

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEX RECREATION CORP.
Petitioner

v.

BESTWAY INFLATABLES & MATERIALS CORP.
Patent Owner

U.S. Patent No. 10,687,633
Filing Date: Sept. 29, 2016
Issue Date: June 23, 2020
Title: Inflatable Bed

Case IPR2023-00489

**PETITION FOR *INTER PARTES* REVIEW
UNDER 35 U.S.C. §§ 311–319 AND 37 C.F.R. § 42.100 *ET SEQ.***

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I. INTRODUCTION

Intex Recreation Corp. (“Petitioner”) respectfully requests *inter partes* review (“IPR”) of claims 3-15 and 17 (the “Challenged Claims”) of U.S. Patent No. 10,687,633 (“the ’633 Patent”) (Ex. 1001).

II. MANDATORY NOTICES (37 C.F.R. § 42.8)

A. Real Party-in-Interest

Petitioner is the real party-in-interest for this petition, as are the following entities: Intex Development Company Ltd., Intex Industries (Xiamen) Co., Ltd., and Intex Marketing Ltd.

B. Related Matters

The ’633 Patent is presently asserted by Patent Owner against Petitioner in *Bestway (USA), Inc. et al. v. Intex Recreation Corp. et al.*, No. 2:22-cv-00406 (C.D. Cal.) (the “District Court Litigation”), filed January 19, 2022 and served on Petitioner on April 28, 2022. The District Court Litigation was stayed on January 18, 2023, pending Petitioner’s IPRs. (Ex. 1057.)

On June 22, 2020, Patent Owner filed U.S. Patent Appl. No. 16/907,893 (the “Continuation Application”), which is a continuation of the ’633 Patent and remains pending.¹

¹ The prior art and arguments presented in this Petition have not been disclosed to nor considered by the Examiner in the Continuation Application.

As explained in Petitioner's Notice of Ranking and Explanation filed herewith, Petitioner is concurrently filing an IPR petition challenging the Challenged Claims based on different grounds, as well as two IPR petitions challenging other claims of the '633 Patent.

Petitioner is not aware of any other judicial or administrative matter that would affect, or be affected by, a decision in this proceeding.

C. Counsel and Service Information

Pursuant to 37 C.F.R. §§ 42.8(b)(3) and 42.10(a), Petitioner hereby identifies its lead and backup counsel as follows:

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Please address all correspondence to the lead counsel at the address shown above. Petitioner also consents to electronic service to all of the email addresses shown above. Pursuant to 37 C.F.R. § 42.10(b), a Power of Attorney accompanies this Petition.

III. PAYMENT OF FEES (37 C.F.R. § 42.103)

Petitioner requests review of 14 claims. Petitioner authorizes the Commissioner to charge the \$19,000 request fee, \$22,500 post-institution fee, and any additional required fees to Deposit Account No. 02-0390.

IV. GROUNDS FOR STANDING (37 C.F.R. § 42.104(A))

Petitioner certifies that the '633 Patent is available for IPR and that Petitioner is not barred or estopped from challenging the '633 Patent claims on the Grounds identified in this Petition.

V. PRECISE RELIEF REQUESTED AND GROUNDS RAISED

Petitioner respectfully requests cancellation of the Challenged Claims based on the following Grounds:

Ground	Claims	Statutory Basis	Reference(s)
1.	3-13, 17	§103	Chinese Patent No. CN203137719 (“Lin”) (Ex. 1006, 1007) in view of the Intex 2014 Catalog (the “Catalog”) (Ex. 1008) and U.S. Pat. No. 7,089,618 (“Metzger”) (Ex. 1010)
2.	12-14	§103	Lin in view of the Catalog, Metzger, and U.S. Patent No. 8,562,773 (“Lin ’773”) (Ex. 1009)

3.	15	§103	Lin in view of the Catalog, Metzger, Lin '773, and U.S. Patent Publication No. 2015/0335164 (“Liu”) (Ex. 1015)
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The '633 Patent issued on June 23, 2020 from U.S. Patent Application No. 15/280,513 (“the '513 Application”), filed on September 29, 2016. (Ex. 1001, Title Page, (21), (22), (45).) The '513 Application claims the benefit of Chinese Patent Application Nos. CN 201610020533 and CN 201620031074U, both of which were filed on January 13, 2016. (*Id.*, Title Page, (30).) Petitioner assumes January 13, 2016 as the priority date (“Priority Date”) for the purposes of this Petition.

Lin issued on August 21, 2013 (Ex. 1007, Title Page, (45)); the Catalog was published in 2013 (Ex. 1008, 90)²; Metzger issued on August 15, 2006 (Ex. 1010, Title Page, (45)); Lin '773 issued on October 22, 2013 (Ex. 1009, Title Page, (45)); and Liu was published on November 26, 2015 (Ex. 1015, Title Page, (43)). Therefore, all five references are prior art under 35 U.S.C. §102(a)(1) and (2).

VI. THE '633 PATENT

A. Overview

The '633 Patent is directed to “an inflatable bed, the structure of which is configured to limit the outward bulging or deformation of a side wall.” (Ex. 1001,

² See also *infra*, §IX.B.

1:12-15.) The '633 Patent notes that particularly for “larger height” inflatable beds, the side walls of the bed “are susceptible to bulge and deform, affecting the appearance of the inflatable beds” and “result[ing] in the decay of air pressure in the air chamber, such that the inflatable beds and inflatable mattresses are softened, reducing the comfort of the inflatable beds.” (*Id.*, 1:37-46.) In addition, the '633 Patent notes that prior art “large height” inflatable beds also had “a defect in its stability,” such that “[w]hen a user lies on or seats near the edge of the inflatable beds,” they are “susceptible to roll over.” (*Id.*, 1:60-65.)

Accordingly, the '633 Patent identifies “[t]he technical problem to be solved by the present invention” as “overcom[ing] 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 in the prior art.” (Ex. 1001, 2:7-12.)

As illustrated in annotated Figure 6 below, the '633 Patent discloses an inflatable bed 10 that includes a top sheet 11 (in blue), a bottom sheet 12 (uncolored), at least one side wall 13 (in green), first tensioning structures 14 (in yellow), a second tensioning structure 15 (in red), a third tensioning structure 16 (in orange), and a built-in air pump 20 (in purple):

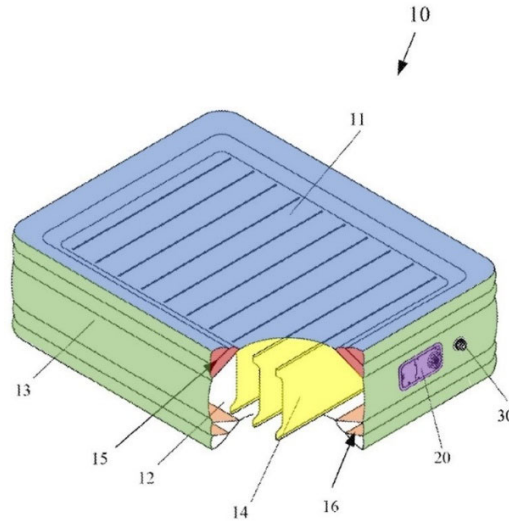


Fig. 6

(*Id.*, 6:18-22, 6:47-55, 8:27-34; Fig. 6.) The first tensioning structure 14 (yellow) is coupled to the top sheet 11 and bottom sheet 12 to “limit[] the respective upward and downward bulging of the top sheet 11 and the bottom sheet 12[.]” (*Id.*, 6:28-35.) The second tensioning structure 15 (red) “is configured to limit the upward and lateral bulging of the top sheet 11 and the side wall 13 after said air chamber is inflated.” (*Id.*, 6:52-55.) The third tensioning structure 16 (orange) “is configured to limit the respective downward and lateral bulging of the bottom sheet 12 and the side wall 13 after said air chamber is inflated.” (*Id.*, 6:60-63.)

B. Relevant File History

1. April 25, 2019 Restriction Requirement and Response

On April 25, 2019, the Examiner issued a Restriction Requirement. (Ex. 1003, 236-241.) Patent Owner filed a response and elected to prosecute claims “directed to Species I as represented by Figures 5-8.” (*Id.*, 336.)

2. Non-Patent Literature Filed by Patent Owner from European Patent Office Opposition Proceeding

Separately from prosecution of the '513 Application, on June 17, 2019, Petitioner filed a Notice of Opposition in the European Patent Office ("EPO") against a related European patent assigned to Patent Owner, EP 3192401 ("the EP '401 Patent"). (Ex. 1038, 500-519.) The EP '401 Patent claims priority to the same Chinese applications as the '513 Application, and generally has the same disclosure and claims as the '513 Application. (*Id.*, 22-41.) In its Notice of Opposition, Petitioner included, *inter alia*, a schematic explaining disclosures in Lin in support of Petitioner's invalidity arguments. (*Id.*, 504-505.)

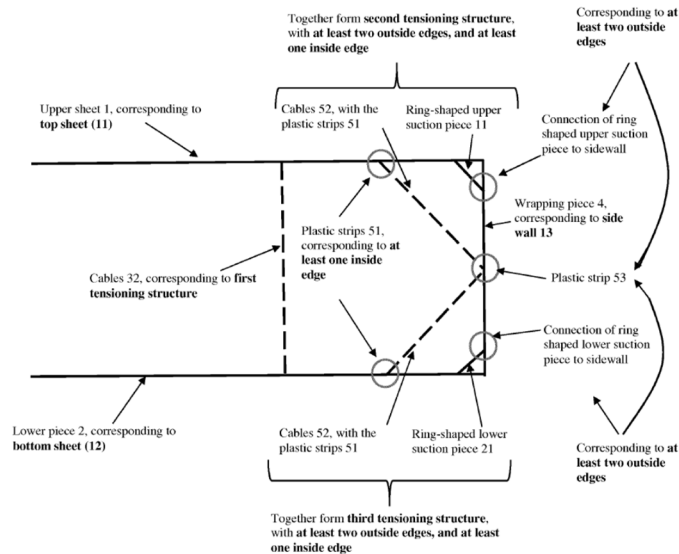
On August 28, 2019, Patent Owner submitted Petitioner's Notice of Opposition as part of an IDS in the prosecution file of the '513 Application. (Ex. 1003, 341, 343.)³

3. October 8, 2019 Non-Final Rejection and Response

On October 8, 2019, the Examiner issued a non-final rejection in which he rejected pending claims 1-6, 13-16, 23, 24, 32, 33, 37, and 38 as being anticipated

³ The EPO Opposition Division ultimately rejected Petitioner's Opposition. (Ex. 1038, 900-914.) As explained below, the EPO Opposition Division erred with respect to certain disclosures in Lin. (*Infra*, §§X.A.1.a.v, vi.) However, these errors do not affect the grounds set forth in this Petition.

by Lin. (*Id.*, 441, 443-447.) In support, the Examiner stated that he “agree[d] with the sectional view Figure provided in [Petitioner’s] Notice of Opposition,” reproduced below:



(*Id.*, 444.)⁴

The Examiner also rejected pending claims 34-36, 39, and 40—generally corresponding to issued claims 14-16, 19, and 20—as being obvious over Lin in view of the Examiner’s Official Notice regarding the knowledge and skill of a POSA. (*Id.*, 448-450.)

⁴ During prosecution of the Continuation Application, the Examiner again indicated that he agreed with this Figure as representing Lin’s disclosure. (Ex. 1055, 169.)

On January 8, 2020, Patent Owner amended claim 1 to add the following limitation:

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

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 couple to said bottom sheet.

(*Id.*, 474-475, 484.)

Patent Owner further included an annotated version of Lin's Figure 2 (reproduced below) and acknowledged that Lin discloses an "inflatable bed" that includes: (1) a top sheet 1; (2) a bottom sheet 2; (3) a side wall 4 that "couples to the top sheet 1 and the bottom sheet 2"; (4) a first tensioning structure 3 that "connects to the top sheet 1 and the bottom sheet 2"; (5) a second tensioning structure 52 that "is coupled to the side wall 4 and the top sheet 1"; and (6) a third tensioning structure that "is coupled to the side wall 4 and the bottom sheet 2."

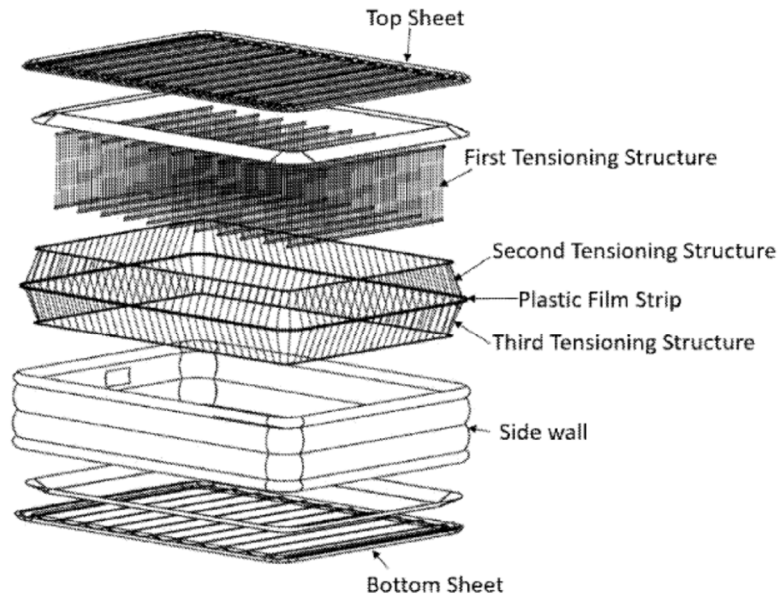


图 2

Annotated Figure 2 of Lin

(*Id.*, 484-485.)

Notably, Patent Owner’s annotated version of Lin’s Figure 2 did not address the “upper suction piece 11” and “lower suction piece 21” of Lin. (*Compare* Ex. 1003, 485, *with* Ex. 1007, ¶¶[0012]-[0013], [0025], Fig. 2.) Patent Owner further argued that the amendment to claim 1 noted above served to overcome the rejections of the dependent claims, without amendment to those claims. (Ex. 1003, 485-486.)

On February 20, 2020, the Examiner issued a Notice of Allowance without explanation. (*Id.*, 489-491.)

VII. LEVEL OF ORDINARY SKILL IN THE ART

A. Background and State of the Art

1. Inflatable Beds and Tensioning Structures

It was well known as of the Priority Date that inflatable beds typically comprised basic features such as a top sheet and bottom sheet connected at their outer edges to four side walls to form an air chamber inside. (*See, e.g.*, Ex. 1001, 1:27-32; Ex. 1007, ¶[0021]; Ex. 1010, 4:4-21; Ex. 1002, ¶35.) It was also well known before the Priority Date that inflatable beds would comprise means for inflation and deflation such as air pumps and/or air valves through which air may pass into and out of the air chamber. (*See, e.g.*, Ex. 1011, 3:38-44; Ex. 1012, 1:16-27; Ex. 1013, ¶[0051]; Ex. 1002, ¶36.)

It was also long known that tensioning structures should be used in inflatable beds to join the top, bottom, and side surfaces of the bed together internally, thus preventing such surfaces from expanding away from each other and taking on a rounded or balloon shape. (*See, e.g.*, Ex. 1015, ¶[0006]; Ex. 1024, 1:1:51-67; Ex. 1002, ¶37.) For example, it was well known before the Priority Date that tensioning structures should be disposed in the air chamber at an oblique, or diagonal, orientation to join the top sheet with the side walls, and to join the bottom sheet with the side walls, and thus prevent those surfaces from overly expanding away from each other as the mattress is inflated. (Ex. 1002, ¶¶39-44.)

2. Known Problems with Larger Inflatable Beds

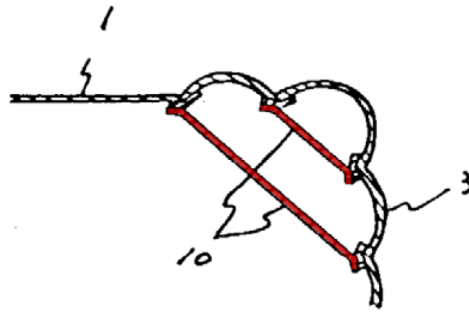
Before the Priority Date, it was recognized in the art that “large height” or “multi-layer” inflatable beds presented a number of problems. (Ex. 1002, ¶¶45-50.) First, it was known that the larger size of such inflatable beds exacerbated the problems of ballooning or bulging of the outer surfaces. (*See, e.g.*, Ex. 1001, 1:37-41; Ex. 1005, 1; Ex. 1007, ¶[0003]; Ex. 1010, 2:6-17; Ex. 1014, ¶¶[0008]-[0010]; Ex. 1002, ¶47.) Second, it was known that the larger height of such inflatable beds also led to instability of the bed. (*See* Ex. 1001, 1:60-65; Ex. 1005, 2; Ex. 1026, 1:48-52; Ex. 1030, 2:39-50; Ex. 1002, ¶48.) Third, it was recognized that attempts to solve these problems presented a number of disadvantages, such as increased materials and costs and unappealing aesthetics. (*See* Ex. 1001, 1:47-2:3; Ex. 1007, ¶¶[0003]-[0004]; Ex. 1011, 1:20-55; Ex. 1031, 1:30-35; Ex. 1002, ¶¶49-50.)

