

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIFE SPINE, INC.

Petitioner

v.

GLOBUS MEDICAL, INC.

Patent Owner

Patent No. 10,925,752

Issue Date: February 23, 2021

Title: EXPANDABLE FUSION DEVICE AND
METHOD OF INSTALLATION THEREOF

Inter Partes Review No. IPR2022-01601

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

TABLE OF CONTENTS

I.	Introduction.....	1
II.	Mandatory Notices Under 37 C.F.R. §42.8.....	1
	A. Each Real Party-In-Interest.....	1
	B. Notice of Related Matters	1
III.	Lead and Backup Counsel	2
IV.	Service Information	2
V.	Requirements for IPR Under 37 C.F.R. §42.104	2
	A. Grounds for Standing.....	2
	B. Identification of Challenge	3
VI.	The '752 patent.....	4
	A. Overview of the '752 Patent	4
	B. Claim Construction	4
VII.	Level of Skill in the Art.....	5
VIII.	Prior Art.....	6
	A. Chung	6
	B. Olmos	6
IX.	Claim-By-Claim Explanation of Grounds for Unpatentability	8
	A. Ground 1: Claims 1-8, 10-18, and 20 are anticipated by Chung	8
	B. Ground 2: Claims 1-5, 8, 10-15, 18, and 20 are anticipated by Olmos	57

C.	Ground 3: Claims 1-8, 10-18, and 20 are obvious over Olmos in view of Chung.....	99
X.	Discretionary Denial is Not Warranted	106
XI.	Conclusion	109
	Appendix: Challenged Claim Listing	111

EXHIBIT LIST

Ex. #	Exhibit
1001	U.S. Patent No. 10,925,752 (“’752 Patent”)
1002	Declaration of Prof. Troy D. Drewry
1003	Curriculum vitae of Prof. Troy D. Drewry
1004	Excerpts of Prosecution History for ’752 Patent
1005	Certified Translation of Korean Reg. Utility Model No. KR20-0290058 (“Chung”)
1006	U.S. Patent Application Publication No. US 2008/0140207 A1 to Olmos et al. (“Olmos”)
1007	<i>Reserved</i>
1008	U.S. Patent No. 4,743,256 to Brantigan (“Brantigan”)
1009	Excerpts of Leonard F. Peltier, <u>Orthopedics: A History and Iconography</u> (1993)
1010	Exhibit G to Plaintiff Globus Medical, Inc.’s Initial Infringement Contentions
1011	U.S. Patent No. 8,308,804 to Krueger (“Krueger”)
1012	<i>Reserved</i>
1013	<i>Engineering Mechanics: Wedges</i> , Mechanics Map: Open Textbook Project, mechanicsmap.psu.edu/websites/7_friction/7-3_wedges/wedges.html
1014	U.S. Patent Application Publication No. US 2008/0114367 to Meyer (“Meyer”)
1015	<i>Wedge</i> , Encyclopaedia Britannica (2008), https://www.britannica.com/technology/wedge
1016	U.S. Patent No. 8,906,095 to Christensen et al. (“Christensen”)
1017	Video titled “Scissor Jack Animation SOLIDWORKS”
1018	Proposed Protective Order
1019	Redlined Proposed Protective Order

Ex. #	Exhibit
1020	Life Spine Stipulation
1021	<i>Reserved</i>
1022	<i>Reserved</i>
1023	Plaintiff Globus Medical, Inc.’s Preliminary Claim Construction Pleading
1024	Defendant Life Spine, Inc.’s Preliminary Claim Construction Pleading
1025	Declaration of Christopher McDonnell Regarding Claim Construction
1026	<i>Reserved</i>
1027	<i>Reserved</i>

I. INTRODUCTION

Petitioner Life Spine, Inc. (“Petitioner”) respectfully requests *inter partes* review of Claims 1-8, 10-18, and 20 of U.S. Patent No. 10,925,752 (“the ’752 patent,” EX1001), assigned to Globus Medical, Inc. (“Patent Owner”), in accordance with 35 U.S.C. §§311-319 and 37 C.F.R. §42.100 *et seq.* The challenged claims recite only devices and methods that were widely known in the industry prior to the ’752 patent’s effective filing date.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Each Real Party-In-Interest

The real party-in-interest is Petitioner Life Spine, Inc., located at 13951 South Quality Drive, Huntley, IL 60142.

B. Notice of Related Matters

The ’752 patent is related to several pending matters. Patent Owner is asserting the ’752 patent and, *inter alia*, U.S. Patent Nos. 8,845,731 (“’731 patent”), 8,845,732 (“’732 patent”), 10,137,001 (“the ’001 patent”), and 10,973,649 (“’649 patent”) against Petitioner in *Globus Medical, Inc. v. Life Spine, Inc.*, 21-cv-1445 (D. Del.). Petitioner has previously filed petitions for *inter partes* review challenging the ’731 patent in IPR2022-01434 and the ’001 patent in IPR2022-01435.

In addition, Petitioner is aware of related U.S. Patent Application No. 17/157,099, which is believed to have a common or overlapping claim of priority as the '752 Patent:

III. LEAD AND BACKUP COUNSEL

Lead Counsel: Michael R. Houston (Reg. No. 58,486) **Tel:** 312-832-4378

Backup Counsel: Jeffrey N. Costakos (Reg. No. 34,144) **Tel:** 414-297-5782

Backup Counsel: Scott D. Anderson (Reg. No. 46,521) **Tel:** 414-297-5740

Backup Counsel: George C. Beck (Reg. No. 38,072) **Tel:** 202-945-6014

Address: Foley & Lardner LLP, 3000 K St NW, Suite 600, Washington, DC 20008

Fax: 312-832-4700

IV. SERVICE INFORMATION

Please address all correspondence to the lead counsel at the address above.

Petitioner consents to electronic service at: LifeSpine-Globus-752IPR@foley.com.

V. REQUIREMENTS FOR IPR UNDER 37 C.F.R. §42.104

A. Grounds for Standing

Petitioner certifies that the patent for which review is sought is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review of the challenged patent claims.

B. Identification of Challenge

Petitioner requests review and cancellation of Claims 1-8, 10-18, and 20 of the '752 patent¹ (collectively, “Challenged Claims”) for the reasons explained in this petition, summarized as follows:

Ground	Claims	Basis	References
I	1-8, 10-18, 20	§102	Chung
II	1-5, 8, 10-15, 18, 20	§102	Olmos
III	1-8, 10-18, 20	§103	Olmos with Chung

This Petition is supported by the Declaration of Prof. Troy Drewry (EX1002), explaining what the art would have conveyed to a person of ordinary skill in the art (“POSITA”) as of the priority date of the '752 patent.

All elements of the Challenged Claims are taught in the prior art as explained below. Also, for each ground under 35 U.S.C. §103(a), the reason to combine and the basis for a reasonable expectation of success are established. Accordingly, this Petition demonstrates a reasonable likelihood of prevailing with respect to at least one of the claims challenged in the petition.

¹ A claim listing is provided as an appendix at the end of this Petition.

VI. THE '752 PATENT

A. Overview of the '752 Patent

The '752 patent, titled “Expandable Fusion Device and Method Installation Thereof,” issued from Application No. 16/127,395, filed on September 11, 2018, and claims priority to Application No. 12/875,818, filed on September 3, 2010. Accordingly, September 3, 2010 is the earliest possible effective filing date.

The '752 patent is directed to “[a]n expandable fusion device capable of being installed inside an intervertebral disc space to maintain normal disc spacing and restore spinal stability, thereby facilitating an intervertebral fusion.” EX1001, Abstract. The device generally includes “a central ramp, a first endplate, and a second endplate, the central ramp capable of being moved in a first direction to move the first and second endplates outwardly and into an expanded configuration...” *Id.* However, as detailed below, devices having these features, and any additional claimed features, were well-known before the '752 patent.

B. Claim Construction

Claims in an IPR are construed in accordance with the ordinary and customary meaning as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. §42.100(b) (Nov. 13, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005). Claim terms are

generally presumed to have their customary and ordinary meaning to a POSITA in view of the specification at filing.

In parallel litigation, Petitioner has proposed that the term “expansion portion” should be construed to mean “extension from the body portion comprising one or more ramped surfaces.”² However, for purposes of considering the prior art presented in this IPR, Petitioner does not believe the term “expansion portion” or any other terms require constructions differing from their plain and ordinary meaning. The parties’ litigation claim construction disclosures to date are attached. EX1023-EX1025.

VII. LEVEL OF SKILL IN THE ART

The testimony evidence here confirms that a POSITA, as of September 3, 2010, would have had a bachelor’s degree in mechanical engineering or biomedical engineering and two or more years of experience in biomechanical engineering, biomedical engineering, and/or spinal implant devices. A person could also have qualified as a POSITA with some combination of more formal education (*e.g.*, an M.D.) and less technical experience or less formal education and more technical or professional experience in the foregoing fields, and would

² Patent Owner asserted that all terms should be given their plain and ordinary meaning.

have had further appreciation of various technical concepts in this field, as explained by Prof. Drewry. EX1002, ¶¶31, 43-64.

VIII. PRIOR ART

A. Chung

Korean Reg. Utility Model No. KR20-0290058 to Chung (“Chung,” EX1005³) was published on September 26, 2002 and is prior art under 35 U.S.C. §§102(a)-(b). Chung was not cited during prosecution leading to the ’752 patent.

B. Olmos

U.S. Patent Application Publication No. US 2008/0140207 to Olmos *et al.* (“Olmos,” EX1006) was first published on June 12, 2008 and is prior art under 35 U.S.C. §§102(a)-(b). While Olmos was discussed during prosecution, the grounds presented herein depend on key disclosures in Olmos that were not raised or appreciated by the Examiner. Specifically, Olmos discusses an embodiment involving an actuator with both a threaded portion and an unthreaded portion, wherein the actuator non-threadingly engages and extends through the through bore of the driving ramp while threadingly extending into the threaded bore of the central ramp. When the actuator is rotated relative to the ramps, the actuator remains axially fixed with respect to the driving ramp (which can only occur if that

³ A certified translation of Chung has been provided per 37 C.F.R. §42.63(b).

portion of the actuator is unthreaded), while moving the two ramps towards or away from each other, which in turn move the endplates away or towards each other, respectively. EX1006, ¶¶[0159]; *see, e.g.*, §§IX(B)(1)(g), IX(B)(1)(i), *infra*.

During prosecution, however, the Examiner overlooked this aspect of Olmos' teachings, potentially having been misdirected by Applicant's remarks regarding the relevant embodiments of Olmos. For example, during prosecution, Applicant amended the claims to recite that "the extension of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp" and argued that, "[f]or FIG. 16A of Olmos, the actuator extension appears to be threadingly engaged with both the driving ramp and the central ramp unlike claim 1 of the present invention." EX1004, 000057. Such remarks misdirected the Examiner, and in the Reasons for Allowance, the Examiner found in the Reasons for Allowance that "similar prior art devices have the actuator threaded bores of both the central ramp and driving ramp, for example see Figs 16a-26 in Olmos US 2008/0140207" (*id.*, 000009).

The Examiner's conclusion in this regard is clearly contradicted by Olmos' teaching that the actuator, alternatively, can remain axially-fixed to the driving ramp (EX1006, ¶[0159]) , which a POSITA would have understood to mean that the portion of the actuator engaging the driving ramp was unthreaded, consistent

with “scissor-jack” type mechanisms already known in the art (EX1002, ¶¶49-51).

This and other examples of how the Examiner was misdirected by Applicant during prosecution are further discussed *infra*, §X.

IX. CLAIM-BY-CLAIM EXPLANATION OF GROUNDS FOR UNPATENTABILITY

A. Ground 1: Claims 1-8, 10-18, and 20 are anticipated by Chung

Anticipation under 35 U.S.C. §102 requires that every element of the claimed invention be disclosed expressly or inherently in a single prior art reference. *In re Paulson*, 30 F.3d 1475, 1478-79 (Fed. Cir. 1994).

Chung anticipates Claims 1-8, 10-18, and 20 of the ’752 patent under 35 U.S.C. §§102(a)-(b) as detailed below and in Prof. Drewry’s declaration (*see* EX1002, ¶¶76-205).

1. Claim 1

(a) Claim Element 1[a]

Claim 1 is directed to “[a]n expandable fusion device,” which Chung discloses. Specifically, Chung discloses “a medical device for correcting the back” in the form of “a lumbar holder that is inserted between the back bones...in order to fix the back bones robustly” (EX1005, 3-4 (also describing the Chung device as a “back bone implant that facilitates bonding of body parts”)), and further discloses that the device is capable of moving from a collapsed position to an expanded

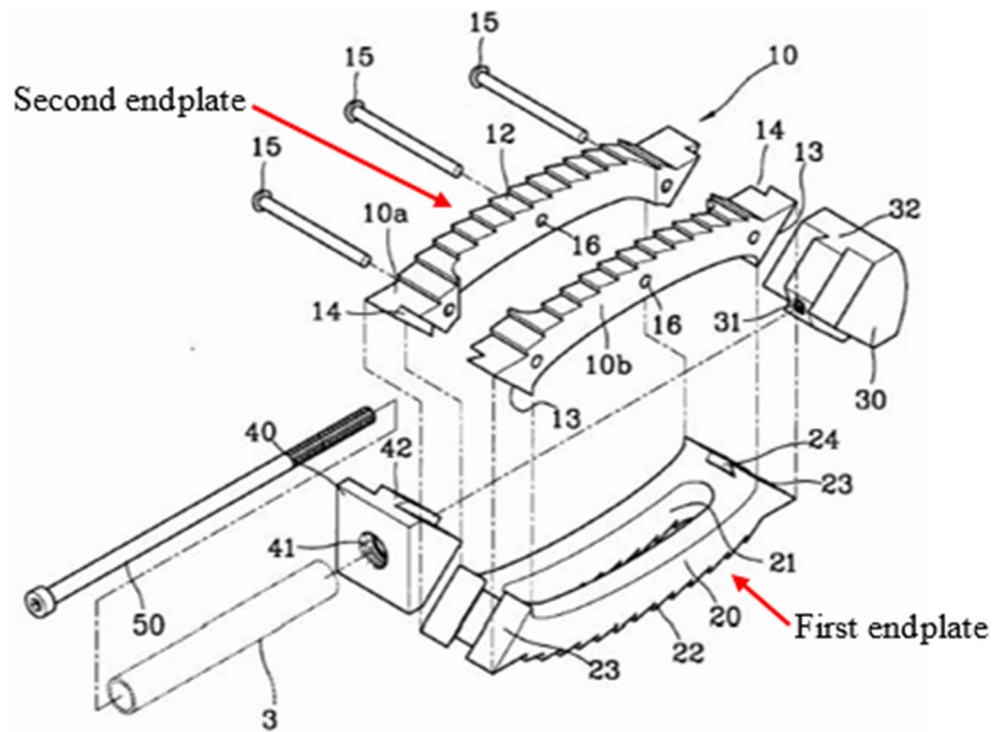
Chung, Figs. 3-4

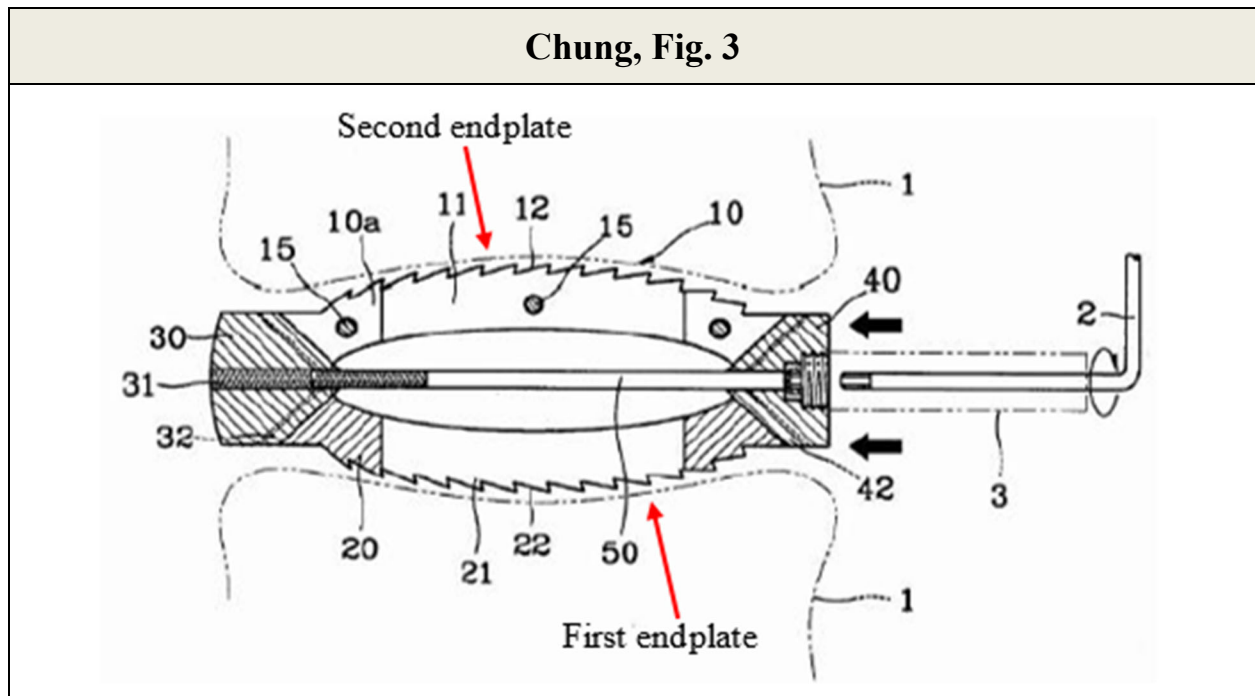
(b) Claim Element 1[b]

9

second endplate from two separate halves. *Id.*, 5, Fig. 2. Figures 2-4 further show this, with annotated Fig. 2-3 below.

Chung, Fig. 2



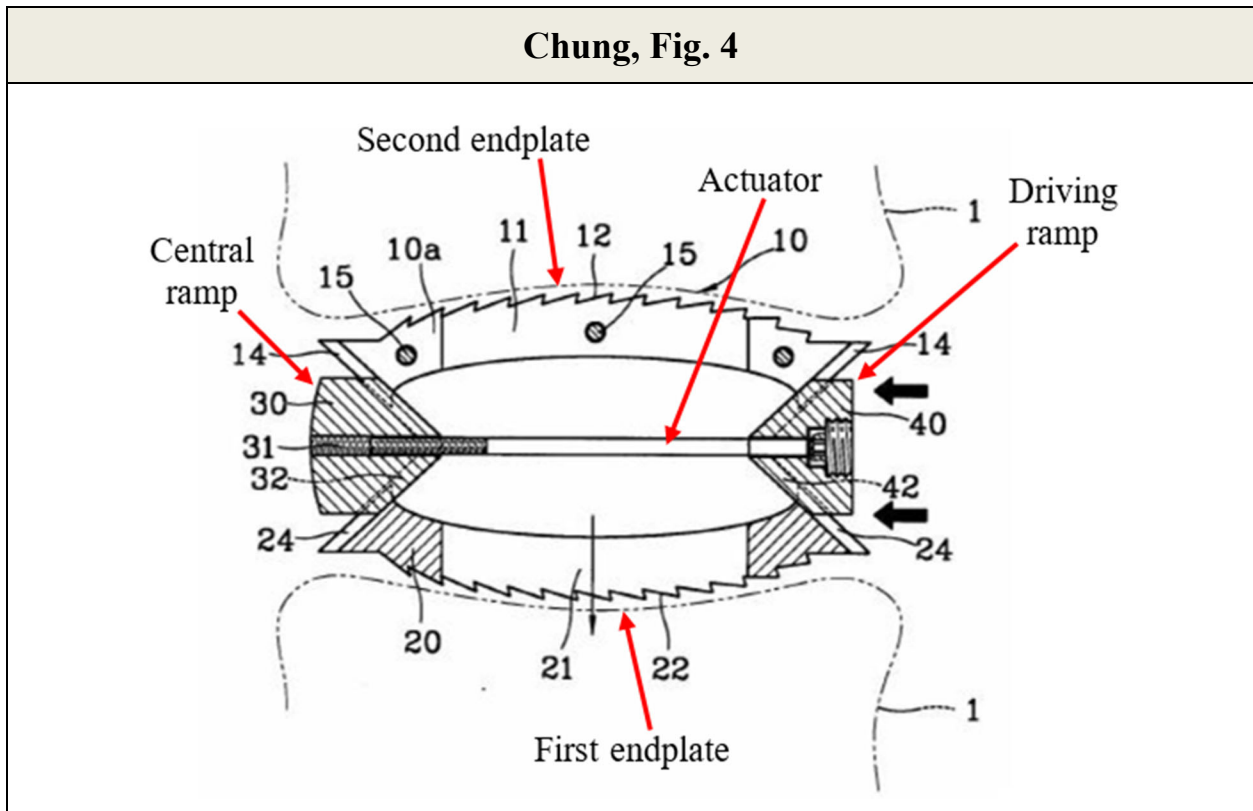


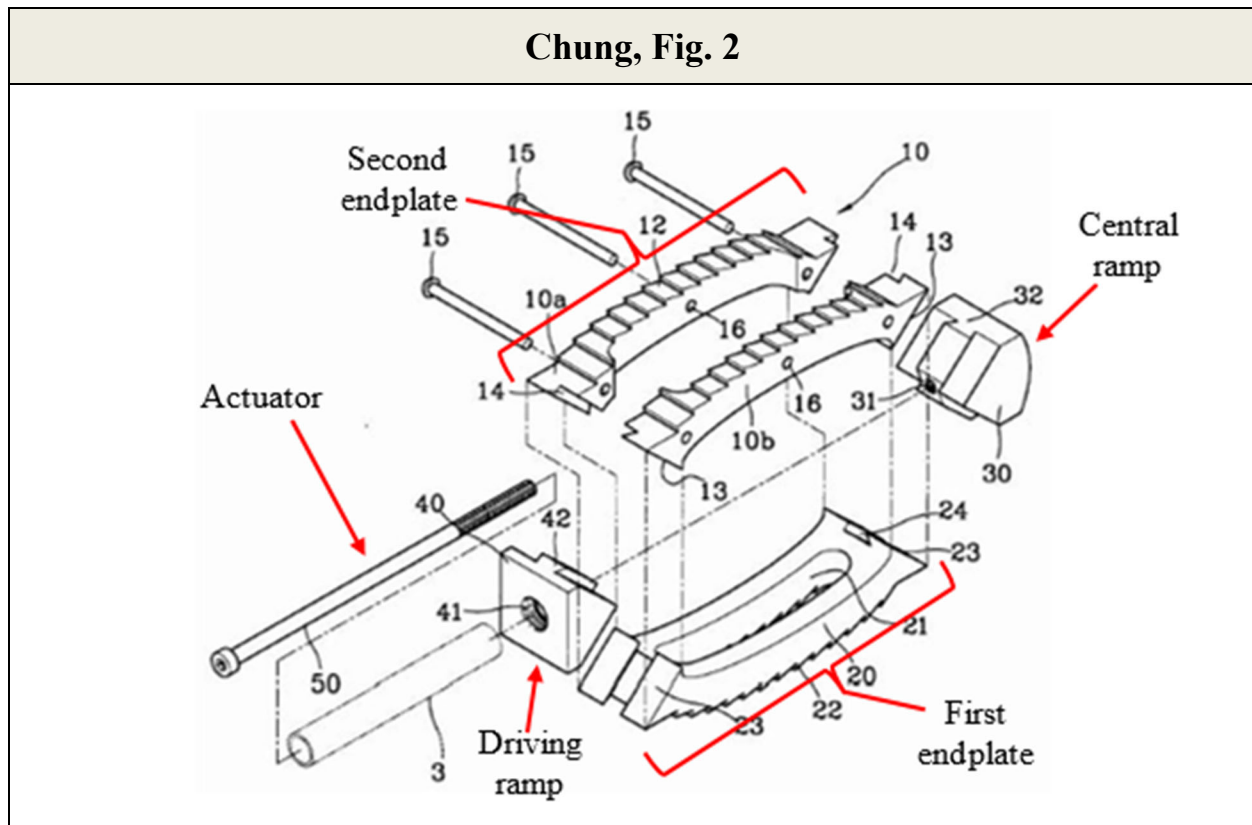
Accordingly, Chung discloses this limitation. EX1002, ¶¶79-81.

(c) Claim Element 1[c]

Claim 1 recites “**a central ramp, a driving ramp, and an actuator positioned between the first and second endplates.**” Chung discloses a central ramp (“lead wedge (30)”), a driving ramp (“opposing wedge (40)”), and an actuator (“groove fastening screw (50)”), all positioned between the first and second endplates (“main holder bodies (10) (20)”). EX1005, 5-6; *see also id.*, 4; Figs. 2-4. Specifically, Chung discloses that the lead and opposing wedges “slid[e] between [the] ends of the aforementioned main holder bodies (10) (20)” and that the actuator is “fastened between the aforementioned lead wedge (30) and the

opposing wedge (40).” *Id.*, 5. Figures 1-4 show this, with annotated Figs. 2 and 4 below:



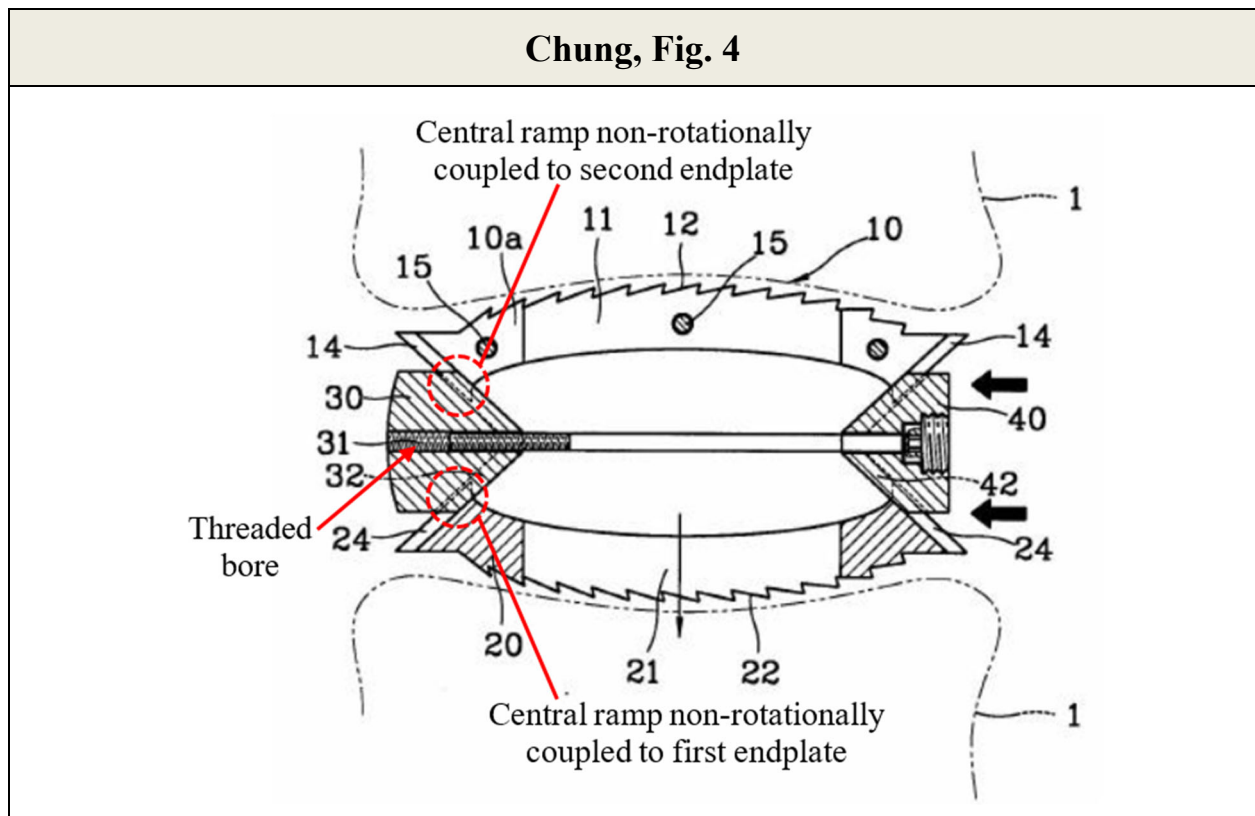


Accordingly, Chung discloses this limitation. EX1002, ¶¶82-86.

(d) Claim Element 1[d]

Claim 1 recites “**the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion, and a second expansion portion longitudinally spaced from the first expansion portion.**” Chung discloses central ramp/lead wedge (30) having a threaded bore (“screw hole (31)”) and being non-rotationally coupled to the first and second endplates (“dovetails (32)” of the central ramp/lead wedge (30) have “contacting surfaces...fitted to the dovetail grooves (14) (24) of the aforementioned main holder bodies (10) (20)”). EX1005, 5-6, Figs. 1-4; *see also*

id., 4 (disclosing the lead wedge having matching dovetails/grooves with main holder bodies). When these mating dovetail structures are fitted together, the central ramp is coupled to the endplates but these elements cannot rotate relative to each other (*see* EX1002, ¶89), as indicated in annotated Fig. 4 below:

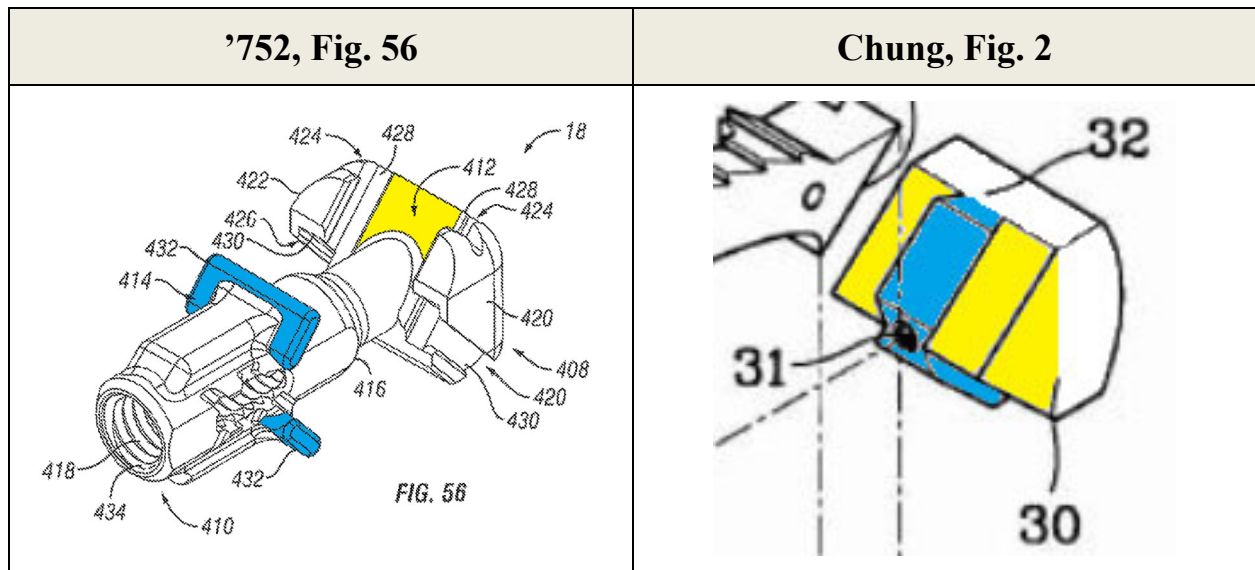


Chung further discloses the central ramp/lead wedge (30) having a first expansion portion (the broad ramped surface extending on each side of the dovetail structure and towards the base of “lead wedge (30)”), and a second expansion portion (“dovetails (32)”) longitudinally spaced from the first expansion portion. EX1005, 5, Figs. 1-4. This identification is comparable to the “first expansion portion 412” and/or the “second expansion portion 414” shown in ’752 patent Fig.

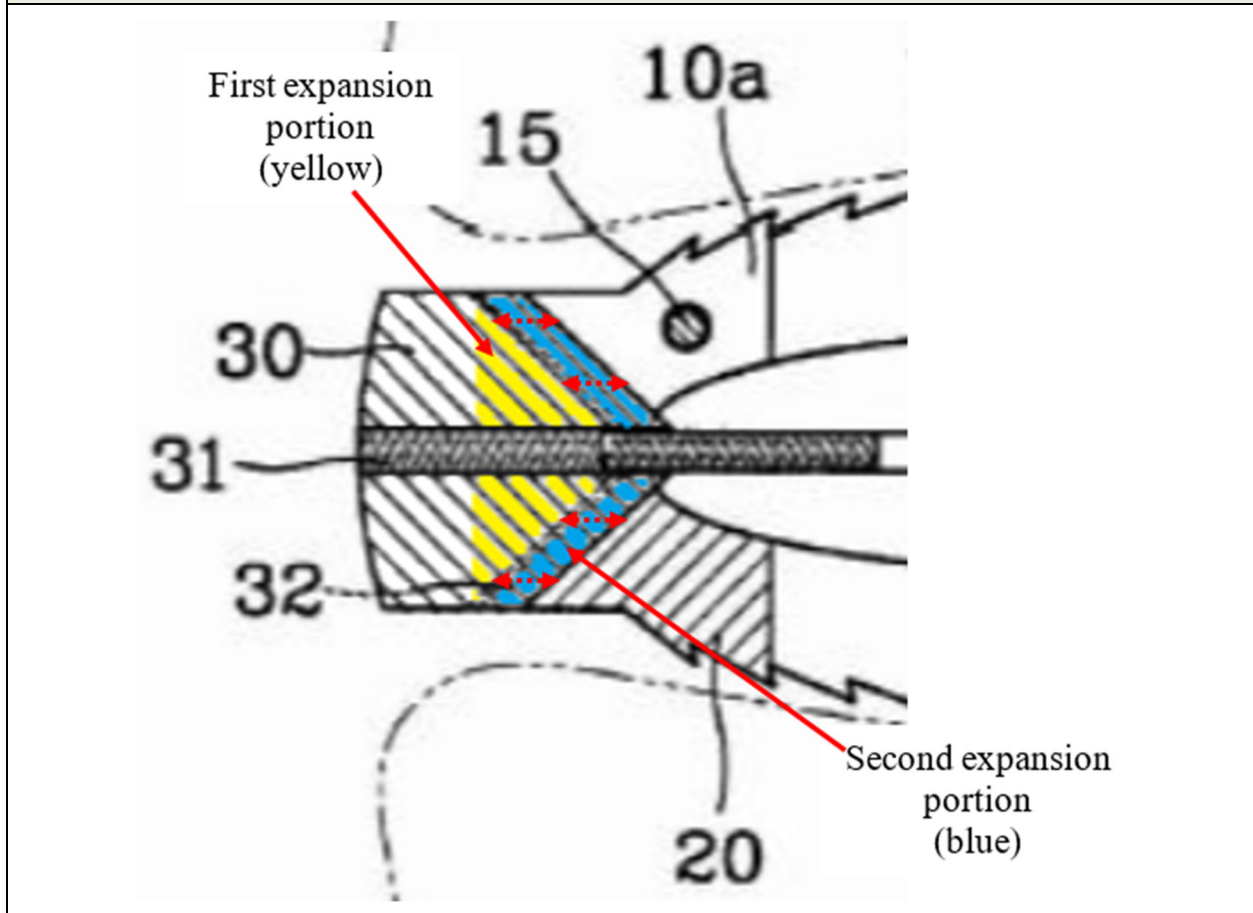
56. EX1001, 18:51-56, Fig. 56. Excerpts of Chung Figs. 2-3 and '752 patent Fig.

