

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BESTWAY (USA), INC.,
Petitioner,

v.

INTEX MARKETING LTD.,
Patent Owner.

IPR2020-01416
Patent 10,165,869 B2

Before KEN B. BARRETT, KEVIN W. CHERRY, and
ARTHUR M. PESLAK, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

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

ORDER
Dismissing Patent Owner's and Petitioner's Motions to Strike
37 C.F.R. § 42.23(b)

I. INTRODUCTION

A. *Background and Summary*

Bestway (USA), Inc. (“Petitioner”)¹ filed a Petition requesting *inter partes* review of U.S. Patent No. 10,165,869 B2 (“the ’869 patent,” Ex. 1001). Paper 1 (“Pet.”). The Petition challenges the patentability of claims 1–30 of the ’869 patent. We instituted an *inter partes* review of all challenged claims on all proposed grounds of unpatentability. Paper 16 (“Inst. Dec.”). Intex Marketing Ltd. (“Patent Owner”)² filed a Response to the Petition. Paper 31 (“PO Resp.”). Petitioner filed a Reply (Paper 36, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 43, “PO Sur-reply”).

Patent Owner, with our authorization (Paper 45), filed a Motion to Strike (Paper 47), to which Petitioner filed an Opposition (Paper 52). Petitioner, with our authorization (Paper 46), also filed a Motion to Strike (Paper 48), to which Patent Owner filed an Opposition (Paper 51).

An oral hearing was held on November 4, 2021, and a transcript of the hearing is included in the record. Paper 53 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4–12, 14–16, 19, 24, 26, and 28–30 of the ’869 patent are unpatentable, but Petitioner has *not* shown

¹ Petitioner identifies Bestway USA, Inc., Bestway Global Holding, Inc., Bestway Hong Kong International, Ltd., and Bestway Inflatables and Material Corporation as real parties-in-interest. Pet. 71.

² Patent Owner identifies Intex Marketing Ltd., Intex Recreation Corp., Intex Development Company Ltd., and Intex Industries (Xiamen) Co., Ltd. as real parties-in-interest. Paper 5, 1; Paper 12, 1; Paper 21, 1.

by a preponderance of the evidence that claims 3, 13, 17–18, 20–23, 25, and 27 of the '869 patent are unpatentable. We also *dismiss* as moot Patent Owner's Motion to Strike and Petitioner's Motion to Strike.

B. Related Proceedings

One or both parties identify, as matters involving or related to the '869 patent, *Intex Recreation Corp. v. Bestway (USA), Inc., et al.*, Civil Action No. 2:19-cv-08596-TJH-AS (C.D. Cal.), Patent Trial and Appeal Board case IPR2020-01405 (U.S. Patent No. 9,901,186 B2), and U.S. Patent Application No. 16/935,964. Pet. 71–72; Paper 5, 1; Paper 12, 1; Paper 21, 1.

C. The '869 Patent

The '869 patent relates to the structure of an inflatable structure, such as an inflatable bed, which is light in weight and low in cost. Ex. 1001, 1:40–42. According to the '869 patent, “[m]any inflatable products utilize internal structures in order to form the product into its intended, predetermined shape upon inflation,” with an example being tension-band type internal structures. *Id.* at 1:47–53. “These internal tension-band structures disposed in the cavity of the inflatable bed give shape to the bed as internal pressure increases, thereby preventing the inflatable bed from expanding evenly on all sides in the manner of a balloon.” *Id.* at 1:57–61. Figure 4 of the '869 patent is reproduced below:

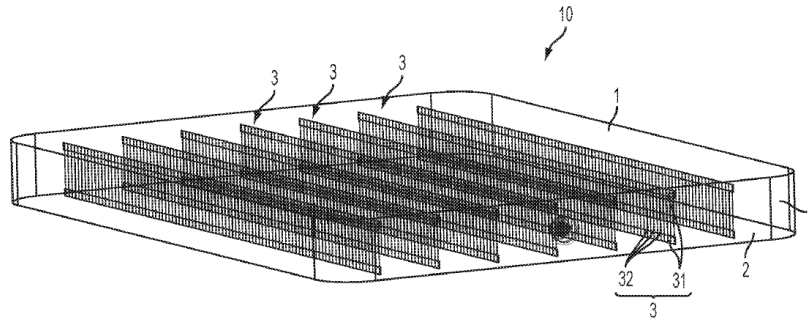


FIG. 4

Figure 4 is an assembled view of an inflatable bed with the inflatable bed material transparent to show the internal arrangement of the tensioning structures. *Id.* at 5:38–40. Tensioning structures 3 are welded to upper material 1 and lower material 2. *Id.* at 9:28–29.

According to the '869 patent, some conventional inflatable structures utilized belt- or sheet-type polyvinylchloride (“PVC”) tension bands, which, when of the necessary thickness to meet the force requirements, were heavy and increased the folded volume of the deflated structure. *Id.* at 2:6–24. The '869 patent addresses this by providing a tensioning structure “formed by connecting a pair of plastic strips . . . via spaced-apart strands, such as strings or wires.” *Id.* at 2:33–35. The strands provide tensile strength, and the plastic strips facilitate welding of the tensioning structure to the inflatable product. *Id.* at 2:35–39. Figure 1 of the '869 patent is reproduced below.

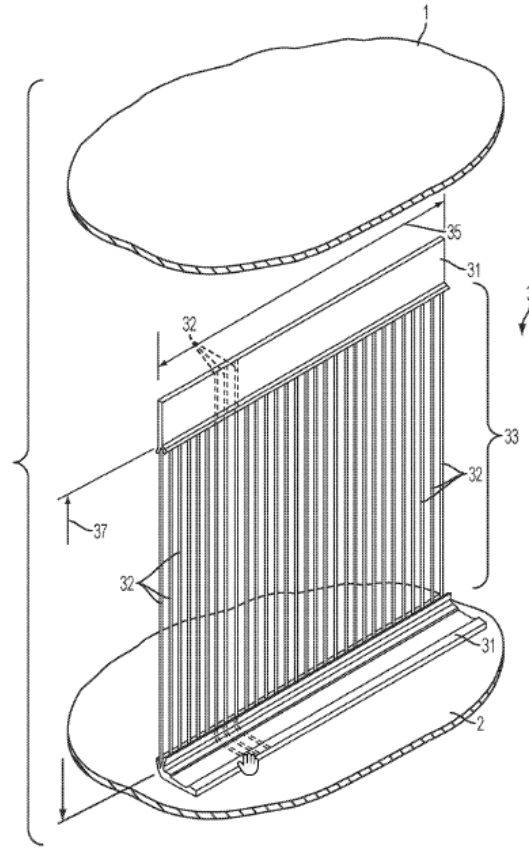


FIG. 1

Figure 1 “is an exploded, perspective view of an inflatable structure incorporating a tensioning structure.” *Id.* at 5:30–31. Tensioning structure 3 joins upper material 1 to lower material 2, with tensioning structure 3 including “upper and lower weld strips 31 connected to one another by a plurality of substantially parallel strands 32 that define a gap portion extending between a gap between upper and lower sheets 1, 2.” *Id.* at 7:48–54. “The upper and lower weld strips 31 are . . . welded to the upper material 1 and the lower material 2, respectively.” *Id.* at 7:54–56.

A particular form of the tensioning structure utilizing sheets rather than strips is shown in Figure 14, which is reproduced below.

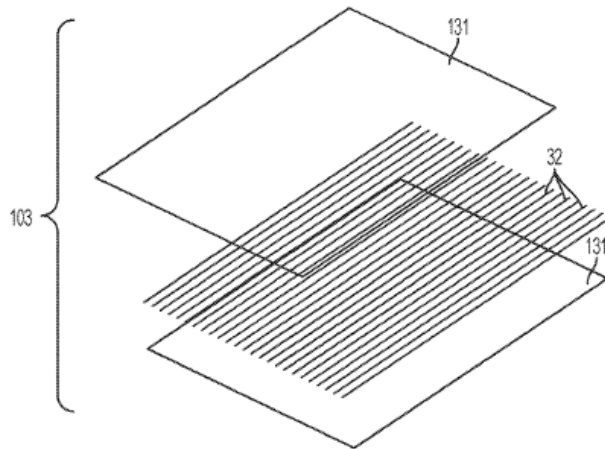


FIG. 14

Figure 14 is an exploded, perspective view of tensioning structure 103 with a plurality of strands 32 evenly spaced and arranged substantially parallel to one another and situated between two weld sheets 131. *Id.* at 6:1–3, 13:59–61, 14:7–11. “[B]ecause tensioning structure 103 includes strands 32 embedded therein, weld sheet 131 does not need to bear significant tensile loads and can be kept to a minimal thickness.” *Id.* at 14:2–5.

Optionally, reinforcing strands 5 . . . may be provided along the longitudinal extent of weld strip 31 (i.e., substantially perpendicular to strands 32). Reinforcing strands 5, when provided, may be coupled to tensile strands 32, such as by folding strands 32 over reinforcing strands 5, tying strands 5, 32 to one another, or adhesively securing strands 5, 32 to one another. When so coupled, reinforcing strands 5 provide additional surface area contact with weld strips 31 and thereby improve the resistance of securing strands 5 to pulling free from weld strips 31. In addition, the presence of reinforcing strands 32 within weld strips 31 improves the tensile strength of weld strips 31 along their longitudinal extents.

Id. at 7:58–8:3.

D. Illustrative Claim

Of the challenged claims of the '869 patent, claims 1, 17, and 24 are independent claims. Claim 1, reproduced below with emphasis added, is illustrative.

