

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.
Petitioner

v.

MOSKOWITZ FAMILY LLC.
Patent Owner

Patent No. 12,011,367

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 12,011,367**

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LIST OF EXHIBITS

Exhibit No.	Document
Ex. 1001	U.S. Patent No. 12,011,367 to Moskowitz et al. (“the ’367 patent”)
Ex. 1002	Declaration of Brad Culbert
Ex. 1003	Curriculum Vitae of Brad Culbert
Ex. 1004	File History for U.S. Patent No. 12,011,367
Ex. 1005	RESERVED
Ex. 1006	U.S. Patent Application Publication No. 2008/0249569 A1 to Waugh et al. (“Waugh”)
Ex. 1007- Ex. 1019	RESERVED
Ex. 1020	Phulchand Prithvi Raj, <i>Intervertebral Disc: Anatomy-Physiology-Pathophysiology-Treatment</i> , 8(1) PAIN PRACT. 18 (2008)
Ex. 1021	Fabio Galbusera et al., <i>Ageing and degenerative changes of the intervertebral disc and their impact on spinal flexibility</i> , 23(3) EUR. SPINE J. 324 (2014)
Ex. 1022	Dil Patel et al., <i>Interbody options in lumbar fusion</i> , 5(1) J. SPINE SURG. S19 (2019)
Ex. 1023	RESERVED
Ex. 1024	U.S. Patent No. 9,585,766 to Robinson (“Robinson”)
Ex. 1025- Ex. 1046	RESERVED
Ex. 1047	U.S. Patent No. 6,342,074 to Simpson (“Simpson”)
Ex. 1048- Ex. 1052	RESERVED

Exhibit No.	Document
Ex. 1053	Anne Polikeit et al., <i>The importance of the endplate for interbody cages in the lumbar spine</i> , 12(6) EUR. SPINE J. 556 (2003)
Ex. 1054- Ex. 1055	RESERVED
Ex. 1056	File History for U.S. Patent No. 10,016,284
Ex. 1057	U.S. Patent No. 9,445,919 to Palmatier et al. (“Palmatier”)
Ex. 1058	RESERVED
Ex. 1059	Patent Owner’s Infringement Claim Charts, Exhibit K1, <i>Moskowitz Family, LLC v. Medtronic, Inc.</i> , No. 0:25-cv-00769 (D. Mass.), served October 30, 2025.
Ex. 1060	Senthil Eswaran et al., <i>The micro-mechanics of cortical shell removal in the human vertebral body</i> , 31 COMPUT. METHODS APPL. MECH. ENGRG. 3025 (2007)
Ex. 1061	Vivek Palepu et al., <i>Biomechanics of Disc Degeneration</i> , ADV. ORTHOP (2012)
Ex. 1062	Kai-Uwe Lewandrowski, <i>Surgical Technique of Endoscopic Transforaminal Decompression and Fusion with a Threaded Expandable Interbody Fusion Cage and A Report of 24 Cases</i> , 7(2) J. SPINE 1 (2018)
Ex. 1063	Erik Emstad et al., <i>The VariLift(®) Interbody Fusion System: expandable, standalone interbody fusion</i> , 8 MED. DEVICES (AUKL.) 219 (2015)
Ex. 1064	Gstoettner Michaela et al., <i>Footprint mismatch in lumbar total disc arthroplasty</i> , 17(11) EUR. SPINE J. 1470 (2008)
Ex. 1065	Thomas Steffen et al., <i>Cages: designs and concepts</i> , 9 EUR. SPINE J. S89 (2000)

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Exhibit No.	Document
Ex. 1066	Thomas Lowe et al., <i>A Biomechanical Study of Regional Endplate Strength and Cage Morphology as It Relates to Structural Interbody Support</i> , 29(21) SPINE 2389 (2004)
Ex. 1067	U.S. Patent No. 6,102,950 to Vaccaro (“Vaccaro”)
Ex. 1068	File History for U.S. Patent No. 10,426,633

I. INTRODUCTION

Medtronic, Inc. (“Petitioner”) respectfully requests *inter partes* review of claims 8, 9, 13, and 17-21 (the “challenged claims”) of U.S. Patent No. 12,011,367 (“the ’367 patent”) (Ex. 1001) assigned to Moskowitz Family LLC (“Patent Owner”).

The ’367 patent concerns medical devices for spinal fusion surgery. Between most vertebrae of the spine are discs, which act as shock absorbers and allow for spinal flexibility. Over time, however, these discs may deteriorate or become injured, and surgery may be needed to restore normal function and alignment of the spine. The ’367 patent discloses a “universal Zero-Profile Expandable Intervertebral Spacer (ZP-EIS),” which is a device implanted during surgery to maintain the space between vertebrae. Various types of expandable spinal implants exist in the prior art. The ’367 patent falls into the class of devices that use a “wedge mechanism” for expansion. But, as demonstrated by Palmatier (Ex. 1057), such implants were well-known to those of ordinary skill in the art at the relevant time. In fact, the Office only allowed the claims of the ’367 patent because it overlooked certain embodiments in Palmatier before it during prosecution.

Petitioner therefore requests that this Petition be granted and that the challenged claims be found unpatentable and canceled.

II. MANDATORY NOTICES

Real Parties-in-Interest: Pursuant to 37 C.F.R. § 42.8(b)(1), the real party-in-interest is Medtronic, Inc. Medtronic plc is the ultimate parent of Medtronic Inc. Medtronic, Inc. is a co-defendant with Medtronic Sofamor Danek, Inc., Medtronic Sofamor Danek USA, Inc., Warsaw Orthopedic, Inc., and Titan Spine, Inc. in a suit involving the '367 patent (*see* Related Matters below).

Related Matters: Patent Owner asserted the '367 patent against Petitioner in the following civil action: *Moskowitz Family LLC v. Medtronic, Inc. et al.*, U.S. District Court for the District of Minnesota, civil action no. 0:25-cv-00769, filed on February 28, 2025 (“the Pending Litigation”). In the Pending Litigation, Patent Owner accused Petitioner’s spinal implant devices of infringing the '367 patent. Patents related to the '367 patent were previously at issue in IPRs filed by Globus Medical, Inc. (*See* IPR2020-01303, -01304, -01305, -01306, -01307, -01308, -01309, -01310.)

The '367 patent is one of eleven patents currently asserted against Medtronic in the Pending Litigation. Petitioner has thus far filed *inter partes* review petitions challenging four of those patents: IPR2025-01598, IPR2026-00121, IPR2026-00124, IPR2026-00163.

Counsel and Service Information: Lead counsel is Naveen Modi (Reg. No. 46,224). Backup counsel are (1) Young Park (Reg. No. 51,114) and (2) Chetan

Bansal (Reg. No. 81,590). Service information is Paul Hastings LLP, 2050 M Street NW, Washington, D.C. 20036, Tel.: 202.551.1700, Fax: 202.551.1705, email: PH-Medtronic-Moskowitz-IPR@paulhastings.com. Petitioner consents to electronic service.

III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 50-2613.

IV. STANDING

Petitioner certifies under 37 C.F.R. § 42.104(a) that the '367 patent is available for review and that Petitioner is not barred or estopped from requesting review on the grounds identified herein.

V. RELIEF REQUESTED AND GROUNDS RAISED

Petitioner respectfully requests review of claims 8, 9, 13, and 17-21 of the '367 patent and cancellation of these claims as unpatentable on the following ground: Claims 8, 9, 13, and 17-21 are unpatentable under pre-AIA 35 U.S.C. § 102 as anticipated, and in the alternative rendered obvious under pre-AIA 35 U.S.C. § 103(a), based on Palmatier (Ex. 1057).

The '367 patent issued on June 18, 2024, from U.S. Application No. 17/408,068 ("the '068 application"), filed on August 20, 2021. The '367 patent has a lengthy priority chain going back to 2005. The specific technology claimed in the

'367 patent appears in the priority chain no earlier than Provisional Application No. 61/718,707 (“the '707 application”), filed on October 25, 2012. For purposes of this Petition, Petitioner has applied a priority date of October 25, 2012.¹

Palmatier was filed on December 19, 2011. Palmatier is thus prior art under pre-AIA 35 U.S.C. § 102(e). Patent Owner disclosed Palmatier in an Information Disclosure Statement (“IDS”) dated February 15, 2022 (*see* Ex. 1004, 133) during prosecution of the '367 patent, but it was not discussed by the Examiner. Palmatier was the subject of a § 102(e) rejection during the prosecution of a related patent,

¹ No application predating the '707 application in the '367 patent priority chain discloses an expandable implant with a wedge-based expansion mechanism for adjusting the spacing between two movable bodies that engage the vertebrae, as recited in each challenged claim. (Ex. 1002, ¶35.) For example, no application predating the '707 application discloses **“a first body,” “a second body,” a “wedge [] positioned between the first body and the second body,”** wherein an **“angled wedge surface [of the wedge] presses against the first interior surface of the first body to move the first body relative to the second body from a compressed configuration to an expanded configuration,”** as recited in claim 8. Petitioner does not concede that any application in the '367 patent priority chain discloses the claimed subject matter to satisfy the requirements of 35 U.S.C. § 112.

U.S. Patent No. 10,016,284 (“the ’284 patent”).² The Office, however, did not issue a rejection over Palmatier during prosecution of the ’367 patent. (*See infra*, Section VI.B.2.)

VI. BACKGROUND

A. Technology Overview

1. Anatomy of the Spine and Vertebral Bodies

The human spine, or spinal column, is the body’s central support structure that protects the spinal cord and allows flexibility for movement. (*See* Ex. 1020, 18-19; Ex. 1002, ¶24.³) It is composed of a series of bones called vertebrae. Most vertebrae are separated by joints known as intervertebral discs. (*See* Ex. 1021, 3.) These discs act as cushions, absorbing shock and allowing flexibility for movement. (*See, e.g.*, Ex. 1047, 1:46-61.) The figure below “shows a lateral view of a portion of a spinal column 10, illustrating a group of adjacent upper and lower vertebrae V1, V2, V3, V4 separated by natural intervertebral discs D1, D2, D3.” (Ex. 1006, [0025].)

² The ’367 patent claims priority to the ’284 patent through a chain of continuations.

³ Petitioner submits a declaration (Ex. 1002) by Mr. Brad Culbert, an expert in the field of spinal implants (Ex. 1003). (Ex. 1002, ¶¶3-14.)

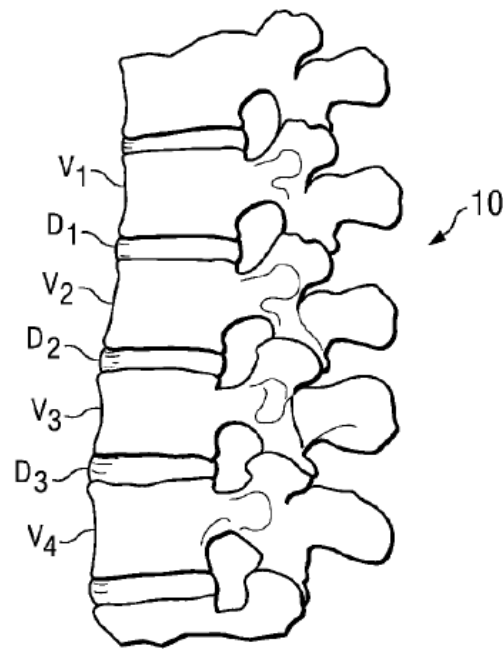


Fig. 1

(*Id.*, Fig. 1.)

Vertebrae consist primarily of a highly porous bone center and a thin bone shell. (Ex. 1060, 3025.) They are separated from the discs by an interface called a vertebral endplate, as shown in the figures below. (Ex. 1002, ¶25.)

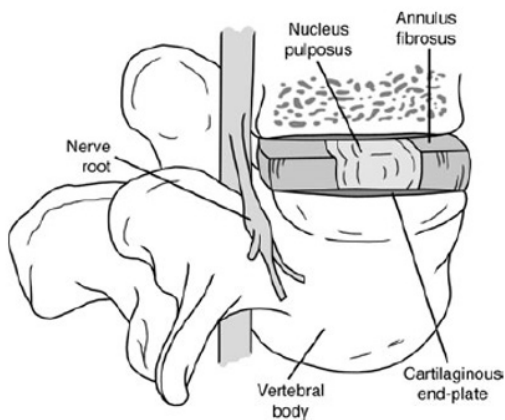


Figure 1. A line drawing of the spinal segment consisting of two vertebral bodies and a normal intervertebral disc sandwiched between them.

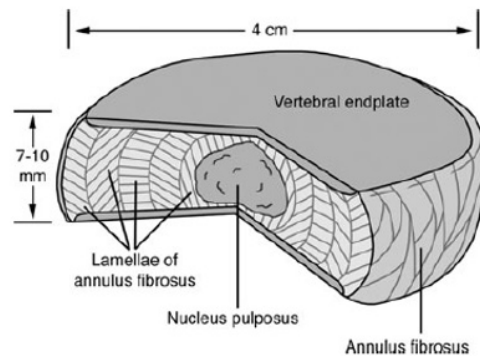


Figure 2. A cut out portion of a normal disc. Note the location of the Nucleus Pulposus, the vertebral end plate and the architecture of Annulus Fibrosis. The intervertebral disc is 4 cm wide and 7-10 mm thick.

(Ex. 1020, 19.) The shape and strength of the vertebral endplate varies across its surface, with the center as the weakest part. (Ex. 1053, 556.)

The intervertebral discs, however, can become damaged due to various reasons, including degenerative diseases, aging, trauma, and mechanical stress. (*See* Ex. 1020, 23-26; *see also* Ex. 1021, 2-3.) Damaged discs can bulge and lose height, which, in turn, can cause compression of nearby nerves, reduce the discs' ability to absorb mechanical loads, and lead to decreased mobility. (*See* Ex. 1020, 26-27.) When spinal disc injury is severe, surgical intervention may be needed. (Ex. 1002, ¶26.)

2. Expandable Intervertebral Fusion Devices and Surgical Tools for Installing the Devices

Surgical intervention for severely damaged discs may involve a discectomy, in which the surgeon removes all or part of the damaged disc, followed by placement of an implant together with bone graft material that can fuse adjacent vertebrae through the implant. (*See* Ex. 1020, 32-37; *see also* Ex. 1022, 20; Ex. 1002, ¶¶27-29.) These implants, known as intervertebral or interbody fusion devices, are positioned between adjacent vertebrae and may employ various components, such as screws, to achieve fusion with the vertebrae. (*See* Ex. 1022, 19-21.) One technique, referred to as the lumbar interbody fusion (“LIF”) technique, uses standalone cages that are placed into the intervertebral disc space and filled with bone graft material to stabilize the spine and promote fusion of the adjacent

vertebrae. (Ex. 1061, 4.) Cages for LIF techniques were initially designed as rigid structures. (*Id.*, 4, Fig. 2 (reproduced below).) However, “to overcome the problems associated with these rigid cages, . . . expandable cages” were developed. (*Id.*, 4, Fig. 3.)



FIGURE 2: Rigid interbody cages. (a) Ardis (Zimmer spine, Minneapolis, MN, USA), (b) Leopard (DePuy, Raynham, MA, USA), (c) Cougar (DePuy, Raynham, MA, USA), and (d) Jaguar (DePuy, Raynham, MA, USA) (website).

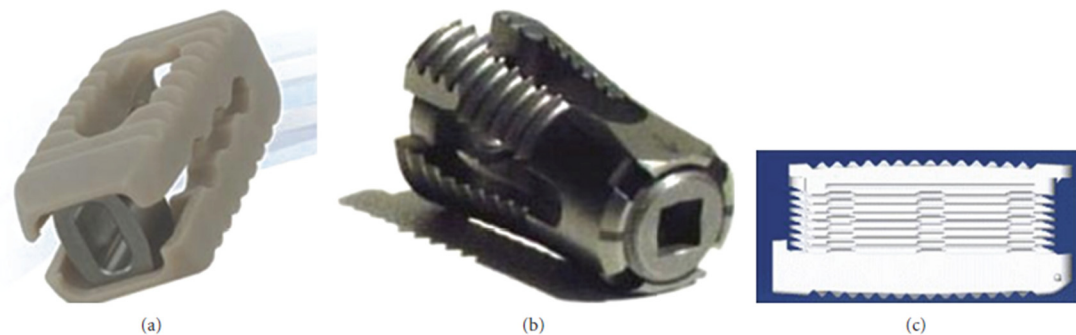
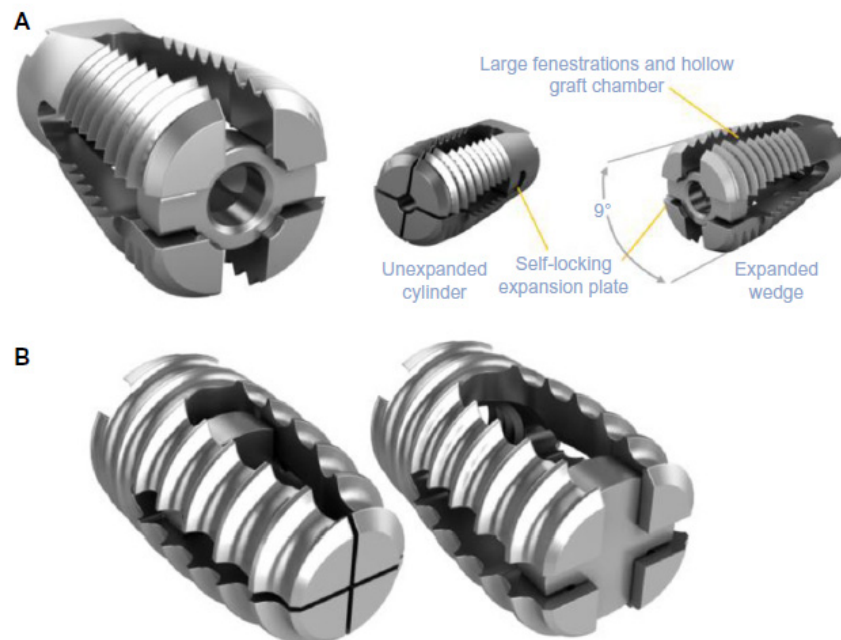


FIGURE 3: Expandable interbody cages. (a) Varian (Medyssey spine, Skokie, IL, USA), (b) VariLift-L (Wenzel spine, Austin, TX, USA), and (c) StaXx XDL (Spine wave, Shelton, CT, USA) (website).

