Expert Testimony

Reference/Expert Testimony	Date	Exhibit No.
US 8,915,691 B2 ("Mintz")	Dec. 23, 2014	1002
US 2013/0206415 A1 ("Sheesley")	Aug. 15, 2013	1003
ISO 1496-1: Series 1 Freight Containers—Specification and Testing—Part 1, General Cargo Containers for General Purposes ("ISO 1496-1")	Aug. 1990	1010
ISO 6346: Freight Containers—Coding, Identification and Marking ("ISO 6346")	Dec. 1995	1011
ISO/IEC 15416: Information Technology—Automatic Identification and Data Capture Techniques—Bar Code Print Quality Test Specification—Linear Symbols ("ISO 15416")	Aug. 2000	1012
Robert Schaaf Declaration	May 31, 2018	1004
Fred P. Smith, P.E., C.S.P., Declaration	May 17, 2019	2007
Robert Schaaf Cross-Examination	Apr. 12, 2019	2008
Fred P. Smith Cross-Examination	July 30, 2019	1016

Patent Owner asserts that the testimony of Mr. Schaaf adds no probative weight and should be disregarded because it substantially duplicates statements in the Petition. *See, e.g.*, PO Resp. 17–18, 24. We are not persuaded that the similarity in content between the Petition and declaration warrants disregarding the declaration. We weigh Mr. Schaaf's opinions on particular issues in accordance with the underlying support provided for those opinions. *See* 37 C.F.R. § 42.65(a) (2017) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

E. The Asserted Grounds of Unpatentability

In the Petition, Petitioner identified the grounds of unpatentability of claims 1–10 of the '602 patent using "ISO Standards" to collectively refer to ISO 1496-1, ISO 6346, and ISO 15416. Petitioner provided the following table of grounds in the Petition:

Reference(s)	35 U.S.C. §	Claims Challenged
Mintz in combination with the ISO Standards	103	1, 3, 5–10
Sheesley in combination with the ISO Standards	103	1–5, 7, 8, 10
Mintz	103	1, 3, 5–10
Sheesley	103	1–5, 7, 8, 10

Pet. 3.

As a preliminary matter, Patent Owner argues that the Petition improperly relies on "ISO Standards" as a single prior art reference when it is instead "three separate and distinct printed publications." PO Resp. 10–12. Patent Owner further suggests that Petitioner was obligated to address every ISO Standard for every challenged claim merely because Petitioner used a short-hand description of the challenges as being based on "ISO Standards." *Id.* at 34–35.

As we explained in our Institution Decision, we are not persuaded that the use of the term "ISO Standards" in the Petition was improper:

> We agree with Patent Owner that Petitioner uses the term "ISO Standards" to refer to the collection of three distinct prior art references, filed as separate exhibits, each with a different publication: ISO 1496-1, ISO 6346, and ISO 15416. *See* Exs. 1010, 1011, 1012. Petitioner's use of a potentially ambiguous shorthand for three distinct references was an ill-conceived choice that only introduces the potential for confusion, as Patent Owner argues. Nonetheless, we find Petitioner has

> sufficiently shown precisely which ISO Standard it relies on in support of each ground and claim it challenges. For example, in regard to claim 1 Petitioner contends that the "[t]he ISO standard provides that ISO containers must be stackable," and cites precisely Exhibit 1010 ¶ 6.2. Pet. 26; see also *id.* at 27 ("stating that "ISO 1496 [Ex. 1010] . . . describes that ISO containers are stackable."). In such circumstances there is no ambiguity as to what ISO standard Petitioner is relying on, thus, Patent Owner is not left trying to "figure out" which ISO standard is applicable. We find Petitioner's use of "ISO Standards" to refer collectively to three separate prior art references does not warrant denial of the Petition because the Petition sufficiently identifies precisely which ISO standard is being asserted in regard to each ground and claim challenged.

Inst. Dec. 15–16. Petitioner further confirms that in the Petition it does not rely on ISO Standards as a single prior art reference. Pet. Reply 25–26.

Patent Owner has not shown that it was unable to determine from the Petition what teachings from the references were relied on in support of Petitioner's contentions or that, subsequent to the Petition, Petitioner altered the references relied on to challenge any particular claim. We conclude Petitioner adequately explained for each claim challenged in the Petition how it relies on ISO 1496-1, ISO 6346, or ISO 15416 as individual publications with respect to each particular limitation.

Based on our review of the Petition, as explained in the Institution Decision, the grounds presented by Petitioner are summarized in the table below:

Reference(s)	35 U.S.C. §	Claims Challenged
Sheesley	103	1–5, 7, 8, 10
Sheesley, ISO 1496-1[3]	103	10
Sheesley, ISO 6346, ISO 15416	103	5, 7
Mintz	103	1, 3, 5–10
Mintz, ISO 1496-1	103	1, 3, 5–10
Mintz, ISO 6346, ISO 15416	103	5, 7
Mintz, ISO 1496-1, ISO 6346, ISO 15416	103	5, 7

Pet. 3, 24–73; Pet. Reply 26; Inst. Dec. 8, 12–29.

III. ANALYSIS

In our analysis of Petitioner's unpatentability contentions with respect to claims 1–10, we next address the applicable principles of law; the level of ordinary skill in the art; the proposed construction of claim terms; the scope and content of the asserted prior art; and then further analyze Petitioner's contentions with respect to each alleged ground of unpatentability for

[3] Petitioner suggests in its Reply that it contended in the Petition that claim 1 would have been obvious over Sheesley in combination with ISO 1496-1. Pet. Reply 26. We disagree. Although Petitioner discusses ISO 1496-1 in regard to one limitation of claim 1, it does so only to purportedly show that ISO 1496-1 sets certain strength requirements for ISO containers and that "the modified ISO container disclosed in Sheesley must also provide" the structural support recited in claim 1. Pet. 58. Petitioner does not present an argument that a person of ordinary skill in the art had reason to modify Sheesley in light of ISO 1496-1, or otherwise explain how claim 1 would have been obvious over the combination.

purposes of determining whether Petitioner has shown by a preponderance of the evidence the unpatentability of the challenged claims.

A. Principles of Law

Petitioner contends the subject matter of the challenged claims would have been obvious over the asserted prior art. A patent claim is unpatentable as obvious if "the differences between" the claimed subject matter "and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a).[4] An invention "composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Rather, "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.*

An obviousness determination "cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.* (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art;

[4] The Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103 effective March 16, 2013. Because the '602 patent has an effective filing date before March 16, 2013, the pre-AIA version of § 103 applies.

(2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). In this case, no objective evidence of nonobviousness was introduced by either party.

B. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103 requires us to resolve the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

Petitioner proposes that a person having ordinary skill in the art would have had either (a) a bachelor's degree in an engineering or logistics discipline, plus one to two years of experience in hydraulic fracturing and logistical support of fracturing operations, or (b) four to five years of experience in hydraulic fracturing and logistical support for fracturing operations. Pet. 7 (citing Ex. 1004 ¶ 35). Patent Owner does not contest Petitioner's asserted level of ordinary skill in the art. *See generally* PO Resp. Based on the evidence provided, including the prior art of record, we agree with Petitioner's proposed level of ordinary skill and also find that the prior art of record further reflects the level of ordinary skill in the art. *See also Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (noting that the prior art of record may reflect the level of ordinary skill in the art).