56 follow with first expansion portions in yellow, second expansion portions in

blue, and in Fig. 3, longitudinal spacing denoted by dashed arrows:



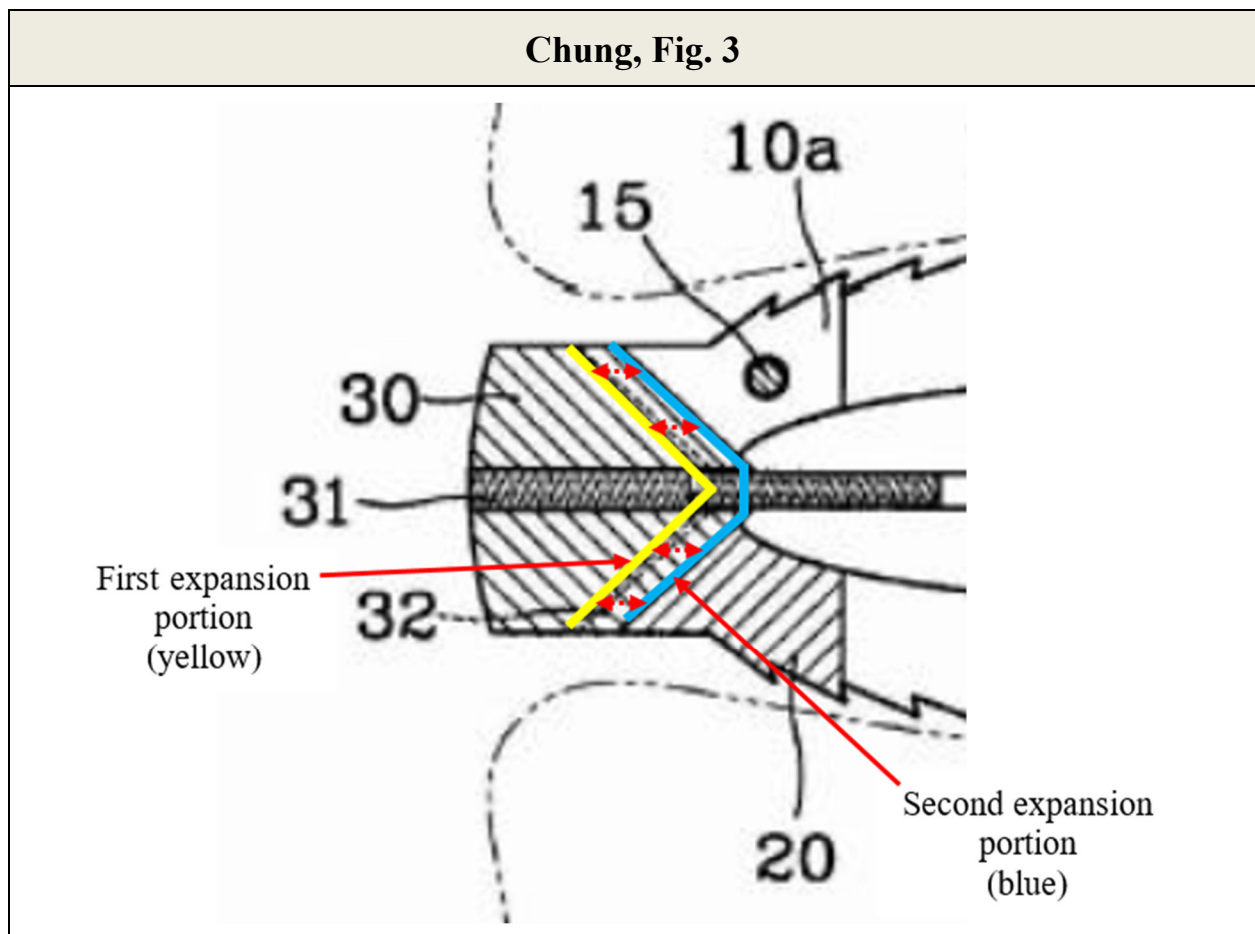
Chung, Fig. 3



This interpretation, including specifically the second expansion portion being “longitudinally spaced” from the first expansion portion because it extends longitudinally (i.e., parallel to the actuator) from the surface of the first expansion portion, without an intervening gap, is consistent with Patent Owner’s infringement contentions in parallel litigation regarding the same elements. *See* EX1010, 5-6.

Accordingly, Chung discloses this limitation. EX1002, ¶¶87-93.

Alternatively, Chung also meets this limitation when the “first expansion portion” is interpreted to encompass only the ramped surfaces adjacent to dovetail (32) and the “second expansion portion” is interpreted to encompass only the ramped surfaces of dovetail (32). This can be seen in the following annotated excerpt of Fig. 3, again denoting the first expansion portion in yellow, the second expansion portion in blue, and longitudinal spacing with dashed arrows:



This alternative interpretation of the first and second expansion portions does not affect the foregoing analysis regarding the central ramp being non-

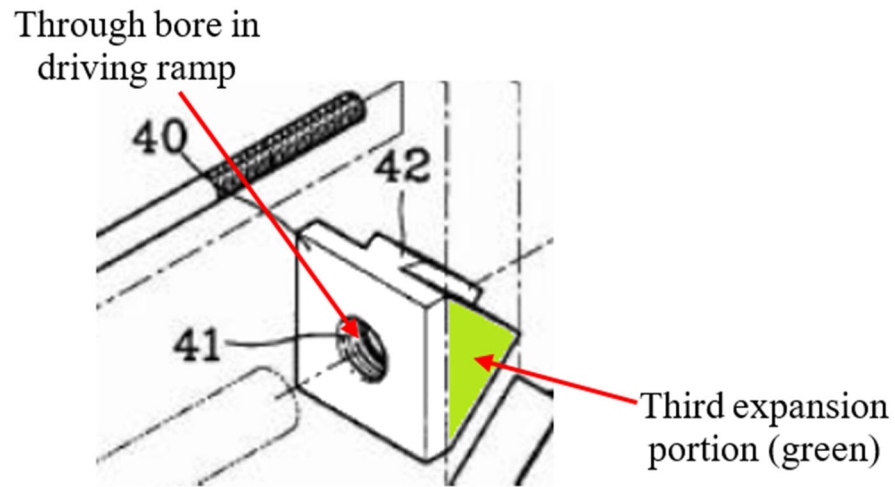
rotationally coupled to the first and second endplates and including a threaded bore. Accordingly, Chung also discloses this limitation under the alternative interpretation of the expansion portion elements. EX1002, ¶¶94-95.

(e) Claim Element 1[e]

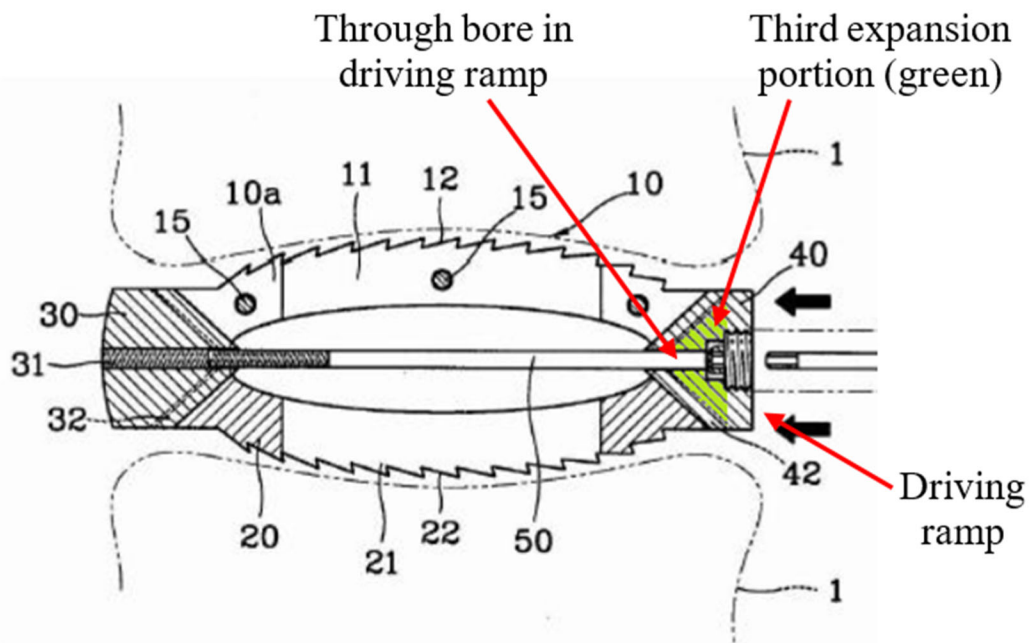
Claim 1 recites “**the driving ramp including a through bore and a third expansion portion.**” Although the ’752 specification does not identify a driving ramp expansion portion, it does disclose central ramp “first expansion portion 412” and “second expansion portion 414.” *See* §IX(A)(1)(d), *supra*. A POSITA would assume that the driving ramp expansion portion is similar to the central ramp expansion portions.

Chung describes opposing wedge (40) having a third expansion portion (the broad ramped surface extending on each side of “dovetail...(42)” and towards the base of the driving ramp) comparable to the expansion portions 412 and/or 414 in ’752 patent Fig. 56. EX1005, 5, Fig. 2; EX1001, 18:51-56, Fig. 56. Chung further discloses a through bore in the form of penetrating hole (41) extending through the driving ramp. EX1005, 5-6, Figs. 1-4. Annotated Figs. 2-3 follow.

Chung, Fig. 2



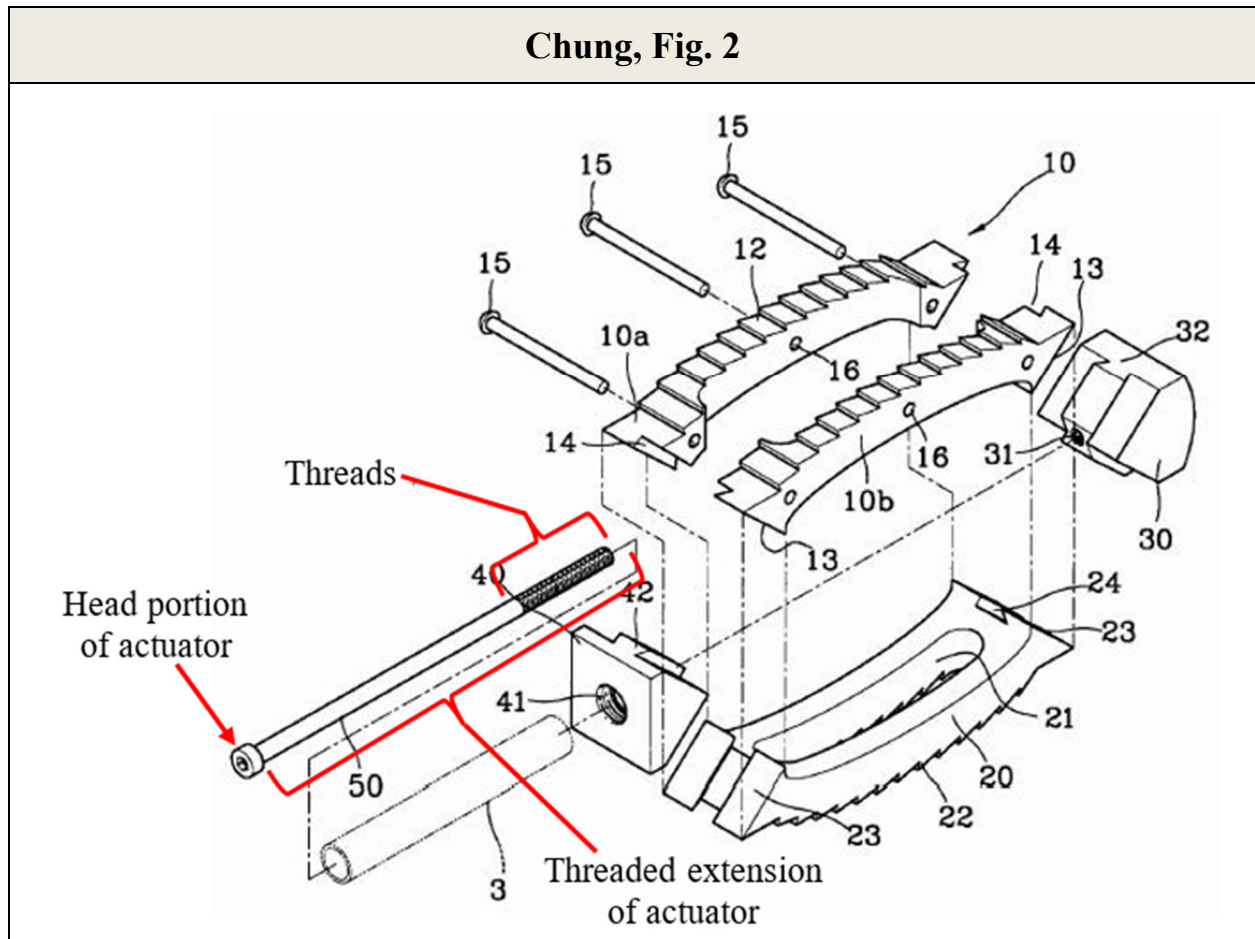
Chung, Fig. 3

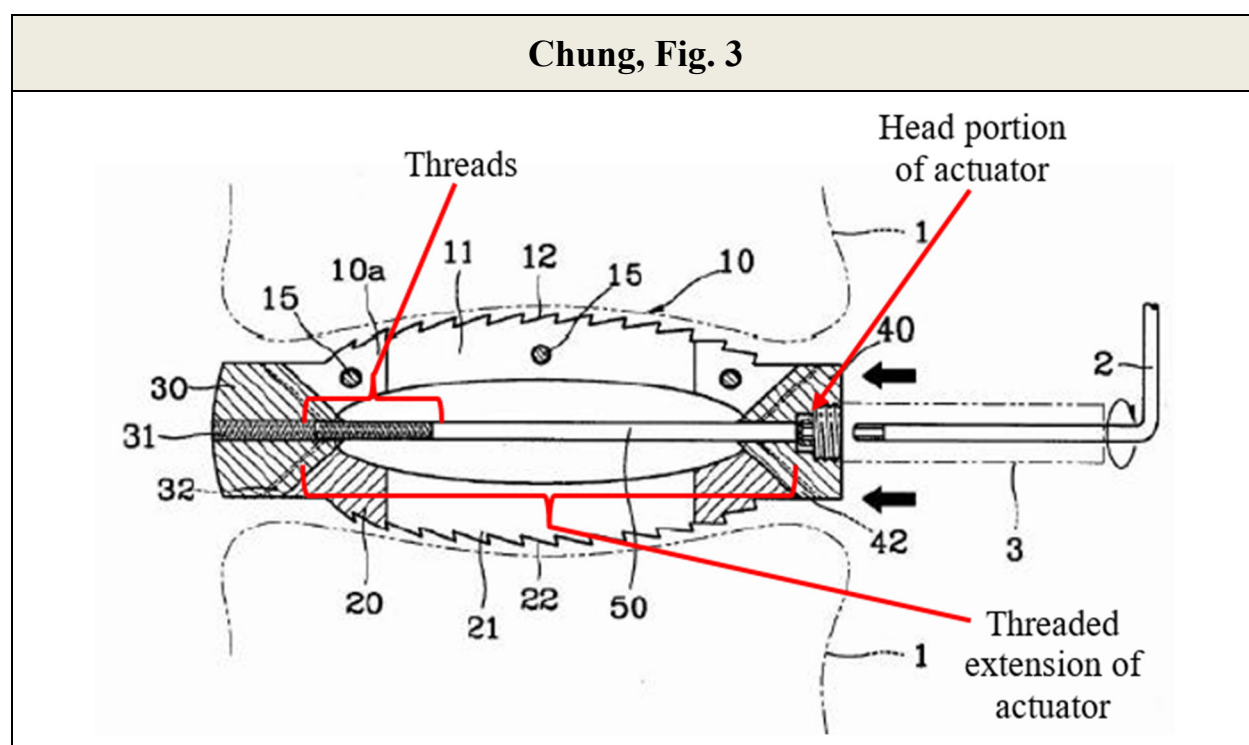


Accordingly, Chung discloses this limitation. EX1002, ¶¶96-99.

(f) Claim Element 1[f]

Claim 1 recites “**the actuator including a head portion and a threaded extension that extends from the head portion.**” Chung discloses an actuator (“groove fastening screw (50)”) including a head portion with a threaded extension extending therefrom, at least a portion of which has threads thus making it a threaded extension (EX1005, 6, Figs. 2-4), as further shown in annotated Figs. 2-3 below.



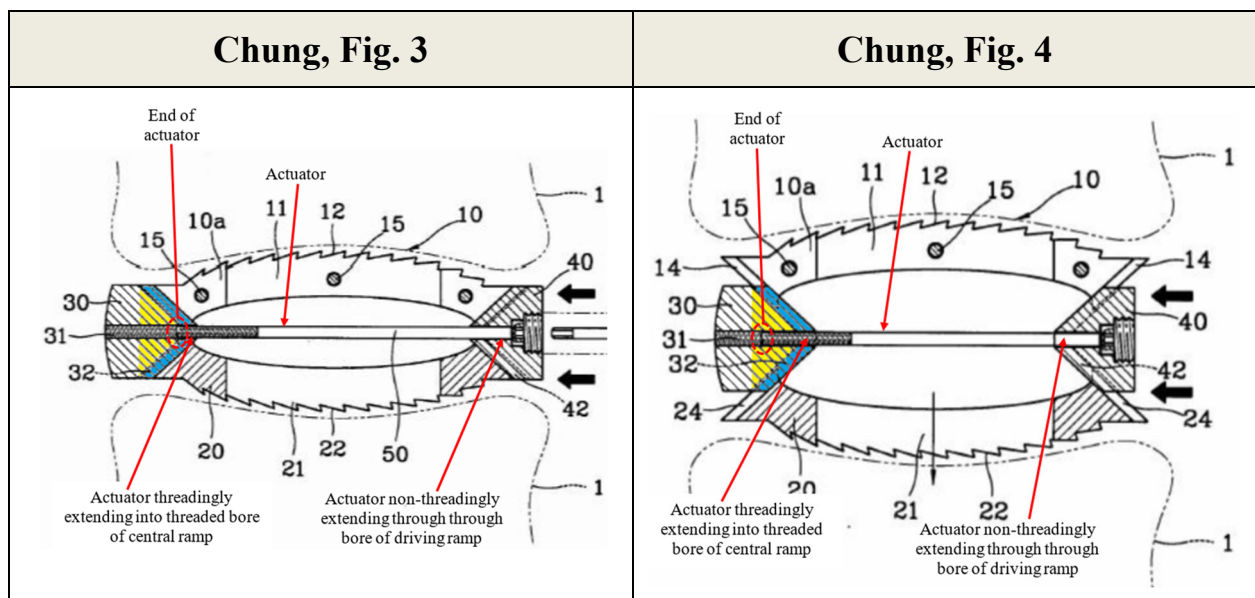


Accordingly, Chung discloses this limitation. EX1002, ¶¶100-101.

(g) Claim Element 1[g]

Claim 1 recites that “**the extension of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp.**” Chung’s lead wedge (30)/central ramp has a threaded screw hole (31) into which the groove fastening screw (50)/actuator threadingly extends. Chung’s opposing wedge (40)/driving ramp has an unthreaded penetrating hole (41) through which the groove fastening screw (50)/actuator non-threadingly extends. EX1005, 6, Figs. 3-4. As Prof. Drewry explains (EX1002, ¶¶103-104), Figs. 3-4 (below) show that central ramp’s opening (31) is threaded while driving ramp’s opening (41) is unthreaded. Figure 4

shows the actuator rotating to engage the threads in the central ramp's opening (31), as evidenced by the actuator's further extension into the opening as compared to its position in Fig. 3. Yet the actuator's position remains unchanged relative to the driving ramp, indicating the driving ramp's opening (41) is unthreaded and that the actuator non-threadingly extends therethrough. Furthermore, the shading of central ramp's opening (31) adjacent to the actuator indicates threading and threaded extension of the actuator through the opening (31), which is absent in the driving ramp's opening (41). Annotated Figs. 3-4 illustrate this:



In addition, while the outermost portion of the driving ramp's opening has a wider diameter and shows some threads, a POSITA would recognize this as a separate structure from the aforementioned through bore, which receives the groove fastening screw/actuator. These threads are not related to the operation of

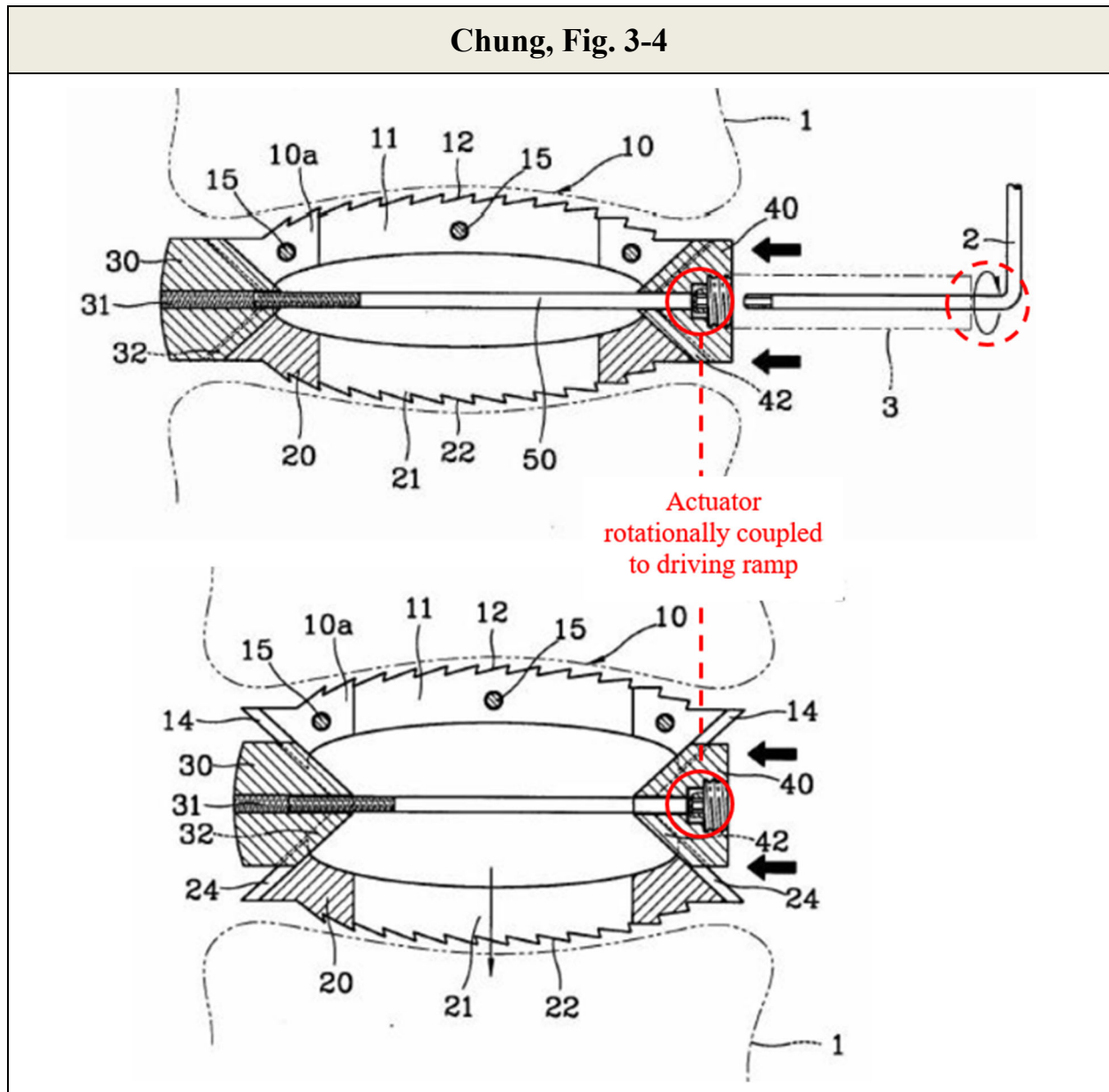
the groove fastening screw; instead, these threads facilitate attachment of a structure Chung identifies as a “wrapper (3),” which the surgeon uses to maintain control and positioning of the device. EX1005, 6. Moreover, because the threads are not related to the operation of the actuator and do not engage the actuator when it is in use, the actuator itself non-threadingly extends through the driving ramp regardless of whether the threads for wrapper (3) are present or not. EX1002, ¶105.

Accordingly, Chung discloses this limitation. *Id.*, ¶¶102-106.

(h) Claim Element 1[h]

Claim 1 recites that “**wherein the actuator is rotationally coupled to the driving ramp.**” As Petitioner’s expert explains, a POSITA would have understood the Chung actuator to be rotationally coupled to the driving ramp where it is capable of rotating relative to the driving ramp while also being coupled to the driving ramp. EX1002, ¶¶107-108. Chung discloses that the actuator is rotationally coupled to the driving ramp, i.e., “fastened to the penetrating hole (41) of the...opposing wedge (40),” such that the head portion of the actuator presses against the recessed rim of the driving ramp and is axially fixed relative to the driving ramp as the actuator is rotated. EX1005, 6; Figs. 3-4. This can further be observed by comparing annotated Figs. 3-4, below, with the circular arrow circled in red indicating rotation of the actuator, in response to which the actuator head presses against the driving ramp’s recessed rim and forces the driving ramp

towards the central ramp. Thus, the actuator is coupled to the driving ramp to push it forward in response to the actuator being rotated, i.e., rotationally coupled.

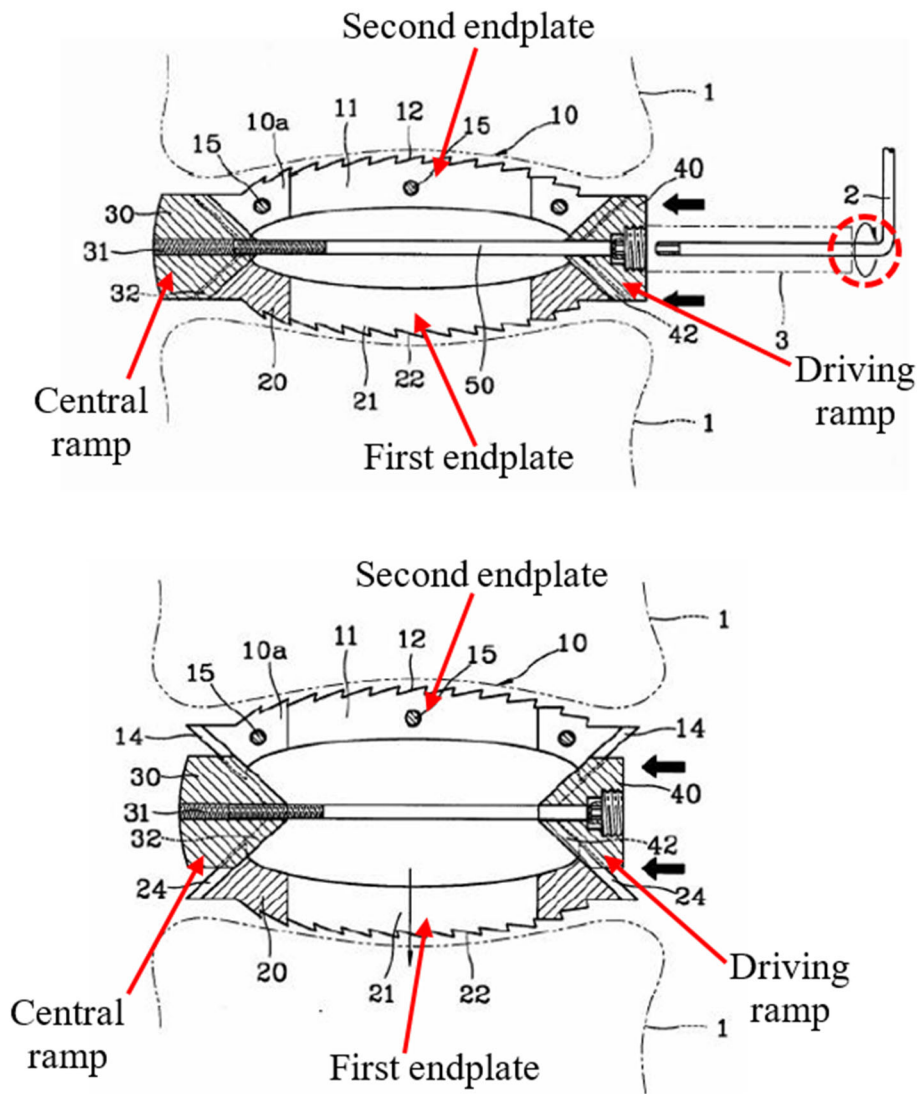


Accordingly, Chung discloses this limitation. EX1002, ¶¶107-110.

(i) Claim Element 1[i]

Claim 1 recites that, **“when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.”** As Chung’s screw is rotated, the two ramps/wedges move together and cause the endplates to move apart or separate. EX1005, 6; *compare id.*, Fig. 3 with Fig. 4 (showing central ramp and driving ramp moving towards one another, thereby causing the first and second endplates to move apart, when actuator is rotated). The relative movement of the ramps/wedges and endplates be further seen by comparing Figs. 3-4, with the circular arrow in Fig. 3 showing that threaded “groove fastening screw (50)” was designed to be rotated (EX1002, ¶111).

Chung, Figs. 3-4



Accordingly, Chung discloses these limitations. EX1002, ¶¶111-114.

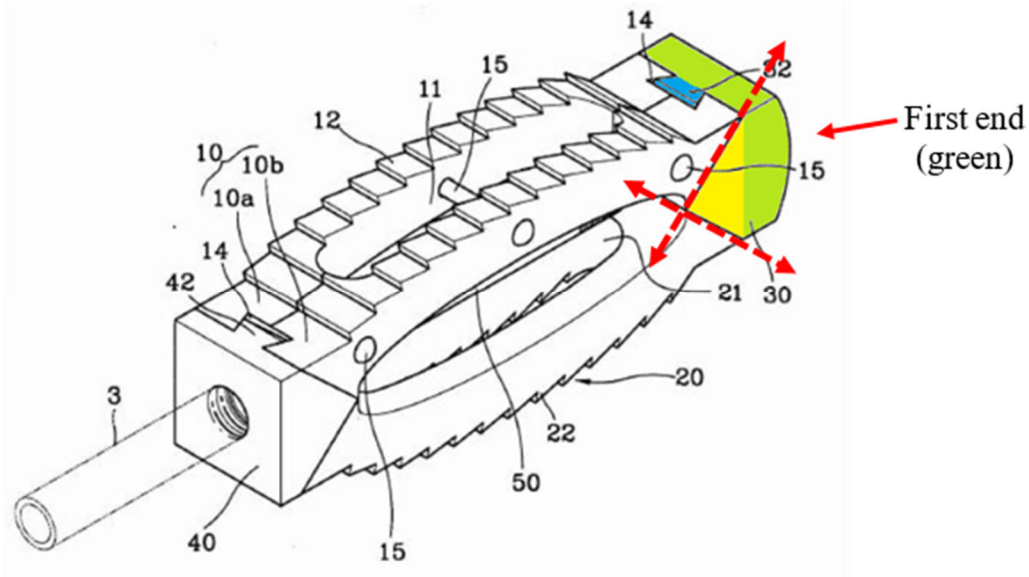
2. Claim 2

Claim 2, which depends from Claim 1, recites that “**the first expansion portion is proximate a first end and includes overlapping ramped portions.**”

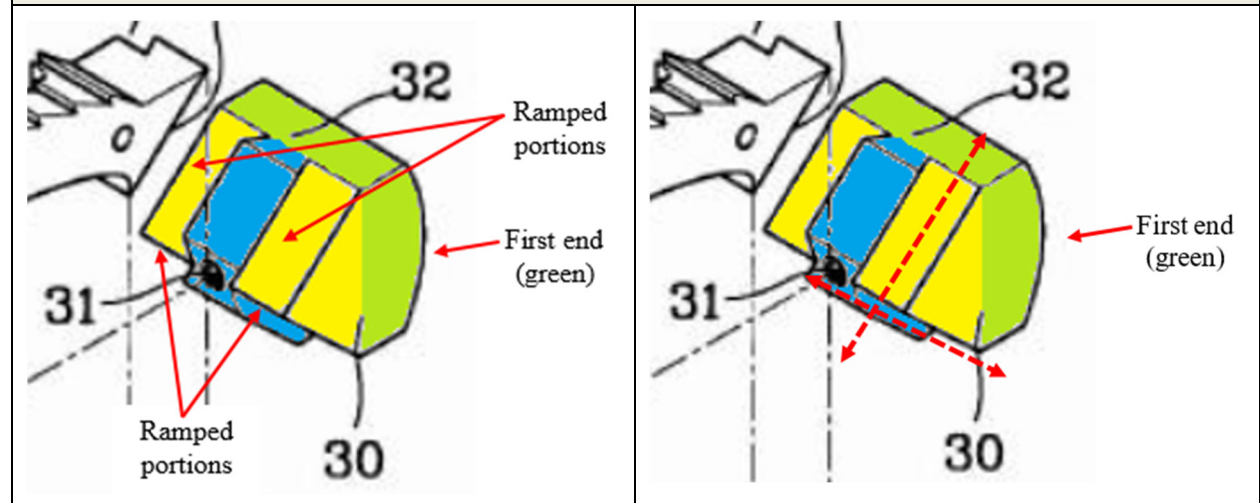
Chung discloses a first expansion portion proximate to a first end and including

overlapping ramped portions. EX1005, Figs. 1-2. Annotated Fig. 1 follows with the first end marked in green, the first expansion portion marked in yellow, and the overlapping ramped portions denoted by dashed arrows.

Chung, Fig. 1



Chung, Fig. 2

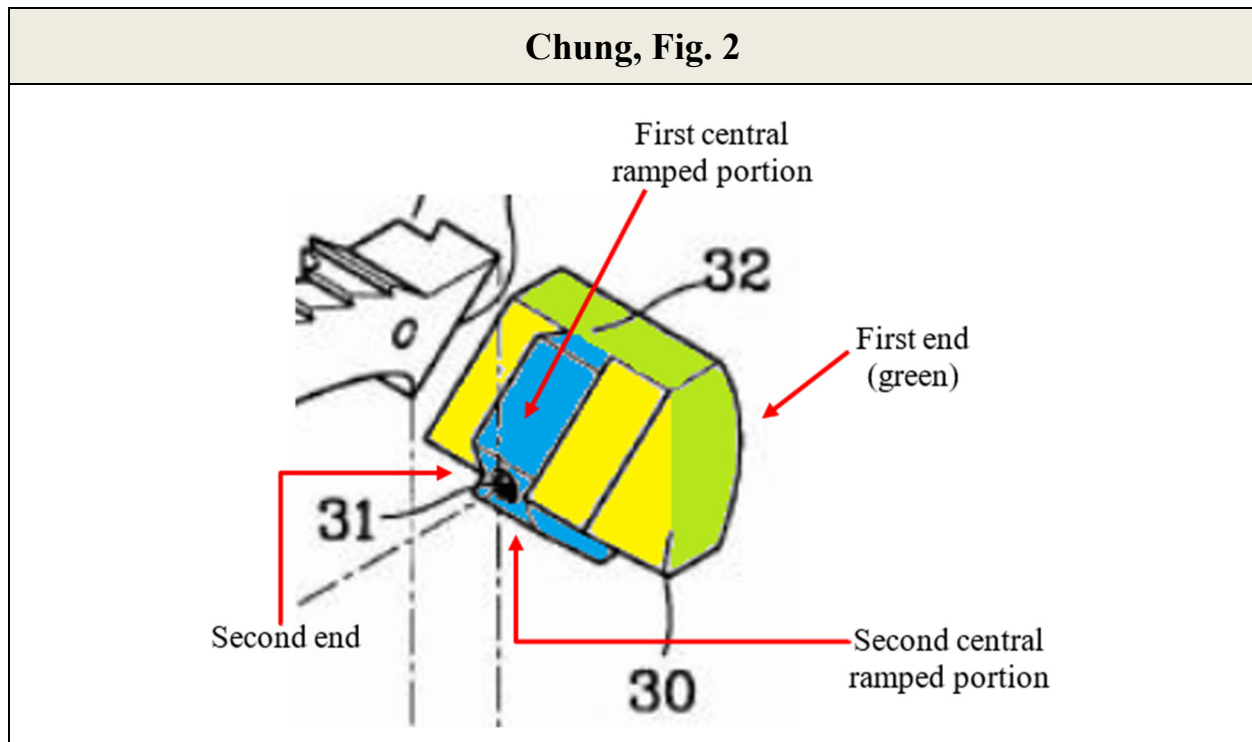


This interpretation is consistent with Patent Owner's infringement contentions in parallel litigation regarding these elements. *See* EX1010, 13. As seen therein, Patent Owner takes the position that two ramped portions "overlap" if the angles of those ramped portions intersect and/or those ramped portions reside opposite each other (i.e., one over the other), consistent with Petitioner's foregoing interpretation of Chung.

Accordingly, Chung discloses this limitation. EX1002, ¶¶115-117.

