

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORP.,
Petitioner,

v.

BESTWAY INFLATABLES & MATERIALS CORP.,
Patent Owner.

IPR2023-00488
Patent 10,687,633 B2

Before BARRY L. GROSSMAN, KIMBERLY McGRAW, and
RICHARD H. MARSCHALL, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

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

I. INTRODUCTION

Intex Recreation Corp. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 3–15 and 17 of U.S. Patent No. 10,687,633 B2 (Ex. 1001, “the ’633 patent”). Petitioner also filed a Ranking and Explanation of Material Differences Between Petitions to address its four concurrently filed petitions (IPR2023-00486 through IPR2023-00489) challenging claims of the ’633 patent. Paper 3. Bestway Inflatables and Material Corp. (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). With our authorization (Paper 9), Petitioner then filed a Reply (Paper 10, “Reply”) to respond to Patent Owner’s Preliminary Response, to which Patent Owner filed a Sur-Reply to Petitioner’s Reply. Paper 11 (“Sur-Reply”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted unless “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Applying this standard, we institute an *inter partes* review of all challenged claims of the ’633 patent on the grounds asserted in the Petition.

II. BACKGROUND

A. *Related Matters*

The parties identify *Bestway (USA), Inc. et al. v. Intex Recreation Corp. et al.*, No. 2:22-cv-00406 (C.D. Cal.) (the “District Court Proceeding”) as a related matter involving the ’633 patent. Pet. 1; Paper 6

(Patent Owner's Mandatory Notice), 2.¹ In addition, the parties identify IPR2023-00486, IPR2023-00487, and IPR2023-00489, which also challenge claims of '633 patent, as well as pending U.S. Patent Appl. No. 16/907,893, which is a continuation of the application that became the '633 patent, as related matters. Pet. 1; Paper 6, 2.

B. Real Parties-in-Interest

Petitioner identifies itself, Intex Development Company Ltd., Intex Industries (Xiamen) Co., Ltd., and Intex Marketing Ltd. as real parties-in-interest. Pet. 1. Patent Owner identifies itself, Bestway (USA), Inc., Bestway Global Holding, Inc., and Bestway (Hong Kong) International, Ltd. as real parties-in-interest. Paper 6.

C. Overview of the '633 patent

The '633 patent, titled "Inflatable Bed," "relates to inflatable beds or inflatable mattresses, and more specifically, to an inflatable bed, the structure of which is configured to limit the outward bulging or deformation of a side wall." Ex. 1001, code (54), 1:12–15. The '633 patent discloses that prior art inflatable beds or mattresses having a larger height can experience side wall bulging and deforming, which affects appearance and may result in decay of air pressure and softening that reduces comfort. *Id.* at 1:37–46. The '633 patent also discloses that these prior art inflatable beds or mattresses also have a stability issue in which the bed may roll over as a user sits or lies near the edge. *Id.* at 1:60–65. According to the '633 patent, "[t]he technical problem to be solved by the present invention to provide an

¹ Patent Owner's Mandatory Notice filed in accordance with 37 C.F.R. § 42.8 does not include page numbers. Paper 6. We consider the title page as page 1 and then proceed from there in numerical order.

inflatable bed, in order to overcome the defects of easy occurrence of bulging and deformation of the side walls of the inflatable beds and inflatable mattresses, poor stability of the inflatable beds and inflatable mattresses, and susceptibility of roll-over.” *Id.* at 2:7–12.

Figure 6 of the '633 patent, reproduced below, is a partial section view of an inflatable bed according to a first embodiment. *Id.* at 5:13–15.

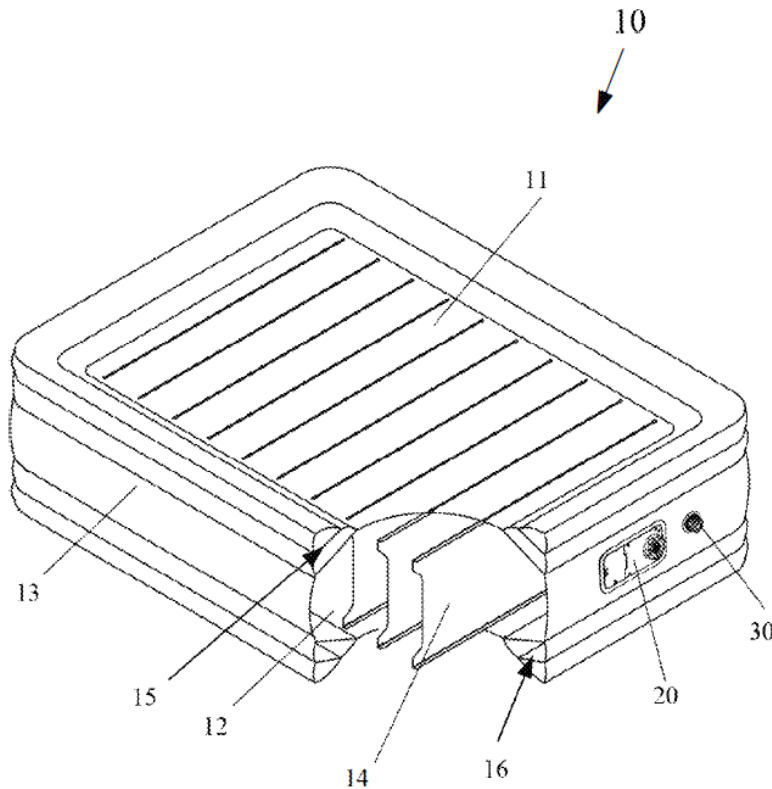


Fig. 6

Figure 6 of the '633 patent depicts inflatable bed 10 including top sheet 11, bottom sheet 12, at least one side wall 13, and at least one first tensioning structure 14. *Id.* at 6:18–22. An upper edge of sidewall 13 is coupled to an outer edge of top sheet 11 and a lower edge of sidewall 13 is coupled to an outer edge of bottom sheet 12. *Id.* at 6:22–26. An air chamber is formed between the top sheet 11, bottom sheet 12, and side wall 13. *Id.* at

6:26–28. First tensioning structure 14 includes upper and lower ends that are coupled to top sheet 11 and lower sheet 12, respectively. *Id.* at 6:28–31. According to the '633 patent, first tensioning structure 14 limits upward and downward bulging of top sheet 11 and bottom sheet 12 after the air chamber is inflated. *Id.* at 6:31–35. Inflatable bed 10 also includes a support structure comprising second tensioning structure 15 and third tensioning structure 16. *Id.* at 6:47–48. Second tensioning structure 15 is coupled to side wall 13 and top sheet 11 to limit lateral bulging of top sheet 11 and side wall 13 after the air chamber is inflated. *Id.* at 6:49–55. Similarly, third tensioning structure 16 is coupled to side wall 13 and bottom sheet 12 to limit lateral bulging of bottom sheet 12 and side wall 13. *Id.* at 6:56–63.