C. Claim Construction

In an *inter partes* review, "[a] claim in an unexpired patent . . . shall be given its broadest reasonable construction in light of the specification of the patent in which it appears." 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016) (upholding the use of the broadest reasonable interpretation standard).[5] "Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history." *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

Petitioner proposes constructions for the following claim terms: "desired location," "adjacent," and "a flow gate positioned adjacent the outlet to control flow of proppant through the outlet of each of the plurality of containers." Pet. 7–9. Patent Owner argues that statements made by Petitioner about the construction of certain claim terms are incorrect, but further maintains that no claim term requires an express construction. PO Resp. 13–14. We agree with Patent Owner that no claim term requires express construction for purposes of this Decision. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) ("claim terms

[5] Although the claim construction standard applied in *inter partes* review was changed to the federal court claim construction standard used in a civil action under 35 U.S.C. § 282(b), that change does not apply to this proceeding because the Petition was filed before November 13, 2018, the effective date of the change. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,344 (Oct. 11, 2018) (now codified at 37 C.F.R. pt. 42 (2019)).

need only be construed 'to the extent necessary to resolve the controversy'" (internal citation omitted)).

D. Scope and Content of the Prior Art

To demonstrate the unpatentability of the challenged claims of the '602 patent, Petitioner relies on Sheesley, ISO Standards (separately, ISO 1496-1, ISO 6346, and ISO 15416), and Mintz, each of which is briefly summarized below.

1. Summary of Sheesley

Sheesley, titled "Method and Apparatus for Modifying a Cargo Container to Deliver Sand to a Frac Site," describes cargo containers for carrying "proppant such as sand from a quarry or source to the frac site." Ex. 1003, codes (54), (57). In particular, Sheesley discloses a method whereby "cargo containers may be taken directly to the quarry and loaded with sand . . . [and that the] containers can then move through all of the normal modes of transportation including ship, barge, rail or by truck, all the way to the frac site." *Id.* ¶ 17.

To illustrate an embodiment of Sheesley's method, we reproduce its Figure 2, below:

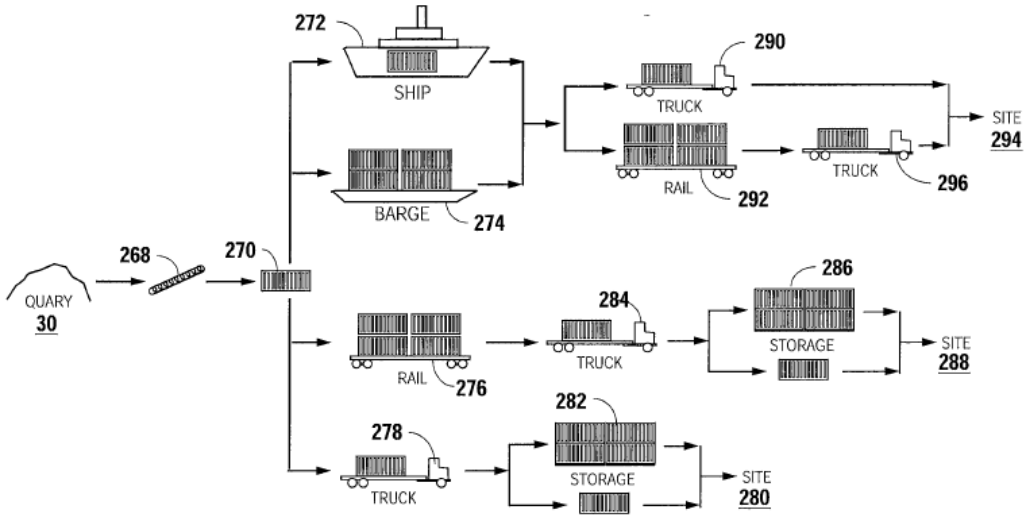

Fig. 2

According to Sheesley, the above Figure 2 depicts the delivery of "sand from the quarry or source to the frac site." *Id.* ¶ 20. Sand from quarry 30 or source may be loaded by conveyor 268 and into cargo container 270. *Id.* ¶ 78. Containers 270 may be loaded on ship 272, barge 274, rail 276, or flatbed truck trailer 278. *Id.* If container 270 is loaded on trailer 278, container 270 may be taken directly to fracing site 280 or placed in storage 282 at fracing site 280. *Id.* ¶ 79. Sheesley further discloses that the containers can be stacked and that a container handler can be used to pick up full or empty containers. *Id.* ¶ 83 (referencing Figs. 3, 4).

2. Summary of ISO Standards

According to Petitioner, the "International Organization for Standardization ('ISO') is a global federation of standards-setting bodies that promulgates international technical, industrial, and commercial standards,"

including uniform standards for shipping containers. Pet. 21–22 (citing Ex. 1013, 8–10).

ISO 1496-1, titled "Series 1 freight containers – Specification and testing – Part 1: General cargo containers for general purposes," provides "basic specifications and testing requirements for ISO series 1 freight containers of the totally enclosed general purpose types and certain specific purpose types (closed, vented, ventilated or open top) which are suitable for international exchange and for conveyance by road, rail and sea, including interchange between these forms of transport." Ex. 1010 ¶ 1.1. Pertinent to Petitioner's contentions, ISO 1496-1: (1) provides testing specifications "to prove the ability of a fully loaded container to support a superimposed mass of containers;" and (2) states that fork-lift pockets used for handling loaded or unloaded containers may be provided as optional features. *Id.* ¶¶ 5.8.1.1, 6.2.1, Annex C; *see also* Pet. 17–18.

ISO 6346, titled "Freight containers – Coding, identification and marking," provides "a system for the identification and presentation of information about freight containers" for use "in documentation, control and communications (including automatic data processing systems), as well as for display on the containers themselves." Ex. 1011 ¶ 1.1. Pertinent to Petitioner's contentions, ISO 6346 specifies an identification system including a three letter owner code and a six numeral serial number. *Id.* ¶ 3.1; *see also* Pet. 18.

ISO 15416, titled "Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Linear symbols," sets forth a methodology which "provides a basis for grading the quality of bar code symbols in relation to their expected

performance when read." Ex. 1012, Introduction. Pertinent to Petitioner's contentions, ISO 15416 "specifies the methodology for the measurement of specific attributes of bar code symbols" and "defines a method for evaluating these measurements and deriving an overall assessment of symbol quality." Ex. 1012 ¶ 1; *see also* Pet. 18.

3. Summary of Mintz

Mintz, titled "Apparatus for Transporting Frac Sand in Intermodal Container," is directed to an internal structure adapted to support and strengthen a container manufactured to International Organization for Standardization (ISO) specifications and a valve apparatus to transfer sand and proppant material from the container to fracking operations. Ex. 1002, code (54), 1:63–2:13. In particular, Mintz discloses, "[h]orizontal and angular peripheral bracing framework to strengthen the side walls of such standard ISO intermodal shipping container." *Id.* at 2:55–57.