3. Use of Multiple Tensioning Structures Connecting the Top and Bottom Sheets to the Side Walls of Larger-Height Inflatable Beds

By the Priority Date, it was recognized that the above-described issues could be addressed by providing sufficient tensioning structures in the air chamber of the inflatable bed, including multiple diagonally oriented tensioning structures coupled to the top and side walls of the mattress, and the bottom and side walls of the mattress, respectively. (Ex. 1002, ¶¶51-56.)

For example, as shown in annotated Figure 4 below, Aoki discloses providing multiple “diagonal bracing hanging sheets (10)” at each corner of the air mattress:

FIG. 4



(Ex. 1005, 2-4, Fig. 4.) Aoki teaches that this prevents bulging of the outer surfaces, enhances stability, and prevents users from falling off the bed. (*Id.*, 4-5; Ex. 1002, ¶¶52-53.)

As shown in the annotated Figure 9 below, U.S. Patent Publication No. 2013/0145560 to Chen (Ex. 1013) discloses an air mattress comprising an air chamber with “a first peripheral strip 150a” (red) connected between the top and side walls, and “a second peripheral strip 190” (orange) connected between the bottom and side walls:

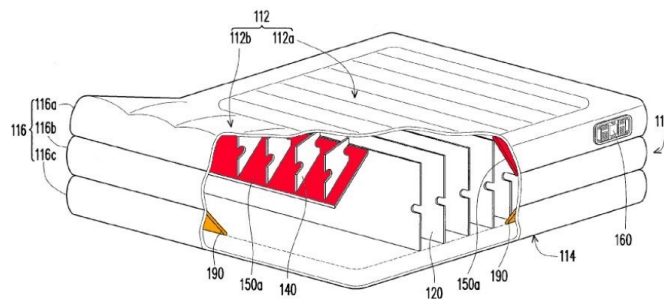


FIG. 9

(Ex. 1013, ¶¶[0068]-[0069], Fig. 9; Ex. 1002, ¶54.) Chen discloses that the “quantity of the peripheral strip with different heights connected to the side wall is not limited,” and that “when more than one peripheral strip is used to respectively surround the side wall and connected to positions of different height, then the air mattress having the side wall with more-than-three-layered structure can easily be formed.” (Ex. 1013, ¶¶[0067], [0072].)

As shown in annotated Figure 3 below, U.S. Patent Publication No. 2006/0265810 to Wu (Ex. 1014) discloses an upper pull band (12) (red) joined to the top and side walls of an inflatable mattress, and a lower pull band (12) (orange) joined to the bottom and side walls of the mattress:

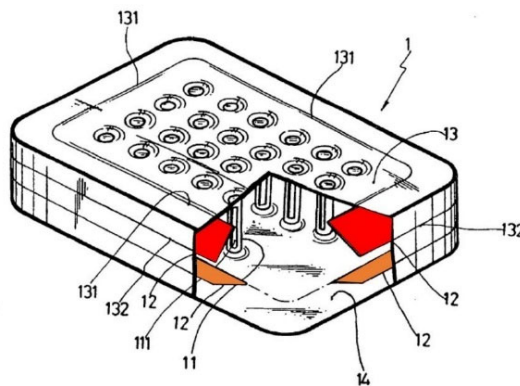
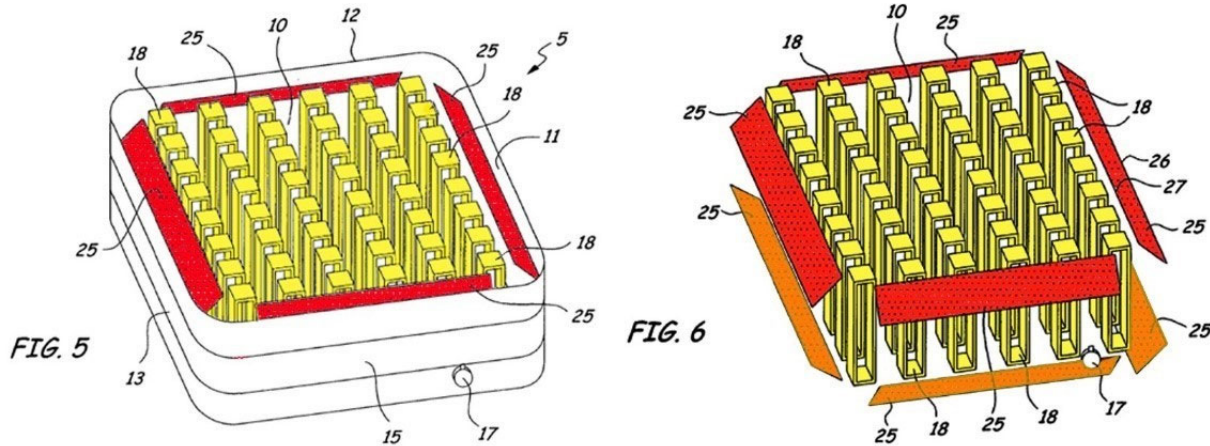


FIG.3

(Ex. 1014, ¶[0027], Fig. 3; Ex. 1002, ¶55.) Wu further discloses that using “two or more” components, including pull bands, “may also find a useful application in other types of methods” of solving the problem of deformation of the corners of the mattress. (Ex. 1014, ¶[0028].)

As shown in annotated Figures 5 and 6 below, Metzger discloses an air mattress comprising “at least one side support beam 25” (red and orange) that “extend[s] in the lengthwise direction of at least one of the mattress side panels, or along each one of the side panels of the air mattress”:



(Ex. 1010, 5:27-30, Figs. 5, 6.) Metzger teaches that multiple side support beams could be used to accomplish this purpose. (*Id.*, 5:41-51, 6:10-14, 6:44-47, 8:59-60, 10:3-8; Ex. 1002, ¶56.)

4. Use of Lightweight Materials for Tensioning Structures

It was further known in the art before the Priority Date that it would be advantageous to make tensioning structures with lighter materials, such as plastic strips disposed on either side of a panel of mesh, threads, or fibers, to minimize costs, weight, and volume of inflatable beds. (Ex. 1002, ¶57; Ex. 1009, 1:20-22, 1:53-2:20, 6:50-7:25, 8:30-9:5, 9:52-55; Ex. 1015, ¶¶[0003], [0006]-[0010], [0034], [0061]; Ex. 1040, ¶¶[0036], [0038]-[0039], [0056].)

B. Qualifications of a POSA

A POSA as of the Priority Date would have had at least:

- A bachelor's degree in mechanical engineering, or an equivalent field; or
- An associate's degree in mechanical engineering, or an equivalent field,

and two years of practical experience in inflatable product design.

(Ex. 1002, ¶¶30-31.) More education can supplement practical experience and vice versa. (*Id.*, ¶32.)

VIII. CLAIM CONSTRUCTION

Petitioner's grounds herein do not turn on a specific construction of any of the Challenged Claims, as the prior art discloses and renders obvious the Challenged Claims even under the most narrow application of the ordinary and customary meaning. 37 C.F.R. § 42.100(b).

IX. SUMMARY OF THE PRIOR ART

A. Lin

Lin is directed to large-height inflatable beds that are “as high as . . . a normal bed.” (Ex. 1007, ¶[0002].) Lin recognizes problems with such large-height inflatable beds, including the needs for stability and prevention of protrusion of the periphery of the bed. (*Id.*, ¶¶[0002], [0006].) To address these problems, Lin discloses providing, in addition to “drawbelts 3” attached to the top and bottom sheets of the airbed, a “side wrapping belt 5” comprised of a plurality

of cables and plastic strips, and “ring-shaped” upper and lower “suction pieces” 11 and 21. (*Id.*, ¶¶[0022]-[0025].)

As shown in annotated Figure 2 below, the side wrapping belt and suction pieces (in red and orange) are connected at an oblique or diagonal orientation to the upper sheet (“upper piece 1,” blue) and side walls (“wrapping piece 4,” in green), and to the bottom sheet (“lower piece 2,” blue) and side walls, respectively:

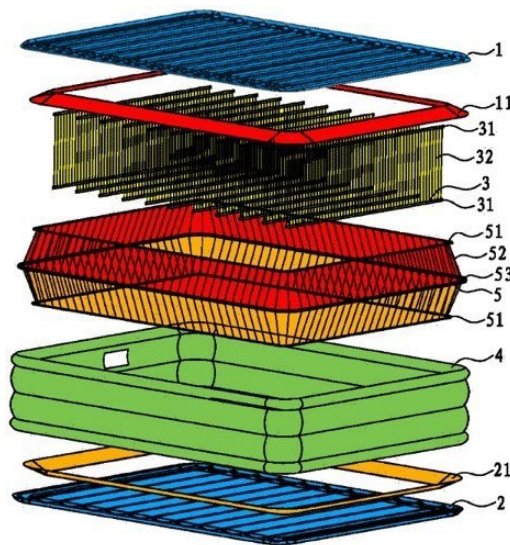


图 2

(*Id.*, Fig. 2.)

Lin is in the same field as the '633 Patent because Lin relates to inflatable mattresses and the components of such mattresses. (*Id.*, ¶¶[0001], [0022]-[0025].)

Lin is pertinent to the problems the '633 Patent purportedly addresses because Lin is directed to addressing concerns related to large-height inflatable beds, including protrusion of the side walls, stability, aesthetics, and material costs. (*Id.*, ¶¶[0006], [0013].) Lin therefore is analogous art to the '633 Patent.

B. The Catalog

The Catalog was published in 2013 and publicly accessible—“disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it”—before the Priority Date. *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 10-11 (PTAB Dec. 20, 2019) (precedential) (quotation marks omitted)).

First, the Catalog bears a copyright date of 2013, and as noted by its Copyright Registration, was first published on June 10, 2013 in the United States. (Ex. 1008, 90; Ex. 1053, ¶5; Ex. 1054, 1.) *See Hulu*, Paper 29 at 17-19 (noting that indicia such as a copyright date may support a finding of public accessibility).

Second, the Catalog was widely disseminated and made available such that persons interested and ordinarily skilled in the art could have located it before the Priority Date. (Ex. 1051, ¶¶5-6; Ex. 1053, ¶¶6-8.) For example, 19,000 copies of the Catalog were printed by Intex Development Company Ltd. for publication and distribution to customers, potential customers, and persons interested in the inflatable products industry. (*Id.*, ¶6.) Of these 19,000 copies, 5,225 were sent to Petitioner in Long Beach, California, and Petitioner’s sales representatives distributed these copies throughout the United States to customers and potential customers in 2013 and 2014. (*Id.*) This includes distribution of the Catalog—

without restriction or expectation of confidentiality—at 11 industry trade shows and two customer-focused shows in 2013 and 2014. (*Id.*, ¶¶7-8; Ex. 1051, ¶¶5-6.) These trade shows were attended by major inflatable product manufacturers and distributors, as well as hundreds of actual and potential customers—*e.g.*, persons interested and ordinarily skilled in the subject matter or art—and anyone attending these trade shows could have requested and obtained a copy of the Catalog. (Ex. 1051, ¶¶5-6; Ex. 1053, ¶¶7-8.)

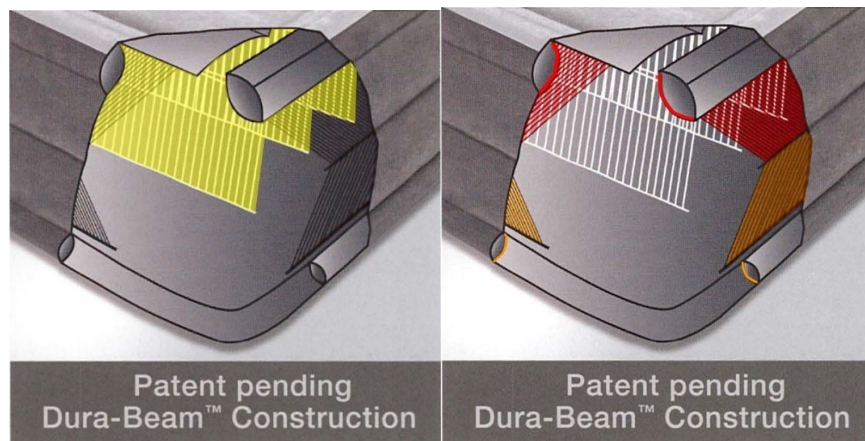
Third, before the Priority Date, any customer or potential customer in the United States could have requested a copy of the Catalog by contacting Petitioner through its website, by mail, or by email. (*Id.*, ¶6.)

Based on the above, the Catalog was publicly accessible before the Priority Date and thus qualifies as a printed publication under 35 U.S.C. §102(a)(1).

The Catalog generally describes Intex’s “Comfort Rest™” line of inflatable products available for purchase, including inflatable beds. (*See, e.g.*, Ex. 1008, 3.) The Catalog also describes inner components of these inflatable beds, including its “Dura-Beam™ Technology.” (*Id.*, 6, 16-17.) The Catalog discloses that its Dura-Beam™ construction is “comprised of thousands of high-strength polyester fibers” which “do not stretch over time, resulting in amazing durability for years of lasting comfort.” (*Id.*, 6.) The Catalog further discloses that its “Dura-Beam™ interior

construction provides the ideal firmness for superb support and rejuvenating sleep.” (*Id.*)

Among the inflatable beds disclosed by the Catalog is the “Comfort-Plush High Rise Airbed.” (*Id.*, 16.) As shown in the annotated graphics below, the Catalog discloses that this airbed comprises multiple inner tensioning structures, including tensioning structures: (a) coupled between the top and bottom sheets of the bed (**yellow**); (b) coupled between the top sheet and side walls (**red**); and (c) coupled between the bottom sheet and side walls (**orange**):

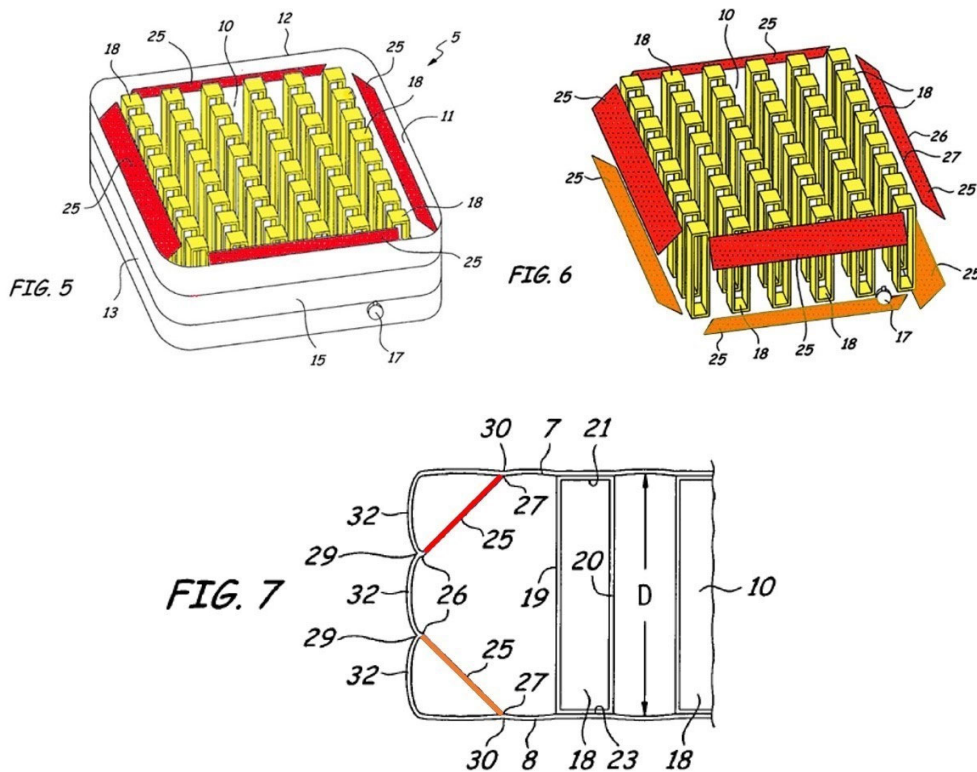


(*Id.*)

The Catalog is in the same field as the '633 Patent because the Catalog relates to inflatable mattresses and the components of such mattresses. (*Id.*, 6, 16-17.) The Catalog is pertinent to the problems the '633 Patent purportedly addresses because the Catalog describes tensioning structures that address the needs for durability, comfort, and support in large-height inflatable beds. (*Id.*) The Catalog therefore is analogous art to the '633 Patent.