D. The Challenged Claims

Petitioner challenges dependent claims 3–15 and 17 of the '633 patent. Pet. 1. Each of the claims depend directly or indirectly from claim 1, which is representative of the challenged subject matter and is reproduced below with bracketed lettering added.

1.[a] An inflatable bed, comprising:

[b] a top sheet and a bottom sheet disposed vertically at an interval;

[c] at least one side wall, an upper edge of said side wall being coupled to an outer edge of said top sheet, a lower edge of said side wall being coupled to an outer edge of said bottom sheet, an air chamber formed between said top sheet, said bottom sheet and said side wall;

[d] at least one first tensioning structure disposed in said air chamber, an upper end and a lower end of said first tensioning structure being respectively coupled to said top sheet and said bottom sheet; and

[e] at least one support structure disposed in said air chamber, said support structure being disposed in a longitudinal direction of at least one of said side walls, at least two outside

edges of said support structure being respectively coupled to the side wall adjacent, at least one inside edge of said support structure being coupled to the top sheet or bottom sheet adjacent;

[f] wherein said support structure comprises a second tensioning structure and a third tensioning structure, at least two outside edges of said second tensioning structure are respectively coupled to said at least one side wall, at least one inside edge of said second tensioning structure is coupled to said top sheet; and

[g] wherein at least two outside edges of said third tensioning structure are respectively coupled to said at least one side wall, at least one inside edge of said third tensioning structure is coupled to said bottom sheet.

Ex. 1001, 12:37–65.

E. Asserted Grounds of Unpatentability

Petitioner contends claims 3–15 and 17 of the '633 patent are unpatentable on the following grounds. Pet. 3–4.

Claim(s) Challenged	35 U.S.C. §	Reference(s)
3–11, 17	103 ²	Aoki ³
3–14, 17	103	Aoki, Lin '773 ⁴
12	103	Aoki, Lin '773, Metzger ⁵
15	103	Aoki, Lin '773, Liu ⁶

² The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103 effective March 16, 2013.

Because the application giving rise to t '633 patent was filed after that date, with no benefit claim prior to that date, the AIA version of § 103 applies. *See* Ex. 1002, (60). Thus, we refer to the AIA version of 35 U.S.C. § 103.

³ JPU-1-1974-034811, dated June 28, 1972 (Japanese language document (Ex. 1004); English translation (Ex. 1005, “Aoki”).

⁴ US 8,562,773 B2, issued Oct. 22, 2013 (Ex. 1009, “Lin '773”).

⁵ US 7,089,618 B1, issued Aug. 15, 2006 (Ex. 1010, “Metzger”).

⁶ US 2015/0335164 A1, published Nov. 26, 2015 (Ex. 1015, “Liu”).

In support of its unpatentability arguments, Petitioner relies on the declaration of Bernhard Kuchel. Ex. 1002 (“Kuchel Declaration”).

F. Overview of Asserted Art

1. *Aoki*

Aoki is a Japanese patent application that “relates to a highly stable box-shaped air mattress structure.” Ex. 1005, 2.⁷ Aoki discloses a “box-shaped air mattress in which a vertical hanging sheet between the upper and bottom sheet of the box-shaped air mattress, as well as diagonal bracing hanging sheets between the upper and lengthwise sheets, bottom and lengthwise sheets, upper and widthwise sheets, and the bottom and widthwise sheets, respectively.” *Id.*

Figure 1 of Aoki, reproduced below, shows an embodiment of a box-shaped air mattress. *Id.* at 6.

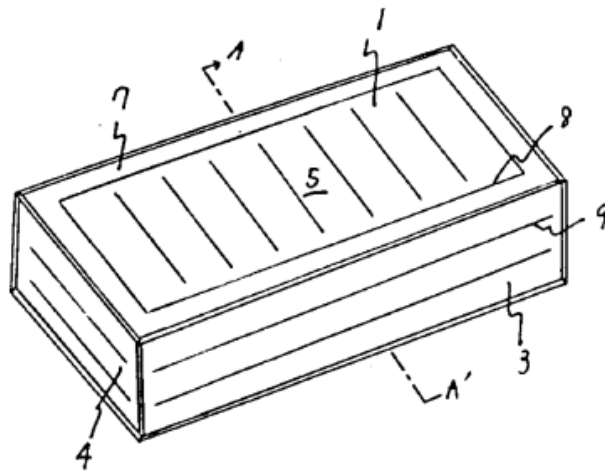


Figure 1 of Aoki depicts box-shaped air mattress 5 including upper sheet 1, bottom sheet 2 (not shown), peripheral areas 7, lengthwise sheet 3, and

⁷ We cite to the exhibit page numbers added by Petitioner to the English language version (Ex. 1005).

widthwise sheet 4. *Id.* at 3. Multiple vertical hanging sheets 6 (labelling not shown) are located between the upper and lower sheets. *Id.*

Figure 2 of Aoki, reproduced below, is a cross-section view of box-shaped air mattress 5 shown in Figure 1 along line A–A'. *Id.* at 6.