3. Claim 3

Claim 3, which depends from Claim 2, recites that **"the second expansion portion is positioned between the first end and a second end and includes central ramped portions."** As seen in at least Fig. 2, Chung discloses that the second expansion portion (*see supra* §IX(A)(1)(d)) is positioned between the first and second ends and includes central ramped portions in the form of the flat, ramped surfaces of "dovetails 32." EX1005, 5, Fig. 2. An annotated excerpt of Fig. 2 showing this follows with the second expansion in blue and the first end in green:

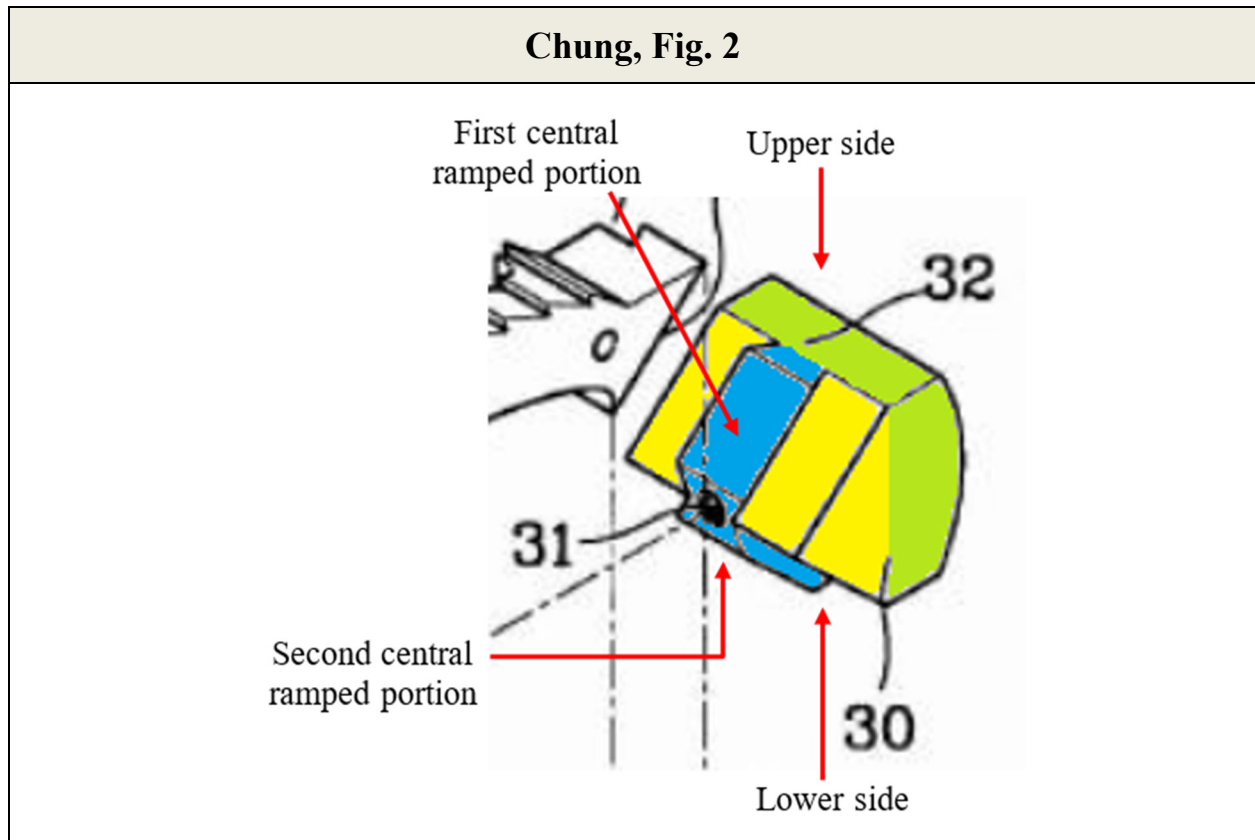


Accordingly, Chung discloses this limitation. EX1002, ¶¶118-120.

4. Claim 4

Claim 4, which depends from Claim 3, recites that “**the central ramped portions includes two central ramped portions on opposite side [sic] of the central ramp.**” As shown in §IX(A)(3), *supra*, Chung discloses two central ramped portions on opposite sides of the central ramp, i.e., one central ramped portion on the upper side of the central ramp and one central ramped portion on the

lower side of the central ramp.⁴ See also EX1005, Figs. 2-4. This is further shown below in the following annotated excerpt of Fig. 2:



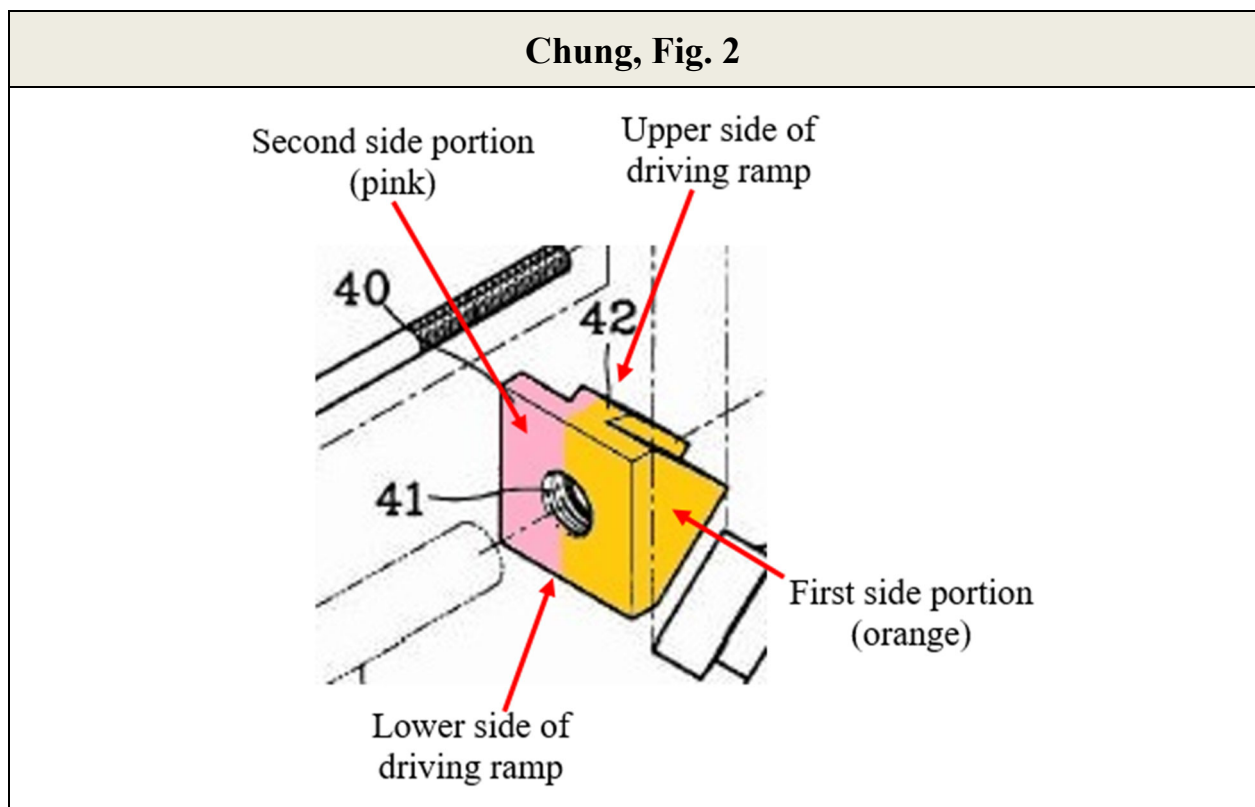
Accordingly, Chung discloses this limitation. EX1002, ¶¶121-123.

⁴ Claim 5 refers to the driving ramp having an “upper side” and a “lower side,” thus indicating that Patent Owner considers the ’752 patent to disclose the upper and lower portions of the ramps comprising an “upper side” and an opposing “lower side.” See §IX(A)(5)(a), *infra*.

5. Claim 5

(a) Claim Element 5[a]

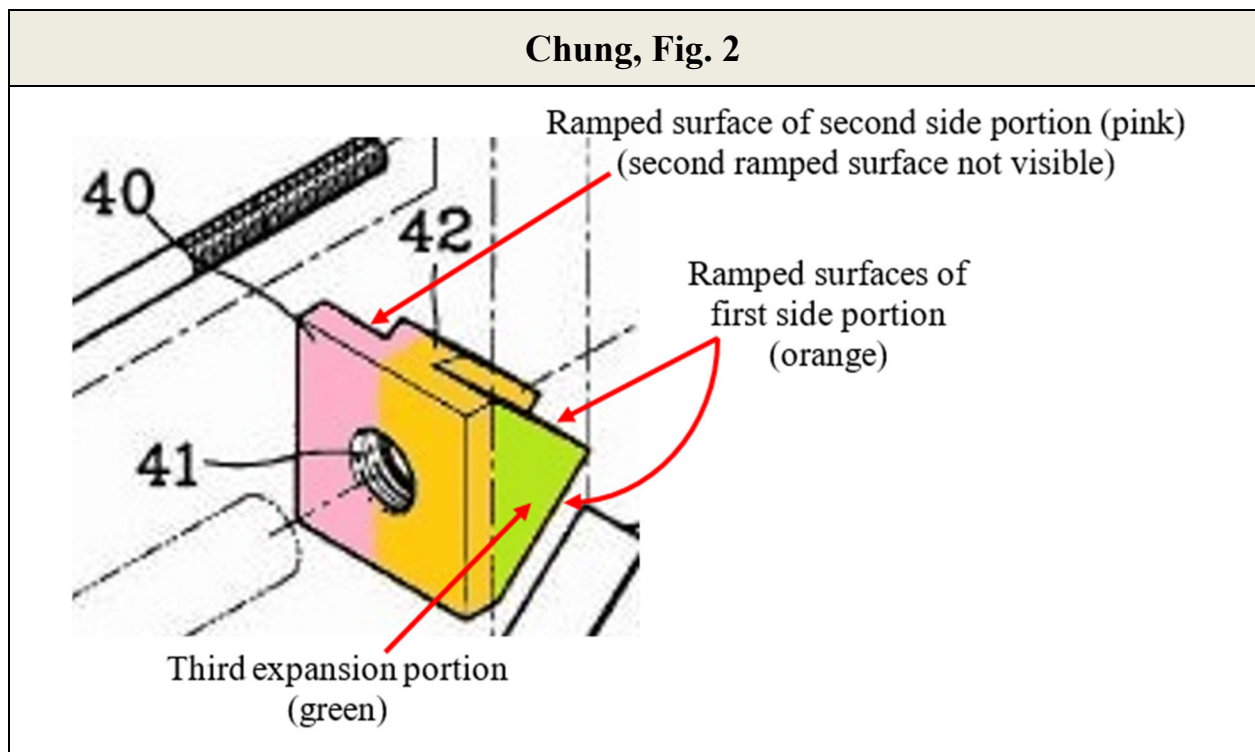
Claim 5, which depends from Claim 1, recites that “**the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side.**” Chung Figs. 1-4 show the driving ramp/opposing wedge (40) having upper and lower sides and first and second side portions connecting the upper and lower sides. This is shown in annotated Fig. 2 below, with the first side portion highlighted in orange and second side portion highlighted in pink.

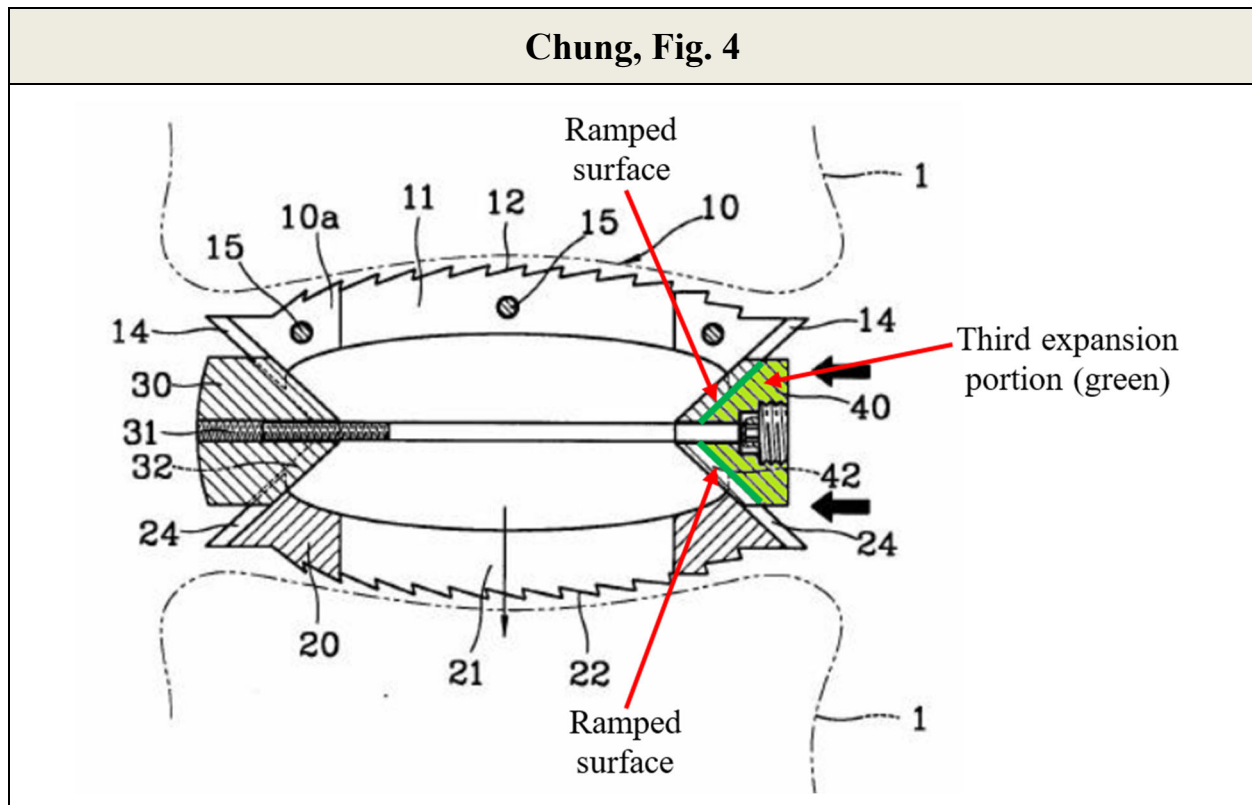


Accordingly, Chung discloses these limitations. EX1002, ¶¶124-126.

(b) Claim Element 5[b]

Claim 5 further recites that “**the first and second side portions include the third expansion portion as one or more ramped surfaces.**” Chung discloses that the first and second side portions include the aforementioned third expansion portion, which includes one or more ramped surfaces. EX1005, Figs. 1-4. As seen in annotated Figs. 2 and 4, below, each of Chung’s side portions (the first side portion in orange and the second side portion in pink) includes two ramped surfaces of the third expansion portion, which is shown in green.



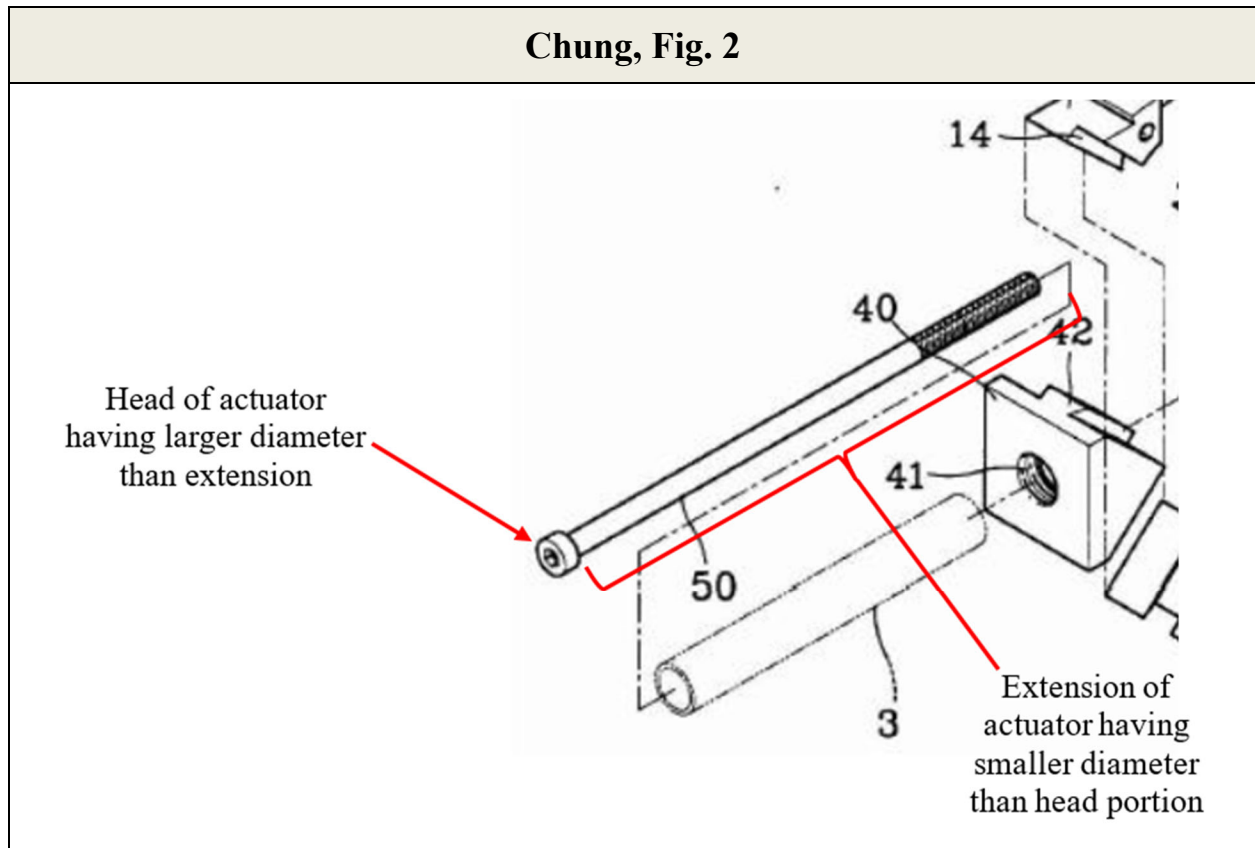


Accordingly, Chung discloses these limitations. EX1002, ¶¶127-128.

6. Claim 6

Claim 6, which depends from Claim 1, recites that “**the head portion of the actuator has a larger diameter than the extension.**” Chung discloses that “opposing wedge (40) has a penetrating hole (41) with a raised spot in order for the aforementioned groove fastening screw (50)’s head to be held,” meaning that groove fastening screw (50)’s head portion necessarily has a larger diameter than the extension. EX1005, 6. Moreover, a POSITA would have understood that, for groove fastening screw (50) to actuate the two wedges towards each other, the head portion of the groove fastening screw (50) must have a larger diameter than

the extension such that it can form a contact surface with the driving ramp. Figs. 2-4 further show this, with annotated Fig. 2, below:



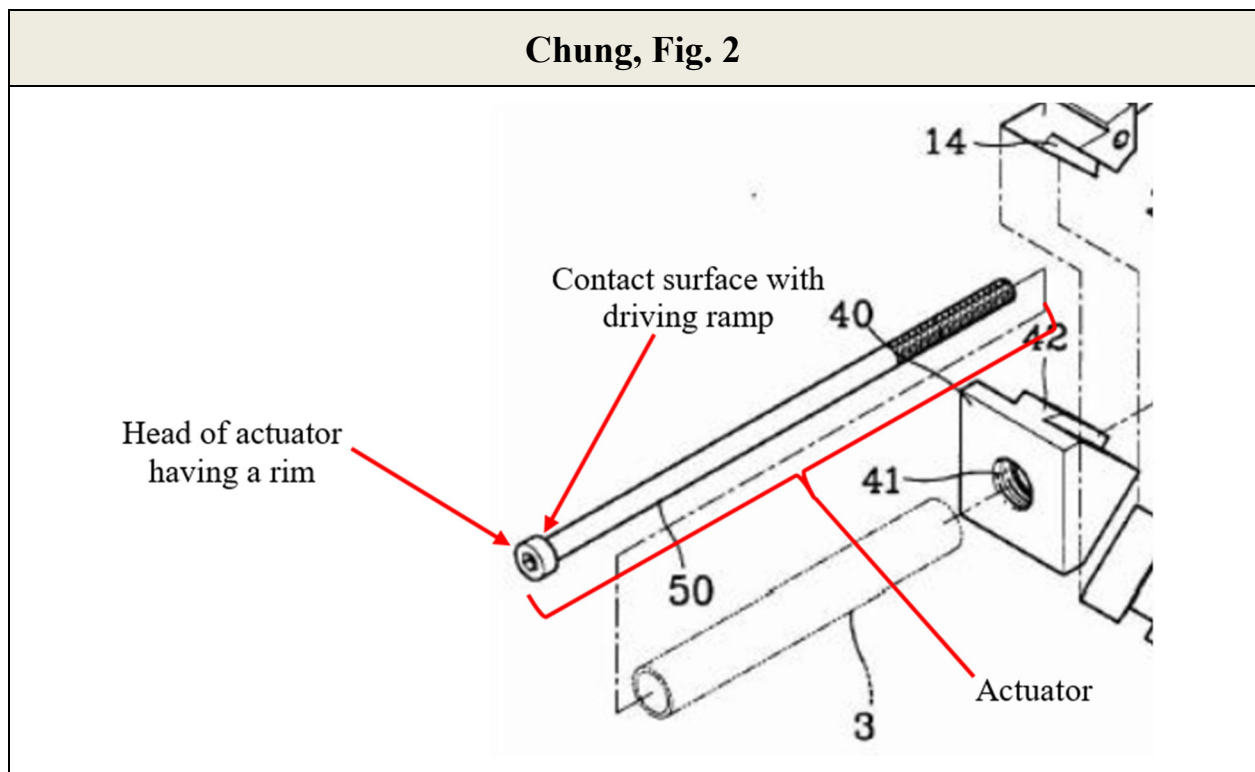
Accordingly, Chung discloses these limitations. EX1002, ¶¶129-132.

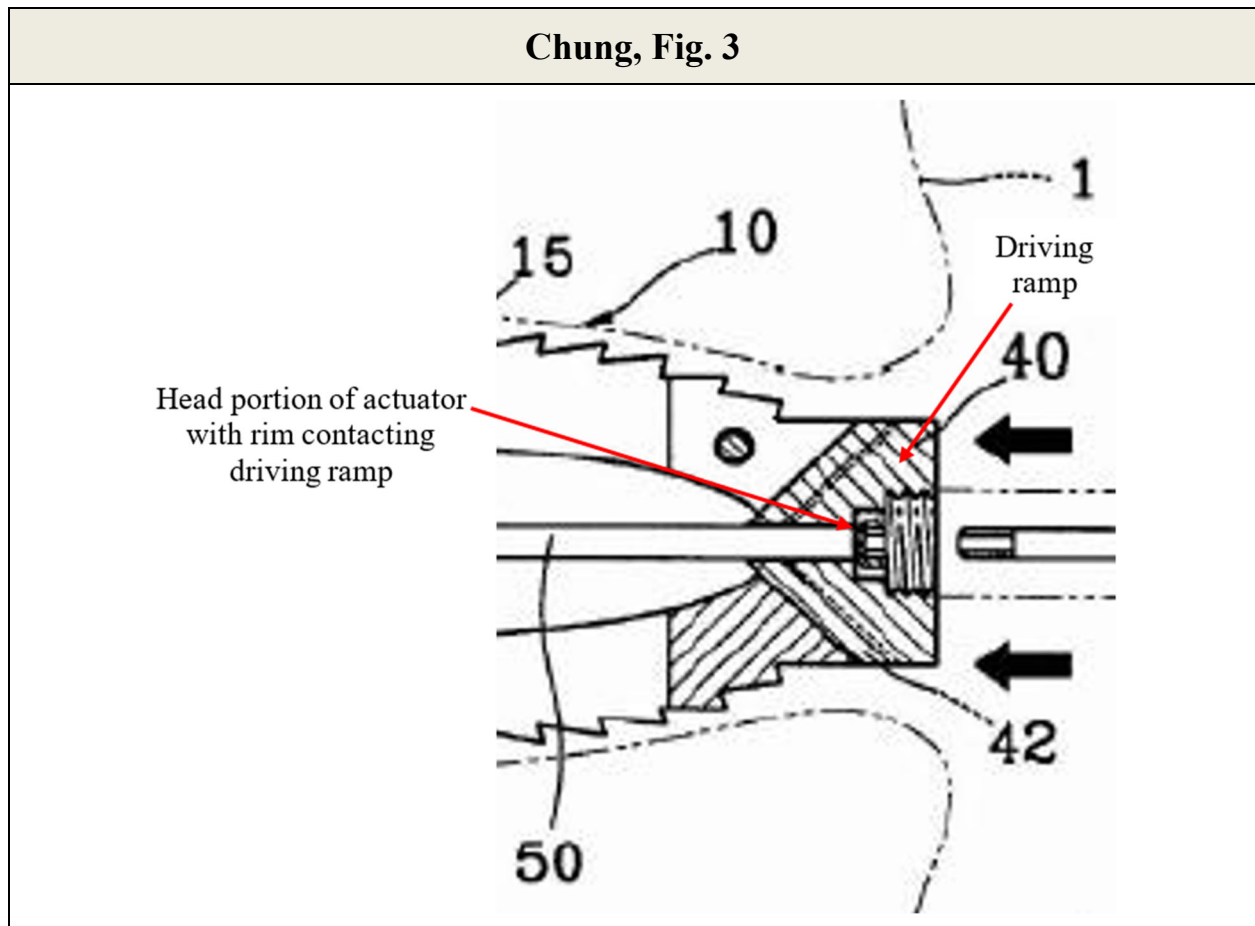
7. Claim 7

Claim 7, which depends from Claim 1, recites that the **“the head portion of the actuator includes a rim configured to contact the driving ramp.”** Chung discloses that the head portion (“groove fastening screw (50)’s head”) includes a rim that is configured to contact the driving map (“opposing wedge (40)”).

EX1005, 6. Chung’s “opposing wedge (40) has a penetrating hole (41) with a

raised spot in order for the aforementioned groove fastening screw (50)'s head to be held." EX1005, 6. A POSITA would have understood that for the groove fastening screw's head to have a contact surface with the driving ramp to move the wedges together when rotated, the head portion of the groove fastening screw (50) includes a rim that is configured to contact the driving ramp. Figures 2-4 show this, with annotated excerpts of Figs. 2-3 below.



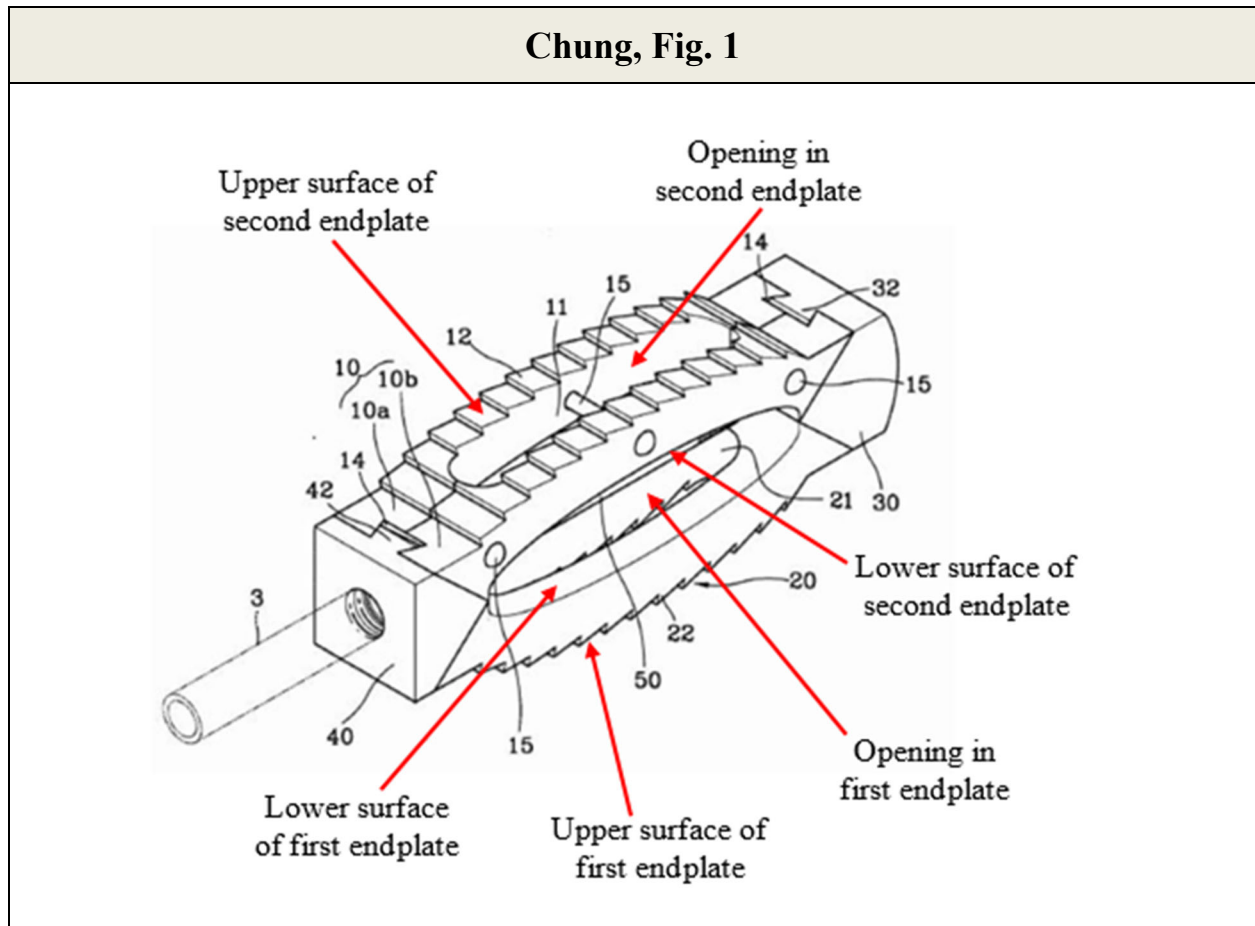


Accordingly, Chung discloses these limitations. EX1002, ¶¶133-136.

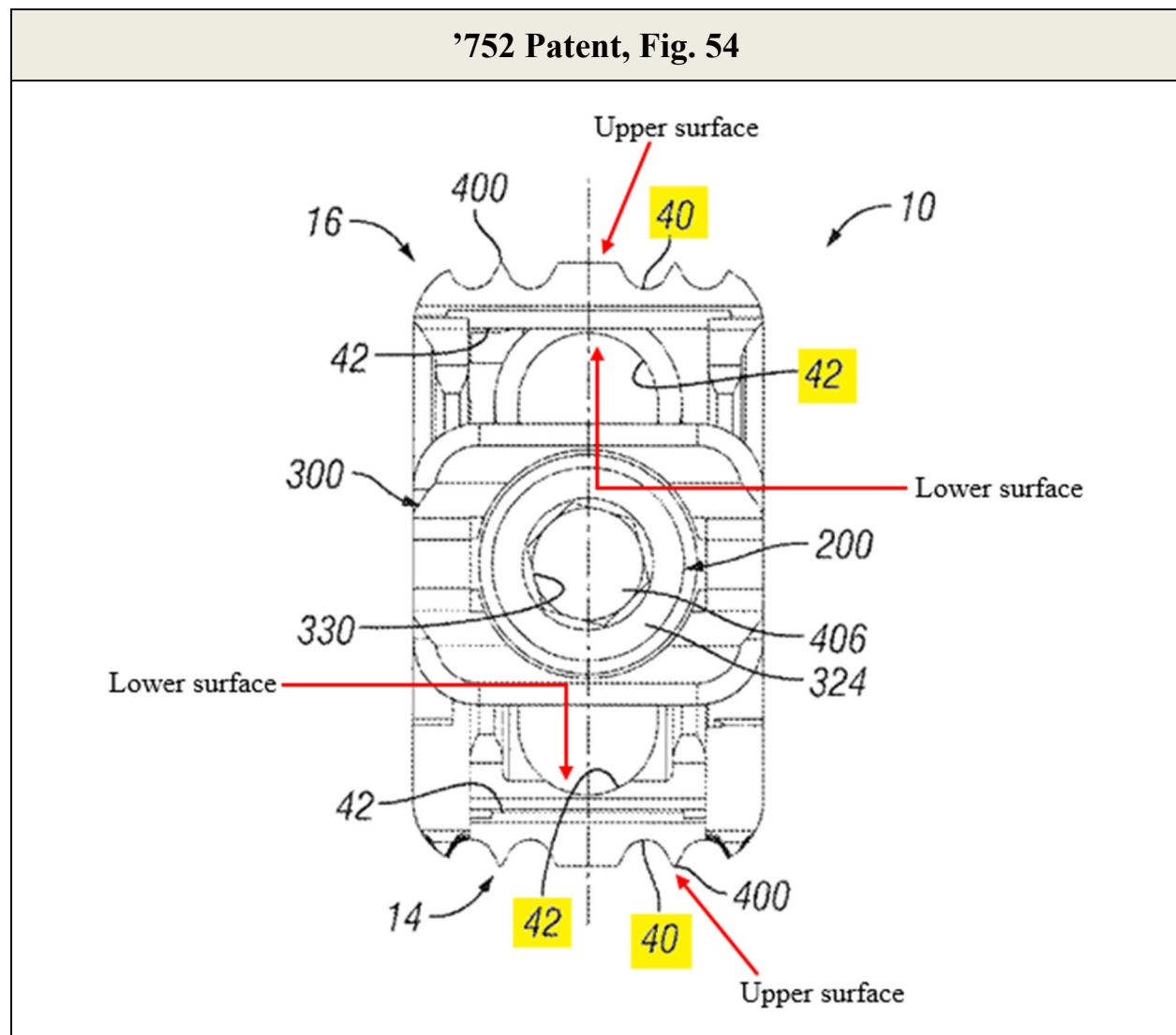
8. Claim 8

Claim 8, which depends from Claim 1, recites that “**the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.**” Chung’s first and second endplates (“main holder bodies (10) (20)”) each comprise an opening that extends from an upper surface through a lower surface (e.g. “long penetrating holes (11) (21) through which back bone implant materials can pass through...are formed at the center” of each

endplate) EX1005, 4; *see also id.*, 5 (similar teaching), Figs. 1-2. Annotated Fig. 1, below, further shows this:



With respect to the characterization of the upper and lower surfaces, the '752 patent discloses the “upper” surface in both endplates as element 40 while the “lower” surface is element 42. EX1001, 17:12-32. As seen in '752 patent Fig. 54, these structures are mirrored between the two endplates such that the “upper surface” of one endplate is downward-facing, with the “lower surface” upward-facing.



Accordingly, Chung discloses this limitation. EX1002, ¶¶137-142.

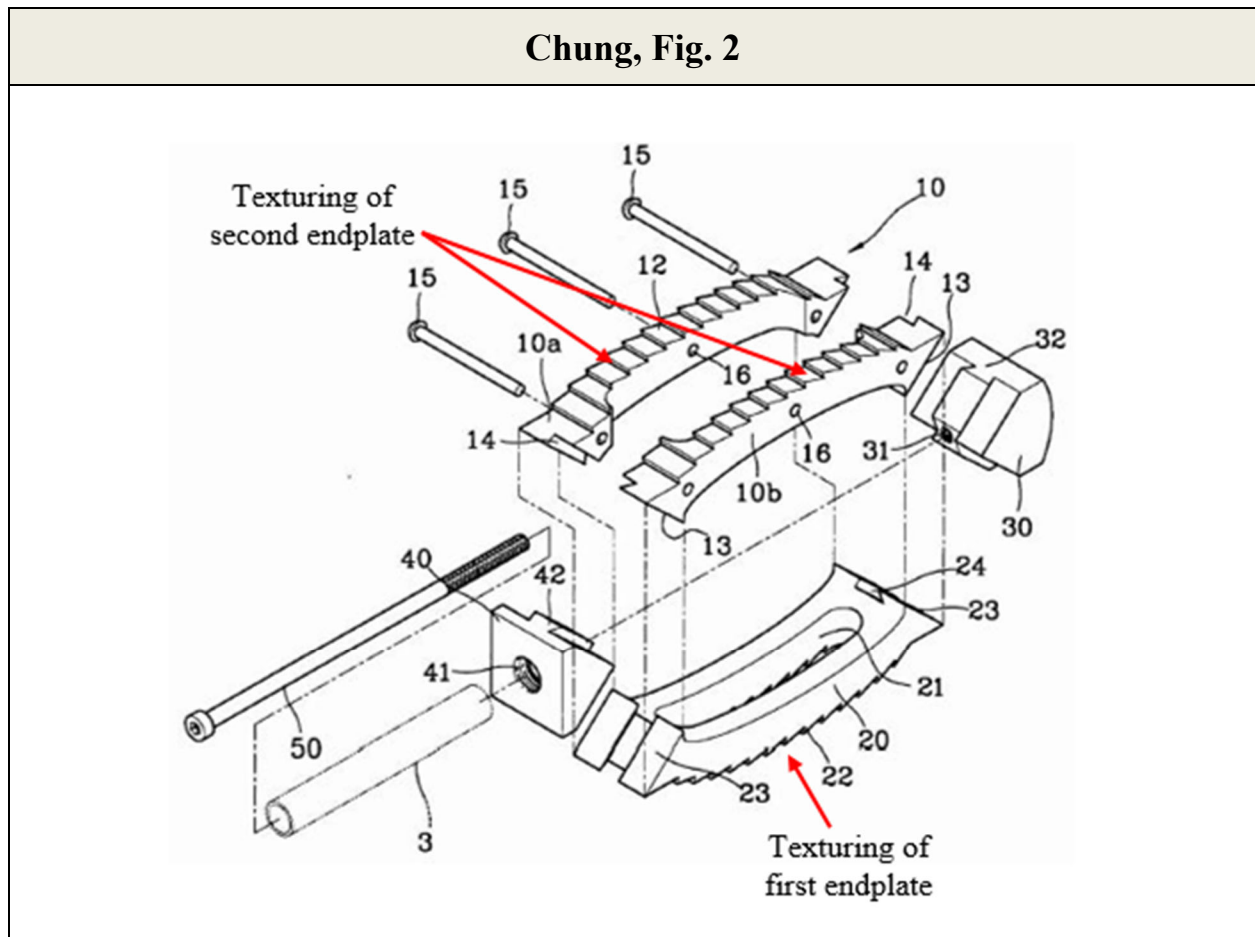
9. Claim 10

Claim 10, which depends from Claim 1, recites that “**the first and second endplates comprise texturing for gripping adjacent vertebral bodies.**” Chung discloses that the first and second endplates comprise texturing for gripping adjacent vertebral bodies in the form of “one-direction saw tooth (12) (22) [that]

exhibit strong friction against the contact surfaces of the aforementioned back

bones (1).” EX1005, 6; *see also id.*, 5, Figs. 1-4. Figures 1-4 show this texturing, as

shown in annotated Fig. 2, below:



Accordingly, Chung discloses this limitation. EX1002, ¶¶143-146.