C. Metzger

Like the '633 Patent and Lin, Metzger recognizes a number of problems with existing “double height” air mattresses, including “the expansion or deflection of the mattress faces during use.” (Ex. 1010, 1:60-2:17.) To address these problems, Metzger discloses “a series of spaced coils 18” (yellow) and “at least one side support beam 25” (red and orange) that “extend[s] in the lengthwise direction of at least one of the mattress side panels, or along each one of the side panels of the air mattress”:



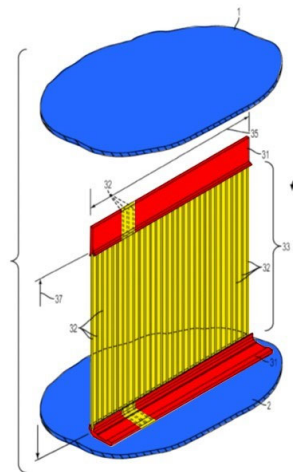
(*Id.*, 4:44-51, 5:27-30, Figs. 5-7.) The side support beams “act to limit the outward expansion of the side panel(s) of the air mattress.” (*Id.*, 5:54-59.)

Metzger discloses that the respective edges of the two side support beams “may be spaced from one another on the side wall of the mattress as shown in FIG. 7, or may be co-linear and extend along a common edge connection ... on the side wall.” (*Id.*, 5:60-64.)

Metzger is in the same field as the '633 Patent because Metzger relates to inflatable mattresses and the components of such mattresses. (*Id.*, 1:5-8, 2:55-3:13.) Metzger is pertinent to the problems the '633 Patent purportedly addresses because Metzger is directed to preventing the outward expansion of large-height air mattresses during use, particularly the side walls of such mattresses. (*Id.*, 1:45-2:51, 5:12-59.) Metzger therefore is analogous art to the '633 Patent.

D. Lin '773

Lin '773 discloses tensioning structures comprising a “plurality of substantially parallel strands 32” (yellow) that are captured between two weld strips 31 (red) at the top and bottom of the strands:



(Ex. 1009, 7:17-22, 12:22-31, Fig. 1.) The weld strips, in turn, are welded to an “upper material 1” and “lower material 2,” such as the top and bottom sheets (blue) of an inflatable bed, as shown above and further in annotated Figure 3 below:

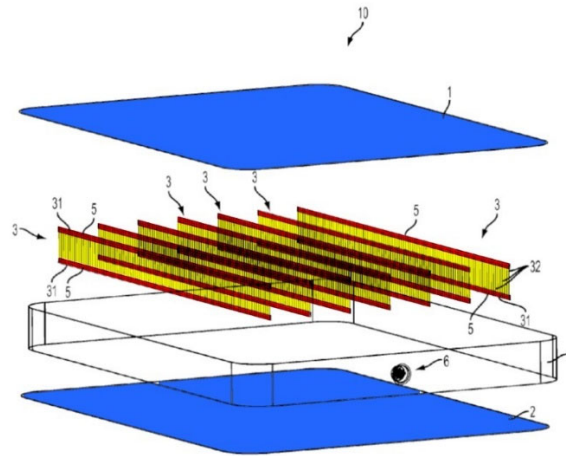


FIG. 3

(*Id.*, 7:22-25, 7:53-66, Fig. 3.)

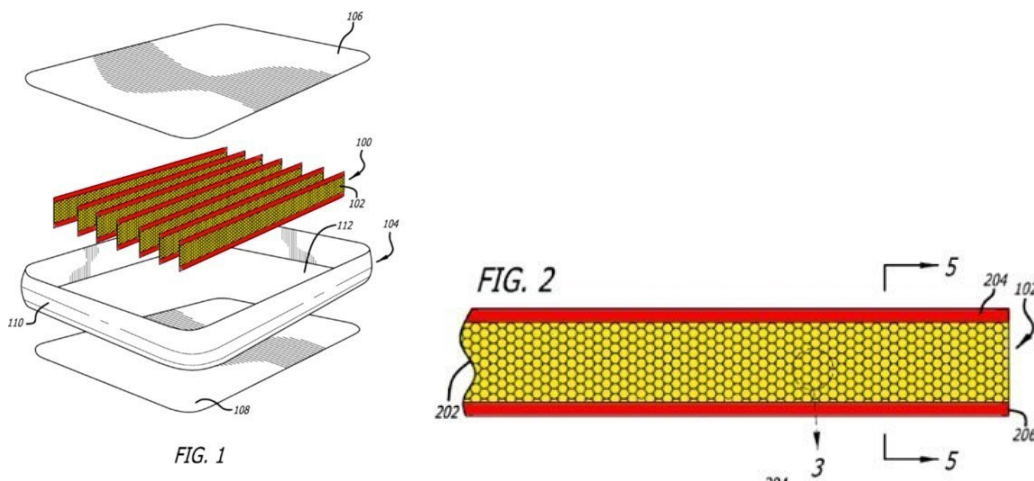
Lin ’773 teaches that using these tensioning structures “achieves high tensile strength while promoting light weight and low packed volume of the finished inflatable product.” (*Id.*, 9:52-55; *see also id.*, 6:52-56; 10:19-20; 16:17-31.) In addition, Lin ’773 teaches that the use of these tensioning structures reduces costs as compared to prior art tensioning structures. (*Id.*, 1:20-22; 8:67-9:1; 18:25-27.)

Lin ’773 is in the same field as the ’633 Patent because Lin ’773 relates to inflatable beds and internal tensioning structures used in such beds. (*Id.*, Abstract, 1:20-22, 2:8-20, 6:50-56.) Lin ’773 is pertinent to the problems the ’633 Patent purportedly addresses because Lin ’773 is directed to preventing the outward

expansion of the outside surfaces of an inflatable bed as the bed is inflated. (*Id.*, 1:38-52, 7:16-25, 8:47-55.) Lin '773 therefore is analogous art to the '633 Patent.

E. Liu

Liu discloses tensioning structures comprised of “open cell or mesh material” (yellow) and that are “firmly connected at their ends to adjacent fabric by an intermediate material, such as a strip of plastic” (red), as shown in annotated Figures 1 and 2 below:



(Ex. 1015, ¶¶[0035], [0040], Figs. 1, 2.)

Liu is in the same field as the '633 Patent because Liu relates to inflatable mattresses and the components of such mattresses. (*Id.*, ¶¶[0003], [0037]-[0040].) Liu is pertinent to the problems the '633 Patent purportedly addresses because Liu is directed to preventing the outward expansion of air mattresses during use, including multiple-layer air mattresses. (*Id.*, ¶¶[0009]-[0010], [0039]-[0040], [0063].) Liu therefore is analogous art to the '633 Patent.

X. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: Lin in view of the Catalog and Metzger Renders Obvious Claims 3-13, and 17 of the '633 Patent

1. Claim 3

a. The inflatable bed according to claim 1,

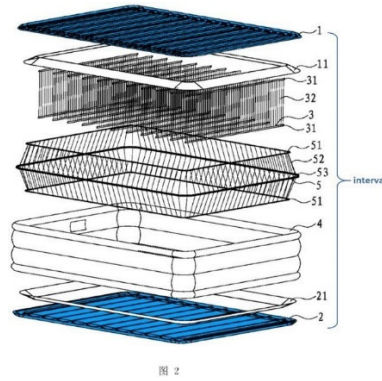
As discussed below, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1.

i. An inflatable bed, comprising:

To the extent the preamble is limiting, Lin discloses this feature. (Ex. 1007, ¶¶[0001]-[0002], [0022], Figs. 1, 2; Ex. 1002, ¶299.) For example, Lin discloses that it is directed to an “airbed” and other inflatable products. (Ex. 1007, ¶[0022].) A POSA would thus understand Lin to disclose an inflatable bed. (Ex. 1002, ¶299.)

ii. a top sheet and a bottom sheet disposed vertically at an interval;

Lin discloses this limitation. (Ex. 1007, ¶¶[0021], [0023], Figs. 2-4; Ex. 1002, ¶300.) As shown in annotated Figure 2 below, Lin discloses an airbed that comprises a top sheet (“upper piece 1”) and bottom sheet (“lower piece 2”) (blue) disposed vertically at an interval:

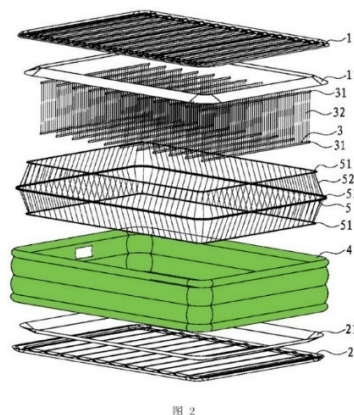


(Ex. 1007, Fig. 2.)

- iii. 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; and

Lin discloses this limitation. (Ex. 1007, ¶[0021], Figs. 2-4; Ex. 1002, ¶301.)

As shown in annotated Figure 2 below, Lin discloses that the airbed comprises a side wall (“wrapping piece 4”) (green), with an upper edge of the side wall being coupled to an outer edge of the top sheet (“upper piece 1”), a lower edge of the side wall being coupled to an outer edge of the bottom sheet (“lower piece 2”), and an air chamber formed between the top sheet, bottom sheet and side wall:



Lin discloses this limitation. (Ex. 1007, ¶¶[0021]-[0023], [0025], Fig. 2; Ex. 1002, ¶¶303-305.) As shown in the annotated Figure 2 below, Lin discloses that the airbed comprises “side wrapping belt 5” (red and orange, middle), “a ring-shaped upper suction piece 11” (red, top), and “a ring-shaped lower suction piece 21” (orange, bottom):

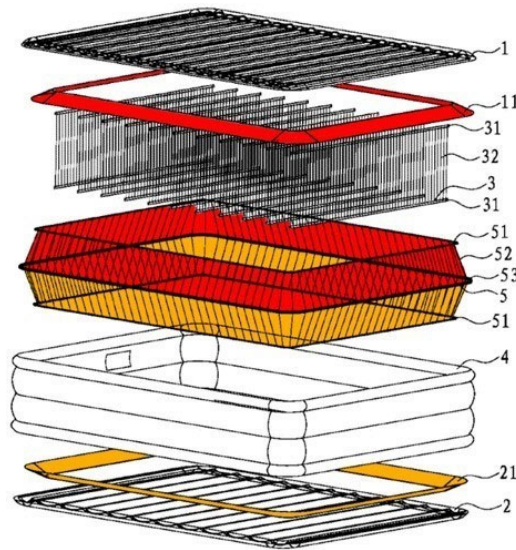


图 2

(Ex. 1007, ¶¶[0021], [0025], Fig. 2).

Lin discloses that the side wrapping belt (5) is disposed within the air chamber in a longitudinal direction, and includes an upper structure and a lower structure. (*Id.*, ¶¶[0021]-[0023]; Fig. 2.) Indeed, this is consistent with Patent Owner’s identification of Lin’s side wrapping belt 5 as the second and third tensioning structures recited in claim 1 of the ’633 Patent, as shown in Patent Owner’s annotated version of Lin’s Figure 2 that Patent Owner submitted during prosecution of the ’633 Patent:

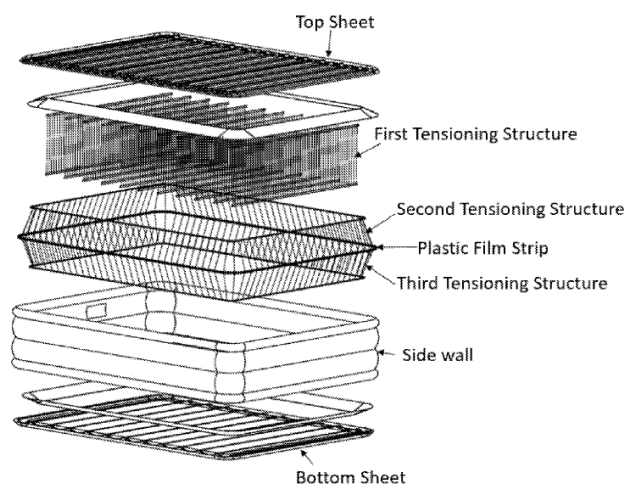


图 2

Annotated Figure 2 of Lin

(Ex. 1003, 485.)

As shown in the annotated Figure below, Lin thus discloses that the second tensioning structure (in red) includes an inside edge that is “connected to the lower surface of the upper piece 1 [i.e., the top sheet] near the periphery” via plastic strips 51, and that the third tensioning structure (in orange) includes an inside edge that is connected to “the upper surface of the lower piece 2 [i.e., the bottom sheet] near the periphery” via plastic strips 51:

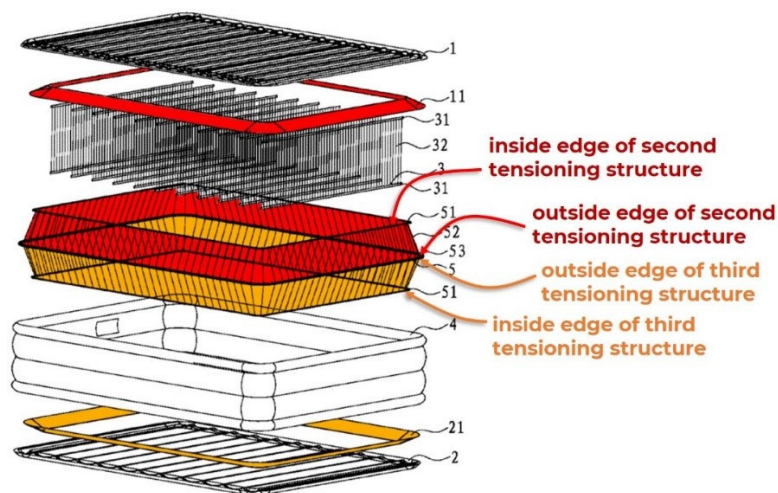


图 2

(Ex. 1007, ¶¶[0021], [0023], Fig. 2.) Lin’s second tensioning structure (in red) also includes an outside edge (a first outside edge) coupled to the wrapping piece 4 via plastic strip 53, and Lin’s third tensioning structure (in orange) also includes an outside edge (and second outside edge) coupled to the wrapping piece 4 via plastic strip 53. (*Id.*) Indeed, this is how Patent Owner described Lin’s disclosure during prosecution of the ’633 Patent: “A second tensioning structure 52 wherein the second tensioning structure 52 is coupled to the side wall 4 and the top sheet 1. A third tensioning structure wherein the third tensioning structure is coupled to the side wall 4 and the bottom sheet 2.” (Ex. 1003, 484.)

Moreover, a POSA would have known that coupling the upper structure and lower structure to the side walls of the inflatable bed through a common plastic strip was a design choice, and the two structures could instead be coupled to the side walls using separate plastic strips. (Ex. 1002, ¶¶306-310.) As explained above, it was well known in the art as of the Priority Date that it would be advantageous to be able to adjust the locations at which the outer edges of tensioning structures were coupled to the side wall of an inflatable bed could be adjusted so as to create more or fewer “layers” to the inflatable bed. (*Supra*, §VII.A.3.; Ex. 1002, ¶307; Ex. 1013, ¶¶[0067], [0073]; Ex. 1010, 5:41-6:14, 6:44-47, 8:59-60, 10:3-8). It was further well known that it would be advantageous to position such diagonal tensioning structures could be positioned such that there

was a gap in between the tensioning structures. (Ex. 1002, ¶307; Ex. 1005, 4, Figs. 2, 4; Ex. 1013, ¶¶[0068]-[0069], Fig. 9; Ex. 1014, ¶¶[0027]-[0028], Fig. 3; Ex. 1010, 5:27-6:14, Figs. 5, 6.)

For example, Metzger expressly contemplates two separate alternatives for coupling diagonal tensioning structures (“side support beams”) to the side walls of an inflatable bed: (1) spacing the edges apart from each other on the side wall; or (2) making them co-linear such that they “extend along a common edge connection ... on the side wall.” (Ex. 1010, 5:60-64.) Metzger discloses that with the first alternative, “the side support beam edges act to define three separate side panel segments ... of approximate equal width extending across the at least one side panel of the mattress ... for more uniformly distributing the mattress loading across the face of the side panel(s).” (*Id.*, 5:64-6:5.) Metzger discloses that with the second alternative, the side support beam edges “will define two separate side panel segments, which side panel segments may be of approximate equal width if so desired, extending across the at least one side panel.” (*Id.*, 6:5-10.) However, Metzger also discloses that “[t]he respective first edges of the side support beams *may be positioned and spaced from one another as desired along the side panel(s) of the mattress for forming separate side panel segments of any desired width thereacross.*” (*Id.*, 6:10-14 (emphasis added).)