(*Id.*, Figs. 2-3.)

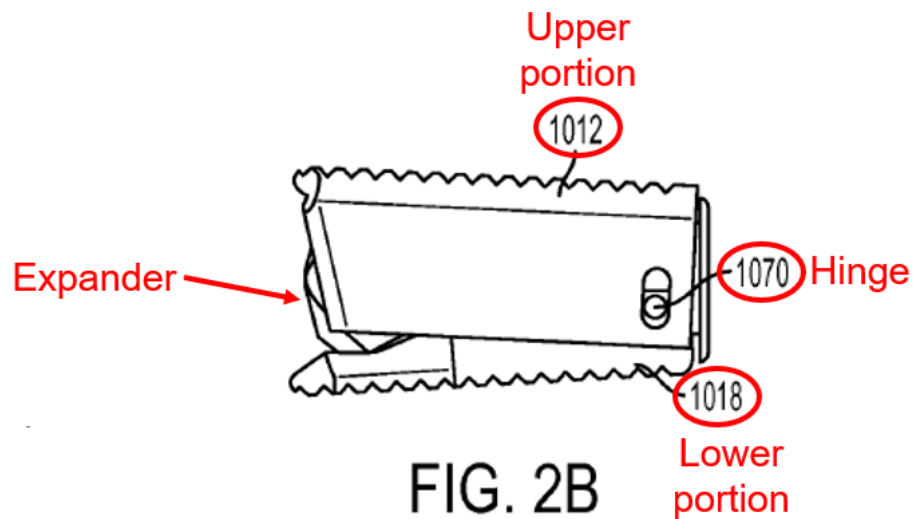
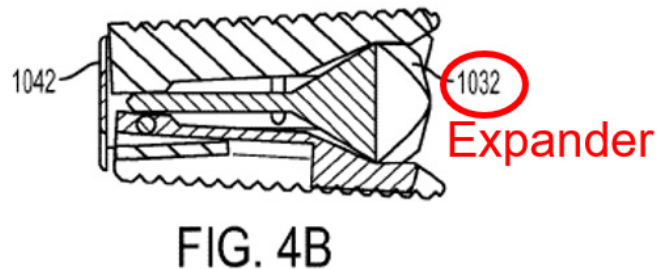
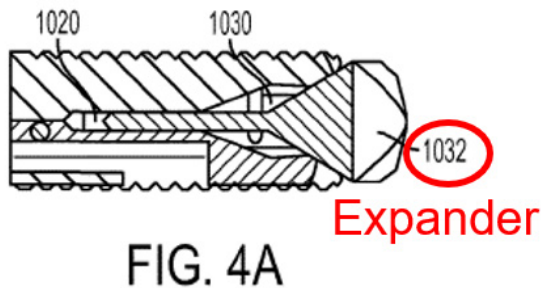
One known expandable cage was the VariLift[®]-L (shown below). (*Id.*, 4-5.) The VariLift[®]-L device was designed to be expanded in the intervertebral space to offer stable engagement with the vertebral endplates over a large contact area. (*Id.*) VariLift[®]-L included a central expansion screw. (Ex. 1062, 4.) When the expansion screw was turned, as shown in the figure below, a sliding expansion plate expanded the device. (Ex. 1063, 220.)



(*Id.*, Fig. 1.)

Another expandable device known by the early 2010s is described in U.S. Patent No. 9,585,766 to Robinson (“Robinson”) (Ex. 1024). Robinson discloses an “expandable assembly for insertion into an intervertebral space” that includes “an upper portion 1012 and a lower portion 1018,” which are “joined together by a pin-in-slot joint or another type of hinge 1070 near the proximal end.” (Ex. 1024,

1:57-58, 4:1-10.) Robinson's device also includes an expander 1032 that "is generally conical in cross-section with a rectangular or square end, like the head of a bolt, and tapered on both sides." (*Id.*, 4:15-20.) As shown in figures 4A and 4B below, when expander 1032 is pulled along the longitudinal axis, "two portions 1012, 1018 of the cage body 1010 [] expand or spread open." (*Id.*, 4:54-57.) "The pin-in-slot joint or hinge 1070 may allow the two portions 1012, 1018 to expand or move vertically relative to one another, while also allowing the two portions 1012, 1018 to rotate about the hinge 1070." (*Id.*, 4:57-62.)



(*Id.*, Figs. 4A-4B (top), and 2B (bottom) (all annotated).)

Expandable implants based on hinges were thus known in the art.

3. Design Considerations to Mitigate Subsidence

When intervertebral or interbody fusion devices are positioned between adjacent vertebrae, there is a risk that these devices can sink into the body of the vertebrae. This problem is referred to as “subsidence.” (Ex. 1002, ¶¶30-31.) To mitigate the risk of subsidence, those in the art investigated how to better distribute stress caused by interbody cages. (Ex. 1053, 556; Ex. 1064, 1472.) Researchers observed that “[t]he shape, density and the strength of the [vertebral] endplate have been shown to vary across its surface, with the centre being the thinnest and weakest area.” (Ex. 1053, 556.) Improper size and geometry of the interbody implant and placement of the implant in the porous *central area* of the vertebral body were factors that could cause subsidence. (*Id.*; Ex. 1066, 2389; Ex. 1064, 1472.) Those in the art concluded that implants should be designed “such that they rely on the strong peripheral part of the endplate to reduce the risk of subsidence” (Ex. 1053, 560.) Additionally, for “an optimal surface fit,” cages should “mimic the inverse shape of the endplate’s concave contour,” *i.e.*, have a convex surface. (Ex. 1065, 90.)

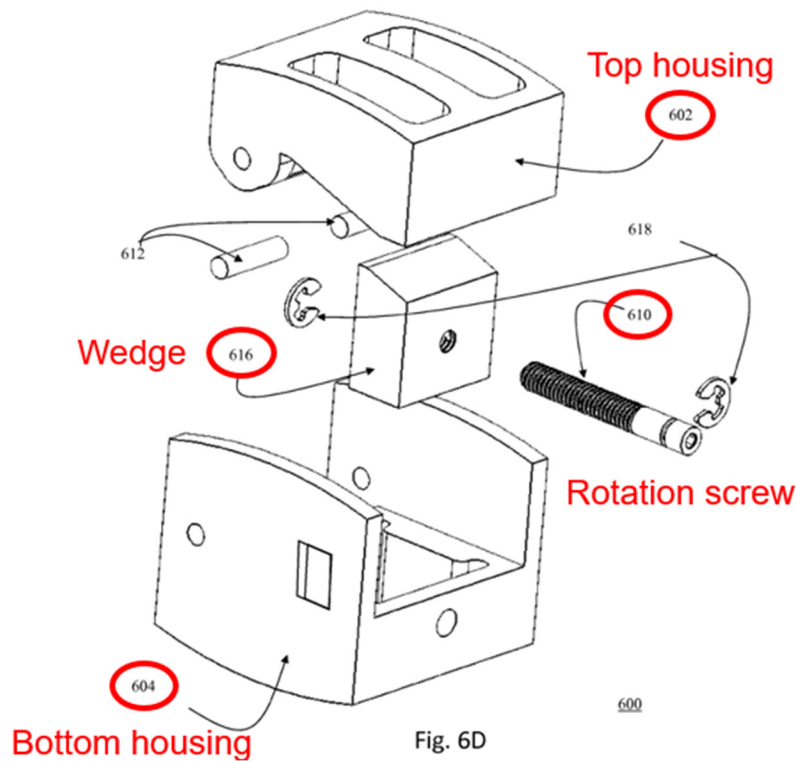
Moreover, it was known that “[t]he footprint size of the interbody fusion device is an important factor that determines the biomechanical stability afforded by

these implants” and that “occurrence of subsidence is also influenced by the cage’s footprint.” (Ex. 1061, 4.) A larger footprint increases the biomechanical stability, lessens the occurrence of subsidence, and results in lower stress on the endplates after surgery. (*Id.*, 4-5.) “From a biomechanical point of view, an implant with the largest possible surface area appears to be best to avoid subsidence into the vertebral body as the circumference would provide a brace for the strongest areas in the periphery.” (Ex. 1064, 1473.)

B. ’367 Patent Overview

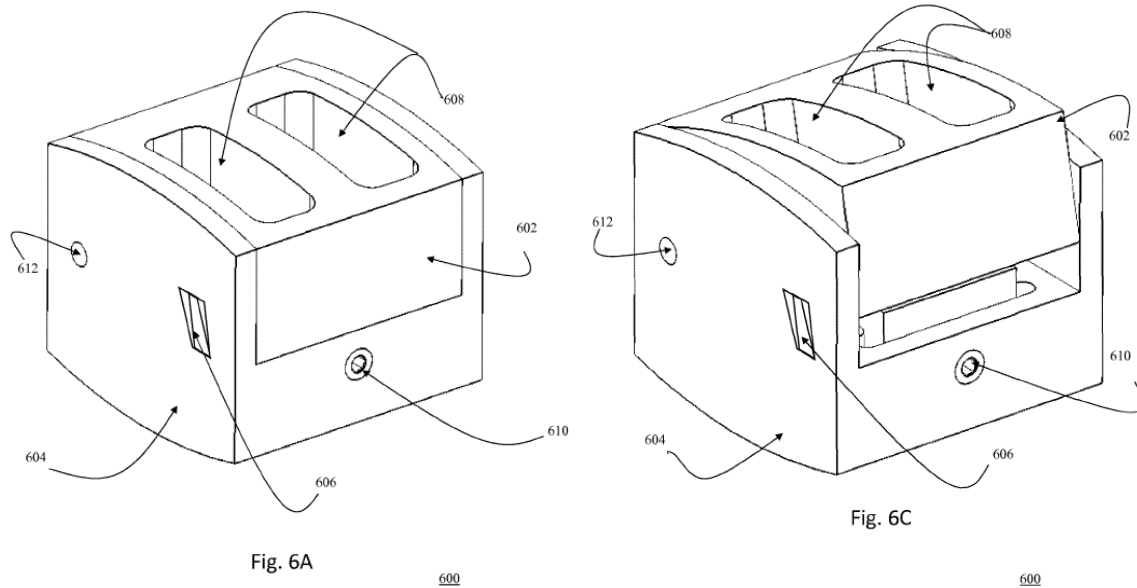
1. Disclosure of the ’367 Patent

The ’367 patent discloses an expandable intervertebral implant for fusion and distraction, *i.e.*, a device placed between vertebrae to join them together or promote proper spacing. (Ex. 1001, Abstract; Ex. 1002, ¶¶32-35.) As shown in figure 6D below, the device has two housings 602, 604, and a wedge 616 in between the housings. (Ex. 1001, 9:23-45.)



(*Id.*, Fig. 6D (annotated).)

The two housings are connected by one or more pins 612 that allow pivoting of the top housing 602 and bottom housing 604 relative to each other. (*Id.*, 9:26-30.) A rotation screw 610 “can control the relative angular orientation of the two housing pieces 602, 604.” (*Id.*, 9:35-38.) “When the screw 610 is rotated by an external tool[,] . . . the screw 610 causes lateral motion” of the wedge 616. (*Id.*, 9:40-43.) As the wedge moves, it engages “an inner tapered surface of the top housing 602 and forces the top housing piece 602 to rotate away from the bottom housing 604,” *i.e.* expands the device. (*Id.*, 9:43-45.) Figure 6A below shows the device in its closed configuration, and figure 6C shows the device in its fully expanded configuration. (*Id.*, 6:4-8.)



(*Id.*, Figs. 6A, 6C.)

The device 600 “can include indentions 606” on the lateral sides of the top housing 602 and the bottom housing 604 “to mate with prongs” of a tool “to assist in grasping, inserting and impacting the device 600.” (*Id.*, 9:30-35.) The device 600 can also include “one or more bone cavities 608 incorporated into the top housing 602 and/or bottom housing 604 for bone fusion.” (*Id.*, 9:45-47.)

2. Prosecution of Related Patents

The '367 patent issued from the '068 application, which is a continuation of U.S. Application No. 16/587, 993, which is a continuation of U.S. Application No. 16/025,667, now U.S. Patent No. 10,426,663, which is continuation of U.S. Application No. 15/820,232, now U.S. Patent No. 10,016,284. During prosecution of the '367 patent, the Office rejected then pending independent claim 21 over

Glerum but patentee overcame that rejection by amending claim 21. (Ex. 1004, 325-29, 335-51.) The Office allowed the claims without any explanation as to which limitations it believed were missing from the prior art.

During the prosecution of the related '284 patent (which has nearly identical independent claims), the Office issued an anticipation rejection based on Palmatier's implant 540, shown in figures 17-21. (Ex. 1056, 146-48.) Patent Owner argued that "Palmatier does not teach . . . 'the second housing defines a slot in the fourth end portion between the third and fourth side portions that is sized to receive the second end portion of the first housing such that the second end of the first housing and the fourth end of the second housing are axially aligned.'" (*Id.*, 182.) The Examiner subsequently allowed the claims. (*Id.*, 231.)

In allowing the claims, the Examiner focused specifically on an embodiment presented in Figures 17-21, which do not appear to have the claimed slot in the fourth end. (*Id.*, 146-48.) In focusing on this embodiment, however, the Examiner failed to appreciate that the claimed slot appeared in the embodiment of Palmatier discussed with respect to Figures 22-26 describing implant 840. (*See infra* Section X.A.1.v.)

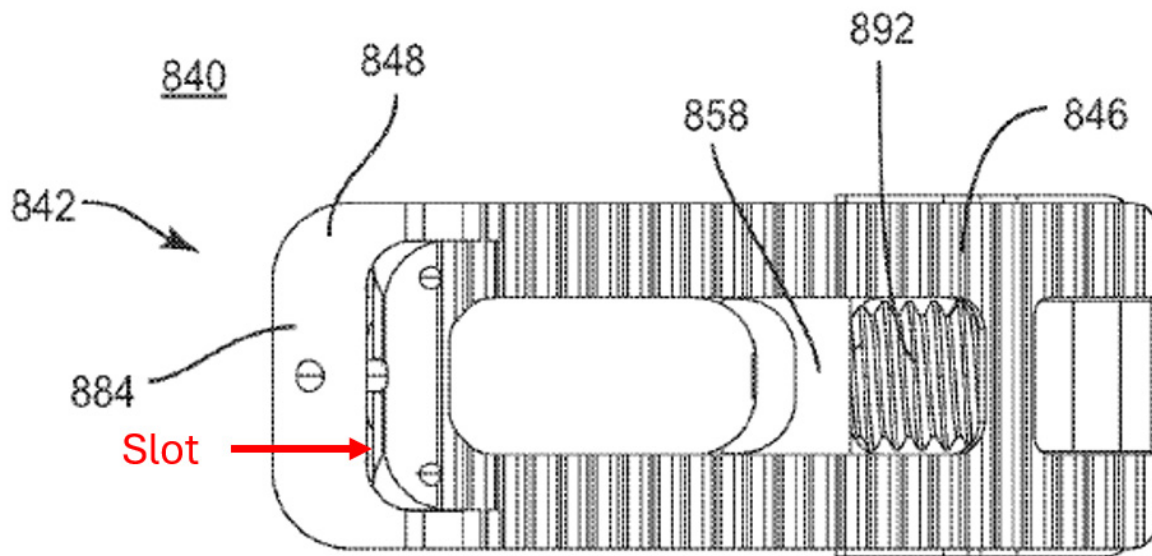


FIG. 23

(Ex. 1057, Fig. 23 (annotated).)

Moreover, during prosecution of U.S. Patent No. 10,426,633, the Office did not reject the claims over Palmatier. Instead, the Office issued one prior art rejection, anticipation of claims 1-14 and 16-20 based on U.S. Patent No. 6,102,950 to Vaccaro (“Vaccaro”) (Ex. 1067). Patentee distinguished Vaccaro by arguing that “Vaccaro has no second movable portion defining a slot as claimed,” and “Vaccaro does not have a wedge that is configured to slide in a direction toward the second and fourth ends to hingedly open the first movable portion with respect to the second movable portion.” (See Ex. 1068, 297-98.) But Palmatier has each of these features that the

patentee argued were absent from Vaccaro, as shown in Figure 22 above. (*See infra* Section X.A.1.)

VII. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art (“POSITA”) at the time of the alleged invention (early-2010s, including the time leading up to October 25, 2012) would have a bachelor’s or equivalent degree in Mechanical Engineering or a related discipline (*e.g.*, biomechanics, biomedical or metals and materials engineering), and at least five years of experience. (Ex. 1002, ¶21.) More education can supplement practical experience and *vice versa*. For example, a POSITA could have an advanced degree, in the technical disciplines provided above, or a Doctor of Medicine, and at least two years of experience in the subject areas provided above.