To illustrate an embodiment of Mintz, Figure 1 is reproduced below:

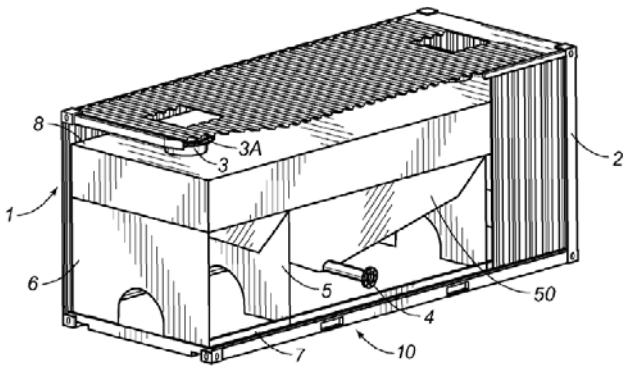

FIG. 1

Figure 1 of Mintz illustrates a perspective view of frac sand transport apparatus 1, comprising plurality of inlet ports 3, plurality of outlet transverse discharge ports 4, plurality of saddle supports 5, pair of end supports 6, pair of cross-braces 7, and roof 8. *Id.* at 4:46–51.

E. Alleged Obviousness Over Sheesley, Alone, or Over Combinations of Sheesley and ISO Standards

Petitioner contends that the subject matter of claims 1–5, 7, 8, and 10 of the '602 patent would have been obvious over Sheesley, alone, or in combination with ISO Standards. Pet. 48–72. As explained above, ISO Standards consists of three separate prior art references—ISO 1496-1, ISO 6346, and ISO 15416—and we understand Petitioner's contentions as to each challenged claim to be based on the particular ISO standards expressly alleged in the Petition to be applicable to the recited limitations. *See, e.g.*, Pet. 65–67 (expressly applying Sheesley, ISO 6346, and ISO 15416 to claim 5 with "bar-codes and logging mechanisms" limitation).

1. Independent Claim 1

Petitioner contends each of the limitations of claim 1 is taught by Sheesley. Pet. 48–59, 73; Pet. Reply 14–19. Patent Owner argues that Sheesley fails to teach stacking containers "adjacent a rail line," as discussed below. PO Resp. 24–29, PO Sur-Reply 12–17. For the reasons provided below, we find Petitioner has shown by a preponderance of the evidence that Sheesley teaches every limitation of claim 1.

a. A method of storing and moving fracking proppant at a desired location with a plurality of separate containers constructed to store fracking proppant therein, the method comprising

To the extent that the preamble is limiting, Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches a corresponding method of using "modified cargo containers" to transfer sand to frac sites. Pet. 48 (citing Ex. 1003, Abstract, ¶¶ 2, 78).

b. stacking one or more of the plurality of containers having proppant therein on top of one another adjacent a rail line

Petitioner has shown that Sheesley teaches that modified containers filled with proppant may be stacked in a storage location, including adjacent a rail line, corresponding to the stacking requirement recited in claim 1. Pet. 49–51 (citing Ex. 1003 Abstract, ¶¶ 11, 17–19, 21, 23, 42, 49, 77, 78, 84, Figs. 1, 3, 5). Indeed, Sheesley expressly states that the "modified frac containers may be stacked in any conventional means" and illustrates containers stacked on top of one another separate from a vehicle. Ex. 1003 ¶ 18, Figs. 2, 3. Figure 3 of Sheesley is reproduced below.

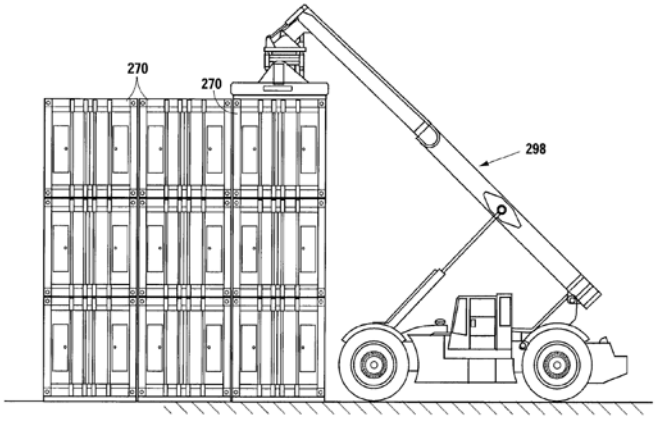

Fig. 3

Sheesley states that Figure 3 "is a pictorial illustration of the stackability of modified cargo containers, with or without sand therein." *Id.* ¶ 21. The only thing not expressly shown in Figure 3 that is recited in the limitation is whether the stack is "adjacent a railroad line." But Sheesley clearly shows the containers transported by ship, barge, rail, and truck. *See* Ex. 1003 Fig. 2. Petitioner further reasons that Sheesley teaches loading sand from a "source" by conveyor into a modified cargo container, that a "source" includes "any point along a supply chain" of the proppant, and that a rail site

is a point along a supply chain. Pet. 49. Petitioner also has shown that Sheesley teaches that the modified containers may be filled in a stacked configuration. *Id.* at 50 (citing Ex. 1003 ¶¶ 23, 84, Fig. 5). Thus, Petitioner reasons that "Sheesley discloses that the containers may be filled while stacked at a rail site, resulting in containers filled with proppant stacked adjacent a rail line." *Id.* (citing Ex. 1004 ¶ 131). Mr. Schaaf further provides sound reasoning for why a person of ordinary skill in the art would have understood Sheesley teaches stacking containers containing proppant adjacent a rail line. Ex. 1004 ¶¶ 128–132 (noting that Sheesley's express desire for trucks to be quickly unloaded so that operators may avoid demurrage fees applies to the need to promptly unload trains as well, which would have motivated a person of ordinary skill to stack containers adjacent a rail line).

Patent Owner's multitude of arguments for why Petitioner purportedly failed to show how Sheesley teaches stacking containers of proppant "adjacent a rail line" are unavailing. PO Resp. 24–28; PO Sur-Reply 12–17. Through a series of convoluted arguments Patent Owner attempts to show that Sheesley does not expressly state that containers filled with proppant are stacked "adjacent a rail line." For example, Patent Owner asserts that even if "Sheesley generally discloses that modified containers may be 'filled with proppant at a rail site,' [citing Pet. 49,] "this statement does not disclose stacking containers with proppant therein 'adjacent a rail line,' as required by the claim language, because Petitioner does not argue these are either 'stacked' or 'adjacent a rail line.'" PO Resp. 24–25. Patent Owner further argues that "at best, Sheesley discloses filling stacked containers *on* a rail car, not "*adjacent* a rail line." *Id.* at 25. Sheesley does not expressly

identify every physical structure and possible location "adjacent" to which a person of ordinary skill in the art would have understood containers filled with proppant may be stacked, nor does it need to for Petitioner to establish the obviousness of the limitation, because a "reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment." *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012).

