To:	Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313–1450	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Southern District of California on the following: **_X_** Patents or ___ Trademarks:

DOCKET NO. 3:18–cv–00347–GPC–BLM	**DATE FILED** 2/13/18	**US District Court** Southern District of California San Diego, CA
PLAINTIFF Nuvasive, Inc.		DEFENDANT Alphatec Holdings, Inc., et al.
PATENT OR TRADEMARK NO.	**PATENT OR TRADEMARK NO.**	**PATENT OR TRADEMARK NO.**
1. 7,819,801	**6.** 8,361,156	**11.**
2. 8,355,780	**7.** D750,252	**12.**
3. 8,439,832	**8.** D652,519	**13.**
4. 9,833,227	**9.**	**14.**
5. 8,753,270	**10.**	**15.**

In the above–entitled case, the following patents(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY __ Amendment __ Answer __ Cross Bill __ Other Pleading	
PATENT OR TRADEMARK NO.	**PATENT OR TRADEMARK NO.**	**PATENT OR TRADEMARK NO.**
1.	**6.**	**11.**
2.	**7.**	**12.**
3.	**8.**	**13.**
4.	**9.**	**14.**
5.	**10.**	**15.**

In the above–entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT

CLERK John Morrill	(BY) DEPUTY CLERK	DATE

Trials@uspto.gov
571-272-7822

Paper 57
Entered: May 9, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.,
Petitioner,

v.

NUVASIVE, INC.,
Patent Owner.

Case IPR2013-00506
Patent 8,361,156 B2

Before SALLY C. MEDLEY, LORA M. GREEN, and STEPHEN C. SIU, *Administrative Patent Judges.*

GREEN, *Administrative Patent Judge.*

JUDGMENT
Granting Joint Motion to Terminate after Remand from
the Court of Appeals for the Federal Circuit
35 U.S.C. § 317 and 37 C.F.R. §§ 42.72, 42.74

On April 26, 2017, the Parties filed a Joint Motion to Terminate this proceeding (Paper 56) and a true copy of the Parties' Settlement Agreement (Ex. 2041). As part of their Joint Motion to Terminate, the parties request that we "treat the Settlement Agreement as business confidential information and keep it separate from the file of the involved patent." Paper 56, 1.

In the Joint Motion to Terminate this proceeding, the parties represent that they have settled their disputes regarding U.S. Patent 8,361,156 B2. Paper 56, 1. The present *Inter Partes* Review was vacated and remanded to the Patent Trial and Appeal Board by the U.S. Court of Appeals for the Federal Circuit ("Federal Circuit"). *In Re: Nuvasive, Inc.*, No. 2015-1670, slip op. at 13 (Fed. Cir. December 7, 2016). We determine that it is appropriate to terminate this proceeding without rendering any further decisions. *See* 37 C.F.R. § 42.72.

ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the parties' request to treat the Settlement Agreement (Ex. 2041) as business confidential information under 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(c) is GRANTED; and

FURTHER ORDERED that the Joint Motion to Terminate this proceeding is GRANTED, and this proceeding is hereby TERMINATED.

PETITIONER:

Jeff E. Schwartz
Seth A. Kramer
FOX ROTHSCHILD LLP
jeschwartz@foxrothschild.com
skramer@foxrothschild.com

PATENT OWNER:

Michael T. Rosato
Paul D. Tripodi II
Andrew S. Brown
WILSON SONSINI GOODRICH & ROSATI
mrosato@wsgr.com
ptripodi@wsgr.com
asbrown@wsgr.com

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

NOTICE OF ENTRY OF JUDGMENT ACCOMPANIED BY OPINION

OPINION FILED AND JUDGMENT ENTERED: 12/07/2016

The attached opinion announcing the judgment of the court in your case was filed and judgment was entered on the date indicated above. The mandate will be issued in due course.

Information is also provided about petitions for rehearing and suggestions for rehearing en banc. The questions and answers are those frequently asked and answered by the Clerk's Office.

Each side shall bear its own costs.

