

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD


PROPPANT EXPRESS INVESTMENTS, LLC,
PROPPANT EXPRESS SOLUTIONS, LLC,
Petitioner,

v.

OREN TECHNOLOGIES, LLC,
Patent Owner.

Case IPR2018-00733
Patent 9,440,785 B2

Before MITCHELL G. WEATHERLY, KEVIN W. CHERRY, and
MICHAEL L. WOODS, *Administrative Patent Judges*.

CHERRY, *Administrative Patent Judge*.

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

Ex. 1114 PropX v. Oren Technologies IPR2018-00733

I. INTRODUCTION

A. Background

Proppant Express Investments, LLC and Proppant Express Solutions, LLC (collectively, “PropX” or “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting institution of an *inter partes* review of claims 1, 3, 6–11, 13–19, and 21–23 of U.S. Patent No. 9,440,785 B2 (Ex. 1001, “the ’785 patent”). Oren Technologies, LLC (“Patent Owner”) filed a Preliminary Response (Paper 7, “Prelim. Resp.”). In the Preliminary Response, Patent Owner contended that the Petition fails to list “all the real parties-in-interest,” as required by 35 U.S.C. § 312(a)(2). Prelim. Resp. 1–29. At Petitioner’s request, we allowed additional briefing from the parties directed to Patent Owner’s contention that Big Box Proppant Investments, LLC is a real party-in-interest to the instant petition. Petitioner filed a reply. Paper 8. Patent Owner filed a sur-reply. Paper 12.

The Petition asserts the following grounds:

Ground	References	Basis	Claims challenged
1	Sheesley ¹ , Hurst ² , Harris '554 ³ or Harris '809 ⁴ , and Luharuka ⁵	§ 103(a)	1, 3, 6, 9, 10, 13, and 15
2	Sheesley, Hurst, Harris '554 or Harris '809, Wietgreffe ⁶ , and Luharuka	§ 103(a)	7, 8, 11, 14, 16–19, and 21–23

Pet. 6.

On September 13, 2018, we instituted an *inter partes* review of all claims challenged in the Petition, and on all of the asserted grounds. See Paper 13, 30 (“Dec. on Inst.”).

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 37, “PO Resp.”), and Petitioner filed a Reply (Paper 46, “Pet. Reply”). We also permitted Patent Owner to file a Sur-Reply (Paper 60, “PO Sur-Reply”) in lieu of Observations on Cross Examination.

Petitioner supports its arguments with a declaration by Dr. Gary R. Wooley, Ph.D., dated March 6, 2018 (Ex. 1002), and a reply declaration by Dr. Wooley, dated June 11, 2019 (Ex. 1099). Patent Owner supports its Response with a declaration by Mr. Fred P. Smith, P.E. C.S.P., dated

¹ U.S. Published Patent Application 2013/0206415 A1, published Aug. 15, 2013 (Ex. 1003, “Sheesley”).

² U.S. Patent No. 5,413,154, issued May 9, 1995 (Ex. 1004, “Hurst”).

³ U.S. Published Patent Application 2014/0083554 A1, published Mar. 27, 2014 (Ex. 1007, “Harris '554”).

⁴ U.S. Published Patent Application 2016/0332809 A1, published Nov. 17, 2016 (Ex. 1008, “Harris '809”).

⁵ U.S. Patent No. 9,624,036 B2, issued Apr. 18, 2017 (Ex. 1006, “Luharuka”).

⁶ U.S. Patent No. 8,387,824 B2, issued Mar. 5, 2013 (Ex. 1005, “Wietgreffe”).

February 25, 2019 (Ex. 2038). Oral argument was held on July 31, 2019, a transcript of which is included in the record. Paper 78 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. 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); 37 C.F.R. § 42.1(d). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 3, 6–11, 13–19, and 21–23 of the ’785 patent are unpatentable. *See* 35 U.S.C. § 316(e).

B. Related Proceedings

The ’785 patent is involved in a lawsuit titled *SandBox Logistics, LLC v. Proppant Express Investments, LLC*, No. 4:17-cv-00589 (S.D. Tex.). Pet. 1; Paper 5, 1. Petitioner is also named as defendants in *SandBox Logistics, LLC v. Grit Energy Solutions, LLC*, No. 3:16-cv-00012-GCH (S.D. Tex.), which concerns patents related to the ’785 patent. Pet. 1.

A number of petitions for *inter partes* review have been filed regarding patents related to the ’785 patent. *See* Pet. 2.

C. The ’785 Patent

The ’785 patent is titled “Method of Delivering, Storing, Unloading, and Using Proppant at a Well Site.” Ex. 1001, [54]. The ’785 patent describes a process for delivering proppant to a fracturing site. *Id.* at 8:49–50. Proppant is a material, such as grains of sand, ceramic, or other particulates, that prevents fractures created by hydraulic fracturing from

closing when the injection of fluid is stopped. *Id.* at 1:34–36. Hydraulic fracturing is the propagation of fractures in a rock layer caused by the presence of pressurized fluid, typically to release petroleum, natural gas, coal seam gas, or other substances for extraction. *Id.* at 1:16–28. Fracturing is done from a wellbore drilled into reservoir rock formations. *Id.* at 1:28–29. The energy from the injection of a highly-pressurized fracking fluid creates new channels in the rock that can increase the extraction rates and ultimate recovery of fossil fuels. *Id.* at 1:29–30. The fracture width is typically maintained after the injection by introducing proppant into the injected fluid. *Id.* at 1:30–34. The '785 patent describes silica sand, made up of ancient weathered quartz, as by far the dominant proppant. *Id.* at 1:42–43. The '785 patent explains that, typically, in any hydraulic fracturing operation, a large amount of such proppant is required, and it has been difficult to store and transport effectively the proppant at and to the fracturing sites. *Id.* at 1:57–61. The '785 patent seeks to solve these problems and provide a means to transport proppant effectively and store the proppant in the desired location adjacent to the hydraulic fracturing location. *Id.* at 2:3–6.

The process described in the '785 patent includes the steps of:

- (1) forming a container having an interior suitable for receiving the proppant therein and having an outlet at a bottom thereof;
- (2) filling the container with the proppant;
- (3) moving the filled container along a roadway to the fracturing site;
- (4) placing the filled container upon a conveyor structure;
- (5) discharging the proppant from the outlet of the container onto the conveyor;
- and (6) conveying the discharged proppant to a desired location at the fracturing site. *Id.* at 8:49–59.

In this process described in the '785 patent, the step of forming includes forming the container so as to have a length of approximately ten feet. *Id.* at 8:60–62. A gate is placed over the outlet of the container. *Id.* at 8:62–63. The gate is movable between a first position closing the outlet and a second position opening the outlet. *Id.* at 8:63–64. The conveyor structure has an actuator thereon. *Id.* at 8:65. This actuator is connected to a receptacle. *Id.* at 8:65–66. The gate has a pin extending outwardly therefrom. *Id.* at 8:66–67. The pin is positioned into the receptacle of the actuator and the actuator is actuated so as to move the gate from the first position to the second position. *Id.* at 8:67–9:2. The conveyor structure has a hopper that is positioned below a top surface thereof. *Id.* at 9:3–4. The hopper has a metering gate at a bottom thereof. *Id.* at 9:4–5. The metering gate is positioned above the conveyor of the conveyor structure. *Id.* at 9:5–6. The filled container is positioned directly above the hopper of the conveyor structure. *Id.* at 9:6–8. The proppant is discharged from the outlet of the container into the hopper of the conveyor structure. *Id.* at 9:8–9. The proppant is metered through the metering gate at a control flow rate so as to be discharged therefrom onto the conveyor. *Id.* at 9:9–11.

D. Illustrative Claim

Challenged claims 1, 9, and 16 are independent. Challenged claims 3, 6, and 7 depend from claim 1. Challenged claims 10, 11, and 13–15 depend from claim 9. Challenged claims 17–19 and 21–23 depend from claim 16.

Claim 1 is illustrative of the claimed subject matter, and is reproduced below (with bracketing and additional numerals added):

1. A method of unloading fracking proppant at a well site for use when hydraulic fracking is to be performed, the method comprising:

- a) [a1] removing a plurality of proppant containers that contain fracking proppant from a trailer of one or more transport road vehicles when positioned adjacent a well site at a location where hydraulic fracking is to be performed, [a2] each of the plurality of proppant containers having an outlet positioned at a bottom thereof with a funnel-shaped portion directing the fracking proppant toward the outlet, [a3] each of the plurality of proppant containers having a closed and substantially rectangular upper proppant containing portion, the funnel-shaped portion underlying the upper proppant containing portion and having proppant also positioned therein, a pair of vertically-extending end walls and a pair of vertically-extending side walls defining the closed and substantially rectangular upper proppant containing portion, [a4] a frame including a plurality of structural support members positioned to span the end walls and the sidewalls between end frame members to enhance support of the end walls and the side walls when the proppant container is full of fracking proppant, and [a5] each of the plurality of containers has an open area positioned about the funnel-shaped portion and below the upper proppant containing portion adjacent a bottom of the respective each of the plurality of proppant containers to allow for visual access of a respective exterior surface of the funnel-shaped portion when the container is full of fracking proppant, the open area being visible through one or more spatial gaps extending through the frame in a location positioned below at least each of the side walls of and above the bottom of the proppant container;
- b) [b1] transferring, after removal from the trailer of the one or more transport road vehicles, each of the plurality of proppant containers to a support structure positioned at the well site so that each of the plurality of proppant containers is positioned to overlay a common conveyor positioned at a separate location on the well site from the trailer, [b2] the support structure including a plurality of cradles that correspond to the plurality of proppant containers transferred thereto, the common conveyor

being positioned to underlie and to be spaced-apart from each of the plurality of cradles;

- c) discharging by gravity feed the fracking proppant contained within each of the plurality of proppant containers when positioned on the support structure and within the plurality of cradles from the outlet positioned at a bottom of each of the plurality of proppant containers so that the fracking proppant passes onto the common conveyor; and
- d) conveying the fracking proppant away from the plurality of proppant containers, after the discharging of the fracking proppant onto the common conveyor, toward a desired location at the well site where hydraulic fracking is to be performed so that the fracking proppant is introduced to fracking fluid for passage into a wellbore at the well site.

Ex. 1001, 14:65–15:56.

II. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner contends that a person of ordinary skill in the art would have had at least a bachelor's degree in mechanical engineering or equivalent discipline and at least 2–3 years of experience with hydraulic fracturing and discharge systems for use with particulate material, such as proppant. Pet. 19 (citing Ex. 1002 ¶¶ 9, 37). Mr. Smith testifies that a person of ordinary skill in the art would have at least a four-year bachelor's degree in engineering and two to three years of experience in mobile container design and material handling/discharge systems for use with particulate material, such as sand or proppant, or a high school degree and an equivalent amount of training and experience with container design and material handling/discharge systems. Ex. 2038 ¶ 27.

The principal difference between the parties' definitions appears to be whether a person of ordinary skill in the art needs to have specific experience in mobile container design in addition to handling/discharge

system for use with particulate material. The parties do not identify any specific dispute where this difference will make a material difference, and we fail to see how our analysis would differ based on whether we adopt one definition over the other. Given that the claims at issue are directed to a system and method for handling proppant and not merely to containers, we find Petitioner's definition of the level of skill in the art more closely related to the technology that is claimed and apply it for purposes of this decision. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

III. CLAIM CONSTRUCTION

In an *inter partes* review based on a petition filed prior to November 13, 2018, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2017);⁷ *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). There is a presumption that claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art in the context of the specification. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Nonetheless, if the specification “reveal[s] a special definition given to a claim term by the patentee that

⁷ A recent amendment to this rule does not apply here because the Petition was filed before November 13, 2018. *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 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective Nov. 13, 2018) (to be codified at 37 C.F.R. pt. 42).

differs from the meaning it would otherwise possess[,] . . . the inventor’s lexicography governs.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc) (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). Another exception to the general rule that claims are given their ordinary and customary meaning is “when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Uship Intellectual Props., LLC v. United States*, 714 F.3d 1311, 1313 (Fed. Cir. 2013) (quoting *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)). Additionally, only terms that are in controversy need to be expressly construed, and these need be construed only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

The parties do not seek construction of any terms. *See* Pet. 22; PO Resp. 8. We determine that no further express construction of other terms is necessary for purposes of this Decision.

IV. ANALYSIS

Petitioner contends the combination of Sheesley, Hurst, Harris ’554 or Harris ’809, and Luharuka would have rendered the subject matter of claims 1, 3, 6, 9, 10, 13, and 15 obvious to one of ordinary skill in the art at the time of the invention. Pet. 35–76. Petitioner further contends that the combination of Sheesley, Hurst, Harris ’554 or Harris ’809, Wietgreffe, and Luharuka would have rendered the subject matter of claims 7, 8, 11, 14, 16–19, and 21–23 obvious to one of ordinary skill in the art at the time of the invention. *Id.* at 76–87.

A. Obviousness

The U.S. Supreme Court set forth the framework for applying the statutory language of 35 U.S.C. § 103 in *Graham v. John Deere Co.*, 383 U.S. 1 (1966):

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

Id. at 17–18.