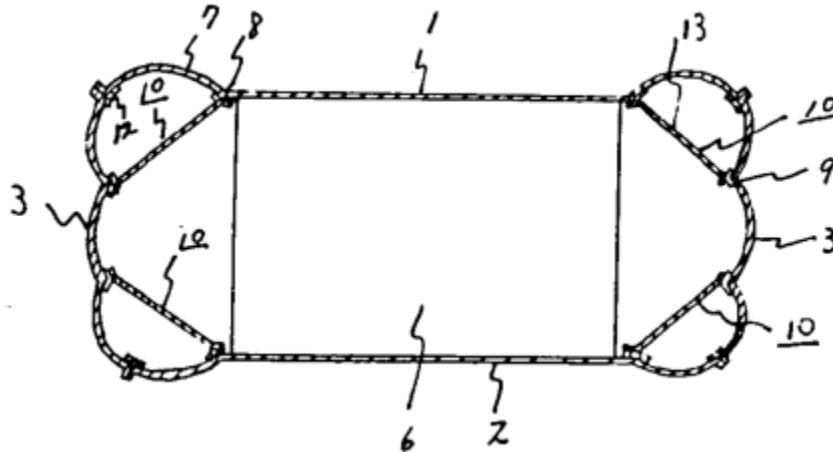


Figure 2 of Aoki depicts vertical hanging sheet 6 placed in between upper sheet 1 and lower sheet 2. *Id.* at 3. Each diagonal bracing hanging sheet 10 adheres to one of lengthwise sheets 3 and one of upper sheet 1 and lower sheet 2. *See id.* Diagonal bracing sheets 10 tense to maintain an almost perpendicular relationship between upper and lower sheets 1 and 2 and lengthwise and widthwise sheets 3 and 4. *Id.* at 4. Aoki also discloses that, for large box-shaped air mattresses, two or more diagonal bracing sheets 10 may be used in each corner to the air mattress. *Id.* at 5, Fig. 4.

2. Lin '773

Lin '773, titled “Method of Producing an Internal Tensioning Structure Useable with Inflatable Devices,” relates “to an inflatable product structure which is light in weight and low in cost.” Ex. 1009, code (54), 1:20–22. Lin '773 discloses an internal tensioning structure for inflatable products that maintains a desired geometric arrangement of inflatable surfaces. *Id.* at 2:8–13.

Figure 1 of Lin '773, reproduced below, is an exploded perspective view of a tensioning structure according to one embodiment. *Id.* at 5:4–6.

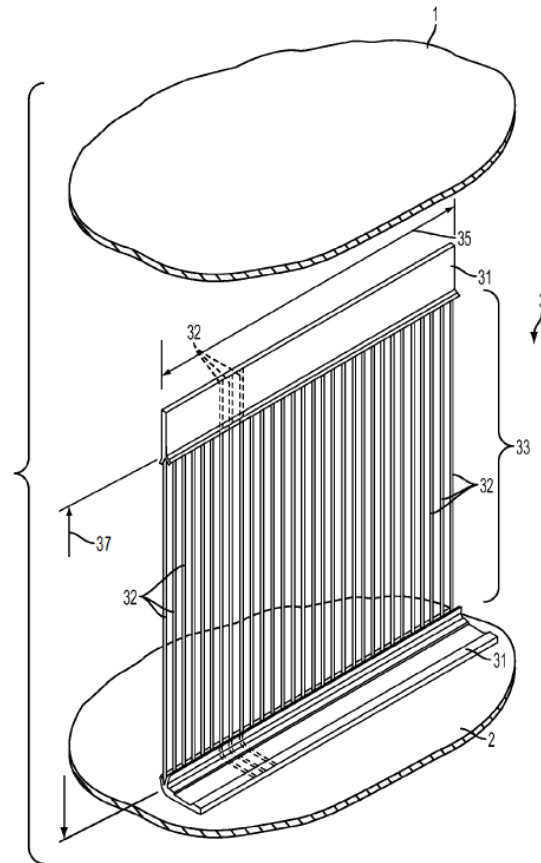


FIG. 1

Figure 1 of Lin '773 depicts tensioning structure 3 for joining upper material 1 and lower material 2. *Id.* at 7:16–22. Tensioning structure 3 includes upper and lower weld strips 31, which are connected by a plurality of substantially-parallel strands 32 and are welded to upper material 1 and lower material 2. *Id.* at 7:16–25.

3. *Liu*

Liu, titled “Internal Supports for Inflatable Products,” relates “to an inflatable product incorporating a durable tensioning structure that is light in weight and low in cost.” Ex. 1015, code (54), ¶ 3. Liu discloses a

tensioning structure that spans the gap between sheets of an inflatable product. *Id.* ¶ 11.

Figure 1 of Liu, reproduced below, is an exploded perspective view of an exemplary air mattress incorporating a tensioning structure. *Id.* ¶ 21.

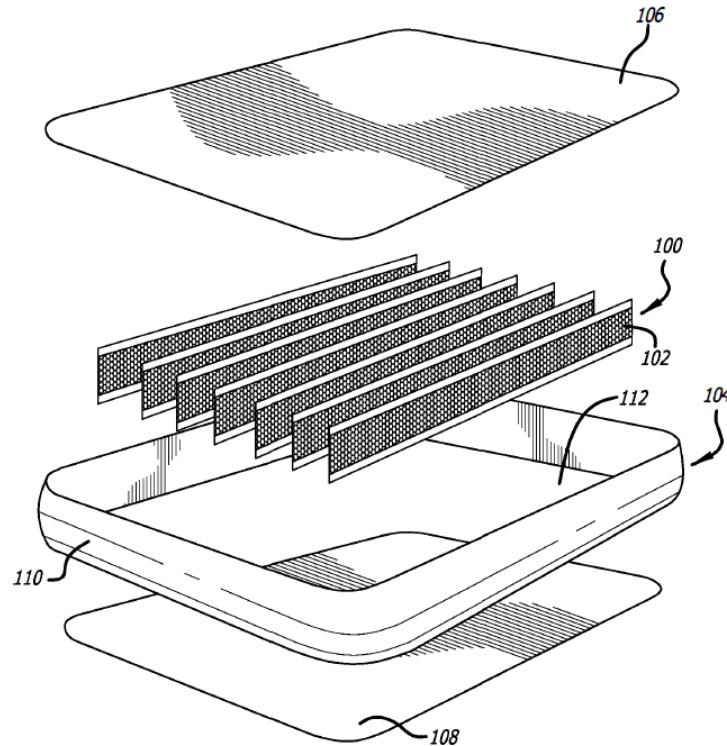


FIG. 1

Figure 1 of Liu depicts inflatable air mattress 104 including top sheet 106 and bottom sheet 108, and flexible sidewall 110, which are peripherally-welded to form inflatable chamber 112. *Id.* ¶ 37. Tensioning structures 100 within inflatable chamber 112 may include one or more I-beam support structures 102 attached to the inner surfaces of top sheet 106 and bottom sheet 108. *Id.* Liu also discloses the use of “RF welding, hot-air coupling, adhering, or other means known in the art” to attach tensioning structures to the top and bottom sheets. *Id.* ¶ 54.