VIII. OVERVIEW OF THE PRIOR ART

A. Palmatier

Palmatier discloses “an expandable interbody implant system.” (Ex. 1002, ¶¶38-41; Ex. 1057, 1:35-37.) Palmatier’s intervertebral implant 40, described with references to figures 1-16, is one embodiment of the disclosed “expandable interbody implant system.” (Ex. 1057, 15:9-12 (“intervertebral implant 40 . . . described above with regards to FIGS. 1-16”).) Palmatier describes variations of implant 40 as implants 540 and 840, which have largely similar components as implant 40. (*Id.*, 15:9-12, 18:38-41.) For example, all three have a piston component

46/546/846, a base component 48/548/848, a wedge 58/558/858 between the two components, and a rotating screw 92/592/892. (*Id.*, 6:28-31, 8:34-38, 15:15-20, 16:25-29, 18:42-45.⁴) As explained below, each embodiment has the same basic operating mechanism: the piston component is hingedly connected to the base component, and a wedge is axially translated between them by rotating the screw, which moves the distal portion of the piston component away from the base component to expand the implant. (Ex. 1002, ¶38.) For example, the implant expands from a “collapsed configuration” (shown in figure 15) to an “expanded configuration” (shown in figure 16) by moving the wedge 58 from right to left, *i.e.*, in the direction of arrow D. (Ex. 1057, 13:54-14:2.)

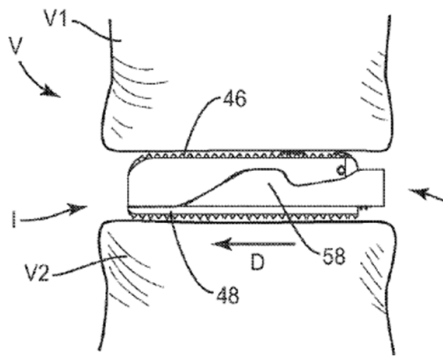


FIG. 15

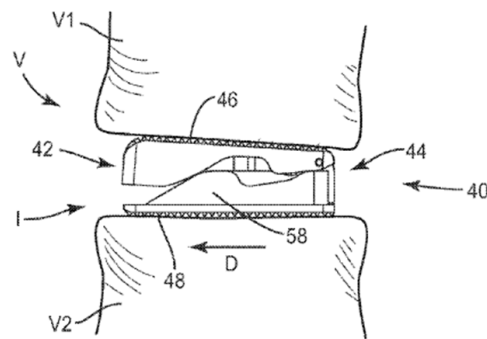
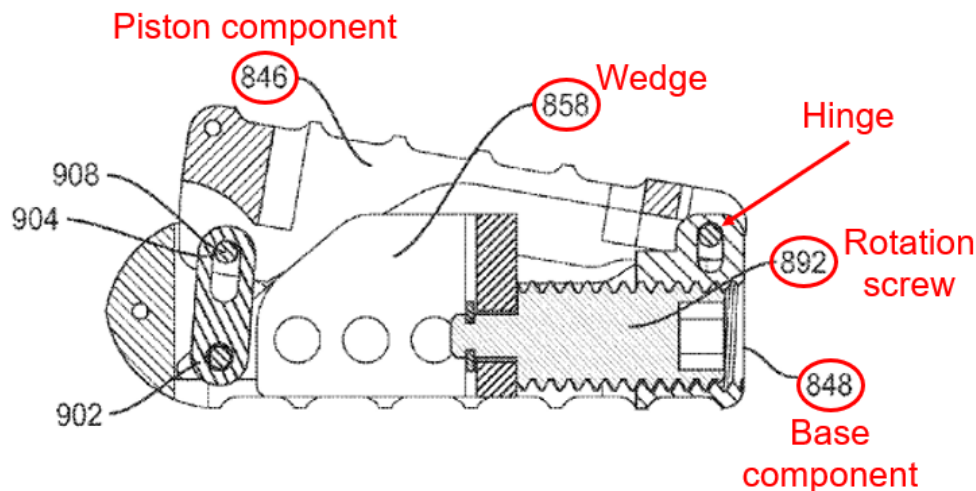


FIG. 16

⁴ Analogous structures in *Palmatier* have the same ending digits. (Ex. 1002, note 2.) For example, piston component ends with “46,” base component ends with “48,” wedge ends with “58,” and screw ends with “92.”

(*Id.*, Figs. 15-16.)

The embodiment of figures 22-26, which is a focus of this Petition, discloses an “intervertebral implant 840, similar to intervertebral implant 40” (*Id.*, 18:38-41.) Like implant 40, implant 840 has a base component 848 that is pivotably connected by a hinge with the piston component 846. (*Id.*, Fig. 24 (reproduced below), 18:42-48, 8:43-46 (“Base component 48 is pivotably connected to piston component 46 adjacent posterior ends 66, 86 with hinge 50 to facilitate a pivoting connection between components 46, 48.”), 15:9-23.)

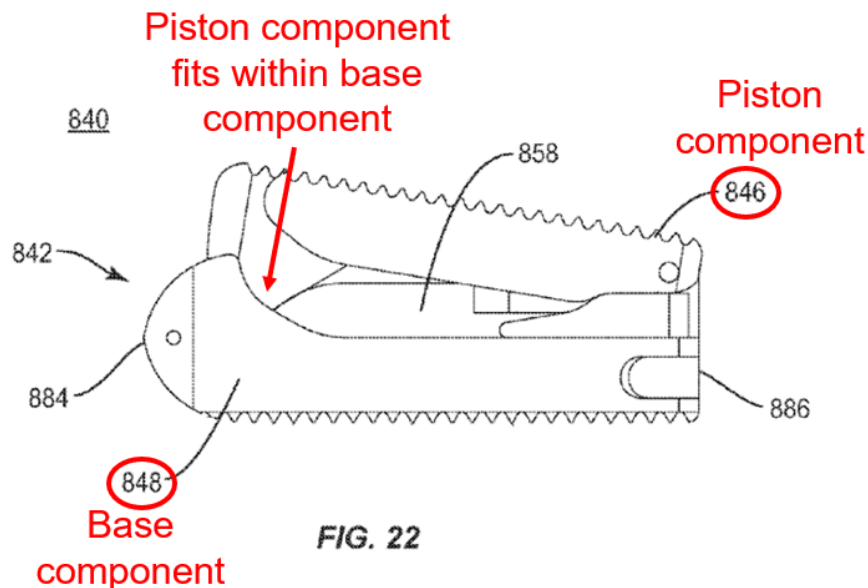


(*Id.*, Fig. 24 (annotated).)

To expand the implant, a tool rotates rotation screw 892, which then pushes wedge 858 along the longitudinal axis of the implant. (*Id.*, 18:42-45 (“an inserter or tool (not shown) [] engages a screw 892 for axially translating a wedge 858”); *compare, id.*, Fig. 26, with Fig. 24.) As wedge 858 moves longitudinally, the surface

of wedge 858 engage an angled abutting surface of piston component 846 to pivot piston component 846 relative to base component 848 about a hinge. (*Id.*, Figs. 24-26, 16:25-42.)

Palmatier's implant 840 differs from implants 40, 540 because, as shown in figures 22 and 23 below, base component 848 has side walls that create a slot to nest part of piston component 846 within base component 848. According to Palmatier, "[b]ase component 848 protects wedge 858 and screw 892 as intervertebral implant 840 is inserted into an intervertebral disc space." (*Id.*, 18:46-48.)



(*Id.*, Fig. 22 (annotated).)

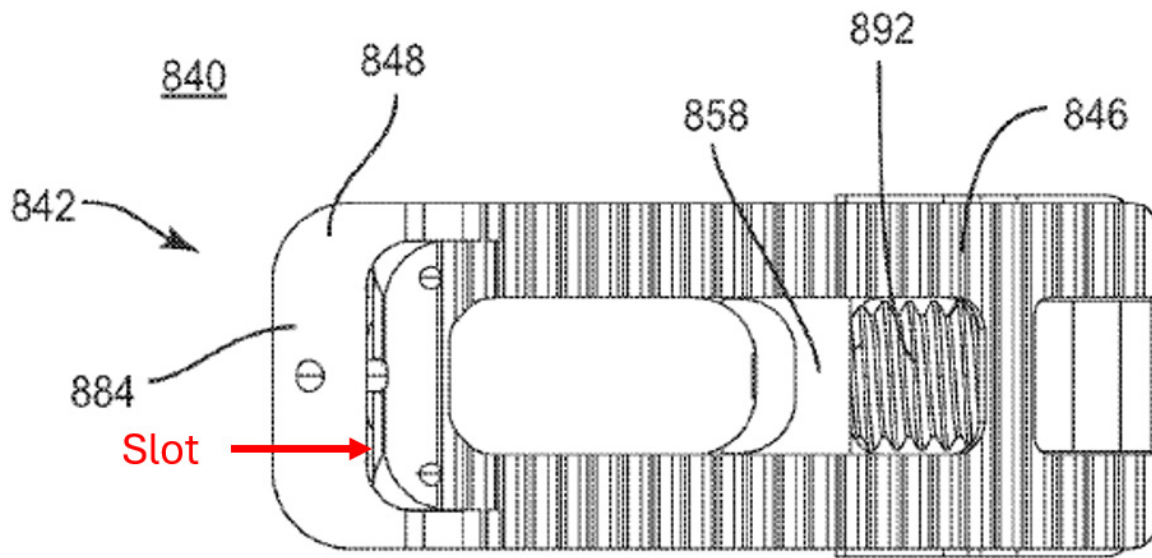


FIG. 23

(*Id.*, Fig. 23 (annotated).)

IX. CLAIM CONSTRUCTION

For IPR proceedings, the Board applies the claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). See 83 Fed. Reg. 51,340-59 (Oct. 11, 2018). Under *Phillips*, claim terms are typically given their ordinary and customary meanings, as would have been understood by a POSITA, at the time of the invention, having taken into consideration the language of the claims, the specification, and the prosecution history of record. *Phillips*, 415 F.3d at 1313; *see also id.* at 1312-16. The Board need not construe any claims as the claims are unpatentable under any reasonable construction, or any construction

offered by Patent Owner (*see, e.g.,* Ex. 1059). *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11 at 16 (P.T.A.B. Aug. 14, 2015).⁵

X. DETAILED EXPLANATION OF GROUNDS

For the reasons set forth below, the prior art renders claims 8, 9, 13, and 17-21 of the '367 patent unpatentable.

A. Ground 1: Palmatier Anticipates and Renders Obvious Claims 8, 9, 13, and 17-21

1. Claim 8

i) [8.a] “An expandable intervertebral device comprising:”

To the extent the preamble is limiting, Palmatier discloses this limitation. (Ex. 1002, Appendix [8.a].) Palmatier discloses an intervertebral implant 840 with reference to figures 22-26, and, as shown in figures 24 (expanded configuration) and 26 (collapsed configuration) below, implant 840 is an “expandable interbody implant system.” (Ex. 1057, 1:35-37, 3:30-35, Figs. 22, 24, 26.) The “implant []

⁵ Petitioner reserves all rights of raise claim construction and other arguments in other venues. Specifically, Petitioner is not conceding that each claim satisfies all statutory requirements, nor waiving any arguments concerning claim scope or grounds that can only be raised in district court.

expands after insertion into an intervertebral disc space.” (*Id.*, 3:39-48; *supra* Section VIII.A.)

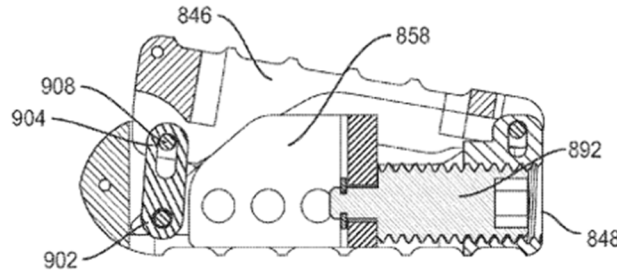


FIG. 24

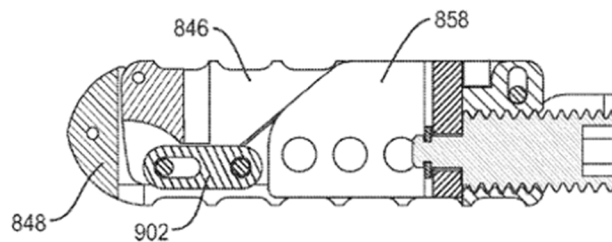


FIG. 26

(Ex. 1057, Figs. 24, 26.)

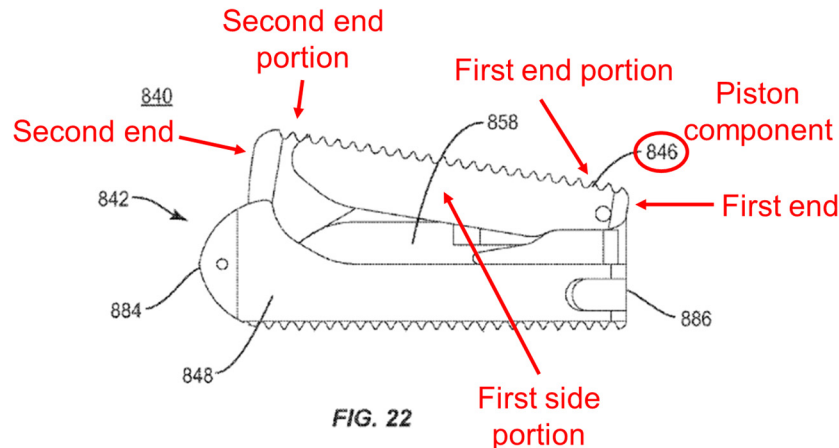
- ii) [8.b] “a first body extending from a first end to a second end, wherein the first body has first and second end portions positioned at the first and second ends, respectively, and has first and second side portions extending between the first and second end portions,”

Palmatier discloses this limitation. (Ex. 1002, Appendix [8.b].) As shown in figure 22 below, implant 840 includes a piston component 846, which is a “**first body**,”⁶ that moves between an expanded and collapsed configuration. (Ex. 1057,

⁶ Claim language is bolded throughout.

18:38-19:2, Figs. 24-26; *see also id.*, 6:31-36 (“Base component 48 is movably mounted to piston component 46 with a hinge 50 to facilitate a pivoting connection between components 46, 48. Components 46, 48 are relatively movable to expand and collapse with [the] intervertebral implant.”).⁷)

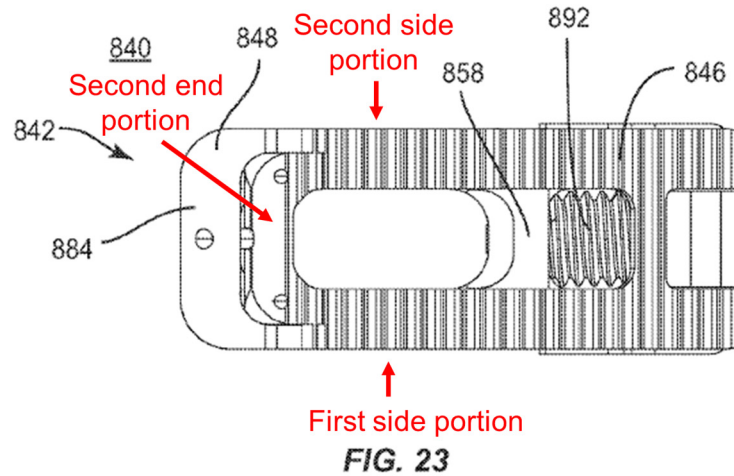
⁷ Palmatier discloses three exemplary embodiments (implant 40, implant 540, and implant 840). Palmatier explains that its statements about implant 40 and implant 540 also apply to implant 840. (Ex. 1057, 18:38-41 (“intervertebral implant 840 [is] similar to intervertebral 40 and intervertebral implant 540 and their components.”).) Palmatier also states that “intervertebral implant 840 is expanded . . . as described above with regard to intervertebral implants 40, 540.” (*Id.*, 18:63-66.) Where certain components are not expressly discussed with respect to implant 840, but are otherwise present in the figures for implant 840, as well as implants 40, 540, Petitioner cites disclosure for analogous components in implants 40, 540 that are provided, *e.g.*, analogous components have been assigned the same ending digits. (Ex. 1002, ¶45 n.4.)



(*Id.*, Fig. 22 (annotated).)

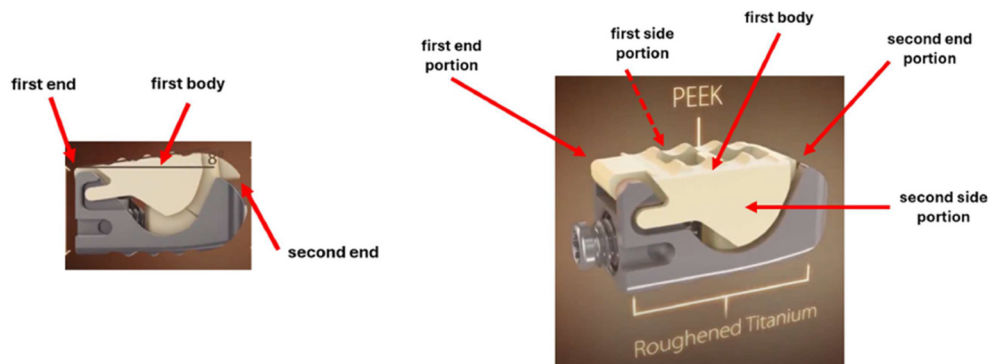
As shown in figure 22 above, the piston component 846 extends from a posterior end, *i.e.*, “**a first end**,” to an anterior end, *i.e.*, “**a second end**.” (*Id.*, Figs. 22, 24; *see also id.*, 6:25-38, Fig. 12.) Areas around the posterior end and anterior end are “**first and second end portions**,” respectively. Palmatier thus discloses “**a first body extending from a first end to a second end, wherein the first body has first and second end portions positioned at the first and second ends, respectively.**”

Moreover, as shown in figure 22 above, Palmatier’s piston component 846 includes “**first and second side portions extending between the first and second end portions.**” (*Id.*, 3:14-17.) While the “**second side portion**” is not visible in figure 22, a POSITA would have understood that there is a **second side portion** on the other side of the **second end portion** given the symmetrical nature of the device evident from figure 23 below. (Ex. 1002, Appendix [8.b].)



(Ex. 1057, Fig. 23 (annotated).)