Regarding exhibits and visual aids: Your attention is directed Fed. R. App. P. 34(g) which states that the clerk may destroy or dispose of the exhibits if counsel does not reclaim them within a reasonable time after the clerk gives notice to remove them. (The clerk deems a reasonable time to be 15 days from the date the final mandate is issued.)

FOR THE COURT

/s/ Peter R. Marksteiner
Peter R. Marksteiner
Clerk of Court

cc: Andrew Swanson Brown
Nathan K. Kelley
Joseph Matal
Grace J. Pak
Michael T. Rosato
Richard Torczon
Paul David Tripodi II
Scott Weidenfeller

15-1670 - In re: NuVasive, Inc.
United States Patent and Trademark Office, Case No. IPR2013-00506

United States Court of Appeals for the Federal Circuit

IN RE: NUVASIVE, INC.,
Appellant

2015-1670

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2013-00506.

Decided: December 7, 2016

MICHAEL T. ROSATO, Wilson, Sonsini, Goodrich & Rosati, PC, Seattle, WA, argued for appellant. Also represented by ANDREW SWANSON BROWN; RICHARD TORCZON, Washington, DC; GRACE J. PAK, PAUL DAVID TRIPODI II, Los Angeles, CA.

JOSEPH MATAL, Office of the Solicitor, United States Patent and Trademark Office, Alexandria, VA, argued for intervenor Michelle K. Lee. Also represented by NATHAN K. KELLEY, SCOTT WEIDENFELLER.

Before MOORE, WALLACH, and TARANTO, *Circuit Judges*.

WALLACH, *Circuit Judge*.

Appellant NuVasive, Inc. ("NuVasive") appeals the final written decision of the U.S. Patent and Trademark

Office's ("USPTO") Patent Trial and Appeal Board ("PTAB"), finding claims 1–14, 19–20, and 23–27 of U.S. Patent No. 8,361,156 ("the '156 patent") invalid as obvious. *See Medtronic, Inc. v. NuVasive, Inc.*, No. IPR2013-00506, 2015 WL 996352, at *2 (P.T.A.B. Feb. 11, 2015). We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (2012). We vacate and remand.

BACKGROUND

NuVasive is the assignee of the '156 patent, which generally relates to "[a] system and method for spinal fusion comprising a spinal fusion implant of non-bone construction releasably coupled to an insertion instrument dimensioned to introduce the spinal fusion implant into any of a variety of spinal target sites." '156 patent, Abstract. The '156 patent includes one independent claim (claim 1) and 26 dependent claims (claims 2–27). Illustrative claim 1 recites in relevant part:

> A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:
>
> . . .
>
> at least *first and second radiopaque markers* oriented generally parallel to a height of the implant, wherein said first radiopaque marker extends into said first sidewall at a position *proximate to said medial plane*, and said second radiopaque marker extends into said second sidewall at a position *proximate to said medial plane*.

Id. col. 12 ll. 32–67 (emphases added).

In response to Medtronic, Inc.'s ("Medtronic") petition,[1] the PTAB instituted the subject inter partes review to determine whether claims 1–14, 19–20, and 23–27 would have been obvious over, inter alia, a Synthes Vertebral Spacer-PR brochure ("SVS-PR brochure") (J.A. 769–70), a Telamon Verte-Stack PEEK Vertebral Body Spacer brochure ("Telamon brochure") (J.A. 771–72), a Telamon Posterior Impacted Fusion Devices guide ("Telamon guide") (J.A. 773–82), and U.S. Patent Application Publication No. 2003/0028249 ("Baccelli") (J.A. 744–51). *See Medtronic, Inc. v. NuVasive, Inc.*, No. IPR2013-00506, 2014 WL 1253040, at *11–12 (P.T.A.B. Feb. 13, 2014). The PTAB later issued the Final Written Decision concluding the claims would have been obvious over various combinations of, inter alia, the SVS-PR brochure, the Telamon brochure and Telamon guide (collectively, "the Telamon references"), and Baccelli. *See Medtronic*, 2015 WL 996352, at *14.

DISCUSSION

NuVasive argues that the PTAB's Final Written Decision should be reversed for two reasons: (1) "the [PTAB] erred in concluding that the SVS-PR brochure and Telamon references are printed publication prior art"; and (2) "the [PTAB] erred in concluding it would have been obvious to include radiopaque markers proximate to the medial plane." Appellant's Br. 22, 26 (capitalization omitted). After articulating the applicable standard of review, we address these arguments in turn.