4. Metzger

Metzger is a U.S. patent titled “Air Mattress” that “relates to an air mattress or bed constructed to limit the expansion or deformation of the mattress during use.” Ex. 1010, code (54), 1:6–8. Metzger states that “a need exists for an improved double height air mattress better adapted for controlling or limiting the expansion or deflection of the mattress sidewall, or sidewalls, during usage.” *Id.* at 2:48–51.

Figure 7 of Metzger, reproduced below, is a partial cross-section view of an air mattress according to one embodiment. *Id.* at 3:66–67.

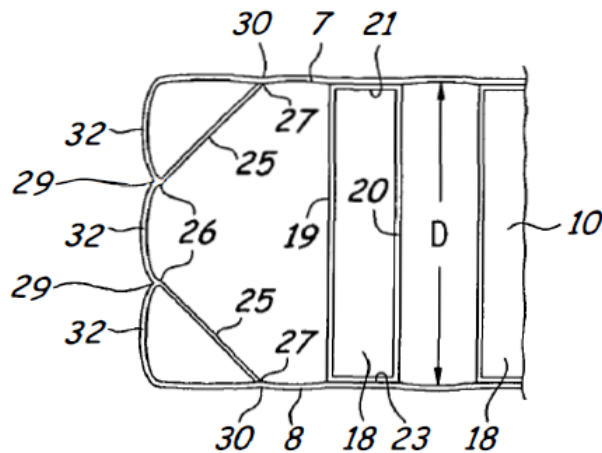


Figure 7 of Metzger depicts an air mattress including top panel 7 and bottom panel 8 tied together by spaced coils 18 extending through air chamber 10. *Id.* at 4:41–51. Side support beams 25 extend lengthwise along the side panels of the air mattress (not labeled). *Id.* at 5:27–30. Each support beam 25 has first edge 26 affixed to a side panel along weld line 29 and second edge 27 affixed to top panel 7 or bottom panel 8 along weld line 30. *Id.* at 5:27–35. Metzger discloses that side support beams 25 act to limit the outward expansion of the side panel of the air mattress in response to the presence of a load placed externally on the first panel or the second panel. *Id.* at 5:52–59.

III. ANALYSIS

A. Discretion under 35 U.S.C. § 314(a) Due to Parallel Petitions

Petitioner filed four petitions challenging the patentability of claims of the '633 patent. Two of the petitions, namely the present Petition and petition filed in IPR2023-00486 (the “486-Petition”), present challenges based on Aoki alone or in combination with other references. The two other petitions, namely those filed in IPR2023-00487 and IPR2023-00489, present challenges based on Lin with other references.

Of the two petitions that rely on Aoki, the 486-Petition, which Petitioner ranked first, challenges the claims that are at issue in the related District Court Proceeding (i.e., claims 1, 2, 16, 19, and 20). The present Petition challenges claims that were not asserted in the District Court Proceeding, (i.e., claims 3–15 and 17⁸⁸, “the “Non-Asserted claims”).

Petitioner asserts that institution of the present Petition, challenging the Non-Asserted Claims, in addition to the 486-Petition, challenging the Asserted Claims, is warranted because (1) there is no overlap in claims between the two sets of petitions, (2) the length of the claims, disparate features recited, and issues required to be addressed in each petition make it impossible to challenge all Asserted and Non-Asserted claims in one petition, and (3) separation of the petitions between the Asserted and Non-Asserted claims serves administrative efficiency and finite resources of the Board and Petitioner. Paper 3, 2–5. With respect to efficiency, Petitioner

⁸⁸ Petitioner does not challenge claim 18, contending that the claim is indefinite and indefiniteness cannot be resolved in an IPR. Paper 3, 2 n.1.

agrees to terminate the present proceeding if Patent Owner confirms that it will not sue on the Non-Asserted Claims. Paper 3, 3.

Patent Owner argues Petitioner fails to justify multiple petitions to challenge only 19 claims and requests that the Board institute on no more than one of the four petitions. Prelim. Resp. 1–15.

Based on the particular circumstances presented here, we determine Petitioner has presented a reasonable explanation as to why a second petition challenging the Non-Asserted claims, in addition to the petition filed in IPR2023-00486 challenging the Asserted Claims, is warranted. Although there are a total of only 19 claims challenged, Petitioner has sufficiently shown that two petitions are required to address each of the claims.

For example, Petitioner explains that the arguments for the grounds in the 486-Petition required 6,644 words and that the arguments for the grounds in the present Petition required 9,779 words. This word count does not include the sections describing the '633 patent or its file history, the background of the state of the art, the summary of the asserted prior art, claim construction, or the level of skill in the art. We agree with Petitioner that it would not be possible to effectively present its Aoki-based challenges to each of the claims in a single Petition. Any condensing of the argument may have come at the cost of clarity.

Patent Owner also asserts that each of Petitioner's Aoki-based Petitions presents "multiple redundant grounds" for at least some of the claims. *See* Prelim. Resp. 3. We disagree with Patent Owner's characterization of the multiple grounds as "redundant." For example, in each Aoki-based proceeding, Petitioner presents challenges based on Aoki alone as well as Aoki in combination with Lin '733. *See* Paper 3, 1.

Petitioner relies on Lin '733 to address the possibility that Aoki does not disclose the “coupled” to limitations recited in claim 1. *See, e.g.*, Pet. 49. We do not see the grounds relying upon Aoki and Lin '733 to be redundant of the grounds relying on Aoki alone.

We also agree with Petitioner that Patent Owner’s failure to stipulate that the claims challenged in the present petition will not be asserted in the parallel District Court litigation supports our decision to decline to exercise our discretion to deny institution. *See, e.g., Square, Inc. v. 4361423 Canada, Inc.*, IPR2019-01653, Paper 9 at 51 (May 12, 2020) (granting institution of a second petition where “Patent Owner did not . . . stipulate that certain claims challenged in these Petitions would not be asserted in the parallel litigation”); *see* Consolidated TPG 61 (“Among other issues, the patent owner should explain whether the differences identified by the petitioner are directed to an issue that is not material or not in dispute. If stating that issues are not material or in dispute, the patent owner should clearly proffer any necessary stipulations.”). Notably, Patent Owner did not proffer any stipulations in its response to seek to avoid additional petitions. Rather, Patent Owner expressly states that it “is *not* willing to ‘confirm that it will not sue on the Non-Asserted claims’” Prelim. Resp. 9.