A POSA implementing Lin’s tensioning structures would have been motivated to look to Metzger’s teachings of options for disposing such tensioning structures, as Metzger discloses almost the same structures as Lin (large-height inflatable mattress incorporating diagonal tensioning structures), and both Lin and Metzger are directed to solving the same problems—enhancing stability and preventing deformity in large-height air mattresses. (Ex. 1002, ¶308-309; *compare* Ex. 1007, ¶¶[0002], [0006], [0013], *with* Ex. 1010, 1:60-2:51.) A POSA would have known from Metzger’s teachings that using two diagonal tensioning structures with separate outside edges such that the tensioning structures were disposed at an interval along the side wall was a simple choice from a finite number of identified, predictable solutions (i.e., separate or co-linear), and would have had a reasonable expectation of success in selecting this choice. (Ex. 1002, ¶309.) A POSA further would have been motivated to try disposing such tensioning structures at an interval to provide the benefits of “more uniformly distributing the mattress loading across the face of the side panel(s).” (Ex. 1010, 5:64-6:5.) While disposing the two halves of Lin’s side wrapping belt at an interval would require a separate plastic strip, this would have represented a minimal addition of material and cost in exchange for the added benefits of more uniform distribution of the mattress loading across the face of the side walls and creation of additional “layers” of the inflatable bed. (Ex. 1002, ¶309.) In any

event, a POSA would have thus known that either option would have trade-offs, and either would be obvious to try. (*Id.*)

Accordingly, it would have been obvious to implement Lin's side wrapping belt using two separate outside edges, which would have yielded a structure depicted in the following modified Figure 2 of Lin:

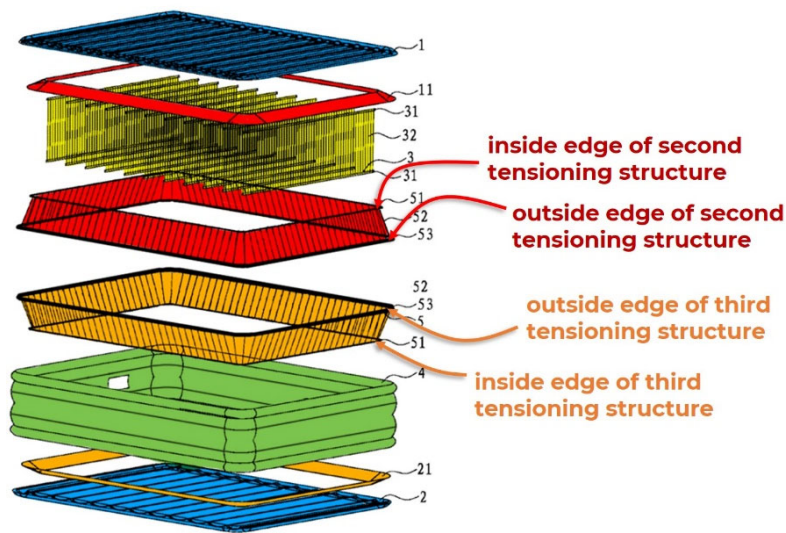


图 2

(Ex. 1007, Fig. 2; Ex. 1002, ¶310.) As shown above, this obvious implementation of Lin would comprise a support structure disposed in the air chamber in a longitudinal direction of at least one of the side walls, with at least two outside edges of the support structure being respectively coupled to the side wall adjacent, and at least one inside edge of the support structure being coupled to the top sheet or bottom sheet adjacent. Such a modification of Lin would not change its other

features, such as its upper sheet and lower sheet (**blue**), side walls (**green**),⁵ and plurality of drawbelts (**yellow**), disclosed by Lin as described above. (*Supra*, §§X.A.1.a.i-iv.)

- vi. 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
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.

As shown in annotated Figure 2 below, in addition to the side wrapping belt (5), Lin discloses “a ring-shaped upper suction piece 11” (**red**), and “a ring-shaped lower suction piece 21” (**orange**) that “are respectively disposed between the upper piece 1 and the wrapping piece 4 and between the lower piece 2 and the wrapping piece 4”:

⁵ As shown in the annotated Figure, the modification would change the location of the connection seams on the side walls to create additional “layers” of the inflatable bed, consistent with Metzger’s teaching. (Ex. 1010, 5:60-6:10; *see also* Ex. 1013, ¶¶[0067], [0073].)

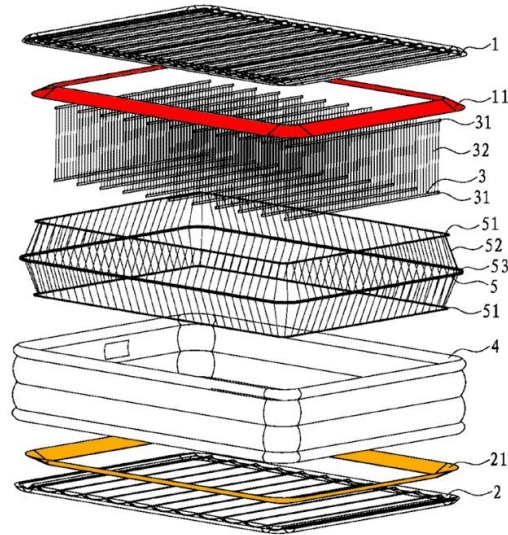


图 2

(Ex. 1007, Fig. 2; ¶[0025].)

As discussed above, Lin was considered by the Examiner during prosecution of the '633 Patent. (*Supra*, §VI.B.3.) However, the Examiner allowed the claims after Patent Owner submitted an annotated version of Lin that omitted any reference to suction pieces 11 and 21. (*Id.*; Ex. 1003 at 484-485, 493-495.) As explained below, the Examiner erred by allowing the claims without addressing Lin's disclosures regarding suction pieces 11 and 21.

As also noted above, Lin was also considered by the EPO in connection with an opposition proceeding concerning the EP '401 Patent. (*Supra*, §VI.B.2.) In the EPO proceeding, the EPO concluded that the EP '401 Patent claims were novel over Lin because it was not clear from Lin's disclosure whether the suction pieces 11 and 21 were disposed on the inside or the outside of the air chamber. (Ex. 1038, 911-913.) As explained below, the EP Opposition Division erred because a

POSA would understand Lin to disclose that its suction pieces are disposed inside the air chamber,⁶ and regardless, it would have been obvious to a POSA to dispose Lin's suction pieces in the inside of the air chamber such that the outside edges of each suction piece would be coupled to the adjacent side wall. (Ex. 1002, ¶¶314-326.)

As an initial matter, Lin itself would have suggested to a POSA to dispose the suction pieces in the inside of the air chamber. (Ex. 1002, ¶¶315-318.) First, Lin discloses that the suction pieces “improve the aesthetics of the bed” by “prevent[ing] the wrapping piece from overly protruding,” as indicated by the connection seams in the annotated Figure 2 below:

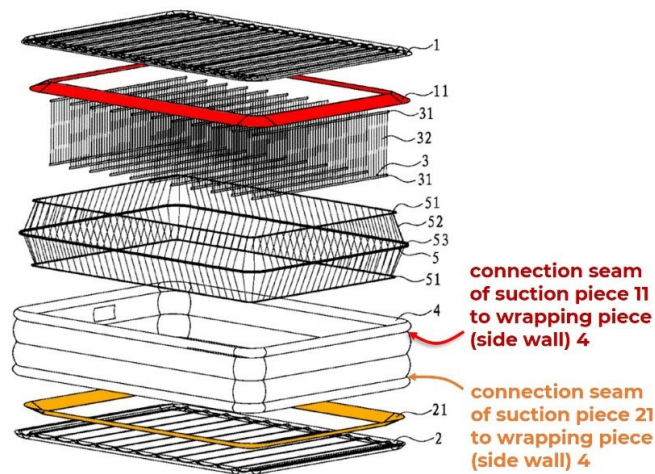


图 2

⁶ Indeed, the Examiner in the Continuation Application explicitly found that Lin's suction pieces served as tensioning structures and were disposed inside the air chamber. (Ex. 1055, 168-173.)

(Ex. 1007, ¶¶[0012]-[0013]; Fig. 2.) A POSA would understand from the connection seams shown in the annotated Figure above that the suction pieces should be coupled to the top sheet and side walls, and bottom sheet and side walls, respectively. (Ex. 1002, ¶315; Ex. 1001, Figs. 1, 6; Ex. 1005, 1, 5, Fig. 1; Ex. 1010, 5:60-6:14, Figs. 1, 7; Ex. 1014, ¶[0027], Fig. 3; Ex. 1013, ¶¶[0067]-[0072], Figs. 6, 9; Ex. 1008, 16.)

Second, the top sheet (1) and bottom sheet (2) of Lin are depicted above and below suction pieces (11) and (21), respectively. (Ex. 1007, Fig. 2.) In addition, as shown in the annotated Figure 2 below, the suction pieces are depicted as dimensionally smaller and within the perimeter of the top sheet (red arrow) and bottom sheet (orange arrow), and further within the perimeter of the side walls (green arrow):

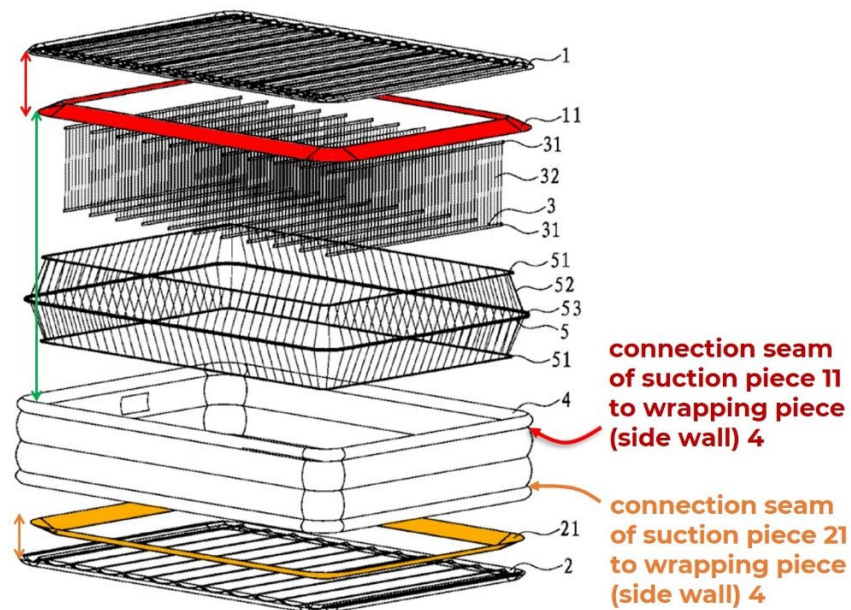


图 2

(Ex. 1007, Fig. 2.) A POSA would understand both of these to indicate that the suction pieces should be disposed within the air chamber of the bed. (Ex. 1002, ¶¶316-317; Ex. 1007, ¶[0015]; Ex. 1037, 3.)

Nonetheless, to the extent Lin’s disclosure was unclear, a POSA implementing Lin would have sought out teachings from other prior art to determine advantageous arrangements for Lin’s components, including its suction pieces. (Ex. 1002, ¶319.) Because Lin is directed to problems with large-height inflatable beds, including the needs for stability and prevention of protrusion of the periphery of the bed, (Ex. 1007, ¶¶[0002], [0006]), a POSA would have been motivated to look to other references disclosing large-height inflatable beds similar to Lin. A POSA would thus have been motivated to look to the Catalog because the Catalog describes contemporary tensioning structures used in inflatable beds—including large-height inflatable beds—as of the Priority Date. (Ex. 1002, ¶¶319-326; Ex. 1008, 3, 6-19.) Indeed, the Catalog discloses a large-height inflatable bed having internal tensioning structures almost exactly the same as Lin’s disclosure of internal tensioning structures. (Ex. 1008, 16-17.)

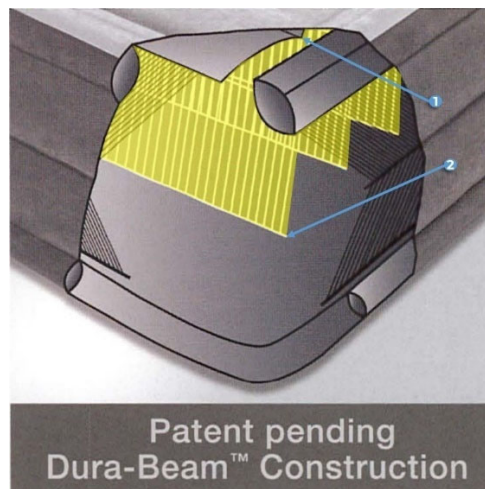
Specifically, as shown in the annotated graphics below, the Catalog discloses an “elevated 22” height” airbed comprising a top sheet, bottom sheet, and side walls, with an upper edge of the side walls (**green**) coupled to an outer edge of

the top sheet (**blue**) and a lower edge of the side walls coupled to an outer edge of the bottom sheet:



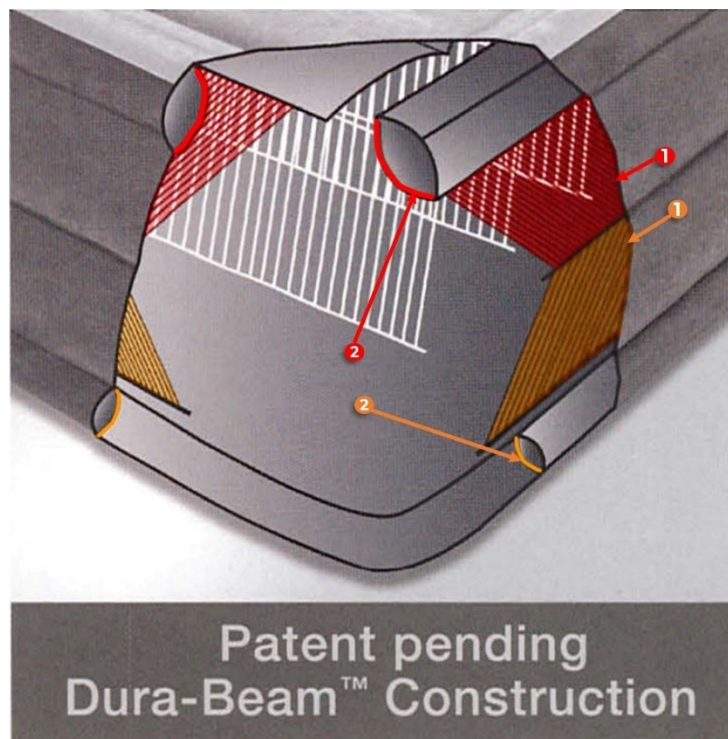
(*Id.*, 16-17.)

As shown in the annotated graphics below, the Catalog further discloses that the airbed has at least one first tensioning structure (in **yellow**, below) made of “Dura-Beam™ Construction” (comprised of “thousands of high-strength polyester fibers”) disposed in the air chamber, with an upper end of the tensioning structure coupled to the top sheet (indicated by **blue** arrow #1) and a lower end coupled to the bottom sheet (indicated by **blue** arrow #2):



(*Id.*, 6, 16.)

The Catalog further discloses that the inflatable bed has a support structure disposed in the air chamber. As shown in the annotated graphic below, the support structure is comprised of (1) center structures (red and orange) coupled to the top sheet and side wall and bottom sheet and side wall, much like Lin's "side wrapping belt 5" (*supra*, §X.A.1.a.v); and (2) an upper structure (red) coupled to the top sheet and side wall, and a lower structure (orange) coupled to the bottom sheet and side wall, much like Lin's upper and lower suction pieces (*supra*, §X.A.1.a.vi):



(Ex. 1008, 16.) The Catalog further indicates that the upper structure and lower structure (indicated by #2 in the Figure above) serve as tensioning structures. A POSA would have understood from the connection seams shown in the annotated

graphics below that the upper structure and lower structure would be connected between and “pull” on the top sheet and side wall (red) and bottom sheet and side wall (orange), respectively, to prevent the top sheet and side walls and bottom sheet and side walls from urging away from each other as the bed is inflated:



(Ex. 1002, ¶323.) The Catalog discloses that this construction “provides the ideal comfort and firmness for a rejuvenating night’s sleep” and that “[t]he horizontal air

chambers provide added stability and support around the entire bed.” (Ex. 1008, 17.)

Thus, a POSA implementing Lin would have been motivated to look to the Catalog’s teaching of placing the entirety of upper and lower support structures within the air chamber of an inflatable bed in determining the placement of Lin’s suction pieces 11 and 21. (Ex. 1002, ¶¶320-326.) Both Lin and the Catalog disclose large-height inflatable beds with internal tensioning structures, and indeed the Catalog discloses essentially the same layout of tensioning structures as Lin. The Catalog discloses that its tensioning structures are directed to the same objectives in large-height inflatable beds identified by Lin—specifically, preventing protrusion of the periphery and enhancing the stability of the inflatable bed. (Ex. 1007, ¶¶[0002], [0006], [0013]; Ex. 1008, 6, 16-17.) A POSA would have been motivated by the Catalog’s teaching to place Lin’s suction pieces inside the air chamber of the inflatable bed such that they prevented the top sheet and side walls, and bottom sheet and side walls, respectively, from protruding as the bed is inflated. (Ex. 1002, ¶325.)