1. An inflatable product comprising:
 - a first sheet;
 - a second sheet disposed opposite the first sheet, the first and second sheets spaced apart when the product is inflated to define a gap;
 - a tensioning structure sized to span the gap between the first sheet and the second sheet, the tensioning structure comprising:
 - a plurality of strands uniformly spaced apart and arranged substantially parallel to one another*, the plurality of strands extending across the gap; and
 - a first weld sheet having the plurality of strands uniformly affixed to a surface of the first weld sheet; and
 - a second weld sheet disposed opposite the first weld sheet, the plurality of strands captured between the first and second weld sheets when the first and second weld sheets are welded to one another.

Ex. 1001, 19:66–20:16 (emphasis added). Independent claims 17 and 24 are similar and also recite, *inter alia*, “each of the plurality of strands having a first terminal end positioned adjacent to the first sheet, a second terminal end positioned adjacent to the second sheet, and an axial extent between the first and second terminal ends that is substantially perpendicular to the first and second sheets.” *Id.* at 21:22–28, 22:17–23.

E. Evidence

Petitioner relies on the following references:

Reference		Dates	Exhibit No.
Hanlie	CN 2676755Y	Filed July 2, 2003; Published Feb. 9, 2005	1011

Reference		Dates	Exhibit No.
Fireman	US 2004/0040082 A1	Filed Feb. 6, 2003; Published Mar. 4, 2004	1012
Boso	US 2003/0188388 A1	Filed Apr. 8, 2002; Published Oct. 9, 2003	1013
Kuriyama	US 4,402,887	Filed July 30, 1979; Issued Sept. 6, 1983	1014
Liu	US 2007/0277324 A1	Filed Apr. 23, 2007; Published Dec. 6, 2007	1015
Pennel	US 3,683,431	Filed June 1, 1970; Issued Aug. 15, 1972	1016
Song	US 2012/0031265 A1	Filed Oct. 15, 2010; Published Feb. 9, 2012	1018

Petitioner also relies on the declarations of Dr. John P. Abraham (Exs. 1002, 1040) in support of its arguments and Patent Owner relies on the declaration of Dr. Scott Schroeder (Ex. 2016) in support of its arguments. The parties rely on other exhibits as discussed below.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 2, 4, 5, 8–12	103(a)	Hanlie, Fireman
6, 7	103(a)	Hanlie, Fireman, Boso
13	103(a)	Hanlie, Fireman, Kuriyama
15	103(a)	Hanlie, Fireman, Liu
16	103(a)	Hanlie, Fireman, Liu, Song
14	103(a)	Hanlie, Fireman, optionally Liu, Song

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
3, 17, 21–23	103(a)	Hanlie, Fireman, optionally Pennel
18, 20	103(a)	Hanlie, Fireman, Kuriyama, optionally Pennel
24, 28–30	103(a)	Hanlie, Fireman, Background Knowledge of PHOSITA [Person Having Ordinary Skill in the Art]
25, 26	103(a)	Hanlie, Fireman, Kuriyama, Background Knowledge of PHOSITA
19, 27	103(a)	Hanlie, Fireman, Background Knowledge of PHOSITA, optionally Pennel

II. THE MOTIONS TO STRIKE

The parties filed competing motions to strike evidence that was filed late in the trial and near the date of the oral argument. *See* Paper 47, 4–5 (Patent Owner arguing that the subject re-direct testimony was elicited at a time when Patent Owner lacked the ability to respond); Paper 48, 3–4 (Petitioner arguing that Patent Owner’s evidence was introduced at a point in the proceeding when Petitioner had no opportunity to respond).

Patent Owner filed a motion to strike the re-direct testimony of translator Mr. Alex Wang (Ex. 2106, 27:14–31:7). Paper 47, 2. Mr. Wang’s testimony pertains to the translation of the word “fused” in the Hanlie reference. Patent Owner argues that Petitioner improperly elicited re-direct testimony that was based on some “quick research online” that Mr. Wang conducted “during the break” in the deposition. *Id.* at 5 (citing Ex. 2106, 27:14–31:7).

Petitioner responds that it “also believes the testimony should be struck, but believes that the scope of the evidence that should be struck should not only be Mr. Wang’s re-direct testimony (as asserted by Patent Owner), but *all* testimony that was solicited on this new and improper evidence as well as the evidence itself.” Paper 52, 3. That evidence is the subject of Petitioner’s motion to strike.

Petitioner moves to strike Exhibits 2100, 2101, and 2103, the testimony regarding these exhibits (Ex. 2104, 124:17–132:5; Ex. 2105, 229:18–234:9; Ex. 2106, 18:8–31:7), and portions of Patent Owner’s Sur-reply regarding these exhibits (Paper 43, 13 n.5 and 14 referencing Exhibits 2100, 2101, and 1007, and the sentence on pages 25–26 referencing Exhibit 2103). Paper 48, 1. Petitioner argues these exhibits and the portions of the Sur-reply that reference those exhibits are improper because a patent owner sur-reply may not include new evidence other than deposition transcripts of any reply witness. *Id.*

We do not rely on these exhibits. Accordingly, we *dismiss* as moot both Motions to Strike.

III. ANALYSIS

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden 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 establish by a preponderance of the evidence that the challenged claims are unpatentable. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2020).

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

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (internal quotation marks and citation omitted).

Petitioner contends that:

A Person Having Ordinary Skill in the Art (“PHOSITA”) at the time of the effective filing date of the ’869 Patent would have at least a bachelor’s degree in mechanical engineering, or an equivalent field, and two to four years of practical

³ The parties have not directed our attention to any objective evidence of obviousness or non-obviousness.

experience in inflatable product design, manufacturing, and related materials.

Pet. 6 (citing Ex. 1002 ¶ 28). Patent Owner, for purposes of this proceeding, agrees with Petitioner's description of the level of ordinary skill in the art. PO Resp. 8.

Petitioner's description is consistent with the level of ordinary skill reflected in the prior art references of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (recognizing that the prior art itself may reflect an appropriate level of skill in the art). For purposes of this decision, we apply Petitioner's definition of the person of ordinary skill in the art.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b) (2020).

In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Both parties assert that no claim term requires express construction. *See* Pet. 6; PO Resp. 8–9.

On this record, we determine that no claim terms require express construction. We discuss below, in the analysis of Petitioner’s challenge to claim 17, the parties’ positions on the construction of “full surface-area contact in spaces between the plurality of strands.”

*D. The Alleged Obviousness of Claims 1, 2, 4, 5, and 8–12
Over Hanlie and Fireman (Ground 1)*

Petitioner alleges that claims 1, 2, 4, 5, and 8–12 of the ’869 patent would have been obvious over Hanlie and Fireman. *See* Pet. 6–16 (addressing claim 1). Petitioner contends that Hanlie discloses an inflatable product having a tensioning structure made of two layers of PVC with a mesh layer between them, and that Fireman teaches a mesh of threads in a square grid layout that has strands arranged substantially parallel to one another and uniformly spaced apart. *See id.* at 7–8, 12.

Patent Owner argues that a person of ordinary skill in the art would not have been motivated to combine Hanlie and Fireman. PO Resp. 12.

For the reasons given below, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 4, 5, and 8–12 would have been obvious over Hanlie and Fireman.

1. Hanlie (Ex. 1011)

Hanlie discloses “an enhanced inflatable mattress.” Ex. 1011, 13. Hanlie explains that conventional inflatable mattresses had straps joining the top and bottom sides of the mattress. *Id.* According to Hanlie, conventional mattresses used only single-layer material—PVC, nylon, polyethylene, or cotton—for the straps as well as the mattress top, sides, and bottom. The single-layer straps were difficult to sew or fuse to the mattress surfaces, thus leaving a weak joint, and the single-layer top, bottom, and sides were prone

to damage. *Id.* Hanlie discloses straps made of mesh covered by PVC fabric. *Id.*

Hanlie's Figure 2 is reproduced below.

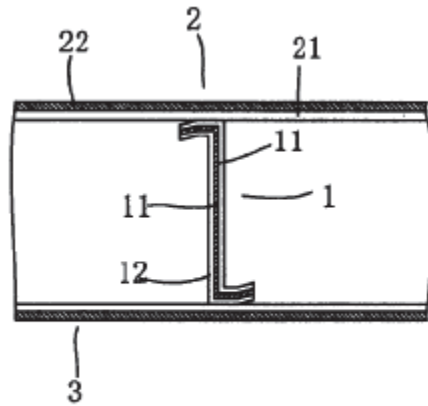


Fig. 2

Figure 2 is a sectional view of an inflatable mattress. *See id.* at 14. “The horizontal rectangular straps 1 and vertical rectangular straps 7 [not shown] are sewed to top side 2 and bottom side 3.” *Id.* at 15. “The horizontal rectangular straps 1 are made of mesh covered by PVC fabric, and their two outer layers are PVC film 11, while the inner layer is made of chemical fiber 12.” *Id.* The outer layers of PVC are fused to the chemical fiber of mesh 12. *Id.*

2. Fireman (Ex. 1012)

Fireman pertains to a self-rising swimming pool utilizing an inflatable toroidal top member that, when inflated, raises the flexible wall as water fills the pool. Ex. 1012, Abstract, ¶ 2. Fireman explains that the walls of earlier self-rising pools were constructed of thick layers of opaque material to provide the necessary strength to withstand the hydraulic pressure of the pool water and that this resulted in undesirably opaque walls. *Id.* ¶ 2. Such opacity prevented outside observers from seeing fully the occupants of the pool. *Id.* To address this, Fireman discloses “self-rising swimming pool

constructions employing side walls sufficiently translucent to allow those outside the swimming pool to monitor the underwater activities of the swimming pool's occupants.” *Id.* ¶ 3.

Fireman teaches the use of a wall comprised of mesh interposed between two layers of translucent material of the type “used in the construction of inflatable and self-rising swimming pools,” such as PVC. *Id.* ¶¶ 5, 19. Figure 5A of Fireman is reproduced below.