We also note that the present proceeding and the IPR2023-00486 proceeding can be coordinated and that a similar or common schedule can be adopted, thus decreasing the inconvenience to the Patent Owner.

Given the particular circumstances of this case, Petitioner has sufficiently shown that it requires more than one petition to challenge all of the claims of the '633 patent on its Aoki-based grounds. Accordingly, we

decline to exercise our discretion to deny the instant Petitioner under § 314(a) on the basis of Petitioner's filing of multiple petitions.

B. Claim Construction

We apply the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b), including construing the claim accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history. 37 C.F.R. § 42.100(b) (2020). Under this standard, claim terms 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. *Philips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc). Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Board Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review). Based on the present record, we determine that no claim terms need to be construed to resolve any controversies in dispute.

C. Level of Skill in the Art

Petitioner asserts that a POSITA would have “at least: [a] bachelor's degree in mechanical engineering, or an equivalent field; or [a]n associate's degree in mechanical engineering, or an equivalent field, and two years of practical experience in inflatable product design.” Pet. 16 (citing Ex. 1002 ¶¶ 30–31) (bullet symbols omitted). Petitioner asserts that “[m]ore

education can supplement practical experience and vice versa.” *Id.* (citing Ex. 1002 ¶ 32).

Patent Owner does not dispute Petitioner’s definition of a POSITA. *See generally* Prelim. Resp. We adopt Petitioner’s definition of a POSITA, except that we delete the qualifier “at least” to eliminate vagueness as to the appropriate level of education or experience. The qualifier expands the range without an upper bound (e.g., encompassing a Ph.D. degree and beyond) and thus does not meaningfully indicate the level of ordinary skill in the art. This definition of a person of ordinary skill in the art is supported by the testimony of Mr. Kuchel and appears to be commensurate with the level of ordinary skill as reflected in the prior art and the ’633 patent. *See* Ex. 1002 ¶¶ 31–32.

D. Legal Principles

An invention is not patentable under 35 U.S.C. § 103 “if the differences between the subject matter sought to be patented 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.” 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) where in evidence, so-called secondary considerations, including commercial success, long-felt but unsolved needs, and failure of others.⁹ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

⁹ At this stage of the proceeding, neither party has directed us to evidence of such secondary considerations.

When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

E. Asserted Unpatentability of Claims 3–11 and 17 over Aoki (Ground 1)

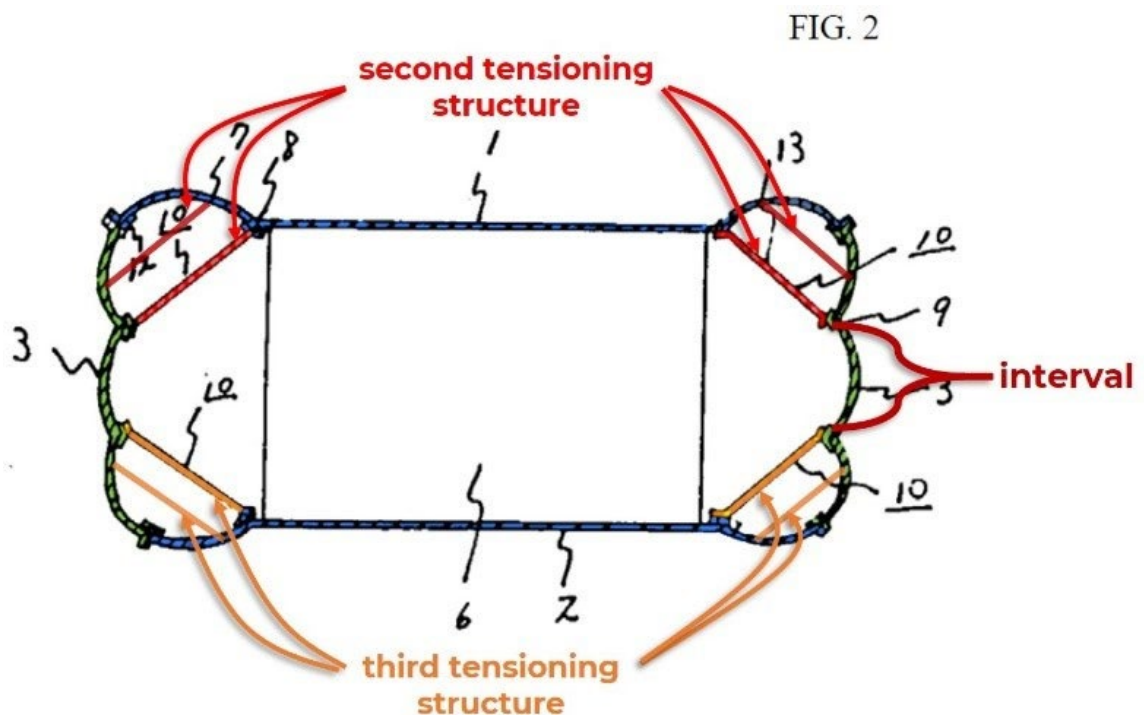
Petitioner contends that independent claim 3–11 and 17 are unpatentable under 35 U.S.C. § 103 over Aoki. Pet. 23–49. Patent Owner does not address the merits of the Petition in its Preliminary Response. *See* Prelim. Resp. For the reasons set forth below, we determine Petitioner has shown a reasonable likelihood that claims 3–11 and 17 are unpatentable over Aoki.

1. Claim 3

Claim 3 depends on claim 1. Petitioner asserts that Aoki teaches all of the limitations of claim 1 for the same reasons set forth in IPR2023-0486 *Compare* Pet. 23–32 *with* 486-Petition 26–36. For example, Petitioner asserts that Aoki discloses an inflatable bed having a top sheet, bottom sheet, side walls coupled to the top and bottom sheet as recited in claim elements 1[a]–[c]. *See* Pet. 23–24 (citing, *inter alia*, Ex. 1005, 2–3, 5, Figs, 1, 2; Ex. 1002 ¶ 129). Petitioner also asserts that Aoki’s vertical sheets 6 teach a first tensioning structure as recited in claim element 1[d] and that Aoki’s diagonal bracing hanging sheets 10 teach a support structure having a second and third tensioning structure as required by claim elements 1[e]–[g]. *See* Pet. 25–33 (citing, *inter alia*, Ex. 1005 2–5, Figs. 1–4; Ex. 1002 ¶¶ 130–154).