I. Standard of Review

---

[1] Medtronic initially opposed NuVasive's appeal, but later withdrew as Appellee. The USPTO intervened pursuant to 35 U.S.C. § 143 (2012) and, although it did not file a brief, participated at oral argument.

We review the PTAB's factual determinations for substantial evidence and its legal determinations de novo. *See In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). "Substantial evidence is something less than the weight of the evidence but more than a mere scintilla of evidence." *In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000) (citation omitted). It is "such relevant evidence as a reasonable mind might accept as adequate to support a conclu-conclusion." *In re Applied Materials, Inc.*, 692 F.3d 1289, 1294 (Fed. Cir. 2012) (internal quotation marks and citation omitted).

II. NuVasive Waived Its Arguments as to the PTAB's Treatment of the Prior Art References as Printed Publications

As an initial matter, the court must consider whether the SVS-PR brochure and Telamon references were publicly accessible such that they qualify as printed publications pursuant to 35 U.S.C. § 311(b)[2] and 35 U.S.C. § 102 (2006).[3] Pursuant to § 311(b), "[a] petitioner in an inter partes review may request to cancel as unpatentable [one] or more claims of a patent only on a ground that could be

---

[2] Congress amended § 311 when it enacted the Leahy-Smith America Invents Act ("AIA"). Pub. L. No. 112-29, § 6(a), 125 Stat. 284, 299 (2011). Although the amendments to § 311 did not take effect until September 16, 2012, the amendments "apply to any patent issued before, on, or after th[e] effective date" and, thus, apply to the '156 patent. *See id.* § 6(c)(2)(A), 125 Stat. at 304.

[3] Congress amended § 102 when it enacted the AIA. Pub. L. No. 112-29, § 3(b)(1), 125 Stat. at 285–87. However, because the application that led to the '156 patent was filed before March 16, 2013, the pre-AIA § 102 applies. *See id.* § 3(n)(1), 125 Stat. at 293.

raised under [§] 102 or [§] 103 and only on the basis of prior art consisting of patents or printed publications." 35 U.S.C. § 311(b). Section 102 provides that prior art includes "printed publication[s]" describing the invention either "before the invention thereof" or "more than one year prior to the date of the [patent] application . . . ." 35 U.S.C. § 102(a), (b).

We first must determine whether NuVasive preserved its public accessibility arguments for appeal. In appeals from the PTAB, "we have before us a comprehensive record that contains the arguments and evidence presented by the parties and our review of the [PTAB]'s decision is confined to the four corners of that record." *In re Watts*, 354 F.3d 1362, 1367 (Fed. Cir. 2004) (internal quotation marks and citation omitted). While the court "retains case-by-case discretion over whether to apply waiver," *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1251 (Fed. Cir. 2005) (citations omitted), we have held that a party waives an argument that it "failed to present to the [PTAB]" because it deprives the court of "the benefit of the [PTAB]'s informed judgment," *Watts*, 354 F.3d at 1367–68.

NuVasive waived its public accessibility arguments before the PTAB and may not raise them on appeal. NuVasive challenged the public accessibility of the prior art references during the preliminary proceedings of the inter partes review, J.A. 159–63 (section of NuVasive's Preliminary Response that addresses public accessibility), but failed to challenge public accessibility during the trial phase, J.A. 227–93 (NuVasive's Trial Response that fails to address public accessibility). In fact, during oral argument before the PTAB, NuVasive explicitly declined to make further arguments as to public accessibility of the Telamon references:

> [PTAB Judge]: I take it you no longer are disputing the public availability of the Telamon reference[s]?

> [NuVasive's Attorney]: *That is correct*, we're leaving that issue aside. We're focusing *entirely* on the obviousness to modify these markers in the medial plane. We're not abandoning the other arguments in our Patent Owner response, specifically with the dependent claims, we're just not addressing them right now because they're already addressed.
>
> So, we're going to assume that these are prior art . . . .