The above mapping is consistent with Patent Owner's infringement contentions.



(Ex. 1059, 1-2 (excerpted).)

- iii) [8.c] “wherein the first body has a first vertebral body engagement surface and has a first interior surface positioned on an opposite side of the first body than the first vertebral body engagement surface, the first vertebral body engagement surface comprising a plurality of ridges for interfacing with a vertebral body surface, the first interior surface

**includes at least one angled housing surface
protruding from the first interior surface;”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [8.c].) As shown in figure 22 below, piston component 846 (**the first body**) has a ridged outer surface that contacts the vertebral body.

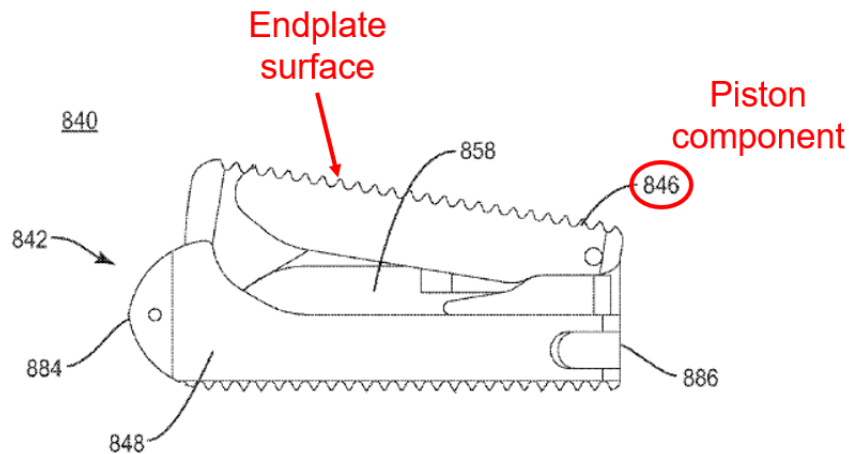


FIG. 22

(Ex. 1057, Fig. 22 (annotated).) As explained with reference to the corresponding parts of implant 40, this ridged outer surface is “an outer tissue engaging surface, such as, for example, an endplate surface 52,” which is “configured to engage an endplate of a vertebra.” (*Id.*, 6:46-61, Fig. 16; *compare id.*, Fig. 22, with *id.*, Fig. 5; Fig. 15.)

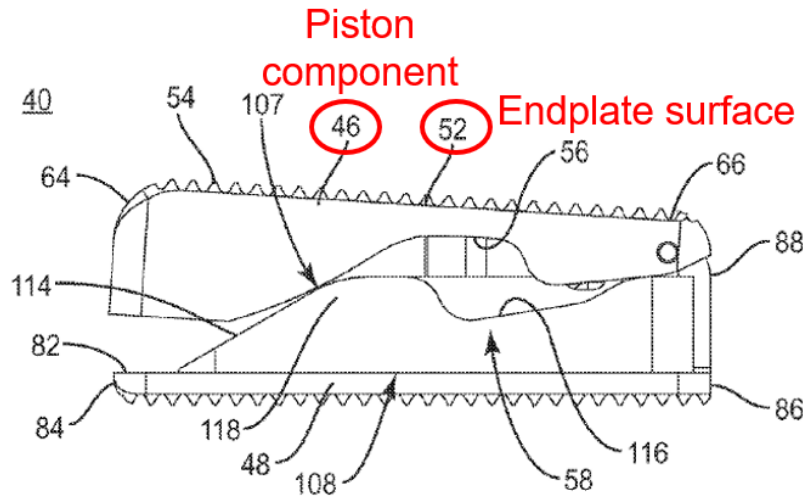
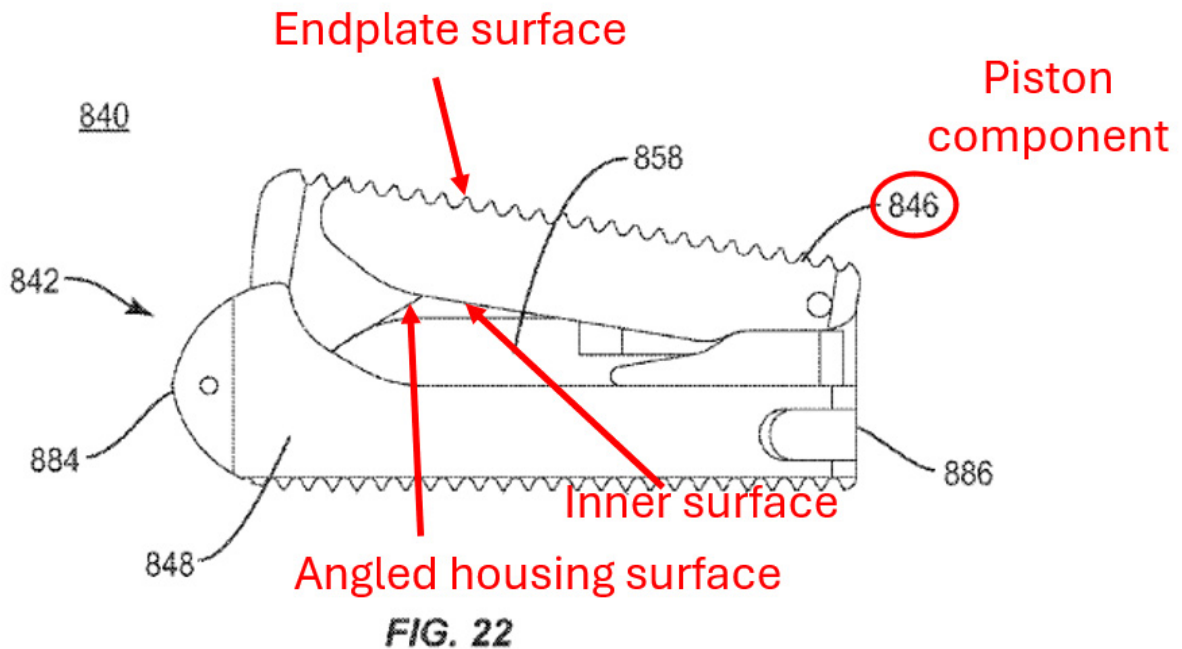


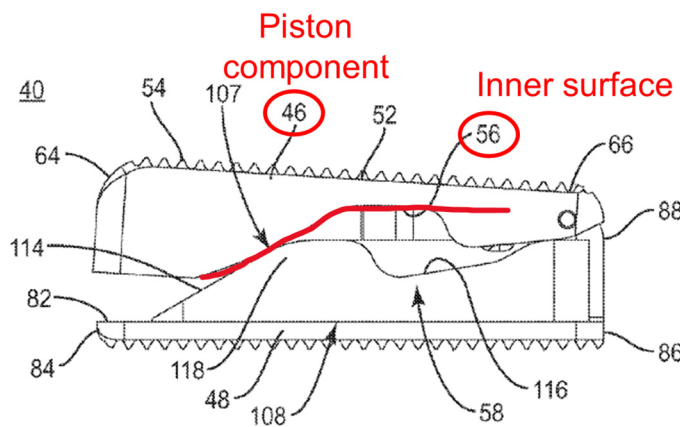
FIG. 4

(*Id.*, Fig. 4 (annotated).) In the expanded configuration as shown in figures 22 and 4 above, the plurality of ridges on the first vertebral body engagement surface are in contact with the vertebral body surface. (*Id.*, Fig. 16.) Palmatier thus discloses that **“the first body has a first vertebral body engagement surface[,] . . . the first vertebral body engagement surface comprising a plurality of ridges for interfacing with a vertebral body surface.”**

As shown in figure 22 below, piston component 846 has an inner surface (**the first interior surface**) opposite the endplate surface facing and engaging wedge 858. There is also an **“angled housing surface protruding from the first interior surface.”**



(*Id.*, Fig. 22 (annotated).) As explained with respect to implant 40, which has a similar design as implant 840, the “[p]iston component 46 includes an inner surface 56 disposed to face an opposing orientation and/or direction relative to the facing orientation and/or direction of endplate surface 52.” (*Id.*, 7:4-7, Fig. 4.)

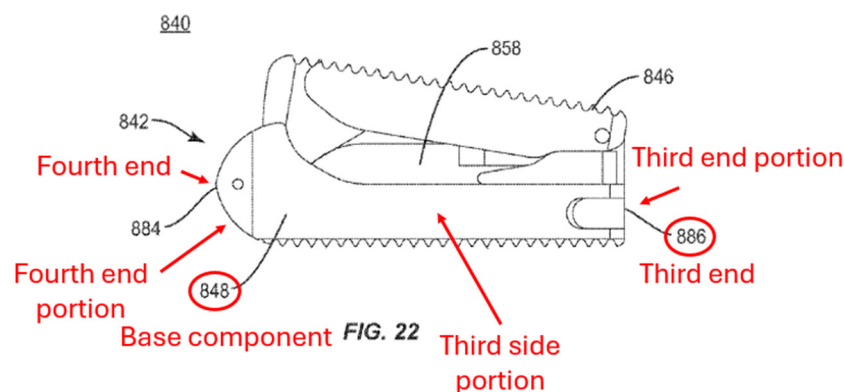


(*Id.*, Fig. 4 (annotated).)

Palmatier thus discloses “wherein the first body . . . has a first interior surface positioned on an opposite side of the first body than the first vertebral body engagement surface, . . . the first interior surface includes at least one angled housing surface protruding from the first interior surface.”

iv) [8.d] “a second body extending from a third end to a fourth end, wherein the second body has third and fourth end portions positioned at the third and fourth ends, respectively, and has third and fourth side portions extending between the third and fourth end portions,”

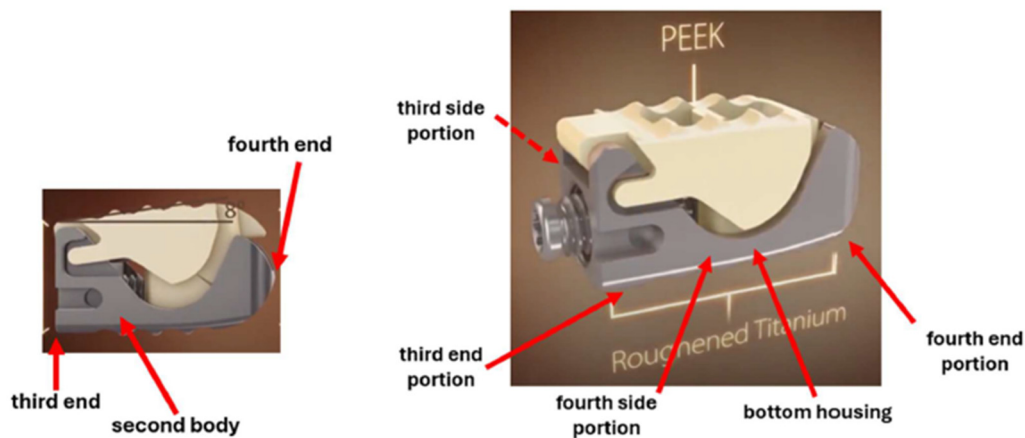
Palmatier discloses this limitation. (Ex. 1002, Appendix [8.d].) Palmatier's implant 840 includes a base component 848, which is a **"second body."** (Ex. 1057, 18:38-19:2, figures 24-26.) As shown in figure 22 below, Palmatier's base component 848 extends from a posterior end 886, *i.e.*, **"a third end,"** to an anterior end 884, *i.e.*, **"a fourth end."** (*Id.*, 18:38-46, Fig. 22.) Areas around the posterior end and anterior end are **"third and fourth end portions,"** respectively.



(*Id.*, Fig. 22 (annotated).)

Figure 22 above also shows that the base component 848 includes a **“third . . . side portion[] extending between the third and fourth end portions.”** A POSITA would have understood that there is an additional side portion on the opposite side of the implant, *i.e.*, on the side not shown in figure 22. (Ex. 1002, Appendix [8.d].) Such symmetry is evident from figure 23, as discussed above for limitation [8.b]. Palmatier thus discloses **“third and fourth side portions extending between the third and fourth end portions.”**

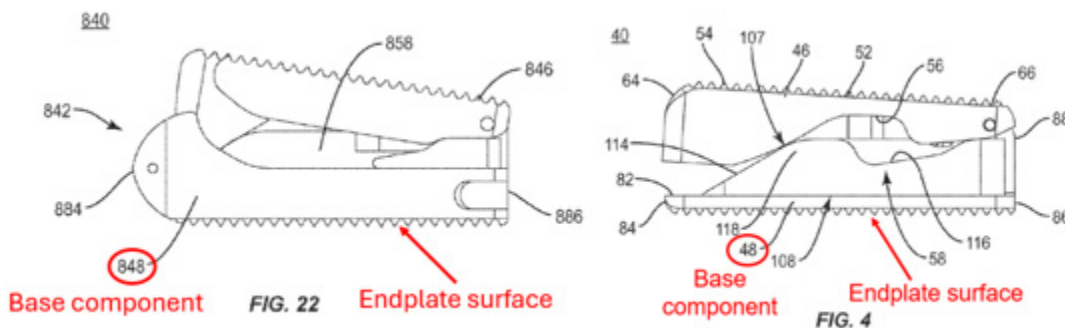
The above mapping is consistent with Patent Owner’s infringement contentions.



(Ex. 1059, 4 (excerpted).)

- v) [8.e] “wherein the second body has a second vertebral body engagement surface and has a second interior surface positioned on an opposite side of the second body than the second vertebral body engagement surface, the first body configured to fit between the third and fourth side portions in a compressed configuration of the expandable intervertebral device; and”

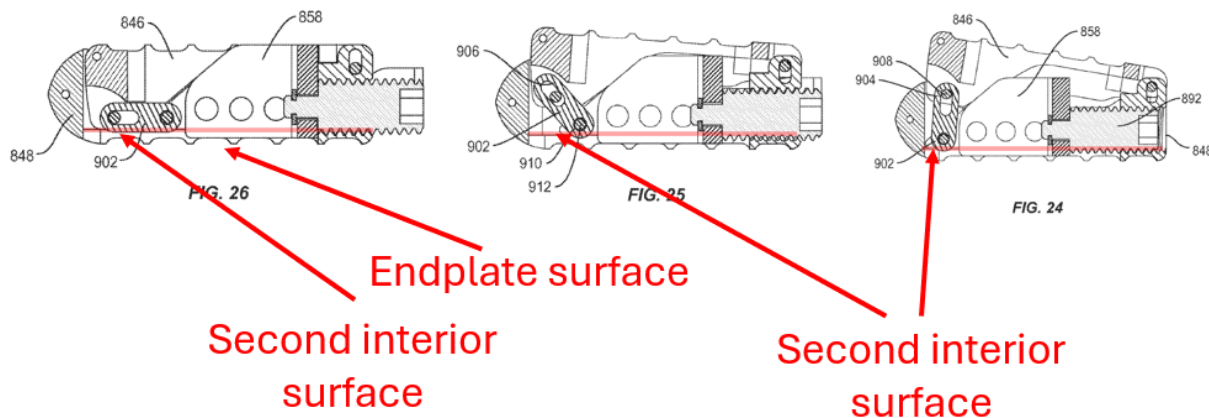
Palmatier discloses this limitation. (Ex. 1002, Appendix [8.e].) As shown in figure 22 below, base component 848 (**the second body**) has a ridged outer surface that is annotated as an “endplate surface.” As explained with reference to implant 40, the ridged outer surface is “an outer tissue engaging surface, such as, for example, an endplate surface 78.” (Ex. 1057, 7:47-48; *compare id.*, Fig. 22, with *id.*, Fig. 4.) Endplate surface 78 is “configured to engage an endplate of a vertebrae.” (*Id.*, 7:51-54.)



(Ex. 1057, Figs. 22, 4 (both annotated).) Palmatier thus discloses “**the second body** [that] **has a second vertebral body engagement surface.**”

The base component 848 also has an inner surface that is opposite the endplate surface. This inner surface (“**second interior surface**”) is not visible in figure 22

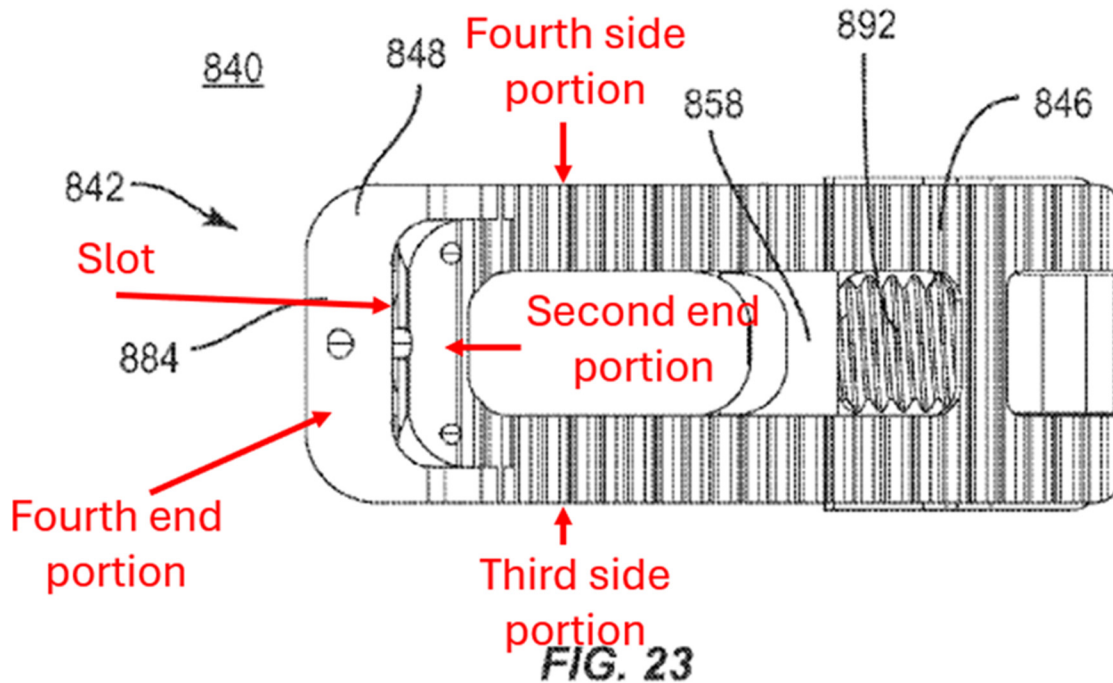
but is visible in figures 24-26 below. The inner surface is described in the embodiment relating to implant 40 as “inner surface 82” (*see* figure 4 above) and serves as the base surface over which the wedge slides. (*Id.*, 7:62-8:4 (explaining that surface 82 is “planar” and engages a “surface of wedge 58”); *see also id.*, Figs. 4, 7.)