In its Sur-Reply, Patent Owner argues that, because Petitioner contends Sheesley teaches this limitation, "[w]hether it would have been obvious to a [person of ordinary skill in the art] is not before the Board." Sur-Reply 13. Patent Owner appears to confuse what is required for a reference to show that a limitation would have been obvious to a person of ordinary skill in the art with what is required when the knowledge of a person of ordinary skill in the art is relied upon to fill in a missing limitation. Contrary to Patent Owner's position, an express teaching in Sheesley of "adjacent to a rail line" is not required to show obviousness over Sheesley. There is no missing limitation from Sheesley because it is clear from the evidence provide by Petitioner that Sheesley teaches a person of ordinary skill in the art "stacking one or more of the plurality of containers having proppant therein on top of one another adjacent a rail line." We have considered all of Patent Owner's arguments and are convinced that Petitioner has shown that, when read in its entirety, Sheesley teaches the claimed limitation for the reasons provided above. *See* Ex. 1003, Abstract, ¶¶ 17–19, 21, 23, 42, 49, 77, 78, 84, claims 15, 21, Figs. 1, 3, 5.

c. placing one or more of the plurality of containers from the stack adjacent the rail line onto one or more trailers of one or more vehicles at a desired location by use of a container loader/unloader

For the reasons provided above, Petitioner has shown that Sheesley teaches stacking containers of proppant adjacent a rail line. Petitioner also has shown (and Patent Owner does not dispute) that Sheesley teaches using trailers to transport cargo containers to storage or fracking sites, and using Rough Terrain Cargo Handler 298, corresponding to a "loader/unloader," to move filled containers. Pet. 51–52 (citing ¶¶ 25, 78, 79, 88, Fig. 7).

d. moving a first of the plurality of containers when positioned on the one or more trailers away from the desired location

Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches moving modified containers on a trailer to a fracking site, and that moving the modified containers "towards the fracking site necessarily means that the modified container is moving away from the 'desired location' where the containers were loaded onto the trailer." *Id.* at 52–53 (citing Ex. 1003 ¶¶ 2, 17, 79).

e. scaling a number of the plurality of containers according to an amount of proppant required at a particular location

Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches the "scaling" limitation, including that a person of ordinary skill would have understood from Sheesley the importance of having the required amount of proppant at the well site for fracking to keep the fractures created through fracking open and the oil and gas flowing. *Id.* at 53 (citing Ex. 1003 ¶¶ 8, 9). Sheesley also explains the increased costs associated with the failure to unload trucks carrying proppant when they arrive. *Id.* (citing Ex. 1003 ¶ 11). Petitioner reasons that a person of

ordinary skill would have understood the need to have the correct amount of proppant at a particular location, corresponding to the requirement of claim 1. *Id.* at 54 (citing Ex. 1004 ¶ 141).

f. each of the plurality of containers positioned to include an outlet to allow discharge of proppant therefrom, an opening adjacent a top of the container to load proppant therein

Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches that a lower hatch is placed in bottom hole 144 cut into bottom 146 of cargo container 130 which "may be opened to remove the sand therefrom," corresponding to the recited "outlet," and an upper hatch placed in top hole 140 cut into top 142 of cargo container 130, which may be "used to load sand in the cargo container," corresponding to the recited "opening adjacent a top." *Id*. at 54–56 (citing Ex. 1003 ¶¶ 14, 16, 21, 50, 57, 66, Figs. 10, 15).

g. a pair of spaced-apart end walls connected to and extending between a bottom of the container and the top, a pair of side walls connected to and extending between the pair of end walls and the top and the bottom

Petitioner has shown (and Patent Owner does not dispute) that Figure 9 of Sheesley teaches a container with a pair of end walls and a pair of sidewalls, as recited by claim 1. *Id*. at 57 (citing Ex. 1003 ¶ 50).

h. one or more structural support members positioned to support each of the side walls of the pair of side walls and each of the end walls of the pair of end walls

Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches structural support members at the corners and edges of the container to support the side and end walls and that all ISO containers "must meet certain strength requirements" pursuant to ISO 1496-1. *Id*. at 57–58 (citing Ex. 1003 Figs. 9, 10; Ex. 1010 ¶¶ 5.1, 5.2, 5.3.1, 6.3, 6.4).

i. and a flow gate positioned adjacent the outlet to control flow of proppant through the outlet of each of the plurality of containers

Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches bottom hole 144 "with a lower hatch 214 having a wedge-shaped slot 216 therein in which the lower sliding door 218 opens and closes the lower opening 220," corresponding to the recited flow gate. *Id*. at 59 (quoting Ex. 1003 ¶ 57).

j. Summary

Petitioner has shown that Sheesley teaches every limitation of claim 1 and, for the reasons provided above, we conclude that Petitioner has shown by a preponderance of the evidence that independent claim 1 is unpatentable as obvious over Sheesley.

2. Dependent Claim 2

Claim 2 recites transporting proppant by railcar to a desired location in certain quantities, which Petitioner has shown (and Patent Owner does not dispute) is taught by Sheesley. *Id*. at 60–61 (citing Ex. 1003 ¶¶ 2–4, 16, 17, 19, 42, 49, 50, 77, 78). We conclude that Petitioner has shown by a preponderance of the evidence that claim 2, which depends from claim 1, is unpatentable as obvious over Sheesley.

3. Dependent Claim 3

Claim 3 recites positioning containers of proppant "adjacent a fracturing operation of a well site of a production field." Corresponding to this limitation, Petitioner has shown (and Patent Owner does not dispute) that "Sheesley explains that the modified containers can be 'loaded on flatbed truck trailer' and 'taken directly to the fracing site 280 or placed in storage 282 at the fracing site 280.'" *Id*. at 62–63 (quoting Ex. 1003 ¶ 79).

We conclude that Petitioner has shown by a preponderance of the evidence that claim 3, which depends from claim 1, is unpatentable as obvious over Sheesley.

4. Dependent Claim 4

Claim 4 further requires that a certain number of containers are positioned in two adjacent stacks. Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches that "modified frac containers may be stacked in any conventional means," and that containers "can be stacked up to seven containers high." *Id*. at 63–65 (quoting Ex. 1003 ¶¶ 6, 18); *see also* Ex. 1003, Fig. 4 (illustrating containers in adjacent stacks). Claim 4 further recites "wherein the one or more structural support members include a plurality of support bars." Petitioner has shown (and Patent Owner does not dispute) that Sheesley teaches "that the modified container contains one or more structural support members at the corners and edges positioned to support each of the side walls of the pair of side walls and each of the end walls of the pair of end walls." Pet. 65; *see also id.* at 57–58 (citing Ex. 1003 Fig. 9; Fig. 10). We conclude that Petitioner has shown by a preponderance of the evidence that claim 4, which depends from claim 1, is unpatentable as obvious over Sheesley.

5. Dependent Claim 5

Claim 5 recites "tracking an amount of proppant on hand at the desired location with one or more of bar-codes and logging mechanisms." Petitioner contends that such tracking would have been obvious in light of the importance of proppant to the fracking operation and "the industry's widespread adoption of precisely this practice." *Id*. at 65–67 (citing Ex. 1004 ¶ 168). Mr. Schaaf supports Petitioner's contention but his opinion

is of limited value because his opinion fails to disclose what it is based upon and identifies no supporting evidence. *See* Ex. 1004 ¶ 168 (opining without identifying any support that "using bar codes or logging" would have been obvious "in light of the industry's widespread adoption of precisely this practice."). We conclude that Petitioner has not shown that Sheesley, alone, teaches the requirements of claim 5.