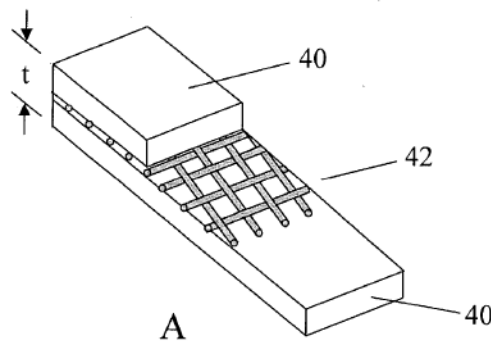


Figure 5A is a schematic cutaway view of a three-layer construction of a swimming pool's flexible side wall or side wall panels. *Id.* ¶¶ 13, 19. “In an exemplary embodiment, the mesh layer is constructed of fine polyester fibers bundled into threads approximately 1 mm in thickness, woven into a mesh of a density approximately 36 squares per square inch.” *Id.* ¶ 19.

Fireman explains: “The mesh layer 42 enhances the tensile strength of the flexible wall 12, increasing the durability of the structure and allowing larger swimming pools to be constructed, compared to flexible walls made without a reinforcing mesh layer.” *Id.*

3. The Alleged Obviousness of Independent Claim 1 in View of Hanlie and Fireman

Independent claim 1 recites an inflatable product comprising two spaced apart sheets having between them a tensioning structure of a particular configuration. Specifically, claim 1, in part, recites:

An inflatable product comprising:
a first sheet;
a second sheet disposed opposite the first sheet, the first and second sheets spaced apart when the product is inflated to define a gap;
a tensioning structure sized to span the gap between the first sheet and the second sheet

Ex. 1001, 19:66–20:5.

Petitioner contends that Hanlie discloses the overall structure of the claimed inflatable product. *See* Pet. 8–11. Below, we again reproduce Figure 2 of Hanlie.

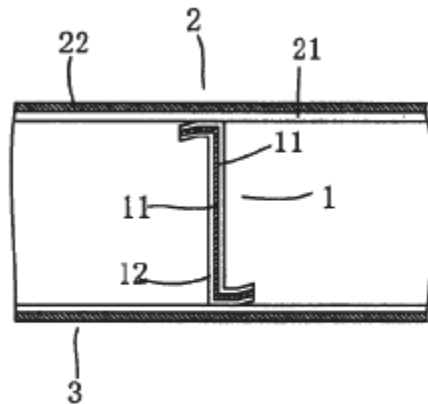


Fig. 2

Figure 2 is a sectional view of an inflatable mattress and depicts top side 2 and bottom side 3 of the mattress connected by strap 1, which is comprised of mesh made of chemical fiber 12 between two layers of PVC film 11 and with “[b]oth outer layers of PVC film . . . fused to the chemical fiber of the mesh 12.” Ex. 1011, 14, 15.

Petitioner contends that Hanlie discloses an inflatable mattress (the recited “inflatable product”) having top side 2 and bottom side 3 (mapped, respectively, to the “first sheet” and “second sheet”), with those sides configured such that they define a gap when the mattress is inflated (mapped to the recitation, “a second sheet disposed opposite the first sheet, the first

and second sheets spaced apart when the product is inflated to define a gap”). *Id.* at 8–10 (citing Ex. 1011, Abstract, 11, 13–14, 16, Figs. 2–3, 5–6; Ex. 1002 ¶¶ 44–48). Petitioner further contends that Hanlie’s strap 1 is the recited “tensioning structure,” asserting that the strap spans the gap between the top and bottom of the mattress and that a person of ordinary skill in the art “would understand that Hanlie’s straps resist tension and maintains the shape of the mattress.” *Id.* at 10–11 (citing Ex. 1011, 14, Figs. 2, 5; Ex. 1002 ¶¶ 49–50).

As mentioned, claim 1 calls for a tensioning structure of a particular configuration. That configuration is a plurality of strands extending across the gap and sandwiched between two weld sheets, with the strands being uniformly spaced apart and substantially parallel to one another.

Specifically, claim 1 recites a tensioning structure comprising:

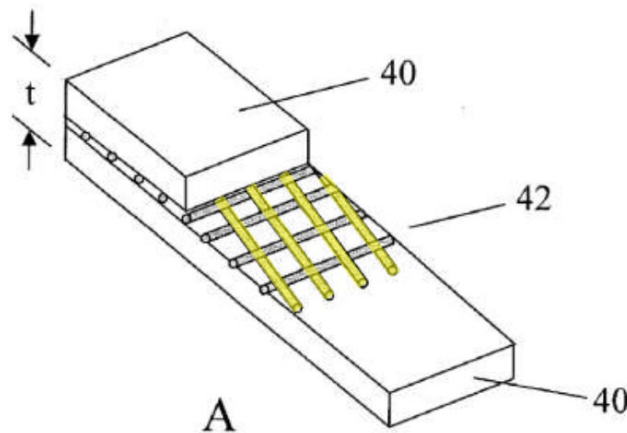
- a plurality of strands uniformly spaced apart and arranged substantially parallel to one another, the plurality of strands extending across the gap; and
- a first weld sheet having the plurality of strands uniformly affixed to a surface of the first weld sheet; and
- a second weld sheet disposed opposite the first weld sheet, the plurality of strands captured between the first and second weld sheets when the first and second weld sheets are welded to one another.

Ex. 1001, 20:7–16.

As Petitioner notes (Pet. 12), Hanlie discloses that the straps (mapped to the claimed tensioning structures) are “made of mesh covered by PVC fabric.” Ex. 1011, 13. Petitioner contends that, because Hanlie discloses that the PVC is “fused” to the mesh and Figure 2 depicts PVC film layers (elements 11) as uniformly affixed to the mesh (element 12), Hanlie discloses weld sheets uniformly affixed to the strands of the mesh. Pet. 14

(citing Ex. 1002 ¶ 60), 16 (citing Ex. 1002 ¶¶ 65–66). Petitioner acknowledges that “Hanlie does not disclose the exact structure of its mesh.” *Id.* at 12 (citing Ex. 1002 ¶ 52).

For the configuration of the mesh, and thus the strands forming the mesh, Petitioner turns to Fireman. *Id.* Petitioner asserts that Fireman discloses an inflatable pool having a flexible wall comprised of a layer of mesh interposed between two PVC layers, with the mesh woven from bundled threads, and that the mesh enhances the tensile strength of the wall. *Id.* (quoting Ex. 1012 ¶ 5). Petitioner further asserts that “Fireman discloses using a conventional grid mesh of ‘squares.’” *Id.* (citing Ex. 1012 ¶ 19, Figs. 5a, 5b). Petitioner provides an annotated version of Fireman’s Figure 5A, reproduced below.



Fireman, Figure 5A (annotated)

Id. The above annotated version of Figure 5A “illustrates a schematic cutaway view of the three-layer construction [of Fireman],” Ex. 1012 ¶ 19, with certain threads in yellow. Petitioner argues that the above annotated figure shows that “the vertical components (highlighted yellow [above]) of such squares are strands arranged substantially parallel to one another and are uniformly spaced apart.” Pet. 12 (citing 1002 ¶¶ 53–54). As discussed further below, Petitioner’s proposed combination is the substitution of

Fireman's square grid mesh for the mesh layer of Hanley's straps. *See id.* at 13. Petitioner contends that the mesh would have at least some strands extending across the gap regardless of the orientation of the mesh relative to the top and bottom of Hanlie's mattress. *See id.* at 13–14.

Patent Owner argues that there is no reason to combine the references' teachings but does not dispute that the combination of Hanlie and Fireman, if made, teaches or suggests the limitations of independent claim 1. Based on the arguments and evidence presented by Petitioner, we are persuaded that Petitioner has demonstrated that the proposed combination of prior art teaches all of the claim limitations of independent claim 1.

Petitioner reasons that, because Hanlie does not disclose the specific layout of its mesh, a person of ordinary skill in the art would have looked to other prior art for a mesh structure to implement in Hanlie's product. Pet. 13. Petitioner, relying on the testimony of Dr. Abraham, contends that “[s]quare grids were well-known, conventional mesh structures, and would immediately come to mind to a [person of ordinary skill in the art] when reading Hanlie.” *Id.* (citing Ex. 1002 ¶¶ 38, 55). Petitioner argues that a person of ordinary skill in the art “would naturally look to references describing the use of a square grid mesh in a PVC-laminated tensile structure for an inflatable product,” and that Fireman is such a reference. *Id.* (citing Ex. 1002 ¶¶ 38, 56). Petitioner further argues that “[u]sing Fireman's conventional square grid mesh structure to implement the mesh layer of Hanlie's straps would have been a simple substitution of one known element [Fireman's square grid mesh] for another [Hanlie's mesh] to yield predictable results.” *Id.* (alterations in original) (citing Ex. 1002 ¶¶ 39, 56). Petitioner further argues that “[u]sing Fireman's square grid mesh in

Hanlie's PVC-mesh-PVC straps would satisfy the claim requirement that 'a plurality of strands uniformly spaced apart and arranged substantially parallel to one another' because the vertical components of a square grid mesh are parallel and uniformly spaced apart." *Id.* (citing Ex. 1002 ¶¶ 53–54).

After providing this reasoning, Petitioner continues:

In combining Fireman with Hanlie, to maximize the strength of Fireman's mesh, a PHOSITA would be motivated to orient Fireman's mesh layer with the vertical components parallel to the direction of tension (i.e. perpendicular to the top and bottom sheets). Ex. 1002 ¶ 58. The alternative—having the strands diagonal to the direction of tension—would result in strands near the edges of the tensioning structure being unsupported on at least one end. *Id.* Thus, given that the vertical strands would be parallel to the direction of tension (i.e. the length of the strap), they would extend through the entire length of the Hanlie-Fireman strap. Even a diagonal orientation would satisfy this limitation because at least some strands would span the gap. *Id.* Accordingly, the Hanlie-Fireman combination would have a "plurality of strands extend[] across the gap," because, as discussed above in element 1c, Hanlie's tensioning structure spans the gap between the top and bottom mattresses. *Id.* ¶¶ 50, 58.