Patent Owner does not dispute Petitioner's contentions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine Petitioner sufficiently shows Aoki teaches the limitations of claim 1.

Claim 3 further requires that the second and third tensioning structures are disposed at an interval. Petitioner asserts that the diagonal bracing hanging sheets shown in Figures 2 and 4 that are adhered between the upper sheet and the side walls comprise a second tensioning structure and that the diagonal hanging sheets that are adhered between the bottom sheet and side walls comprise a third tensioning structure. Pet. 30–31 (citing Ex. 1005, Figs 2, 4). Petitioner further asserts, *inter alia*, that Figure 2 of Aoki, reproduced below, depicts a second tensioning structure (in red) and a third tensioning structure (in orange) that are disposed at an interval. Pet. 33 (citing Ex. 1005, Figs 2, 4; Ex. 1002 ¶¶ 148–150).



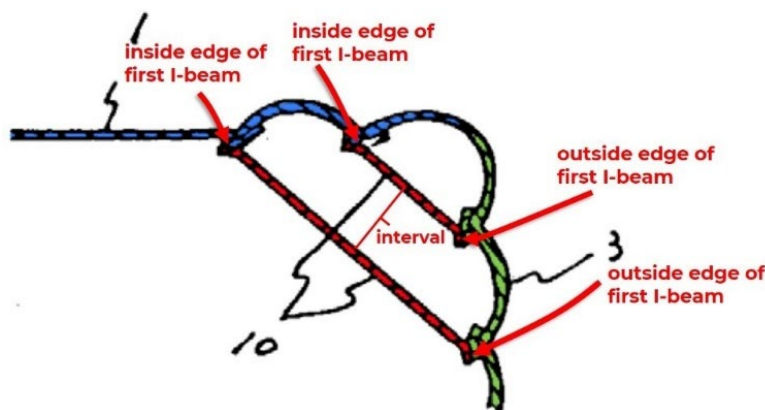
Aoki Figure 2 above depicts a cross section of an air mattress with color labeling added by Petitioner to identify the second and third tensioning structures that are separated by an interval. Pet. 33; Ex. 1005, 6.

Patent Owner does not dispute Petitioner's assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations of claim 3.

2. Claim 4

Claim 4 depends from claim 1 and further requires that the "second tensioning structure comprises at least two first I-beams, an outside edge and an inside edge of each of said first I-beams are respectively coupled to said side wall and said top sheet adjacent, the at least two first I-beams are disposed at an interval." Petitioner contends that Aoki's Figure 4 teaches the limitations by showing that that the outside and inside edge of the two depicted diagonal bracing hanging sheets (I-beams) are respectively coupled to the side wall and top sheet adjacent. Pet. 34 (citing Ex. 1002 ¶¶ 151–154; Ex. 1005, Fig. 4). An annotated version of Aoki's Figure 4, with Petitioner's labeling and color coding added, is reproduced below.

FIG. 4

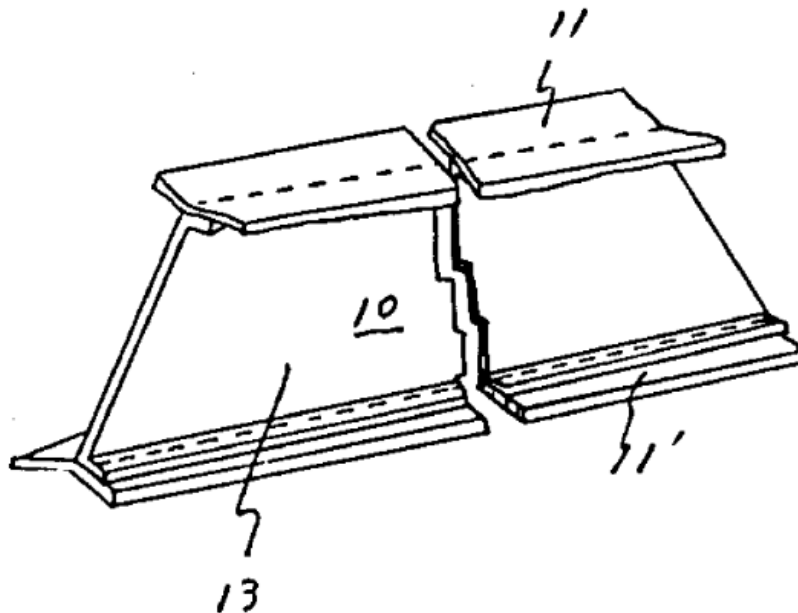


Aoki's Figure 4 above depicts a cross section of an air mattress having two diagonal bracing hanging sheets 10, with color labeling added by

Petitioner to identify the inside and outside edges of the two depicted first I-beams. Pet. 33; Ex. 1005, 6.

Patent Owner does not dispute Petitioner's assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations of claim 4. We also note that Aoki Figure 3, shown below, appears to depict diagonal bracing hanging sheet 10 as an I-beam. Ex. 1005, Fig. 3; *see also* Pet. 26 (citing Fig. 3).

Figure 3



Aoki's Figure 3 above is an oblique figure with the diagonal bracing hanging sheet 10 partially omitted. Ex. 1005, 6. The diagonal bracing hanging sheet appears to be structured as an I-beam.

Patent Owner does not dispute Petitioner's assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's

arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations of claim 3.

3. *Claim 5*

Claim 5 depends from claim 4 and further requires that the “least two first I-beams are spaced apart from each other at a lower surface of said top sheet.” Petitioner contends that Aoki teaches these limitations by showing two diagonal bracing hanging sheets are spaced apart from each other at a lower surface of the upper sheet. Pet. 35–36.

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 5.

4. *Claim 6*

Claim 6 depends from claim 4 and further requires that the “at least two first I-beams are disposed at an interval on an inner surface of said side wall.” Petitioner contends that Aoki’s Figure 4 teaches the limitations by showing that the two diagonal bracing hanging sheets (I-beams) comprising the second tensioning structure are disposed at an interval on an inner surface of the lengthwise side sheet (side wall). Pet. 36–37 (citing Ex. 1005, Fig. 4; Ex. 1002 ¶¶ 158–160).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 6.

5. *Claim 7*

Claim 7 depends from claim 4 and further requires that the “least two first I-beams as a whole are of a continuous annular structure or a segmental annular structure.” Petitioner contends that the multiple diagonal bracing hanging sheets shown in Figure 1 of Aoki are adhered to both the lower surface of the upper sheet and along the side walls in an annular shape.