Alternatively, Petitioner contends as follows: (1) Sheesley utilizes standard cargo containers governed by ISO standards, (2) ISO 6346 "provides for marking each ISO container with a unique code," and (3) ISO 15416 "provides for a standardized methodology governing bar codes." Pet. 66–67. Petitioner reasons, and we adopt as our own findings, as follows:

> In particular, ISO 6346 Standard provides for marking each ISO container with a unique code. Ex. 1011 (ISO 6346 Standard) at 3. ISO 6346 Standard further provides that containers may be marked with "maximum payload, or net mass." Ex. 1011 (ISO 6346 Standard) at 5.2. A [person of ordinary skill in the art] would understand that Sheesley's standard cargo containers may be marked in accordance with ISO 6346 Standard, and that these codes could be used to communicate information about the proppant containers, including amount of proppant. Ex. 1004 (Schaaf Decl.) ¶171. A [person of ordinary skill in the art] would further understand that these codes may be logged, including with a logging mechanism. Ex. 1004 (Schaaf Decl.) ¶171.
>
> Further, as discussed above, ISO 15416 Standard provides for a standardized methodology governing bar codes. Ex. 1012 (ISO 15416 Standard) at 1. A [person of ordinary skill in the art] would understand that standard cargo containers may be tracked using bar codes, as this method of tracking is contemplated and regulated by the ISO, which promulgates regulations for standard cargo containers. Ex. 1004 (Schaaf Decl.) ¶172. Further, a [person of ordinary skill in the art] would understand that the bar

> codes taught by ISO 15416 Standard may be used to track an amount of proppant in a container. Ex. 1004 (Schaaf Decl.) ¶172.
>
> A [person of ordinary skill in the art] would be motivated to combine the modified container disclosed in Sheesley with the tracking capabilities disclosed in the ISO standards. Ex. 1004 (Schaaf Decl.) ¶173. Sheesley discloses the use of a container that is modified from a standard cargo container. Ex. 1003 (Sheesley) ¶[0002]–¶[0004]; ¶[0016]; ¶[0050]. The ISO promulgates standards that govern standard cargo containers. Ex. 1011 (ISO 6346 Standard) at 1.1. Moreover, a [person of ordinary skill in the art] would expect reasonable success in combining Sheesley's modified containers with standards promulgated by the ISO, because those standards are widely and successfully practiced in the industry. Ex. 1004 (Schaaf Decl.) ¶173.

Id. Patent Owner does not dispute Petitioner's contentions with regard to claim 5. We conclude that Petitioner has shown by a preponderance of the evidence that claim 5, which depends from claim 1, is unpatentable as obvious over Sheesley, ISO 6346, and ISO 15416.

6. Dependent Claim 7

Claim 7 recites "tracking a mesh size of the proppant in the plurality of containers at the desired location with one or more of bar-codes or logging mechanisms." For the reasons provided above, Petitioner has shown that it would have been obvious in light of Sheesley, ISO 6346, and ISO 15416 to track the *amount* of proppant on hand at the desired location with bar-codes or logging mechanisms, as required by claim 5. Petitioner further explains in the Petition that Sheesley teaches that the type of sand used in fracing is "critical." Petitioner further reasons that a person of ordinary skill in the art would have understood that in addition to the amount of proppant on hand, it also would have been obvious to a person of ordinary

skill in the art to track information about the proppant in the containers, including mesh size, "because the characteristics of the sand used in fracing is critical to the process and there may be multiple types of sand at the fracking site." *Id*. at 68 (citing Ex. 1004 ¶¶ 175, 176); *see also* Ex. 1003 ¶ 10. Patent Owner does not dispute Petitioner's contentions with regard to claim 7. We conclude that Petitioner has shown by a preponderance of the evidence that claim 7, which depends from claim 1, is unpatentable as obvious over Sheesley, ISO 6346, and ISO 15416. Petitioner, however, has not shown that Sheesley, alone, teaches the requirements of claim 7 for the same reasons explained above with regard to claim 5.

7. Dependent Claim 8

Claims 8 further recites "staging a plurality of empty containers at a proppant loading site, and wherein the rail line comprises a rail spur." Petitioner has shown (and Patent Owner does not dispute) that because Sheesley teaches filling the containers with proppant at a rail site and illustrates loading multiple modified cargo containers, a person of ordinary skill would have understood the containers must have been empty at the rail site to be filled at the site. Pet. 69 (citing Ex. 1003 ¶¶ 17, 19, 42, 49, 77, 78, 84, 85, Figs. 1, 5, 7, 8; Ex. 1004 ¶ 177). Petitioner further asserts a rail spur is the preferable location for loading proppant into containers, because it would not prevent other rail operations from occurring. *Id.* (citing Ex. 1004 ¶ 178). We conclude that Petitioner has shown by a preponderance of the evidence that claim 8, which depends from claim 1, is unpatentable as obvious over Sheesley.

8. Dependent Claim 10

Claim 10 recites that the loader/unloader "comprises a forklift" which is positioned in slots in the container for positioning the container. The '602 patent does not address a forklift outside of the claims and the container illustrated in the '602 patent appears to lack forklift pockets. There is no dispute that Sheesley also does not expressly describe container slots into which prongs of a forklift may be inserted to lift or position the container. Accordingly, we are not persuaded that Sheesley, alone, teaches "positioning prongs of a forklift."

Petitioner also contends that Sheesley modifies a standard cargo container and that ISO 1496-1 teaches "forklift pockets" as optional features for containers. *Id*. at 70 (citing Ex. 1010 ¶ 5.8.1). Petitioner reasons that a person of ordinary skill in the art "would have been motivated to combine the teachings of the specific container disclosed in ISO 1496 Standard to the general ISO container teachings disclosed in Sheesley in order to facilitate transferring the container, because ISO 1496 Standard teaches an optimal and widely adopted method of effectuating the container movement described in Sheesley." *Id.* at 72 (citing Ex. 1004 ¶ 182). We agree.

Patent Owner argues that Sheesley describes the use of a Rough Terrain Container Handler ("RTCH") to pick up and stack containers, not a forklift, and that the use of the RTCH "is preferable to the use of a forklift" because well sites tend to be rough. PO Resp. 29–34. Patent Owner further argues that because Sheesley uses trailers to transport containers "[i]t would be much more difficult, if not impossible, to place Sheesley's containers on its trailers using a forklift." *Id.* at 32–33. Patent Owner further argues that Petitioner fails to show obviousness, because "whether a [person of ordinary

skill in the art] *could* have modified Sheesley's container to add forklift pockets and use a forklift for discrete tasks does not mean that one *would* have done so." PO Sur-Reply 17–19.

We find Patent Owner's arguments unpersuasive. Petitioner explains that claim 10 is directed to moving containers at any "desired location" at any point in the supply chain, not exclusively at rough well sites. We agree with Petitioner that a person of ordinary skill in the art would have understood the benefit of having "multiple methods of effectuating the container movement described in Sheesley." Pet. Reply 22–23. We credit the testimony of Mr. Schaaf, who explains as follows:

> Indeed, as Sheesley discloses, the entire purpose of a modular container is to able to move the container "through all of the normal modes of transportation including ship, barge, rail or by truck, all the way to the frac site." Ex. 1003 (Sheesley) ¶[0017]. Thus, it is my opinion that a [person of ordinary skill in the art] would have been motivated to combine the teachings of the specific container disclosed in ISO 1496Standard to the general ISO container teachings disclosed in Sheesley in order to facilitate transferring the container, because ISO 1496 Standard teaches an optimal and widely-adopted method of effectuating the container movement described in Sheesley.