Id. at 13–14 (alterations in original).

Patent Owner argues that a person of ordinary skill in the art would not have been motivated to combine Fireman with Hanlie and, specifically, that it would not have been obvious to use Fireman's square mesh. *See* PO Resp. 12. As a reminder, the limitation not taught by Hanlie (because it is silent as to the configuration of its mesh) is that of "a plurality of strands uniformly spaced apart and arranged substantially parallel to one another, the plurality of strands extending across the gap," and Petitioner contends that it would have been obvious to use Fireman's square mesh in Hanlie.

Pet. 12–14. Patent Owner concedes that a person of ordinary skill in the art “would have been well aware of various mesh designs available to be used as a tensioning structure.” PO Resp. 16. Patent Owner argues, however, that mesh configurations other than square would have had advantages over square mesh and thus would have been chosen by a person of ordinary skill before square mesh. *See id.* at 12, 16, 27–35. For example, Patent Owner asserts that a person of ordinary skill in the art “would have known that hexagonal mesh would have been preferable to square mesh for use as a tensioning structure in an inflatable product.” *Id.* at 32.

Patent Owner’s argument regarding other options is unavailing. Patent Owner implicitly agrees that square mesh was known by persons of ordinary skill in the inflatable products art. *See, e.g., id.* at 28 (Patent Owner asserting that a person of ordinary skill in the art would know that squares had disadvantages compared to other shapes); Tr. 30:22–31:11, 31:24–32:2 (Patent Owner agreeing that a person of ordinary skill in the art would have known of the Fireman product and that Fireman uses a square grid mesh). The purported preferable or most desirable combination is not the only combination that may be obvious. *See In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012) (“This court has further explained that just because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.”); *cf. In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (holding that “a particular combination” need not “be the preferred, or the most desirable, combination described in the prior art in order to provide motivation”); *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994) (“A known or obvious composition does not become patentable simply because it has been described as somewhat inferior to some other

product for the same use.”). And, even if square mesh was known to have certain disadvantages, “a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006).

Dr. Abraham credibly testifies that “[s]quare-grid meshes were well-known, conventional mesh structures, and would immediately come to mind to a [person having ordinary skill in the art] when reading Hanlie as a potential structure for implementing Hanlie’s mesh” and that “square grid meshes are simple, common configurations for mesh that provide durability and strength.” Ex. 1002 ¶ 38. Mr. Schroeder, Patent Owner’s expert, agrees that square mesh was one of the various known mesh designs for tensioning structures. Ex. 1038, 17:9–19:11; *see* Ex. 2016 ¶ 74 (Mr. Schroeder: “Just because meshes oriented in a square pattern were known In my opinion, simply because square grid meshes were known”). As Dr. Abraham credibly testifies, square grid mesh has certain advantages relative to a hexagonal mesh, the subject of Patent Owner’s argument. Ex. 1040 ¶ 15. Dr. Abraham also credibly testifies that the proposed combination would have yielded predictable results, testifying that “a square grid mesh would predictably provide a suitably strong tension-resisting structure for implementing the mesh in Hanlie’s straps.” Ex. 1002 ¶ 56; *see also id.* ¶¶ 38–39, 55–56.

We find that a person of ordinary skill in the art of inflatable products would have been aware that square mesh was a known option for use in a tensioning structure and that square mesh possessed certain advantages, even if it also had some disadvantages, that a person of ordinary skill in the art

would have been motivated to use Fireman's mesh in Hanlie's product, and that the substitution of Fireman's square mesh for the mesh of Hanlie's strap would have yielded predictable results. Accordingly, Patent Owner's arguments regarding the availability of other known and purportedly more preferred options is not persuasive.

We also do not find persuasive Patent Owner's argument that a person of ordinary skill in the art would fail to appreciate the application of Fireman's square mesh in Hanlie because "Fireman is directed to different applications and objectives."⁴ PO Resp. 17–22 (Patent Owner arguing, *inter alia*, that Fireman is directed to the wall of a pool rather than an interior tensioning structure and that Fireman's three-layer material is designed to be much stronger than would be needed in Hanlie); *id.* at 12–13, 28. "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). And, "familiar items may have obvious uses beyond their primary purposes." *Id.* at 420.

We are unpersuaded by Patent Owner's argument that there is no motivation to combine because the person of ordinary skill in the art already would have been aware of the possible alternatives and therefore would not need to turn to a secondary reference for that knowledge. *See* PO Resp. 15–17. In this case, Fireman is evidence of that knowledge of an alternative, namely square mesh. Patent Owner's assertion that an ordinary artisan

⁴ Patent Owner does not make a non-analogous art argument and acknowledges that a person of ordinary skill in the art would have been familiar with both Hanlie and Fireman. Tr. 30:22–31:6; *cf. Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986) ("The person of ordinary skill is a hypothetical person who is presumed to be aware of all the pertinent prior art.").

possesses a high degree of knowledge points towards, not away, from obviousness. *See KSR*, 550 U.S. at 416 (“[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result.”).

Patent Owner argues that Petitioner, in relying on a reference teaching the use of square mesh rather than the several other known configurations, is plucking Fireman out of the sea of prior art and, therefore, engaging in improper hindsight. *See* PO Resp. 14–15, 50 (citing *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1338 (Fed. Cir. 2016)); PO Sur-reply 2–4. Patent Owner’s reliance on *WBIP* is misplaced. When read in context, the court, in *WBIP*, was referring to the specific facts of that case. *See WBIP*, 829 F.3d at 1337 (“The real question is whether that skilled artisan would have plucked one reference out of the sea of prior art (Phipps) and combined it with conventional coolant elements to address some need present in the field (the need for low-carbon monoxide emission marine gen-sets). . . . This is part of the fact question . . .”). *WBIP* did not, as Patent Owner’s arguments imply, create a *per se* rule that the existence of several known alternatives renders non-obvious a claim covering one of those alternatives. In this case, it is not as if some obscure option was plucked out a sea of alternatives. Rather, the square mesh option was well-known option and used in inflatable products.

Patent Owner argues that a person of ordinary skill in the art would not use Fireman’s three-layer material as the tensioning structure in the Hanlie mattress because Fireman’s PVC layers make the overall three-layer material heavy, bulky, costly, and much stronger than would be necessary in the Hanlie application. *See* PO Resp. 22–26; *see id.* at 24 (“Fireman

requires much thicker PVC layers than Hanlie”), 25 (referring to “the thickness of Fireman’s PVC and the attendant extra weight, material, and cost it would introduce for Hanlie’s application”). Patent Owner’s argument is not persuasive as it fails to address Petitioner’s articulated combination, which is the substitution of Fireman’s square mesh for Hanlie’s mesh of an unidentified configuration, and does not modify Hanlie’s PVC layers. *See* Pet. 13–16 (explaining the “simple substitution” and retaining Hanlie’s “PVC film” in the proposed combination). Further, Patent Owner’s argument would require the bodily incorporation of Fireman’s three-layer material into Hanlie’s air mattress, but “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (citations omitted). Lastly, Patent Owner undermines its own argument in acknowledging that the person of ordinary skill in the art would not intentionally overdesign a product and would use thinner PVC sheets than those in Fireman. PO Resp. 22–23; *see KSR*, 550 U.S. at 421 (A person of ordinary skill is not an automaton.).

As mentioned, Petitioner, after setting forth its simple substitution rationale regarding the use of square mesh, asserts that, “[i]n combining Fireman with Hanlie, to maximize the strength of Fireman’s mesh, a [person having ordinary skill in the art] would be motivated to orient Fireman’s mesh layer with the vertical components parallel to the direction of tension (i.e. perpendicular to the top and bottom sheets),” but that “[e]ven a diagonal orientation would satisfy [the “another, the plurality of strands extending

across the gap] limitation because at least some strands would span the gap.” Pet. 13–14 (emphasis omitted). Patent Owner argues that this contention regarding the obviousness of an orthogonal mesh orientation is flawed. PO Resp. 35–50. Patent Owner contends that an orthogonal orientation has disadvantages and that Petitioner argued in another case that a person of ordinary skill in the art would not have preferred an orthogonal orientation and that an orthogonal orientation would be suboptimal. *See, e.g., id.* at 36, 40–45 (referring to “the Prior PGR,” PGR2017-00003).

The parties do not identify any limitation of independent claim 1 or of the other claims challenged in this ground that pertains to the orientation of the strands relative to the top and bottom of the inflatable product or that requires orthogonality.⁵ *See* PO Sur-reply 16–17 (Patent Owner arguing that Petitioner’s orientation arguments are not “‘irrelevant’ to the claims challenged in the ’869 Patent” and that a diagonally oriented mesh would not be obvious, but only identifying independent claims 17 and 24 and their dependent claims as requiring a strand orientation). Petitioner’s contentions regarding independent claim 1—where Fireman is relied on for the claimed spaced apart strands substantially parallel to one another and extending across the gap—do not turn on the portion in the Petition asserting that a particular orientation of the parallel strands would also have been obvious.

⁵ Petitioner states that it included the mesh orientation argument because “it was expected that Patent Owner would make an argument that particular mesh orientations were required for certain claim limitations.” Tr. 9:25–11:17. Patent Owner asserts that an orthogonal orientation of the strands is required by claims 17–30 of the ’869 patent. *See* PO Sur-reply 17; Tr. 46:11–16; *see, e.g.,* Ex. 1001, 21:21–28 (claim 17: each strand “is substantially perpendicular to the first and second sheets”).