J.A. 527 (emphases added). NuVasive abandoned its challenge to the public accessibility determination even though the PTAB had warned NuVasive that this would result in waiver. J.A. 201–02 (where the PTAB indicated in a scheduling order that "[t]he patent owner is cautioned that any arguments for patentability not raised and fully briefed in the response will be deemed waived"). Because NuVasive no longer contested the public accessibility of the prior art references, the PTAB did not address this issue in the Final Written Decision. *See generally Medtronic*, 2015 WL 996352. As a result, we do not have "the benefit of the [PTAB]'s informed judgment" on the public accessibility issue, *Watts*, 354 F.3d at 1368, and NuVasive waived its arguments on this issue.

III. The PTAB Did Not Adequately Explain How Claim 1 of the '156 Patent Would Have Been Obvious Over the Prior Art

Having determined that NuVasive waived its arguments that the SVS-PR brochure and Telamon references were publicly accessible prior art, we examine whether the PTAB adequately set forth findings and explanations to support the conclusion that a combination of these prior art references would have rendered claim 1 of the '156 patent obvious. It did not.

A. Legal Standard for Obviousness

A patent claim is invalid as obvious "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the [relevant] art [('PHOSITA')] . . . ." 35 U.S.C. § 103(a) (2006).[4] The ultimate determination of obviousness is a question of law, but that determination is based on underlying factual findings. *See Gartside*, 203 F.3d at 1316. The underlying factual findings include (1) "the scope and content of the prior art," (2) "differences between the prior art and the claims at issue," (3) "the level of ordinary skill in the pertinent art," and (4) the presence of secondary considerations of nonobviousness such "as commercial success, long felt but unsolved needs, failure of others," and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *United States v. Adams*, 383 U.S. 39, 50–52 (1966).

In assessing the prior art, the PTAB "consider[s] whether a PHOSITA would have been motivated to combine the prior art to achieve the claimed invention." *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (internal quotation marks, brackets, and citation omitted); *see KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) ("[I]t can be important to identify a reason that would have prompted a [PHOSITA] to combine the elements in the way the claimed new invention does."). Although we review this factual finding for substantial evidence, "[t]he factual inquiry whether to combine references must be thorough and searching," and "[t]he need

---

[4] Congress amended § 103 when it enacted the AIA. Pub. L. No. 112-29, § 3(c), 125 Stat. at 287. However, because the application that led to the '156 patent was filed before March 16, 2013, the pre-AIA § 103 applies. *See id.* § 3(n)(1), 125 Stat. at 293.

for specificity pervades [our] authority" on the PTAB's findings on motivation to combine. *In re Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002) (internal quotation marks and citations omitted); *see id.* (stating that "[t]his precedent has been reinforced in myriad decisions[] and cannot be dispensed with" and listing supporting precedent).

B. The PTAB Failed to Articulate a Motivation to Combine the Prior Art References

NuVasive argues that, inter alia, the PTAB's Final Written Decision did not make adequately explained findings as to why a PHOSITA would have been motivated to combine the prior art references and place the radiopaque markers on the medial plane. Appellant's Br. 27–28. According to NuVasive, the PTAB relied on only one conclusory statement by Medtronic's expert that the modification would provide "additional information." *Id.* (emphasis omitted). We agree with NuVasive.

Two distinct yet related principles are relevant to our review. First, the PTAB must make the necessary findings and have an adequate "evidentiary basis for its findings." *Lee*, 277 F.3d at 1344. Second, the PTAB "must examine the relevant data and articulate a satisfactory explanation for its action including a rational connection between the facts found and the choice made." *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983) (internal quotation marks and citation omitted); *see Synopsys, Inc. v. Mentor Graphics Corp.*, 814 F.3d 1309, 1322 (Fed. Cir. 2016) (stating that, as an administrative agency, the PTAB "must articulate logical and rational reasons for [its] decisions" (internal quotation marks and citation omitted)).

This explanation enables the court to exercise its duty to review the PTAB's decisions to assess whether those decisions are "arbitrary, capricious, an abuse of discretion, or . . . unsupported by substantial evidence . . . ." 5 U.S.C. § 706(2)(A)–(E) (2012); *see Dickinson v. Zurko*, 527 U.S.