Ex. 1004 ¶ 182. We have considered Mr. Smith's testimony to the contrary and find it not persuasive because it is inconsistent with ISO 1496-1, which makes clear that the use of forklifts to move containers with slots was routine, and because the alleged preference for an RTCH at rough well sites is beyond the scope of claim 11, which recites such use "at a desired location" not limited to any particular site conditions. *See* Ex. 2007 ¶¶ 52–58. We conclude that Petitioner has shown by a preponderance of the

evidence that claim 10, which depends from claim 1, is unpatentable as obvious over Sheesley and ISO 1496-1, but not over Sheesley, alone.

F. Alleged Obviousness Over Mintz, Alone, or Over Combinations of Mintz and ISO Standards

Petitioner contends that the subject matter of claims 1, 3, and 5–10 would have been obvious over Mintz, alone, or in combination with ISO Standards. Pet. 24–47, 72. As explained above, ISO Standards consists of three separate prior art references—ISO 1496, ISO 6346, and ISO 15416—and we understand Petitioner's contentions as to each challenged claim to be based on the particular ISO standards expressly alleged in the Petition to be applicable to the recited limitations. *See, e.g.*, Pet. 36–39 (expressly applying Mintz, ISO 6346, and ISO 15416 to claim 5 with "bar-codes and logging mechanisms" limitations).

1. Independent Claim 1

Petitioner contends each of the limitations of claim 1 is taught by Mintz, alone, or in combination with ISO 1496-1. Pet. 24–36, 72; Pet. Reply 3–14. Patent Owner argues that Mintz fails to teach "scaling" containers or a "flow gate," as discussed below. PO Resp. 23–29, PO Sur-Reply 12–17. For the reasons provided below, we find Petitioner has shown by a preponderance of the evidence that Mintz, alone, as well as Mintz in combination with ISO 1486-1 both teach every limitation of claim 1.

a. A method of storing and moving fracking proppant at a desired location with a plurality of separate containers constructed to store fracking proppant therein, the method comprising

To the extent that the preamble is limiting, Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches a corresponding method

of using "standard ISO shipping containers" to transfer sand and proppant material to fracking operations. Pet. 24 (citing Ex. 1002, 1:65–2:05).

b. stacking one or more of the plurality of containers having proppant therein on top of one another adjacent a rail line

Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches a corresponding method, including "a delivery scenario where 'frac sand and/or proppant are loaded at a quarry or a supplier thereof' into containers, which are then 'emplaced upon a flat-bed or spine railcar' and transported 'to Company controlled rail spur closer to drill site,' 'thereby necessitating, in step 130, a relatively short haul of the frac sand and proppant to a rig.'" *Id*. at 25 (citing Ex. 1002, 8:67–9:6; Fig. 9); *see also id.* at 26–28. As Petitioner explains, Mintz further teaches that the containers may be immediately offloaded at the rail site, resulting in no demurrage, unlimited storage, and huge savings. *Id.* (citing Ex. 1002, 1:54–58, Fig. 9; Fig. 10). Petitioner has also shown (and Patent Owner does not dispute) that ISO containers such as the type used in Mintz must be stackable (citing Ex. 1010 ¶ 6.2) and that a person of ordinary skill in the art would have been motivated to use the modified ISO containers taught by Mintz "with the stacking capability" taught by ISO 1496-1 with a reasonable expectation of success and to reduce the footprint taken up by the containers. *Id.* at 27.

c. placing one or more of the plurality of containers from the stack adjacent the rail line onto one or more trailers of one or more vehicles at a desired location by use of a container loader/unloader

For the reasons provided above, Petitioner has shown that Mintz teaches stacking containers of proppant adjacent a rail line. Petitioner also has shown (and Patent Owner does not dispute) that Mintz teaches using

trailers to transport cargo containers from the stack adjacent the rail line using a container loader/unloader. *Id*. at 28–29 (citing Ex. 1002, 9:3–6, 9:57–62, Fig. 9).

d. moving a first of the plurality of containers when positioned on the one or more trailers away from the desired location

Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches moving modified containers on a trailer to a fracking site, and that moving the modified containers "towards a well site necessarily requires that the containers are moved away from the 'desired location,' i.e., adjacent the rail line." *Id*. at 29 (citing Ex. 1002, 9:49–53, 9:57–62; Ex. 1004 ¶¶ 82, 83).

e. scaling a number of the plurality of containers according to an amount of proppant required at a particular location

With regard to the "scaling" limitation, the Specification of the '602 patent explains only that the "arrangement of containers is scalable for as much or as little proppant as required" and that "the number of containers is scalable for inventory requirements." Ex. 1001, 10:15–16, 10:36–37. The primary teaching relied upon by Petitioner from Mintz of the "scaling" limitation is set forth in full below:

> Since it has been difficult if not virtually impossible—for special-purpose railcars and pneumatic trucks to be brought sufficiently close to well sites, it has become a prevalent occurrence for several material transfers to be prerequisite for ultimate delivery of sufficient frac sand and/or proppant to the intended well site so that fracking operations may be initiated. Moreover, pneumatic trucks are frequently unavailable and unloading of frac sand from trucks or railcars is likewise frequently delayed, wherein railcars remain idle, with railroads charging significant demurrage fees.
>
> Accordingly, what is needed in the art is an apparatus and concomitant methodology for improving the logistics for transporting frac sand and proppants proximal to well sites to

> avoid these several longstanding limitations and disadvantages prevalent in the prior art. This need is fulfilled by embodiments of the present invention which contemplate novel application of Standard ISO shipping containers to accommodate an internal structure adapted to Support and strengthen the walls and floor of such ISO shipping containers and a valve apparatus configured to efficiently and securely achieve prerequisite sand and proppant material transfer from such adapted containers to fracking operations regardless of the remoteness and limited accessibility of a diversity of well site locations.

Ex. 1002, 1:48–2:5.

We agree with Petitioner that Mintz teaches the "scaling" limitation by expressly describing a system designed to "efficiently and securely achieve prerequisite sand and proppant material transfer from such adapted containers to fracking operations." Pet. 30 (citing Ex. 1002, 2:1–2; 3:28–32; Fig. 10 (comparing the relative cost of delivering "Required Sand" to a drill site each month). That is, Mintz describes a system that uses containers to provide as much or as little proppant as required, which in accordance with the Specification of the '602 patent, is precisely what is meant by "scaling."

First, Patent Owner argues that Mintz's teaching concerns only the transfer of "prerequisite sand" from a single container to the fracking operation. PO Resp. 15–16. According to Patent Owner, the portion of Mintz quoted above teaches nothing more than "that Mintz's valve apparatus can discharge proppant . . . at remote frac sites." PO Sur-Reply 5. We find no credible support for such a narrow reading of Mintz.

We find substantially more credible Petitioner's explanation that the system of Mintz is described as providing the "sufficient frac sand and/or proppant to the intended well site," and that it is fulfilled by using containers with strengthened walls and floor and a valve apparatus to provide the

"prerequisite sand and material" to a "diversity of well site locations." *See id.*; *see also* Pet. Reply 3–6.