(*Id.*, Figs. 24-26 (all annotated).) Palmatier thus discloses “**wherein the second body . . . has a second interior surface positioned on an opposite side of the second body than the second vertebral body engagement surface.**”

As explained below Palmatier discloses a slot in the **second body**, such that the “**first body [is] configured to fit between the third and fourth side portions in a compressed configuration of the expandable intervertebral device.**” As shown in figure 23 below, the anterior end portion of base component 848 (the **fourth end portion of the second body**) has an opening that fits within it the anterior end portion of piston component 846 (**second end portion of the first body**). As

further shown in figure 23 below, the slot is “**between the third and fourth side portions.**”



(*Id.*, Fig. 23 (annotated).)

This slot can also be seen in figure 27, which is a “perspective view of one embodiment of the components of the implant shown in FIG. 22.” (*Id.*, 3:23-24, Fig. 27.)

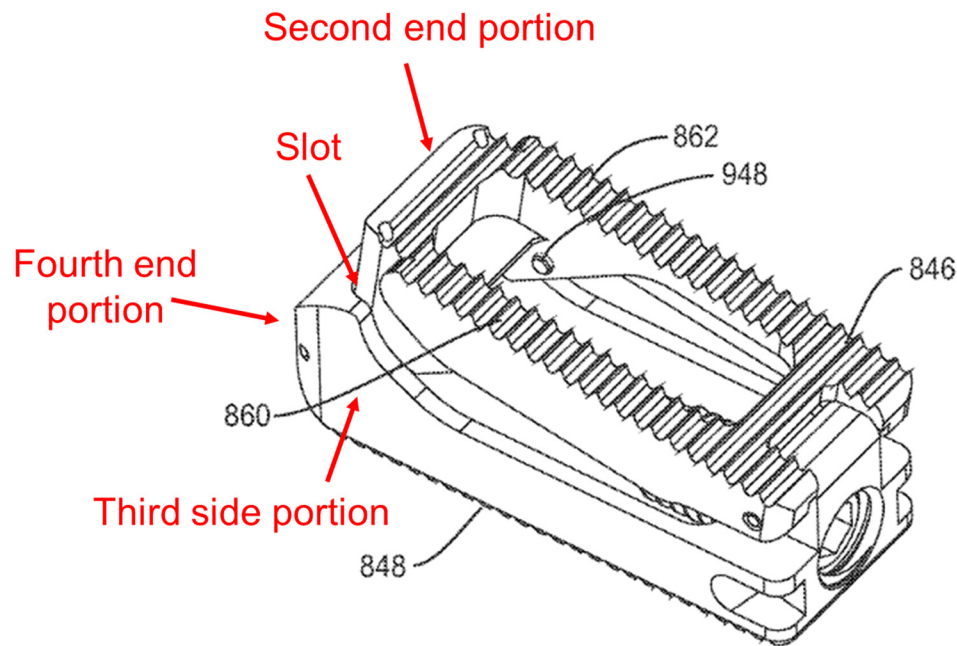


FIG. 27

(*Id.*, Fig. 27 (annotated).)

Furthermore, Palmatier discloses that the above-identified slot allows **the first body** (*i.e.*, **piston component 846**) to fit within “**a compressed configuration of the expandable intervertebral device.**” For example, figure 24 shows the implant in an expanded state, whereas figure 26 shows the implant in a compressed configuration. (*Id.*, 18:63-19:3.) A POSITA would have understood that figures 24 and 26 in view of figures 22, 23, and 27 show that the anterior end of the piston component 846 slides into the slot of base component 848 as the device transitions from an expanded to a compressed (or collapsed) configuration. (Ex. 1002, Appendix [8.e].)

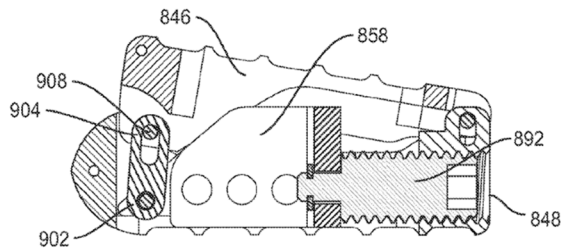


FIG. 24

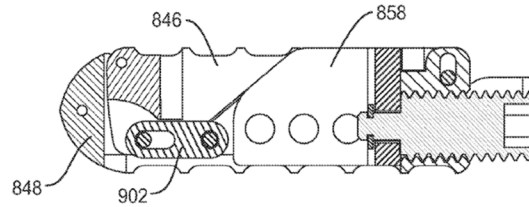


FIG. 26

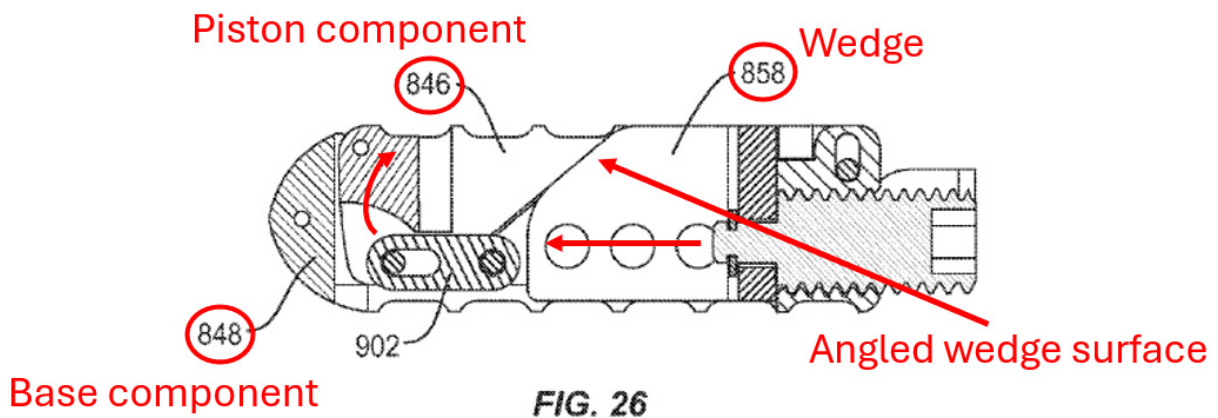
(*Id.*, Figs. 24, 26.)

- vi) [8.f] “a wedge having an angled wedge surface, wherein the wedge is positioned between the first body and the second body with the angled wedge surface facing the first interior surface of the first body and the at least one angled housing surface of the first body is positioned to engage the angled wedge surface of the wedge,”

Palmatier discloses this limitation. (Ex. 1002, ¶¶42-43, Appendix [8.f].)

Palmatier discloses that the implant 840 expands like implants 40 and 540 via a mechanism comprising a screw and “a wedge” that pivots piston component 846 relative to the base component 848. (Ex. 1057, 18:42-45; *see also id.*, 19:18-20.) For example, as shown in figures 24 and 26 below, pushing wedge 858 along the longitudinal axis of implant 840 pivotably moves piston component 846 and base component 848 apart relative to one another, such that components 846 and 848 expand from a collapsed configuration to an expanded configuration. (*Id.*, 14:2-12, 18:9-17, 18:63-66 (“intervertebral implant 840 is expanded . . . as described above with regard to intervertebral implants 40, 540”).)

As shown in the figures below, wedge 858 has “**an angled wedge surface**” and is positioned between piston component 846 (**first body**) and base component 848 (**second body**). Moreover, as shown in figure 22 below, “**the angled wedge surface [is] facing the first interior surface of the first body**” and the “**angled housing surface of the first body is positioned to engage the angled wedge surface of the wedge.**” As explained with reference to implant 40, this engagement between an angled surface of the wedge and an angled portion of the inner surface allows the piston component to hingedly move relative to the base component. (*See, e.g., id.*, 14:2-12.)



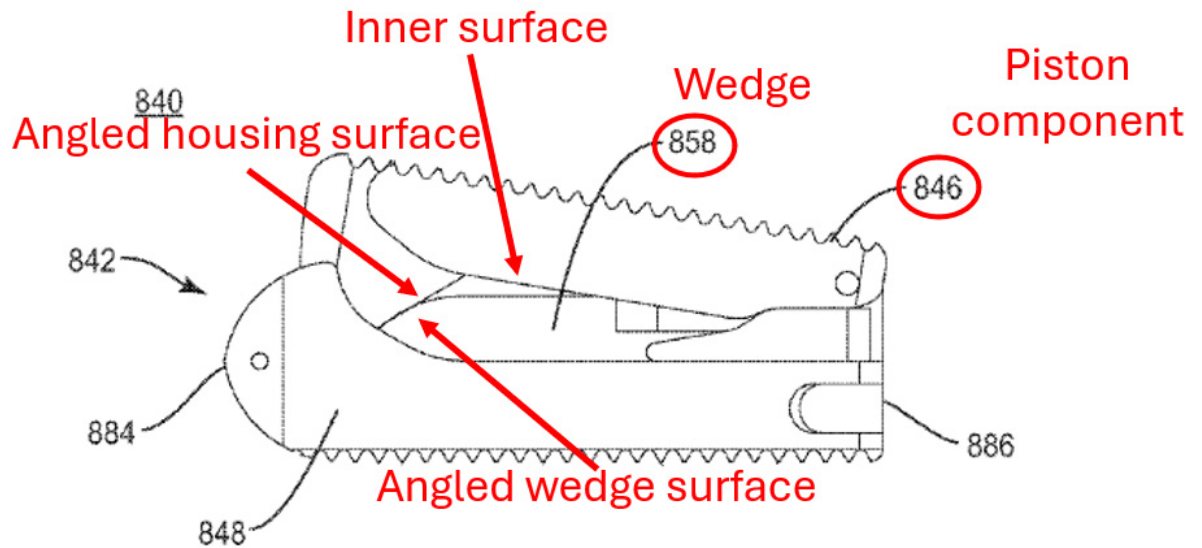


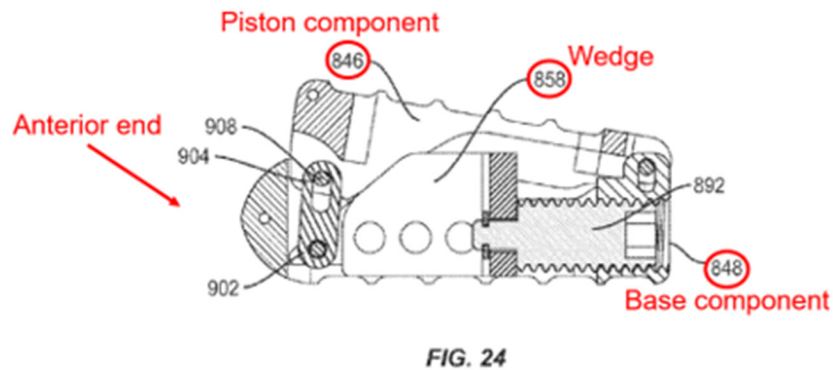
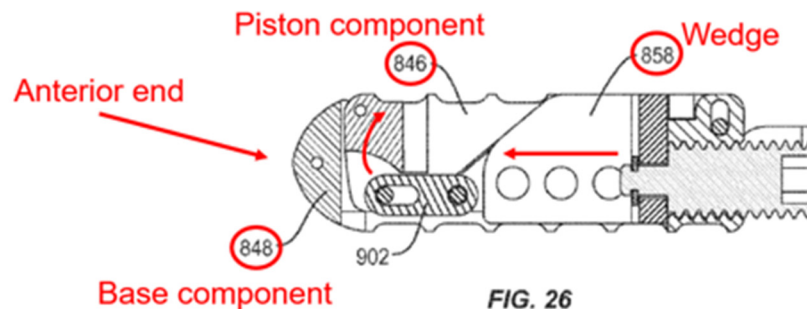
FIG. 22

(*Id.*, Figs. 26, 22 (both annotated).)

- vii) [8.g] “wherein the wedge is configured to slide within a space defined by the first body and second body in a direction toward the second and fourth ends of the first body and second body from a first wedge position in which the first body and the second body are in a substantially closed position to a second wedge position whereby the angled wedge surface presses against the first interior surface of the first body to move the first body relative to the second body from a compressed configuration to an expanded configuration without moving the second body,”

Palmatier discloses this limitation. (Ex. 1002, ¶¶44-49, Appendix [8.g].) As discussed in Section X.A.1.vi, wedge 858 sits in between piston component 846 (**first body**) and base component 848 (**second body**). As shown in figures 24 and 26 below, wedge 858 slides within the space between piston component 846 and

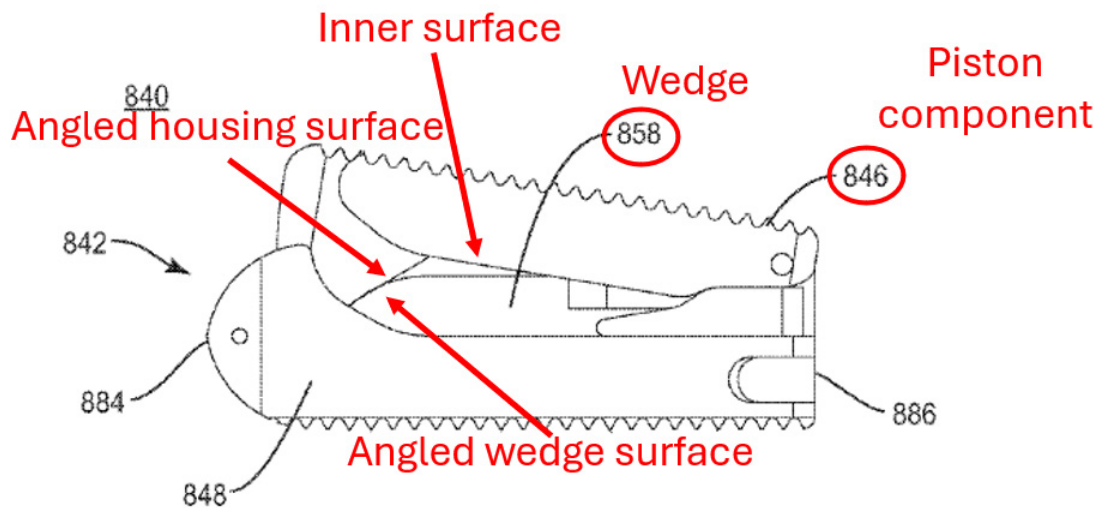
base component 848. Palmatier thus discloses that “**the wedge is configured to slide within a space defined by the first body and second body.**” Moreover, as shown in figures 24 and 26 below, the wedge slides towards the anterior end, *i.e.*, the **second and fourth ends**, of implant 840. (*Supra*, Sections X.A.1.ii, X.A.1.iv.) Palmatier thus discloses that “**the wedge is configured to slide . . . in a direction toward the second and fourth ends of the first body and second body.**”



(Ex. 1057, Figs. 26, 24 (both annotated).)

The position of wedge 858 in figure 26 above is “**a first wedge position in which the first body and the second body are in a substantially closed position.**” And the position of wedge 858 in figure 24 above is “**a second wedge position.**”

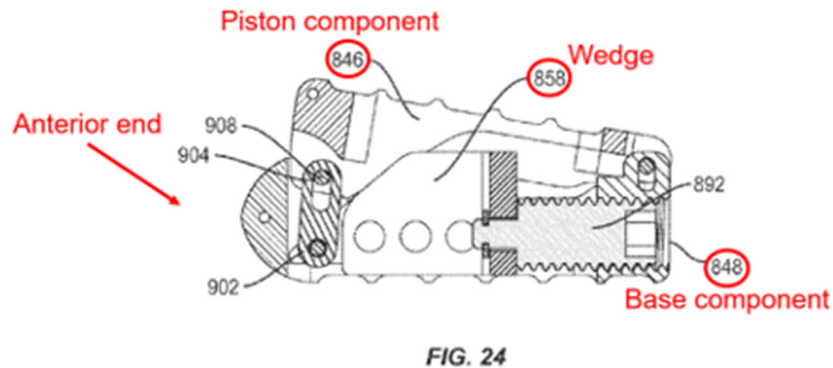
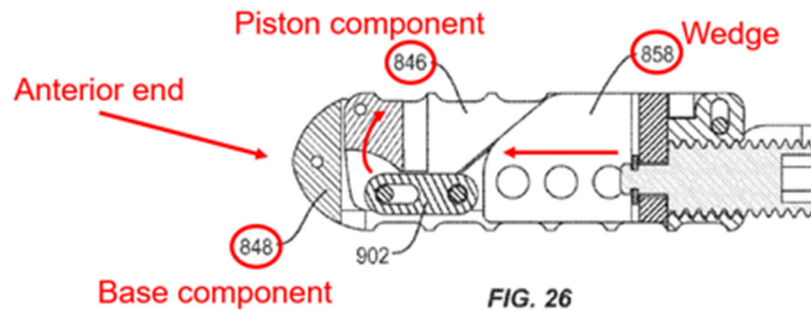
As shown in figure 22 below and explained above in Section X.A.1.vi, wedge 858 has an “**angled wedge surface**” that engages an angled portion of inner surface of piston component 846 in implant 840 to move the piston component away from the base component, *i.e.*, **the angled wedge surface presses against the first interior surface of the first body to move the first body relative to the second body from a compressed configuration to an expanded configuration without moving the second body**. As shown by figures 24 and 26, Palmatier teaches that as the wedge pushes the piston component upwards, the base component 848 does not move.