10. Claim 11

(a) Claim Element 11[a]

Claim 11 is directed to an “[a]n **expandable fusion device.**” Chung discloses such a device, as discussed previously. *See* §§IX(A)(1)(a); EX1002, ¶147.

(b) Claim Element 11[b]

Claim 11 recites “**a first endplate and a second endplate.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(1)(b); EX1002, ¶¶148-149.

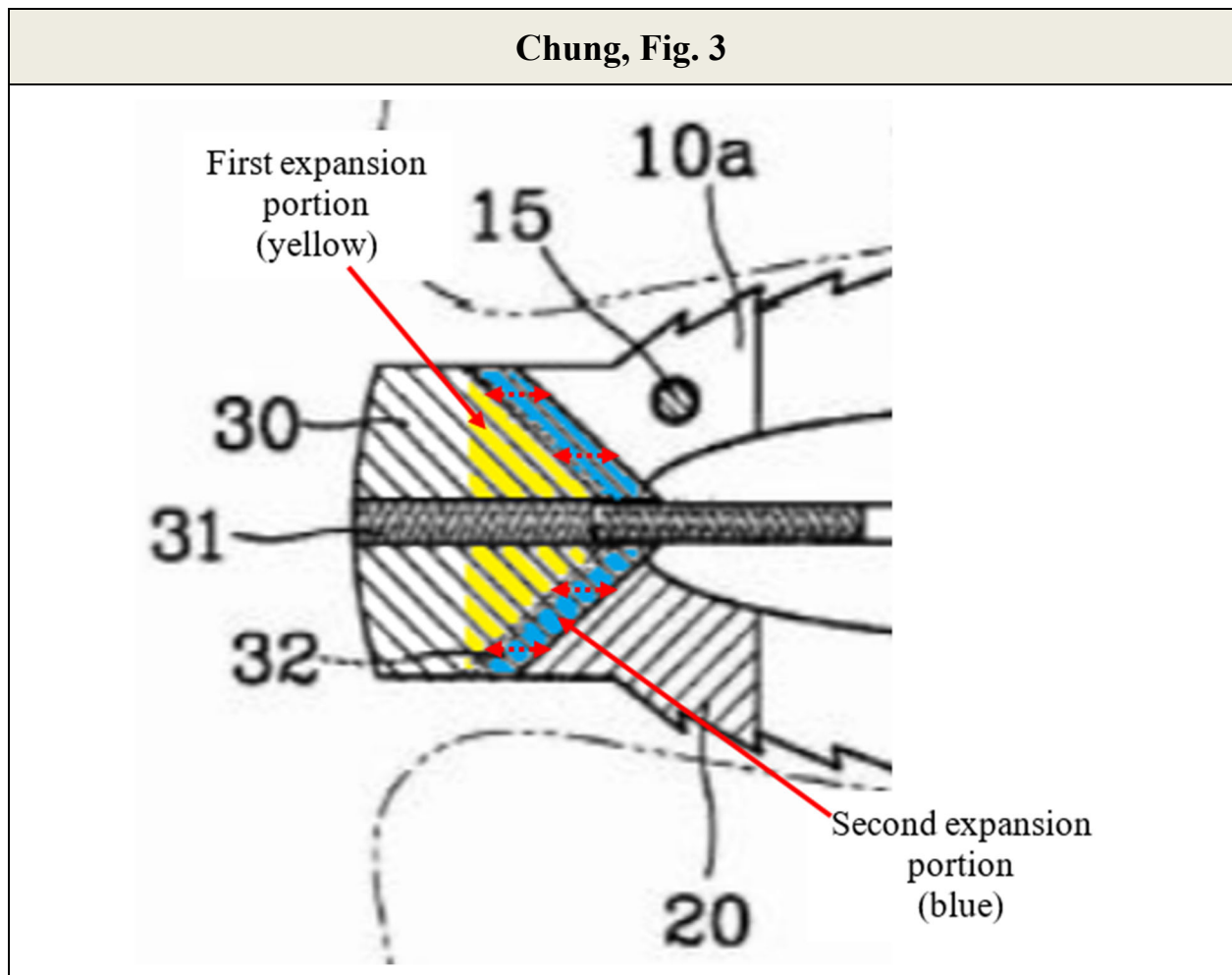
(c) Claim Element 11[c]

Claim 11 recites “**a central ramp, a driving ramp, and an actuator positioned between the first and second endplates.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(1)(c); EX1002, ¶¶150-151.

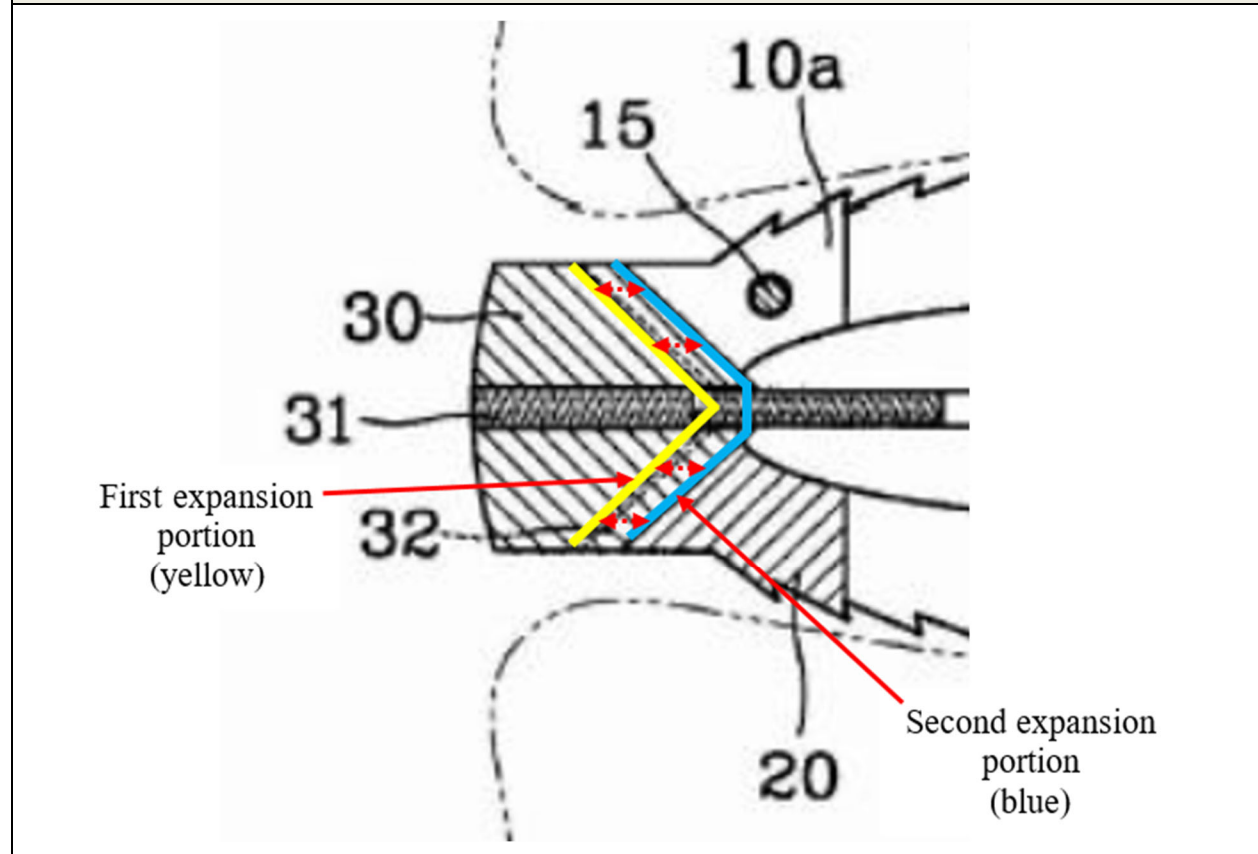
(d) Claim Element 11[d]

Claim 11 recites “**the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion including at least one ramped surface, and a second expansion portion including at least one ramped surface, the second expansion portion being longitudinally spaced from the first expansion portion.**” As discussed previously, Chung discloses the central ramp being non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion,

and a second expansion portion longitudinally spaced from the first expansion portion. See §IX(A)(1)(d), *supra*. This is further shown in the following annotated excerpts of Fig. 3, which show the previously-discussed alternative interpretations of the first and second expansion portions:

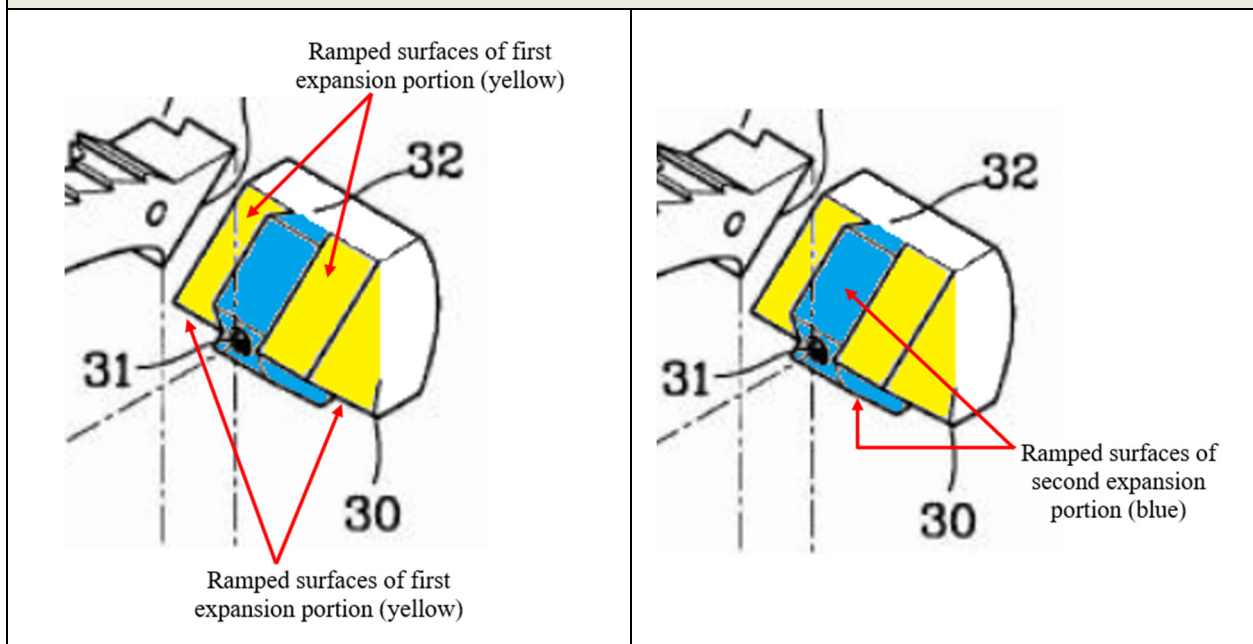


Chung, Fig. 3

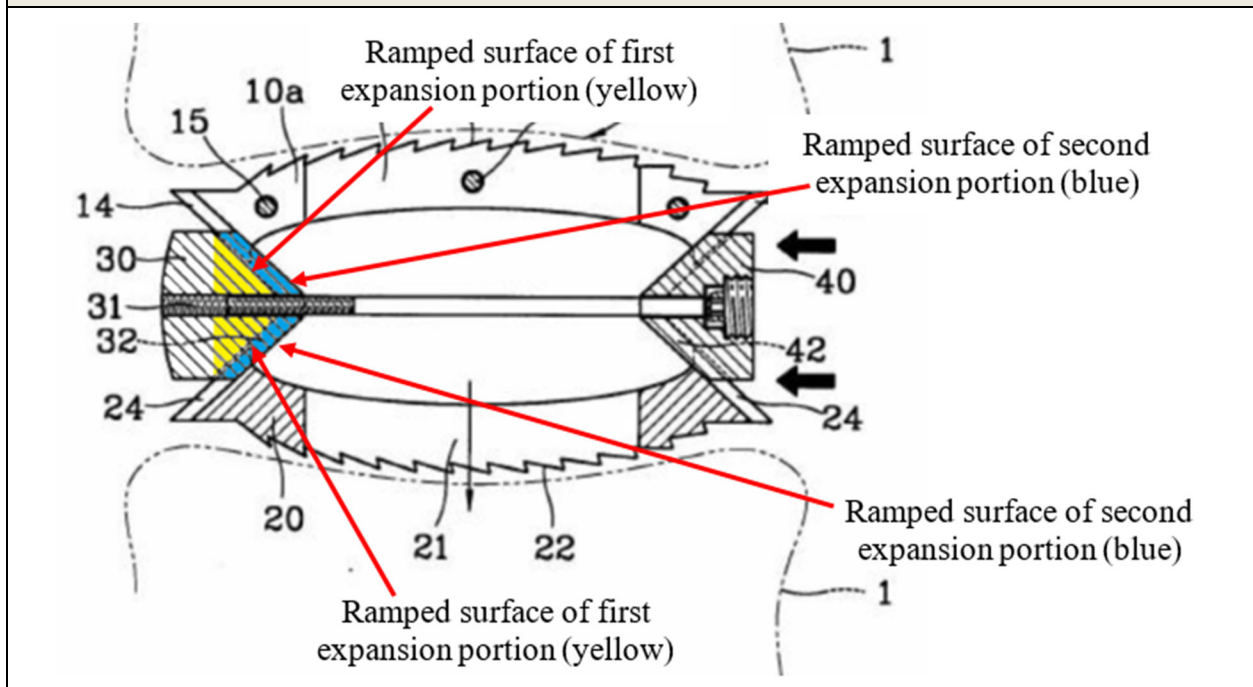


Chung further discloses that the first expansion portion includes at least one ramped surface and that the second expansion portion includes at least one ramped surface. EX1005, Figs. 1-4. Annotated Figs. 2 and 4 showing these elements follow:

Chung, Fig. 2



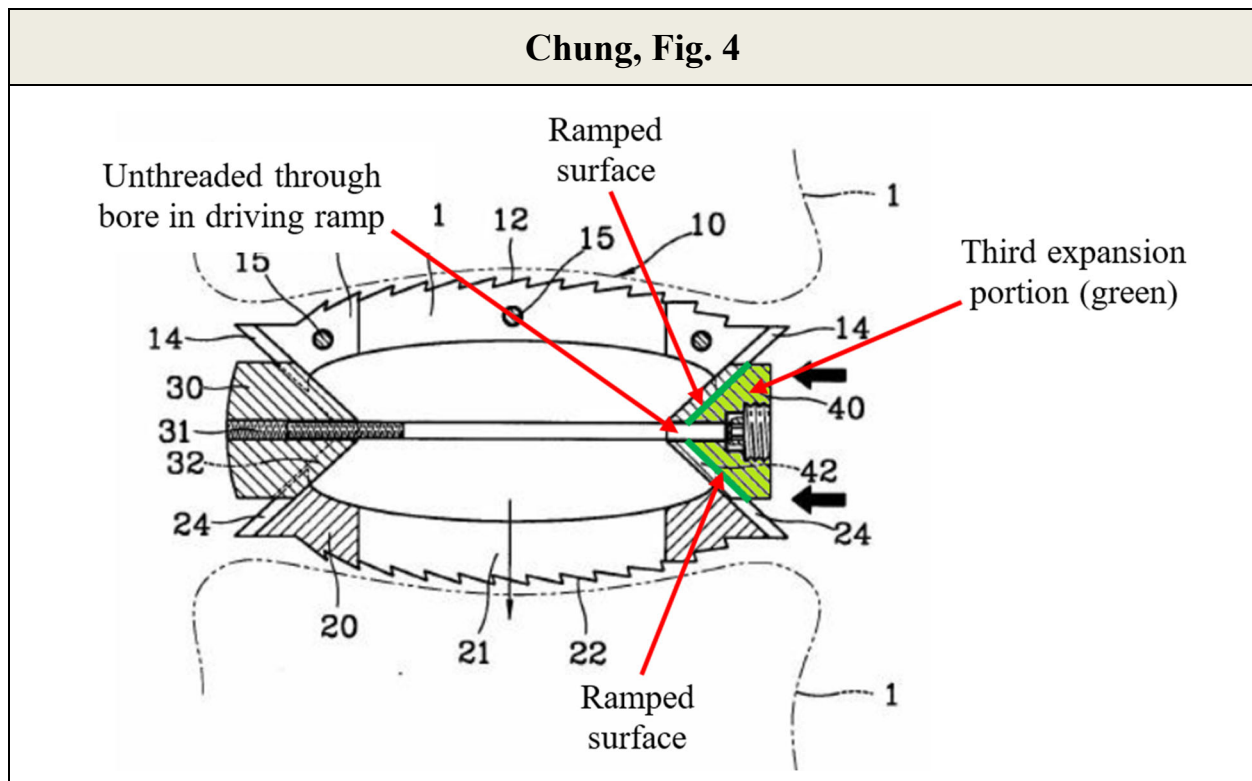
Chung, Fig. 4



Accordingly, Chung discloses this limitation. EX1002, ¶¶152-156.

(e) Claim Element 11[e]

Claim 11 recites the “**driving ramp including an unthreaded through bore and a third expansion portion including at least one ramped surface.**” As previously discussed, Chung’s driving ramp includes an unthreaded through bore and a third expansion portion including at least one ramped surface. *See* §IX(A)(1)(e), IX(A)(5)(b), *supra*. This limitation is visible in at least Chung Figs. 2-4, with an annotated excerpt of Fig. 4 provided below.



In addition, while the outermost portion of the driving ramp's opening has a wider diameter and shows some threads, a POSITA would recognize this as a separate structure from the aforementioned unthreaded through bore, which

receives the groove fastening screw/actuator. These threads are not related to the operation of the groove fastening screw; instead, these threads facilitate attachment of a structure Chung identifies as a “wrapper (3),” which the surgeon uses to maintain control and positioning of the device. EX1005, 6. Moreover, because the threads are not related to the operation of the actuator and do not engage the actuator in use, the through bore is unthreaded vis-à-vis the actuator.

A POSITA also would have been well-aware of other methods and configurations for maintaining control and positioning of the device, which would have made such threads in the outer portion of Chung’s driving ramp opening superfluous. EX1002, ¶162. Accordingly, it would have been an obvious modification to simply omit these particular threads from the outer portion of Chung’s driving ramp opening, thereby providing an entirely unthreaded opening. *Id.* A POSITA would have been motivated to make such a modification in order to simplify the Chung design and improve the manufacturing and operation of the device and would have had a reasonable expectation of success in doing so because it represents a simple substitution of one known design capable of performing the required function for another. *Id.*, ¶¶163-164.

Accordingly, Chung discloses this limitation and/or renders it obvious. EX1002, ¶¶157-165.

(f) Claim Element 11[f]

Claim 11 recites that **“a portion of the actuator non-threadingly extends through the through bore of the driving ramp and threadingly extends into the threaded bore of the central ramp.”** Chung discloses this limitation, as discussed previously. *See* §§IX(A)(1)(g), IX(A)(10)(e); EX1002, ¶¶166-167.

(g) Claim Element 11[g]

Claim 11 recites that **“the actuator is rotationally coupled to the driving ramp.”** Chung discloses this limitation, as discussed previously. *See* §IX(A)(1)(h); EX1002, ¶¶168-169.

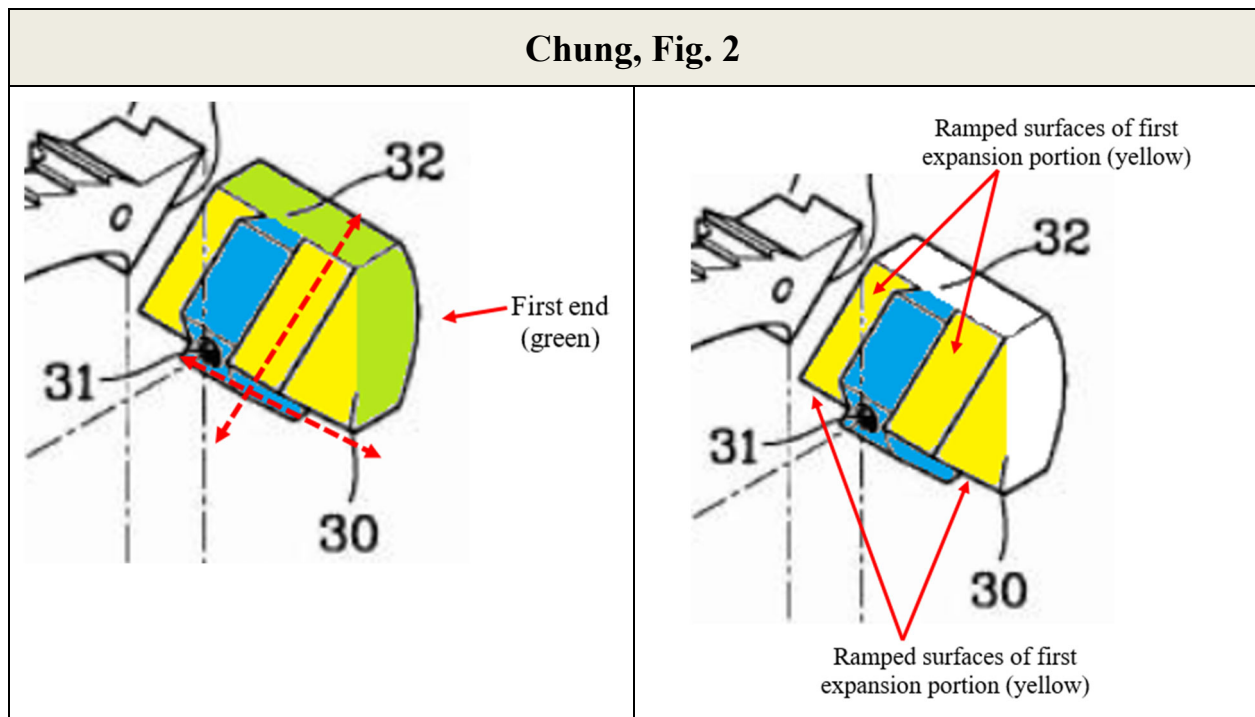
(h) Claim Element 11[h]

Claim 11 recites that, **“when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.”** Chung discloses this limitation, as discussed previously. *See* §IX(A)(1)(i); EX1002, ¶¶170-171.

11. Claim 12

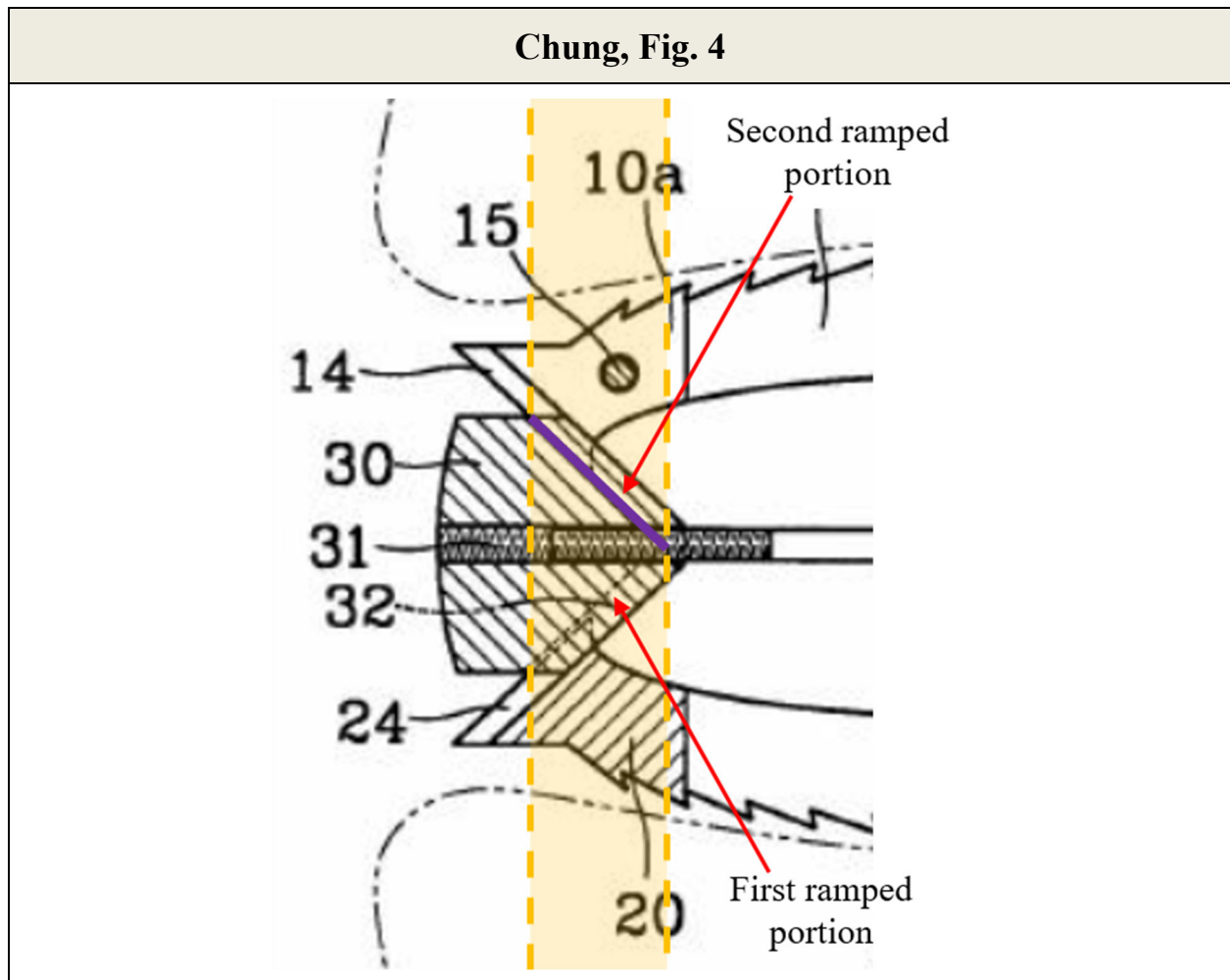
Claim 12, which depends from Claim 11, recites **“the first expansion portion is proximate a first end and the at least one ramped surface of the first expansion portion includes overlapping ramped portions.”** This limitation overlaps Claim 2, already discussed in §IX(A)(2), *supra*. As explained by Petitioner’s expert, a POSITA would have recognized that Chung’s overlapping

ramped portions described in §IX(A)(2), *supra*, are included in the various ramped surfaces (which collectively constitute “at least one ramped surface”) of Chung’s first expansion portion described in §IX(A)(10)(d), *supra*, as seen in the annotated excerpts of Fig. 2 reproduced below.



This interpretation is consistent with Patent Owner’s infringement contentions regarding Claim 12. *See* EX1010, 25. As seen therein, Patent Owner takes the position that two ramped portions “overlap” where two angled surfaces reside opposite each other (i.e., one over the other), and/or have angles that intersect. Moreover, Patent Owner alleges that two ramped portions may be “include[d]” in the “at least one ramped surface” where the ramped portions fall within the footprint of the ramped surface. Chung discloses such a configuration,

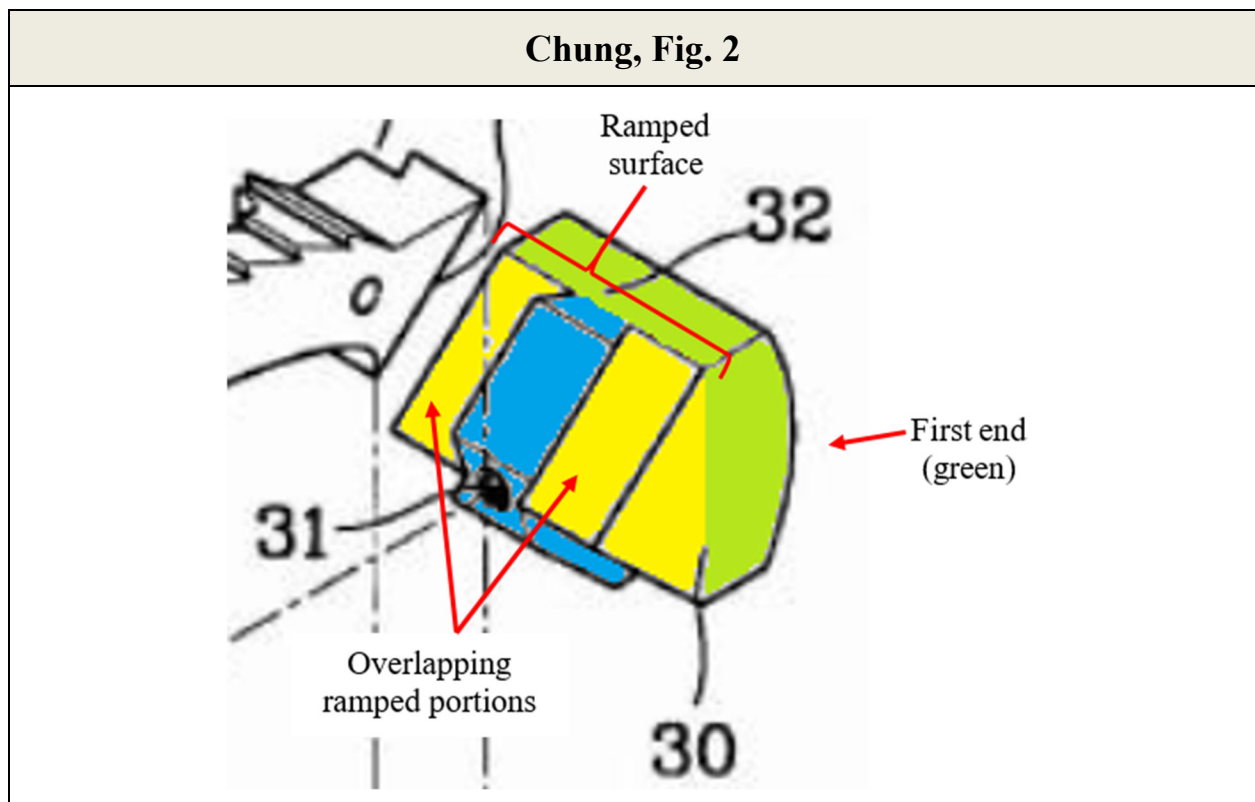
as shown in the following annotated excerpt of Fig. 4, which shows at least one ramped surface in purple with the two ramped portions falling within the surface's footprint, as indicated by the orange column:



Accordingly, Chung discloses this limitation. *See* §§IX(A)(2), IX(A)(10)(d); EX1002, ¶¶172-175, 177.

While the above analysis is plainly consistent with Patent Owner's infringement contentions, alternatively, Chung also discloses a first expansion

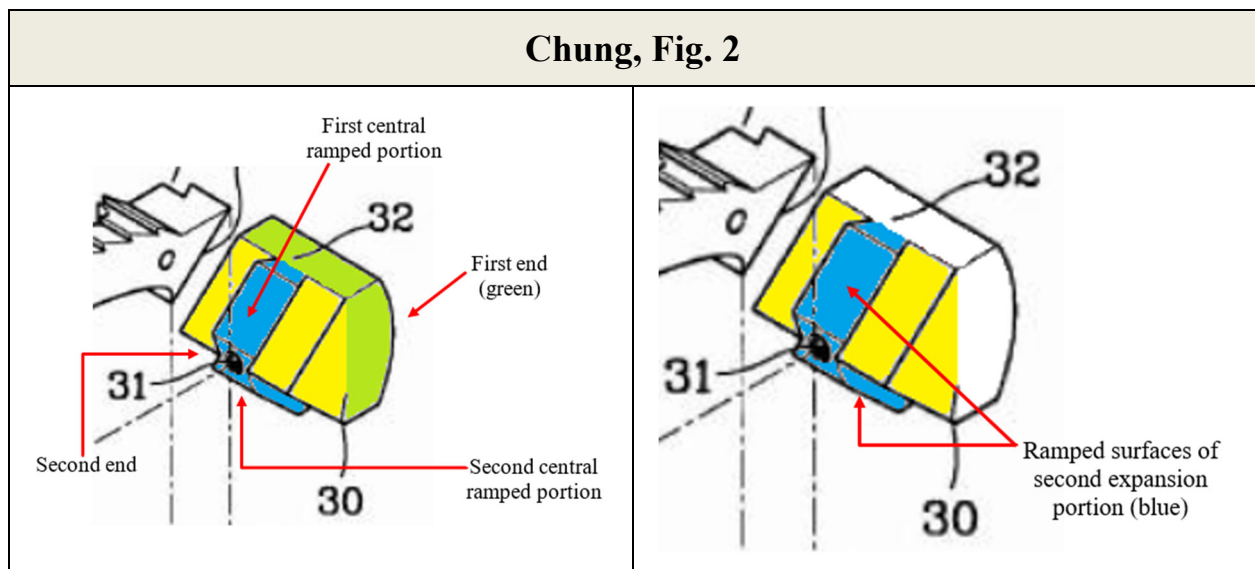
portion having a ramped surface with overlapping ramped portions in the form of the two lateral surfaces on either side of dovetail (32). These ramped portions are located on a single ramped surface (e.g., the plane comprising the upper ramped surface) of the first expansion portion and are overlapping because they are positioned in parallel to one another within a single plane and thus completely cover each other (i.e., overlap) in the direction parallel to that plane. The following annotated excerpt of Fig. 2 further identifies these features:



Accordingly, Chung discloses Claim 12's limitation for these additional reasons. *See* §§IX(A)(2), IX(A)(10)(d); EX1002, ¶¶176-177.