We further credit the testimony of Mr. Schaaf, who explained that a person of ordinary skill in the art would have understood "the importance of having the required amount of proppant at the well site, as proppant is required for fracking." Ex. 1004 ¶ 85. Patent Owner argues that Mr. Schaaf's opinion "does not speak to scaling the number of containers according to the amount of proppant required as claimed." PO Resp. 17. We disagree. The entirety of Mintz is directed to delivering the necessary amount of proppant to a well site in containers. If, as Mintz teaches, proppant is delivered in containers, then the importance to a person of ordinary skill in the art of having the required amount of proppant directly corresponds to having the proper number of containers, which likewise corresponds to "scaling a number of the plurality of containers according to an amount of proppant required at a particular location." For the reasons provided above, Petitioner has shown by a preponderance of the evidence that Mintz teaches the "scaling" limitation.

f. each of the plurality of containers positioned to include an outlet to allow discharge of proppant therefrom, an opening adjacent a top of the container to load proppant therein

Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches an outlet (discharge port 40) and an opening (inlet ports 3), as required by claim 1. Pet. 30–33 (citing 5:39–41, 5:44–46, 5:52–53, 5:57–60, Figs. 1, 2).

g. a pair of spaced-apart end walls connected to and extending between a bottom of the container and the top, a pair of side walls connected to and extending between the pair of end walls and the top and the bottom

Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches a container with a pair of sidewalls and a pair of endwalls. *Id*. at 33 (citing Ex. 1002 8:49–58, Figs 15–17).

h. one or more structural support members positioned to support each of the side walls of the pair of side walls and each of the end walls of the pair of end walls

Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches brace and truss support assembly 10, including "longitudinal basal cross-braces 7 fixedly interconnected at each end thereof with one of pair of end supports 6 and intermediately thereof with plurality of saddle supports 5," corresponding to the recited "structural support members." *Id*. at 34–35 (citing Ex. 1002, 1:63–2.3, 2:28–31, 4:56–61, 8:50–58, Figs. 1, 2).

i. and a flow gate positioned adjacent the outlet to control flow of proppant through the outlet of each of the plurality of containers

With regard to the "flow gate," the Specification of the '602 patent states that the "flow gate is openable so as to allow the proppant to flow outwardly of the interior volume of the container," and that the "flow gate is slidable between an open position and a closed position." Ex. 1001, 5:57–59, 6:16–17. Petitioner has shown that Mintz teaches a "sliding gate valve" corresponding to the recited "flow gate." Pet. 59 (citing Ex. 1002, 5:44–46, 5:57–60); *see also* Ex. 1004 ¶ 94; Pet Reply 10. Referring to Figures 1–8, Mintz states that "seen is transverse discharge port 4 with a mechanical valve or the like typically having a 4 inch outlet and a 24" x 24" sliding gate valve." Ex. 1002, 5:44–46. Mintz further states that "[i]t will

also be appreciated that a 24" x 24" gate valve or the like is particularly advantageous under circumstances in which frac sand is being unloaded into a mobile hopper unit or the like." *Id*.

Patent Owner does not dispute that a "sliding gate valve," as taught by Mintz, is a "flow gate" as used in claim 1 of the '602 patent. Instead, Patent Owner argues, in essence, that Mintz does not mean what it says. PO Resp. 20–23; PO Sur–Reply 8–12. According to Patent Owner, there must be some other undisclosed outlet in the Mintz container that corresponds to the 24" x 24" sliding gate valve, not the outlet identified by Petitioner. Patent Owner implicitly concedes that, under its own reading of Mintz, Mintz teaches a "flow gate positioned adjacent the outlet," as required by claim 1. *See* PO Resp. 22 (stating that "Mintz thus expressly teaches that the 24" x 24" gate valve is an alternative to discharge port 4, not an addition to it"); *see also* PO Sure-Reply 8 (a person of ordinary skill in the art "understand Mintz as teaching 'discharge port 4' and the unnumbered 24" x 24" sliding gate valve as 'two separate ways to get sand out of the container.'"). Patent Owner argues, instead, that Petitioner has not shown the limitation would have been obvious over Mintz because Petitioner relies on Mintz's discharge port 4 as the recited "outlet," and not some other undisclosed outlet that Patent Owner contends must be present in Mintz and associated with the 24" x 24" gate valve is not persuasive.

Patent Owner's strained reading of Mintz is not persuasive as there is no ambiguity in what Mintz expressly teaches: "transverse discharge port 4 with a mechanical valve or the like typically having a 4 inch outlet and a 24" x 24" sliding gate valve." According to Mintz, transverse discharge port 4 has a sliding gate valve. Patent Owner's argument that a person of

ordinary skill would not use a 24" x 24" sliding gate valve to control the flow of proppant through a 4" discharge pipe (and, presumably, would therefore use some other outlet) is irrelevant, because it is contrary to what Mintz expressly states. Indeed, Mr. Smith merely suggests that "[u]sing a 24" x 24" gate valve on a 4" line would be much more expensive than using a 4" gate valve," and that "[s]uch a large gate valve would also require expanding the 4" pipe to fit a 24" gate valve, adding additional expense." Ex. 2007 ¶ 40. Thus, according to Mr. Smith, a larger gate valve may be more costly, but he does not suggest it would have been unsuitable.

We have considered all of Patent Owner's arguments to the contrary. *See* PO Resp. 20–23; PO Sur–Reply 8–12. For the reasons provided above, we conclude Petitioner has shown by a preponderance of the evidence that Mintz teaches a "flow gate," as recited by claim 1.

j. Summary

Petitioner has shown that Mintz teaches every limitation of claim 1 for the reasons provided above. Petitioner has also shown that Mintz in combination with the teaching of ISO 1496-1 that all ISO containers "must be stackable" also teaches every limitation of claim 1, and that a person of ordinary skill in the art would have had reason to combine the references to reduce the footprint taken up by the containers. *See* Pet. 26–27. We conclude that Petitioner has shown by a preponderance of the evidence that independent claim 1 is unpatentable as obvious over Mintz, alone, and as obvious over Mintz in combination with ISO 1496-1.

2. Dependent Claim 3

Claim 3 recites positioning containers of proppant "adjacent a fracturing operation of a well site of a production field." Corresponding to

this limitation, Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches loaded containers are transported "to a trans-loading facility proximal to a well site," thereby necessitating "a relatively short haul of frac sand and proppant to a rig." *Id*. at 35 (citing Ex. 1002, 9:2–6; Fig. 9). We conclude that Petitioner has shown by a preponderance of the evidence that claim 3, which depends from claim 1, is unpatentable as obvious over Mintz, alone, and as obvious over Mintz in combination with ISO 1496-1.

3. Dependent Claim 5

Claim 5 recites "tracking an amount of proppant on hand at the desired location with one or more of bar-codes and logging mechanisms." Petitioner has shown that Mintz expressly identifies improved tracking as a benefit of transporting proppant in the disclosed containers. *Id*. at 36 (citing Ex. 1002, Fig. 9). Petitioner contends that a person of ordinary skill in the art would have understood such tracking may be accomplished using bar codes or other logging mechanisms. *Id.* at 37. Mr. Schaaf supports Petitioner's contention but his opinion is of questionable value because his opinion fails to disclose what it is based upon and identifies no supporting evidence. *See* Ex. 1004 ¶ 98 (opining without identifying any support that "using bar codes or logging mechanisms" would have been obvious "in light of the industry's widespread adoption of precisely this practice."). Petitioner has not shown that Mintz, alone, or in combination with ISO 1496-1, teaches the requirements of claim 5.