As explained by the Supreme Court in *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398 (2007):

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

Id. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)

(“[R]ejections on obviousness grounds 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.”)).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016). “[W]here a party argues

a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

As discussed *supra*, we find a person of ordinary skill in the art at the time of the ’785 patent would have “at least a bachelor’s degree in mechanical engineering or equivalent discipline and at least 2–3 years’ experience with hydraulic fracturing and discharge systems for use with particulate material, such as proppant.” *See supra* Section II.

B. Scope and Content of the Prior Art

1. Sheesley

Sheesley is titled “Method and Apparatus for Modifying a Cargo Container to Deliver Sand to a Frac Site.” Ex. 1003, [54]. Sheesley relates to the transportation of a granular substance, such as sand, to frac sites. *Id.* ¶ 2. Sheesley describes issues associated with handling frac sand at multiple locations in multiple ways and explains that “[t]he more times the fracing sand is handled, the more expensive it is to the individual fracing company and to the well operator.” *Id.* ¶¶ 9, 10. Sheesley also explains that quickly unloading frac sand from a delivery vehicle is needed to minimize demurrage charges for waiting. *Id.* ¶ 11.

Sheesley teaches a delivery method using cargo containers (also called intermodal containers, freight containers, ISO containers, shipping containers, Hi-Cube containers, Sea Cans) that have been modified to carry proppant that allows the containers to be moved from “the quarry to the frac

site” without handling the sand multiple times. *Id.* ¶¶ 4, 13–17. Sheesley describes an unloading and handling process for the containers once they are at the fracing site. *Id.* ¶¶ 83, 88. Sheesley teaches a method of unloading containers loaded with proppant that includes removing multiple containers from truck trailers 278, 284, and/or 290 at a fracing site. Containers can be unloaded and stacked as shown in Figure 3, reproduced below.

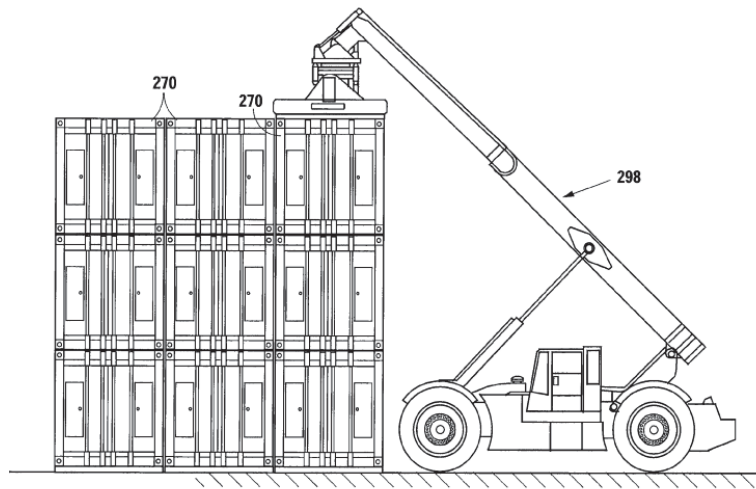


Fig. 3

Figure 3 shows a stack of modified cargo containers 270 being handled by Rough Terrain Cargo Handler (RTCH) 298. *Id.* ¶ 83. After unloading, the containers can be moved to and stacked on belt system 330, which, along with flatbed trailer 320, is a support structure for Sheesley’s modified cargo containers, as shown in annotated Figure 7, reproduced below.

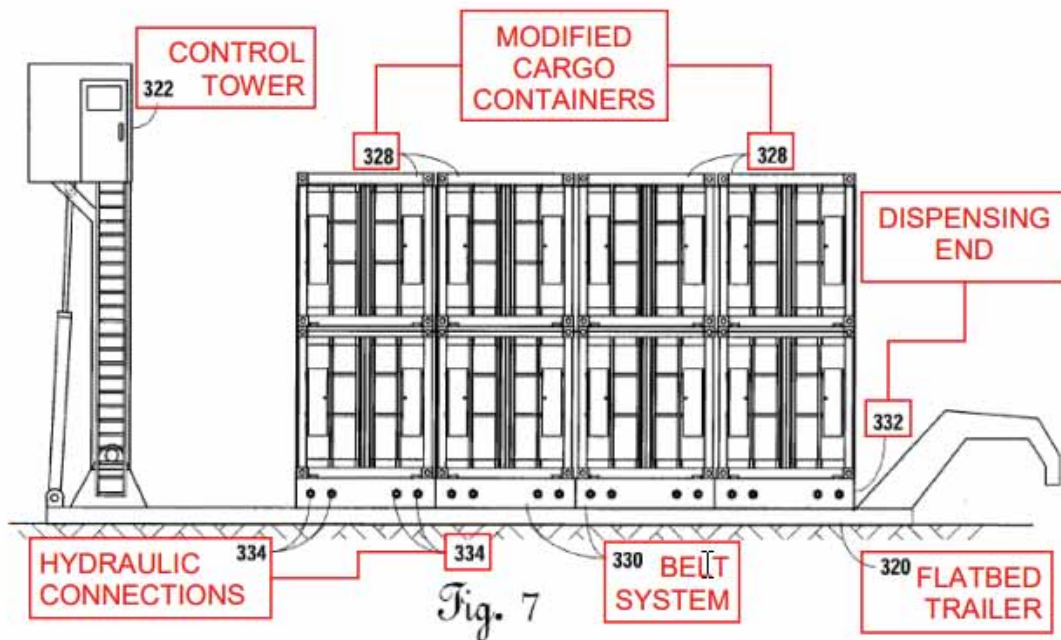
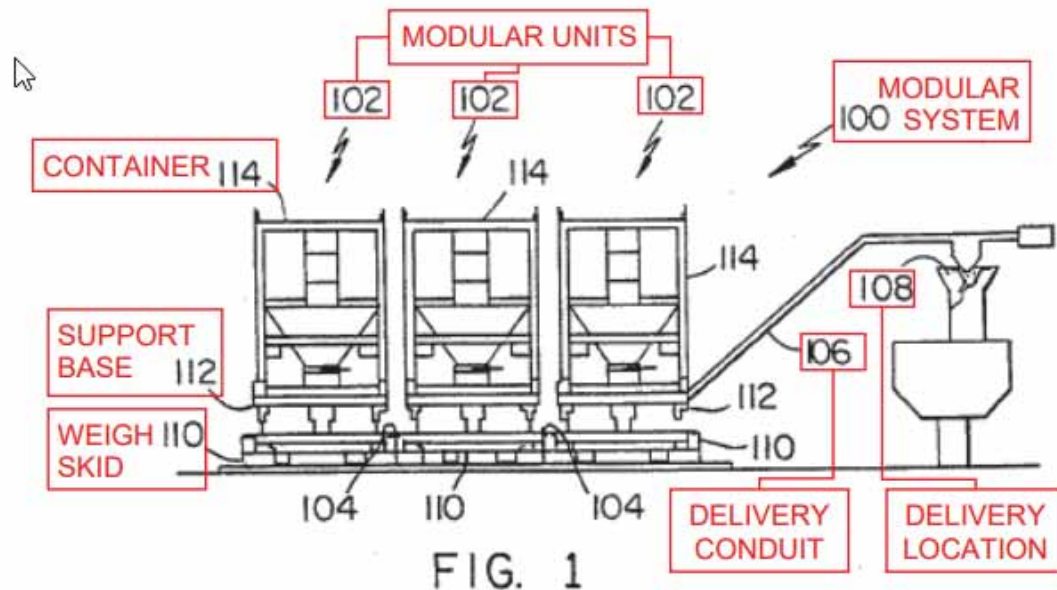


Figure 7, annotated by Petitioner (Pet. 25) and reproduced above, shows modified cargo containers 328 mounted on Flatbed Trailer 320, with belt system 330, hydraulic connections 334, control tower 322, and dispensing end 332. Ex. 1003 ¶¶ 86–89. Containers on flatbed trailer 320 are discharged by gravity feed through the outlets in the bottom of each container. *Id.* ¶ 86. After the proppant is deposited on belt system 330, it is discharged out of dispensing end 332 and transported to a blender where it is mixed with fracking fluid prior to injection into a well. *Id.* ¶¶ 83, 84, 89.

2. Hurst

Hurst is titled “Programmable Modular System Providing Controlled Flows of Granular Materials.” Ex. 1004, [54]. Hurst describes containers for granular materials and a discharging system for storing and dispensing granular materials, such as “powdered materials to form drilling mud.” *Id.* at 1:8–11, 1:25–26. Hurst recognizes the problems of “spillage and

consequential waste in handling the materials.” *Id.* at 1:45–47. Hurst’s modular system 100, shown in annotated Figure 1 is reproduced below.



Hurst’s system shown in Figure 1 of Hurst as annotated by Dr. Wooley (Ex. 1002 ¶ 80), which is reproduced above, includes a plurality of modular units 102 that provide particulate material to delivery location 108 via common delivery conduit 106. Ex. 1004, 3:49–51, 3:61–65. Hurst’s modular units 102 comprise weight skid 110, container support base 112 rests on weight skid 110, and granular material container 114 rests on corresponding support base 112 and, thus, on corresponding weight skid 110. *Id.* at 4:7–12.

We reproduce Petitioner’s annotated version of Hurst’s Figure 3 below.

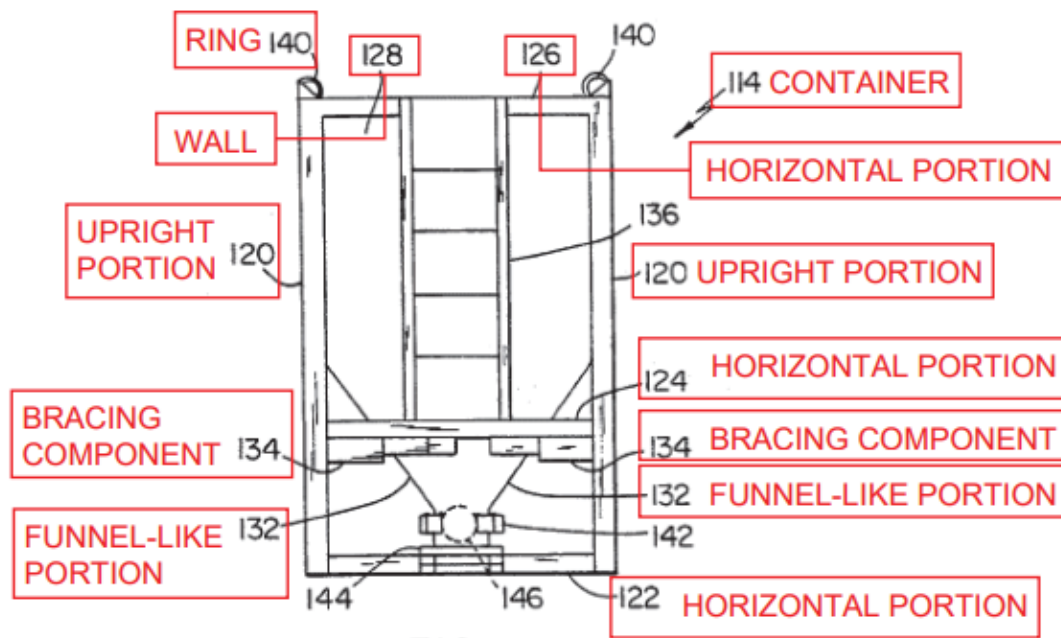


FIG. 3

Figure 3 of Hurst, as annotated by Dr. Wooley (Ex. 1002 ¶ 80), shows a front elevation view of a container for granular materials for use with Hurst's system. Ex. 1004, 3:21–23. Each of containers 114 preferably has an outer portion that serves as an “exoskeleton” with upright portions 120 and horizontal portions 122 at the bottom, 124 thereabove, and 126 at the very top. *Id.* at 4:22–25. Container 114 has walls 128 and 130 (not shown) within the exoskeleton. *Id.* at 4:25–27. Below about mid-height, the side walls of the container are inclined inwardly in sections 132 to create a tapered or funnel-like lower container space to facilitate gravity-induced outflow of granular material from the container. *Id.* at 4:27–32.

Reinforcement and/or bracing components such as 134 may be provided at suitable locations to enhance the overall stiffness and strength of the container and to provide support for external ladder 136. *Id.* at 4:32–36.

Further, Hurst's container 114 is portable and can be moved around the

wellsite with a fork-lift via horizontal open channels, or by crane using hook engagement rings 140. *Id.* at 4:62–5:5.

Containers 114 are each positioned on support base 112 shown in Figure 7, as annotated by Dr. Wooley, reproduced below.