150, 152 (1999) (holding that § 706 governs our reviews of the USPTO's findings of fact and providing the framework for this review). We "cannot exercise [our] duty of review unless [we] are advised of the considerations underlying the action under review." *SEC v. Chenery Corp.*, 318 U.S. 80, 94 (1943). Indeed, "the orderly functioning of the process of review requires that the grounds upon which the [PTAB] acted be clearly disclosed and adequately sustained." *Id.* Although we do not require perfect explanations, we may affirm the PTAB's findings "if we may reasonably discern that it followed a proper path, even if that path is less than perfectly clear." *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015) (citation omitted).

The relevant principles apply with equal force to the PTAB's motivation to combine analysis. Our precedent dictates that the PTAB must make a finding of a motivation to combine when it is disputed. *See, e.g.*, *Lee*, 277 F.3d at 1343–45; *see also KSR*, 550 U.S. at 418 (stating that the PTAB's motivation to combine "analysis should be made explicit" (citation omitted)). Although identifying a motivation to combine "need not become [a] rigid and mandatory formula[]," *KSR*, 550 U.S. at 419, the PTAB must articulate a *reason why* a PHOSITA would combine the prior art references.

Our recent decisions demonstrate that the PTAB knows how to meet this burden. For example, in *Nike, Inc. v. Adidas AG*, we affirmed the PTAB's finding of a motivation to combine where it determined that a PHOSITA "interested in Nishida's preference to *minimize waste in the production process* would have logically consulted the well-known practice of flat-knitting, which eliminates the cutting process altogether." 812 F.3d 1326, 1337 (Fed. Cir. 2016) (emphasis added). Thus, a PHOSITA "would have been motivated to address the problem identified in Nishida by applying the teachings of the Schuessler References to arrive at the invention in

Nike's proposed substitute claims." *Id.* Similarly, in *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, we affirmed the PTAB's explanation that "a skilled artisan could modify Caterpillar in view of Ogawa by treating the first jaw like the second" to "*allow*[] *for a greater degree of movement* between the jaws, without impacting the quick change functionality . . . ." 825 F.3d 1373, 1381 (Fed. Cir. 2016) (emphasis added) (citations omitted). In each of these cases, the PTAB identified a reason why a PHOSITA would have combined the prior art references—i.e., "minimiz[ing] waste" (*Nike*, 812 F.3d at 1337) and "allow[ing] for a greater degree of movement" (*Allied*, 825 F.3d at 1381)—that had a foundation in the prior art.

The PTAB must provide "a reasoned basis for the agency's action," and "we will uphold a decision of less than ideal clarity if the agency's path may reasonably be discerned." *Bowman Transp., Inc. v. Ark.-Best Freight Sys., Inc.*, 419 U.S. 281, 285, 286 (1974). The PTAB's own explanation must suffice for us to see that the agency has done its job and must be capable of being "reasonably . . . discerned" from a relatively concise PTAB discussion. *In re Huston*, 308 F.3d 1267, 1281 (Fed. Cir. 2002).

We have, however, identified some insufficient articulations of motivation to combine. First, "conclusory statements" alone are insufficient and, instead, the finding must be supported by a "reasoned explanation." *Lee*, 277 F.3d at 1342, 1345. Second, it is not adequate to summarize and reject arguments without explaining why the PTAB accepts the prevailing argument. *See Cutsforth, Inc. v. MotivePower, Inc.*, 636 F. App'x 575, 578 (Fed. Cir. 2016) ("The majority of the [PTAB]'s Final Written Decision is spent summarizing the parties' arguments and offers only conclusory analysis of its own. While the decision does specify when it is rejecting a party's argument, the [PTAB] does not explain why it accepts the remaining arguments as its own analysis.

This leaves little explanation for why the [PTAB] found the claimed invention obvious."). Third, although reliance on common sense may be appropriate in some circumstances, *see KSR*, 550 U.S. at 421 ("Rigid preventative rules that deny factfinders recourse to common sense . . . are neither necessary under our case law nor consistent with it."), the PTAB cannot rely solely on common knowledge or common sense to support its findings, *see Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) ("[R]eferences to 'common sense' . . . cannot be used as a wholesale substitute for reasoned analysis and evidentiary support . . . ."); *see also In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998) (explaining that the Board of Patent Appeals and Interferences cannot simply invoke "the high level of skill in the art" as proof positive of its findings).