Pet. 37. Petitioner asserts that Aoki’s four separate diagonal hanging bracing sheets spanning four sides of the inflatable bed are of a segmental annual structure, similar to the segmented annual structure of the separate I-beams shown in Figures 8 and 14 of the ’633 patent. Pet. 38 (citing, *inter alia*, Ex. 1002 ¶¶ 161–163; Ex. 1001, 7:41–50, 9:56–59, Fig. 8, 14). Relying on the testimony of Mr. Butcher, Petitioner asserts that Aoki’s diagonal hanging bracing sheets can also be considered to be of a “continuous annular structure” because the diagonal bracing hanging sheets are attached to the lower surface of the upper sheet in a continuous rectangular shape, as shown in Aoki Figure 1. Pet. 38; Ex. 1002 ¶ 162.

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 7.

6. *Claim 8*

Claim 8 depends from claim 1 and recites “wherein said third tensioning structure comprises at least two second I-beams, an outside edge and an inside edge of each of said second I-beams are respectively coupled to the side wall and said bottom sheet adjacent, the at least two second I-beams are disposed at an interval.” Petitioner asserts that Aoki discloses two

diagonal bracing hanging sheets, each having an outside edge couple to a side wall and an inside edge coupled to a bottom sheet, that are disposed at an interval. Pet. 39–40 (citing Ex. 1002 ¶¶ 164–168; Ex. 1005, 4–5, Fig. 4).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 8.

7. *Claim 9*

Claim 9 depends from claim 8 and further requires that the two second I-beams are spaced apart from each other at an upper surface of the bottom sheet. Petitioner asserts, *inter alia*, that because Aoki discloses providing the same diagonal bracing hanging sheets to each corner of the air mattress, Aoki discloses this limitation for the same reasons it discloses the limitations of claim 5. Pet. 40–41 (citing Ex. 1005, 4–5, Fig. 4; Ex. 1002 ¶¶ 169–172).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 9.

8. *Claim 10*

Claim 10 depends from claim 8 and recites “wherein said at least two second are disposed at an interval on the inner surface of said side wall.” We understand the “said at least two second” refers to the at least two second I-beams of the third tensioning structure recited in claim 8.

Petitioner asserts, *inter alia*, that because Aoki discloses providing the same diagonal bracing hanging sheets to each corner of the air mattress,

Aoki discloses this limitation for the same reasons it discloses the limitations of claim 6. Pet. 42–43 (citing Ex. 1005, 4–5, Fig. 4; Ex. 1002 ¶¶ 173–176).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 10.

9. *Claim 11*

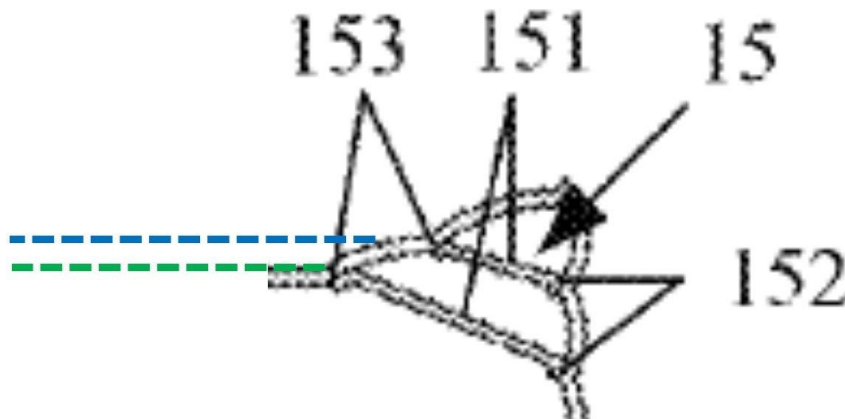
Claim 11 depends on claim 8 and further recites “wherein said at least two second I-beam as a whole are of a continuous annular structure or a segmental annular structure.”

Petitioner asserts, *inter alia*, that because Aoki discloses providing the same diagonal bracing hanging sheets to each corner of the air mattress, Aoki discloses this limitation for the same reasons it discloses the limitations of claim 7. Pet. 43–45 (citing Ex. 1005, 4–5, Fig. 4; Ex. 1002 ¶¶ 177–181).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 11.

10. *Claim 17*

Claim 17 depends from claim 1 and further recites “wherein a location where said top sheet is located in the inside part of an upper edge of said second tensioning structure is lower than the location where said top sheet is located in the outside part of the upper edge of said second tensioning structure.” Petitioner asserts Aoki’s Figure 5 discloses this limitation. Pet. 45–49 (citing Ex. 1001, Fig. 5; Ex. 1002 ¶¶ 182–185). An excerpt of Aoki’s Figure 5, with color annotations added by Petitioner is reproduced below.



The figure above depicts an excerpt of Aoki's Figure 5, illustrating a close up of the upper right corner of an air-mattress, with green and blue annotations added by Petitioner. Ex. 1005, 6; Pet. 46–47; Ex. 1002 ¶ 183.

Patent Owner does not dispute Petitioner's assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine that Petitioner sufficiently shows that Aoki teaches the limitations recited in claim 17.

F. Asserted Unpatentability of Claims 3–14 and 17 of the '633 Patent over Aoki and Lin '733 (Ground 2)

Petitioner contends that dependent claim 3–14 and 17 are unpatentable under 35 U.S.C. § 103 over Aoki in view of Lin '733. Pet. 23–49. Patent Owner does not address the merits of the Petition in its Preliminary Response. *See* Prelim. Resp. For the reasons set forth below, we determine Petitioner has shown a reasonable likelihood that claims 3–14 and 17 are unpatentable over Aoki.

1. Claim 3–11 and 17

Claims 3–11 and 17 depend directly or indirectly upon claim 1. Petitioner argues, for the same reasons it set forth in IPR2023-00486, that to the extent Aoki does not disclose that its diagonal hanging bracing sheets are “coupled” to the outer surfaces as recited in claim 1, that claim 1 would have

been obvious over Aoki in view of Lin '733, which teaches coupling its tensioning structures to the top, bottom, and side sheets using a high frequency welding process. *Compare* Pet. 49–54 *with* 486-Petition 38–43. Patent Owner does not dispute Petitioner's contentions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine Petitioner has sufficiently shown that the combined teachings of Aoki and Lin '733 teach the subject matter recited in claim 1 and has articulated sufficient reasoning with rational underpinning for combining the references. *See* Pet. 49–54 (citing, *inter alia*, Ex. 1002 ¶¶ 187–194; Ex. 1009, 1:20–22, 6:52–56, 7:9–14, 7:16–25, 7:53–8:3, 8:47–55, 8:67–9:1, 9:52–55, 10:19–20, 16:17–31, 18:25–30, Figs. 1, 3).