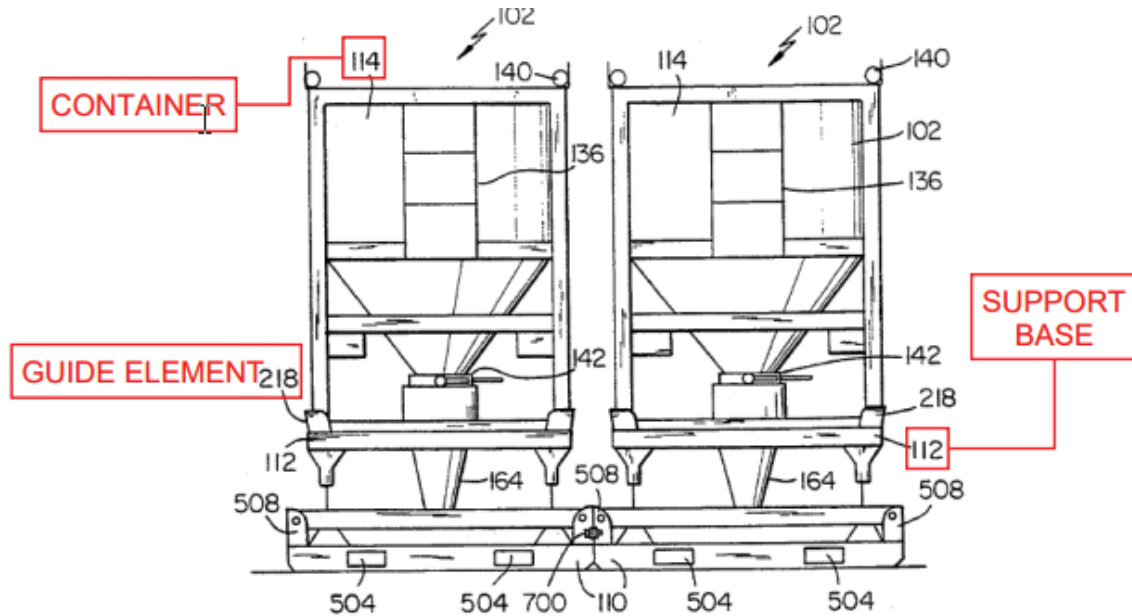


FIG. 7

An annotated version (Ex. 1002 ¶ 81) of Figure 7 of Hurst is reproduced above. Figure 7 of Hurst shows a front elevation view of two connected weight-skids each supporting a respective platform and container. Ex. 1004, 3:31–33. As illustrated in Figure 7, at the four corners of support base 112 there are provided channel-section generally upright guide elements 218. *Id.* at 6:8–11. The outward inclination of guide elements 218 serves the function of guiding the lower-most portion of container 114 placed on support base 112. *Id.* at 6:11–15.

Figure 5 of Hurst, as annotated by Petitioner, is reproduced below.

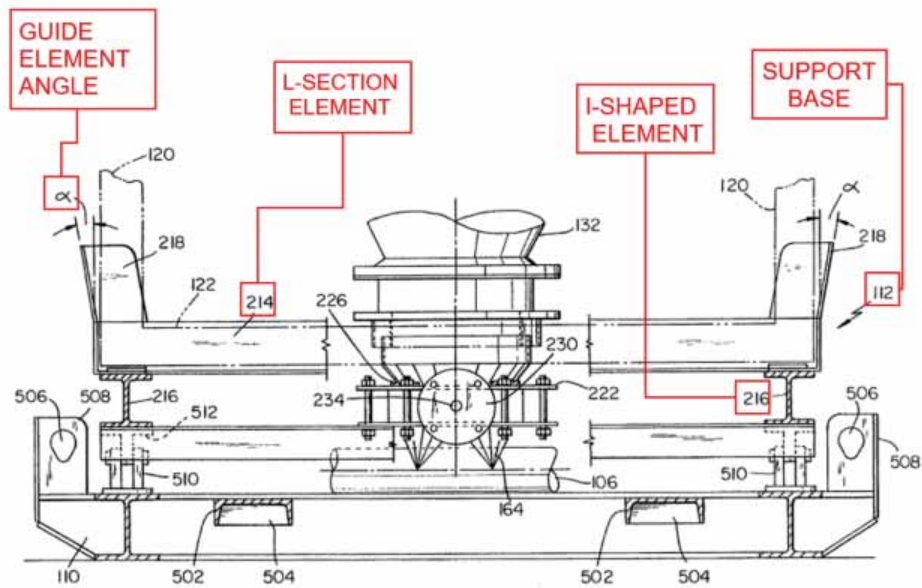


FIG. 5

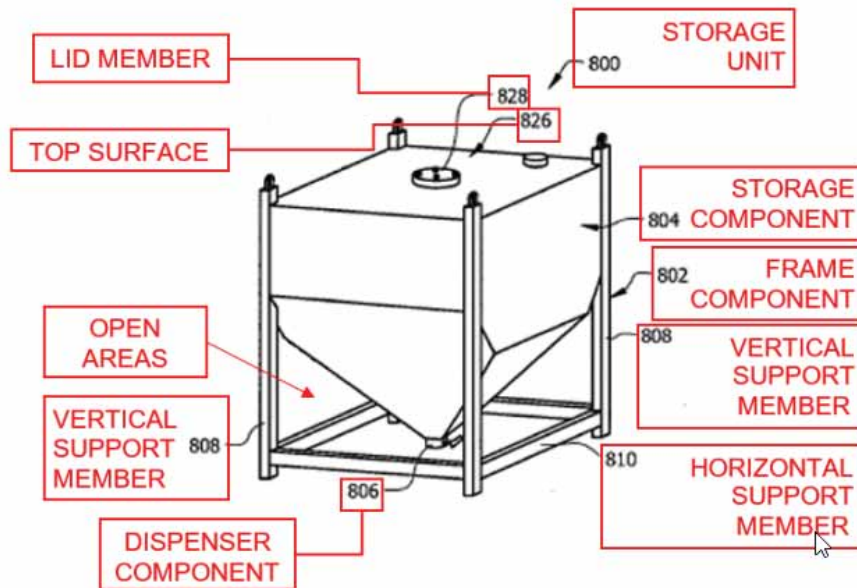
An annotated version of Figure 5 of Hurst (Pet. 29) is reproduced above. Figure 5 is an enlarged side elevation view of exemplary unit 102 and weight-skid 110. Ex. 1004, 5:10–13. Support base 112 has a rectangular outer framework formed of L-section elongate elements 214 welded to I section elongate elements 216. *Id.* at 5:67–6:5. Generally upright guide elements 218 are positioned on the corners of each support base 112 and are inclined outwardly by a small angle α , up to about 25 degrees, in both transverse directions. *Id.* at 6:8–11, Fig. 11.

3. *Harris*⁸

Harris is titled “Systems and Methods for Bulk Material Storage and/or Transport.” Ex. 1007, [54]. *Harris* teaches containers for holding

⁸ The disclosures of *Harris* ’554 and *Harris* ’809 are substantially identical (Ex. 1002 ¶ 14), and Petitioner refers to them collectively as “*Harris*.” Pet. 17, n.3. For purposes of this Decision, we cite to *Harris* ’554.

and transporting proppant. *Id.* ¶ 7. Figure 8 of Harris, as annotated by Petitioner, is reproduced below.



An annotated version of Figure 8 of Harris (Pet. 26) is reproduced above showing the various parts of Harris’s container. Ex. 1007 ¶ 28. Figure 8 shows bulk storage unit 800 comprising frame component 802, storage component 804, and dispenser component 806. *Id.* ¶ 47. Storage component 804 and horizontal support members 810 are respectively attached to frame component 802 such that a portion of the top and bottom of each vertical support member 808 are available so the top of vertical support members 808 of one storage unit 800 can engage and attach to the bottom of vertical support members 808 of another storage unit 800. *Id.* Bulk storage unit 800 also includes lid member 828 placed generally in the center of top surface 826. *Id.*

4. *Luharuka*

Luharuka is titled “System and Method for Mitigating Dust Migration at a Wellsite.” Ex. 1006, at [54]. Luharuka teaches a “method for delivering oilfield material,” such as proppant, using “an oilfield delivery vehicle” that

proppant feeder 227 to blender 225, where the proppant is mixed with fluid before being pumped into the well, is by conveyor 130 that runs underneath the compartments. *Id.* at Figs. 1 and 2, 2:34–48; 62–3:6, 4:32–41, 4:59–63, 5:15–23.

Figure 2 of Luharuka, annotated by Petitioner, is reproduced below.

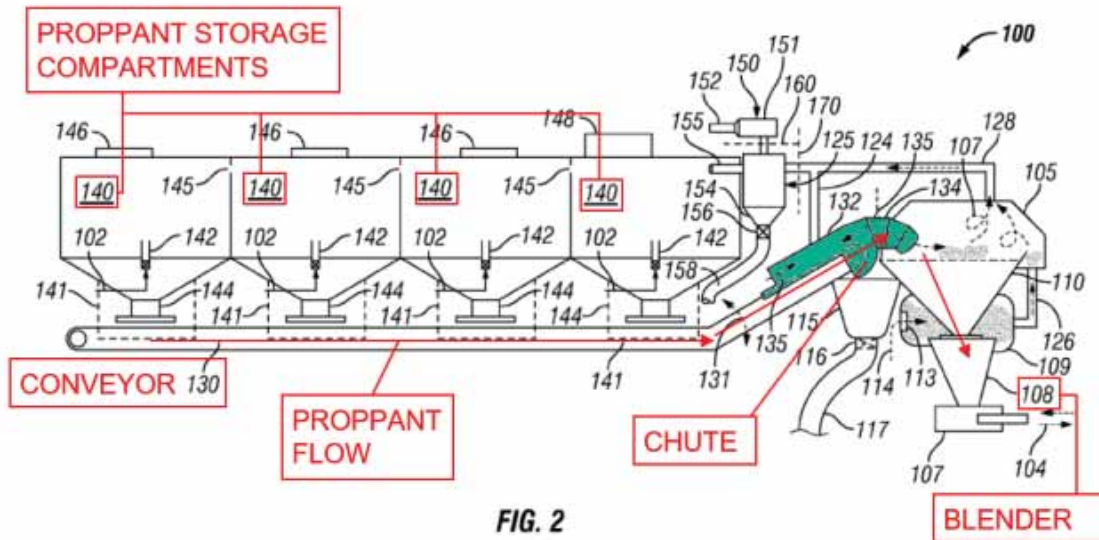


FIG. 2

Figure 2 of Luharuka is reproduced above as annotated by Petitioner (Pet. 32) and shows greater detail of Luharuka's dust control system. Ex. 1006, 2:12–14. Figure 2 shows compartments 140 of proppant feeder 227. *Id.* at 3:45–51. Conveyor 103 of proppant feeder 227 may comprise conveyor enclosure, or chute 132 and hopper enclosure 105. *Id.* at 4:32–35. Bellow 134 is attachable to the opening of hopper enclosure 105 and may be adapted to guide proppant 102 into hopper 110. Luharuka shows that the conveyor can angle upwardly after it clears the last compartment and dump the proppant through a chute (green) that communicates with the blender. *See* Ex. 1002 ¶ 82; Ex. 1006, Figs. 1 and 2.

5. *Wietgrefe*⁹

Wietgrefe is titled “Apparatus and Method for Bulk Dispensing,” and is directed to “apparatuses and methods that facilitate dispensing of bulk product from a hopper.” Ex. 1005, [54], 1:18–20. *Wietgrefe* describes a “hopper apparatus” for delivering granular products to a user. *Id.* at 5:8–10. While *Wietgrefe* primarily addresses the distribution of agricultural products such as seed, it expressly teaches that its “apparatus and method . . . may be used for products and distribution systems of other industries.” *Id.* at 4:62–5:7. *Wietgrefe*’s Figure 1, annotated by Petitioner, appears below.

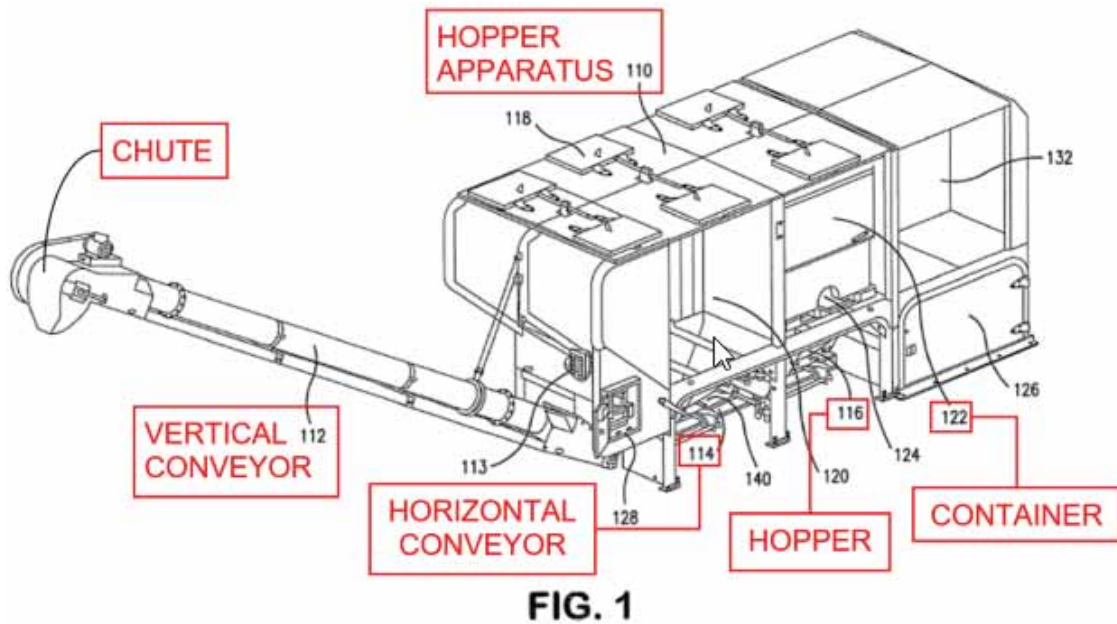


Figure 1, reproduced above as annotated by Petitioner (Pet. 33), illustrates an embodiment of *Wietgrefe*’s apparatus suitable to facilitate dispensing of products. Ex. 1005, 4:1–3. Figure 1 shows hopper apparatus 110 including a number of different product storage receptacles, including an integral large container/bulk storage receptacle 120. *Id.* at 5:8–14. Hopper 116 is

⁹ *Wietgrefe* is only relied on for Ground 2, which challenges claims 7, 8, 11, 14, 16–19, and 21–23.

positioned below container 122. *Id.* at 6:56–57. Container 122 includes “an interior funnel hopper-like structure featuring smooth sides and a funnel shape, e.g., cone-shape, for complete emptying without tipping.” *Id.* at 5:55–58. Container 122 also includes “a bottom exit slide door [123]” (*Id.* at 5:61–62) that when opened allows product in container 122 to fall into hopper 116 (*id.* at 6:58–59). Wietgreffe teaches that hopper 116 includes slide gate 140 at its lower end that can be opened to discharge the product onto horizontal conveyor 114. *Id.* at 6:59–64.