(*Id.*, Fig. 22 (annotated).)

- viii) [8.h] “whereby the wedge remains axially confined within the space defined by the first body and second body in the compressed and expanded configurations.”

Palmatier discloses this limitation. (Ex. 1002, Appendix [8.h].) As discussed in Section X.A.1.vii and as further shown in figures 24 (expanded configuration) and 26 (compressed configuration) of Palmatier, **“the wedge remains axially confined within the space defined by the first body and second body in the compressed and expanded configurations.”**



(Ex. 1057, Figs. 26, 24 (both annotated).)

This understanding is further confirmed by Patent Owner’s contentions (excerpted below).



(Ex. 1059, 9 (excerpted).)

2. Claim 9

- i) **“The expandable intervertebral device of claim 8, wherein in the expanded configuration of the expandable intervertebral device the plurality of ridges on the first vertebral body engagement surface are configured to be in contact with the vertebral body surface.”**

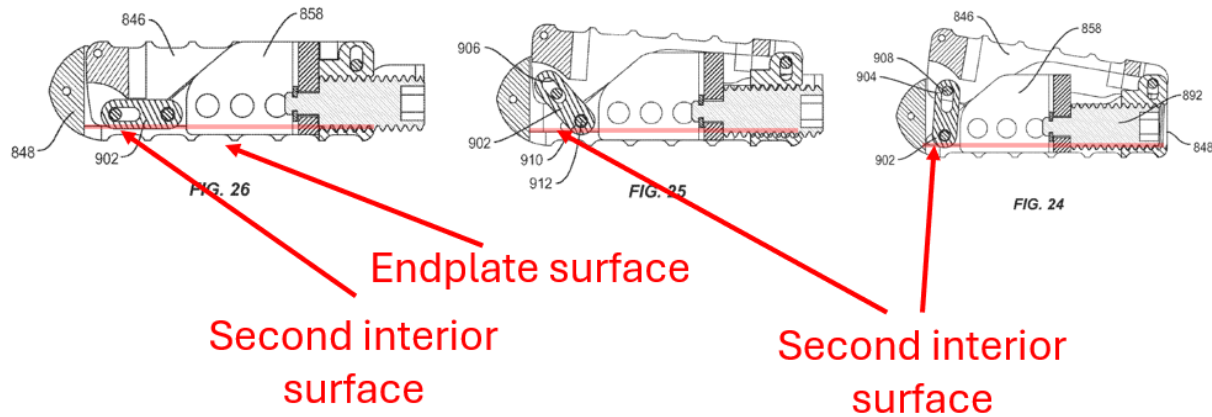
Palmatier discloses this limitation as discussed above for limitation [8.c].

(*Supra*, Section X.A.1.iii.) (Ex. 1002, Appendix [9].)

3. Claim 13

- i) **“The expandable intervertebral device of claim 8, wherein the second interior surface is substantially parallel with the second vertebral body engagement surface such that the wedge is configured to move along a path parallel to the second vertebral body engagement surface when the wedge slides within the space against the second interior surface.”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [9].) As explained above with respect to claim limitation [8.e], the base component 848 also has an inner surface that is opposite the endplate surface. The two surfaces are **“substantially parallel”** with each other.



(Ex. 1057, Figs. 24-26 (all annotated).) As apparent from figures 24-26, **“the wedge [858] is configured to move along a path parallel to the second vertebral body engagement surface,”** *i.e.*, the surface annotated as endplate surface. Moreover, **“the wedge slides within the space against the second interior surface,”** which is confirmed by Palmatier’s earlier disclosure concerning a similar interior surface (*i.e.*, inner surface 82). (*Id.*, 7:62-8:4 (explaining that surface 82 is “planar” and engages a “surface of wedge 58”); *see also id.*, Figs. 4, 7.)

4. Claim 17

i) [17.a] “An expandable intervertebral device comprising:”

Palmatier discloses this limitation as discussed above for limitation [8.a]. (*Supra*, Section X.A.1.i.) (Ex. 1002, Appendix [17.a].)

- ii) **[17.b] “a first body extending from a first end to a second end, wherein the first body has first and second end portions positioned at the first and second ends, respectively, and has first and second side portions extending between the first and second end portions,”**

Palmatier discloses this limitation as discussed above for limitation [8.b].

(*Supra*, Section X.A.1.ii.) (Ex. 1002, Appendix [17.b].)

- iii) **[17.c] “wherein the first body has a first vertebral body engagement surface having a first plurality of ridges formed therein and has a first interior surface positioned on an opposite side of the first body than the first vertebral body engagement surface;”**

Palmatier discloses this limitation as discussed above for limitation [8.c].

(*Supra*, Section X.A.1.iii.) (Ex. 1002, Appendix [17.c].)

- iv) **[17.d] “a second body extending from a third end to a fourth end, wherein the second body has third and fourth end portions positioned at the third and fourth ends, respectively, and has third and fourth side portions extending between the third and fourth end portions,”**

Palmatier discloses this limitation as discussed above for limitation [8.d].

(*Supra*, Section X.A.1.iv.) (Ex. 1002, Appendix [17.d].)

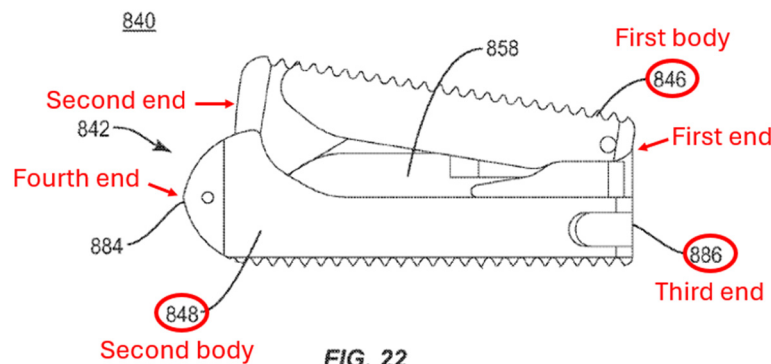
- v) **[17.e] “wherein the second body has a second vertebral body engagement surface having a second plurality of ridges formed therein and has a second interior surface positioned on an opposite side of the second body than the second vertebral body engagement surface,”**

Palmatier discloses this limitation as discussed above for limitation [8.e].

(*Supra*, Section X.A.1.v.) (Ex. 1002, Appendix [17.e].)

- vi) [17.f] “wherein the first body is aligned with the second body such that the first end of the first body is axially aligned with the third end of the second body and the second end of the first body is axially aligned with the fourth end of the second body,”

Palmatier discloses and renders this limitation obvious. (Ex. 1002, ¶¶50-57, Appendix [17.f].) As discussed above in Sections X.A.1.ii and X.A.1.iv, and shown below in figure 22, implant 840 has a piston component 846 (**first body**) extending from “**the first end**” to “**the second end**” and a base component 848 (**second body**) extending from “**the third end**” to “**the fourth end.**”



(Ex. 1057, Fig. 22 (annotated).) Each of these ends is aligned relative to an “axis” of the implant, as shown in the figures below.⁸ Figure 23, which is a top view of

⁸ Claim 17 does not define the “axis” or give any further clarity regarding what is required for ends to be “axially aligned.” For example, claim 17 does not specify if

implant 840, shows that the **second end** and **fourth end** are on the same axis, and further shows (in conjunction with figure 27) that the **first end** and the **third end** are also on the same axis.⁹ Palmatier thus discloses limitation [17.f].

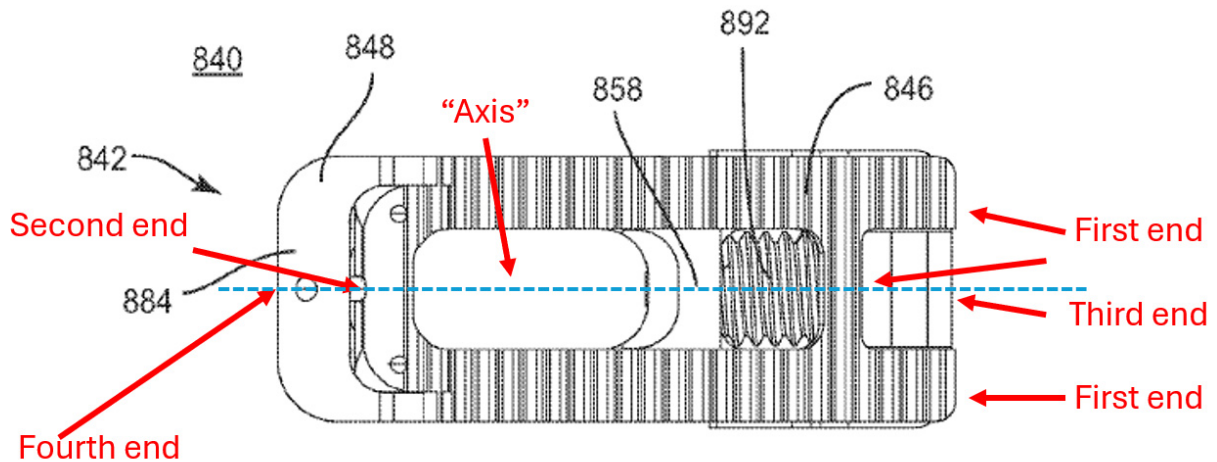
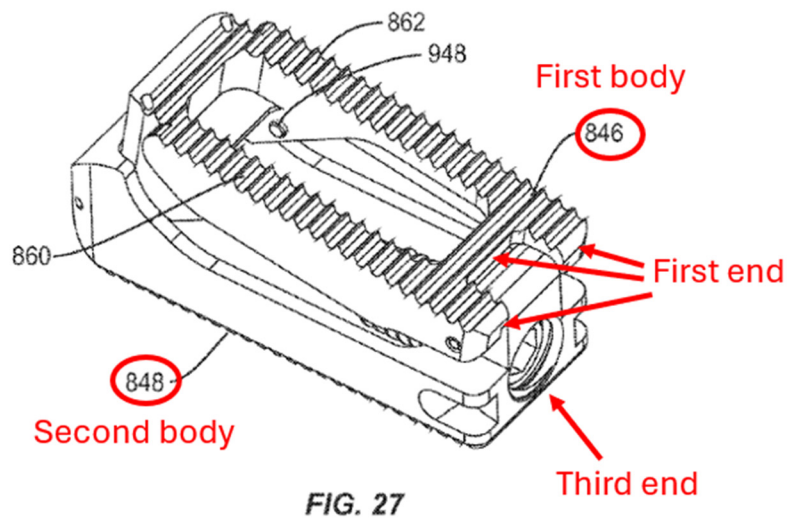


FIG. 23

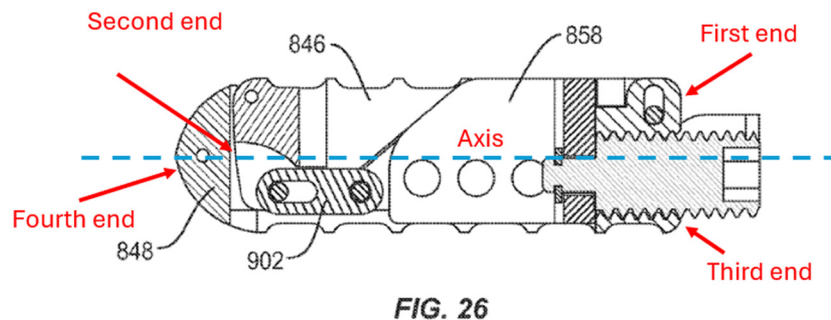
there is one or more than one axis relative to which the ends are aligned. The '367 patent specification is similarly deficient.

⁹ Figure 27 is a “perspective view of one embodiment of the components of the implant shown in FIG. 22.” (*Id.*, 3:23-24, Fig. 27.)

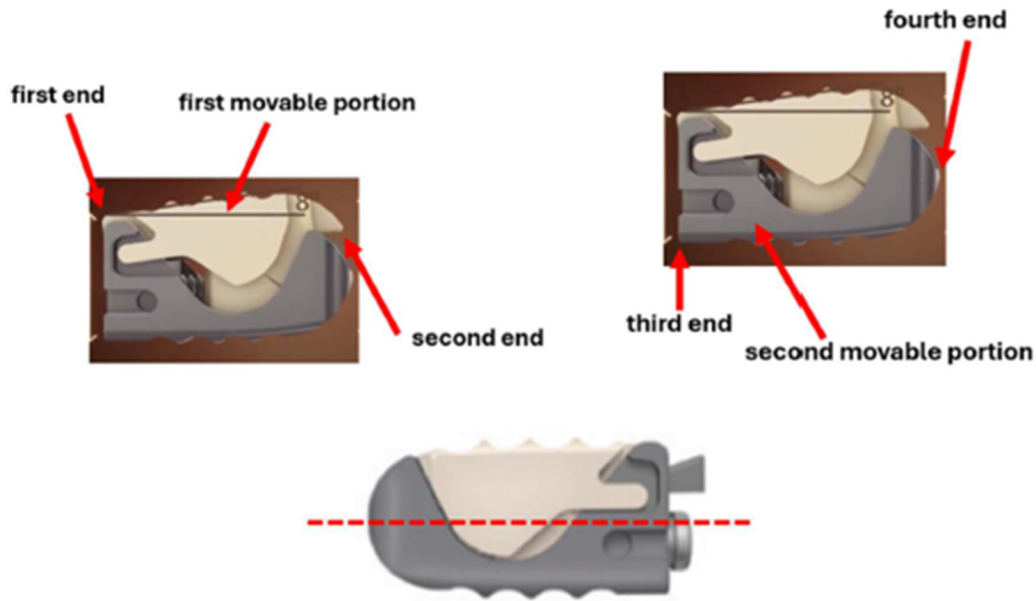


(*Id.*, Figs. 23, 27 (both annotated).)

The axial alignment of the different ends is further evident from figure 26 below, which shows the “second” and “fourth” ends on the same axis whereas the “first” and “third” ends are aligned relative to the axis.



(*Id.*, Fig. 26 (annotated).) The above mapping is consistent with Patent Owner’s infringement contentions (excerpted below) identifying the “first,” “second,” “third” and “fourth end[s]” as well as a dotted line that appears to indicate an axis:



(Ex. 1059, 17 (excerpted).)

Furthermore, Palmatier contains additional teachings that render this limitation obvious. The other exemplary embodiments of Palmatier (shown in, *e.g.*, figure 3 as implant 40 and figure 17 as implant 540) are described as “similar” to implant 840. (Ex. 1057, 18:38-41.) All three exemplary embodiments are implementations of Palmatier’s expandable implant having “base” and “piston components” sandwiching a translating “wedge” that expands the implant. And like implant 840 shown in figure 22, each of Palmatier’s alternative exemplary embodiments are “axially aligned” in a manner consistent with Patent Owner’s infringement contentions. For example, as shown in figure 3 of Palmatier below, the “first,” “second,” “third” and “fourth” ends of implant 40 are also axially aligned relative to a “longitudinal axis a” of the device. (*Id.*, 6:25-28, 7:14-18, 8:5-8.)

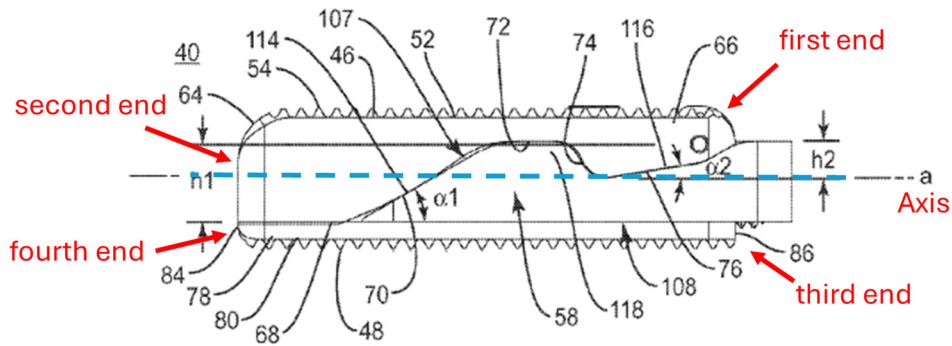


FIG. 3

(*Id.*, Fig. 3 (annotated).) And as shown in figure 17 below, the “first,” “second,” “third” and “fourth” ends of implant 540 are axially aligned relative to a “longitudinal axis aa” of the device. (*Id.*, 15:12-14.)