Alternatively, Petitioner also contends as follows: (1) Mintz utilizes standard cargo containers governed by ISO standards, (2) ISO 6346 "provides that containers may be marked with 'maximum payload, or net mass,'" and (3) ISO 15416 "provides for a standardized methodology

governing bar codes." Pet. 37–38 (citing Ex. 1011 at ¶ 5.2; Ex. 1012, 1). Petitioner reasons that a person of ordinary skill in the art would have been motivated to combine the teachings of Mintz, ISO 6346, and ISO 15416, "because those standards provide an optimal way of achieving the tracking benefits taught by Mintz and are promulgated by the same organization that regulates Mintz's ISO containers." *Id*. at 38 (citing Ex. 1004 ¶ 103). Patent Owner does not dispute Petitioner's contentions with regard to claim 5. We conclude that Petitioner has shown by a preponderance of the evidence that claim 5, which depends from claim 1, is unpatentable as obvious over Mintz, ISO 6346, and ISO 15416 and as obvious over Mintz in combination with ISO 1496-1, ISO 6346, and ISO 15416.

4. Dependent Claim 6

Claim 6 recites "injecting air" into the containers to enhance the flow of proppant from the outlet. Corresponding to this limitation, Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches that "the valves may be cycled and the sand driven through the discharge pipe by a commercial compressor." *Id*. at 39; Ex. 1002 6:47–55. Petitioner further explains that a person of ordinary skill in the art would have understood that a compressor works by increasing pressure by injecting air into the container. Pet. 39–40. We conclude that Petitioner has shown by a preponderance of the evidence that claim 6, which depends from claim 1, is unpatentable as obvious over Mintz, alone, and as obvious over Mintz in combination with ISO 1496-1.

5. Dependent Claim 7

Claim 7 recites "tracking a mesh size of the proppant in the plurality of containers at the desired location with one or more of bar-codes or

logging mechanisms." For the reasons provided above, Petitioner has shown that it would have been obvious in light of Mintz, ISO 6346, and ISO 15416 to track the *amount* of proppant on hand at the desired location with bar-codes or logging mechanisms, as required by claim 5. Petitioner further reasons that a person of ordinary skill in the art would have understood that in addition to the amount of proppant on hand, it also would have been obvious to a person of ordinary skill in the art to track information about the proppant in the containers, including mesh size, "because the characteristics of the sand used in fracing is critical to the process and there may be multiple types of sand at the fracking site." *Id*. at 40 (citing Ex. 1004 ¶ 108). Patent Owner does not dispute Petitioner's contentions with regard to claim 7. We conclude that Petitioner has shown by a preponderance of the evidence that claim 7, which depends from claim 1, is unpatentable as obvious over Mintz, ISO 6346, and ISO 15416 and as obvious over Mintz in combination with ISO 1496-1, ISO 6346, and ISO 15416. Petitioner, however, has not shown that Mintz, alone, teaches the requirements of claim 7, or that Mintz and ISO 1496–1, together teach the requirements of claim 7, for the same reasons explained above with regard to claim 5.

6. Dependent Claim 8

Claims 8 further recites "staging a plurality of empty containers at a proppant loading site, and wherein the rail line comprises a rail spur." Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches that "frac sand and/or proppant are loaded at a quarry or a supplier thereof" into the modified containers. *Id*. at 41; Ex. 1002, Abstract, 8:64–9:3. Petitioner reasons that a person of ordinary skill in the art would have understood that "in order to fill the modified containers at the quarry or

supplier thereof, there must be empty containers at the rail site," and that Mintz expressly states that loaded containers "are transported to a trans-loading facility proximal to a wellsite," which may be a "Company controlled rail spur closer to drilling site." Pet. 41; Ex. 1002, 9:2–6, Fig. 9. We conclude that Petitioner has shown by a preponderance of the evidence that claim 8, which depends from claim 1, is unpatentable as obvious over Mintz, alone, and as obvious over Mintz in combination with ISO 1496-1.

7. Dependent Claim 9

Claim 9 recites "wherein the outlet of each of the plurality of containers is positioned adjacent the bottom of the container." Petitioner has shown (and Patent Owner does not dispute) that Mintz teaches discharge port 4 positioned adjacent the bottom of the container corresponding to the location of outlet 28 illustrated in Figure 1 of the '602 patent. Pet. 42; Ex. 1002, 5:44–46, 5:57–60, Figs. 1, 2.

Claim 9 further recites that the outlet "is positioned adjacent the bottom of the container" and that "one or more structural support members of each of the plurality of containers includes a first plurality of structural support members, and wherein each of the first plurality of structural support members further includes a second one or more structural members extending between the first plurality of structural support members." Petitioner has shown (and Patent Owner does not dispute) that the end supports and cross braces illustrated in Figures 1 and 2 of Mintz correspond to the recited "structural support members." Pet. 44; Ex. 1002 4:56–61, Figs. 1, 2. We conclude that Petitioner has shown by a preponderance of the evidence that claim 9, which depends from claim 1, is unpatentable as

obvious over Mintz, alone, and as obvious over Mintz in combination with ISO 1496-1.

8. Dependent Claim 10

Claim 10 recites that the loader/unloader "comprises a forklift" which is positioned in slots in the container for positioning the container. Mintz does not expressly describe the use of a forklift. Petitioner, however, has shown that the container illustrated in Figure 1 of Mintz includes forklift pockets corresponding to the recited "slots," and that a person of ordinary skill in the art would have understood that the prongs of a forklift may be inserted into the forklift pockets to "enhance the container's ability to be stacked and moved." Pet. 45–46; Ex. 1002, Fig. 1; Ex. 1004 ¶¶ 118–120. Petitioner further demonstrates that Mintz's container is modified from a standard ISO container, that ISO 1496 states that forklift pockets may be provided as an optional feature on a container, and that a person of ordinary skill in the art would have understood from ISO 1496 that a forklift may be used to load or unload the modified containers of Mintz. Pet. 46; Ex. 1004 ¶ 121; Ex. 1010 ¶ 5.8.1, Annex C at A.21. Petitioner reasons that reliance on the use of a modified ISO container motivates the inclusion of the forklift functionality taught by ISO 1496, and that the combination provides increased container mobility and is merely a "combination of known elements, leading to predictable results." Pet. 46–47. Patent Owner does not dispute Petitioner's contentions with regard to claim 7. We conclude that Petitioner has shown by a preponderance of the evidence that claim 10, which depends from claim 1, is unpatentable as obvious over Mintz, alone, and as obvious over Mintz in combination with and ISO 1496-1.

IV. CONCLUSION

Weighing the evidence of the disclosure of the references, the competing testimony, and the reasoning to combine the references, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–10 of the '602 patent are unpatentable.[6]

Our final determination in this case is summarized in the table below:

Claims	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–5, 7, 8, 10	103	Sheesley	1–4, 8	5, 7, 10
10	103	Sheesley, ISO 1496-1	10	
5, 7	103	Sheesley, ISO 6346, ISO 15416	5, 7	
1, 3, 5–10	103	Mintz	1, 3, 6, 8–10	5, 7
1, 3, 5–10	103	Mintz, ISO 1496-1	1, 3, 6, 8–10	5, 7
5, 7	103	Mintz, ISO 6346, ISO 15416	5, 7	
5, 7	103	Mintz, ISO 1496-1, ISO 6346, ISO 15416	5, 7	
Overall Outcome			1–10	

[6] Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–10 of the ’602 patent have been shown to be unpatentable; and

FURTHER ORDERED that the parties to the proceeding seeking judicial review of this Final Written Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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