Figure 6, annotated by Petitioner, is reproduced below.

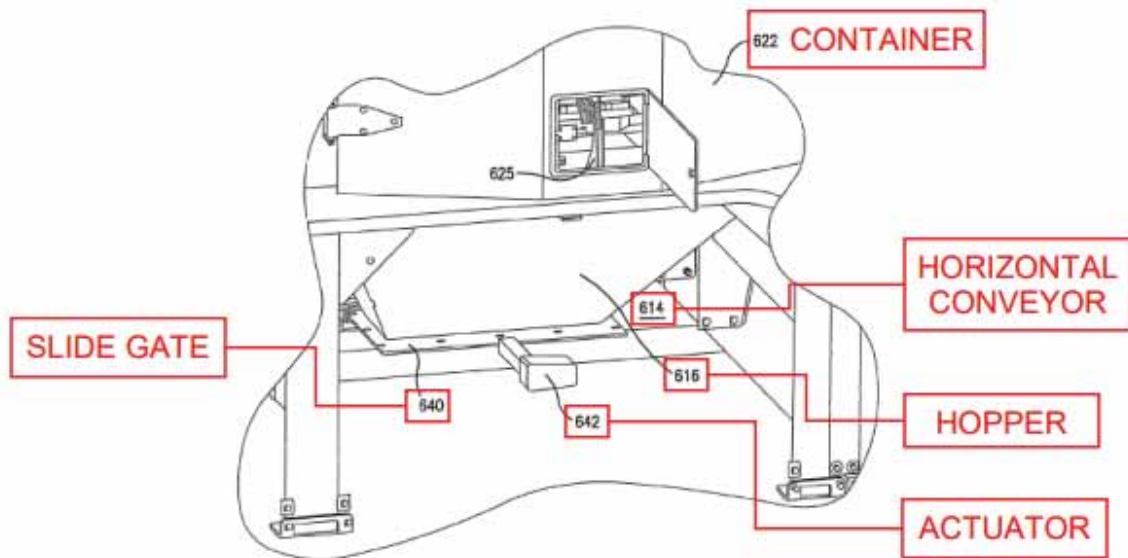


FIG. 6

Annotated Figure 6 (Pet. 34) shows that a hopper that includes a slide gate that meters the flow of particulate material falling onto a horizontal conveyor. Ex. 1005, 6:63–7:1. Once the product is dispensed onto the horizontal conveyor, it may be conveyed by the conveyor up a vertical conveyor and through the “output end” of the vertical conveyor (labeled above as a chute in the annotated version of Fig. 1) to a desired location. *Id.*

at 6:64–7:2, 7:20–25, 17:39–45, 18:27–29, Figs. 1 and 7. Wietgreffe explains that an object of his disclosure “is to provide apparatuses and methods that can dislodge material within a hopper to facilitate bulk dispensing.” *Id.* at 2:6–10.

C. Discussion: Differences Between the Prior Art and the Claims; Motivation to Modify

1. Independent Claim 1

a. Petitioner’s Contentions

Claim 1 is independent. Petitioner relies on Sheesley and Harris to teach most of the steps of the claimed method. Petitioner asserts that Sheesley discloses a method for transporting proppant to frac sites and unloading proppant “from a modified cargo container at the frac site.” Pet. 36 (citing, e.g., Ex. 1003, Abstract, ¶¶ 2, 17, 22, 78, 79, 83, 84, Figs. 2–8). With respect to the first portion of the step (a) of the method (labeled a1 in the claim reproduced above, Ex. 1001, 15:1–5), Petitioner relies on Sheesley for its teaching of removing multiple proppant-filled containers from trailers of a transport vehicle, *id.* (citing, e.g., Ex. 1003, Figs. 2–3), and also modifies Sheesley’s disclosed method to use the container disclosed in Harris, Ex. 1002 ¶¶ 87–105. Petitioner argues that it would have been obvious to use Harris’s container because (1) Harris’s container would fit better on the flatbed truck used by Sheesley (both loaded and unloaded); (2) Harris’s container would allow the truck to transport more unloaded containers at a time; (3) Harris’s container would be easier to customize, if modifications for specific applications were needed; and (4) Harris’s container would enable easier inspection of the proppant. Pet. 36–

43; Ex. 1002 ¶¶ 89–105; Ex. 1007 ¶¶ 45, 47, Fig. 8; Ex. 1009¹⁰, 2:8–10, 2:21–22, Fig. 4.

As for part a2 of step (a) of claim 1 (as labeled above, Ex. 1001, 15:5–8), Petitioner contends that each of Harris’s containers has an outlet positioned at its bottom in Harris, covered by Harris’s dispenser component. Pet. 44; Harris ¶¶ 47, 11, Fig. 8; Ex. 1009, 15–17, Fig. 4. Petitioner also asserts that each of Harris’s containers has a funnel-shaped portion directing the fracking proppant toward the outlet. Ex. 1007, Fig. 8; Ex. 1009, Fig. 4.

With respect to part a3 of step (a) of claim 1 (as labeled above, Ex. 1001, 15:8–16), Petitioner argues that Harris teaches each of its containers has “a storage component that includes a generally rectangular portion and a tapered portion” (the funnel-shaped portion of the container shown in Harris’s Figure 8), and depicts the funnel-shaped portion as underlying the generally rectangular portion. Ex. 1007 ¶¶ 7, 47, and Fig. 8; Ex. 1009, 12–17, Fig. 4.

As for part a4 of step (a) of claim 1, Petitioner contends that either Harris as modified by either the knowledge of a person of ordinary skill or in view of Hurst would account for this limitation. *See* Pet. 46–50. Petitioner submits that Harris teaches that its containers each has “a frame component attached to said storage component, where the frame component includes a plurality of support members configured to allow said storage component to sit on a surface.” Pet. 46; Ex. 1007 ¶¶ 7, 47, Fig. 8; Ex. 1009, 2:7–13, Fig. 4. Petitioner concedes that Harris only includes one end frame member

¹⁰ Petitioner includes citations to Ex. 1009, which is U.S. Provisional Application No. 61/538,616, which both Harris ’554 and Harris ’809 claim priority to.

per side, but contends that it would have been obvious for a person of ordinary skill in the art to modify Harris to include more horizontal support members, either based on the knowledge of a person of ordinary skill or in view of Hurst. Pet. 47–50. With respect to Harris alone, Petitioner contends that a person of ordinary skill would have recognized that additional support members could enhance the strength and stability of Harris’s container, and would have recognized that this strength would enable stacking and protected the containers from damage. *Id.* at 47–48; Ex. 1002 ¶¶ 107–109. As for the combination with Hurst, Petitioner argues that Hurst teaches stackable containers with horizontal support members at the top. Pet. 48; Ex. 1004, 4:22–27, Fig. 3; Ex. 1002 ¶ 108. Petitioner asserts that a person of ordinary skill would have recognized that modifying Harris’s container to incorporate Hurst’s teachings regarding horizontal support members would have provided the benefits of enhanced strength and durability discussed with respect to Petitioner’s proposed modification based on Harris alone. *Id.* at 48–49; Ex. 1002 ¶ 108.

As for part a5 of step (a) of claim 1 (as labeled above, Ex. 1001, 15:21–31), Petitioner argues that Harris’s containers have open areas around the funnel-shaped portion that: (1) are adjacent the bottom of the storage component; (2) allow visual access of exterior surfaces of the tapered or funnel-shaped part of Harris’s storage component; (3) are visible through spatial gaps in Harris’s frame component; and (4) are positioned above the bottom of the container and below the sidewalls. Pet. 50–51; Ex. 1007 ¶ 7, Fig. 8; Ex. 1009, Fig. 4.

With respect to part b1 of step (b) of claim 1 (as labeled above, Ex. 1001, 15:32–38) — “transferring, after removal from the trailer of the

one or more transport road vehicles, each of the plurality of proppant containers to a support structure positioned at the well site so that each of the plurality of proppant containers is positioned to overlay a common conveyor positioned at a separate location on the well site from the trailer” —
Petitioner contends that Sheesley accounts for this limitation. Pet. 51–54; Ex. 1002 ¶¶ 84, 85; Ex. 1003 ¶¶ 83–90, Figs. 3, 5, 7, 8.

As for part b2 of step (b) of claim 1 (as labeled above, Ex. 1001, 15:38–42), Petitioner submits that it would have been obvious to modify Sheesley’s support structure to include a cradle for each of Harris’s containers and incorporate Hurst’s guide elements and reasons why a person of ordinary skill would have been motivated to make these modifications. Pet. 54–65; Ex. 1002 ¶¶ 111–130; Ex. 1004, 3:26–28, 4:8–11, 5:66–67, 6:8–11, Figs. 5, 7. Petitioner contends that a person of ordinary skill would have been motivated to include Hurst’s guide elements because

such guide elements—just as they do for Hurst’s containers on Hurst’s support base—would have facilitated alignment of Harris’s containers on Sheesley’s support structure, during and after their placement thereon, including by: (1) positioning of the outlets of Harris’s containers over the conveyor; and (2) positioning of the containers on the respective locations of the support structure intended for them. [Ex. 1002] ¶115. A POSITA would have found (1) desirable because they would have known that a mispositioned container outlet would have created a risk of wasteful proppant spillage. *Id.* A POSITA would have found (2) desirable because they would have known that a mispositioned container that encroached on the location of the support structure intended for another container would have interfered with placement of the other container and may have required moving of the mispositioned container (costing time and money). *Id.* A POSITA also would have recognized that, once Harris’s containers were aligned on Sheesley’s support structure, such guide elements would have reduced the risk of the

containers becoming misaligned (even if bumped) by constraining movement of the containers relative to Sheesley's support structure. *Id.* ¶ 116.

Pet. 58.

With respect to step (c), Ex. 1001, 15:43–49, Petitioner argues that consistent with Sheesley's teaching, the proppant in Harris's containers (positioned on Sheesley's support structures and within the cradles) flows, under gravity, through the outlets thereof and onto the conveyor of Sheesley's belt system below them, including because the funnel-shaped portions of those containers facilitate such gravity discharge. Pet. 65 (citing Ex. 1003 ¶¶ 16, 84, 88, 89).

Finally, with respect to step (d), Ex. 1001, 15:50–56, Petitioner asserts that Sheesley teaches that, after being deposited on the common conveyor of Sheesley's belt system, proppant is carried through the dispensing end thereof and to a blender, where it can be mixed with fracking fluid prior to injection into a well at the well site. Pet. 66 (citing Ex. 1003 ¶¶ 84, 89, Claim 15, Figs. 7–8).

b. Patent Owner's Arguments

Patent Owner raises a number of arguments against Petitioner's contentions. First, Patent Owner contends that Petitioner's entire analysis is driven by improper hindsight. *See* PO Resp. 8–11. Second, Patent Owner argues that Dr. Wooley fails to opine on certain claim limitations. PO Resp. 12–15. Third, Patent Owner argues that Sheesley fails to teach the common conveyor. *Id.* at 52–53. Fourth, Patent Owner argues that Petitioner failed to show a motivation to incorporate a conveyor that runs the length of the support structure. *Id.* at 16–22. Fifth, Patent Owner asserts Petitioner failed to show an adequate motivation to use Harris's container

with Sheesley. *Id.* at 22–34. Finally, Patent Owner contends that Petitioner failed to show an adequate motivation to modify Sheesley to incorporate guide elements from Hurst. *Id.* at 38–44.

i. Undisputed Limitations

For the limitations that Patent Owner does not dispute, we have reviewed the Petition and cited evidence and find that Petitioner has proven by preponderance of the evidence that the combination accounts for those limitations.

ii. Hindsight

The Patent Owner Response includes a section that Petitioner’s entire analysis is driven by improper hindsight. *See* PO Resp. 8–11; PO Sur-Reply 1. To the extent that is a separate argument, we note that:

Any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.