A POSA further would have been motivated to implement Lin’s suction pieces in the inside of the air chamber as disclosed in the Catalog based on the background knowledge and skill in the art a POSA would have had as of the Priority Date. (Ex. 1002, ¶326.) As described above, it was well-known in the art

as of the Priority Date that the use of tensioning structures coupled to the top sheet and side walls and bottom sheet and side walls of an air mattress would satisfy the objectives of preventing bulging or deformation of these surfaces and also improving the aesthetics of the bed—objectives to which Lin and the Catalog are expressly directed. (*Supra*, §VII.A; Ex. 1007, ¶¶[0012]-[0013], [0025]; Ex. 1008, 6, 16-17.) Thus, a POSA would have been motivated to apply Lin’s disclosure of its suction pieces such that they were disposed in the inside of the air chamber and were coupled to the top and bottom sheets and side walls of the inflatable bed, as taught by the Catalog. (Ex. 1002, ¶326.) A POSA would have understood that this would have been the application of a known technique to address known issues in large-height inflatable beds, and would have yielded predictable results. (*Id.*)

As discussed above, a POSA would have been motivated by Metzger to implement Lin’s side wrapping belt using two separate outside edges. (*Supra*, §X.A.1.a.v.) When implemented in this way and with Lin’s suction pieces inside the air chamber (as taught by Lin’s Figure 2 and the Catalog), the resulting support structure would comprise a second tensioning structure and a third tensioning structure, wherein at least two outside edges of the second tensioning structure are respectively coupled to at least one side wall and at least one inside edge of the second tensioning structure is coupled to said top sheet, and wherein at least two outside edges of the third tensioning structure are respectively coupled to at least

one side wall and at least one inside edge of the third tensioning structure is coupled to the bottom sheet, as recited in claim 1 of the '633 Patent:

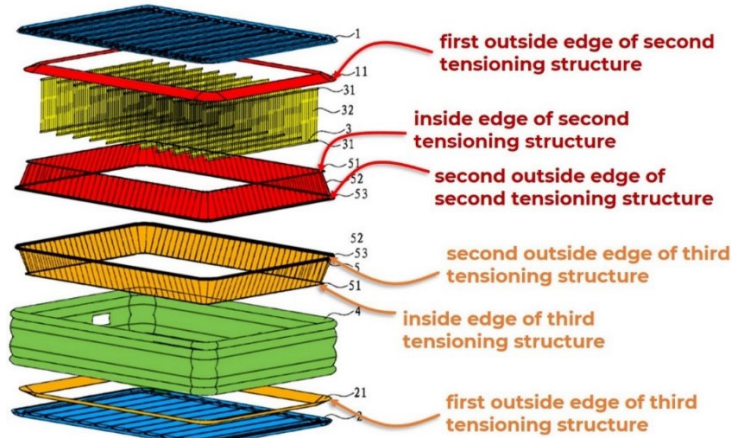


图 2

(Ex. 1002, ¶328; Ex. 1007, Fig. 2.)

- b. wherein said second tensioning structure and said third tensioning structure are disposed at an interval.***

As shown in the annotated and modified Figure 2 below, the obvious combination of Lin, the Catalog, and Metzger would result in the second tensioning structure and third tensioning structure being disposed at an interval:

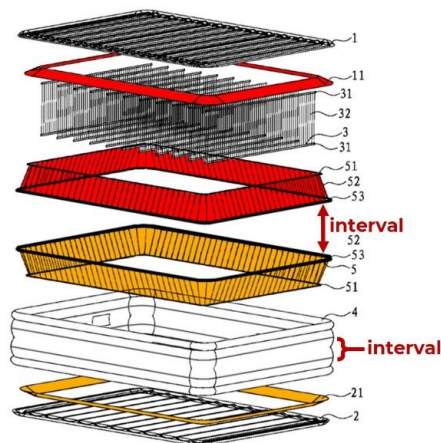


图 2

(Ex. 1007, Fig. 2; Ex. 1002, ¶336.) Lin in view of the Catalog and Metzger therefore renders obvious claim 3. (Ex. 1002, ¶¶335-337.)

2. Claim 4

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. wherein said 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.

As described above and as shown in annotated Figure 2 below, Lin discloses a second tensioning structure (red) comprising upper suction piece 11 and the upper half of side wrapping belt 5, each of which constitutes an I-beam:

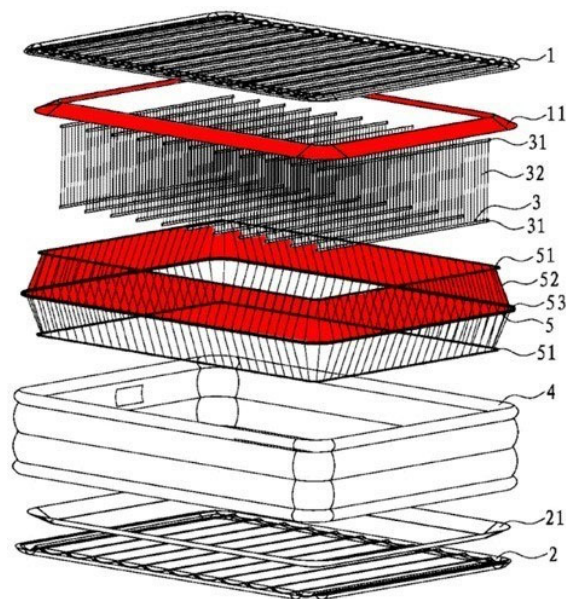
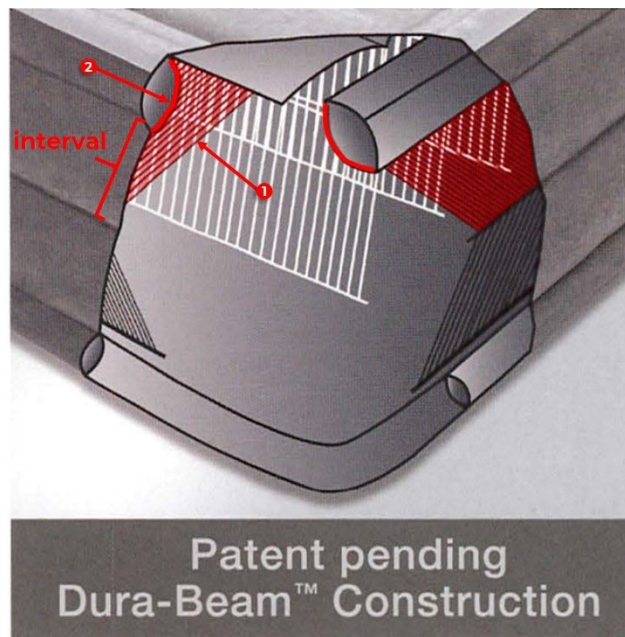


图 2

(Ex. 1007, ¶¶[0023]-[0025], Fig. 2; *supra*, §X.A.1.a.vi.)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) As shown in the annotated graphic below, the Catalog further teaches that an outside edge and inside edge of each of the two upper tensioning structures (i.e., the upper half of the center "Dura-Beam™ Construction" tensioning structure (#1 below) and the upper tensioning structure (#2 below)) should be respectively coupled to the side wall and top sheet adjacent, and the two structures should be disposed at an interval:



(Ex. 1008, 16.)

A POSA would have been motivated to combine the Catalog's teaching of coupling an outside edge and inside edge of each upper tensioning structure to the

side wall and top sheet adjacent and disposing the two structures at an interval in implementing Lin's upper suction piece and side wrapping belt. (Ex. 1002, ¶341.) A POSA would have known from the Catalog that this would enhance the stability, support, and aesthetics of the inflatable bed, consistent with Lin's objectives. (*Id.*; Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.) In addition, such teaching is consistent with Lin's disclosure. As shown in the annotated Figure below, when the upper suction piece is disposed within the air chamber, an outside edge and inside edge of each of Lin's I-beams are respectively coupled to the side wall and top sheet adjacent, and the two I-beams are disposed at an interval:

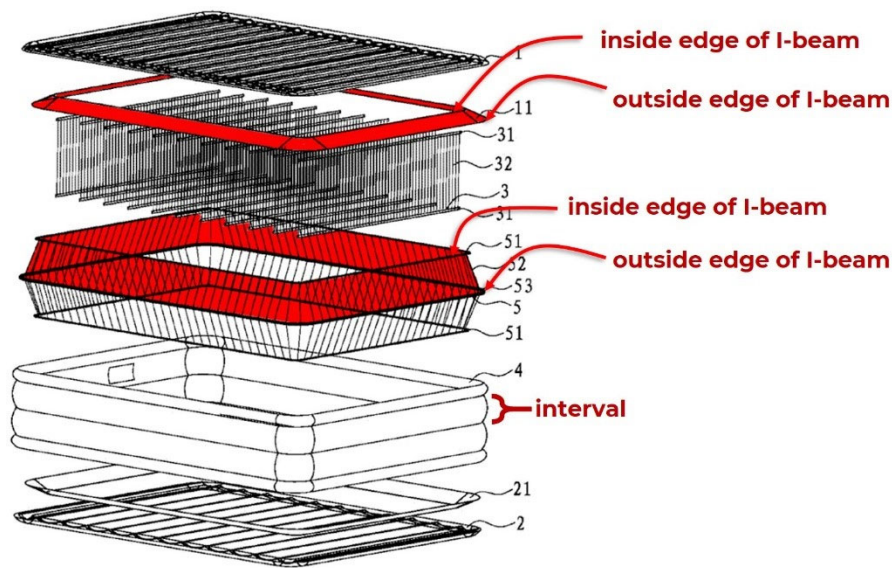


图 2

(Ex. 1007, Fig. 2.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the disposition of the two first I-beams of the second tensioning structure, as shown in the annotated and modified Figure 2 of Lin below:

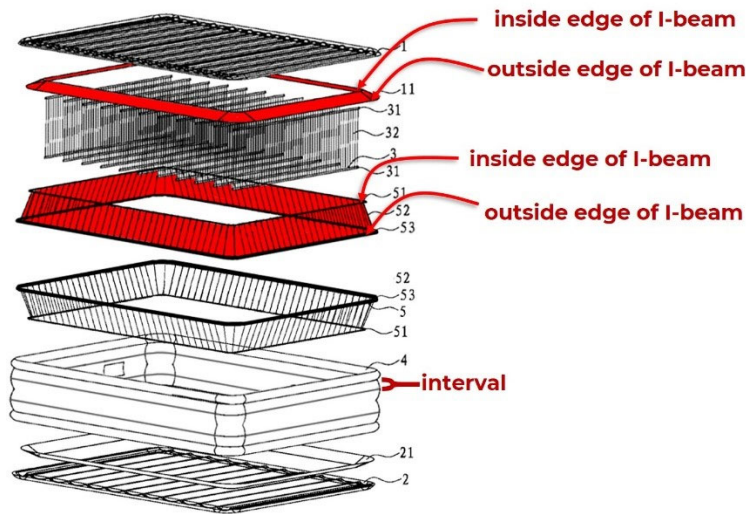


图 2

(Ex. 1002, ¶342.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 4.

(Ex. 1002, ¶¶338-343.)

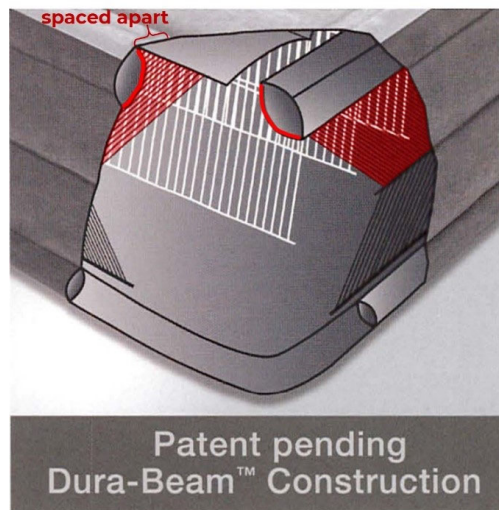
3. Claim 5

a. *The inflatable bed according to claim 4,*

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 4. (*Supra*, §X.A.2.)

- b. wherein said at least two first I-beams are spaced apart from each other at a lower surface of said top sheet.***

As shown in the annotated graphic below, the Catalog discloses that its two upper tensioning structures (red) are spaced apart from each other at a lower surface of the top sheet, as indicated by the connection points of each structure to the top sheet:



(Ex. 1008, 16.)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) A POSA further would have been motivated to follow the Catalog's teaching of disposing the two upper tensioning structures such that they were spaced apart from each other at a lower surface of the top sheet in order to prevent bulging, effectively resist tensile forces, and enhance stability and aesthetics. (Ex. 1002, ¶346; *supra*, §VII.A.3.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the spaced-apart disposition of the two first I-beams at a lower surface of the top sheet. (Ex. 1002, ¶347.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 5. (Ex. 1002, ¶¶344-348.)

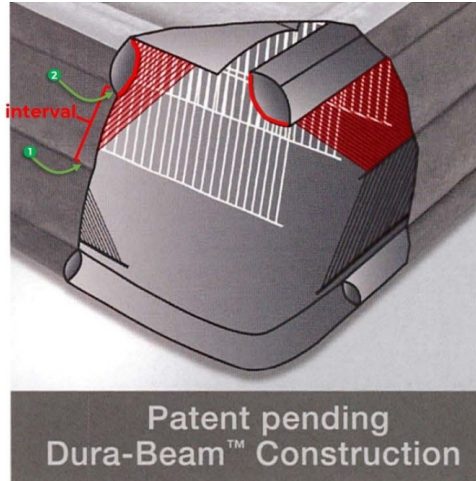
4. Claim 6

a. The inflatable bed according to claim 4,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 4. (*Supra*, §X.A.2.)

b. wherein said at least two first I-beams are disposed at an interval on an inner surface of said side wall.

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) As shown in the annotated graphic below, the Catalog further teaches that the two upper tensioning structures (red) should be respectively coupled to the inner surface of the side wall at locations 1 and 2 (in green) below, and thus should be disposed at an interval on an inner surface of the side wall:



(Ex. 1008, 16.)

A POSA would have been motivated to combine the Catalog's teaching of disposing its two upper tensioning structures at an interval on an inner surface of the side wall in implementing Lin's upper suction piece and side wrapping belt.

(Ex. 1002, ¶351.) A POSA would have known from the Catalog that this would enhance the stability, support, and aesthetics of the inflatable bed, consistent with Lin's objectives. (*Id.*; Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.) In addition, such teaching is consistent with Lin's disclosure.

As shown in annotated Figure 2 below, Lin discloses that the upper suction piece and the upper half of the side wrapping belt of the second tensioning structure (red) are coupled to the inner surface of the side wall at connection seams that are spaced apart from each other, and thus the upper suction piece and upper half of the side wrapping belt are disposed at an interval on an inner surface of the side wall:

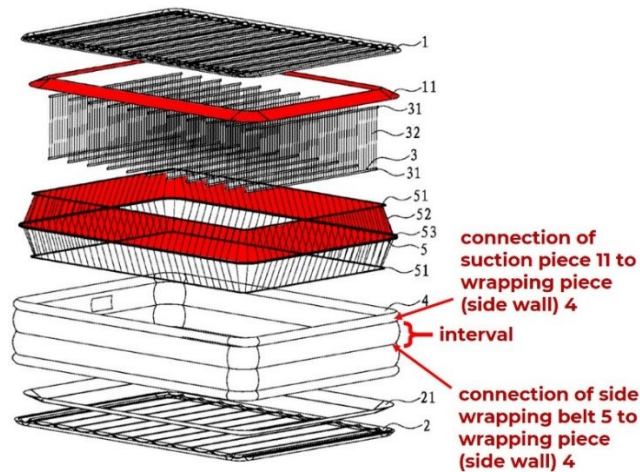


图 2

(Ex. 1007, Fig. 2.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the disposition of the two first I-beams at an interval on an inner surface of the side wall, as shown in the annotated and modified Figure 2 of Lin below:

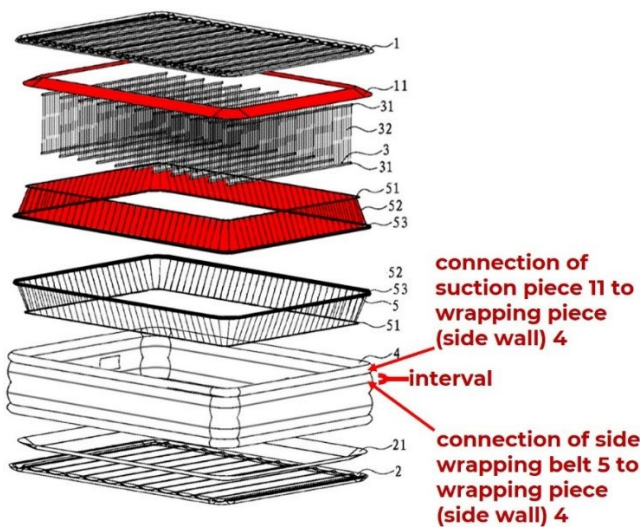


图 2

(Ex. 1002, ¶352.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 6.

(Ex. 1002, ¶¶349-353.)