12. Claim 13

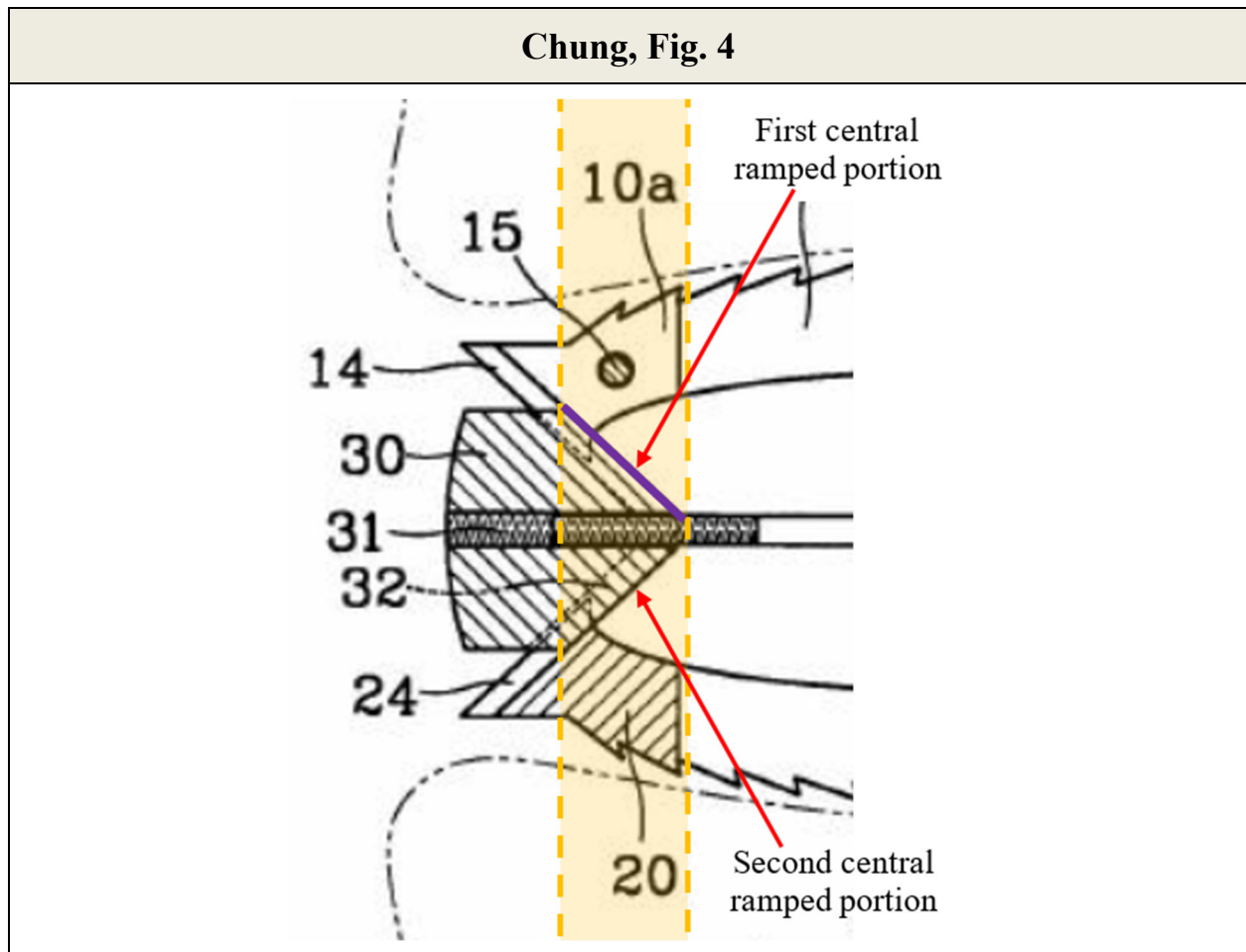
Claim 13, which depends from Claim 12, recites that “**the second expansion portion is positioned between the first end and a second end and the at least one ramped surface of the second expansion portion includes central ramped portions.**” As discussed for Claim 3, Chung’s second expansion portion is positioned between the ends and includes central ramped portions. *See* §IX(A)(3), *supra*. As explained by Petitioner’s expert, a POSITA would have recognized that Chung’s central ramped portions are included in the ramped surfaces of Chung’s second expansion portion described in §IX(A)(10)(d), *supra*, as can be seen in the annotated excerpts of Fig. 2 reproduced below.



Accordingly, Chung discloses this limitation, as discussed previously.

EX1002, ¶¶178-180, 182.

This interpretation is consistent with Patent Owner’s aforementioned infringement contentions regarding Claim 12. *See* §IX(A)(11). As previously discussed, Patent Owner asserts that two ramped portions “overlap” where two angled surfaces reside opposite each other and/or have angles that intersect, and that two ramped portions may be “include[d]” in “at least one ramped surface” where the ramped portions fall within the footprint of the ramped surface. *Id.* Chung discloses such a configuration with respect to the elements of Claim 13, as seen in the following annotated excerpt of Fig. 4, which shows at least one ramped surface in purple with the two central ramped portions falling within the surface’s footprint, as indicated by the orange column:

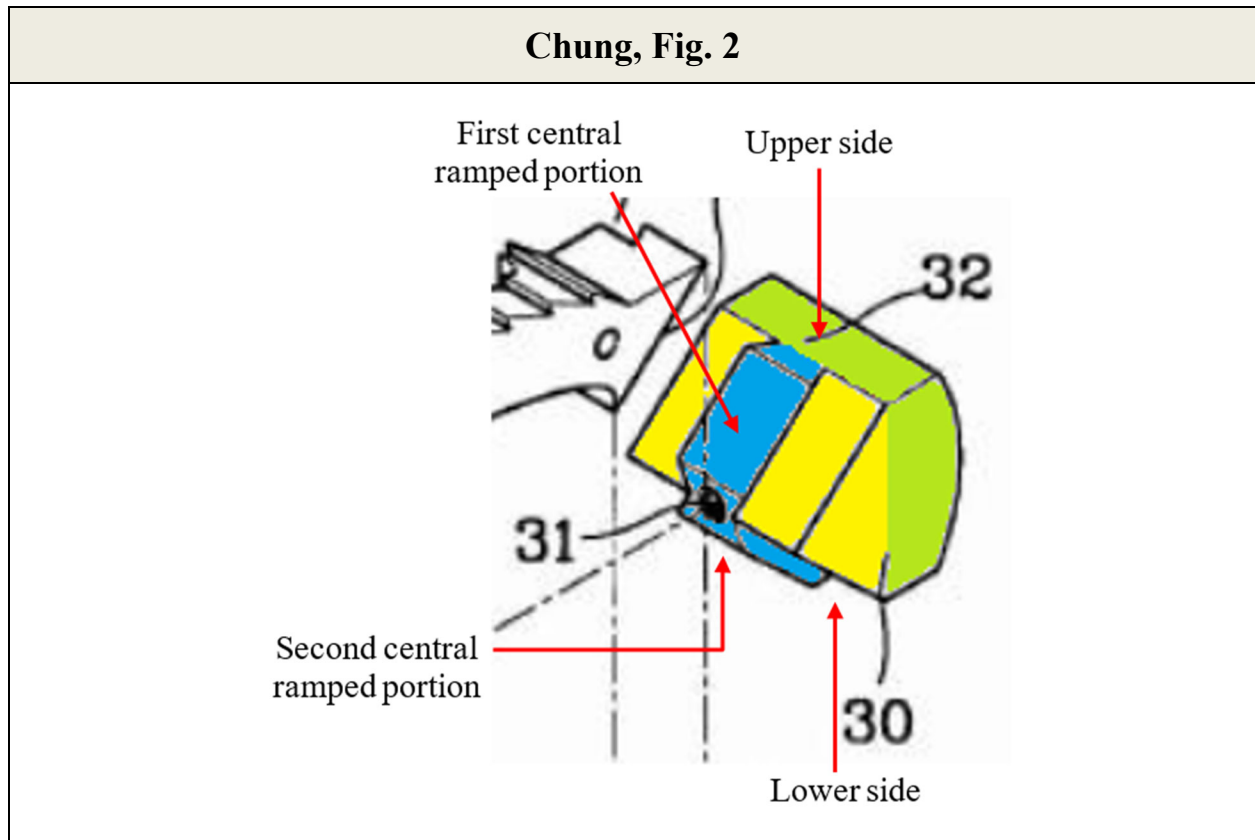


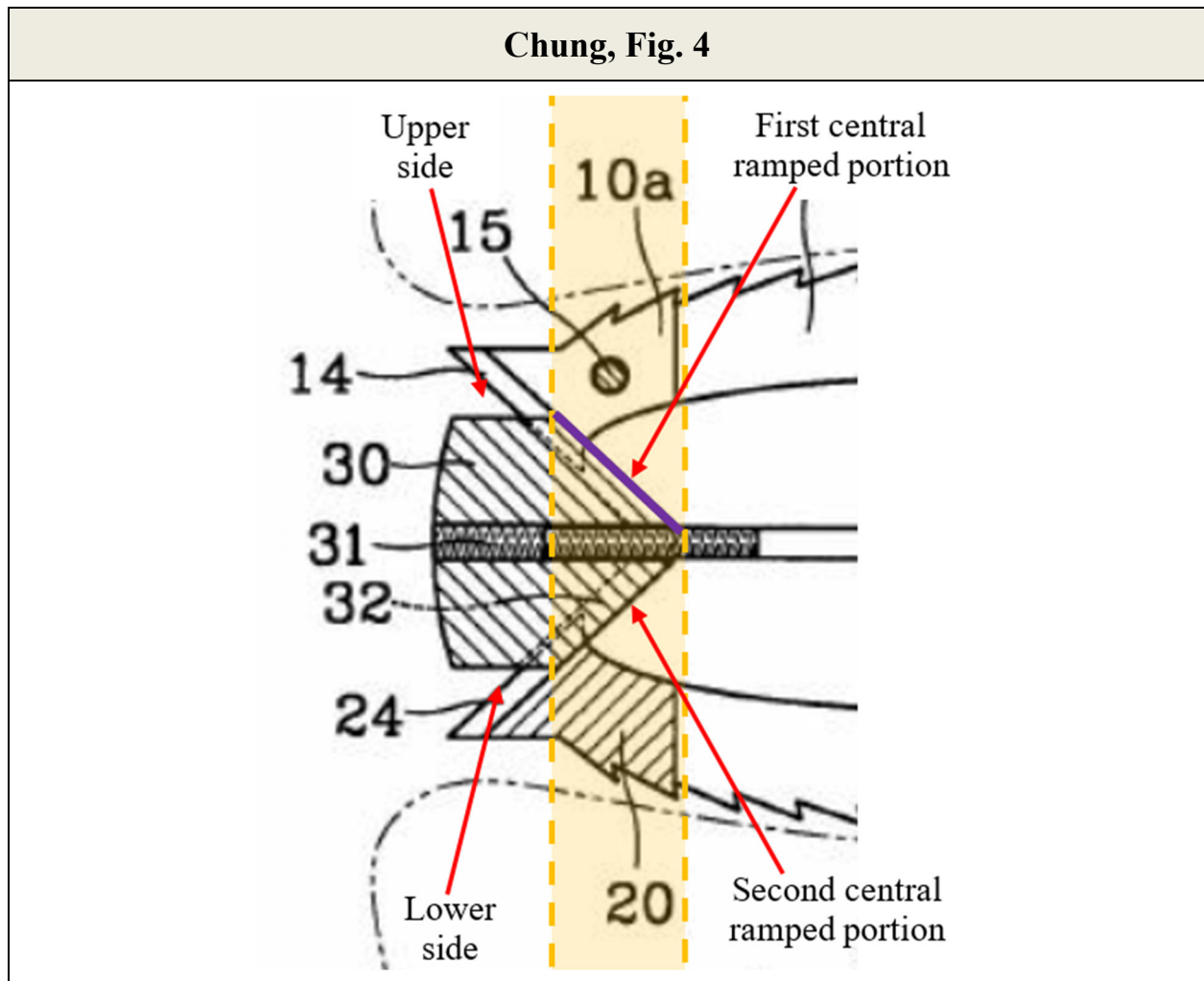
Accordingly, Chung discloses Claim 13's limitation for these additional reasons. See §IX(A)(3), IX(A)(10)(d), IX(A)(11); EX1002, ¶¶181-182.

13. Claim 14

Claim 14, which depends from Claim 13, recites that “**the central ramped portions includes two central ramped portions on opposite side [sic] of the central ramp.**” As shown in §IX(A)(12), *supra*, Chung discloses two central ramped portions on opposite sides of the central ramp, i.e., one central ramped portion on the upper side of the central ramp and one central ramped portion on the

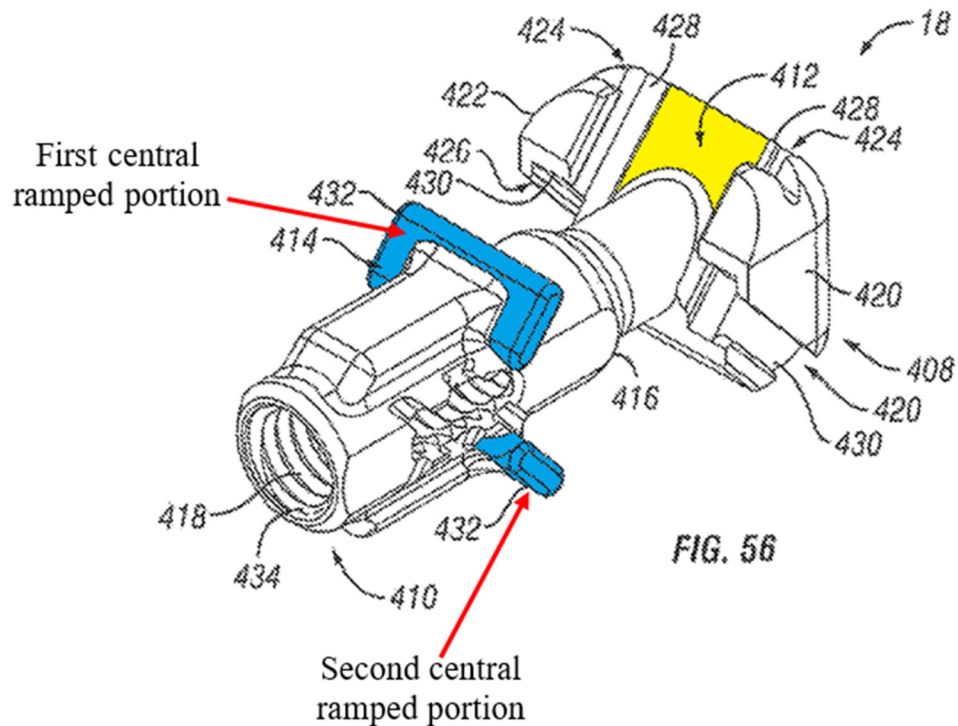
lower side of the central ramp. *See also* EX1005, Figs. 2-4; §IX(A)(4), *supra*. This is further shown below in the following annotated excerpts of Figs. 2 and 4:





Moreover, the foregoing is consistent with the '752 patent specification, which discloses the two “central ramped portions **432**” as being located on “opposite sides” of the central ramp when they are positioned on the upper side and the bottom side of the second expansion portion (*see* EX1001, 19:19-22, Fig. 56), as seen in the following annotated version of Fig. 56:

'752, Fig. 56



Accordingly, Chung discloses this limitation. EX1002, ¶¶183-187; *see also* IX(A)(4), *supra*.

14. Claim 15

(a) Claim Element 15[a]

Claim 15, which depends from Claim 11, recites “**the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(5)(a); EX1002, ¶¶188-189.

(b) Claim Element 15[b]

Claim 15 further recites “**the first and second side portions include the third expansion portion as one or more ramped surfaces.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(5)(b); EX1002, ¶¶190-191.

15. Claim 16

(a) Claim Element 16[a]

Claim 16, which depends from Claim 11, recites that “**the actuator includes a head portion and an extension that extends from the head portion.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(1)(f); EX1002, ¶¶192-193.

(b) Claim Element 16[b]

Claim 16 further recites that “**the head portion of the actuator has a larger diameter than the extension.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(6); EX1002, ¶¶194-195.

16. Claim 17

Claim 17, which depends from Claim 16, recites that “**the head portion of the actuator includes a rim configured to contact the driving ramp.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(7); EX1002, ¶¶196-198.

17. Claim 18

Claim 18, which depends from Claim 11, recites that “**the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(8); EX1002, ¶¶199-201.

18. Claim 20

Claim 20, which depends from Claim 11, recites that “**the first and second endplates comprise texturing for gripping adjacent vertebral bodies.**” Chung discloses this limitation, as discussed previously. *See* §IX(A)(10); EX1002, ¶¶202-204.

B. Ground 2: Claims 1-5, 8, 10-15, 18, and 20 are anticipated by Olmos

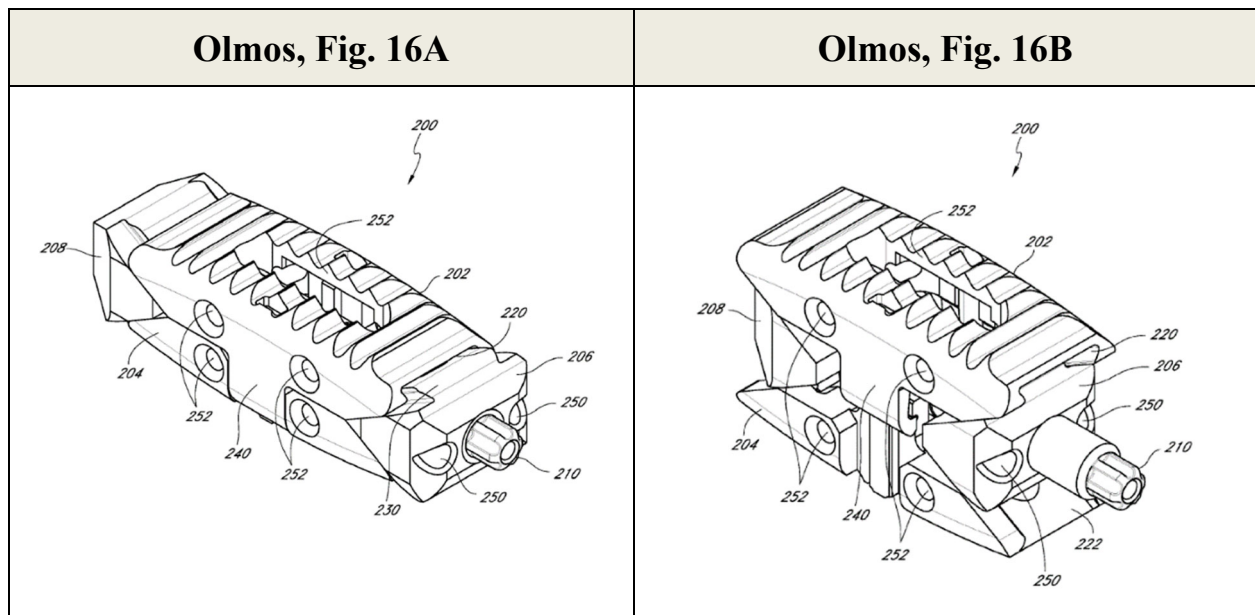
Claims 1-5, 8, 10-15, 18, and 20 of the '752 patent are anticipated by and/or obvious over Olmos as detailed below and in Prof. Drewry's declaration (*see* EX1002, ¶¶205-316).

1. Claim 1

(a) Claim Element 1[a]

Claim 1 is directed to an “[a]n **expandable fusion device**,” which Olmos discloses. Olmos discloses such a device by its teaching of “[a]n adjustable spinal fusion intervertebral implant” that has “an unexpanded state” and “can be

expanded...to increase the height of the implant **200** when implanted into the intervertebral space of the spine.” EX1006, Abstract, ¶[0152]; *see also id.*, ¶¶[0074], Figs. 16A-B. The expandable nature of the device can further be observed by comparing Figs. 16A-B, shown below.

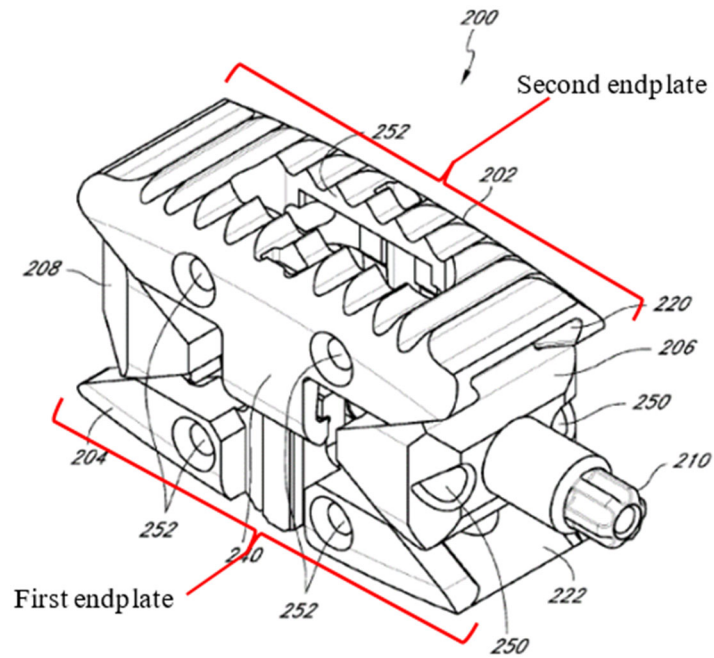


Accordingly, Olmos discloses an expandable fusion device. EX1002, ¶¶205-207.

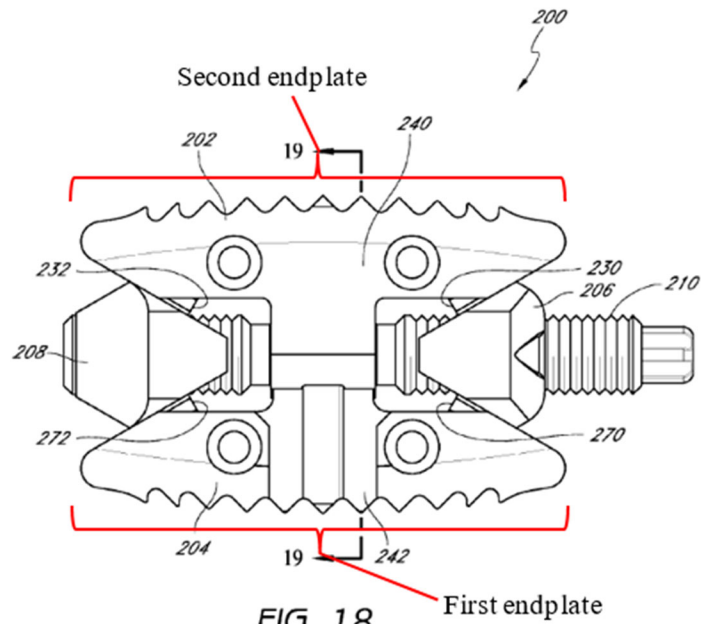
(b) Claim Element 1[b]

Claim 1 recites “**a first endplate and a second endplate.**” Olmos discloses a first endplate (“lower body portion **204**”) and a second endplate (“upper body portion **202**”). EX1006, ¶¶[0014], [0152], [0168], [0173]. Olmos Figs. 16A-B, 18, 20A-B, and 21A-B show these structures, with annotated Figs. 16B and 18 below.

Olmos, Fig. 16B



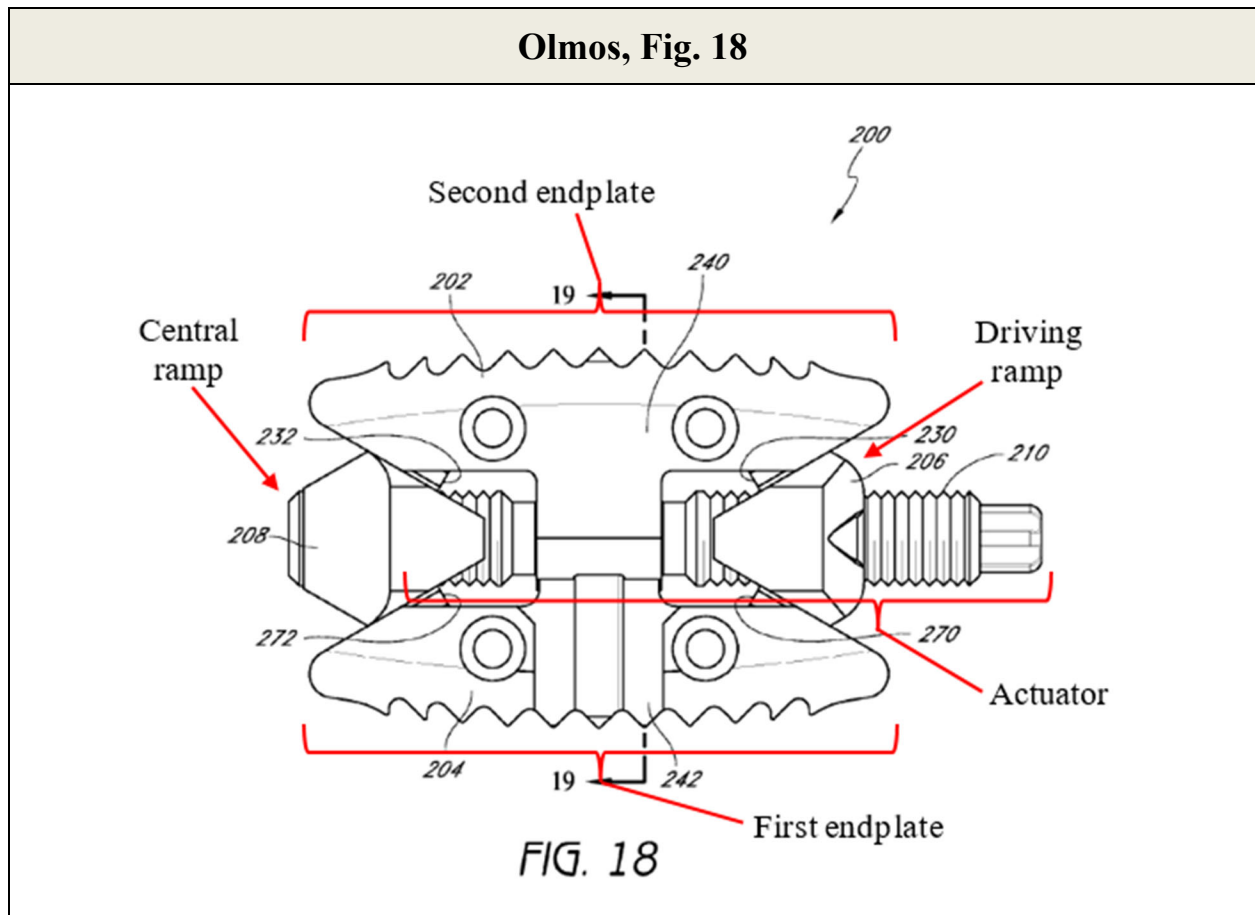
Olmos, Fig. 18



Accordingly, Olmos discloses this limitation. EX1002, ¶¶208-210.

(c) Claim Element 1[c]

Claim 1 recites “**a central ramp, a driving ramp, and an actuator positioned between the first and second endplates.**” Olmos discloses a central ramp (“distal wedge member[]...**208**”), a driving ramp (“proximal wedge member **206**”), and an actuator (“actuator shaft **210**”) positioned between the first and second endplates, EX1006, ¶¶[0021], [0152], [0155]-[0156], [0170]. Figures 16A-B and 18 show these features, with annotated Fig. 18, below.

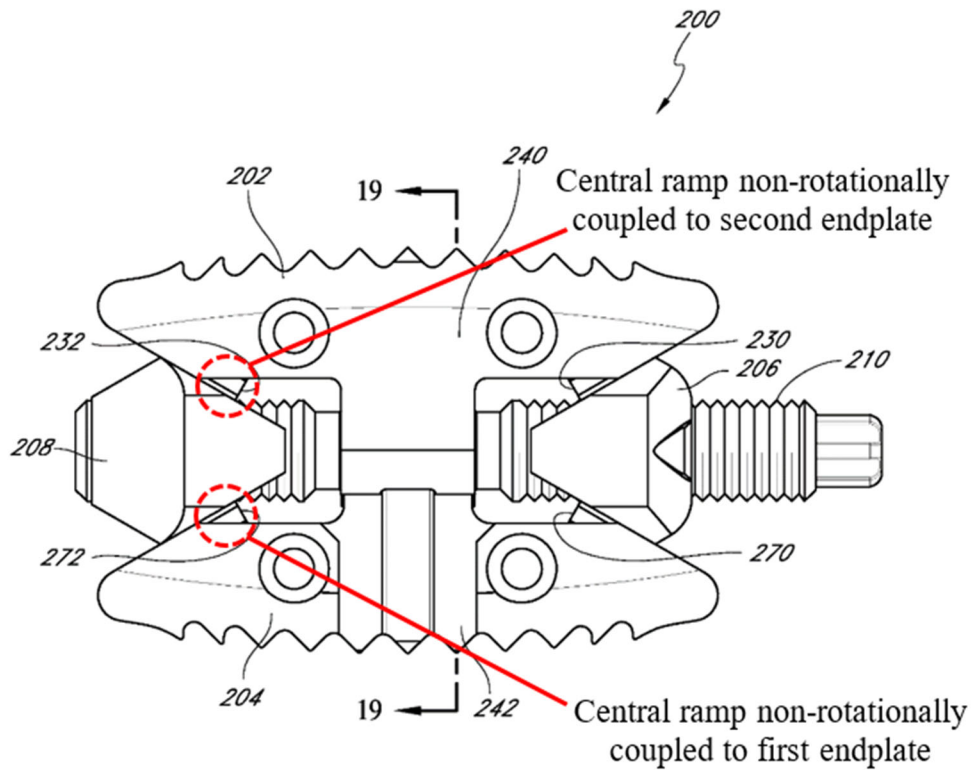


Accordingly, Olmos discloses this limitation. EX1002, ¶¶211-215.

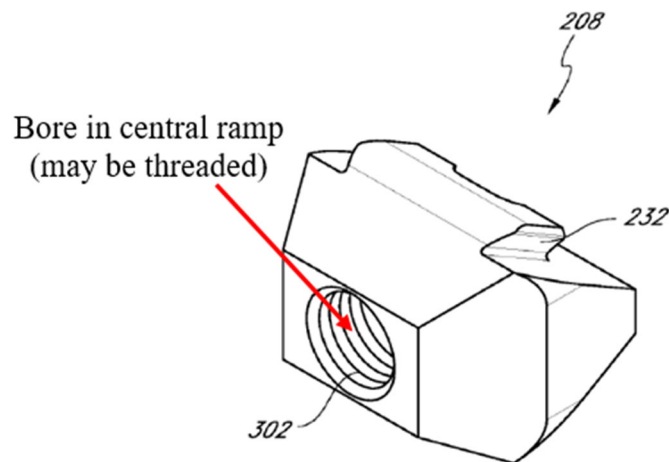
(d) Claim Element 1[d]

Claim 1 recites “**the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion, and a second expansion portion longitudinally spaced from the first expansion portion.**” Olmos discloses that “implant **200** can be configured such that the proximal and distal wedge members **206, 208** are interlinked with the upper and lower body portions **202, 204** to improve the stability and alignment of the implant **200**” and that this is accomplished by having “at least one guide member (an upper guide member **230** of the proximal wedge member **206** is shown in FIG. 16A and an upper guide member **232** of the distal wedge member **208** is shown in FIG. 18)...at least partially extend[ing] into a respective slot of the upper and lower body portions.” EX1006, ¶[0156]; *see also id.*, ¶[0168]. Olmos therefore discloses that the central ramp (distal wedge member **208**) is non-rotationally coupled to the first and second endplates (upper and lower body portions **202, 204**). Olmos further discloses the central ramp having a threaded bore (“central aperture **302**...can be threaded to correspond to the threads **294** of the actuator shaft **210**”). *Id.*, ¶[0178]. These elements can be seen in Figs. 16A-B, 18, and 24A-B, with annotated Figs. 18 and 24A below:

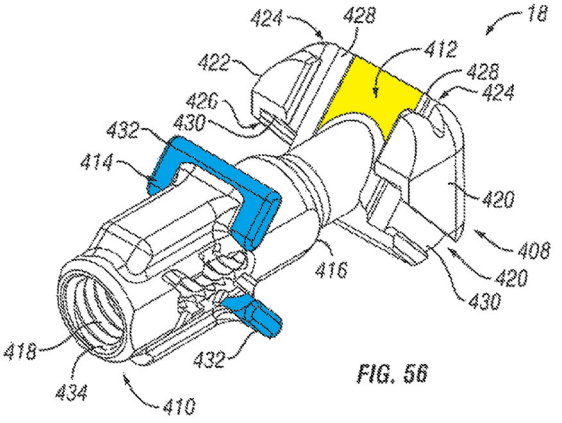
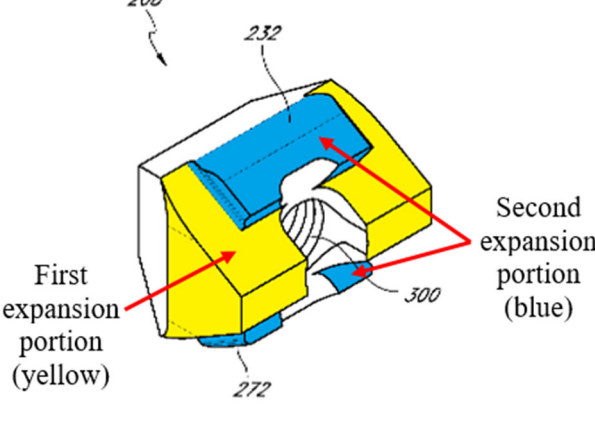
Olmos, Fig. 18

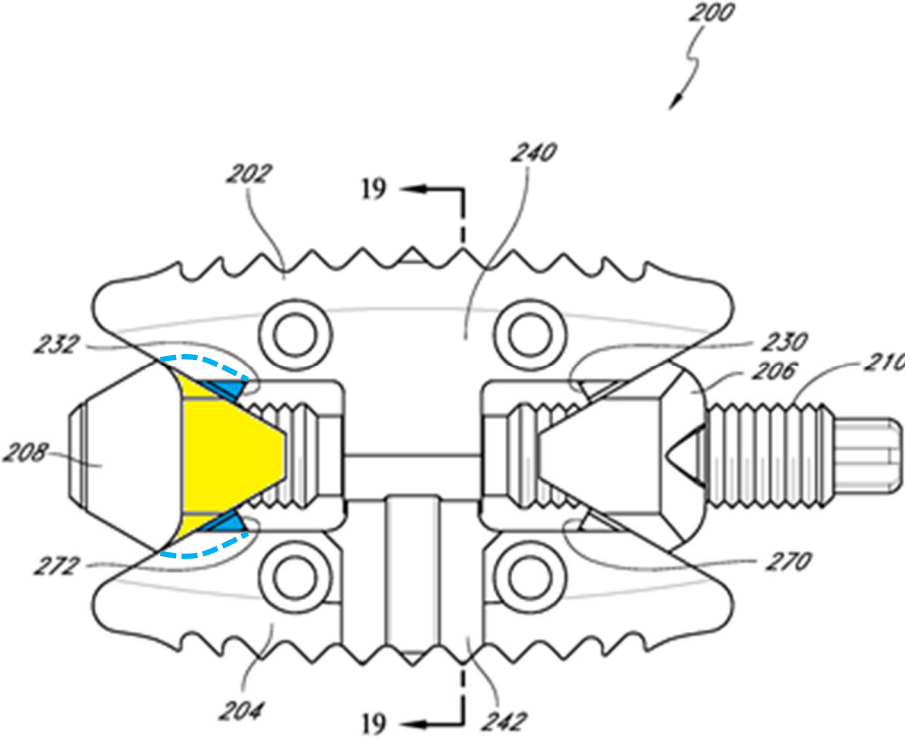


Olmos, Fig. 24A



Olmos further discloses that the central ramp/distal wedge member 208 has a first expansion portion (the broad ramped surfaces extending on each side of guide members 232, 272 and towards the base of distal wedge member 208) and a divided second expansion portion longitudinally spaced from the first expansion portion (guide members 232, 272 that “at least partially extend[] into a respective slot of the upper and lower body portions”), which are comparable to the “first expansion portion 412” and/or the “second expansion portion 414” shown in ’752 Fig. 56. EX1006, ¶¶[0111], [0156], [0159], [0168], [0170], [0178]; EX1001, 18:51-56, Fig. 56. Annotated excerpts of Olmos Figs. 18 and 24B and ’752 Fig. 56 follow with their respective first expansion portions in yellow and second expansion portions in blue (and, in Fig. 18, the outer bounds of the second expansion portion when extending into the endplates approximated in dashed blue lines):

'752 Patent, Fig. 56	Olmos, Fig. 24B
 <p>FIG. 56</p>	 <p>First expansion portion (yellow)</p> <p>Second expansion portion (blue)</p>

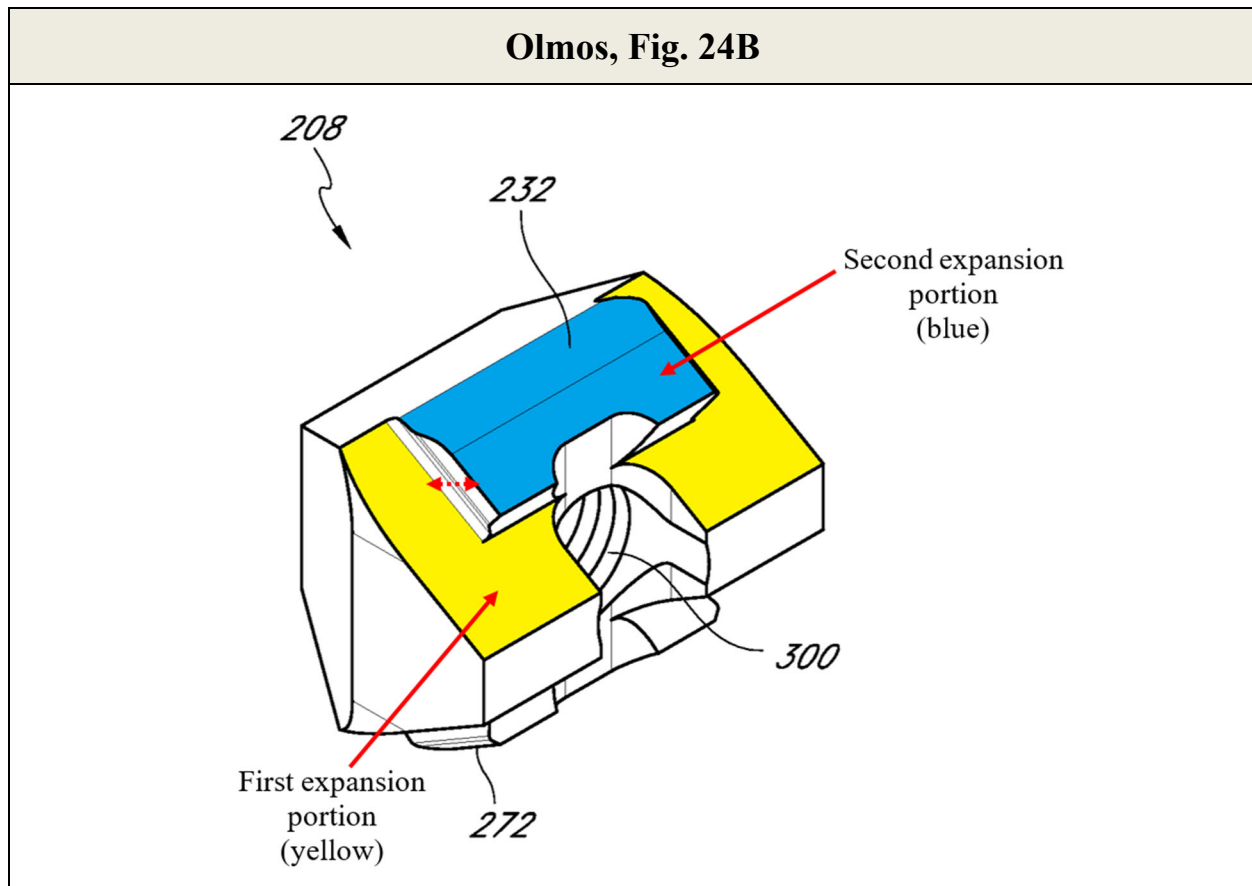
Olmos, Fig. 18


This interpretation, including specifically the second expansion portion being “longitudinally spaced” from the first expansion portion because it extends

longitudinally (i.e., parallel to the actuator) from the surface of the first expansion portion, without an intervening gap, is consistent with Patent Owner's infringement contentions in parallel litigation regarding the same elements. *See* EX1010, 6-7.