In re McLaughlin, 443 F.2d 1392, 1395 (CCPA 1971). “However, rejections on obviousness grounds 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.” *Kahn*, 441 F.3d at 988; *see also KSR*, 550 U.S. at 418 (“To facilitate review, this analysis should be made explicit.”) (citing *Kahn*, 441 F.3d at 988)). We believe that this hindsight argument is best considered in the context of the individual combinations and modifications that Petitioner proposes. In reviewing the individual motivations to combine or modify the art, we have

kept in mind these admonitions and Patent Owner's contentions regarding hindsight.

iii. Lack of Dr. Wooley's Opinion on Certain Limitations and Failure to Account for the Claimed "Common Conveyor"

Patent Owner argues that Petitioner's challenge should fail because Petitioner's contentions regarding the limitations "structural support members," "span the end walls and the side walls," "end frame member," and "common conveyor," are not supported by specific testimony from Dr. Wooley and that they are "pure attorney argument," entitled to no weight. PO Resp. 12–15; PO Sur-Reply 1–2. We disagree. As the Federal Circuit explained, "[t]here is no invariable requirement that a prior art reference be accompanied by expert testimony." *In re Brimonidine Patent Litig.*, 643 F.3d 1366, 1376 (Fed. Cir. 2011) (citation omitted). It is well-established, moreover, that, where the technology involved is easily understandable, expert testimony is not required. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1242 (Fed. Cir. 2010); *see also Centricut, LLC v. Esab Group, Inc.*, 390 F.3d 1361, 1369 (Fed. Cir. 2004) ("In many patent cases expert testimony will not be necessary because the technology will be 'easily understandable without the need for expert explanatory testimony.'" (citation omitted)). The limitations for which Dr. Wooley has not offered a specific opinion are just such readily understandable, technologically simple limitations. For example, "structural support members," "span the end walls and the side walls," "end frame member," and "common conveyor," are just the type of basic mechanical components that are readily understandable.

In addition, Petitioner supports its arguments with evidence by citing the individual references. *See* Pet. 46–50, 51–54. In particular, Harris

expressly identifies its “frame” as having a plurality of support members and an end frame member. Ex. 1007 ¶ 7. Harris further states, when describing Figure 8, that frame component 802 has horizontal support member 810 and vertical support member 808. *Id.* ¶ 47. As for the requirement that the “structural support members” of the frame “span the end walls and the side walls,” it readily ascertainable from Figure 8 of Harris that the support members 808 and 810 span the entire length of the end walls and side walls. *See id.* at Fig. 8. Mr. Smith does not testify that this understanding of Harris is incorrect. Thus, we conclude that Harris itself is sufficient evidence to show that Harris accounts for these limitations.

As for the “end frame member,” Petitioner identifies horizontal support member 810 as accounting for this limitation. Pet. 47. As we explain above, Petitioner relies on Dr. Wooley’s testimony that it would have been obvious to incorporate a second end frame member on the top of Harris’s container as is shown in Hurst. Pet. 47–50 (citing Ex. 1002 ¶¶ 107–109, 143–144). Mr. Smith does not contend that these structures fail to account for these limitations. Thus, we find Harris, Hurst, and Dr. Wooley’s testimony sufficient to account for the claimed “end frame member.” *See* Ex. 1007 ¶¶ 7, 47, Fig. 8; Ex. 1004, 4:22–27, Fig. 3; Ex. 1002 ¶¶ 107–109, 143–144.

As for the “common conveyor,” contrary to Patent Owner’s contentions, Petitioner and Dr. Wooley explain in detail that they are relying on the combined teachings of Sheesley and Luharuka to account for this limitation. Pet. 51–53; Ex. 1002 ¶¶ 84, 85. Indeed, Sheesley explains that it includes a conveyor. Ex. 1003 ¶¶ 83–90, Figs. 3, 5, 7, 8. Although the parties dispute whether Sheesley’s belt system is a “common conveyor,”

Petitioner also points to Luharuka, which shows a single conveyor belt beneath the containers. *See* Ex. 1006, Fig. 2, 3:3–4 (discussing conveyor 130). We disagree with Patent Owner that Dr. Wooley does not offer an opinion whether Luharuka teaches a “common conveyor.” *See* Ex. 1002 ¶¶ 84, 85.

Patent Owner’s arguments regarding whether Sheesley discloses the claimed “common conveyor” are not persuasive because Petitioner does not rely on Sheesley alone for that limitation. *See* PO Resp. 17–20, 52–53. Patent Owner’s arguments that Luharuka’s conveyor “does not ‘underlie and to be spaced-apart from [a] plurality of cradles,’ nor does it even underlie a plurality of containers as required by the Challenged Claims” are not persuasive because Petitioner does not rely on Luharuka for those limitations. *See* Pet. 51–66. Patent Owner’s arguments simply attack the references individually when Petitioner is relying on a combination of references to account for those limitations. *See In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986). (“Nonobviousness cannot be established by attacking the references individually where the rejection is based upon the teachings of a combination of references.”). Thus, we find that Petitioner has adequately accounted for the “common conveyor” limitation.

iv. No Motivation to Use Luharuka’s Conveyor.

Patent Owner argues that Sheesley does not disclose a common conveyor, but instead, discloses a belt system combining several conveyors together. PO Resp. 17–20; PO Sur-Reply 9–12. Patent Owner contends that, therefore, Sheesley teaches away using a single conveyor. PO Resp. 20. In particular, Patent Owner asserts that Sheesley teaches that the belt system sits on the trailer when in use, and can be removed from the

trailer. *Id.* Patent Owner contends that Sheesley’s system is designed to use standardized equipment, and argues that Sheesley’s removable belt systems facilitate the use of standard equipment because they do not require specialized trailers with built in or fixed belt systems. *Id.* at 21. Patent Owner asserts that the size of Sheesley’s individual, separated belt systems also makes them easier and safer to move around a wellsite using standard equipment, such as a forklift. *Id.* Patent Owner contends that “[a] larger combined belt system, as Petitioner suggests, would defeat the advantages of the belt systems Sheesley depicts.” *Id.* Patent Owner argues that Petitioner gives no explanation for how one would move such a large conveyor system—which would be at least 32 feet long, the same as the width of 4 Sheesley containers positioned side-by-side—around the often cramped and fast-paced environment of a wellsite. *Id.* Patent Owner argues that Petitioner’s analysis is hindsight driven and insufficient. *Id.* at 21–22.

We determine that Petitioner has shown an adequate motivation to combine Sheesley and Luharuka. To begin with, as we explained above, Patent Owner’s arguments regarding Sheesley’s conveyor is not persuasive because Petitioner relies on the combination of the references not just Sheesley alone. *See supra* at IV.D.b.iii. Indeed, Dr. Wooley recognizes the ambiguity regarding Sheesley’s belt system 330 and turns to Luharuka for additional disclosure. *See Ex. 1002 ¶¶ 84, 85.* Thus, as we explained above, we do not find Patent Owner’s attack on Sheesley individually to be persuasive.

We also disagree with Patent Owner’s contention that Sheesley teaches away from the combination. A reference teaches away “when a person of ordinary skill, upon reading the reference, would be discouraged

from following the path set out in the reference, or would be led in a direction divergent from the path that was taken” in the claim. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 738 (Fed. Cir. 2013). A reference that “merely expresses a general preference for an alternative invention but does not criticize, discredit, or otherwise discourage investigation into” the claimed invention does not teach away. *Id.* Here, Sheesley provides scant discussion of its belt system 330 and certainly does not criticize, discredit, or otherwise discourage the use of a common conveyor, such as shown in Luharuka.

We also disagree with Patent Owner’s contention that a person of ordinary skill would not have relied on Luharuka’s conveyor because such a combination would result in the loss of the benefits of Sheesley’s removable belt system. PO Resp. 20–21. Patent Owner’s contentions rest on Mr. Smith’s interpretation that Figure 8 shows the belt system removed. *Id.* (citing Ex. 2038 ¶¶ 75, 76). However, Sheesley provides no discussion of this alleged feature of removability of the belt system. Moreover, Sheesley describes Figures 7 and 8 as simply showing different perspectives of the same configuration. *See* Ex. 1003 ¶ 26. Thus, it is unclear from the drawing alone whether the conveyor is, in fact, removable. However, regardless of what Figure 8 teaches precisely, we do not find this, at best, implied disclosure that Mr. Smith relies upon to be a teaching away because it is never identified as a feature of the invention and Sheesley never disparages or discredits a single conveyor.

As for Patent Owner’s argument that the use of a single conveyor with Sheesley’s method would have been inconvenient and unwieldy, we disagree. As Dr. Wooley explains, bodily incorporation of Luharuka’s

conveyor is unnecessary and it was well within the level of skill in the art to arrange Luharuka's conveyor in a way that was not inconvenient and unwieldy. *See* Ex. 1099 ¶¶ 78–98.

Even if Sheesley teaches a removable belt system, we find that the benefits identified by Dr. Wooley—that this would be the most logical design and would have reduced dust generated (Ex. 1002 ¶¶ 84, 85)—would have provided sufficient motivation to combine Luharuka with Sheesley and would have outweighed any alleged benefits from Sheesley's conveyor system. A combination of known elements is likely to be obvious when it yields predictable results. *See KSR*, 550 U.S. at 416. Petitioner's evidence shows sufficiently that the combination of Luharuka and Sheesley is just such a predictable combination of known elements. *See* Ex. 1002 ¶¶ 84, 85; Ex. 1099 ¶¶ 78–98. Therefore, we find that Petitioner has shown a sufficient motivation to combine Sheesley with Luharuka.

v. Motivation to Combine Sheesley with Harris

Patent Owner argues that Petitioner has failed to show an adequate motivation to use Harris's container in Sheesley's system. PO Resp. 22–34. Patent Owner raises a number of attacks against the combination of Harris and Sheesley. First, Patent Owner argues that attempts to commercialize Harris failed. *Id.* at 23–24. We consider this argument more appropriately as objective indicia of nonobviousness (failure by others) and discuss it below. *See infra* at IV.E.

Second, Patent Owner argues a person of ordinary skill would not have used Harris's containers because such a modification would result in the loss of the significant benefits Sheesley's system derives from using modified ISO cargo containers. PO Resp. 25–27. Patent Owner submits

that by using modified ISO cargo containers, Sheesley allows lower cost and economies of scale; robust processes, services, and compatible equipment used with the containers; and fewer durability and safety concerns. *Id.* at 25; PO Sur-Reply 17–21. Patent Owner contends that a person of ordinary skill would not trade those benefits because Harris’s container is more expensive. PO Resp. 25. In particular, Patent Owner identifies Sheesley’s containers use of ISO-compliant corner castings, the availability of an RTCH to move Sheesley’s containers versus Harris’s use of forklifts, and Sheesley’s containers compliance with roadway height restrictions versus Harris’s non-compliant height when carried on a standard flatbed trailer. *Id.* at 26–27.

Although we agree with Patent Owner that Sheesley’s system—which utilizes modified standard ISO containers—has benefits, including its containers’ compatibility with equipment used in transporting and handling standardized ISO containers (PO Resp. 25), we also agree with Petitioner that using Harris’s container with Sheesley’s support structure would have yielded numerous benefits (*see* Pet. 37–43). “The fact that the motivating benefit comes at the expense of another benefit . . . should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.” *Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000).

In the present case, having weighed the benefits gained and lost by using Harris’s container with Sheesley’s support structure, we agree with Petitioner and credit Dr. Wooley’s testimony that a skilled artisan would have made the modification as doing so would have improved visual

inspection of the containers (Ex. 1002 ¶¶ 102, 103) while also making the containers easier to repair (*id.* ¶ 104).

We also agree with Petitioner that Patent Owner’s arguments regarding the alleged costs of Petitioner’s modifications are not persuasive. To the extent Patent Owner relies on high costs, such evidence does not raise doubt that a proppant transporting system combining Sheesley and Harris can be manufactured. *See Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983) (“[T]hat the two disclosed apparatus would not be combined by businessmen for economic reasons is not the same as saying that it could not be done because skilled persons in the art felt that there was some technological incompatibility that prevented their combinations.”); *see also KSR*, 550 U.S. at 417 (cautioning against rewarding obvious variations precipitated by “design incentives and other market forces”).

As for the alleged benefits of corner castings, we agree with Petitioner that the evidence shows that Harris’s containers could have still been safely transported without corner casting by being strapped or otherwise secured to the trailer. *See Ex. 2038* ¶ 96. Thus, we are not persuaded that the benefits are as significant as Patent Owner contends. Indeed, the fact that better alternatives exist does not mean that inferior combinations are inapt for obviousness purposes. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012). The same conclusion applies to Patent Owner’s arguments regarding the use of an RTCH to move Sheesley’s containers. Contrary to Patent Owner’s implication, Sheesley never expressly criticizes or discusses forklifts (Ex. 1069, 202:12–14), and movement of containers using forklifts was well known at the time (*see, e.g.*, Ex. 1002 ¶ 110).

Finally, Patent Owner's arguments regarding the height of Harris's height are not persuasive because (1) Harris itself teaches that the dimensions of its container may be adjusted to allow for transportation (Ex. 1006 ¶ 45), (2) Mr. Smith's admission that drop down trailers existed at the time of invention that could have accommodated Harris's preferred height while complying with height restrictions (Ex. 1069, 84:10–95:2), and availability of permits for oversized containers (Ex. 1099 ¶ 88).

Third, Patent Owner argues that Petitioner is incorrect (1) that a person of ordinary skill would have sought to reduce the overhang in Sheesley, and (2) Harris's containers would have reduced the likelihood containers would tip off the trailer and would have been easier to position on the trailer. PO Resp. 27. Patent Owner asserts that a person of ordinary skill would not have recognized that a problem with overhang because Sheesley does not discuss any problems with overhand and Sheesley would have been "well aware of how 20-foot containers would hang off the sides of the trailer when positioned perpendicularly, yet he designed his system to be used in precisely that way." *Id.* at 28.