5. Claim 7

a. *The inflatable bed according to claim 4,*

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 7. (*Supra*, §X.A.2.)

b. *wherein said at least two first I-beams as a whole are of a continuous annular structure or a segmental annular structure.*

Lin discloses this limitation. (Ex. 1007, ¶¶[0023], [0025], Fig. 2.) As shown in annotated Figure 2 below, Lin discloses that both the upper suction piece and upper half of the side wrapping belt as a whole are of a continuous annular structure or segmental annular structure:

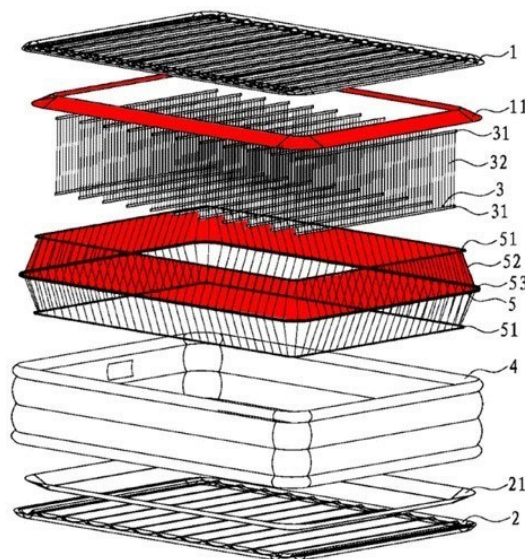


图 2

(Ex. 1007, ¶¶[0023], [0025], Fig. 2.) Indeed, the above Figure comports with the '633 Patent's disclosure of its I-beams having a continuous annular structure or a segmental annular structure. (*See, e.g.*, Ex. 1001, Fig. 7.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the continuous or segmental annular structure of the two first I-beams, as shown in the annotated and modified Figure 2 of Lin below:

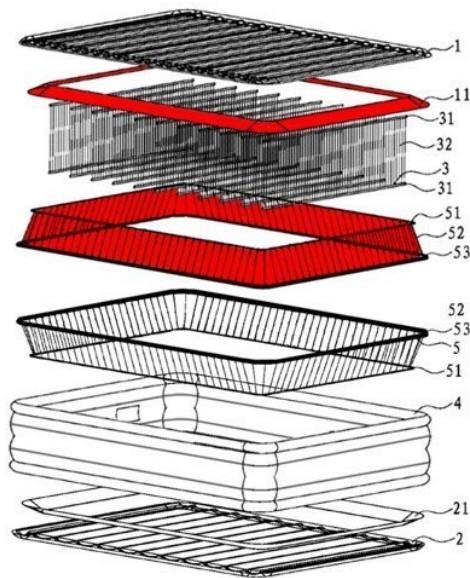


图 2

(Ex. 1002, ¶356.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 7.

(Ex. 1002, ¶¶354-357.)

6. Claim 8

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. 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.

As described above and as shown in annotated Figure 2 below, Lin discloses a third tensioning structure (orange) comprising lower suction piece 21 and the lower half of side wrapping belt 5, each of which constitutes an I-beam:

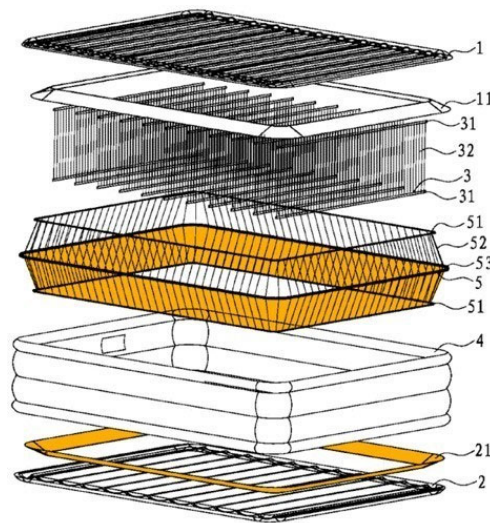
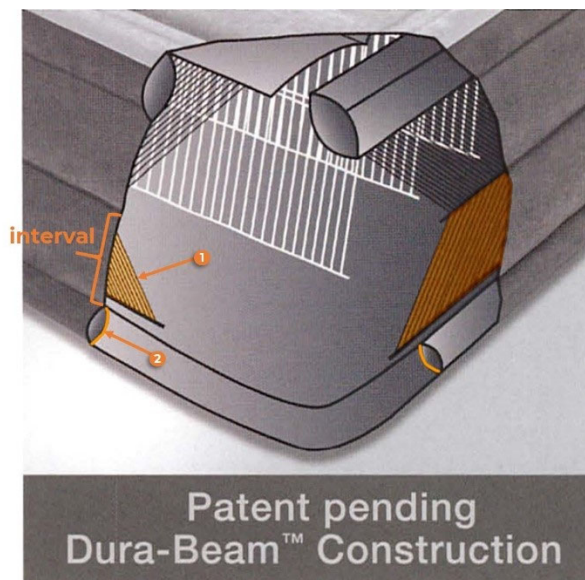


图 2

(Ex. 1007, 4:22-5:10, Fig. 2; *supra*, §X.A.1.a.vi.)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air

chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) As shown in the annotated graphic below, the Catalog further teaches that an outside edge and inside edge of each of the two lower tensioning structures (i.e., the lower half of the center “Dura-Beam™ Construction” tensioning structure (#1 below) and the lower tensioning structure (#2 below)) are coupled to the side wall and bottom sheet adjacent respectively, and the two structures are disposed at an interval:



(Ex. 1008, 16.)

A POSA would have been motivated to combine the Catalog’s teaching of coupling an outside edge and inside edge of each lower tensioning structure to the side wall and bottom sheet adjacent and disposing the two structures at an interval in implementing Lin’s lower suction piece and side wrapping belt. (Ex. 1002, ¶361.) A POSA would have known from the Catalog that this would enhance the stability, support, and aesthetics of the inflatable bed, consistent with Lin’s

objectives. (Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.) In addition, such teaching is consistent with Lin's disclosure. As shown in the annotated Figure below, when the lower suction piece is disposed within the air chamber, an outside edge and inside edge of each of Lin's I-beams are respectively coupled to the side wall and top sheet adjacent, and the two I-beams are disposed at an interval:

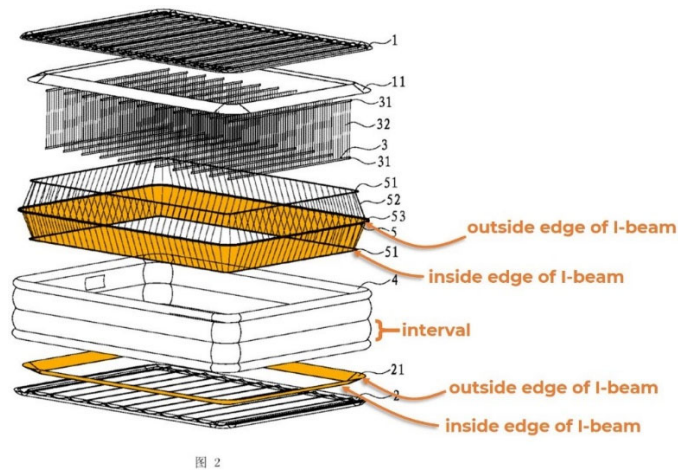
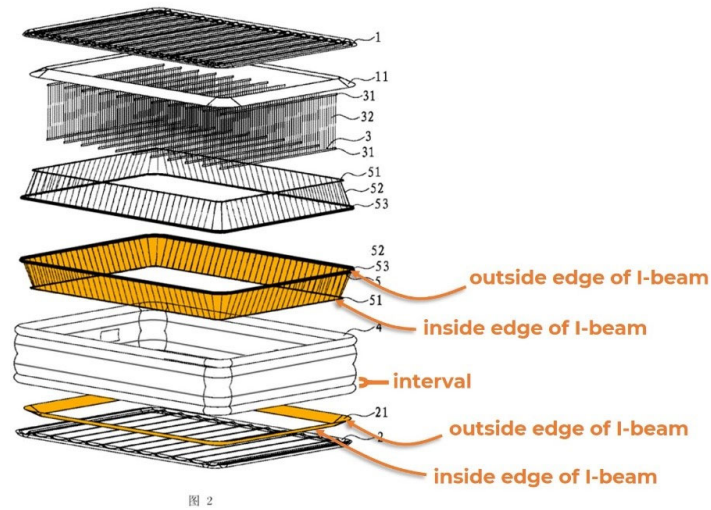


图 2

(Ex. 1007, Fig. 2.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the two second I-beams of the third tensioning structure, as shown in the annotated and modified Figure 2 of Lin below:



(Ex. 1002, ¶362.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 8.

(Ex. 1002, ¶¶358-363.)

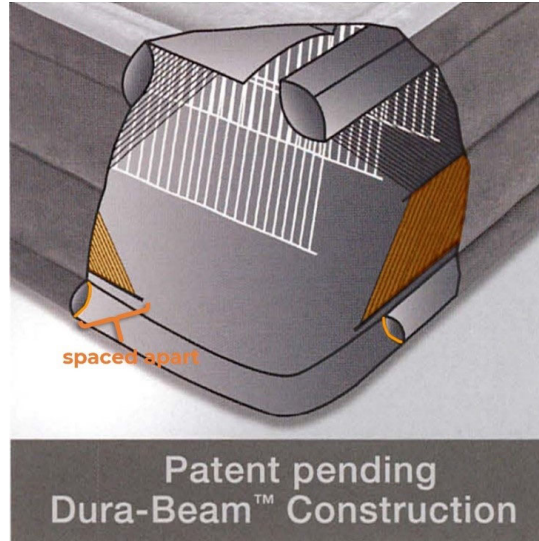
7. Claim 9

a. The inflatable bed according to claim 8,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 8. (*Supra*, §X.A.6.)

b. wherein said at least two second I-beams are spaced apart from each other at an upper surface of said bottom sheet.

As shown in the annotated graphic below, the Catalog discloses that its two lower tensioning structures (orange) are spaced apart from each other at an upper surface of the bottom sheet, as indicated by the connection points of each structure to the bottom sheet:



(Ex. 1008, 16.)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) A POSA further would have been motivated to follow the Catalog's teaching of disposing the two lower tensioning structures such that they were spaced apart from each other at an upper surface of the bottom sheet in order to prevent bulging, effectively resist tensile forces, and enhance stability and aesthetics. (Ex. 1002, ¶366; *supra*, §VII.A.3.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the spaced-apart disposition of the two second I-beams at an upper surface of the bottom sheet. (Ex. 1002, ¶367.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 9.
(Ex. 1002, ¶¶364-368.)

8. Claim 10

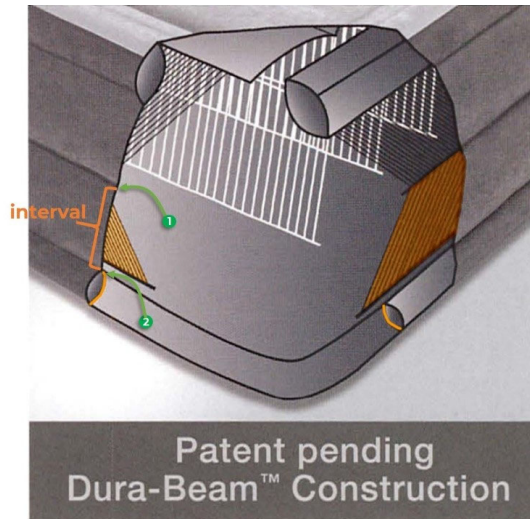
a. The inflatable bed according to claim 8,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 8. (*Supra*, §X.A.6.)

b. wherein said at least two second are disposed at an interval on the inner surface of said side wall.⁷

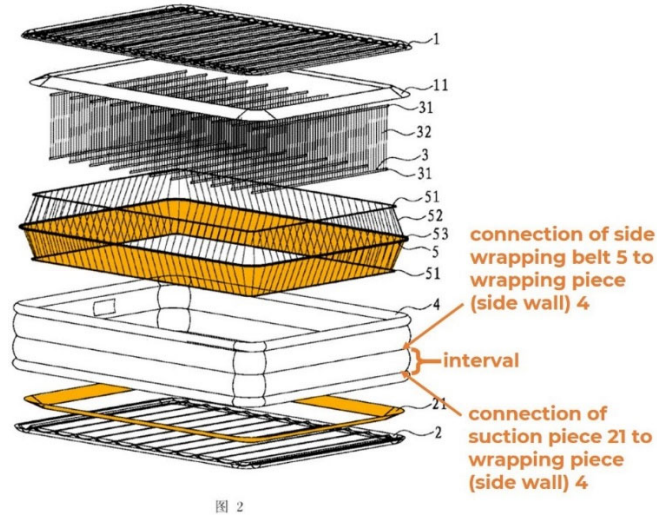
As discussed above, a POSA implementing Lin would have been motivated by the Catalog’s teaching to dispose Lin’s suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) As shown in the annotated graphic below, the Catalog further teaches that the two lower tensioning structures (orange) are respectively coupled to the inner surface of the side wall at locations 1 and 2 (in green) below, and thus are disposed at an interval on an inner surface of the side wall:

⁷ Although the claim states “said at least two second,” it appears that this claim is intended to recite “said at least two second I-beams,” as “second I-beams” are referenced in claim 8, from which this claim depends.



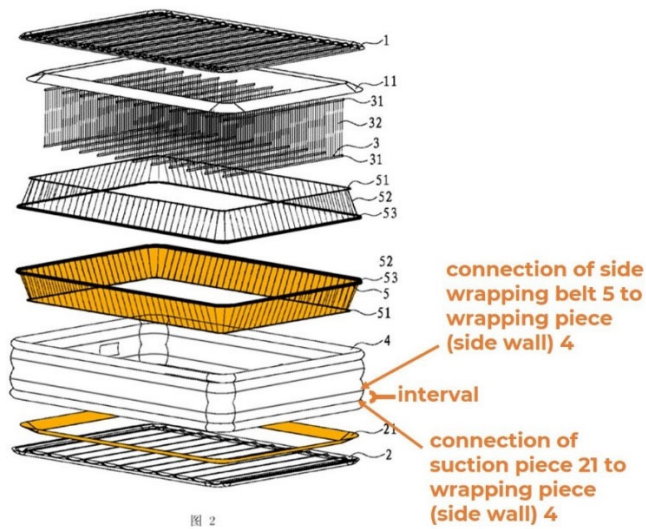
(Ex. 1008, 16.)

A POSA would have been motivated to combine the Catalog's teaching of disposing its two lower tensioning structures at an interval on an inner surface of the side wall in implementing Lin's lower suction piece and side wrapping belt. (Ex. 1002, ¶372.) A POSA would have known from the Catalog that this would enhance the stability, support, and aesthetics of the inflatable bed, consistent with Lin's objectives. (*Id.*; Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.) In addition, such teaching is consistent with Lin's disclosure. As shown in annotated Figure 2 below, Lin discloses that the lower suction piece and the lower half of the side wrapping belt of the third tensioning structure (orange) are coupled to the inner surface of the side wall at connection seams that are spaced apart from each other, and thus the lower suction piece and lower half of the side wrapping belt are disposed at an interval on an inner surface of the side wall:



(Ex. 1007, Fig. 2.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the disposition of the two second I-beams at an interval on an inner surface of the side wall, as shown in the annotated and modified Figure 2 of Lin below:



(Ex. 1002, ¶373.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 10.

(Ex. 1002, ¶¶369-74.)

9. Claim 11

a. The inflatable bed according to claim 8,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 8. (*Supra*, §X.A.6.)

b. wherein said at least two second I-beam as a whole are of a continuous annular structure or a segmental annular structure.

Lin discloses this limitation. (Ex. 1007, ¶¶[0023], [0025], Fig. 2.) As shown in annotated Figure 2 below, Lin discloses that both the lower suction piece and lower half of the side wrapping belt as a whole are of a continuous annular structure or segmental annular structure:

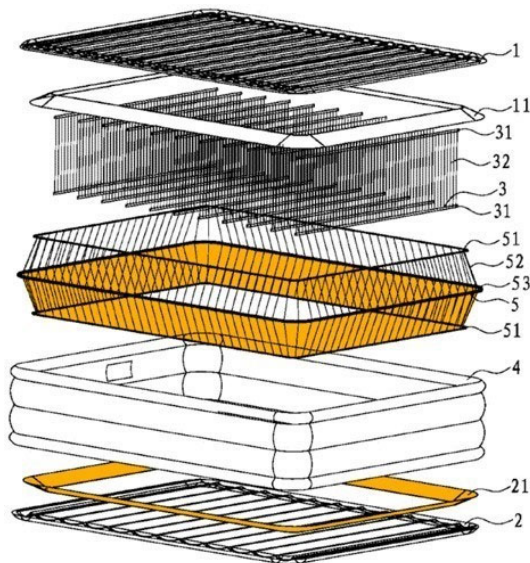


图 2

(*Id.*) Indeed, the above Figure comports with the '633 Patent's disclosure of its I-beams having a continuous annular structure or a segmental annular structure.