See Pet. 13–14; Ex. 1002 ¶ 58 (Dr. Abraham: “[R]egardless of the orientation of Fireman’s square grid mesh within Hanlie’s strap, the mesh would still satisfy this claim’s requirement for ‘the tensioning structure comprising: a plurality of strands uniformly spaced apart and arranged substantially parallel to one another, the plurality of strands extending across the gap.’”). Thus, even if Petitioner’s contentions regarding a motivation for a particular mesh orientation were flawed, that does not impact our analysis as to whether Petitioner has demonstrated the obviousness of the subject matter of independent claim 1, which does not require a particular orientation. Accordingly, we do not need to reach, in this ground, the parties’ arguments regarding the obviousness of the orientation of the mesh relative to the top and bottom of the mattress. We address those arguments below in the context of independent claim 24 (Ground 9), which contains a limitation directed to the orientation of the strands relative to the first and second sheets.

Petitioner has provided adequate reasoning as to why one of ordinary skill in the art would have substituted Fireman’s square mesh—having strands uniformly spaced apart and arranged substantially parallel to one another—for the mesh of undisclosed configuration in Hanlie’s strap (tensioning structure) and has shown that this simple substitution yields the claimed subject matter of independent claim 1. Petitioner also has provided adequate evidence to show that a person of ordinary skill in the art would have had a reasonable expectation of success in making the substitution. *See KSR*, 550 U.S. at 416 (“[W]hen a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for

another known in the field, the combination must do more than yield a predictable result.”).

After having considered Petitioner’s arguments, evidence, and reasoning, along with all of Patent Owner’s arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that independent claim 1 is unpatentable over the combined teachings of Hanlie and Fireman.

4. The Alleged Obviousness of Dependent Claims 2, 4, 5, and 8–12 in View of Hanlie and Fireman

Claims 2, 4, 5, and 8–12 depend directly or indirectly from independent claim 1. Petitioner alleges that these claims, like independent claim 1, would have been obvious over Hanlie and Fireman. *See* Pet. 16–26. We have reviewed Petitioner’s arguments and evidence directed to claims 2, 4, 5, and 8–12, which Patent Owner does not separately dispute, and find that Petitioner has shown by a preponderance of the evidence that claims 2, 4, 5, and 8–12 are unpatentable over Hanlie and Fireman.

E. The Alleged Obviousness of Dependent Claims 6, 7, and 14–16 (Grounds 2 and 4–6)

Petitioner contends that: claims 6 and 7 would have been obvious over Hanlie, Fireman, and Boso (Ground 2); claim 15 would have been obvious over Hanlie, Fireman, and Liu (Ground 4); claim 16 would have been obvious over Hanlie, Fireman, Liu, and Song (Ground 5); and claim 14 would have been obvious over Hanlie, Fireman, optionally Liu, and Song (Ground 6). Pet. 26–29, 32–44. These claims depend directly or indirectly from independent claim 1. We have reviewed Petitioner’s arguments and evidence directed to claims 6, 7, and 14–16, which Patent Owner does not separately dispute, and find that Petitioner has shown by a preponderance of

the evidence that claims 6, 7, and 14–16 are unpatentable over the respective relied-on combinations of references.

*F. The Alleged Obviousness of Dependent Claim 13
Over Hanlie, Fireman, and Kuriyama (Ground 3)*

Petitioner contends that claim 13 would have been obvious over Hanlie, Fireman, and Kuriyama. Pet. 30–31; *see also* Pet. Reply 16–20. Claim 13 depends directly from independent claim 1 and recites that “the first and second weld sheets are about 0.10 millimeters in thickness.” Ex. 1001, 20:63–64.

Petitioner asserts that Hanlie does not disclose the specific dimensions of the strap layers. Pet. 30. Petitioner contends that Fireman discloses that its three-layer material—with each of its PVC sheets having a thickness of about 0.275 mm to 0.375 mm—could withstand much more force than would be encountered in Hanlie’s mattress. *Id.* Petitioner further contends that “[b]ecause Hanlie’s straps would be under less force than Fireman’s three-layer material, a PHOSITA would naturally implement Hanlie’s straps using thinner PVC sheets, reducing materials costs and the size and weight of the deflated mattress.” *Id.* (citing Ex. 1002 ¶ 127). For the recited thickness, Petitioner turns to Kuriyama. *Id.* at 31. Petitioner asserts that, “[l]ike Hanlie’s ‘fus[ing]’ and Fireman’s hot ‘lamination,’ Kuriyama discloses ‘laminat[ing]’ PVC film to woven fabrics,” and, that, in creating “synthetic leather,” Kuriyama discloses a PVC sheet having a thickness of 0.1 to 1 mm. *Id.* (citing Ex. 1002 ¶ 129, 132–133; Ex. 1014, 9:65–10:5) (alteration in original).

Petitioner argues that a person of ordinary skill in the art, implementing Hanlie, “would need PVC sheets of some specific thicknesses, and would find Kuriyama’s disclosures relating to laminating PVC for

‘synthetic leather’ and other durable goods directly applicable to Hanlie’s inflatable mattress.” *Id.* (citing Ex. 1002 ¶¶ 129–130, 133). Petitioner further argues that, “[g]iven these disclosures, a [person having ordinary skill in the art] would be motivated to combine Kuriyama with Hanlie and Fireman and to try the 0.1mm thick sheets of PVC as disclosed in Kuriyama in constructing Hanlie’s straps.” *Id.* (citing Ex. 1002 ¶¶ 129–131).

We determine that Petitioner has not adequately explained why a person of ordinary skill in the art would have used Kuriyama’s thickness for the tensioning structure of Hanlie. *See* PO Resp. 50–54. Petitioner points to a reference disclosing a very thin sheet of PVC applied to a cloth substrate so as to imitate leather (*see, e.g.*, Ex. 1002 ¶ 129) but does not persuasively explain why a person of ordinary skill in the art would have a reason to use that thickness in a structural component under tension. Dr. Abraham testifies that Kuriyama makes high wear PVC sheets for durable consumer products that support the human body, and implies that is similar to how an air mattress supports a person. Ex. 1002 ¶¶ 129–130. However, the proposed application of the thin, durable PVC is not to a mattress in general, but to a structure under tension and that is inside the mattress. Dr. Abraham does not opine persuasively whether a person of ordinary skill in the art would have a reason to use a thin layer in such circumstances or why durability is a concern inside the mattress such that it would prompt the use of a 0.10 millimeter thick layer inside Hanlie’s product. To the extent that Petitioner is making an “obvious to try” argument, we find that too conclusory and undeveloped to meet Petitioner’s burden. *See* Pet. 31; Ex. 1002 ¶ 131.

Petitioner has not shown by a preponderance of the evidence that claim 13 is unpatentable over Hanlie, Fireman, and Kuriyama.

*G. The Alleged Obviousness of Claims 3, 17, and 21–23
Over Hanlie, Fireman, and Optionally Pennel (Ground 7)*

Petitioner contends that claims 3, 17, and 21–23 would have been obvious over Hanlie, Fireman, and optionally Pennel. *See* Pet. 50–54 (addressing independent claim 17); *see also* Pet. Reply 20–22. Independent claim 17 is somewhat similar to independent claim 1 and recites, for the tensioning structure,

a second weld sheet disposed opposite the first weld sheet and affixed to the first weld sheet with the plurality of strands captured between the first and second weld sheets, the first and second weld sheets *having full surface-area contact in spaces between the plurality of strands*.

Ex. 1001, 21:30–35 (emphasis added). Claim 3 depends from independent claim 1 and similarly requires that “each one of the plurality of strands interrupts an otherwise full surface-area contact between the first weld sheet and the second weld sheet.” *Id.* at 20:27–30. The remaining claims challenged in this ground depend from independent claim 17. The “full surface-area contact” aspect is in dispute. *See* PO Resp. 54–60.

Petitioner presents two theories as to how this limitation is satisfied. *See* Pet. 47–50 (addressing claim 3); *see also id.* at 53 (addressing independent claim 17 and relying on the arguments for claim 3). First, Petitioner contends that the combination of Hanlie and Fireman results in the two PVC layers of the tensioning structure bonded together through the holes of the mesh. *Id.* at 48. Petitioner contends that the presence of the “horizontal” members of the mesh do not preclude the existence of full-surface area contact between the strands (the “vertical” members of the

mesh), and that this is consistent with the Specification of the '769 patent. *Id.* Petitioner argues that “the only place where ‘full surface-area contact’ is used in the specification is in the description of ‘tensioning structures 3, 103, 203, 303, 403 and 503,’ which are also described and depicted as having one or more ‘reinforcement strand 5.’” *Id.* (citing Ex. 1001, 13:14–15, 14:66–15:3, 16:11–14, 16:22–24, 17:41–45, Figs. 3, 8–11, 20 (element 5)); *see also* Pet. Reply 20. Thus, according to Petitioner, the presence of reinforcing strands (“horizontal” components) does not preclude full surface-area contact. *Id.*

We agree with Patent Owner (PO Resp. 55–56) that Petitioner’s first theory is incorrect. Claim 17, for example, recites the plurality of strands extending between the first and second sheets (mapped to the “vertical” members of the mesh spanning between the top and bottom of the mattress). Claim 17 does not recited reinforcing strands. As mentioned, the claim calls for “the first and second weld sheets [mapped to the PVC sheets] having full surface-area contact in spaces between the plurality of strands.” Thus, the presence of the “horizontal” members of Fireman’s mesh prevents full surface-area contact between the “vertical” members. *See* Pet. 18 (Petitioner arguing, in asserting that claim 2 is satisfied, that, “[s]ince the mesh’s strands occupy volume in space, they necessarily space apart the weld sheets.” (citing Ex. 1002 ¶ 76)).