Patent Owner's argument that Petitioner's motivation fails because Sheesley does not recognize the problems with overhand is not persuasive. There is no requirement that the reference sought to be modified recognize the problem that would motivate a skilled artisan to improve it. Indeed, the law clearly provides that "[t]he motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself." *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006).

As the Federal Circuit explained in *Randall Mfg. v. Rea*, 733 F.3d 1355 (Fed. Cir. 2013):

In *KSR*, the Supreme Court criticized a rigid approach to determining obviousness based on the disclosures of individual prior-art references, with little recourse to the knowledge, creativity, and common sense that an ordinarily skilled artisan would have brought to bear when considering combinations or modifications. *KSR*, 550 U.S. at 415–22. Rejecting a blinkered focus on individual documents, the Court required an analysis that reads the prior art in context, taking account of “demands known to the design community,” “the background knowledge possessed by a person having ordinary skill in the art,” and “the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418. This “expansive and flexible approach,” *id.* at 415, is consistent with our own pre-*KSR* decisions acknowledging that the inquiry “not only permits, but *requires*, consideration of common knowledge and common sense.”

Id. at 1362. Thus, Patent Owner’s argument that Sheesley is silent about this problem is not consistent with the law.

As we explained above, Patent Owner’s argument regarding the use of the RTCH is not persuasive because Patent Owner does not accurately characterize Sheesley’s description of its use of the RTCH. *See supra* at 37. Furthermore, we find persuasive Petitioner’s evidence that forklifts were a well-known and widely used method for moving proppant containers. *See* Ex. 1099 ¶ 60; Ex. 1069, 66:25–68:13, 69:19–70:16. We find also find Petitioner’s evidence that overhang could lead to safety concerns and that Harris’s containers would provide repair and visual inspection benefits to be well-supported and reasoned and give it substantial weight. *See* Ex. 1002 ¶¶ 90–98, 103, 104. Thus, we do not agree with Patent Owner’s assertion that a person of ordinary skill would view the use of forklifts as so

disadvantageous that a person of ordinary skill would not pursue the benefits of eliminating overhang and improving visual inspection and repair.

Patent Owner also argues that Petitioner has failed to show that a person of ordinary skill would have been motivated to arrange Sheesley's 12-foot containers lengthwise on Sheesley's trailer. PO Resp. 30–32. Patent Owner submits that Petitioner acknowledges that this arrangement would reduce proppant flow rate, but Patent Owner asserts that Petitioner does not give any basis for assuming that a wellsite operator would ever desire a flow rate so low that a person of ordinary skill in the art would want to place only two stacks of containers on the trailer. *Id.* at 30. Patent Owner argues that a person of ordinary skill would be motivated to maximize flow rate, “not one that is designed for only the least-demanding requirements.” *Id.* Patent Owner further contends that, even if circumstances demanded a lower discharge rate, that the arrangement would empty “in a matter of minutes” creating a risk of halting the entire fracking operation. *Id.* at 31. Patent Owner further submits that Harris's container are not designed to be placed lengthwise based on the location of the forklift openings. *Id.* at 31–32.

We agree with Petitioner that Patent Owner's lengthwise arguments do not address the 8-foot container proposed by Dr. Wooley. *See* Pet. Reply 9. Petitioner also submits detailed testimony and explanation from Dr. Wooley explaining why the reduced proppant discharge rate that a lengthwise configuration would cause would be more than sufficient for many types of fracking jobs. *See id.* at 20–25. We find Dr. Wooley's testimony to be well-reasoned and supported by the cited evidence. Ex. 1099 ¶¶ 53–69. Based on this testimony, we disagree with Patent Owner's assertion that a person of ordinary skill would not be motivated to

use Harris's container lengthwise because the flow rate would be insufficient. On the contrary, we agree with Petitioner that Harris's container arranged lengthwise would provide an adequate proppant discharge rate. *Id.* As for Patent Owner's contention that the containers would empty too quickly to be changed safely, we agree with Petitioner (Pet. Reply 24 (citing Ex. 1069, 96:18–97:5, 99:6–100:9, 97:7–22, 99:25–100:3, 105:8–106:2, 115:11–24, 105:8–106:2) that Mr. Smith's opinion is based on inadequately explained assumptions regarding opening size of the containers and is entitled to little weight. Accordingly, we find Patent Owner's contentions regarding the risk of the containers emptying too quickly to be entitled to little weight.

Finally, Patent Owner contends that Petitioner's assertions that using Harris's container would be cheaper by reducing the number trips to remove empty containers are incorrect. PO Resp. 32–34. Patent Owner submits that removing empty containers does not require any more trips than required to deliver the full containers, and it would take exactly the same number of trips to deliver Harris's containers as it would Sheesley's containers. *Id.* at 32–33 (citing Ex. 2038 ¶¶ 101–104). However, as Petitioner persuasively explains, Mr. Smith's hypothetical delivery scenario which he uses to illustrate why using Harris's container would not reduce transport costs, is not correct. *See* Pet. Reply 8. As Dr. Wooley explains, Mr. Smith provides an inadequate buffer for the fracking job, which leads Mr. Smith to underestimate the cost savings. *See id.*; Ex. 1099 ¶¶ 44, 45, 72–75.

We also agree with Petitioner that Mr. Smith's assertion that that a trucker would decline to haul a full container without a guaranteed backhaul

is seriously undermined, because, in his hypothetical, 53 truckers took such a job. Ex. 1099 ¶¶ 76, 77. Thus, for these reasons, we find Mr. Smith's testimony that Harris's container would not result in transportation cost savings to be entitled to little weight. Instead, we credit Dr. Wooley's testimony that Harris's container would result in cost savings and that this would provide an additional motivation for a person of ordinary skill to use Harris's container. Ex. 1002 ¶ 99; Ex. 1099 ¶¶ 44, 45, 72–77.

vi. Motivation to Modify Harris

Patent Owner argues a person of ordinary skill would not have been motivated to modify Harris to include another end frame member on the top of Harris because Harris was sufficiently strong, stable, and protected from damage as designed. PO Resp. 34–35. Patent Owner asserts that a person of ordinary skill in the art would not have been motivated to solve problems that did not exist. *Id.* at 35. In particular, Patent Owner contends that there is no contemporaneous evidence that Harris's container was insufficiently strong. *Id.* Patent Owner submits that the need for additional strengthening is less at the top of the container. *Id.* (citing Ex. 2038 ¶¶ 114, 115). Patent Owner also asserts that Petitioner provides no evidence that the top of the containers need protection from damage. *Id.* at 36. Patent Owner argues that Hurst would not motivate a person of ordinary skill to add the claimed support members because there is no discussion in Hurst that the braces provide the claimed benefits. *Id.* Finally, Patent Owner argues that a person of ordinary skill would not have been motivated to add the support members because it would add cost and the added weight would reduce the amount of proppant that could be carried. *Id.* at 37.

We find that Petitioner has shown an adequate motivation to modify Harris. In particular, we agree with Petitioner that Mr. Smith concedes that adding the support members would protect a “very small and narrow area of the container.” Ex. 2038 ¶ 118. Dr. Wooley explained on cross examination that this would be the type of damage that the container would be at risk given stacking. Ex. 2035, 138:11–141:1. Thus, we disagree with Patent Owner that there is no evidence to support Petitioner’s contention, and, to the contrary, we find this evidence sufficient to show that a person of ordinary skill would have been motivated to add horizontal support members to the top of Harris’s container. There is no requirement that there be evidence that Harris was, in fact, inadequate, only there was a reason that a person of ordinary skill would have been motivated to try to improve Harris. The potential risks Petitioner has identified are just such a motivation.

Patent Owner’s argument that Hurst does not expressly explain that its support members would have this benefit is not persuasive. As we explained above, there is no requirement that the reference expressly disclose the motivation. *See supra* at 38–39. Here, Petitioner has presented evidence that a person of ordinary skill would understand that a support member, such as disclosed in Hurst, would have had this benefit. Ex. 1002 ¶¶ 107–110. This is sufficient, and there is no requirement that there be an express teaching, suggestion, or motivation in Hurst for this combination. *See supra* at 38–39.

vii. Motivation to Combine Hurst

With respect to the combination with Hurst, Patent Owner argues that Hurst’s guide elements would not work with Sheesley’s support structure, so a person of ordinary skill would not be motivated to use them. PO

Resp. 38–41. In particular, Patent Owner asserts that because Hurst’s guide elements work by engaging the corners of a container, when Harris’s 12-foot container is placed perpendicularly on Sheesley’s trailer, its corners are floating in the air and cannot be engaged in any direction. *Id.* at 38, 40. Patent Owner contends that Petitioner’s side-engaging guide is not the claimed cradle. *Id.* at 41.

We agree with Petitioner that Patent Owner’s “side-engaging guide” argument relies on Harris’s 12-foot container being placed width-wise, and does not apply to Petitioner’s arguments regarding the Harris 8-foot container or Harris’s 12-foot container oriented lengthwise. Pet. Reply 13. For the 12-foot Harris container placed lengthwise or the 8-foot Harris container, Petitioner relies on corner-engaging guides for those two proposed embodiments. *See* Ex. 1002 ¶¶ 125. Thus, we agree with Petitioner that these arguments are not persuasive.

Patent Owner submits that Dr. Wooley previously testified that twist lock assemblies would be used to align Harris’s containers on Sheesley’s structure and that “[s]uch elements (twistlocks, pins, or rings) would be preferable over Petitioner’s side-engaging guides because they would provide greater tolerance for placement misalignment.” PO Resp. 41–42. Patent Owner contends that this testimony “dooms” Petitioner’s obviousness argument. However, again this argument does not appear to engage with Petitioner’s arguments regarding the 12-foot Harris container positioned lengthwise and the 8-foot Harris container. In addition, Dr. Wooley’s district court opinion addresses a different proposed combination (*see* Ex. 1072 ¶¶ 175, 345–348, 603), and Dr. Wooley does not contend, as Patent Owner implies (PO Resp. 43), that twistlocks are superior to Hurst’s

guides. Moreover, we note that there is no requirement that Petitioner prove that a combination would be the best possible combination for obviousness purposes. *See In re Mouttet*, 686 F.3d at 1334.

Patent Owner contends that Petitioner’s assumption of adding guides of any kind to Sheesley would have been beneficial is wrong. PO Resp. 43. Patent Owner asserts that Sheesley gives “no indication ‘mispositioning’ containers in its system would be a problem, or that there was need to create ‘small spacing [] between Harris’s containers’ using guide elements.” *Id.* Patent Owner asserts that a person of ordinary skill would have “avoided using Harris’s containers with Sheesley, rather than requiring more modifications to counteract Harris’s flaws.” *Id.*

To begin with, as we explained in detail above, there is no requirement that Sheesley discuss a problem in order for such a problem to be considered in an obviousness analysis. *See supra* at 38–39. As Petitioner explains in detail, and we agree, having turned Harris’s container to solve Sheesley’s overhang problem, a person of ordinary of ordinary skill would have been motivated to include guides, such as Hurst’s, in order to improve alignment. *See Ex. 1002 ¶¶ 111–121, 125–130.*

Patent Owner argues that a person of ordinary skill would not have been motivated to add Hurst’s guide elements because of the added cost. PO Resp. 44. As we explained above, we do not find Patent Owner’s cost argument persuasive. *See supra* at 36–37.

Thus, we disagree with Patent Owner’s argument that Petitioner has failed show that a person of ordinary skill would have been motivated to combine Hurst with Harris and Sheesley.

c. Summary

In conclusion, we find that Petitioner has shown by a preponderance of the evidence that the combination accounts for the limitations of claim 1, and that a person of ordinary skill would have been motivated to combine the teachings of Sheesley, Harris '554 or Harris '809, Hurst, and Luharuka in the manner asserted.

2. Claims 6, 9, 13, and 15

Petitioner has shown sufficiently that the combination of Sheesley, Hurst, Harris, and Luharuka teaches or suggests the claimed subject matter of claims 6, 9, 13, and 15. Pet. 69–76. Patent Owner does not argue that the combination of Sheesley, Hurst, Harris, and Luharuka fails to disclose the additional limitations recited by claims 6, 9, 13, and 15. Accordingly, Patent Owner has waived any argument directed to those limitations. *See* Paper 14, 3 (“Patent Owner is cautioned that any arguments for patentability not raised in the response will be deemed waived.”). We reviewed Petitioner’s evidence and argument and adopt it as our own. For the reasons provided therein, Petitioner demonstrates that the combination of Sheesley, Hurst, Harris, and Luharuka accounts for the limitations of claims 6, 9, 13, and 15, that a person of ordinary skill in the art would have been motivated to combine the references in the manner proposed, and would have had a reasonable expectation of success in doing so.