(*See, e.g.*, Ex. 1001, Fig. 7.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the continuous or segmental annular structure of the two second I-beams, as shown in the annotated and modified Figure 2 of Lin below:

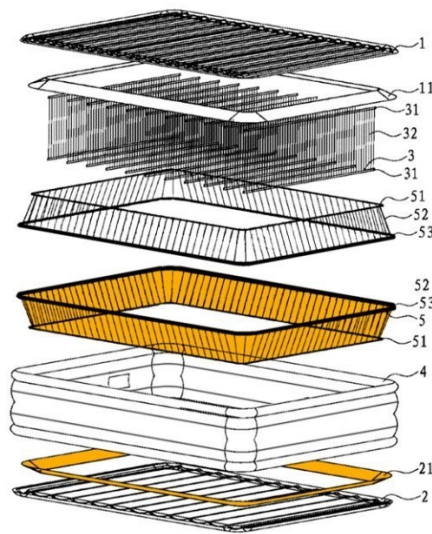


图 2

(Ex. 1002, ¶377.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 11.

(Ex. 1002, ¶¶375-78.)

10. Claim 12

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. wherein said first tensioning structure, said second tensioning structure and said third tensioning structure are all made of thermoplastic plastic sheet.

Lin discloses this limitation. (Ex. 1007, ¶¶[0009]-[0011], [0023], [0028].) First, Lin discloses that its drawbelts 3 (the first tensioning structure) include “plastic strips 31 at both ends.” (*Id.*, ¶[0023]; *see also id.*, ¶[0011].) Second, the upper half of Lin’s side wrapping belt (5) (comprising part of the second tensioning structure) includes a plastic strip 51 and plastic strip 53, and the lower half of Lin’s side wrapping belt (comprising part of the third tensioning structure) includes a plastic strip 51 and plastic strip 53. (*Id.*, ¶¶[0009]-[0010], [0023]; *supra*, X.A.1.a.v.) Third, Lin teaches that each of these tensioning structures “can alternatively be implemented with a linear drawbelt or a cylindrical drawbelt of an integral plastic piece as long as they satisfy the requirements of the internal pressure of the inflatable product.” (Ex. 1007, ¶[0028].)

Lin discloses that its drawbelts 3 (first tensioning structure) are coupled to the top and bottom sheets by welding, and that its side wrapping belt (second and third tensioning structures) are coupled to the top sheet and side wall, and to the

bottom sheet and side wall, respectively, by welding. (*Id.*, ¶¶[0011], [0023].) A POSA would have known that welding the plastic strips (or integral plastic piece) of Lin’s tensioning structures would necessarily require that these materials be thermoplastic. (Ex. 1002, ¶382; Ex. 1035, 4.)

In addition, Metzger discloses that each of the spaced coils (first tensioning structure) and side support beams (second and third tensioning structures) may be formed of “polyvinylchloride, polyethylene, and the like,” and may be attached to the top and bottom sheet and side walls of the bed “by using any known heat welding, fusing, or bonding technique.” (Ex. 1010, 6:15-30.) Polyvinylchloride (PVC) is a known thermoplastic plastic sheet, and a POSA would have understood that connecting plastic by heat welding or fusing would necessarily require that the tensioning structures would be made of thermoplastic plastic sheet. (Ex. 1002, ¶384; Ex. 1046, 5; Ex. 1047, 1; Ex. 1048, Abstract; Ex. 1035, 4.)

A POSA would have known from Metzger’s teaching and Lin’s disclosure of using “an integral plastic piece” (Ex. 1007, ¶[0028]), that Lin could be implemented by using thermoplastic sheets for the entirety of the drawbelt, side wrapping belt, and suction pieces. (Ex. 1002, ¶385.) A POSA would have known that using thermoplastic sheets would simplify the manufacturing process, provide a “flexible barrier material” and “fluid tight edge connection,” and would have been obvious to try. (*Id.*; Ex. 1010, 6:15-30.) Indeed, Patent Owner’s own expert

in a prior IPR proceeding asserted that “using PVC for the interior and exterior components of a mattress was well-known in the art and in the background knowledge of a PHOSITA” before the Priority Date, and that “using the same material as the top and bottom side of the mattress and the extending parts would ensure that they could be suitably welded together.” (Ex. 1043, ¶¶21, 105.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 12. (Ex. 1002, ¶¶379-86.)

11. Claim 13

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. 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.

Lin discloses that its drawbelts 3 (the first tensioning structure) comprise “cables 32,” and that its side wrapping belt 5 (forming parts of the second and third tensioning structures) comprise “cables 52.” (Ex. 1007, ¶[0023].) A POSA would have understood that these cables constituted a type of thread. (Ex. 1002, ¶388; Ex. 1035, 5.) Indeed, in the EPO proceeding, Patent Owner conceded that Lin’s cables constituted “threads.” (Ex. 1038, 575 (claim 32).)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) In addition, the Catalog discloses that each of its tensioning structures at least partially comprise "Dura-Beam™ Construction," which is comprised of "thousands of high-strength polyester fibers." (Ex. 1008, 6, 16-17.) The Catalog further discloses that the polyester fibers of "Dura-Beam™ Construction" are "spun." (*Id.*, 13.) A POSA would have known that spun polyester fibers constitute a type of thread, and thus the tensioning structures are each comprised of threads. (Ex. 1002, ¶389; Ex. 1035, 5.) A POSA would have been motivated to use "Dura-Beam™ Construction" as disclosed by the Catalog for Lin's first, second, and third tensioning structures, as a POSA would have known from the Catalog that this would enhance the durability, stability, support, and aesthetics of the inflatable bed, consistent with Lin's objectives. (Ex. 1002, ¶390; Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.) A POSA would have known that use of Dura-Beam™ Construction for the tensioning structures of Lin would have been a simple substitution of known materials, and would have yielded predictable results. (Ex. 1002, ¶390.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger

(*supra*, §X.A.1.a.v) would not alter Lin's use of threads for one or more of the first, second, and third tensioning structure. (Ex. 1002, ¶391.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 13. (Ex. 1002, ¶¶387-92.)

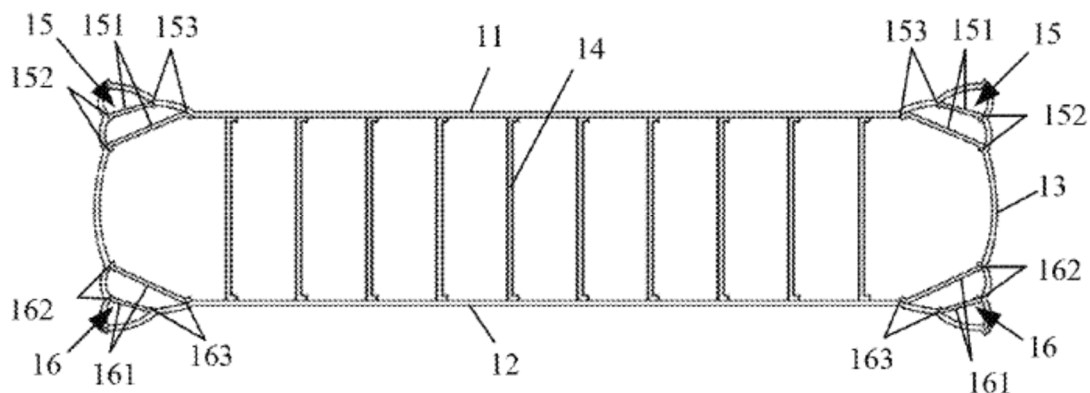
12. Claim 17

a. The inflatable bed according to claim 1,

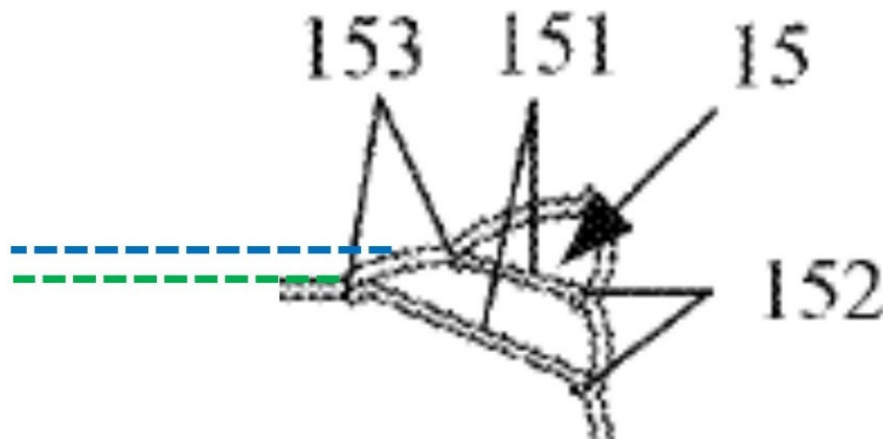
As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. 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.

A POSA's understanding of this limitation would be informed by Figure 5 of the '633 Patent:

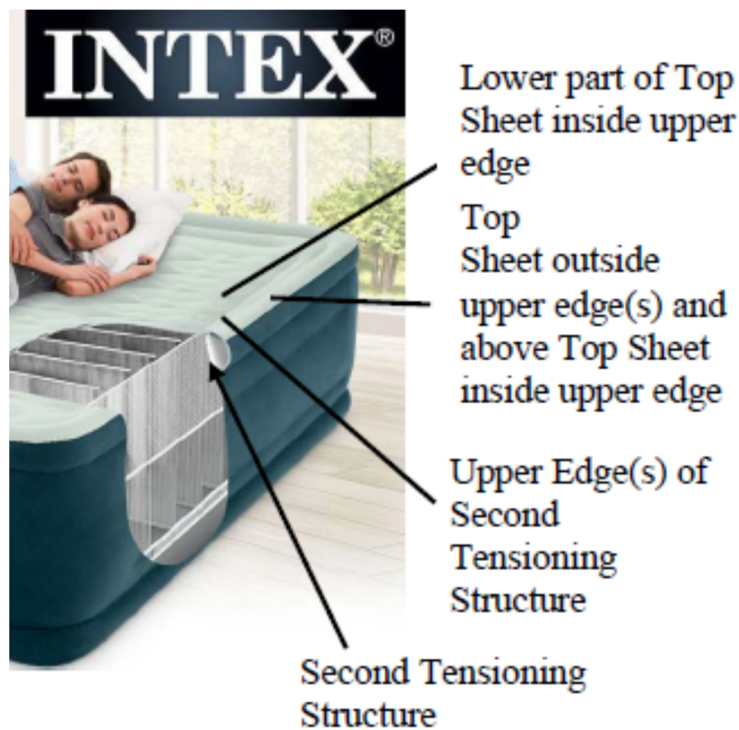


(Ex. 1001, Fig. 5; Ex. 1002, ¶183.) As shown in the below annotated close-up of the upper right corner of Figure 5, the green dashed line reflects the “location where said top sheet is located” at “the inside part” of an upper edge of the tensioning structure (i.e., closer to the inside portion of the inflatable bed), and the blue dashed line reflects a “location where said top sheet is located” at “the outside part” of this upper edge (i.e., closer to the outside portion of the inflatable bed). As reflected by the two dashed lines, the “location where said top sheet is located” at the inside part (green dashed line) is “lower” (closer to the ground) than the “location where said top sheet is located” at the outside part (blue dashed line):



(Ex. 1002, ¶183.)

Indeed, this is consistent with Patent Owner’s own initial infringement contention for this claim,⁸ in which Patent Owner alleges that an inflatable bed with a top sheet that is “lower” at a location where it is closer to the inside portion of the bed, relative to an upper edge of a tensioning structure, than a location where it is closer to the outside portion, relative to the upper edge of the tensioning structure, meets this claim limitation:



(Ex. 1042, 8.)

⁸ Patent Owner appears to no longer be asserting claim 17 in the District Court Litigation. However, Patent Owner has refused to covenant that it will not assert this claim against Petitioner. (See Ex. 1056.)

With this understanding of the meaning of this claim limitation, the Catalog discloses this limitation. (Ex. 1008, 16.) As shown in the annotated graphic below, the Catalog discloses an upper edge of a second tensioning structure (red arrow), and that a location where the top sheet is located at the inside part of the upper edge (blue arrow #1) is lower than a location where the top sheet is located at the outside part of the upper edge (blue arrow #2):



(Id..)

As discussed above, a POSA implementing Lin would have been motivated by the Catalog's teaching to dispose Lin's suction pieces 11 and 21 inside the air chamber of the inflatable bed. (*Supra*, §X.A.1.a.vi.) A POSA would have been motivated to combine the Catalog's teaching of providing that a location where the top sheet is located at the inside part of an upper edge of a second tensioning structure is lower than a location where the top sheet is located at the outside part

of the upper edge in implementing Lin's upper suction piece and side wrapping belt. (Ex. 1002, ¶395.) A POSA would have known from the Catalog that this would enhance the stability, support, and aesthetics of the inflatable bed, consistent with Lin's objectives. (*Id.*; Ex. 1007, ¶¶[0002], [0006], [0012]-[0013], [0024]-[0025]; Ex. 1008, 6, 16-17.)

Modifying Lin to couple the side wrapping belt to the side walls using two separate plastic strips instead of a common plastic strip as taught by Metzger (*supra*, §X.A.1.a.v) would not alter the location of the upper edges of the second tensioning structure in relation to the top sheet as explained above. (Ex. 1002, ¶396.)

Lin in view of the Catalog and Metzger therefore renders obvious claim 17. (Ex. 1002, ¶¶393-97.)

B. Ground 2: Lin in view of the Catalog, Metzger, and Lin '773 Renders Obvious Claims 13 and 14 of the '633 Patent

1. Claim 12

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

- b. wherein said first tensioning structure, said second tensioning structure and said third tensioning structure are all made of thermoplastic plastic sheet.***

As discussed above, Lin in view of the Catalog and Metzger discloses or suggests this limitation. (*Supra*, §X.A.10.b.) However, if the Board disagrees, this limitation is nonetheless disclosed by Lin '773.

As shown in annotated Figure 1 below, Lin '773 discloses that its tensioning structures for connecting the outer sheets of an inflatable bed (blue) may comprise a “plurality of substantially parallel strands 32” (yellow) captured between two weld strips 31 (red) at the top and bottom of the strands:

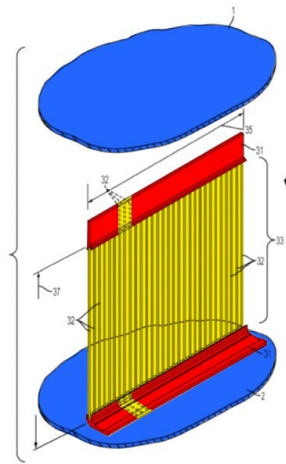
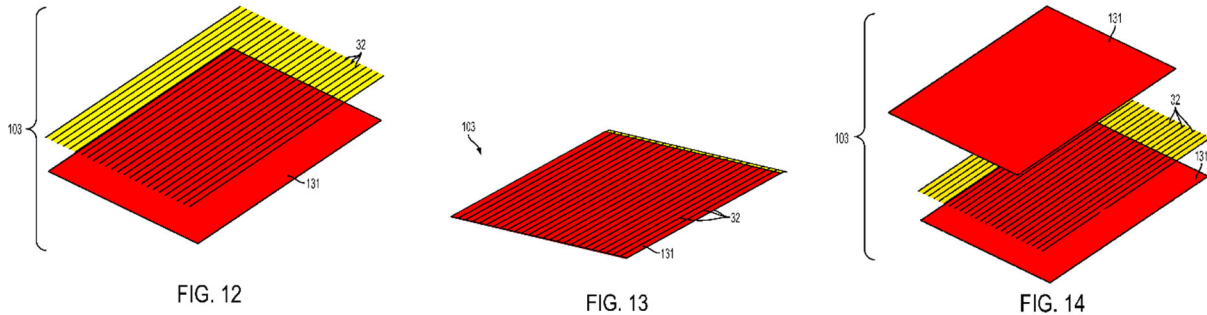


FIG. 1

(Ex. 1009, 7:17-25, 7:53-66, 12:22-31, Fig. 1; *supra*, §IX.D.)

In addition, Lin '773 discloses that instead of weld strips, the strands can be affixed to a single weld sheet spanning the distance between the outer sheets of the inflatable bed, as shown in annotated Figures 12 and 13 below, or be encapsulated

between two weld sheets spanning the distance between the outer sheets, as shown in annotated Figure 14 below:



(*Id.*, 12:37-67; Figs. 12-14; Ex. 1002, ¶414.)

Lin '773 discloses that its weld strips are “made of PVC,” and that the weld strips may be welded to the top and bottom sheets of the inflatable bed “applying heat to melt and fuse the material of weld strips 31 to the abutting material.” (Ex. 1009, 8:12-20.) PVC is a known thermoplastic plastic sheet, and a POSA would have understood that connecting PVC by “applying heat to melt and fuse the material of weld strips 31 to the abutting material” (Ex. 1009, 8:12-20), would necessarily require that the weld strips be thermoplastic. (Ex. 1002, ¶415; Ex. 1046, 5; Ex. 1047, 1; Ex. 1048, Abstract; Ex. 1035, 4.) Lin '773 further discloses that the weld sheets are also made of plastic. (Ex. 1009, 14:46-52.)