With respect to the additional limitations set forth in dependent claims 3–11 and 17, Petitioner asserts, *inter alia*, that Aoki teaches the limitations of these dependent claims and that modification of Aoki to employ Lin '733's I-beam tensioning structures as the diagonal bracing hanging sheets in Aoki's air mattress would not prevent the modified air mattress from meeting the dependent claim limitations. *See* Pet. 54–65.

Patent Owner does not dispute Petitioner's assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine that Petitioner sufficiently shows that the combination of Aoki and Lin '733 teaches the limitations recited in dependent claims 3–11 and 17. Accordingly, based on the record before us, Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that claims 3–11 and 17 unpatentable over Aoki and Lin '733.

2. *Claims 12 and 13*

Claim 12 depends from claim 1 and further recites “wherein said first tensioning structure, said second tensioning structure and said third tensioning structure are all made of thermoplastic plastic sheet.” Claim 13 also depends from claim 1 and further recites “wherein one or more of said first tensioning structure, said second tensioning structure and said third tensioning structure at least partially comprise mesh, laminated plastic sheet or a threads.”

Petitioner asserts that Lin ’733 teaches the limitations recited in claims 12 and 13. Pet. 65–67. For example, Petitioner asserts Lin ’733’s weld strips are thermoplastic sheets as required by claim 12. Pet. 65–66 (citing Ex. 1002 ¶¶ 230–235; Ex. 1009, 8:12–20). Petitioner also asserts that Lin ’733’s tensioning structures contain nylon thread as required by claim 13. Pet. 67 (citing Ex. 1002 ¶¶ 236–239; Ex. 1009, 8:64–9:1).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that the combination of Aoki and Lin ’733 teaches the limitations recited in dependent claims 12 and 13 and has articulated sufficient reasoning with rational underpinning for combining the references. Accordingly, based on the record before us, Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that claims 12 and 13 are unpatentable over Aoki and Lin ’733.

3. *Claim 14*

Claim 14 depends from claim 13 and requires that the “two side surfaces of said mesh or said threads are at least partially coupled integrally

with two opposite plastic strips, said mesh and said threads¹⁰ are sandwiched between the two opposite plastic strips.”

Petitioner asserts that Lin ’773’s strands are sandwiched between two weld strips at the top and the bottom of the strands as required by claim 14. Pet. 68–69 (citing Ex. 1002 ¶¶ 242–243; Ex. 1009, 7:17–22, 12:22–31, Fig. 1). Petitioner also asserts that a POSITA would have understood that sandwiching the strands in between the weld strips would result in the strands being coupled integrally with the two opposite weld strips because the materials of both the strands and the weld strips would be fused together. Pet. 69–70 (citing Ex. 1002 ¶ 243; Ex. 1009, 11:11–59; Ex. 1003 (’633 File History) 448). Thus, Petitioner asserts that claim 14 would have been obvious over Aoki in view of Lin ’733. Pet. 70.

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that the combination of Aoki and Lin ’733 teaches the limitations recited in dependent claims 14 and has articulated sufficient reasoning with rational underpinning for combining the references. Accordingly, based on the record before us, Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that claim 14 is unpatentable over Aoki and Lin ’733.

¹⁰ It appears that Petitioner construes, and Patent Owner does not dispute, claim 14 as requiring that either the mesh *or* the threads are sandwiched between the two opposite plastic strips. *See* Pet. 70; *see generally* Prelim. Resp.

G. Asserted Unpatentability of Claim 12 of the '633 Patent over Aoki and Metzger

Petitioner asserts that to the extent claim 12 requires that the three recited tensioning structures must be made entirely of thermoplastic, that claim 12 would have been obvious over Aoki and Metzger. Pet. 71–75 (citing Ex. 1002 ¶¶ 272–278). In particular, Petitioner asserts that Metzger’s spaced coils 18 constitute a first tensioning structure, that Metzger’s side support beams 25 constitute the second and third tensioning structures, and that each of these tensioning structures are composed entirely of thermoplastic. Pet. 72–73. Petitioner also provides reasoning as to why a POSITA would have combined Metzger’s teachings regarding thermoplastic tensioning structures with Aoki. Pet. 73–75 (citing, *inter alia*, Ex. 1002 ¶¶ 276–277; Ex. 1010, 1:29–44, 5:27–59; Ex. 1043 ¶¶ 21, 105).

Patent Owner does not dispute Petitioner’s assertions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner’s arguments and evidence and determine that Petitioner sufficiently shows that the combination of Aoki and Metzger teaches the limitations recited in claim 12 and has articulated a sufficient rationale for combining the references. Accordingly, based on the record before us, Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that claim 12 is unpatentable over Aoki and Metzger.

H. Asserted Unpatentability of Claim 15 over Aoki, Lin ’733, and Liu ’866 (Ground 4)

Claim 15 depends from claim 13 and further recites “wherein two side surfaces of said mesh or said threads are at least partially coupled integrally with an U-shaped plastic strip, said mesh and said threads are sandwiched between the U-shaped plastic strip.”

Petitioner provides evidence and argument that claim 15 would have been obvious over Aoki, Lin '733, and Liu '866. Pet. 75–80.

Patent Owner does not dispute Petitioner's contentions at this stage of the proceeding. *See generally* Prelim. Resp. We have reviewed Petitioner's arguments and evidence and determine Petitioner has sufficiently shown the combined teachings of Aoki, Lin '733, and Liu teach the subject matter recited in claim 15 and has articulated sufficient reasoning with rational underpinning for combining the references. Accordingly, based on the record before us, Petitioner has demonstrated a reasonable likelihood of prevailing on its assertion that claim 15 is unpatentable over Aoki, Lin '733, and Liu.

IV. CONCLUSION

For the reasons set forth above, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one challenged claim of the '633 patent. Thus, we institute an *inter partes* review on all challenged claims and on all grounds presented.

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim or of any underlying factual and legal issues, including claim construction.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted on each of the grounds asserted in the Petition; and

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

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