3. Claims 3 and 10

Claim 3 depends from claim 1 and further recites “directing the fracking proppant from the common conveyor to a desired location with a chute attached to the support structure and configured to receive the fracking proppant from the common conveyor.” Claim 10 depends from claim 9 and

recites a similar limitation. Petitioner explains Sheesley teaches that proppant is delivered by a belt system to the blender, but does not explain how the delivery occurs. Pet. 66. Petitioner argues that delivery to a blender was well known, and a person of ordinary skill in the art would have “found it logical to modify Sheesley’s support structure so that proppant on its conveyor could be transferred to a blender, such as through the use of a conveyor that extended at an upward angle and included a chute at its end, like Luharuka disclosed.” *Id.* at 66–67. Petitioner contends that Luharuka teaches a chute 132 and material transfer guide 134 that attaches to and extends from conveyor 130 and encloses the top portion of the conveyor. *Id.* at 67 (citing Ex. 1002 ¶ 140). Petitioner argues that it would have been a straightforward task for a person of ordinary skill in the art to secure such a chute and conveyor, or similar ones, to Sheesley’s support structure, given their skill level and the fracking industry’s common use of components like conveyors and chutes for proppant transfer. *Id.* (citing Ex. 1002 ¶ 140). Petitioner submits that, as Luharuka shows, Sheesley’s conveyor could have been made continuous from under the containers up through the attached chute, which would have had the benefit of eliminating the need to coordinate the positioning and rates of multiple conveyors. *Id.* (citing Ex. 1002 ¶ 141). Petitioner asserts that a person of ordinary skill would have also seen the benefit of including an inclined section for Sheesley’s conveyor, like that section of Luharuka’s, because it would have allowed the horizontal section of Sheesley’s conveyor that underlies Harris’s containers to be lower to the ground, facilitating placement of those containers over the conveyor, while still allowing proppant to be directed to a location that was elevated relative to the horizontal section, as was often the case. *Id.* at 68.

Petitioner argues that a person of ordinary skill would have also recognized that including a chute at the end of Sheesley's conveyor—like Luharuka's, Speakman's, or Wietgreffe's—would have better contained proppant dust (and proppant) leaving the end of the conveyor. *Id.* Thus, Petitioner contends that modified in this foregoing obvious manner, Sheesley discloses directing the proppant that dropped onto the conveyor of belt system 330 from Harris's containers to a desired location (a blender) with a chute attached to its support structure, which chute would have been configured to receive the proppant from the conveyor. *Id.*

Patent Owner raises two main arguments regarding the “chute” limitation. First, Patent Owner argues that Luharuka does not teach the claimed chute. PO Resp. 54–56. Second, Patent Owner asserts that a person of ordinary skill would not have been motivated to modify Sheesley to include Luharuka's chute. *Id.* at 49–52.

With respect to the missing limitation argument, Patent Owner contends that Luharuka's chute is not “attached to the support structure” and does not “direct[] the fracking proppant from the common conveyor.” *Id.* at 54. Patent Owner argues although Dr. Wooley identifies elements 132 and 134 as teaching the claimed chute, Luharuka only describes element 132 as a “conveyor enclosure, or chute” and element 134 as a “material transfer guide.” *Id.* at 55 (citing Ex. 1006, 4:32–58). Thus, Patent Owner submits that Luharuka differentiates between the chute, which does no directing of material itself, and the “transfer guide,” which “may be adapted to guide the proppant 102 into the hopper 110.” *Id.* (citing Ex. 1006, 4:35–41). Patent Owner asserts that Luharuka explains that element 134 is “attachable to an opening of the hopper enclosure 105.” *Id.* (quoting Ex. 1006, 4:35–41).

Patent Owner argues that the material transfer guide 134 is attached to hopper enclosure 105, but not connected to conveyor 130 or conveyor enclosure 132. *Id.* Patent Owner further argues that Luharuka's chute is not attached to a support structure. *Id.* at 56.

We agree with Petitioner that Patent Owner's argument suffers from two flaws. Pet. Reply 16–19. To begin with, Patent Owner's contention that Luharuka's chute is not attached to a support structure is not persuasive because Petitioner's combination proposes attaching Luharuka's chute to Sheesley's support structure. *See* Pet. 67 (citing Ex. 1002 ¶ 140). Thus, Patent Owner attacks the references individually when Petitioner is relying on the combination. *See Merck*, 800 F.2d at 1097. As for contention that Luharuka's chute does not direct fracking proppant from the common conveyor, we agree with Petitioner that Patent Owner's reading of Luharuka is unreasonable. Pet. Reply 17. In particular, we agree with and find well-reasoned Dr. Wooley's testimony in this regard. Ex. 1099 ¶¶ 99–115. As Petitioner explains, Bellow 134 of Luharuka is explicitly described as a component of conveyor 130 and more specifically of chute 132. Pet. Reply 18 (citing Ex. 1006, 4:32–35, 5:47–48). Consequently, we agree with Petitioner that a person of ordinary skill would not have believed bellow 134 stayed behind with hopper enclosure 105 after the conveyor was driven away. *Id.* (citing Ex. 1099 ¶ 103). We also agree with Petitioner that Mr. Smith's "attachable" interpretation also conflicts with the functions Luharuka describes for the bellow. *Id.* (citing Ex. 1099 ¶ 104). As Petitioner notes, the bellow has to (1) accommodate movement 131 of conveyor 130 (Ex. 1006, 4:35–37) and (2) guide proppant 102 into hopper 110 (*id.* at 4:37–40). Ex. 1099 ¶ 104. As Petitioner also notes, if the

chute and bellow were not attached, the bellow could separate from the chute when performing these functions, spilling proppant and dust.

Ex. 1099 ¶ 104; Ex. 1006, 1:28.

Regarding requirement (1), Petitioner persuasively argues that even if the bellow could accommodate some conveyor movement, as Mr. Smith contended (Ex. 1069, 184:17–185:17), it would not be able to accommodate as much movement as Luharuka requires without separating from the chute (Ex. 1099 ¶ 105 (pivotal movement shown in Luharuka Figs. 2–4), 106 (translational movement)), even taking into account the bellow’s resiliency (Ex. 1069, 185:8–186:21; Ex. 1099 ¶ 107). We agree with Petitioner that such movement would produce shear forces that would tend to separate the chute and bellow absent attachment. Ex. 1099 ¶ 108.

And regarding requirement (2), proppant flow through the bellow would not be insignificant, Ex. 1099 ¶ 109, including n.9 (citing/explaining Ex. 2038 ¶ 89, Ex. 1069, 32:8–33:19; Ex. 1006, 2:62–3:6), and the proppant’s weight and flow direction would have acted to move the chute and bellow apart, Ex. 1099 ¶ 110 (explaining Ex, 1006, 4:35–37). Instead, we agree with Petitioner that a person of ordinary skill would have interpreted bellow 134 as attached to chute 132. Ex. 1099 ¶ 112 (citing Ex. 1006, 1:27–28).

We agree with Petitioner that a person of ordinary skill in the art would have understood the Luharuka language Mr. Smith misconstrues as meaning the bellow is attached to the hopper enclosure to guide the proppant into the hopper (Ex. 1006, 4:37–41) and detached (as implied by “attachable”) therefrom when moved away with the rest of the conveyor.

Ex. 1099 ¶ 113. This interpretation is also most consistent with Luharuka’s Figure 1, as Dr. Wooley explains. *See id.* ¶¶ 114–115.

Patent Owner argues that Petitioner has failed to show that a person of ordinary skill would have been motivated to combine Luharuka’s chute with Sheesley. PO Resp. 49–52; PO Sur-Reply 9–12. We disagree. Patent Owner appears to argue that Luharuka is non-analogous art to the ’785 patent when it contends that “[a] POSITA would not have looked to a reference addressing pneumatic systems [like Luharuka] to design an entirely non-pneumatic alternative.” PO Resp. 49. Although the ’785 patent discusses “eliminat[ing] the need” for “trans-load processes to pneumatic trailers, silos, or flat storage” (Ex. 1001, 13:16–19), nothing in the *claims* prohibits pneumatic storage. The fact that the inventor might have been motivated by eliminating pneumatic storage does not mean that a skilled artisan must have the same motivation. *See Kahn*, 441 F.3d at 989 (“[T]he skilled artisan need not be motivated to combine [a prior art reference] for the same reason contemplated by the [inventor].”). Moreover, the test for analogous art is whether the art is in the same field of endeavor or would have reasonably commended itself to a skilled artisan. *See Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1001 (Fed. Cir. 2016). We disagree with Patent Owner that the scope of analogous art is so limited as to exclude references in the proppant handling field that use pneumatic systems, especially for components that are common to both types of systems. *See* Ex. 1002 ¶ 41. Patent Owner’s remaining arguments largely mirror its arguments addressed above with respect to claim 1. *See supra* IV.D.1.b.ii. Moreover, with respect to its arguments directed specifically at securing Luharuka’s chute to Sheesley’s support structure, we agree with and credit

Dr. Wooley’s thorough testimony regarding why this would be well within the level of skill in the art at the time of the invention and would not have posed the problems that Mr. Smith contends. *See* Ex. 1099 ¶¶ 80–98. As we discussed above, we agree with Dr. Wooley and Petitioner that a person of ordinary skill would have been motivated to incorporate Luharuka’s chute because it was a well-known, predictable method of using conveyors to reliably deliver proppant into a blender. *See* Ex. 1002 ¶¶ 52, 54, 139.

Accordingly, we find that Petitioner has shown by a preponderance of the evidence that combination accounts for the limitations of claims 3 and 10 and a person of ordinary skill would have been motivated to combine the references as proposed.

4. *Claim 7*

Claim 7 depends from claim 1 and additionally recites, “wherein the support structure further supports the common conveyor, and wherein step c) includes directing the flow of fracking proppant from each of the plurality of proppant containers to the common conveyor through one or more separate hoppers fixedly connected to the support structure, and metering the fracking proppant as it passes from the plurality of proppant containers to the common conveyor.” Petitioner relies on Wietgreffe modified in view of a person of ordinary skill in the art and combined with Sheesley to account for the limitation of claim 7 that wherein step c) includes directing the flow of fracking proppant from each of the plurality of proppant containers to the common conveyor through one or more separate hoppers fixedly connected to the support structure, and metering the fracking proppant as it passes from the plurality of proppant containers to the common conveyor. Pet. 76–83. Petitioner argues that person of ordinary skill in the art would have been

motivated to modify Sheesley's support structure to include a hopper with a bottom sliding discharge gate, such as or similar to Wietgreffe's hopper 116 and associated slide gate 140 (referred to herein as a "gated hopper"), corresponding to and positioned below the locations where containers would be placed and positioned above the conveyor of belt system 330. *Id.* at 78.

Patent Owner argues that Wietgreffe does not teach the claimed gated hoppers and that a person of ordinary skill would not have been motivated to modify Sheesley to incorporate gated hoppers. PO Resp. 44–48, 53–54; PO Sur-Reply 15–16. We are not persuaded by Patent Owner's argument that Wietgreffe fails to teach the claimed gated hoppers because Petitioner does not rely only on Wietgreffe to account for this limitation. As the Petition makes clear, it is Sheesley combined with Wietgreffe in view of other modifications that Dr. Wooley discusses that account for this claim limitation. Ex. 1002 ¶¶ 131–138.

Patent Owner also argues that a person of ordinary skill would not have been motivated to add Wietgreffe's gates to Sheesley's support structure for several reasons. PO Resp. 44–48. First, Patent Owner asserts that because Sheesley already discloses a gate structure on the bottom of its containers, a person of ordinary skill would not have been motivated to add the large, expensive structure to Sheesley's support structure for redundant purposes. *Id.* at 44–46. However, Petitioner's combination proposes replacing Sheesley's container with Harris's container. *See* Pet. Reply 14. Thus, Wietgreffe's gated hoppers would not be redundant, so Patent Owner's argument is not persuasive.

Second, Patent Owner argues that a person of ordinary skill would not have combined Wietgreffe with Sheesley because adding Wietgreffe's gated

hoppers would also require further modifying Sheesley. PO Resp. 47. Patent Owner asserts that Petitioner fails to address how gated hoppers would be added to Sheesley's system, and how Wietgreffe's structure would fit into and work in the space between Sheesley's components. *Id.* at 47–48. This argument is not persuasive because bodily incorporation is not required. *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Moreover, “we do not ignore the modification that one skilled in the art would make to a device borrowed from the prior art.” *In re Icon Health & Fitness, Inc.*, 496 F.3d 1374, 1382 (Fed. Cir. 2007). As Dr. Wooley testifies, the incorporation of Wietgreffe's gates into Sheesley's support structure was within the level of skill in the art. *See* Pet. 81–83; Ex. 1002 ¶¶ 136–138. Thus, a person of ordinary skill would have sized the components from Wietgreffe appropriately for Patent Owner's application. *See Icon*, 496 F.3d at 1382.

Finally, Patent Owner argues that a person of ordinary skill would not have combined Wietgreffe with Sheesley as proposed because it would have added over \$34,000 in cost to Sheesley. PO Resp. 48. We disagree. As Petitioner persuasively explains, the use of Wietgreffe's gate would reach a break-even point at 13–16 or 30–33 containers, and the use of this number of containers and wellsite container storage would provide additional benefits of reducing reliance on timely container delivery allowing fracking to continue despite delays. Pet. Reply 14–16 (citing Ex. 1099 ¶¶ 8, 42–45, 49–52). We agree with Petitioner that, for any normal sized fracking job, the use of Wietgreffe's hoppers would have been at worst cost neutral, and likely saved money over the gates on Sheesley's container. *Id.* Thus, Patent Owner's arguments regarding the added cost of Wietgreffe's gated hoppers are not persuasive.