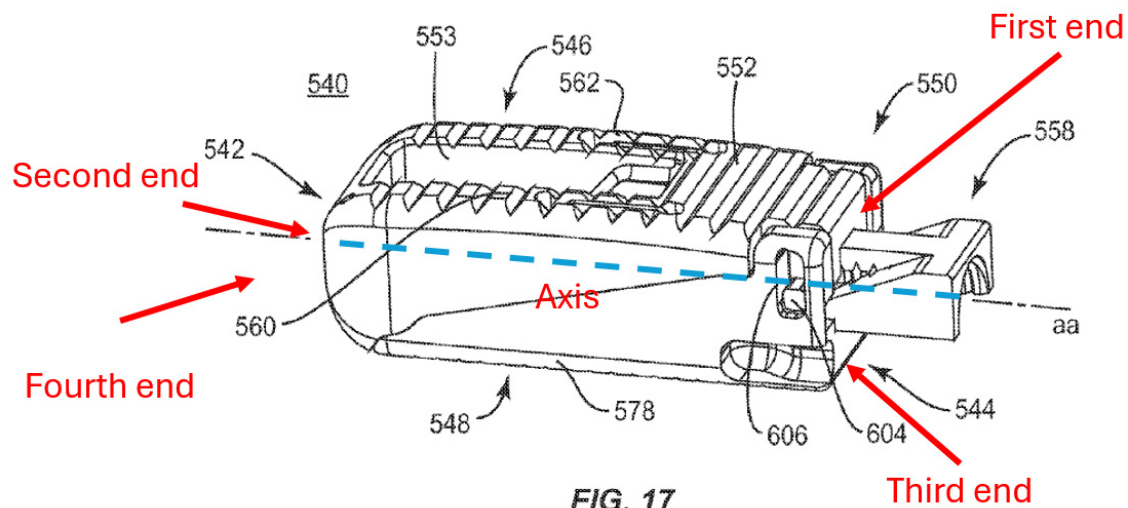
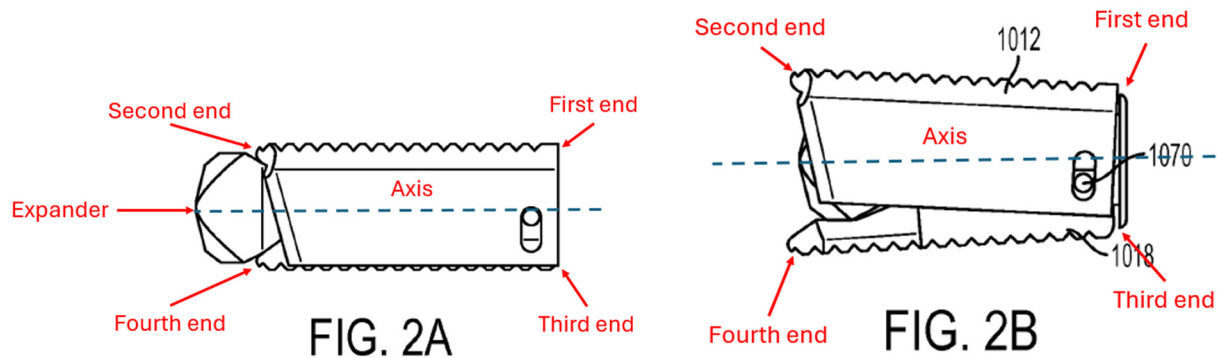


FIG. 17

(*Id.*, Fig. 17 (annotated).) Indeed, numerous “axially aligned” implants were well known in the art, for instance, in Robinson, discussed *supra*, Section VI.A.2.



(Ex. 1024, Figs. 2A, 2B (both annotated).)

Among other subtle distinctions, implants 40, 540 and 840 of Palmatier differ in terms how the piston and the base components—including their respective vertebral engagement surfaces—are configured, as well as with respect to their wedge components responsible for expansion. For instance, in both implant 40 and 540, the piston and base components have largely the same length as measured from the “first” to the “second” end and the “third” to the “fourth” end, and are arranged such that the “first” and “third” ends, and the “second” and “fourth” ends align vertically in the same plane. (See Ex. 1057, Figs. 3, 17 (annotated and reproduced above).) In contrast, in implant 840, the base and piston components have different lengths and are configured such that the “second end” of the piston component fits between sidewalls adjoining the “fourth end” of the base component.

Given the related disclosures in Palmatier, and for additional reasons discussed below, a POSITA would have been motivated to modify implant 840 to extend the anterior end of the piston component 846 all the way to the anterior end

of the base component 848, like in implants 40 and 540. (Ex. 1002, ¶55.) Palmatier envisions such modifications as it expressly teaches that “various modifications may be made to the embodiments disclosed herein.” (Ex. 1057, 19:27-28.) Modifying the base and piston components of implant 840 in this manner to match implants 40 and 540 would have increased the footprint (surface area) of the piston component 846. (Ex. 1002, ¶55.) It was known that larger footprints increase the biomechanical stability, lessen the occurrence of subsidence (by distributing the amount of force over a greater per surface area), and result in lower stress on the endplates. (*Id.*; *supra* Section VI.A.3.) As discussed in Section VI.A.3, to reduce the risk of subsidence, a POSITA would have been motivated to maximize the footprint on piston component 846 and to ensure that the implant extends to the periphery of the vertebral body (the strongest part of the vertebral body) both above and below the implant. (Ex. 1002, ¶55.) Therefore, a POSITA would have been motivated to extend the anterior end of piston component 846 towards the anterior end of base component 848.

A POSITA would have had a reasonable expectation of success in modifying implant 840 in the above manner especially given that Palmatier’s other embodiments expressly disclose such a design. (Ex. 1002, ¶56.) Indeed, Palmatier’s implant 840 differs from Palmatier’s implants 40, 540 in that implant 840 has extended side walls on base component 848 and an opening, *i.e.*, slot, between the

side walls that allows piston component 846 to nest within base component 848. (*Id.*) That same arrangement could have been maintained while extending the anterior end of the piston component 846 to align with the anterior end of the base component 848. (*Id.*) Nor would extending the anterior end of the piston component 846 to align with the anterior end of the base component 848 have required any alteration of the expansion mechanism in implant 840. (Ex. 1057, 18:63-66 (disclosing that implants 40, 540, 840 expand in the same manner).)

Therefore, because prior art expandable implants were generally known to have axially aligned ends and Palmatier expressly discloses multiple exemplary variations with such ends, a POSITA would have reasonably expected success in modifying implant 840 to have the ends configured as in implant 40 or implant 540. (Ex. 1002, ¶57.)

Thus, Palmatier both discloses and renders obvious this limitation.

- vii) [17.g] “wherein the first end portion of the first body and the third end portion of the second body are hingedly interconnected such that the first body can pivot with respect to the second body so as to move the second end portion of the first body away from the fourth end portion of the second body; and”

Palmatier discloses this limitation. (Ex. 1002, Appendix [17.g].) As shown in figure 24 below, Palmatier discloses a hinge attaching the piston and base components.

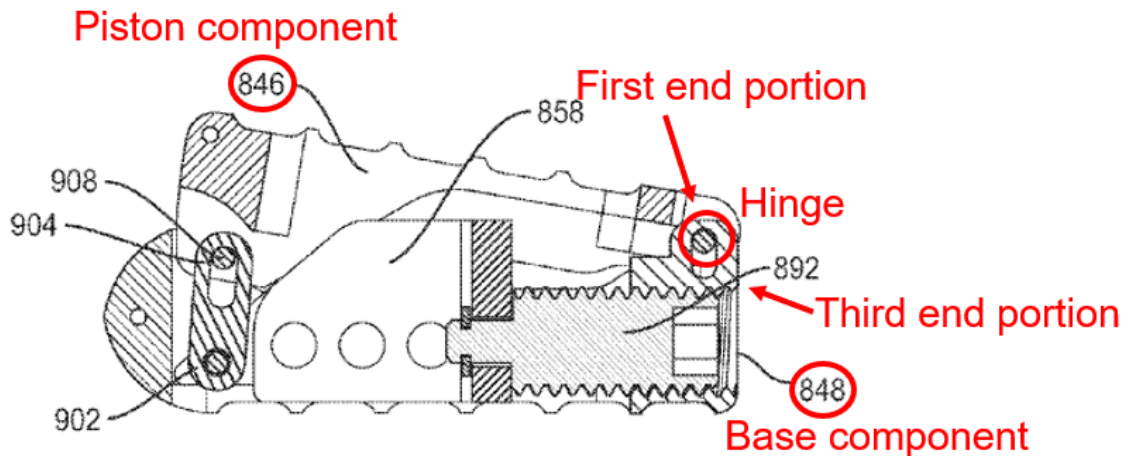


FIG. 24

(Ex. 1057, Fig. 24 (annotated).) This understanding is confirmed by Palmatier’s description of implant 40, which includes a similar hinge pivotably connecting the base and piston components and allowing “expansion and collapse of intervertebral implant 40 between a first configuration and a second configuration.” (*Id.*, 8:43-51, Figs. 5, 6.) Palmatier thus discloses “**wherein the first end portion of the first body and the third end portion of the second body are hingedly interconnected.**” And as evident from figures 24 (expanded configuration) and 26 (collapsed configuration), “**the first body can pivot with respect to the second body so as to move the second end portion of the first body away from the fourth end portion of the second body.**”

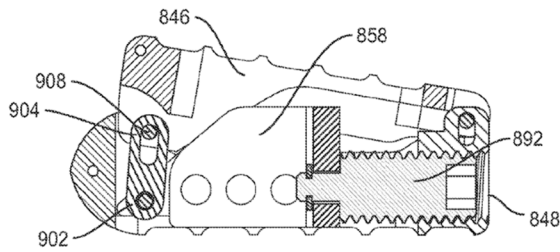


FIG. 24

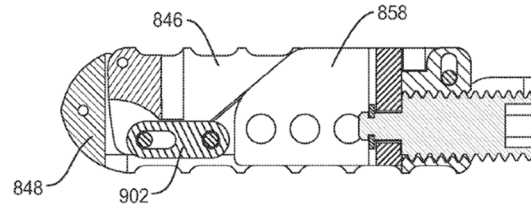
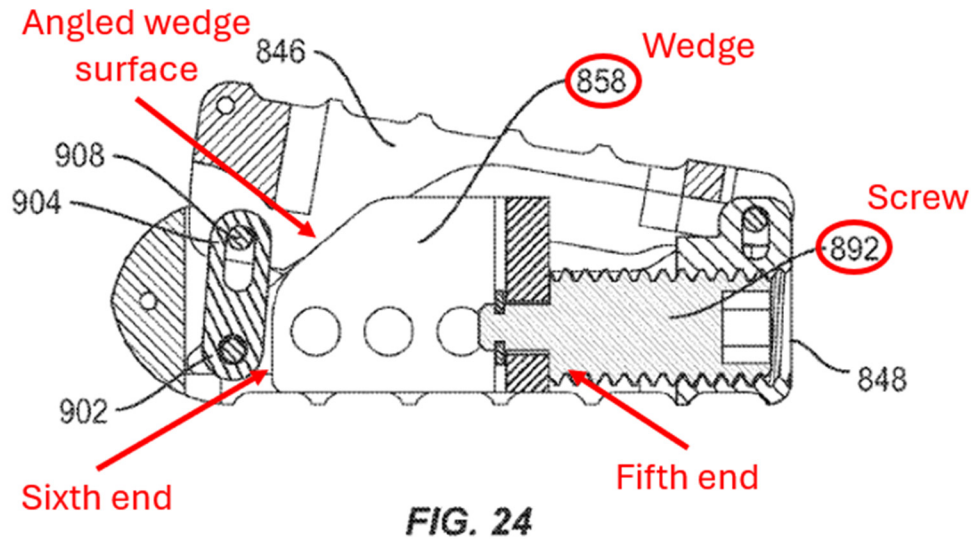


FIG. 26

(*Id.*, Figs. 24, 26.)

- viii) [17.h] **“a wedge extending from a fifth end to a sixth end and having an angled wedge surface extending along at least a portion of a distance between the fifth end and the sixth end,”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [17.h].) As discussed in Section X.A.1.vi, Palmatier discloses an expansion mechanism comprising a wedge. The wedge 858 of implant 840 sits in between piston component 846 and base component 848 (*supra*, Section X.A.1.vi) and has one end (“**the fifth end**”) connected to a screw 892 and extends along an angled wedge surface to the other end (“**the sixth end**”). As shown in figure 24 below, Palmatier thus discloses **“a wedge extending from a fifth end to a sixth end and having an angled wedge surface extending along at least a portion of a distance between the fifth end and the sixth end.”**



(Ex. 1057, Fig. 24 (annotated).)

- ix) [17.i] “wherein the wedge is positioned between the first body and the second body with the angled wedge surface facing the first interior surface of the first body,”

Palmatier discloses this limitation as discussed above for limitation [8.f].

(*Supra*, Section X.A.1.vi.) (Ex. 1002, Appendix [17.i].)

- x) [17.j] “wherein the first interior surface of the first body has an angled housing surface shaped to engage the angled wedge surface of the wedge,”

Palmatier discloses this limitation as discussed above for limitation [8.f].

(*Supra*, Section X.A.1.vi.) (Ex. 1002, Appendix [17.j].)

- xi) [17.k] “wherein the wedge is configured to slide within a space defined by the first body and second body in a direction toward the second and fourth ends of the first body and second body from a first wedge position that allows the first body and second body to pivot to a position that is substantially closed to a second wedge position whereby the angled wedge surface presses against the first interior surface of the first body to hingedly open the first body with respect to the second body whereby the wedge remains axially confined within the space defined by the first body and second body in the first and second wedge positions.”

Palmatier discloses this limitation as discussed above for limitations [8.g]-[8.h] and [17.g]. (*Supra*, Sections X.A.1.vii, X.A.1.viii, and X.A.4.vii.) (Ex. 1002, Appendix [17.k].)

5. Claim 18

- i) [18.a] “The expandable intervertebral device of claim 17, wherein a first length of the first body from the first end to the second end is substantially equal to a second length of the second body from the third end to the fourth end, and”

Palmatier discloses and renders obvious this limitation. (Ex. 1002, Appendix [18.a].) As shown below, Palmatier’s implants 40 and 540 each have “a first length of the first body from the first end to the second end” and “a second length of the second body from the third end to the fourth end” that are “substantially equal” in length. As discussed above in Section X.A.4.vi, a POSITA would have found it obvious to extend the **second end** of the piston component such that its ends

line up like in implants 40 and 540 (reproduced below). Under this modification, the **first length** and the **second length** of implant 840 would be the same or **substantially equal** in length.