We also agree with Patent Owner that the cited portions of the '869 patent do not support Petitioner’s position. *See* PO Resp. 55–56. The Specification indicates that the reinforcement strand is optional in the embodiments. *See, e.g.,* Ex. 1001, 13:14–16 (“As noted above, reinforcement strand 5 *may be added* to tensioning structure 3 to further

improve the strength thereof.” (emphasis added)); *id.* at 14:66–15:3 (“Optionally, as shown in FIG. 20, each end of the weld sheet 131 (i.e., at the ends of strands 32) may include a reinforcing strand 5 arranged similarly to tensioning structure 3.”). In its Reply, Petitioner argues that “the sole location in the specification of the ‘869 Patent where ‘full surface-area contact’ is discussed is in the context of an embodiment having reinforcement strands.” Pet. Reply 20 (citing Ex. 1040 ¶ 26 (citing Ex. 1001, 17:29–45)). The cited portion of the Specification is two paragraphs with different subjects. Ex. 1001, 17:29–45. The first paragraph refers to the optional reinforcement strand. *Id.* at 17:29–35 (“Turning to FIGS. 30-32 tensioning structure 503 may also be provided with at least one reinforcement strand 5 . . .”). The next paragraph—the one referring to the full surface-area contact—is referring to the tensioning structure’s high tensile strength in the axial direction of the plurality of strands. *Id.* at 17:36–45. That paragraph begins as follows:

A tensioning structure in accordance with the present disclosure, including tensioning structures 3, 103, 203, 303, 403 and 503 discussed above, has a high tensile strength along the axial extent of the strands 32, 532 extending between respective weld strips and/or along weld sheets. This high tensile strength is complemented with a full-strength weld between the adjacent material of an inflatable product, which is facilitated by the *full surface-area contact* provided by the weld strip and/or weld sheet interface between strands 32, 532 and such adjacent material

Id. This portion of the Specification does not support Petitioner’s argument that two sheets held apart by a reinforcement strand nonetheless have full surface area contact between those sheets.

Petitioner’s second theory is that “it would be obvious to modify Fireman’s square grid mesh by removing the horizontal components, leaving

only the vertical strands sandwiched by the two PVC layers.” Pet. 48. Petitioner contends that Pennel discloses an inflatable mattress utilizing tension structures composed of threads adhered to the top and bottom of the mattress. *Id.* at 48–49 (citing Ex. 1016, 2:48–52). Petitioner argues that Pennel teaches that using only strands in the direction of tension provides benefits relative to “the known ties in the form of bands.” *Id.* at 49 (citing Ex. 1016, 1:32–39; Ex. 1002 ¶¶ 183–186, 194–196). According to Petitioner, a person having ordinary skill in the art “would be motivated by this teaching in Pennel to eliminate Fireman’s horizontal mesh members (leaving only the vertical mesh member).” *Id.*

Patent Owner argues that Petitioner’s proposed modification “is inconsistent with [Petitioner] Bestway’s whole premise for why a [person having ordinary skill in the art] purportedly would have looked to Fireman—to select a particular mesh structure to use in implementing Hanlie’s straps.” PO Resp. 57. We find Patent Owner’s argument persuasive. Petitioner’s foundational modification is premised on Hanlie utilizing a mesh and the motivation to use a square mesh like Fireman. *See* Pet. 12–14 (arguments for element 1d of independent claim 1); *id.* at 51 (for independent claim 17, relying on the arguments made for claim 1 (“element 1d”)); *but see* Pet. Reply 20–21 (Petitioner arguing that it provided other motivations). In support of Petitioner’s reasoning, Dr. Abraham quoted approvingly Fireman’s statement that it used two layers of PVC “with a mesh made of ‘squares,’ the purpose of which is to ‘enhance[] the tensile strength of the flexible wall 12.’” Ex. 1002 ¶ 56 (quoting Ex. 1012 ¶ 19) (alterations in original). Similarly, Petitioner replied to Patent Owner’s arguments about the availability of other configurations by relying on Dr. Abraham’s

testimony that square grid meshes “are simple, common configurations for mesh that provide durability and strength.” Pet. Reply 11 (citing Ex. 1002 ¶ 38). Accordingly, we find Petitioner’s motivation to further modify the Hanlie-Fireman combination with Pennel is contrary to the motivation to make the initial modification of Hanlie.

Petitioner has not demonstrated persuasively the obviousness of the claimed subject matter including two weld sheets having full surface-area contact in spaces between the plurality of strands. Accordingly, Petitioner has not shown by a preponderance of the evidence that claims 3, 17, and 21–23 are unpatentable over Hanlie, Fireman, and optionally Pennel.

*H. The Alleged Obviousness of Claims 18 and 20
Over Hanlie, Fireman, Kuriyama, and Optionally Pennel (Ground 8)*

Petitioner contends that claims 18 and 20 would have been obvious over Hanlie, Fireman, Kuriyama, and optionally Pennel. See Pet. 57–61. The claims depend from independent claim 17. Petitioner relies on Kuriyama for weld sheet thickness aspects of the claims but does not rely on Kuriyama in a manner that cures the underlying defect of the challenge to independent claim 17 (Ground 7), as discussed above.

Petitioner has not shown by a preponderance of the evidence that claims 18 and 20 are unpatentable over Hanlie, Fireman, Kuriyama, and optionally Pennel.

*I. The Alleged Obviousness of Claims 24 and 28–30
Over Hanlie, Fireman, and the Background Knowledge of a PHOSITA
(Ground 9)*

Petitioner contends that claims 24 and 28–30 would have been obvious over Hanlie, Fireman, and the background knowledge of a PHOSITA (person having ordinary skill in the art). Pet. 61–65. Claim 24 is

an independent claim and claims 28–30 each depend directly from claim 24. Independent claim 24 is similar to independent claim 1 discussed above in the context of Ground 1. Particularly pertinent to the parties’ dispute is the requirement of claim 24 that the plurality of strands extend substantially perpendicular to the first and second sheets (mapped to the top and bottom of the mattress). Patent Owner argues that a person of ordinary skill in the art would not have oriented a mesh orthogonally in a tensioning structure. *See, e.g.*, PO Resp. 43; PO Sur-reply 11 (“[A] PHOSITA would not have been motivated to combine Fireman with Hanlie as Bestway advocates: such that the ‘vertical components’ of Fireman’s mesh are ‘parallel to the direction of tension (i.e., perpendicular to the top and bottom sheets).” (citing Pet. 13–14)). Patent Owner also presents additional arguments regarding dependent claim 30. PO Resp. 64.

1. The Alleged Obviousness of Independent Claim 24 in View of Hanlie, Fireman, and the Background Knowledge of the PHOSITA

Independent claim 24, like independent claim 1 discussed above, calls for an inflatable product having two space apart sheets (mapped to the top and bottom of Hanlie’s air mattress) with a tensioning structure spanning the gap, and with that tensioning structure being comprised of two weld sheets sandwiching a plurality of spaced apart strands that are substantially parallel to one another. *See* Ex. 1001, 22:7–28. Claim 24 also recites “the first and second weld sheets are thinner than the first and second sheets; and a valve in communication with the inflatable chamber to facilitate inflation and deflation of the inflatable product.” *Id.* at 22:29–33. The limitation to which the parties’ orthogonality arguments pertain recites

each of the plurality of strands having a first terminal end positioned adjacent to the first sheet, a second terminal end

positioned adjacent to the second sheet, and *an axial extent between the first and second terminal ends that is substantially perpendicular to the first and second sheets.*

Id. at 22:17–23 (emphasis added).

For much of claim 24, Petitioner relies on its arguments made in Ground 1 for independent claim 1. *See* Pet. 61–62. For the thinner weld sheets feature, Petitioner contends, and Patent Owner does not dispute, that the feature would have been obvious because a person of ordinary skill in the art would know “that using thinner materials would tend to reduce weight and materials costs of the product and that, in construction of such products, durability versus weight and cost are frequent tradeoffs.” *Id.* at 63 (citing Ex. 1002 ¶ 245). Petitioner also asserts that Hanlie’s tensioning structure is a strong component of two PVC weld sheets and a mesh layer as opposed to the single-layer top and bottom sheets and, therefore, it would have been obvious that each of the PVC weld sheets could be significantly thinner than the top and bottom sheets. *Id.* (citing Ex. 1002 ¶ 245). Petitioner also contends, and Patent Owner does not dispute, that Hanlie discloses an inflation/deflation valve. *See id.* at 54, 63; *see also* Ex. 1011, 16 (Embodiment 3: “There is one air valve on air chamber 8.”).

As discussed above regarding independent claim 1 (Ground 1), Petitioner’s proposed combination involves the substitution of Fireman’s square mesh for the mesh in Hanlie’s strap. *See* Pet. 13. Petitioner contends that the combination would have the ends of the strands adjacent the top and bottom sheets of the mattress (the recited first and second sheets). *Id.* at 51–53, 62.

For the aspect of the claim requiring the plurality of strands to be substantially perpendicular to the first and second sheets, Petitioner argues

that, “to take maximum advantage of the tensile strength of the mesh, it would be obvious to orient Fireman’s mesh within Hanlie’s strap in the direction of tension,” and, “[a]s such, the vertical members of the mesh [i.e. strands] in the ‘axial extent’ . . . would be ‘substantially perpendicular to the first and second sheets.’” *Id.* at 53 (addressing “Element 17d” and referencing the arguments made for element 1d; citing Ex. 1002 ¶ 209); *see id.* at 62 (referencing, for claim 24, the arguments made for element 17d; citing Ex. 1002 ¶ 252); *see also id.* at 13–14 (for element 1d, “In combining Fireman with Hanlie, to maximize the strength of Fireman’s mesh, a PHOSITA would be motivated to orient Fireman’s mesh layer with the vertical components parallel to the direction of tension (i.e. perpendicular to the top and bottom sheets).”; citing Ex. 1002 ¶ 58). Petitioner further argues that “[t]he alternative—having the strands diagonal to the direction of tension—would result in strands near the edges of the tensioning structure being unsupported on at least one end.” *Id.* at 14 (citing Ex. 1002 ¶ 58).