Accordingly, we find that Petitioner has shown by a preponderance of the evidence that the combination accounts for the limitations of claim 7, a motivation to combine the references in the manner proposed with a reasonable expectation of success.

5. *Claims 8, 11, 14, 16–19, and 21–23*

Petitioner has shown sufficiently that the combination of Sheesley, Hurst, Harris, Wietgreffe, and Luharuka teaches or suggests the claimed subject matter of claims 8, 11, 14, 16–19, and 21–23. Pet. 84–87. Patent Owner does not argue that the combination of Sheesley, Hurst, Harris, Wietgreffe, and Luharuka fails to disclose the additional limitations recited by claims 8, 11, 14, 16–19, and 21–23. Accordingly, Patent Owner has waived any argument directed to those limitations. *See* Paper 14, 3 (“Patent Owner is cautioned that any arguments for patentability not raised in the response will be deemed waived.”). We reviewed Petitioner’s evidence and argument and adopt it as our own. For the reasons provided therein, Petitioner demonstrates that the combination of Sheesley, Hurst, Harris, and Luharuka accounts for the limitations of claims 8, 11, 14, 16–19, and 21–23, that a person of ordinary skill in the art would have been motivated to combine the references in the manner proposed, and would have had a reasonable expectation of success in doing so.

6. *Summary*

For the reasons explained above, Petitioner has demonstrated sufficiently that the combination of Sheesley, Hurst, Harris, and Luharuka would have accounted for the subject matter of claims 1, 3, 6–11, 13–19, and 21–23 of the ’785 patent and Sheesley, Hurst, Harris, Wietgreffe, and Luharuka would have accounted for the subject matter of claims 7, 8, 11, 14,

16–19, and 21–23, that a person of ordinary skill would have had a motivation for making the proposed combinations and modifications, and would have had a reasonable expectation of success. We consider below Patent Owner’s evidence and arguments regarding objective indicia of non-obviousness and reweigh all the evidence together as necessary.

D. Objective Indicia of Non-Obviousness

Notwithstanding what the teachings of the prior art would have suggested to one skilled in the art, objective evidence of non-obviousness (“secondary considerations”) may lead to a conclusion that the challenged claims would not have been obvious. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Objective evidence of non-obviousness “may often be the most probative and cogent evidence in the record” and “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (citation omitted).

Patent Owner puts forth evidence of commercial success, industry praise, and failure by others. PO Resp. 57–76. As explained below, however, Petitioner submits evidence to persuade us that Patent Owner’s commercial success and industry praise were a result of additional, unclaimed features, thereby rebutting Patent Owner’s presumption of nexus. With respect to failure by others, we determine Patent Owner has failed to show that a nexus between its alleged success and the claimed invention.

To be relevant, evidence of non-obviousness must be commensurate in scope with the claimed invention. *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011). Thus, to be accorded substantial weight, there must be a *nexus*

between the merits of the claimed invention and the evidence of secondary considerations. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining non-obviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). There is a “presumption of a nexus” when a product is “coextensive” with a patent claim. *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 723 F.3d 1363, 1372 (Fed. Cir. 2013). The Federal Circuit has held that “if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus.” *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000).

Patent Owner presents evidence that its product (the “SandBox Product” or “Product”) is covered by the challenged claims. *See* PO Resp. 57–64. In particular, Patent Owner submits multiple pictures of its SandBox Product and explains in detail how each element of the challenged claims is covered by its Product. *See id.* at 59–63. Patent Owner also submits the testimony of Mr. Smith. *Id.* at 58 (citing Ex. 2038, App’x J, 168–244). Within his declaration, Mr. Smith presents detailed claim charts of the challenged claims precisely identifying how the SandBox Product embodies each of the claimed features. Ex. 2038, App’x J, 168–244. In light of this testimony and evidence, Patent Owner submits that the SandBox Product is the product disclosed and claimed in the ’785 patent, thereby establishing a *presumption* of nexus. *See* PO Resp. 58 (citing *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1071 (Fed. Cir. 2018)).

Petitioner argues that “the ‘SandBox Product’s commercial success and industry praise were largely the result of Patent Owner’s trade secret [REDACTED], ‘special forklift,’ ‘special mats,’ and ‘special truck,’ which . . . precludes/rebutts any presumed nexus.” Pet. Reply 27. Petitioner asserts that Patent Owner’s contention that these features are recited in the claims is not correct, because, at best, the claims recite generic forklifts and trailers, not the alleged trade secret technology. *Id.*

Petitioner’s evidence and argument are persuasive to rebut Patent Owner’s presumption of nexus.

Patent Owner is entitled to a presumption of a nexus if it shows that “the asserted objective evidence is tied to a specific product and that product ‘is the invention disclosed and claimed in the patent.’” *WBIP, LLC, v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016) (citation omitted). The Federal Circuit has explained that “[t]his is true even when the product has additional, unclaimed features.” *PPC Broadband, Inc. v. Corning Optical Commc’ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016). Even if unclaimed features do not prevent the presumption of a nexus, however, they may be the basis for rebutting the presumption. *Id.* To do so, a person challenging patent validity must show that the commercial success, or other objective evidence of non-obviousness, was due to “extraneous factors” including “additional unclaimed features.” *Polaris Indus.*, 882 F.3d at 1072.

In the present case, Petitioner submits evidence to persuade us that Patent Owner’s commercial success and industry praise were a result of additional, unclaimed features, namely, [REDACTED], specialized forklifts, specialized mats, and specialized trucks (or chassis). Pet. Reply 27 (citing Ex. 2054, 39; Ex. 2055, 40:22–41:8; Ex. 2057, 117:12–119:6;

Ex. 2056, 11). Although the challenged claims are directed to a methods for unloading fracking proppant at a wellsite, the claims do not require these additional features beyond generic forklifts and trailers. *See, e.g.*, Ex. 1001, 14:64–20:35. Patent Owner’s contentions that these special components are part of the claimed solution is not supported by any evidence. PO Resp. 70–71. Indeed, nothing in the Specification or claims indicates that anything beyond a generic forklift or trailer is required for the claims.

In support of Petitioner’s argument, we find particularly persuasive Byron Aiken’s deposition testimony (Ex. 2055), John Oren’s deposition testimony (Ex. 2057), and initial disclosures (Ex. 2056) submitted by SandBox Enterprises, LLC and SandBox Logistics, LLC (collectively “SandBox”) in an unrelated case.

Turning first to Mr. Aiken’s testimony, Mr. Aiken is a mechanical engineer with Aiken Engineering (Ex. 2055, 10:1–16), with about 50 years of experience, and who specializes in oil field equipment (*id.* at 11:7–12). In around 2015, Mr. Aiken testified for SandBox in a *trade secret* dispute with another party, which related to the SandBox Product. *Id.* at 39:2–16. In response to a question pertaining to SandBox’s trade secrets, Mr. Aiken testified:

There were special features that SandBox developed to make their system successful in the field. An example was a *very special forklift* that they researched extensively that would lift the containers, the weight of the containers and also the height and reach out far enough for the service. They had *special mats* on the ground to keep the heavy forklifts and containers from sinking into the dirt. The truck was a *special truck*, a double drop low bed truck that would — with containers on it would meet the regulations of the transportation department, issues like that.

Id. 40:22–41:8 (emphases added). Mr. Aiken’s testimony supports Petitioner’s argument that it was other, unclaimed features (i.e., special forklifts, special trucks, and special mats) that contributed to the SandBox Product’s commercial success and industry praise.

Mr. Oren’s testimony (Ex. 2057) also supports Petitioner’s argument. Mr. Oren was the Chairman at SandBox Enterprise and its related entities (Ex. 2057, 12:18–13:2) and served as its “[i]nventor, strategist, salesman, marketer, motivator, mentor” (*id.* at 13:9–10). Mr. Oren testified that the “selling point for [the] system,” which was “received by customers” as “[r]evolutionary,” was the “precise measurement of sand into the blender.” *Id.* at 118:16–119:6. In particular, Mr. Oren testified that the SandBox Product has [REDACTED].

Id. at 118:4–23. Mr. Oren’s testimony is further corroborated by Exhibit 2056, in which SandBox submitted “Initial Disclosures for the Purposes of the Temporary Injunction Hearing.” Ex. 2056, 2 (“SandBox Initial Disclosures”).

In the SandBox Initial Disclosures, SandBox explains that the “SandBox Container System” is “SandBox’s unique and highly-efficient compilation of public *and secret information* . . . associated with a combination of equipment, vehicles, and logistics services . . . for the hydraulic fracturing . . . industry . . . [that] constitute *trade secrets* of SandBox.” *Id.* at 1 (emphases added). The SandBox Initial Disclosures further provide that

the SandBox Cradle has innovated the use and accuracy [REDACTED]
[REDACTED]

██—a huge industry and financial advantage.

Id. at 11 (emphasis added).

Based on Mr. Aiken's testimony, Mr. Oren's testimony, and the SandBox Initial Disclosures, we find that SandBox Product's commercial success and industry praise were largely a result of Patent Owner's trade secret ██ "special forklift," "special mats," and "special truck," rather than the features of the challenged claims.

As for Patent Owner's contentions that the recited "metering" in, for example, claims 7, 11, and 16 is intended to capture the precise measurement of sand going through the blender, again no record evidence supports Patent Owner's equating "metering" with the ██. *See* PO Resp. 71–72. Thus, we do not find a nexus between the trade secrets and these claims.

Patent Owner also presents evidence of failure by others to achieve the claimed invention. PO Resp. 75–76. In particular, Patent Owner points to evidence that Hi-Crush (one of the real parties-in-interest) worked with Mr. Harris (inventor of Harris '554 and Harris '809) to commercialize Mr. Harris's container, but failed to do so. *Id.* at 75 (citing Ex. 2041, 48:11–49:1, 50:11–20, 53:17–20). Although evidence of failure by others can be particularly probative of nonobviousness, we find that Patent Owner's allegations suffer from the same lack of nexus to the claimed invention discussed above. To show a failure of others, the evidence must establish that others skilled in the art tried and failed to find a solution for the problem solved by the patentee. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1540 (Fed. Cir. 1983). Here, the evidence suggests that it was Patent Owner's unclaimed features that resulted in any solution to the

problem solved by Patent Owner—containerized proppant delivery. In addition, Patent Owner’s own evidence admits that Sheesley provided a solution to the problem of proppant transportation. Ex. 2038 ¶¶ 48, 50, 62, 134. Therefore, we give little weight to Patent Owner’s evidence of failure by others.

In sum, we conclude that Petitioner rebutted the presumption of a nexus because it has established that it was these unclaimed features that accounted for the success, praise, and solved problem of Patent Owner’s product, not the claimed inventions of the ’785 patent. *See Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006) (holding that evidence that commercial success was due to unclaimed or non-novel features of device “clearly rebuts the presumption that [the commercial product’s] success was due to the claimed and novel features”). “For objective [evidence of secondary considerations] to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010) (quoting *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995)). Because we have found there is no nexus between the evidence of commercial success, industry praise, and failure by others and the claimed inventions of the ’785 patent, we decline to give weight to Patent Owner’s evidence of secondary considerations in our obviousness analysis. *See Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1015, 1027 (Fed. Cir. 1985) (holding on summary judgment that even though commercial success could be deduced, it deserved no weight because a nexus was not established), *overruled on other grounds by Midwest Indus., Inc. v. Karavan Trailers, Inc.*, 175 F.3d 1356 (Fed. Cir. 1999) (en banc).

E. Final Conclusion as to Obviousness

Weighing the evidence of the disclosure of the references, the reasoning to combine the references, and the objective indicia of non-obviousness, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 3, 6, 9, 10, 13, and 15 of the '785 patent are unpatentable as obvious over the combination of Sheesley, Hurst, Harris '554 or Harris '809, and Luharuka, and that claims 7, 8, 11, 14, 16–19, and 21–23 of the '785 patent are unpatentable as obvious over the combination of Sheesley, Hurst, Harris '554 or Harris '809, Wietgreffe, and Luharuka.

V. PETITIONER'S MOTION TO EXCLUDE

Petitioner seeks to exclude financial summaries included in Exhibit 2049. Pet. Mot. Exclude 1. Because we did not rely on Exhibit 2049 in reaching our Decision, we dismiss Petitioner's Motion to Exclude as moot.

VI. PATENT OWNER'S MOTION TO EXCLUDE

Patent Owner moves to exclude Attachment I to Exhibit 1074. PO Mot. Exclude 1. Because we did not rely on Attachment I of Exhibit 1074 or the evidence or arguments related to Attachment I of Exhibit 1074 in reaching our Decision, we dismiss Patent Owner's Motion to Exclude as moot.

VII. CONCLUSION

For the foregoing reasons, on this record, Petitioner has established by a preponderance of the evidence that claims 1, 3, 6–11, 13–19, and 21–23 of the '785 patent are unpatentable. We dismiss Petitioner and Patent Owner's Motions to Exclude as moot.

VIII. ORDER

Accordingly, it is:

ORDERED that claims 1, 3, 6–11, 13–19, and 21–23 of U.S. Patent No. 9,440,785 B2 (“the ’785 patent”) have been shown to be unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude is dismissed as moot;

FURTHER ORDERED that Patent Owner’s Motion to Exclude is dismissed as moot; and

FURTHER ORDERED that 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.

IPR2018-00733
Patent 9,440,785 B2

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