Accordingly, Olmos discloses this limitation. EX1002, ¶¶216-222.

Alternatively, Olmos also meets this limitation when the “first expansion portion” is interpreted to encompass only the ramped surfaces adjacent to guide members 232, 272 and the “second expansion portion” is interpreted to encompass only the ramped surfaces of guide members 232, 272. This can be seen in the following annotated excerpt of Fig. 24B, denoting the first expansion portion in yellow, the second expansion portion in blue, and longitudinal spacing with a dashed arrow:



This alternative interpretation of the first and second expansion portions does not affect the foregoing analysis regarding the central ramp being non-rotationally coupled to the first and second endplates and including a threaded bore. Accordingly, Olmos also discloses this limitation under the alternative interpretation of the expansion portion elements. EX1002, ¶¶223-225.

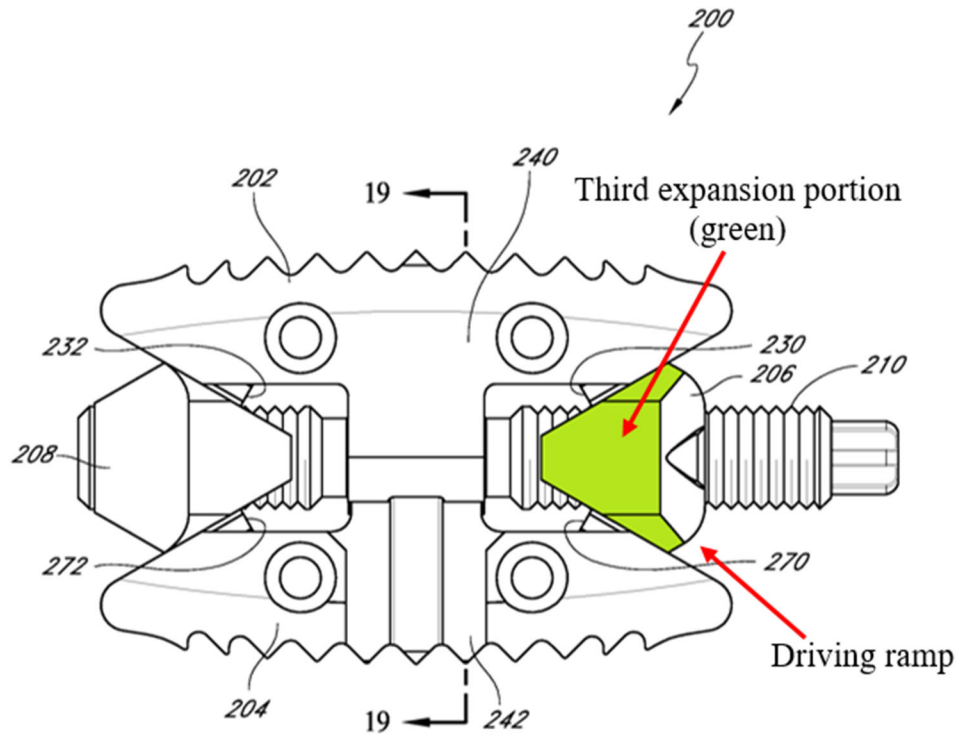
(e) Claim Element 1[e]

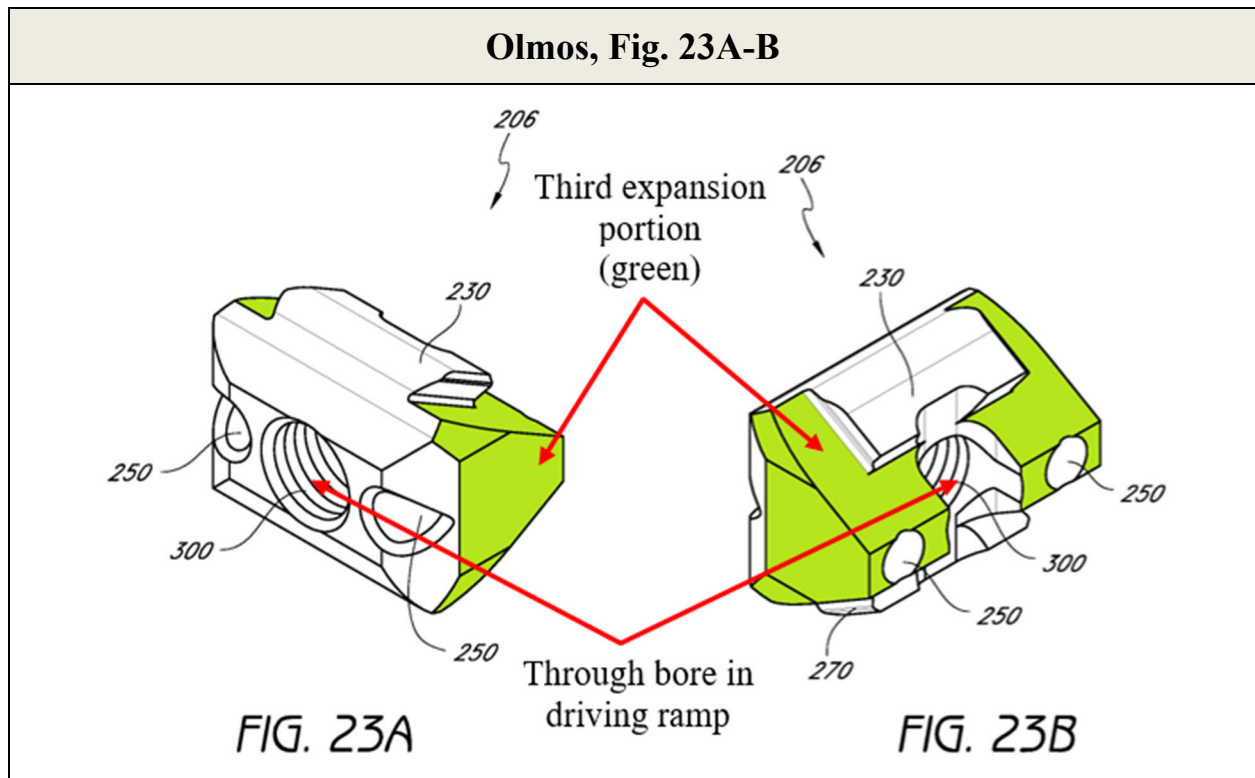
Claim 1 recites “**the driving ramp including a through bore and a third expansion portion.**” Although the ’752 specification does not identify a driving ramp expansion portion, it does disclose central ramp “first expansion portion 412”

and “second expansion portion 414.” *See* §IX(A)(1)(e). The driving ramp expansion portion is assumed to be similar to the central ramp expansion portions. Because the expansion portion of the driving ramp should be comparable to at least one of the “first expansion portion 412” or “second expansion portion 414,” Olmos discloses this limitation.

Specifically, Olmos discloses a driving ramp (“proximal wedge member **206**”) having a third expansion portion (the broad ramped surface extending on each side of “guide members **230, 270**” and towards the base of proximal wedge member 206) comparable to the “first expansion portion 412” and/or the “second expansion portion 414” in ’752 Fig. 56, and a through bore (“central aperture **300**”). EX1006, ¶[0177], Figs. 16A-B, 18, 23B; EX1001, 18:51-56, Fig. 56. Figures 16A-B, 18, and 23A-B show this, with annotated Figs. 18 and 23A-B below (third expansion portion in green):

Olmos, Fig. 18

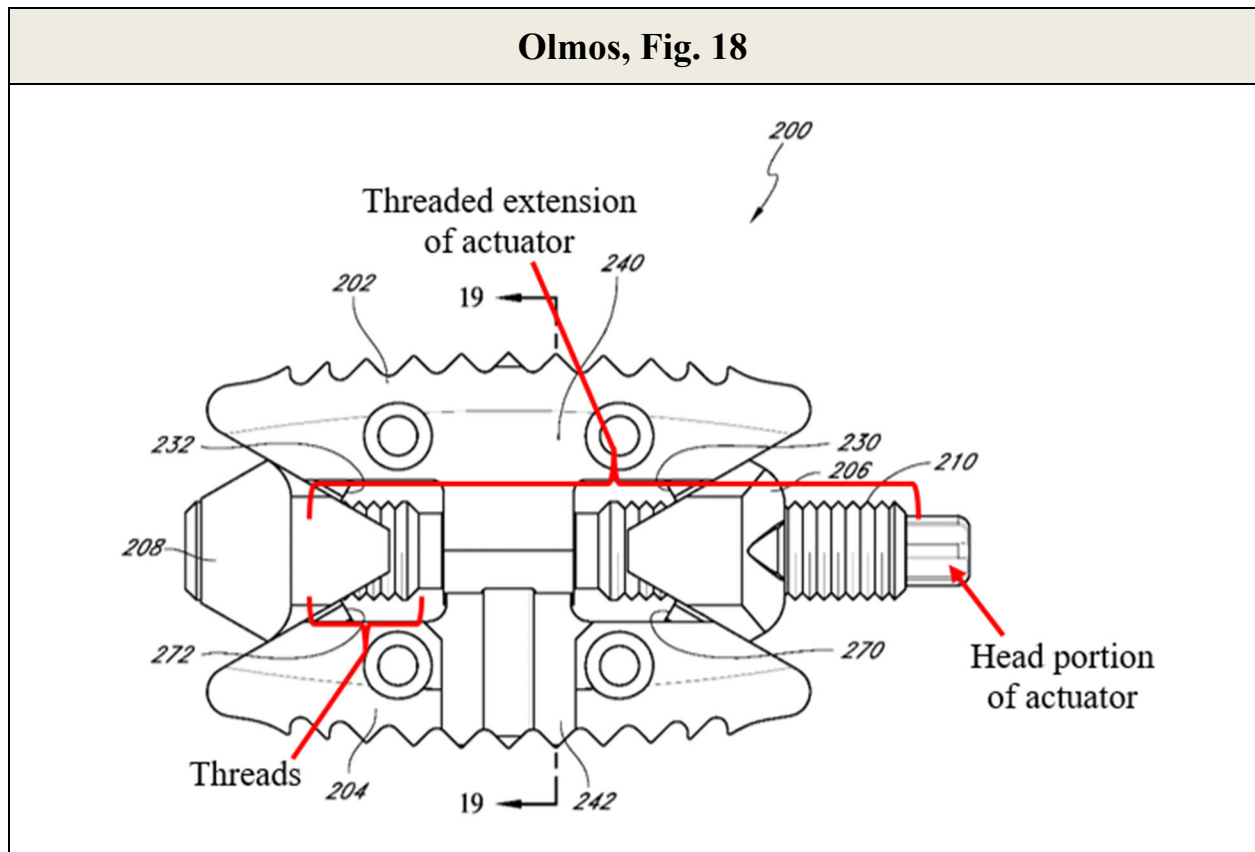




Accordingly, Olmos discloses this limitation. EX1002, ¶¶226-229.

(f) Claim Element 1[f]

Claim 1 recites “**the actuator including a head portion and a threaded extension that extends from the head portion.**” Olmos discloses an actuator (“actuator shaft **210**”) that includes a head portion (“tool engagement section **296**”) and a threaded extension that extends therefrom (“threads **294**”). EX1006, ¶¶[0146], [0159], [0175], [0177]-[0178]; Figs. 18, 22. Annotated Fig. 18 shows:



Accordingly, Olmos discloses this limitation. EX1002, ¶¶230-232.

(g) Claim Element 1[g]

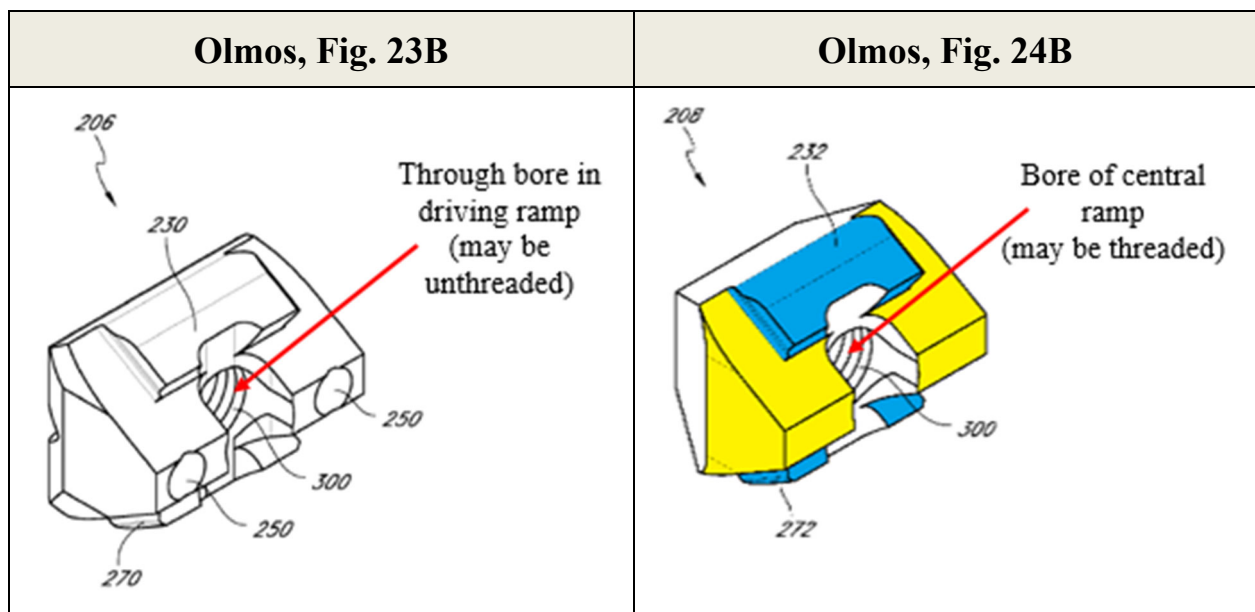
Claim 1 recites that “**the extension of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp.**” Olmos expressly discloses both that “actuator shaft **210** can include threads that threadably engage at least one of the proximal and distal wedge members **206, 208**” and that “at least a portion of the actuator shaft can be axially fixed relative to one of the proximal and distal wedge members **206, 208** with the actuator shaft being operative to

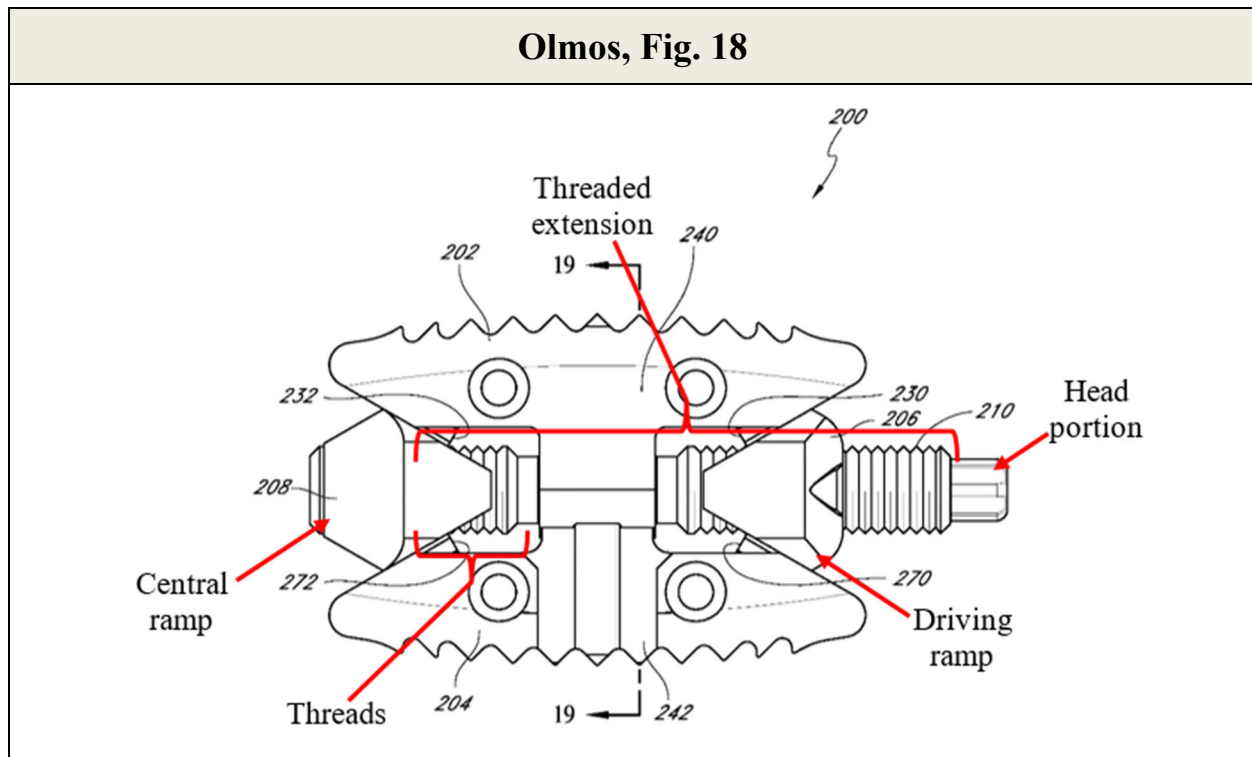
move the other one of the proximal and distal wedge members **206**, **208** via rotational movement or longitudinal contraction of the pin.” EX1006, ¶[0159] (underline added)). A POSITA would have understood this to teach that, where the actuator threadingly extends into one wedge member (e.g., the distal wedge member), it may non-threadingly extend though the other (e.g., the proximal wedge member).

Indeed, Olmos discloses an embodiment in which the driving ramp/proximal wedge member 206 has an unthreaded bore through which the actuator’s extension extends (“central aperture **300** wherethrough an actuator shaft can be received,” in which “the actuator shaft can engage other [non-threaded] portions of the wedge member **206** for causing expansion or contraction...”) and the central ramp/distal wedge member 208 has a threaded bore into which the actuator’s extension extends (“central aperture **302**...configured to receive an actuator shaft therethrough” which “can be threaded to correspond to the threads **294** of the actuator shaft **210**”). *Id.*, ¶¶[0177]-[0178]; *see also id.*, ¶¶[0146], [0159]. Thus,

A POSITA would have recognized from these disclosures that Olmos teaches an embodiment where the actuator extends non-threadingly through the bore in the driving ramp because, if the actuator were theadingly engaged with the driving ramp bore, it could not be “axially fixed” relative to the driving ramp while moving the central ramp when the actuator is rotated. EX1002, ¶¶234-237.

Figures 18, 23A-B, and 24A-B also show that the actuator's extension extends through a bore in the driving ramp and into a bore in the extension of the central ramp. Annotated Figs. 18, 23B, and 24B follow, appreciating that as noted above, Olmos alternatively teaches that the actuator's extension can non-threadingly engage the driving ramp.





Accordingly, Olmos discloses this limitation. EX1002, ¶¶233-239.

(h) Claim Element 1[h]

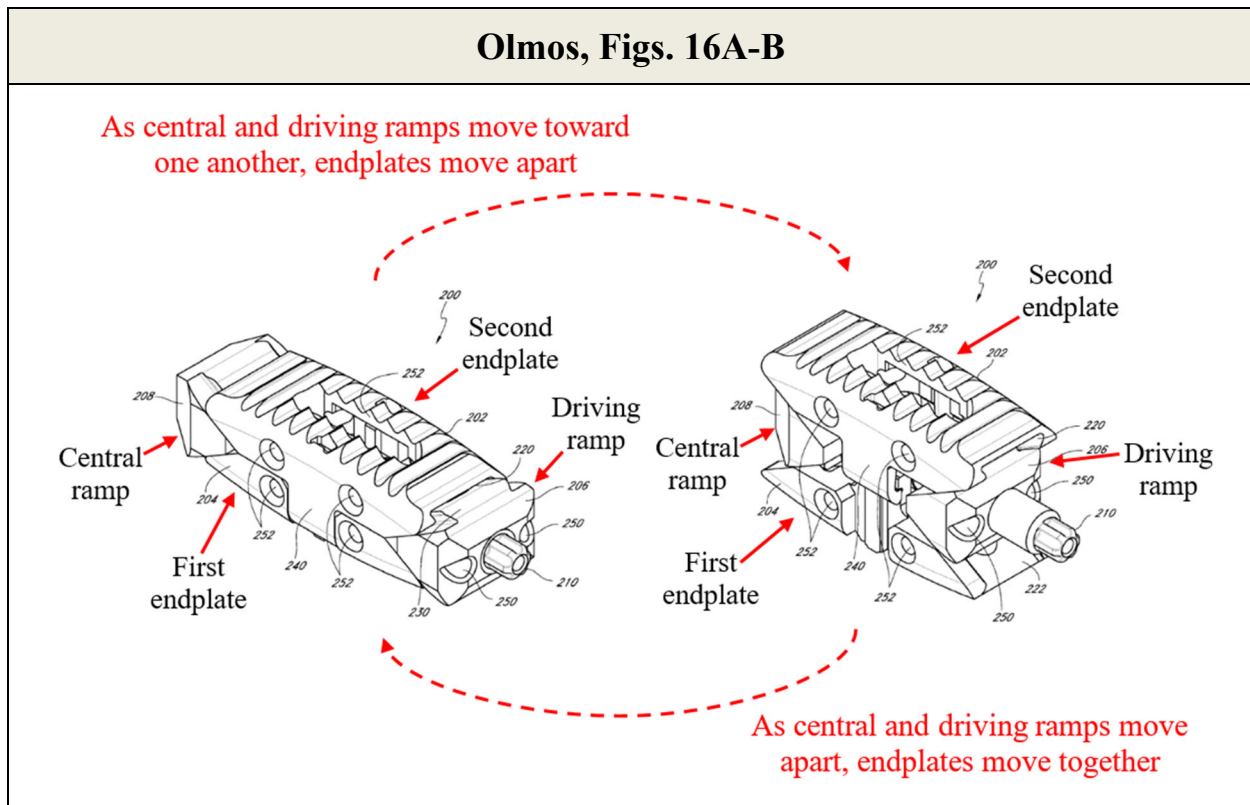
Claim 1 recites that “**wherein the actuator is rotationally coupled to the driving ramp.**” As Petitioner’s expert explains, a POSITA would have understood the Olmos actuator to be rotationally coupled to the driving ramp if it is capable of rotating relative to the driving ramp while also being coupled to the driving ramp. EX1002, ¶¶240-241. Olmos discloses that the actuator/actuator shaft 210 is rotationally coupled to the driving ramp. EX1006, ¶¶[0174] (disclosing that, “upon rotation of the actuator shaft **210**, the wedge members **206**, **208** can be caused to move toward or away from each other to facilitate expansion or contraction of the

implant **200**”), [0177] (disclosing that the driving ramp comprises “a central aperture **300** wherethrough an actuator shaft can be received” and that “the actuator shaft can engage [non-threaded] portions of the wedge member 206 for causing expansion or contraction thereof”).

Accordingly, Olmos discloses this limitation. EX1002, ¶¶240-242.

(i) Claim Element 1[i]

Claim 1 recites that, “**when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.**” Olmos discloses that rotating the actuator relative to the central ramp causes the central ramp and the driving ramp to move towards one another, thereby causing the first and second endplates to move apart. EX1006, ¶[0155] (“[T]he actuator shaft **210** can be rotated to cause the proximal and distal wedge members to move toward each other, thus causing the upper and lower body portions **202, 204** to be separated.”); *see also id.*, ¶¶[0145]-[0146], [0159], [0174]; *compare* Fig. 16A with Fig. 16B. Annotated Olmos Figs. 16A-B, below, further show this:



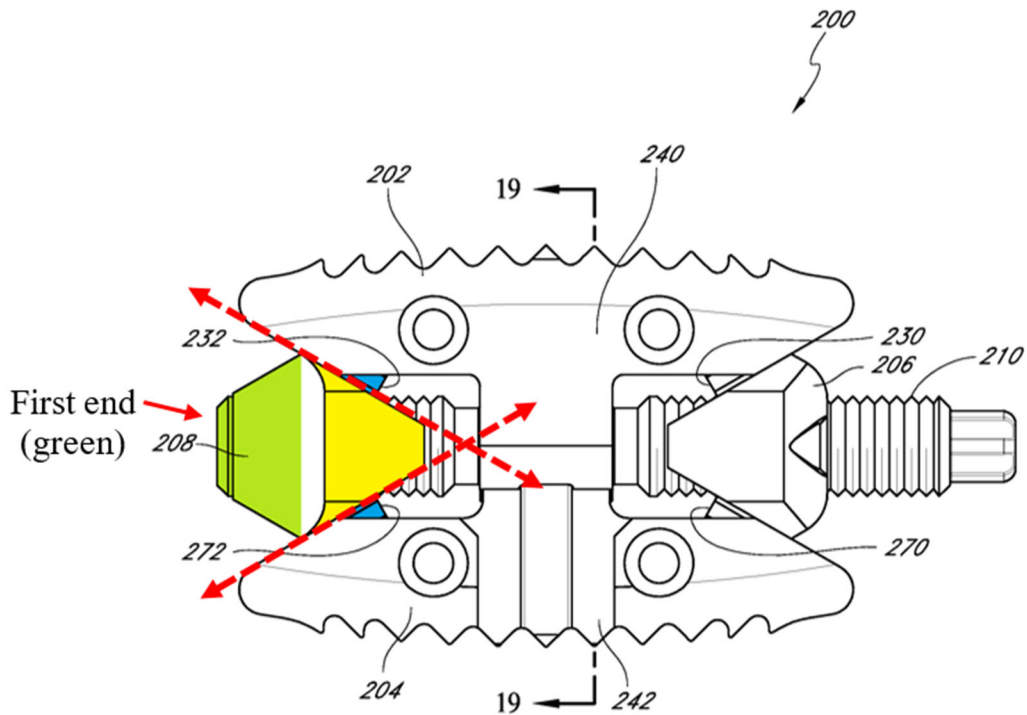
Accordingly, Olmos discloses these limitations. EX1002, ¶¶243-245.

2. Claim 2

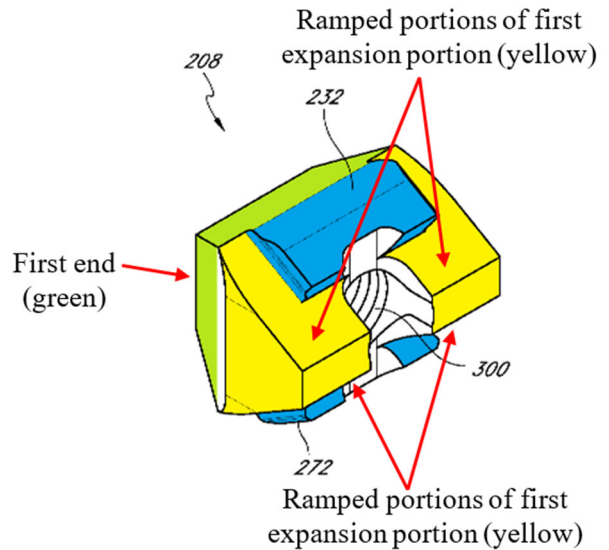
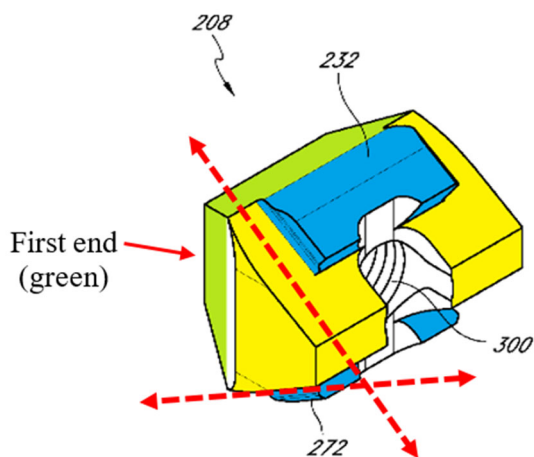
Claim 2, which depends from Claim 1, recites that “**the first expansion portion is proximate a first end and includes overlapping ramped portions.**”

Olmos discloses a first expansion portion proximate to a first end and including overlapping ramped portions. EX1006, Figs. 16A-B, 18, 24A-B. Annotated Figs. 18 and 24B follow with the first end marked in green, the first expansion portion marked in yellow, and the overlapping ramped portions denoted by dashed arrows.

Olmos, Fig. 18



Olmos, Fig. 24B

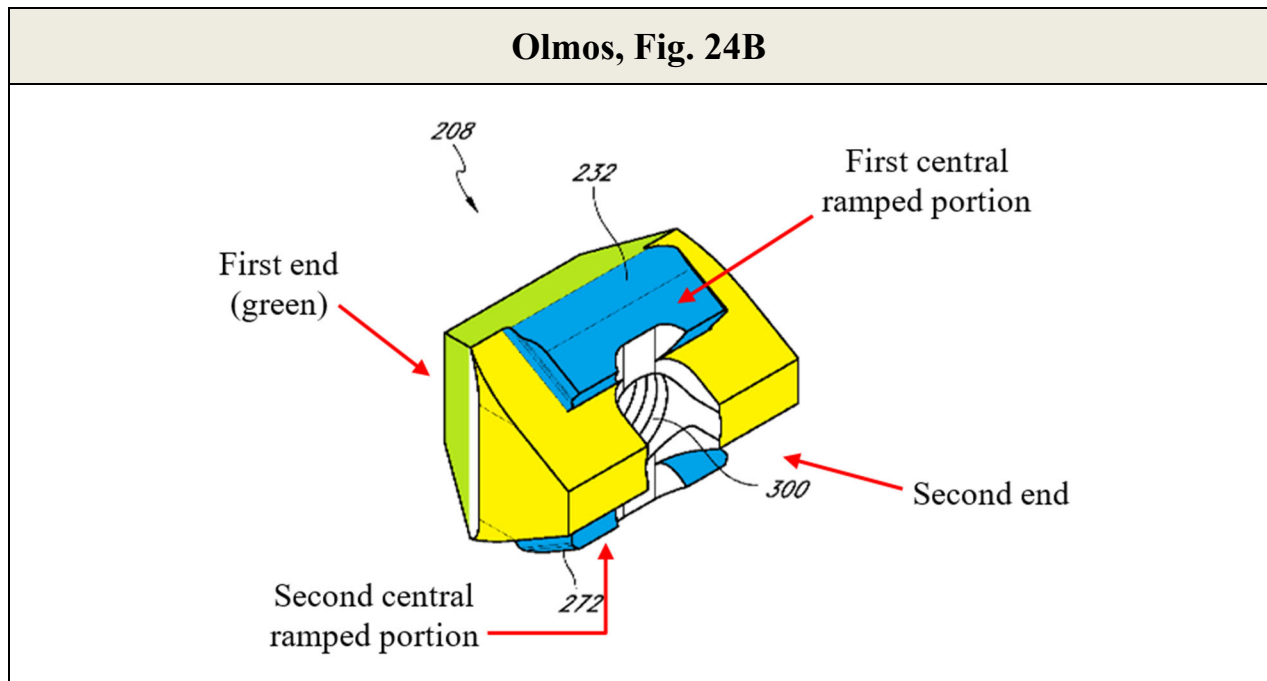


This interpretation is consistent with Patent Owner's infringement contentions in parallel litigation regarding the same elements. *See* EX1010, 13. As seen therein, Patent Owner appears to have taken the position that two ramped portions "overlap[]" if the angles of those ramped portions intersect, consistent with Petitioner's foregoing interpretation of Olmos.

Accordingly, Olmos discloses these limitations. EX1002, ¶¶246-248.

3. Claim 3

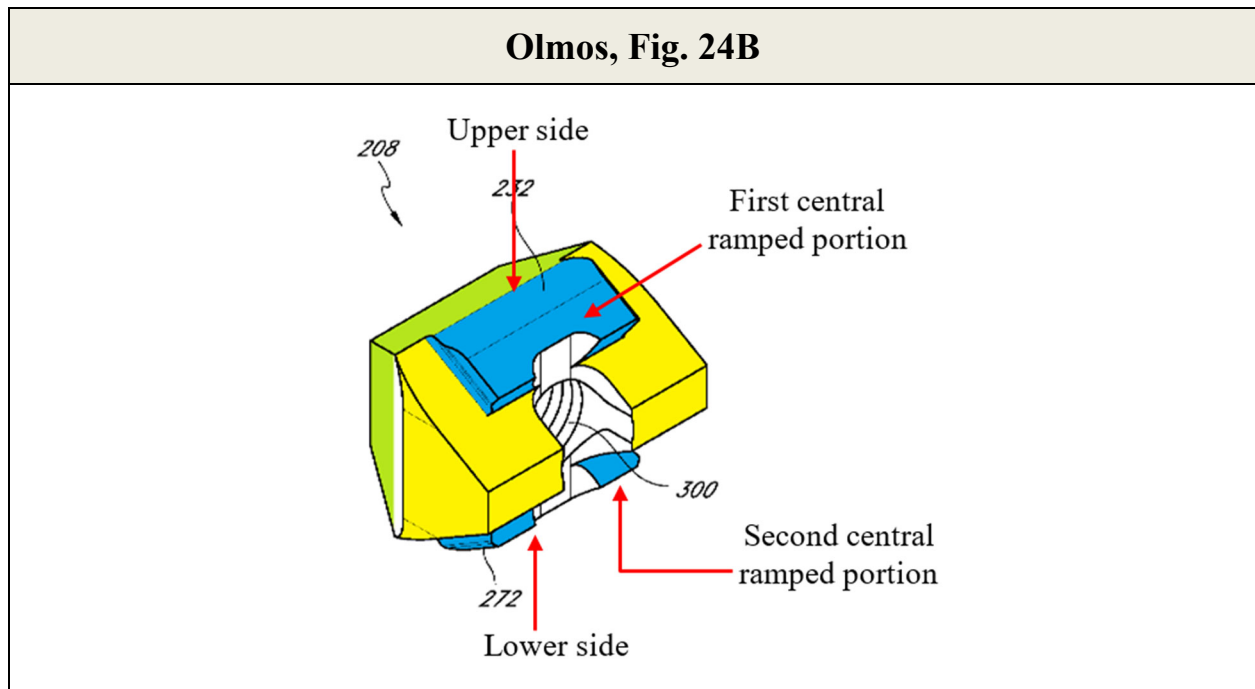
Claim 3, which depends from Claim 2, recites that "**the second expansion portion is positioned between the first end and a second end and includes central ramped portions.**" As seen in at least Figs. 16B, 18, and 24A-B, Olmos discloses that the second expansion portion is positioned between the first end and a second end and includes central ramped portions in the form of the flat, ramped surfaces of guide members 232, 272. EX1006, Figs. 16A-B, 18, 24A-B. Annotated Fig. 24B follows with the second expansion in blue and the first end in green:



Accordingly, Olmos discloses these limitations. EX1002, ¶¶249-251.