Patent Owner argues that one of ordinary skill in the art would not make the proposed combination but does not dispute that, if made, the combination would disclose or suggest every limitation of independent claim 24. Patent Owner’s arguments made in the context of claim 1 (Ground 1) regarding a purported lack of a motivation to use Fireman’s square mesh in Hanlie’s strap apply to independent claim 24. *See, e.g.*, PO Resp. 10–12 (“All of Bestway’s Grounds are based at least in part on a combination of Hanlie with Fireman . . . [and] a PHOSITA would not have been motivated to combine Fireman with Hanlie.”). We have considered those arguments and, for the reasons given above in the context of Ground 1, find them unavailing and, instead, find that Petitioner has provided

persuasive and adequate reasoning why a person of ordinary skill in the art would have had a motivation to make that substitution. *See, supra*, III.D.

As with the mesh having a square pattern, Patent Owner impliedly concedes that orthogonally oriented mesh was known, but argues that it has disadvantages. *See, e.g.*, PO Resp. 48 n.7 (“Indeed, a PHOSITA would have known all of the disadvantages of an orthogonally oriented mesh, including its inefficiency and ineffectiveness at counteracting both tensile and shear stress.”). Patent Owner argues that the proposed combination would be suboptimal. *Id.* at 44.

Patent Owner’s arguments about the purported disadvantages of orthogonality all but concede that a person of ordinary skill in the art, in order to evaluate the pros and cons of such an orientation in a tensioning structure, already would have had to envision the configuration that Patent Owner argues would have been non-obvious. Even if that person determined that a configuration was suboptimal, the person’s mind is not erased as to the known options other than that the purportedly optimal one. “[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.” *In re Mouttet*, 686 F.3d at 1334; *see In re Gurley*, 27 F.3d at 553. Also, “a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d at 1165.

Dr. Schroeder, Patent Owner’s expert, opines that a person of ordinary skill in the art would have known that an orthogonal orientation would have introduced disadvantages. Ex. 2016 ¶¶ 88–93; *see* PO Resp. 36–38. Dr. Schroeder primarily testifies that, in an orthogonal orientation, the

horizontal members would not be attached to a side of the mattress and, therefore, “would not effectively resist tension and thus would introduce inefficiencies in weight, material, and cost.” Ex. 2016 ¶¶ 90, 93. However, Dr. Abraham credibly testifies that having mesh members aligned in the direction parallel to the tension is beneficial, also. Ex. 1002 ¶ 58.

According to Dr. Abraham,

a PHOSITA [person having ordinary skill in the art] would recognize that orienting the vertical members of Fireman’s mesh in the direction of tension would best allow the mesh to resist tension and maximize the strength of the mesh. In particular, a diagonally oriented mesh would result in threads being partially unsupported at the horizontal and vertical edges of the mesh – and would therefore be less effective at resisting tension. By contrast, by orienting Fireman’s mesh parallel to the direction of tension of Hanlie’s strap, there would be vertical members running the entire length of the strap, anchored at both the top and bottom of the mattress, including near the horizontal edges of the strap. This arrangement would guarantee that the support provided by the tensioning structure is uniform and spread across the width of the mesh.

Id.; *see also* Ex. 1040 ¶ 18 (further discussing the beneficial aspects of an orthogonal orientation). Dr. Abraham also testifies, in response to Dr. Schoeder’s identification of a purported disadvantage of an orthogonal orientation, that even unanchored horizontal strands “would still provide the benefit of maintaining the integrity of the strap against shear forces, such as when a user of the air mattress adjusts their body along the plane of the upper surface of the air mattress.” Ex. 1040 ¶ 18.

We find that a person of ordinary skill in the art of inflatable products would have been aware that an orthogonal orientation of square mesh was a known option for use in a tensioning structure and that such an orientation possessed certain advantages, even if it also had some disadvantages. We

also find that a person of ordinary skill in the art would have been motivated to orient Fireman's mesh in Hanlie's product orthogonally (i.e. with strands substantially perpendicular to the top and bottom of the mattress), and that the use of that orientation would have yielded predictable results.

Accordingly, Patent Owner's arguments regarding the disadvantages of an orthogonal orientation are not persuasive.

Patent Owner asserts that Petitioner made arguments and submitted evidence in a prior case that are contradictory to its position regarding orthogonality here. PO Resp. 38–49. Patent Owner contends that, in “the Prior PGR” (PGR2017-00003), Petitioner “and its prior expert confirmed that a [person having ordinary skill in the art] would not have oriented a mesh orthogonally.” *Id.* at 43 (citing Ex. 2002, 49–50; Ex. 2004 ¶¶ 146–149; Ex. 2016 ¶¶ 94–99). We disagree with Patent Owner's characterization. As an initial matter, we are not persuaded that, as Patent Owner impliedly argues (*see id.* at 38), the applications of the mesh in this case and in the Prior PGR—involving different patents, different primary references with one involving a pool filled with water and one a mattress—are so similar that the Petition here must address the purportedly contradictory arguments and evidence. *See* Tr. 43:7–44:14 (Patent Owner conceding that the subject patents are not related); *cf.* PO Sur-reply 10–11 (Patent Owner arguing that the Board's determinations in the prior case should not apply here because the factual circumstances are different). Even if a configuration is suboptimal in one situation, it is not necessarily suboptimal in all situations. *Cf.* PO Sur-Reply 10–11 (Patent Owner distinguishing this case from the prior PGR because this case involves an air mattress).

Further, rather than arguing that a person of ordinary skill in the art would not use an orthogonally oriented mesh, Petitioner in the Prior PGR argued that the two “basic orientations” were orthogonal and diagonal, and that it would have been obvious to try those orientations. *See* PO Resp. 47 (referring to “Bestway’s argument in the Prior PGR that either orientation would have been ‘obvious to try’”). In that case, Petitioner argued that a diagonal orientation would be “preferred” and other orientations would be “suboptimal.” *See* Ex. 2002, 43–44. Accordingly, we are not persuaded by Patent Owner’s implied argument that Petitioner cannot demonstrate the obviousness of an orthogonal orientation for the tensioning structure of an air mattress because that orientation was argued to be suboptimal for use in the pool of the Prior PGR.

Patent Owner asserts that Petitioner filed a patent application that “discloses numerous mesh designs for a tensioning structure in an air mattress—including ‘hexagonal,’ ‘circular,’ ‘triangular,’ and ‘diamond-shaped,’” but did not disclose an orthogonally oriented mesh. PO Resp. 49 (referring to the “‘164 Publication,” Ex. 2015). We do not find, as Patent Owner urges (*id.* at 49), that the silence in a patent application contradicts Dr. Abraham’s opinions on the obviousness of orthogonality in Hanlie straps.

After having considered Petitioner’s arguments, evidence, and reasoning, along with all of Patent Owner’s arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that independent claim 24 is unpatentable over the combined teachings of Hanlie, Fireman, and the background knowledge of a person having ordinary skill in the art.

2. *The Alleged Obviousness of Dependent Claims 28 and 29 in View of Hanlie, Fireman, and the Background Knowledge of the PHOSITA*

Claims 28 and 29 each depend directly from independent claim 24. Petitioner alleges that these claims, like independent claim 1, would have been obvious over Hanlie, Fireman, and the background knowledge of the person having ordinary skill in the art. *See* Pet. 63–64. We have reviewed Petitioner’s arguments and evidence directed to claims 28 and 29, which Patent Owner does not separately dispute, and find that Petitioner has shown by a preponderance of the evidence that claims 28 and 29 are unpatentable over Hanlie, Fireman, and the background knowledge of a person having ordinary skill in the art.

3. *The Alleged Obviousness of Dependent Claim 30 in View of Hanlie, Fireman, and the Background Knowledge of the PHOSITA*

Claim 30 depends directly from independent claim 24 and recites that “the tensioning structure is welded to the first sheet near the first terminal ends of the plurality of strands and to the second sheet near the second terminal ends of the plurality of strands.” Ex. 1001, 22:53–57. Petitioner contends that “Hanlie, as combined with Fireman’s square mesh, renders this limitation obvious.” Pet. 65; *see id.* at 56–57 (addressing the “welded” limitation of claim 22).

As a reminder, Hanlie discloses straps that are made of three-layers—mesh between two layers of PVC fabric. Ex. 1011, 13. Hanlie states that, the “joining is between the PVC fabric of the straps and the PVC fabric of the top and bottom side of the mattress.” *Id.* at 14. Hanlie further states that the joining is by sewing or fusing. *Id.*

Petitioner contends that Fireman’s disclosure of a fused joint is a disclosure of the recitation requiring the tensioning structure to be welded to the first and second sheets. Pet. 65. Specifically, Petitioner contends that “Hanlie discloses that “the straps [i.e. tensioning structure] and the top and bottom side of the mattress [i.e. first and second sheets] are sewed or **fused** [i.e. welded] together.” *Id.* (citing Ex. 1011, 14 (emphasis and alterations in original), Figs. 2, 5; Ex. 1002 ¶ 265).

Dr. Abraham, in describing Hanlie, testifies that a person having ordinary skill in the art (a PHOSITA) “would understand the term ‘fuse’ in this context as synonymous with plastic welding.” Ex. 1002 ¶ 40; *see also id.* ¶ 222 (“As discussed above, a PHOSITA would understand that the term ‘fused,’ as used by Hanlie in this context, refers to thermoplastic welding.”). Dr. Abraham cites the dictionary definition of “fuse,” which is “to reduce to a liquid or plastic state by heat.” *Id.* ¶ 222 (citing Ex. 1027 (Merriam Webster Collegiate Dictionary), 474). Dr. Abraham further testifies that “thermal welding of plastics was a well-known technique used in connection with assembly of inflatable structures prior to the ‘869 Patent.” *Id.* ¶ 40. Dr. Schroeder, Patent Owner’s expert, agreed on cross-examination that thermoplastic welding was a known way of connecting PVC sheets prior to the ’869 patent, testifying that “[t]hermoplastic welding or thermoplastic fusing was—thermoplastic welding was known at the time.” Ex. 1038, 115:22–116:5.