With these principles in mind, we turn to the PTAB's findings regarding motivation to combine. Here, the PTAB acknowledged that the key issue was "whether it would have been obvious to [a PHOSITA] to combine the cited references," *Medtronic*, 2015 WL 996352, at *6, and then found that independent claim 1 would have been obvious over a combination of Baccelli and either the SVS-PR brochure or the Telamon references, *see id.* at *5–8. In reaching this conclusion, the PTAB failed to explain the *reason why* a PHOSITA would have been motivated to modify either the SVS-PR or Telamon implants, in light of Baccelli, to place radiopaque markers "proximate to said medial plane" (i.e., near the middle of the implant), as the '156 patent teaches. The majority of the PTAB's analysis was limited to summaries of the parties' arguments, as the USPTO acknowledged during oral argument. *See* Oral Argument at 14:30–15:55, http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2015-1670.mp3. The PTAB began by summarizing Medtronic's and NuVasive's arguments on whether the "additional information" that could be obtained from placing radiopaque markers near the middle of the implant would benefit a PHOSITA. *See*

Medtronic, 2015 WL 996352, at *6–7 (citing, inter alia, J.A. 591 (Medtronic's expert's statement that a PHOSITA "would have considered it to be common sense" to place radiopaque markers along the medial plane "to provide additional information regarding the orientation or location of an implant")). The PTAB stated "[w]e are not persuaded by [NuVasive]'s argument, because the question is whether it would have been obvious to [a PHOSITA] to combine the cited references, and not whether any specific implants on the market contain a radiopaque marker in a central region." *Id.* at *6. In addition, the PTAB invoked the high level of skill in the art when it "agree[d]" with Medtronic's assertion that "the addition of markers along the medial plane would not confuse" a PHOSITA and found that NuVasive's argument "vastly underestimates the ordinary skill of surgeons in this field." *Id.* at *7 (citation omitted). However, the PTAB never actually made an explanation-supported finding that the evidence affirmatively proved that the PHOSITA would have sought this additional information.

The PTAB avers that it "effectively" adopted Medtronic's arguments, Oral Argument at 14:52–15:11, http://oralarguments.cafc.uscourts.gov/default.aspx?fl=2015-1670.mp3, but the PTAB neither expressly did so nor provided reasoned explanations for crediting the arguments. Medtronic's arguments amount to nothing more than conclusory statements that a PHOSITA would have been motivated to combine the prior art references to obtain additional information. In its summary of Medtronic's arguments, the PTAB never articulated why the additional information would benefit a PHOSITA when implanting a posterior lumbar interbody fusion implant, such as the implants disclosed by the SVS-PR brochure and the Telamon references. It also failed to explain the type of additional information a PHOSITA would obtain or how the PHOSITA would use that information. Although the PTAB did "credit the testimony" of NuVasive's expert that placing radiopaque markers along the medial

plane "would provide . . . better alignment of the implant," *Medtronic*, 2015 WL 996352, at *7 (internal quotation marks, brackets, and citation omitted), NuVasive's expert's statement was made in reference to benefits recognized *after* the priority date of the '156 patent, J.A. 4893 (explaining that these "uses were not disclosed in the cited prior art references"). This statement addresses neither the benefits that could have been obtained by combining the prior art references nor the PHOSITA's motivation to combine at the time of the invention.

In sum, the PTAB failed to articulate a *reason why* the PHOSITA would have been motivated to modify the SVS-PR or Telamon implants, in light of Baccelli, to obtain this additional information. Because we cannot "reasonably discern" the PTAB's reasoning as to motivation to combine, *Ariosa*, 805 F.3d at 1365 (citation omitted), judicial review cannot "meaningfully [be] achieved," *Lee*, 277 F.3d at 1342. Therefore, the PTAB's decision is vacated and the case remanded for additional PTAB findings and explanations regarding the PHOSITA's motivation to combine the prior art references.