4. Claim 4

Claim 4, which depends from Claim 3, recites “**the central ramped portions includes two central ramped portions on opposite side of the central ramp.**” As shown in §IX(B)(3), *supra*, Olmos discloses two central ramped portions on opposite sides of the central ramp, i.e., one central ramped portion on the upper side of the central ramp and one central ramped portion on the lower sider of the central ramp. EX1006, Figs. 24A-B. This is further shown below in the following annotated excerpt of Fig. 24B:



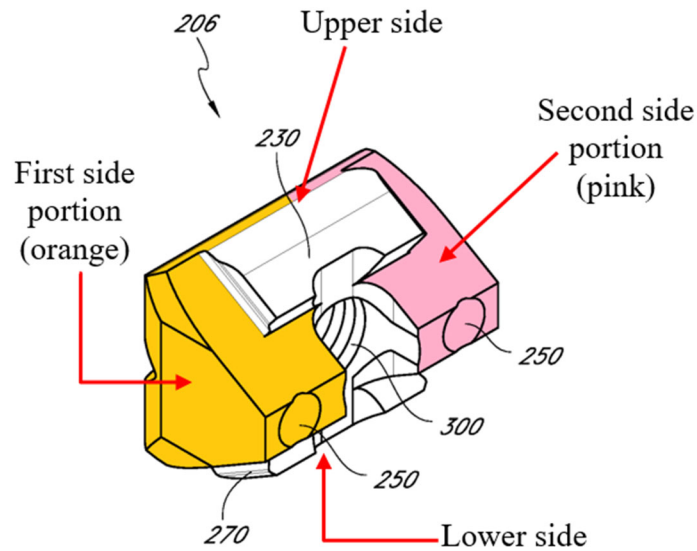
Accordingly, Olmos discloses these limitations. EX1002, ¶¶252-254.

5. Claim 5

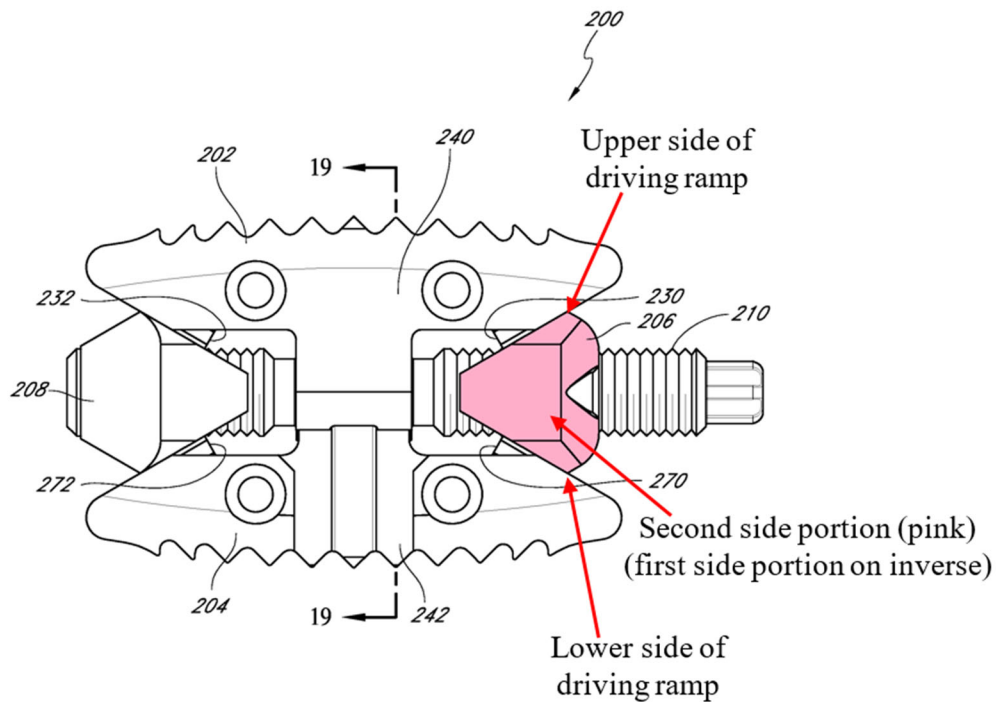
(a) Claim Element 5[a]

Claim 5, which depends from Claim 1, recites that “**the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side.**” Olmos Figs. 16A-B, 18, and 23A-B show the driving ramp/proximal wedge member 206 having upper and lower sides and first and second side portions connecting the upper and lower sides. This is shown in annotated Figs. 23B and 18, below, with the first side portion highlighted in orange and the second side portion highlighted in pink.

Olmos, Fig. 24B



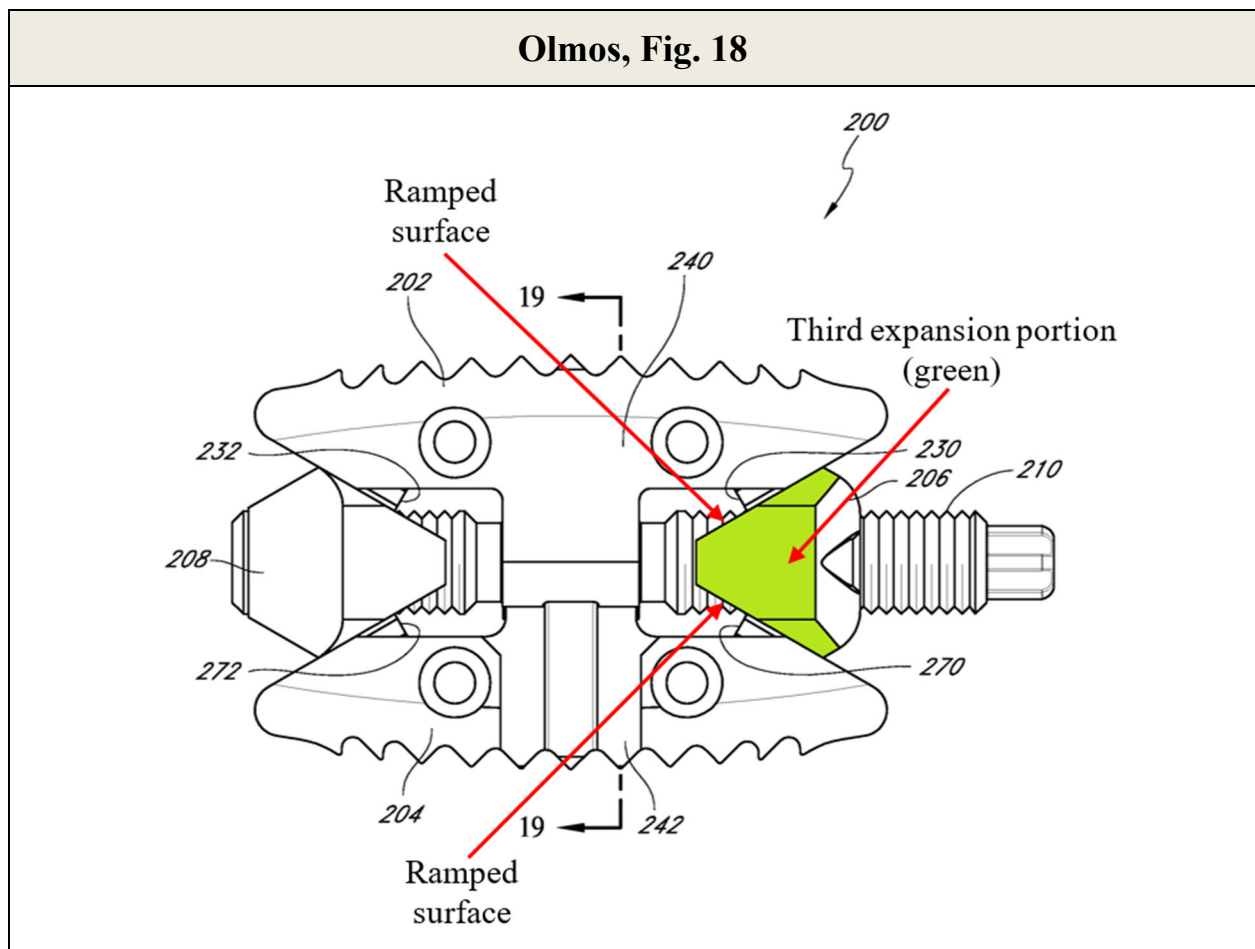
Olmos, Fig. 18

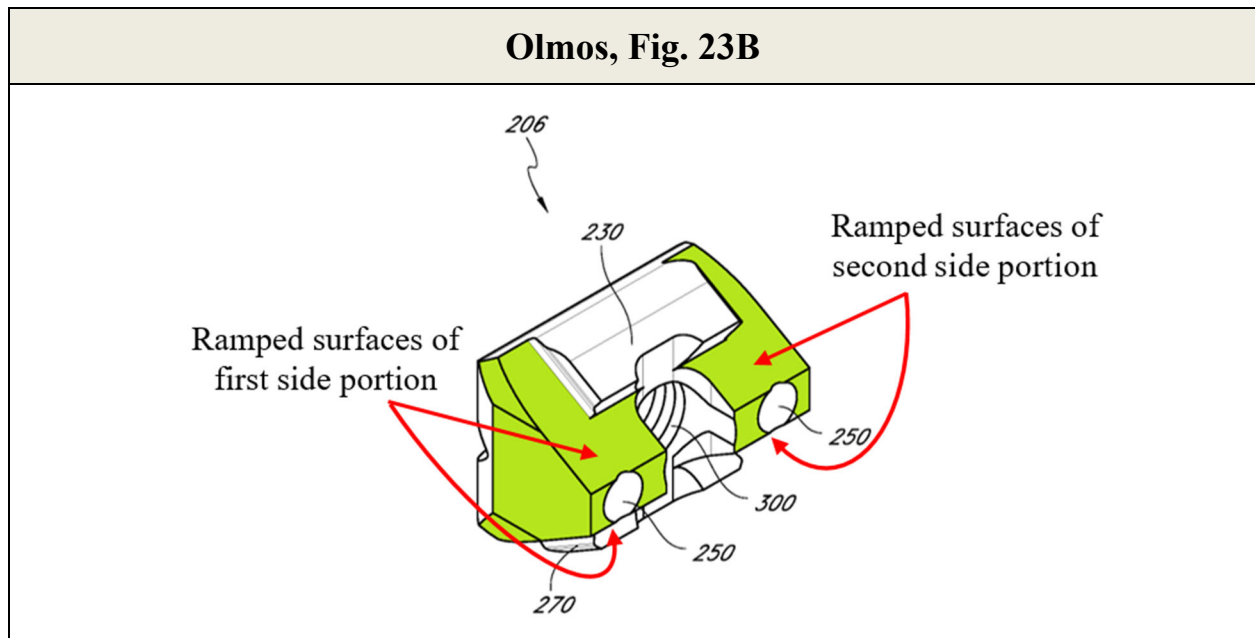


Accordingly, Olmos discloses these limitations. EX1002, ¶¶255-257.

(b) Claim Element 5[b]

Claim 5 further recites that “**the first and second side portions include the third expansion portion as one or more ramped surfaces.**” Olmos discloses that the first and second side portions include the aforementioned third expansion portion, which includes one or more ramped surfaces. EX1006, Figs. 16A-B, 18, 23A-B. As seen in annotated Figs. 18 and 23B, Olmos discloses that each side portion includes two ramped surfaces of the third expansion portion, which is shown in green.



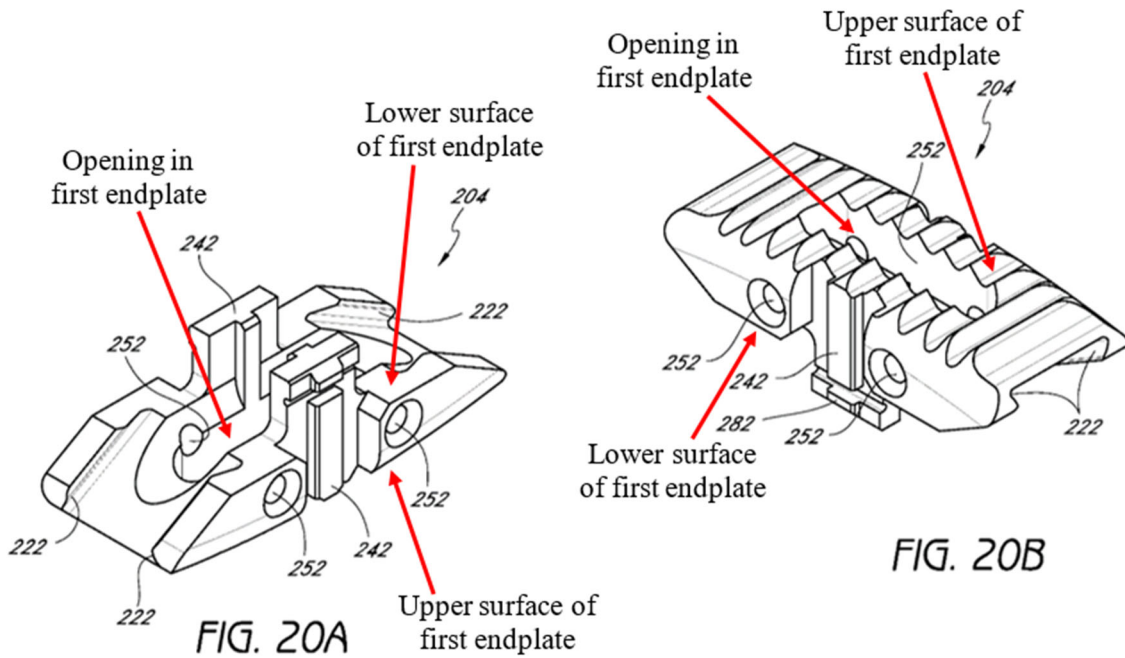


Accordingly, Olmos discloses these limitations. EX1002, ¶¶258-259.

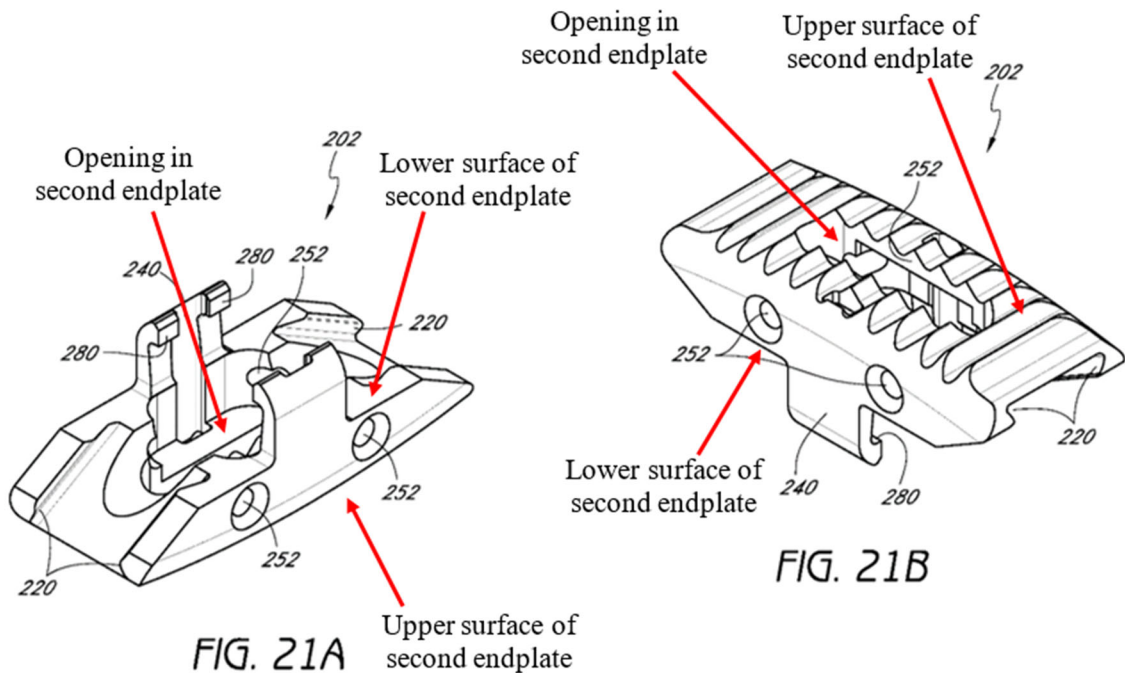
6. Claim 8

Claim 8, which depends from Claim 1, recites that “**the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.**” Olmos discloses that the first and second endplates (“upper and lower body portions **202, 204**”) each comprise an opening that extends from an upper surface through a lower surface (“the upper and lower body portions **202, 204** can define one or more apertures **252** to facilitate osseointegration.”) EX1006, ¶[0173]; *see also id.*, ¶[0162], Figs. 20A-B, 21A-B. As seen in annotated Figs. 20A-B and 21A-B, these openings or apertures each extend from an upper surface to a lower surface of an endplate.

Olmos, Fig. 20A-B



Olmos, Fig. 21A-B



Notably, this orientation of the upper and lower surfaces of the endplates is consistent with the '752 patent's disclosure. *See* §IX(A)(8), *supra*.

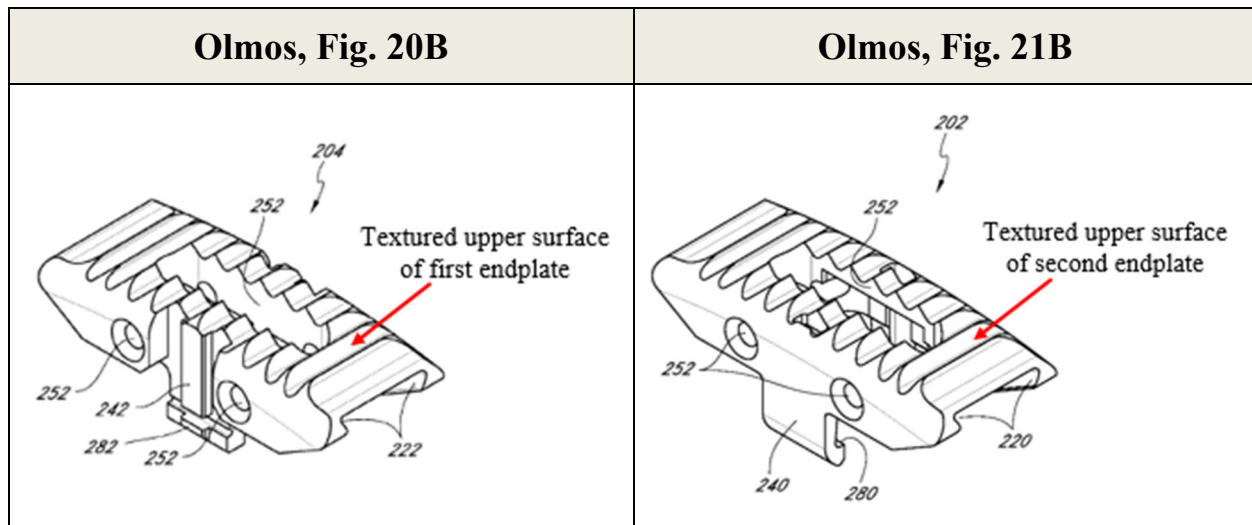
Accordingly, Olmos discloses these limitations. EX1002, ¶¶260-264.

7. Claim 10

Claim 10, which depends from Claim 1, recites that “**the first and second endplates comprise texturing for gripping adjacent vertebral bodies.**”

Specifically, Olmos discloses that the upper surfaces of both the first and second endplates (“bottom surface **262** of the lower body portion **204**” and “top surface **264** of the upper body portion **202**,” as is consistent with the orientation described in the '752 patent) may have texturing for gripping adjacent vertebral bodies in the form of “one or more protrusions,” which “allow the implant **200** to engage the adjacent vertebrae....” EX1006, ¶¶[0163]-[0164]; *see also id.*, ¶[0172], §IX(A)(8), *supra*.

Figures 17, 18, 20B, and 21B show this texturing, as seen in annotated Figs. 20B and 21B below.



Accordingly, Olmos discloses these limitations. EX1002, ¶¶265-268.

8. Claim 11

(a) Claim Element 11[a]

Claim 11 is directed to “[a]n **expandable fusion device**.” Olmos discloses such a device, as discussed previously. *See* §IX(B)(1)(a); EX1002, ¶269.

(b) Claim Element 11[b]

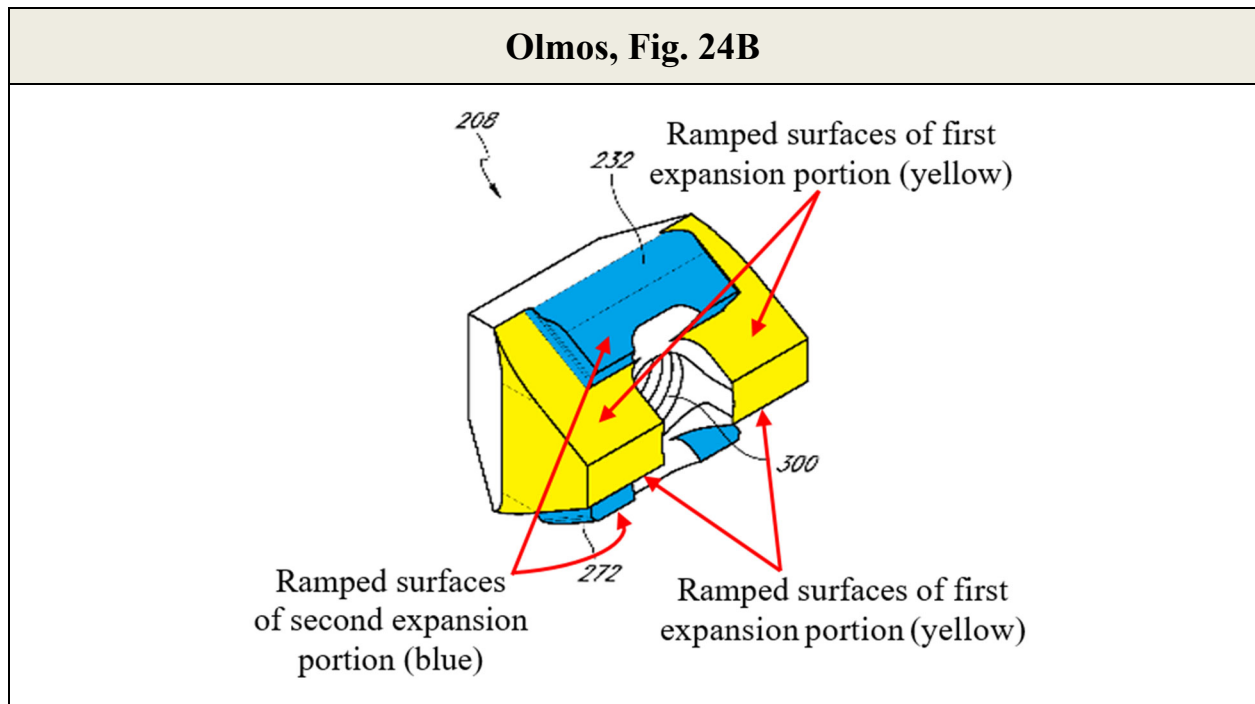
Claim 11 recites “**a first endplate and a second endplate**.” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(1)(b); EX1002, ¶¶270-271.

(c) Claim Element 11[c]

Claim 11 recites “**a central ramp, a driving ramp, and an actuator positioned between the first and second endplates**.” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(1)(c); EX1002, ¶¶272-273.

(d) Claim Element 11[d]

Claim 11 recites **“the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion including at least one ramped surface, and a second expansion portion including at least one ramped surface, the second expansion portion being longitudinally spaced from the first expansion portion.”** As discussed previously, Olmos discloses the central ramp being non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion, and a second expansion portion longitudinally spaced from the first expansion portion. *See* §IX(B)(1)(d), *supra*. Olmos further discloses that the first expansion portion includes at least one ramped surface and that the second expansion portion includes at least one ramped surface. EX1006, Figs. 16A-B, 18, and 24A-B. Annotated Fig. 24B showing these elements follows:



Accordingly, Olmos discloses this limitation. EX1002, ¶¶274-277.

(e) Claim Element 11[e]

Claim 11 recites the “**driving ramp including an unthreaded through bore and a third expansion portion including at least one ramped surface.**” As previously discussed, Olmos discloses the driving ramp including a through bore and a third expansion portion and the third expansion portion forming one or more ramped portions. See §IX(B)(1)(e), IX(B)(5)(b), *supra*. Olmos further discloses that the driving ramp’s through bore is unthreaded.

Olmos discloses that the driving ramp (“proximal wedge member **206**”) has a bore for receiving the actuator (“comprise[s] a central aperture **300** wherethrough an actuator shaft can be received”). EX1006, ¶[0177] (further stating: “the actuator

shaft can engage other portions of the wedge member **206** [besides threads] for causing expansion”); Figs. 18, 23A-B. Olmos notes that aperture 300 can be threaded (EX1006, ¶[0177]), which a POSITA would understand to disclose that the aperture can alternatively be non-threaded. EX1002, ¶280. Such an understanding of Olmos is consistent with a POSITA’s understanding of scissor jacks generally, which include well-known configurations where one side of the scissor jack is threaded and the other side either is or is not threaded depending on whether reverse threads or an unthreaded screw with a head portion is used to hold that side of the screw jack. *Id.*

Moreover, Olmos teaches that “at least a portion of the actuator shaft can be axially fixed relative to one of the proximal and distal wedge members **206, 208** with the actuator shaft being operative to move the other one of the proximal and distal wedge members **206, 208** via rotational movement or longitudinal contraction of the pin.” EX1006, ¶[0159] (underline added). A POSITA would recognize from these disclosures that Olmos teaches an embodiment where the bore in the driving ramp is not threaded because, if the actuator were theadingly engaged with the driving ramp bore, it could not be “axially fixed” relative to the driving ramp while moving the central ramp when the actuator is rotated. EX1002, ¶¶281-283.

Accordingly, Olmos discloses this limitation. EX1002, ¶¶278-284.

(f) Claim Element 11[f]

Claim 11 recites that **“a portion of the actuator non-threadingly extends through the through bore of the driving ramp and threadingly extends into the threaded bore of the central ramp.”** Olmos discloses this limitation, as discussed previously. *See* §§IX(B)(1)(g), IX(B)(10)(e); EX1002, ¶¶285-286.

(g) Claim Element 11[g]

Claim 11 recites that **“the actuator is rotationally coupled to the driving ramp.”** Olmos discloses this limitation, as discussed previously. *See* §IX(B)(1)(h); EX1002, ¶¶287-288.

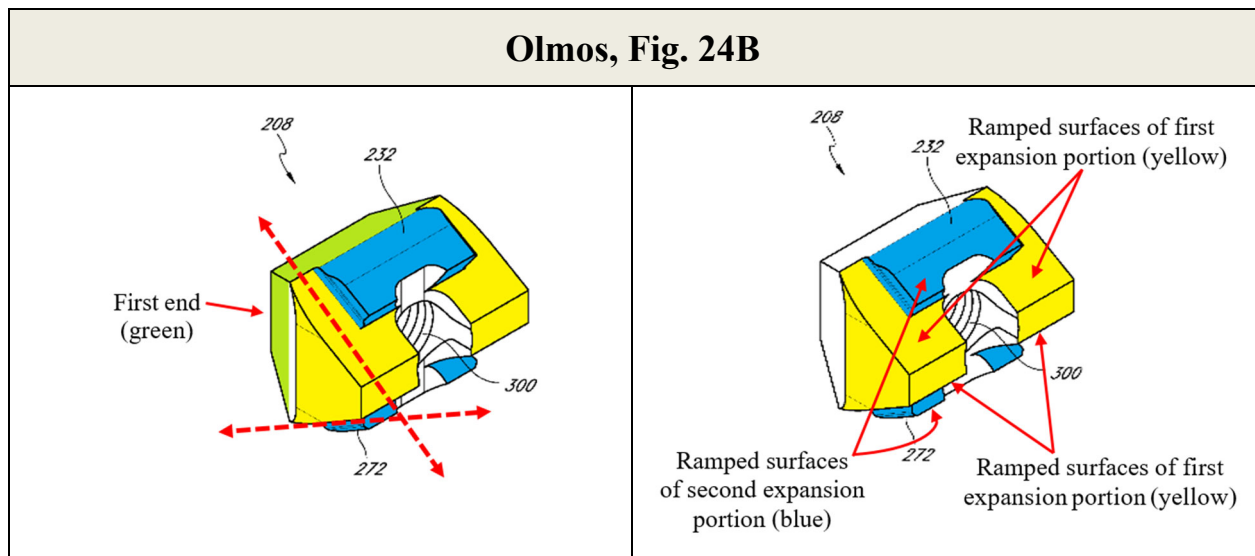
(h) Claim Element 11[h]

Claim 11 recites that, **“when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.”** Olmos discloses this limitation, as discussed previously. *See* §IX(B)(1)(i); EX1002, ¶¶289-290.

9. Claim 12

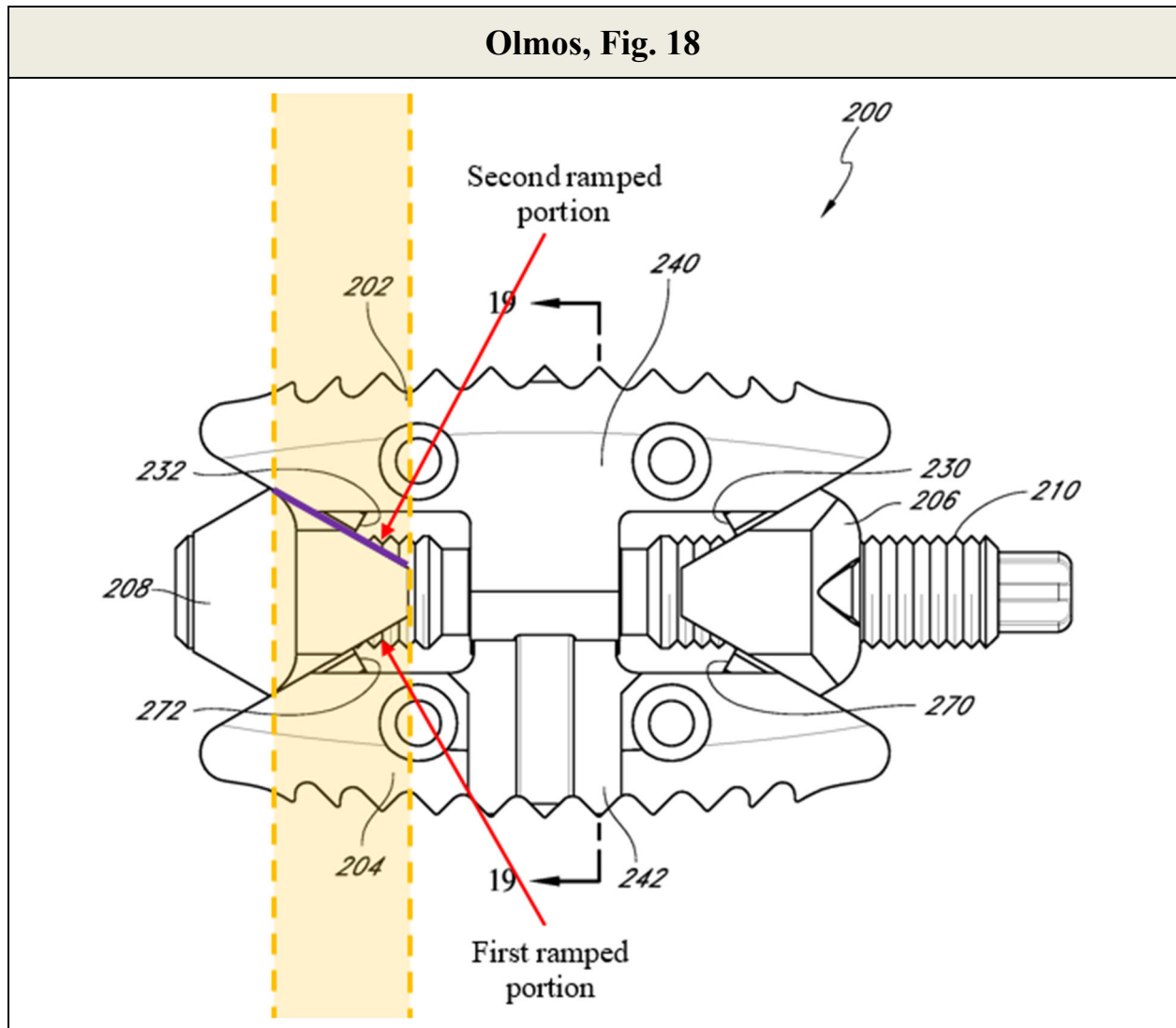
Claim 12, which depends from Claim 11, recites **“the first expansion portion is proximate a first end and the at least one ramped surface of the first expansion portion includes overlapping ramped portions.”** This limitation overlaps Claim 2, already discussed in §IX(B)(2), *supra*. As explained by Petitioner’s expert, a POSITA would have recognized that Olmos’s overlapping

ramped portions described in §IX(B)(2), *supra*, are included in the various ramped surfaces (which collectively constitute “at least one ramped surface”) of Olmos’s first expansion portion described in §IX(B)(10)(d), *supra*, as shown in the annotated excerpts of Olmos Fig. 24B reproduced below.



This interpretation is consistent with Patent Owner’s infringement contentions regarding Claim 12. *See* EX1010, 25. As seen therein, Patent Owner takes the position that two ramped portions “overlap” where two angled surfaces reside opposite each other (i.e., one over the other), and/or have angles that intersect. Moreover, Patent Owner alleges that two ramped portions may be “include[d]” in the “at least one ramped surface” where the ramped portions fall within the footprint of the ramped surface. Olmos discloses such a configuration, as shown in the following annotated version of Fig. 18, which shows at least one

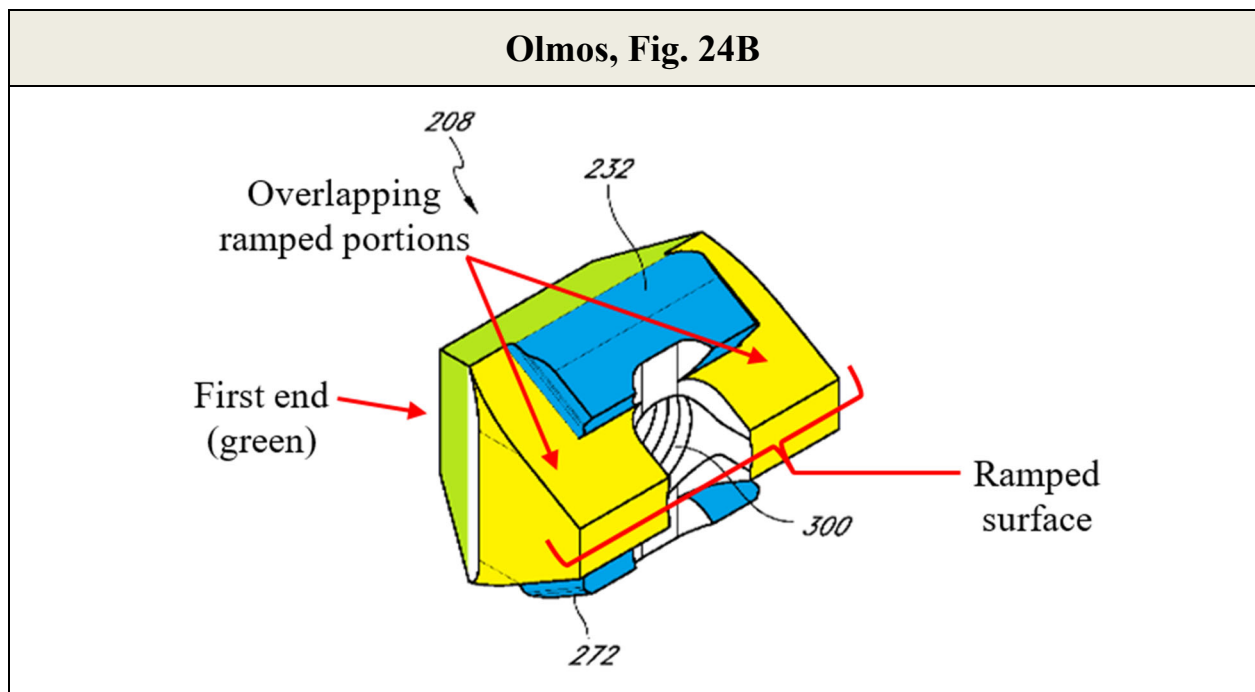
ramped surface in purple with the two ramped portions falling within the surface's footprint, as indicated by the orange column:



Accordingly, Olmos discloses this limitation. *See* §§IX(B)(2), IX(B)(10)(d); EX1002, ¶¶291-294, 296.