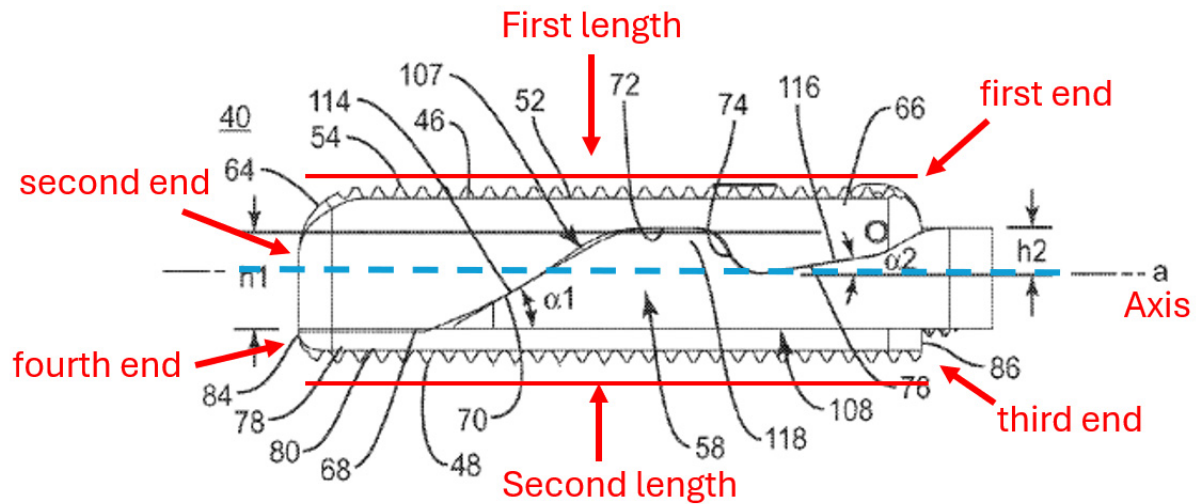


FIG. 3

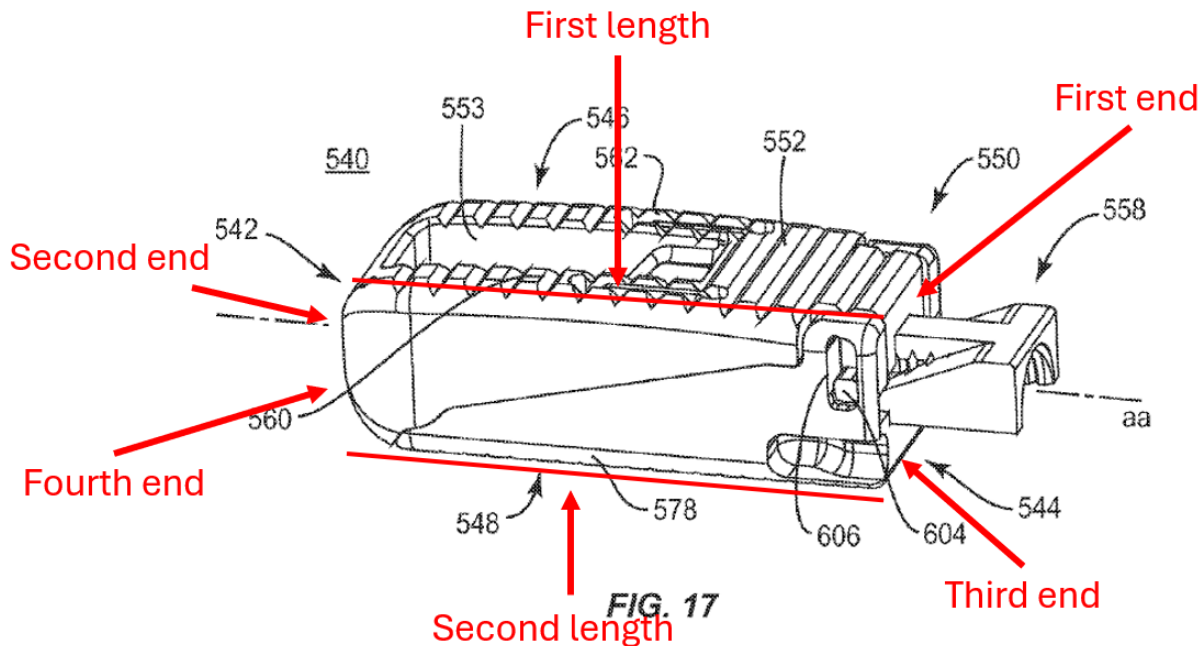
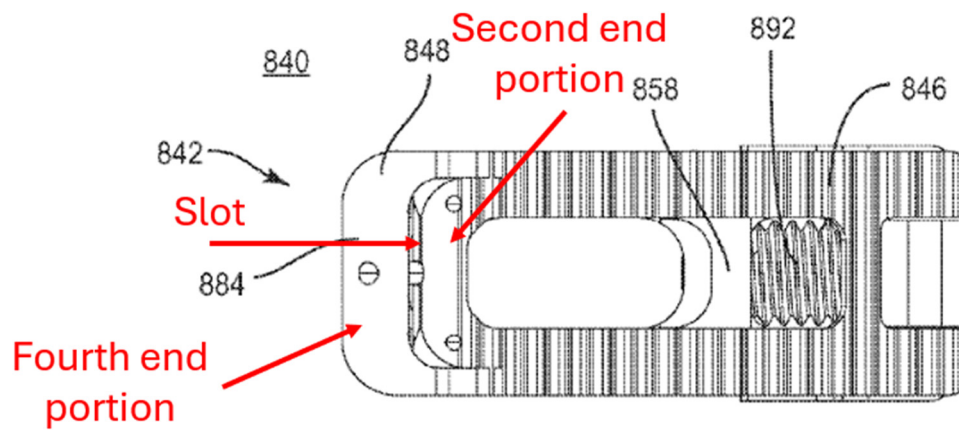
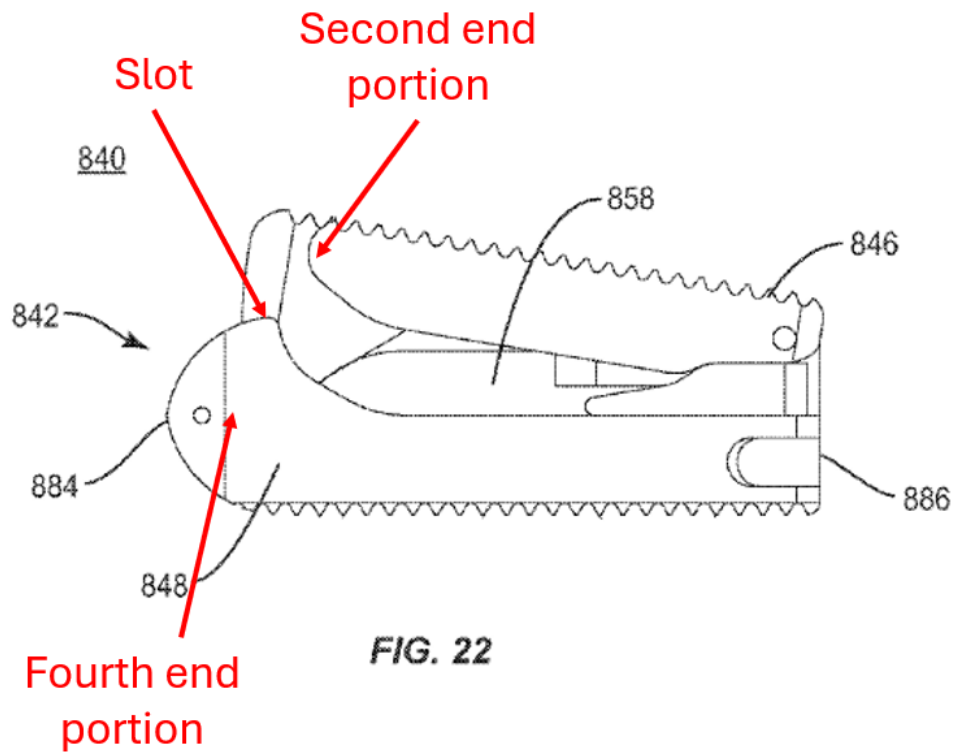


FIG. 17

(Ex. 1057, Figs. 3, 17 (annotated).)

- ii) **[18.b] “wherein the second end portion of the first body is smaller than the fourth end portion of the second body such that the second end portion of the first body is positionable between the third and fourth side portions of the second body at the fourth end of the second body.”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [18.b].) As shown in figures 22 and 23 below, the anterior end portion of base component 848 (**the fourth end portion of the second body**) has an opening, *i.e.*, a slot, that fits within it the anterior end portion of piston component 846 (**the second end portion of the first body**). In other words, Palmatier has a slot in the fourth end portion of the bottom housing that receives the second end portion of the top housing. To fit within this slot, as shown in figures 22 and 23 below, **“the second end portion of the first body is smaller than the fourth end portion of the second body such that the second end portion of the first body is positionable between the third and fourth side portions of the second body at the fourth end of the second body.”**



(Ex. 1057, Figs. 22-23 (both annotated).)

6. Claim 19

- i) [19.a] “The expandable intervertebral device of claim 18, wherein the first body defines a first bone material receiving area between the first and second end portions and the first and second side portions, and the second body defines a second bone material receiving area between the third and fourth end portions and the third and fourth side portions, and”

Palmatier discloses this limitation. (Ex. 1002, Appendix [19.a].) As shown in figure 23 below, Palmatier’s implant 840 has an opening, *i.e.*, “a first bone material receiving area.”

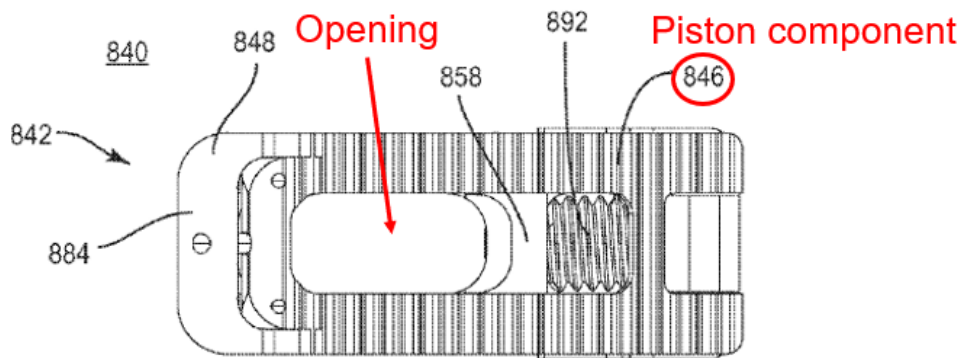
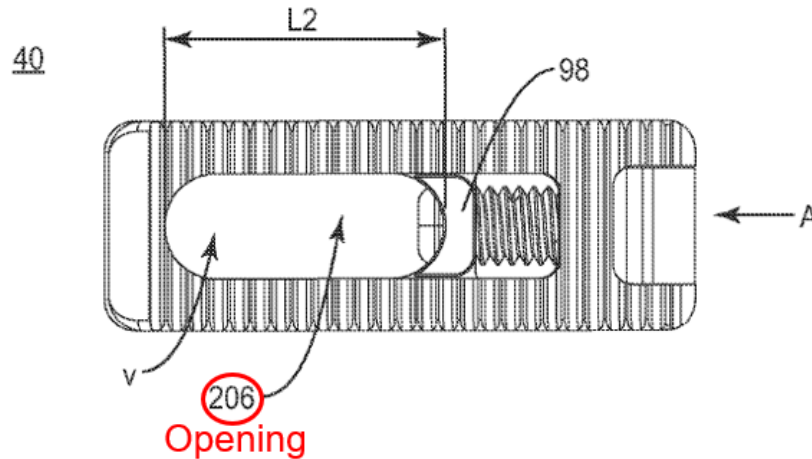


FIG. 23

(Ex. 1057, Fig. 23 (annotated).) A POSITA would recognize this opening as the claimed “bone material receiving area” because Palmatier’s implants “provide a cavity of relatively large volume for post-packing of . . . , for example, bone graft.” (*Id.*, 4:11-15.) This is confirmed by Palmatier’s description of implant 40, which has same kind of opening as shown in figure 10 below extending through both the

base and piston components. (*Id.*, 10:30-36 (“implant 40 includes an opening 206 . . . configured for disposal of at least one agent, for example, bone graft”).)



(*Id.*, Fig. 10 (annotated).)

Moreover, because figure 23 is a top-down “plan view” of implant 840, it is apparent that the opening extends through the center of piston component 846, *i.e.*, the opening is “**between the first and second end portions and the first and second side portions.**” (Ex. 1002, Appendix [9.a].) Again, because figure 23 is a top-down “plan view,” the opening shown in Figure 23 also extends through the center of base component 848 and thus “**the second body defines a second bone material receiving area between the third and fourth end portions and the third and fourth side portions.**” Palmatier confirms this understanding based on its disclosure that “opening 206” in figure 10 above “extend[s] through” piston component 46 and base component 48. (Ex. 1057, 10:33-35.)

- ii) **[19.b] “wherein the first bone material receiving area is coupled to the second bone material receiving area when the wedge is in the second wedge position.”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [19.b].) As discussed in Section X.A.6.i, an opening extends through components 846 (**the first bone material receiving area**) and 848 (**the second bone material receiving area**) and through wedge 858. As such, the two bone material receiving areas are connected or “**coupled.**” (*Id.*) Moreover, as discussed in Section X.A.1.vii, “**the second wedge position**” is when the angled wedge surface presses against the first interior surface of the first body. “FIG. 23 is a plan view of implant shown in FIG. 22.” (Ex. 1057, 3:16.) As wedge 858 axially translates, as shown in figure 23 below, “**the first bone material receiving area is coupled to the second bone material receiving area.**”

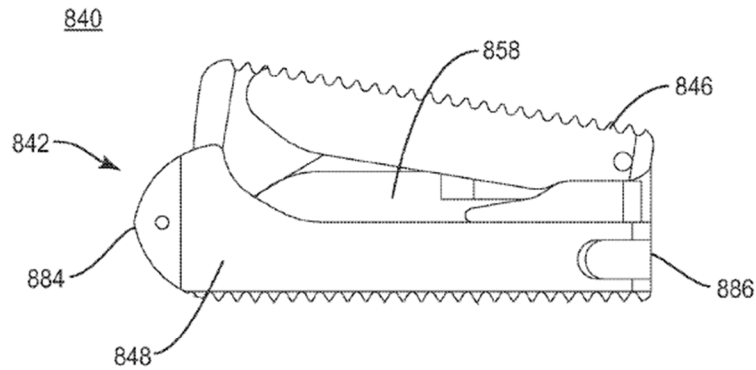


FIG. 22

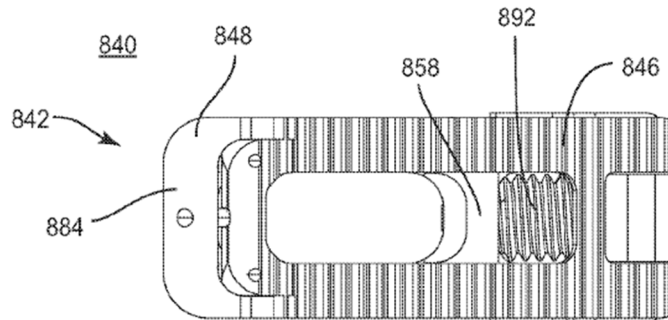


FIG. 23

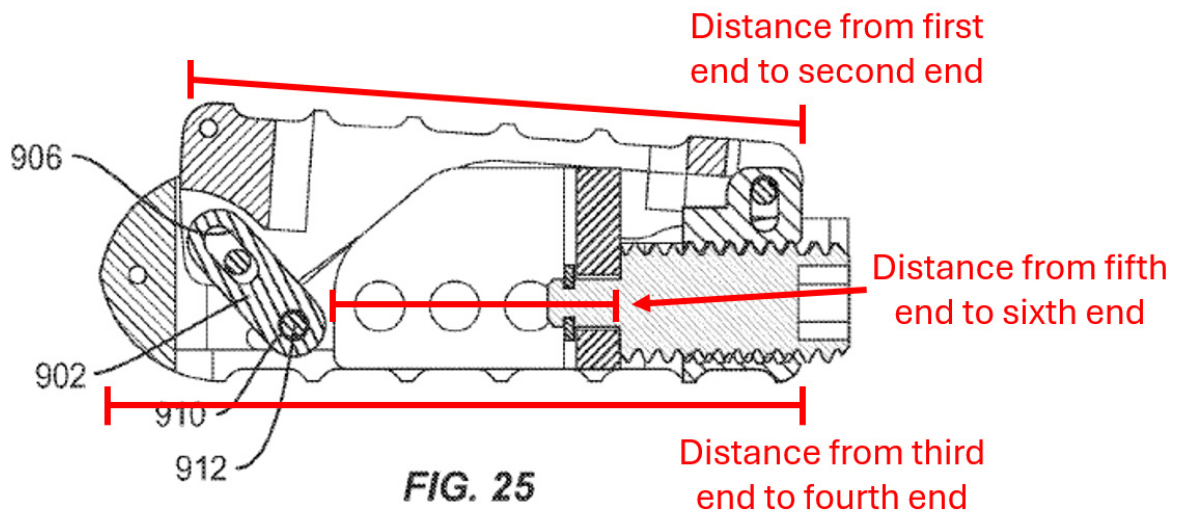
(*Id.*, Figs. 22-23.)

7. **Claim 20**

- i) **“The expandable intervertebral device of claim 19, wherein a distance from the fifth end to the sixth end of the wedge is less than a distance from the first end to the second end of the first body and is less than a distance from the third end to the fourth end of the second body.”**

Palmatier discloses this limitation. (Ex. 1002, Appendix [20].) As shown in figure 25, the length of the wedge (**distance from the fifth end to the sixth end of**

the wedge) is less than the lengths of both piston component 846 (**distance from the first end to the second end of the first body**) and the base component 848 (**distance from the third end to the fourth end of the second body**).



(Ex. 1057, Fig. 25 (annotated).)

8. Claim 21

- i) “A method of operating the expandable intervertebral device of claim 17, the method comprising: inserting the expandable intervertebral device in a target surgical location between two vertebrae of a human patient; and turning a rotation screw to actuate a movement of the wedge to pivot the first body away from the second body while the device is positioned between the vertebrae of the human patient.”

Palmatier discloses this limitation. (Ex. 1002, Appendix [21].) Palmatier discloses that its implant 840 is an “intervertebral implant,” which is “inserted into an intervertebral disc space.” (Ex. 1057, 18:46-48.) Thus, Palmatier discloses

“inserting the expandable intervertebral device in a target surgical location between two vertebrae of a human patient.” Following insertion of the implant into the desired surgical location, the implant is expanded by turning screw 892 (“rotation screw”) to axially translate wedge 858 to pivot piston component 846 away from base component 848 (**“turning a rotation screw to actuate a movement of the wedge to pivot the first body away from the second body while the device is positioned between the vertebrae of the human patient”**). (*Id.*, 3:39-42 (“the system includes an interbody implant that expands after insertion into an intervertebral disc space”), 18:44-45 (“a screw 892 for axially translating a wedge 858”), *supra* Section X.A.1.vii (limitation [8.g]).)

Palmatier further describes the process of operating an implant like implant 840 with reference to implant 40. Specifically, Palmatier explains that a “driver delivers intervertebral implant 40 into the prepared intervertebral disc space I, between vertebrae V1 and vertebrae V2, according to the requirements of a particular surgical application.” (Ex. 1057, 13:59-62.) Then, “[u]pon desired positioning of intervertebral implant 40, . . . [t]he driver engages screw 92 for rotation in a clockwise direction such that screw 92 translates axially to drive wedge 58 axially.” (*Id.*, 13:63-14:2.) A POSITA would have understood that the above-described process applies equally to implant 840 because implant 840 is similar to implant 40 and is expanded as described for implant 840. (*Id.*, 18:38-42, 18:63-66

(“intervertebral implant 840 is expanded to the second, expanded configuration (FIG. 24), as described above with regard to . . . implants 40, 540”); Ex. 1002, Appendix [21].) Palmatier discloses that implant 840 has “a screw 892 for axially translating a wedge 858.” (Ex. 1057, 18:42-45, Fig. 24.) A POSITA would have understood that screw 892 is a “**rotation**” screw and that “**turning a rotation screw . . . actuate[s] a movement of the wedge**” based on the disclosure of screws 92 and 592 given the similarities between the implants 40, 540, and 840. (Ex. 1002, Appendix [21]; *compare* Ex. 1057, Fig. 6 (screw 92), *with id.*, Fig. 24 (screw 892).) For example, Palmatier discloses that “[s]crew 92 is rotatable” and “effect[s] axial translation of the wedge 58 such that wedge 58 is movable relative to components 46, 48” (**the first body and the second body**, respectively). (Ex. 1057, 8:14-16, 8:34-38; *see also id.*, 16:14-33.)

Palmatier thus discloses a “**method comprising: inserting the expandable intervertebral device in a target surgical location between two vertebrae of a human patient; and turning a rotation screw to actuate a movement of the wedge.**” As discussed in Sections X.A.1.vii and X.A.1.viii, Palmatier’s implant expands when the wedge moves along the longitudinal axis of the implant, “**pivot[ing] the first body away from the second body while the device is positioned between the vertebrae of the human patient.**”

XI. CONCLUSION

Petitioner requests institution of IPR for the challenged claims of the '367 patent.

Respectfully submitted,

Dated: December 2, 2025

By: /Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing
Petition for *Inter Partes* Review of U.S. Patent No. 12,011,367 contains, as
measured by the word-processing system used to prepare this paper, 9,712 words.
This word count does not include the items excluded by 37 C.F.R. § 42.24 as not
counting towards the word limit.

Respectfully submitted,

Dated: December 2, 2025

By: /Naveen Modi/
Naveen Modi (Reg. No. 46,224)
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on December 2, 2025, I caused a true and correct copy of the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 12,011,367 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on Patent Center:

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By: /Naveen Modi/
Naveen Modi (Reg. No. 46,224)