Patent Owner argues that, because “welded” is not expressly disclosed in Hanlie, Petitioner’s theory must be one of inherency. PO Resp. 60–61 (addressing the “welded” limitation of claim 22), 64 (addressing claim 30 and referring to the earlier arguments). Patent Owner further argues that

Petitioner cannot show that Hanlie necessarily discloses welding because the dictionary contains other definitions, namely “to blend thoroughly by or as if by melting together: COMBINE” and “to stitch by applying heat and pressure with or without the use of an adhesive,” and asserts that not all those techniques require melting. *Id.* at 61–62 (emphasis omitted) (quoting Ex. 1027, 474). Patent Owner’s expert, Dr. Schroeder, opines that a person having ordinary skill in the art “would have known that ‘fused’ encompasses many applications other than thermoplastic welding.” Ex. 2016 ¶ 128.

Dr. Schroeder does not offer a basis for this opinion other than pointing out that the dictionary contains other definitions. *See id.* ¶¶ 128–129.

Dr. Schroeder further opines, again without support, that a person having ordinary skill in the art would understand that there are a number of bonding methods “that can be used to fuse fibers/fabrics to polymer sheets.” *Id.* ¶ 129; *cf. id.* ¶ 130 (noting that the three layers of Hanlie’s strap are “fused” and making the unsupported assertion that “[a] PHOSITA would certainly have known that you would never want to weld PVC layers to chemical fiber, nylon, or cotton mesh.”).

In reply, Petitioner asserts that it is articulating an obviousness ground and did not make an inherency argument. Pet. Reply 22 (referring to the “welded” limitation of claim 22), 23–24 (for claim 30, referring to the earlier arguments); *see* Pet. 65 (regarding claim 30: “As discussed in Claim 22, the [sic] Hanlie, as combined with Fireman’s square mesh, renders this limitation obvious.”). Petitioner argues that the fact that both parties’ experts agree that welding of plastics was well-known in the art demonstrates that “fusing” in Hanlie discloses or at least suggests welding. Pet. Reply 22 (citing Ex. 1002 ¶¶ 40; Ex. 1040 ¶ 30; Ex. 1038, 115:22–

116:5). Petitioner also provides a declaration by a translator, who testifies that the original Chinese word in Hanlie means “connect by melting,” which Dr. Abraham equates with welding. Ex. 1039 ¶ 4; Ex. 2017, 93:15–20.

We find Dr. Abraham’s testimony to be more credible than Dr. Schroeder’s. Both experts agree that welding was a well-known joining method in the art of inflatable products. Ex. 1002 ¶ 40; Ex. 1038, 115:22–116:5. Dr. Abraham testifies as to how a person of ordinary skill in the art, having that knowledge, would read Hanlie’s disclosure of attaching internal straps to the top and bottom of an air mattress. *See* Ex. 1002 ¶¶ 40, 222; Ex. 1040 ¶ 30. Dr. Schroeder, on the other hand, testifies more generally, opining that an ordinary artisan would know that “‘fused’ encompasses many applications other than thermoplastic welding” (Ex. 2016 ¶ 128), but does not credibly address with any specificity how the ordinary artisan would understand the term “fused” in the context of Hanlie’s overall disclosure. *See id.* ¶¶ 127–130.

We find that Hanlie discloses or at least suggests to a person of ordinary skill in the art that the tensioning structure (strap) is welded to the top and bottom of the mattress. Petitioner has demonstrated that dependent claim 30 would have been obvious over Hanlie, Fireman, and the background knowledge of a person having ordinary skill in the art.

J. The Alleged Obviousness of Claims 25 and 26 Over Hanlie, Fireman, Kuriyama, and the Background Knowledge of a PHOSITA (Ground 10)

Petitioner contends that claims 25 and 26 would have been obvious over Hanlie, Fireman, Kuriyama, and the background knowledge of a person having ordinary skill in the art. Pet. 65–66. Claims 25 and 26 each depend directly from independent claim 24 and recite a limitation pertaining to the

thickness of the first and second weld sheets (mapped to the PVC layers of Hanlie's strap). *See* Ex. 1001, 22:34–42.

1. Claim 25

For claim 25, Petitioner relies on its earlier arguments. Pet. 65–66; *see id.* at 65 (“In particular, Kuriyama discloses PVC sheets with a variety of sheet thicknesses, including ranges overlapping the ranges recited in Claim 25.”). For the reasons discussed above in the context of claim 13 (Ground 3) containing a weld sheet thickness limitation, we determine that Petitioner has not demonstrated that dependent claim 25 would have been obvious over Hanlie, Fireman, Kuriyama, and the background knowledge of a person of ordinary skill in the art. *See, supra*, III.F.

2. Claim 26

Dependent claim 26 recites that “each of the first and second weld sheets is made of plastic having a thickness 20% to 40% less than a conventional plastic sheet having a thickness of 0.36 millimeters to 0.8 millimeters.” Ex. 1001, 22:39–42. Petitioner argues, *inter alia*, that Fireman discloses this limitation, therefore, the claimed range would have been obvious. Pet. 66 (“[T]he effective claimed range of 0.216mm to 0.64mm overlaps with the effective thickness of a single PVC sheet of Fireman's three-layer material.” (citing Ex. 1002 ¶¶ 127, 230, 239)); *id.* at 60 (the referenced analysis for claim 20 (citing *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018) (“[a] prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art.” (internal quotations omitted)))); *see also* Pet. Reply 9–11. We have reviewed Petitioner's arguments and evidence directed to claim 26, which Patent Owner does not separately dispute (*see* PO Resp. 64), and find that

Petitioner has shown by a preponderance of the evidence that claim 26 is unpatentable over Hanlie, Fireman, Kuriyama, and the background knowledge of a person having ordinary skill in the art.

K. The Alleged Obviousness of Claims 19 and 27 Over Hanlie, Fireman, the Background Knowledge of a PHOSITA, and Optionally Pennel (Ground 11)

1. Claim 19

Dependent claim 19 recites that “the first and second weld sheets are thinner than the first and second sheets.” Ex. 1001, 21:44–46. Thus, this claim calls for the tensioning structure layers (mapped to the PVC layers) to be thinner than the sheets (mapped to the top and bottom of the mattress).

Petitioner contends that this claim would have been obvious over Hanlie, Fireman, and the background knowledge of a person having ordinary skill in the art. Pet. 67–68. We have reviewed Petitioner’s arguments and evidence directed to claim 19, which Patent Owner does not separately dispute (*see* PO Resp. 64–65), and find that Petitioner has shown by a preponderance of the evidence that claim 19 is unpatentable over Hanlie, Fireman, and the background knowledge of a person having ordinary skill in the art.

2. Claim 27

Dependent claim 27 recites that “the first and second weld sheets have full surface-area contact in spaces between the plurality of strands.” Ex. 1001, 22:43–45. Petitioner contends that this claim would have been obvious over Hanlie, Fireman, the background knowledge of a person having ordinary skill in the art, and optionally Pennel, and relies on its earlier arguments. Pet. 68. For the reasons discussed above in the context of claim 17 (Ground 7) containing a full surface-area contact limitation, we

determine that Petitioner has not demonstrated that dependent claim 27 would have been obvious over Hanlie, Fireman, the background knowledge of a person having ordinary skill in the art, and optionally Pennel. *See, supra*, III. G.

IV. PATENT OWNER’S CONSTITUTIONAL CHALLENGE

Patent Owner states that it “challenges the constitutionality of, and the panel’s authority to adjudicate, this proceeding.” PO Resp. 65 (citing *Smith & Nephew, Inc. v. Arthrex, Inc.*, 141 S. Ct. 551 (2020) (granting certiorari); *Arthrex, Inc. v. Smith & Nephew Inc.*, 941 F.3d 1320 (Fed. Cir. 2019)). We decline to address Patent Owner’s constitutional challenge except to note that the constitutionality of the appointments of the Administrative Patent Judges was addressed by the United States Supreme Court in *United States v. Arthrex, Inc.*, 141 S. Ct. 1970 (2021).

V. CONCLUSION⁶

Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4–12, 14–16, 19, 24, 26, and 28–30 of the ’869 patent are unpatentable over the relied-on references. Petitioner has *not* shown by a

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

preponderance of the evidence that claims 3, 13, 17–18, 20–23, 25, and 27 are unpatentable over the relied-on references.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 4, 5, 8–12	103(a)	Hanlie, Fireman	1, 2, 4, 5, 8–12	
6, 7	103(a)	Hanlie, Fireman, Boso	6, 7	
13	103(a)	Hanlie, Fireman, Kuriyama		13
15	103(a)	Peterson, Hanlie, Liu	15	
16	103(a)	Hanlie, Fireman, Liu, Song	16	
14	103(a)	Hanlie, Fireman, optionally Liu, Song	14	
3, 17, 21–23	103(a)	Hanlie, Fireman, optionally Pennel		3, 17, 21–23
18, 20	103(a)	Hanlie, Fireman, Kuriyama, optionally Pennel		18, 20
24, 28–30	103(a)	Hanlie, Fireman, Background Knowledge of PHOSITA	24, 28–30	
25, 26	103(a)	Hanlie, Fireman, Kuriyama, Background Knowledge of PHOSITA	26	25
19, 27	103(a)	Hanlie, Fireman, Background Knowledge of PHOSITA, optionally Pennel	19	27

Overall Outcome			1, 2, 4–12, 14–16, 19, 24, 26, 28–30	3, 13, 17, 18, 20–23, 25, 27
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VI. ORDER

For the foregoing reasons, it is

ORDERED that claims 1, 2, 4–12, 14–16, 19, 24, 26, and 28–30 of the '869 patent have been proven to be unpatentable;

FURTHER ORDERED that that Patent Owner's Motion to Strike is *dismissed* as moot;

FURTHER ORDERED that that Petitioner's Motion to Strike is *dismissed* as moot; and

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

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