While the above analysis is plainly consistent with Patent Owner's infringement contentions, alternatively, Olmos also discloses a first expansion

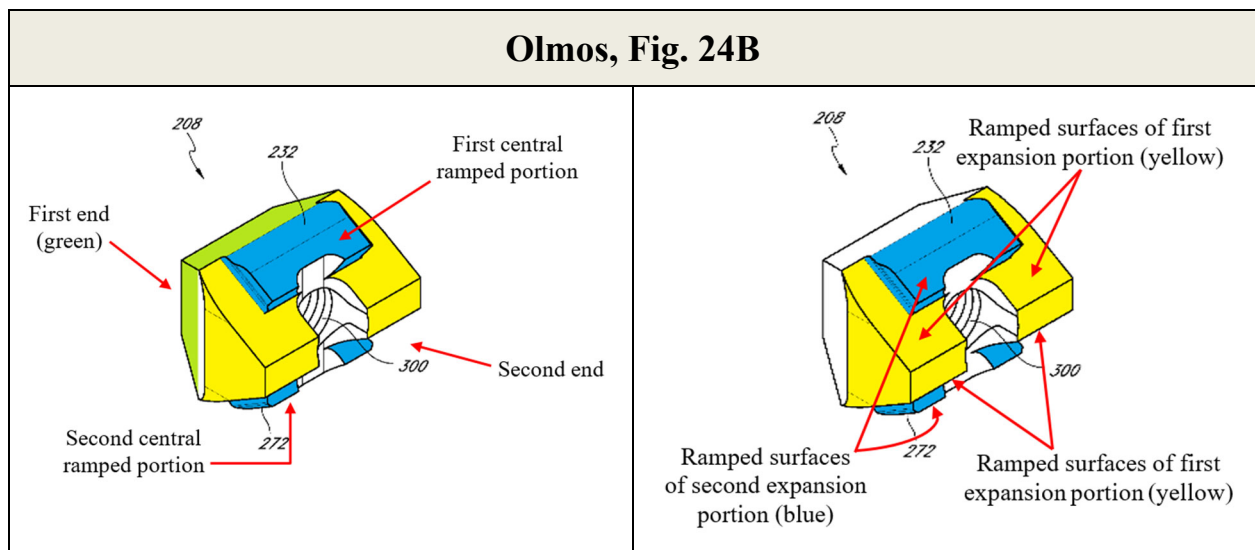
portion having a ramped surface with overlapping ramped portions in the form of the two lateral surfaces on either side of guide member 232. These ramped portions are located on a single ramped surface (e.g., the plane comprising the upper ramped surface) of the first expansion portion and are overlapping because they are positioned in parallel to one another within a single plane and thus completely cover each other (i.e., overlap) in the direction parallel to that plane. The following annotated Fig. 24B further identifies these features:



Accordingly, Olmos alternatively discloses Claim 12's limitation for these additional reasons. *See* §§IX(B)(2), IX(B)(8)(d); EX1002, ¶¶295-296.

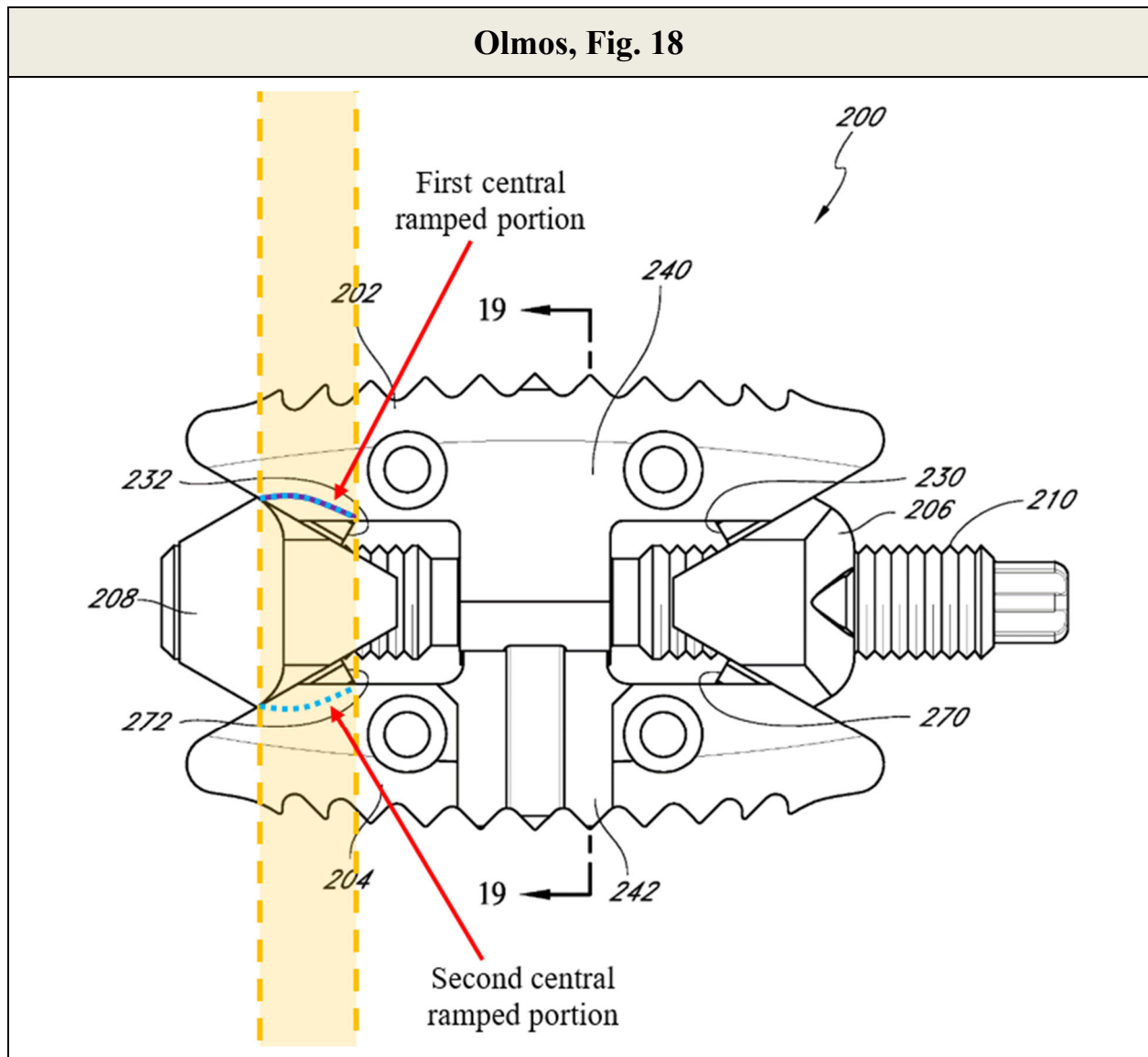
10. Claim 13

Claim 13, which depends from Claim 12, recites that “**the second expansion portion is positioned between the first end and a second end and the at least one ramped surface of the second expansion portion includes central ramped portions.**” As discussed for Claim 3, Olmos’s second expansion portion is positioned between the ends and includes central ramped portions. §IX(B)(2), *supra*. As explained by Petitioner’s expert, a POSITA would have recognized that Olmos’s central ramped portions are included in the ramped surfaces of Olmos’s second expansion portion described in §IX(B)(10)(d), *supra*, as can be seen in the annotated excerpts of Fig. 24B reproduced below.



Accordingly, Olmos discloses this limitation, as discussed previously. *See* §§IX(B)(3), IX(B)(10)(d); EX1002, ¶¶297-299, 301.

This interpretation is consistent with Patent Owner's aforementioned infringement contentions regarding Claim 12. *See* §IX(B)(11). As previously discussed, Patent Owner asserts that two ramped portions "overlap" where two angled surfaces reside opposite each other and/or have angles that intersect and that two ramped portions may be "include[d]" in "at least one ramped surface" where the ramped portions fall within the footprint of the ramped surface. *Id.* Olmos discloses such a configuration with respect to the elements of Claim 13, as shown in the following annotated version of Fig. 18, which shows at least one ramped surface in purple with the two central ramped portions (approximated by blue dashed lines) falling within the surface's footprint, as indicated by the orange column:

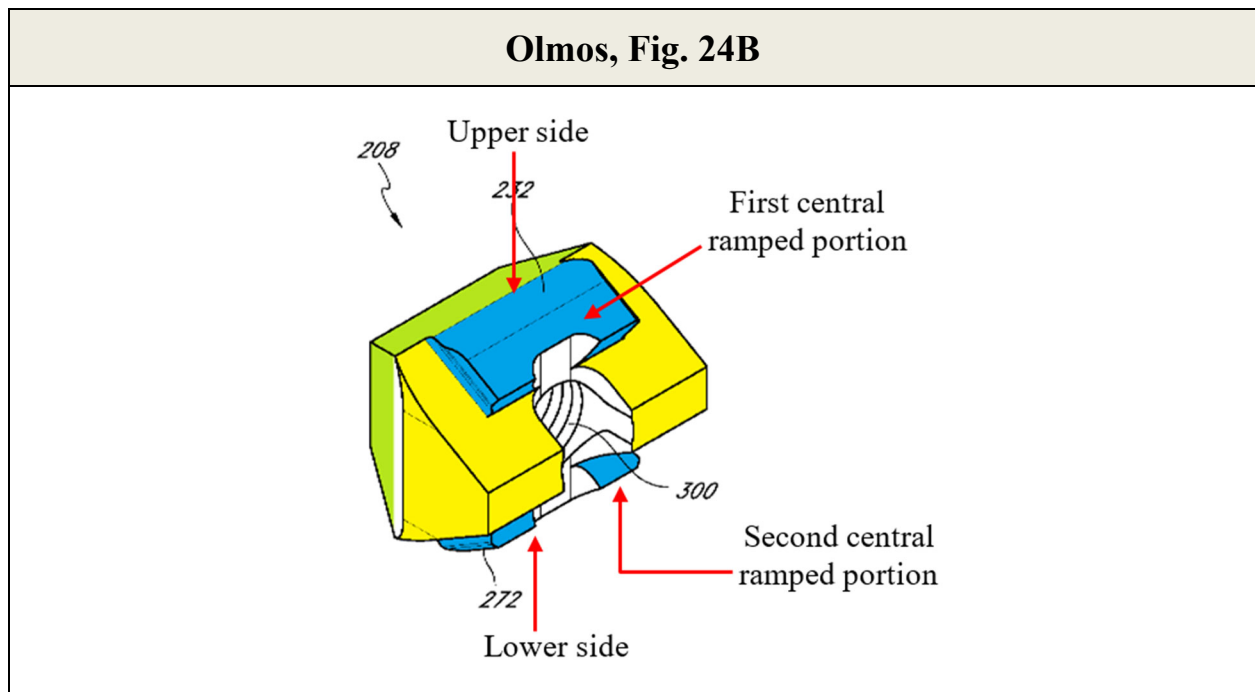


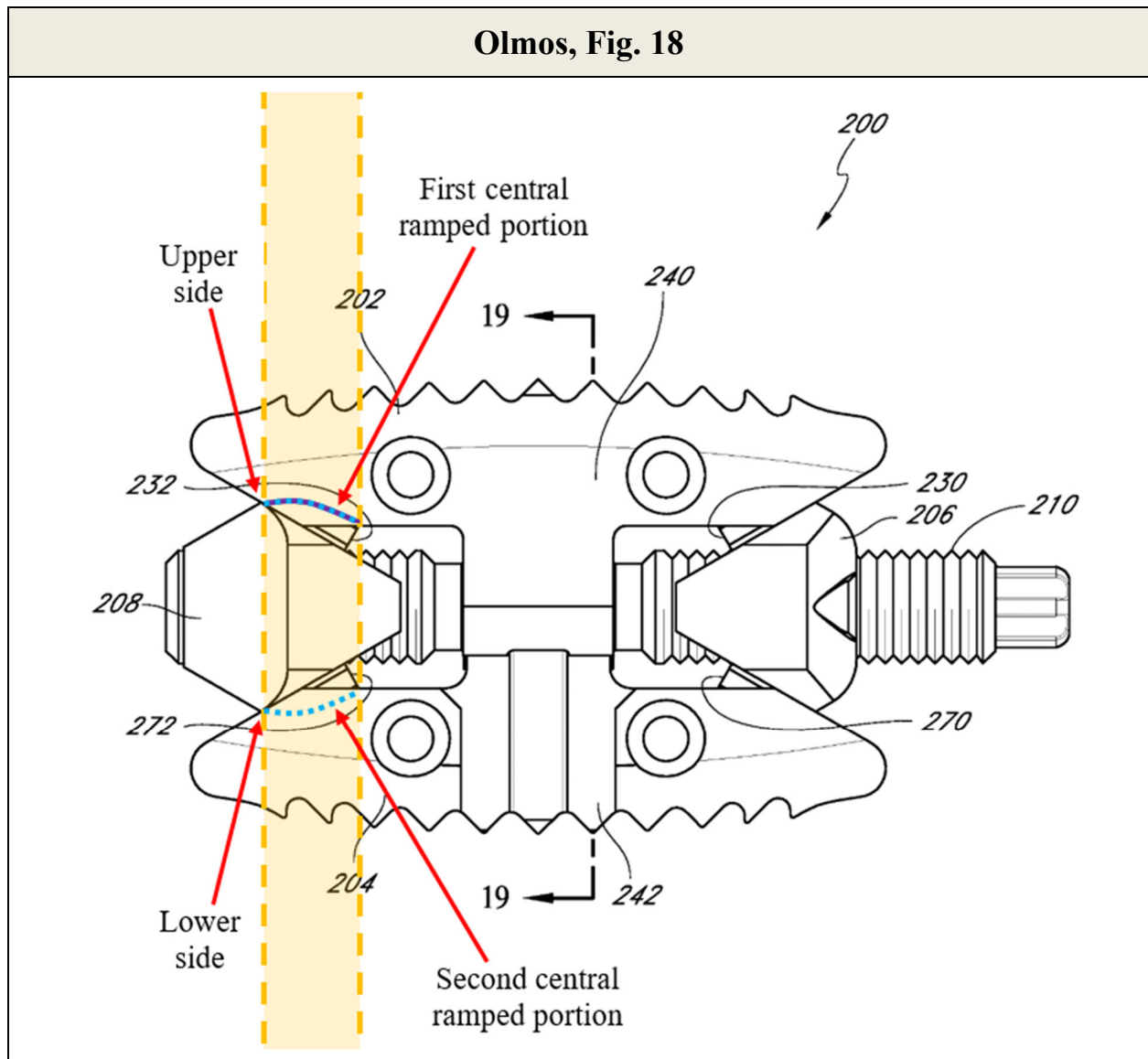
Accordingly, Olmos discloses Claim 13’s limitation for these additional reasons. See §§IX(B)(3), IX(B)(10)(d), IX(B)(11); EX1002, ¶¶300-301.

11. Claim 14

Claim 14, which depends from Claim 13, recites that “**the central ramped portions includes two central ramped portions on opposite side of the central ramp.**” As shown in §IX(B)(12), *supra*, Olmos discloses two central ramped

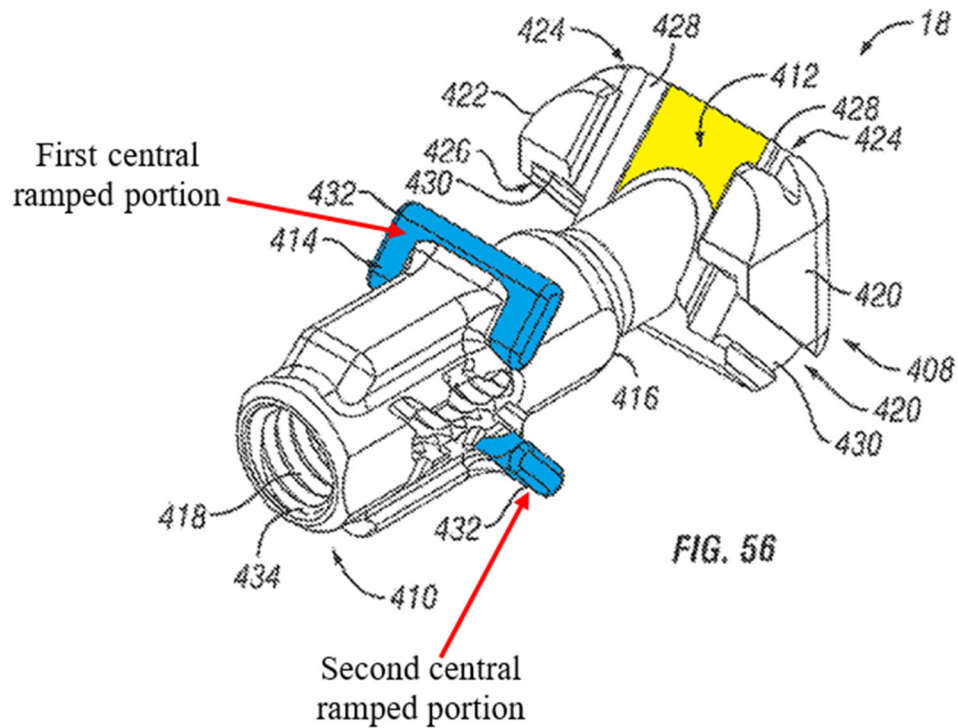
portions on opposite sides of the central ramp, i.e., one central ramped portion on the upper side of the central ramp and one central ramped portion on the lower side of the central ramp. *See also* EX1006, Figs. 18, 24A-B; IX(B)(4), *supra*. This is further shown below in the following annotated version of Figs. 24B and 18:





Moreover, the foregoing is consistent with the '752 patent specification, which discloses the two “central ramped portions **432**” as being located on “opposite sides” of the central ramp when they are positioned on the upper side and the bottom side of the second expansion portion (*see* EX1001, 19:19-22, Fig. 56), as seen in the following annotated version of Fig. 56:

'752, Fig. 56



Olmos discloses this limitation, as discussed previously. *See* §IX(B)(4); EX1002, ¶¶302-306.

12. Claim 15

(a) Claim Element 15[a]

Claim 15, which depends from Claim 11, recites “**the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side.**” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(5)(a); EX1002, ¶¶307-308.

(b) Claim Element 15[b]

Claim 15 further recites “**the first and second side portions include the third expansion portion as one or more ramped surfaces.**” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(5)(b); EX1002, ¶¶309-310.

13. Claim 18

Claim 18, which depends from Claim 11, recites that “**the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.**” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(6); EX1002, ¶¶311-313.

14. Claim 20

Claim 20, which depends from Claim 11, recites that “**the first and second endplates comprise texturing for gripping adjacent vertebral bodies.**” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(7); EX1002, ¶¶314-316.

C. Ground 3: Claims 1-8, 10-18, and 20 are obvious over Olmos in view of Chung

While Petitioner submits that Olmos discloses each and every element of Claims 1-5, 8, 10-15, 18, and 20 of the '752 patent, alternatively, these claims are obvious under 35 U.S.C. §103 over Olmos in view of Chung as detailed below and in Prof. Drewry's declaration (*see* EX1002, ¶¶317-324, 338-349).

Additionally, Claims 6-7 and 16-17 are also obvious over Olmos in view of Chung as detailed below and in Prof. Drewry's declaration (*see* EX1002, ¶¶325-349).

1. Claims 1 and 11

(a) Claim Element 1[f]

Olmos discloses an actuator comprising a "head portion," as discussed above, *supra*, §IX(B)(1)(f). However, should Patent Owner argue that Olmos does not expressly teach that "tool engagement section 296" constitutes a head portion, it alternatively would have been obvious to use Chung's actuator ("groove fastening screw (50)") (*see* §IX(A)(1)(f), *supra*) in place of the structure described in Olmos. Chung discloses all elements of this limitation as discussed previously. *See* §IX(A)(1)(f), *supra*. A POSITA therefore would have recognized that Olmos as modified by Chung discloses this limitation. EX1002, ¶¶318-319.

(b) Claim Elements 1[g] and 11[f]

Olmos discloses the extension portion of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp as discussed, *supra*, §§IX(B)(1)(g). IX(B)(8)(f). However, should Patent Owner argue that Olmos does not teach that the actuator non-threadingly extends through the through bore of the driving ramp, it alternatively would have been obvious to use Chung's actuator ("groove

fastening screw (50)”) (*see* §§IX(A)(1)(g), IX(A)(10)(f), *supra*) in place of the structure described in Olmos and/or to modify the driving ramp/proximal wedge member of Olmos to have an unthreaded bore in view of Chung.

Chung discloses all elements of this limitation as discussed previously. *See* §§IX(A)(1)(g), IX(A)(10)(f), *supra*. A POSITA therefore would have recognized that Olmos as modified by Chung discloses this limitation. EX1002, ¶¶320-321.

(c) Claim Element 11[e]

Olmos discloses the driving ramp including an unthreaded through bore as discussed, *supra*, §IX(B)(8)(e). However, should Patent Owner argue that Olmos does not teach that the through bore in the driving ramp may be unthreaded, it alternatively would have been obvious to modify the driving ramp/proximal wedge member of Olmos to have an unthreaded through bore in view of Chung.

Chung discloses all elements of this limitation as discussed previously. *See* §IX(A)(10)(e). A POSITA therefore would have recognized that Olmos as modified by Chung discloses this limitation. EX1002, ¶¶322-323.

2. Claims 2-5, 8, 10, 12-15, 18, and 20

Claims 2-5, 8, 10, 12-15, 18, and 20 depend either directly or indirectly from Claims 1 and 11, respectively. All elements added by these claims are expressly disclosed in Olmos as discussed previously. *See* §§IX(B)(2)-(7), IX(B)(9)-(14),

supra. Accordingly, Claims 2-5, 8, 10, 12-15, 18, and 20 are likewise obvious for the reasons provided in Ground 2 and here. EX1002, ¶324.

3. Claim 6

Claim 6, which depends from Claim 1, recites that “**the head portion of the actuator has a larger diameter than the extension.**” Olmos as modified by Chung discloses this limitation. Although Olmos does not expressly disclose a head portion having a larger diameter than the extension, Chung does disclose such a structure as discussed previously. *See* §IX(A)(6), *supra*. A POSITA therefore would have recognized that Olmos as modified by Chung discloses this limitation. EX1002, ¶¶325-327.

4. Claim 7

Claim 7, which depends from Claim 1, recites that the “**the head portion of the actuator includes a rim configured to contact the driving ramp.**” Olmos as modified by Chung discloses this limitation. Although Olmos does not expressly disclose a head portion having a rim configured to contact the driving ramp, Chung does disclose such a structure as discussed previously. *See* §IX(A)(7), *supra*. A POSITA therefore would have recognized that Olmos as modified by Chung discloses this limitation. EX1002, ¶¶328-330.

5. Claim 16

(a) Claim Element 16[a]

Claim 16, which depends from Claim 11, recites that “**the actuator includes a head portion and an extension that extends from the head portion.**” Olmos discloses this limitation, as discussed previously. *See* §IX(B)(15)(a); EX1002, ¶¶331-332.

(b) Claim Element 16[b]

Claim 16 further recites that “**the head portion of the actuator has a larger diameter than the extension.**” Olmos as modified by Chung discloses this limitation, as discussed previously. *See* §IX(C)(3); EX1002, ¶¶333-334.

6. Claim 17

Claim 17, which depends from Claim 11, recites that “**the head portion of the actuator includes a rim configured to contact the driving ramp.**” Olmos as modified by Chung discloses this limitation, as discussed previously. *See* §IX(C)(4); EX1002, ¶¶335-337.

7. Motivation to Combine and Reasonable Expectation of Success

A POSITA would have been motivated to combine Olmos with Chung with a reasonable expectation of success. EX1002, ¶¶338-349. Such motivation would be provided at least by a POSITA’s desire to effectuate the full teachings of Olmos

and to avoid the use of structures that could injure a patient by damaging anatomy adjacent to the implant.

To begin with, Olmos teaches that “the actuator shaft can engage other portions of the wedge member **206** for causing expansion or contraction thereof,” through means other than threads. EX1006, ¶[0177]; EX1002, ¶311. Chung expressly discloses an actuator that non-threadingly engages portions of the driving ramp through the use of a larger-diameter, rimmed head portion. *See, e.g.*, §IX(A)(6)-(7), *supra*. Because Chung also teaches that the actuator-receiving opening in the driving ramp lacks threads (*see* §IX(A)(10)(e), *supra*), a POSITA would have understood that, where the actuator engages unthreaded portions of the driving ramp as in both Olmos and Chung, a threaded actuator-receiving opening would be superfluous. A POSITA therefore would have been motivated to simplify the Olmos design by omitting such threads to improve the manufacturing and operation of the device. EX1002, ¶¶345-347.

Another motivation to replace Olmos’ actuator with Chung’s is that, the tool engagement section 296 of Olmos’ actuator extends beyond the end of the driving ramp regardless of whether the device is expanded (*see* EX1006, Figs. 16B, 18) or unexpanded (*see id.*, Fig. 16A). In contrast, the head of Chung’s actuator is recessed within the driving ramp in both the expanded and unexpanded positions (*see* EX1005, Figs. 1, 3-4). As a result, the head portion of Chung’s actuator does

not protrude from the device, which a POSITA would have considered advantageous so that the recessed head portion does not interfere with adjacent anatomy and potentially injure the patient after the device is implanted. EX1002, ¶342.

A POSITA further would have had a reasonable expectation of success in combining the actuator and unthreaded bore of Chung with the Olmos device given the similarity between Olmos and Chung. These configurations of Chung and Olmos represent similar mechanical designs performing the same general function (i.e., causing the ramps to move closer to each other when the actuator is rotated). *Id.*, ¶¶339-341, 348. Chung's design could thus have been readily incorporated into Olmos' device with each component continuing to perform its known function, with no surprising or unexpected results. *KSR Int'l Co. v. Teleflex*, 550 U.S. 398, 417 (2007). Actuators having head portions, like Chung's groove fastening screw (50), are ubiquitous in the art, and have similar structures and functionality as the Olmos actuator. EX1002, ¶¶343, 348. In addition, the embodiment depicted in Olmos' Figs. 5-6 shows a wedge 68 having a non-threaded bore for receiving the outer sleeve member 34 of actuator shaft 30 and is very similar to Chung's teachings of a non-threaded driving ramp and corresponding portion of the actuator screw, further illustrating that such design configurations were well within the POSITA's level of skill in this art. EX1006, ¶[0106], Figs. 5-6; EX1002, ¶345.

Accordingly, a POSITA would have understood that Chung's groove fastening screw (50) could replace Olmos' dual-threaded actuator to provide a screw for implementing Olmos' disclosed embodiment calling for an actuator that remains axially-fixed to the driving ramp (EX1006, ¶[0159]) and that any threads in Olmos' driving ramp could then be omitted as superfluous, especially given Olmos' teaching that a component of the actuator other than threads can be used to "engage other portions of the wedge member **206**." *See* EX1006, ¶[0177]; EX1002, ¶¶338-349.

X. DISCRETIONARY DENIAL IS NOT WARRANTED

The Board has discretion to deny institution under §314(a) and/or §325(d), However, Petitioner has provided a *Sotera*-type stipulation in the parallel litigation (EX1020) which, in addition to the strong merits presented herein, precludes discretionary-denial under §314(a). *See* Director Vidal Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, at 3-5, 7-8 (June 21, 2022).

Regarding §325(d), the '752 patent has not previously been challenged at the PTAB. Chung was not cited or considered during prosecution. The Examiner rejected pending claims over Olmos in two office actions (*see, e.g.*, EX1004, 000034-45) before allowing the claims to issue over Olmos and stating the Reasons for Allowance as follows:

Claims 1, 11 in the instant application have not been rejected using prior art because no references, or reasonable combination thereof, could be found which disclose, or suggest an expandable fusion device with a central ramp having a threaded bore, a driving ramp with a through bore, an actuator with a threaded extension non-threadingly extending through the through bore and threadingly extending into the threaded bore and rotated relative to the central ramp to move the endplates as claimed.

Id., 000009. The Examiner went on to explicitly assert that “Figs 16a-26 in Olmos US 2008/0140207,” relied on herein, only disclose the actuator extending through “threaded bores of both the central ramp and the driving ramp.”⁵ *Id.* This finding is consistent with an earlier argument made by Applicant during prosecution. When amending the claims to recite “the extension of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp,” Applicant argued that, “[f]or FIG. 16A of Olmos, the actuator extension appears to be threadingly engaged with both the

⁵ The Examiner also remarked that “Olmos also discloses another embodiment (Fig 5-6) with a driving ramp (#80) having a non-threaded bore but does not disclose rotating the actuator (#36) relative to the central ramp (#68 and/or #34) to move the endplates.” EX1004, 000009-10. Petitioner does not rely on this embodiment for purposes of this Petition. However, it is notable that the Examiner apparently did not consider whether the Fig. 16-26 embodiment disclosed such a feature, nor did he appear to consider whether it would be obvious to a POSITA to combine the Fig. 5-6 embodiment with the Fig. 16-26 embodiment.

driving ramp and the central ramp unlike claim 1 of the present invention.” *Id.*, 000053, 000057.

Petitioner submits that the Examiner erred in concluding that Olmos did not teach the allegedly distinguishing feature of an actuator with a threaded extension non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp and rotated relative to the central ramp to move the endplates. As discussed is §IX(B)(1)(g), §IX(B)(1)(i), and §§IX(B)(10)(e)-(f), *supra*, at least Olmos ¶[0159] expressly discloses such an embodiment. This disclosure in Olmos may have been overlooked given the Examiner’s primary focus on Olmos’ figures and alternative embodiments, with no office action citing Olmos ¶[0159], and given Applicant’s representations that the relevant embodiments of Olmos did not teach or suggest this feature. EX1004, 000057.

Discretionary denial is not warranted here. First, Olmos discloses an actuator with a threaded extension non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp and rotated relative to the central ramp to move the endplates, contrary to the Examiner’s remarks in the Reasons for Allowance. Yet, there is no evidence that the Examiner appreciated Olmos’ disclosure of this feature (EX1006, ¶[0159]) when allowing the claims. Accordingly, *Becton Dickinson* factors (c)-(f) disfavor

denial under §325(d) given the facts noted above and the new light in which Olmos has been presented here. *Volkswagen Group of America, Inc. v. Michigan Motor Technologies LLC*, IPR2020-00452, Paper 12, 32-33 (finding §325(d) denial unwarranted where examiner “fail[ed] to fully consider” specific embodiment in cited reference).

Second, Ground 1 and 3 in this Petition independently rely on Chung for an even more express teaching of the relevant claim features. *E.g.*, §§IX(A)(1)(g), IX(A)(1)(i), IX(C)(1), *supra*. Thus, to the extent that Olmos is somehow determined to not expressly disclose this feature, Chung fills any remaining gap and is not cumulative to Olmos. And Chung was **not** before the Examiner during prosecution.

Accordingly, *Becton Dickinson* factors (a)-(c) and (f) likewise disfavor denial under §325(d) in view of the Petition’s presentation of Chung. Discretionary denial under §325(d) is unwarranted for these additional reasons. *Oticon Medical AB v. Cochlear Ltd.*, IPR2019-00975, Paper 15 at 19-20 (PTAB Oct. 16, 2019)(precedential as to §§II(B)-(C))(refusing to deny institution given new, noncumulative prior art asserted in the Petition).

XI. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests that Trial be instituted and that Claims 1-8, 10-18, and 20 be canceled.

Inter Partes Review No.: IPR2022-01601
Petition For *Inter Partes* Review
U.S. Patent No. 10,925,752

Respectfully submitted,

Dated: October 13, 2022

By: s/Michael R. Houston/

Michael R. Houston
Reg. No. 58,486
Counsel for Petitioner

APPENDIX: CHALLENGED CLAIM LISTING

Claim No.	Limitation
1[a]	An expandable fusion device comprising:
1[b]	a first endplate and a second endplate,
1[c]	a central ramp, a driving ramp, and an actuator positioned between the first and second endplates,
1[d]	the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion, and a second expansion portion longitudinally spaced from the first expansion portion,
1[e]	the driving ramp including a through bore and a third expansion portion,
1[f]	the actuator including a head portion and a threaded extension that extends from the head portion,
1[g]	the extension of the actuator non-threadingly extending through the through bore of the driving ramp and threadingly extending into the threaded bore of the central ramp,
1[h]	wherein the actuator is rotationally coupled to the driving ramp
1[i]	and when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.
2	The device of claim 1, wherein the first expansion portion is proximate a first end and includes overlapping ramped portions.
3	The device of claim 2, wherein the second expansion portion is positioned between the first end and a second end and includes central ramped portions.

Claim No.	Limitation
4	The device of claim 3, wherein the central ramped portions includes two central ramped portions on opposite side of the central ramp.
5[a]	The device of claim 1, wherein the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side, and
5[b]	the first and second side portions include the third expansion portion as one or more ramped surfaces.
6	The device of claim 1, wherein the head portion of the actuator has a larger diameter than the extension.
7	The device of claim 1, wherein the head portion of the actuator includes a rim configured to contact the driving ramp.
8	The device of claim 1, wherein the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.
10	The device of claim 1, wherein the first and second endplates comprise texturing for gripping adjacent vertebral bodies.
11[a]	An expandable fusion device comprising:
11[b]	a first endplate and a second endplate,
11[c]	a central ramp, a driving ramp, and an actuator positioned between the first and second endplates,
11[d]	the central ramp non-rotationally coupled to the first and second endplates, and including a threaded bore, a first expansion portion

Claim No.	Limitation
	including at least one ramped surface, and a second expansion portion including at least one ramped surface, the second expansion portion being longitudinally spaced from the first expansion portion,
11[e]	the driving ramp including an unthreaded through bore and a third expansion portion including at least one ramped surface, and
11[f]	a portion of the actuator non-threadingly extends through the through bore of the driving ramp and threadingly extends into the threaded bore of the central ramp,
11[g]	wherein the actuator is rotationally coupled to the driving ramp and
11[h]	when the actuator is rotated relative to the central ramp, the central ramp and the driving ramp move towards one another, thereby causing the first and second endplates to move apart.
12	The device of claim 11, wherein the first expansion portion is proximate a first end and the at least one ramped surface of the first expansion portion includes overlapping ramped portions.
13	The device of claim 12, wherein the second expansion portion is positioned between the first end and a second end and the at least one ramped surface of the second expansion portion includes central ramped portions.
14	The device of claim 13, wherein the central ramped portions includes two central ramped portions on opposite side of the central ramp.
15[a]	The device of claim 11, wherein the driving ramp includes an upper side, a lower side, a first side portion connecting the upper side and the lower side, and a second side portion connecting the upper side and the lower side, and

Claim No.	Limitation
15[b]	the first and second side portions include the third expansion portion as one or more ramped surfaces.
16[a]	The device of claim 11, wherein the actuator includes a head portion and an extension that extends from the head portion, and
16[b]	the head portion of the actuator has a larger diameter than the extension.
17	The device of claim 16, wherein the head portion of the actuator includes a rim configured to contact the driving ramp.
18	The device of claim 11, wherein the first and second endplates each comprise an opening that extends from an upper surface through a lower surface.
20	The device of claim 11, wherein the first and second endplates comprise texturing for gripping adjacent vertebral bodies.

CERTIFICATE OF WORD COUNT

The undersigned certifies that the foregoing Petition complies with the requirements of 37 C.F.R. § 42.24. Excluding the portions exempted by 37 C.F.R. § 42.24(a) (a table of contents, a table of authorities, a listing of facts which are admitted, denied, or cannot be admitted or denied, a certificate of service or word count, or appendix of exhibits), the Petition contains 12,367 words as counted by the word processing system used to prepare it.

By: s/Michael R. Houston/

Michael R. Houston
Reg. No. 58,486
Counsel for Petitioner

Inter Partes Review No.: IPR2022-01601

Petition For *Inter Partes* Review

U.S. Patent No. 10,925,752

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Petition for *Inter Partes* Review together with all exhibits and other papers filed therewith was served on Patent Owner, by USPS Express Mail or an equivalent next-day delivery service, directed to the attorneys of record for the patent at the following address:

Globus Medical, Inc.
Valley Forge Business Center
2560 General Armistead Avenue
Audubon, PA 19403

October 13, 2022

By: s/Michael R. Houston/

Michael R. Houston
Reg. No. 58,486
Counsel for Petitioner