A POSA implementing Lin would have been motivated to look to Lin '773's teachings of advantageous tensioning structures for use in inflatable beds. (Ex. 1002, ¶416.) Lin '773 teaches that such tensioning structures could be used to join

the top and bottom sheets of a double-layer mattress, including “in combination with one another as required or desired for a particular design.” (Ex. 1009, 7:4-14, 7:53-63.) Lin ’773 further discloses that its tensioning structures serve to maintain the rectangular shape of the inflatable bed by preventing the surfaces of the bed from urging away from each other and thus taking on the shape of a balloon (*id.*, 1:38-52, 7:16-25, 8:47-55)—the same problem in the art to which Lin is addressed (Ex. 1007, ¶¶[0002], [0006], [0013].). Lin ’773 further teaches that its tensioning structures provide various advantages over known tensioning structures, including providing high tensile strength while minimizing weight, materials, and costs. (*Supra*, §IX.C; Ex. 1002, ¶416; Ex. 1009, 1:20-22; 6:52-56; 8:67-9:1; 9:52-55; 10:19-20; 16:17-31; 18:25-30.)

A POSA would have thus been motivated to employ Lin ’773’s tensioning structures as the tensioning structures in the air mattress disclosed and suggested by Lin, the Catalog, and Metzger, to achieve the advantages disclosed by Lin ’773. A POSA would have a reasonable expectation of success in using Lin ’773’s design as a tensioning structure, as both Lin and Lin ’773 disclose similar materials for their tensioning structures (strands/cables with plastic material on each end), and that their tensioning structures may be welded to the outside surfaces of the inflatable bed via the plastic material on each end. (Ex. 1007, ¶¶[0023], [0028],

Fig. 2; Ex. 1009, 7:4-25, 8:4-29, 8:47-55, Figs. 3, 4.)⁹ Moreover, use of such materials as tensioning structures was well known before the Priority Date.

(*Supra*, §VII.A.4; Ex. 1002, ¶417.)

A POSA further would have known that in employing Lin '773's tensioning structures as the tensioning structures in the air mattress disclosed and suggested by Lin, the Catalog, and Metzger, either using two plastic weld strips on either end of the strands (as shown in annotated Figure 1 above) or using one or more plastic weld sheets (as shown in annotated Figures 12-14 above) would be obvious to try. (Ex. 1002, ¶418.) Lin '773 discloses both implementations as options for achieving the objectives of Lin '773—providing high tensile strength to prevent the outer sheets of an inflatable bed from urging away from each other during inflation, while and minimizing weight, materials, and costs (Ex. 1009, 1:20-22, 1:38-52, 6:52-56, 7:16-25, 8:47-9:1; 9:52-55; 10:19-20; 12:37-67, 16:17-31; 18:25-30)—and a POSA would thus have a reasonable expectation of success in employing either option. (Ex. 1002, ¶418.)

Implementing Lin by using Lin '773's tensioning structures for Lin's drawbelts, side wrapping piece, and suction pieces—whether by using plastic strips

⁹ Indeed, Lin and Lin '773 share the same two inventors. (Ex. 1007, Cover Page, (72); Ex. 1009, Title Page, (72).)

or one or more plastic sheets—would result in the first, second, and third tensioning structures all being made of thermoplastic plastic sheet. (*Id.*, ¶419; Ex. 1036, 13.) Lin in view of the Catalog, Metzger, and Lin ’773 therefore renders obvious claim 12. (Ex. 1002, ¶¶411-20.)

2. Claim 13

a. The inflatable bed according to claim 1,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 1. (*Supra*, §X.A.1.)

b. 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.

As discussed above, Lin in view of the Catalog and Metzger discloses or suggests this limitation. (*Supra*, §X.A.11.b.) However, if the Board disagrees, this limitation is nonetheless disclosed by Lin ’773.

Lin ’773 discloses that the strands comprising its tensioning structures “may be made of regular cotton, polyester, nylon **thread** made of multiple filaments twisted together, of the type typically used in clothing seams, or any other strand types,” and that “[t]hese regular **threads** provide substantial tensile strength at a very low cost.” (Ex. 1009, 8:64-9:1 (emphasis added).)

As discussed above, a POSA would have been motivated to employ Lin ’773’s tensioning structures in the air mattress disclosed and suggested by Lin, the

Catalog, and Metzger. (*Supra*, §X.B.1.b.) Lin in view of the Catalog, Metzger, and Lin '773 therefore renders obvious claim 13. (Ex. 1002, ¶¶421-25.)

3. Claim 14

a. The inflatable bed according to claim 13,

As discussed above, Lin in view of the Catalog, Metzger, and Lin '773 renders obvious all of the limitations of claim 13. (*Supra*, §X.B.22.)

b. wherein two side surfaces of said mesh or said threads are at least partially coupled integrally with two opposite plastic strips, said mesh and said threads are sandwiched between the two opposite plastic strips.

As shown in annotated Figure 1 below, Lin '773 discloses that its strands may be sandwiched between two weld strips (red) at the top and bottom of the strands:

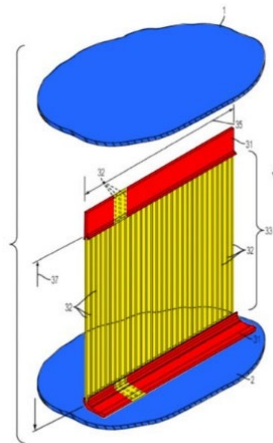
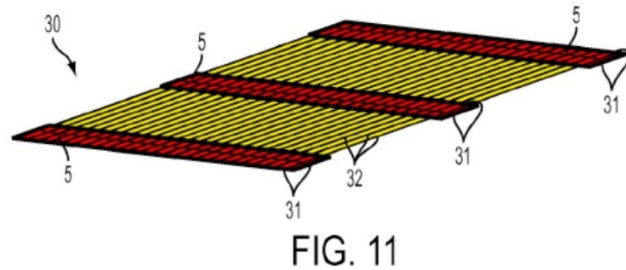
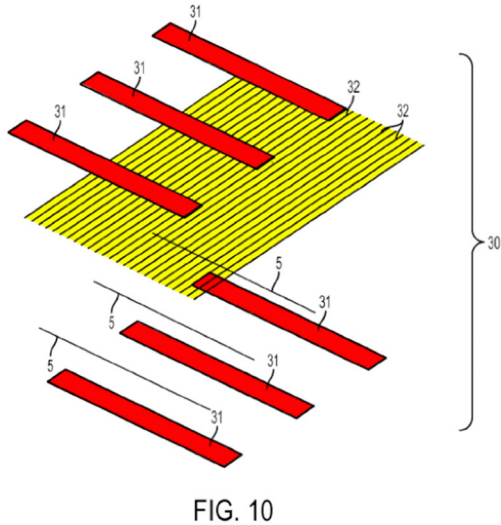


FIG. 1

(Ex. 1009, 7:17-22, 12:22-31, Fig. 1.) In particular, and as shown in annotated Figures 10 and 11 below, Lin '773 discloses that “two mutually opposed weld strips” (31, in red) may be disposed on either side of the strands (32, yellow) and

“‘trap’ or capture the strands therebetween, thereby contributing to a high-strength coupling interface”:



(*Id.*, 12:22-28, Figs. 10, 11.)

Lin '773 further discloses that the weld strips may be made of plastic such as PVC. (Ex. 1009, Abstract, 2:8-26, 8:12-20; Ex. 1002, ¶428.) Lin '773 further discloses that the weld strips may be “fixedly connect[ed]” to the strands by applying “heat or electromagnetic waves,” or by “any suitable welding method.” (Ex. 1009, 11:11-59.) A POSA would have understood that sandwiching the strands in between the weld strips and connecting them in this way would result in the strands being coupled integrally with the two opposite weld strips, as the materials of both the strands and weld strips would be fused together. (Ex. 1002, ¶429.) Moreover, the process of coupling threads with plastic strips by sandwiching the mesh or threads between the plastic strips so that they are coupled

integrally, was well-known before the Priority Date. (Ex. 1002, ¶430; Ex. 1015, ¶[0051], Fig. 5A.) Indeed, the Examiner came to this same conclusion in rejecting this claim during prosecution of the '633 Patent. (Ex. 1003, 448 (citing WO 2013/0130117 (Ex. 1052), which is a published parent PCT application of Lin '773).)

As discussed above, a POSA would have been motivated to employ Lin '773's tensioning structures in the air mattress disclosed and suggested by Lin, the Catalog, and Metzger. (*Supra*, §X.B.1.b.) Lin in view of the Catalog, Metzger, and Lin '773 therefore renders obvious claim 14. (Ex. 1002, ¶¶426-32.)

C. Ground 3: Lin in view of the Catalog, Metzger, Lin '773, and Liu Renders Obvious Claim 15 of the '633 Patent

1. Claim 15

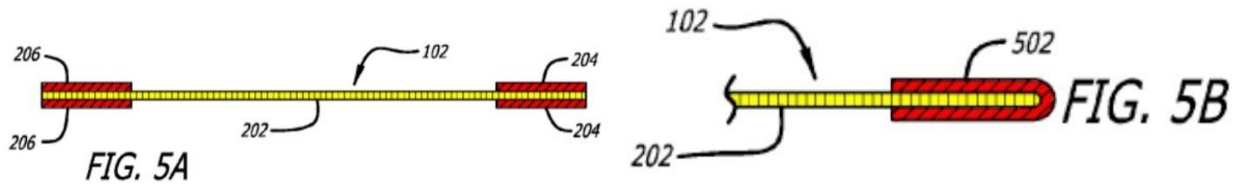
a. The inflatable bed according to claim 13,

As discussed above, Lin in view of the Catalog and Metzger renders obvious the elements of claim 13. (*Supra*, §X.B.22.)

b. 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.

As discussed above, Lin '773 discloses that its tensioning structure may comprise strands made of threads sandwiched between plastic weld strips. (*Supra*, §X.B.2.b.) Liu, in turn, discloses that its tensioning structures may comprise a

mesh panel comprised of threads (yellow) sandwiched between two plastic weld strips (red), as shown in annotated Figure 5A below, or a single weld strip folded about the lateral ends of the panel, as shown in annotated Figure 5B:



(Ex. 1015, ¶¶[0037], [0040], [0046], [0050]-[0052]; Figs. 5A, 5B.)

Liu further discloses that its weld strips may be affixed to the mesh panel by various coupling techniques including welding or melting. (*Id.*, ¶[0051].) A POSA would have understood that folding the weld strip about the lateral ends of the mesh panel and then coupling it by welding or melting would result in the mesh being coupled integrally with the U-shaped weld strip. (Ex. 1002, ¶442.)

Liu is directed to the same problems as Lin and Lin '773 (preventing deforming of large-height inflatable beds), and, like Lin '773, discloses advantageous tensioning structures comprising two weld strips to achieve this objective. (Ex. 1007, ¶¶[0002], [0006], [0013]; Ex. 1009, 1:38-52, 7:16-25, 8:47-55; Ex.1015, ¶¶[0009]-[0010], [00037]-[0041], [0054], [0063].) A POSA implementing Lin '773's tensioning structures in the air mattress disclosed and suggested by Lin, the Catalog, and Metzger thus would have been motivated to look to Liu's teachings regarding advantageous methods of attaching plastic weld

strips to threads. (Ex. 1002, ¶444.) A POSA would have been motivated to try either of the two principal ways to accomplish this—that is, either using two separate weld strips (as taught by Lin ’773 and Liu) or a single weld strip folded over the ends of the threads (as taught by Liu). (*Id.*) A POSA would have known that these two options constituted a finite number of identified, predictable solutions for sandwiching threads between weld strips in a tensioning structure, and that either solution would be obvious to try. (*Id.*) Moreover, as the Examiner found during prosecution of the ’633 Patent, sandwiching mesh or threads between a U-shaped plastic strip so that they are coupled integrally was well known before the Priority Date. (*Id.*; Ex. 1003, 448.)

Lin in view of the Catalog, Metzger, Lin ’773, and Liu therefore renders obvious claim 15 of the ’633 Patent. (Ex. 1002, ¶¶439-46.)

XI. DISCRETIONARY DENIAL IS NOT APPROPRIATE

A. *Fintiv*

The District Court Litigation is stayed pending resolution of this IPR petition and the other IPR petitions filed by Petitioner. (Ex. 1057.) Accordingly, “it is not necessary to analyze the *Fintiv* factors in detail” and discretionary denial on this basis is unwarranted. *Microsoft Corp. v. Throughputer, Inc.*, IPR2022-00528, Paper 12 at 26 (PTAB Sept. 19, 2022); *see also Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“A district

court stay of the litigation pending resolution of the PTAB trial allays concerns about inefficiency and duplication of efforts.”); *Lyft, Inc. v. Agis Software Dev. LLC*, IPR2022-00513, Paper 11 at 5-6 (PTAB June 2, 2022); *Precision Planting, LLC v. Deere & Co.*, IPR2019-01052, Paper 19 at 10 (PTAB Jan. 7, 2020).

B. 35 U.S.C. §325(d)

Denial under 35 U.S.C. §325(d) would not be appropriate under the two-part test set forth in *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*: (1) whether the same or substantially the same prior art or arguments were previously presented to the Office; and (2) whether Petitioner demonstrated that the Office erred in a manner material to the patentability of the challenged claims. IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020) (precedential).

Regarding part one, neither the Catalog nor Metzger were ever presented to or considered by the Examiner. (Ex. 1001, Title Page-2, (56); Ex. 1003.) While Lin was applied by the Examiner in an Office Action during prosecution of the ’633 Patent, none of Petitioner’s arguments or grounds (which all assert obviousness based on Lin in view of at least the Catalog and Metzger (*infra*, §§X.A-C) were ever considered by the Examiner. (*See generally*, Ex. 1003.) Accordingly, the Examiner’s application of Lin during prosecution does not satisfy the first part of the *Advanced Bionics* test. *See Thorne Rsch., Inc. v. Trustees of Dartmouth Coll.*, IPR2021-00491, Paper 18 at 8 (PTAB Aug. 12, 2021) (“The fact

that one piece of art from the combination was previously presented and/or argued to the Office alone is insufficient to satisfy the first prong of *Advanced Bionics* two-part test....”); *Halliburton Energy Servs. v. U.S. Well Servs.*, IPR2021-01036, Paper 12 at 18-20 (PTAB Jan. 19, 2022); *Teradata Corp. v. SAP SE*, IPR2020-00943, Paper 12 at 23-25 (PTAB Nov. 25, 2020).

In addition, while Liu was cited by the Examiner in support of his conclusion that certain limitations in dependent claims were well known in the art (Ex. 1003, 448, 450), Patent Owner’s amendment to purportedly distinguish over Lin did not address these rejections based on Liu (*id.*, 484-86.) Thus, the Examiner never considered or adopted any arguments against this application of Liu, and in any event, Liu is presented in the Petition along with other references (the Catalog and Metzger) not considered by the Examiner during prosecution. Thus, the first prong of *Advanced Bionics* is not satisfied with respect to Liu.

Even if the first part of the *Advanced Bionics* test were satisfied, discretionary denial is not appropriate because the Examiner erred in a manner material to the patentability of the challenged claims. As described above, in amending claim 1 following the Examiner’s rejections based on Lin, Patent Owner submitted an annotated version of Lin’s Figure 2 purporting to show that Lin did not disclose the limitations added by amendment; however, Patent Owner’s annotation expressly ignored Lin’s suction pieces 11 and 21. (*Supra*, §VI.B.3; Ex.

1003, ¶¶484-485.) By not considering Lin’s disclosure of its suction pieces, and by allowing the claims over Lin, the Examiner materially erred. (*Supra*, §§VI.B.3, X.A.1.a.vi.)

XII. CONCLUSION

Petitioner respectfully requests that IPR of claims 3-15 and 17 of the ’633 Patent be instituted and that these claims be determined to be unpatentable.

FAEGRE DRINKER BIDDLE & REATH

Dated: January 21, 2023

By: /R. Trevor Carter/
R. Trevor Carter
Reg. No. 40,549

TYPE-VOLUME CERTIFICATION

Pursuant to 37 C.F.R. §42.24(d), Petitioner hereby certifies that this Petition for *Inter Partes* Review complies with the type-volume limitation of 37 C.F.R. §42.24(a). This Petition contains 13,951 words, excluding the parts of the Petition exempted by 37 C.F.R. §42.24(a), as calculated by Microsoft Word 2010, the word processing system used in its preparation.

FAEGRE DRINKER BIDDLE & REATH

Dated: January 21, 2023

By: /R. Trevor Carter/
R. Trevor Carter
Reg. No. 40,549

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.105, I hereby certify that on January 21, 2023, I caused a true and correct copy of this Petition for *Inter Partes* Review in connection with U.S. Patent No. 10,687,633 and Exhibits 1001 – 1057 to be served via email and electronic file transfer to the following:

Dickinson Wright PLLC
John S. Artz (jsartz@dickinsonwright.com)
Steven A. Caloiaro (scaloiaro@dickinsonwright.com)

The above listed attorney of record for Patent Owner agreed to accept service of the petition and exhibits electronically.

FAEGRE DRINKER BIDDLE & REATH

Dated: January 21, 2023

By: /R. Trevor Carter/
R. Trevor Carter
Reg. No. 40,549