CONCLUSION

We have considered the parties' remaining arguments and find them unpersuasive. For these reasons, the Final Written Decision of the U.S. Patent and Trademark Office's Patent and Trial Appeal Board is

VACATED AND REMANDED

COSTS

Each party shall bear its own costs.

United States Court of Appeals for the Federal Circuit

December 9, 2016

ERRATUM

2015-1670

IN RE: NUVASIVE, INC.,
Appellant

Decided: December 7, 2016
Precedential Opinion

Please note the following change:

On page 4, lines 8–9, delete "conclu-conclusion" and replace with "conclusion."

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

15-1670

In re: NUVASIVE, INC.,
Appellant

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Inter Partes Review no. IPR2013-00506.

MANDATE

In accordance with the judgment of this Court, entered December 7, 2016, and pursuant to Rule 41(a) of the Federal Rules of Appellate Procedure, the formal mandate is hereby issued.

FOR THE COURT

/s/ Peter R. Marksteiner
Peter R. Marksteiner
Clerk of Court

cc: Andrew Swanson Brown
Nathan K. Kelley
Joseph Matal
Grace J. Pak
Michael T. Rosato
Richard Torczon
Paul David Tripodi II
United States Patent and Trademark Office
Scott Weidenfeller

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
Stylesheet Version v1.2

EPAS ID: PAT3962842

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	NOTICE OF GRANT OF SECURITY INTEREST IN PATENTS

CONVEYING PARTY DATA

Name	Execution Date
NUVASIVE, INC.	02/08/2016
IMPULSE MONITORING, INC.	02/08/2016

RECEIVING PARTY DATA

Name:	BANK OF AMERICA, N.A., AS ADMINISTRATIVE AGENT
Street Address:	530 LYTTON AVENUE
City:	PALO ALTO
State/Country:	CALIFORNIA
Postal Code:	94301

PROPERTY NUMBERS Total: 535

Property Type	Number
Patent Number:	D652921
Patent Number:	D652922
Patent Number:	D652519
Patent Number:	D666292
Patent Number:	D666293
Patent Number:	D666294
Patent Number:	D493533
Patent Number:	D533875
Patent Number:	D752646
Application Number:	29559163
Patent Number:	D530423
Patent Number:	D594986
Patent Number:	D639741
Patent Number:	D639243
Patent Number:	D708747
Patent Number:	D733303
Application Number:	29508745
Patent Number:	D671645
Application Number:	29438216

Property Type	Number
Patent Number:	D599019
Application Number:	29496752
Application Number:	29545063
Application Number:	29474062
Application Number:	29479802
Patent Number:	D731063
Patent Number:	D734853
Application Number:	29446441
Patent Number:	D711537
Patent Number:	D621509
Patent Number:	D674092
Patent Number:	D735336
Patent Number:	D750252
Application Number:	29555472
Patent Number:	D741488
Application Number:	29543139
Patent Number:	D656610
Patent Number:	D658761
Patent Number:	D685475
Application Number:	29489679
Patent Number:	D725270
Application Number:	29530069
Patent Number:	D675320
Patent Number:	D696402
Patent Number:	D747485
Application Number:	29551272
Patent Number:	D721808
Application Number:	29515792
Patent Number:	D731061
Patent Number:	D745159
Application Number:	29547760
Application Number:	29504658
Application Number:	29508821
Application Number:	29509736
Application Number:	29550016
Patent Number:	6564078
Application Number:	14622600
Patent Number:	7079883

Property Type	Number
Patent Number:	7962191
Patent Number:	7693562
Patent Number:	8165653
Patent Number:	8489170
Patent Number:	9014776
Patent Number:	6266394
Patent Number:	6183518
Patent Number:	7819801
Patent Number:	7892173
Patent Number:	8303498
Patent Number:	8550994
Patent Number:	8696559
Application Number:	14171347
Patent Number:	6964674
Patent Number:	7901430
Patent Number:	7883527
Patent Number:	9277903
Application Number:	15063249
Patent Number:	6764452
Patent Number:	7582058
Application Number:	14297438
Application Number:	14297369
Patent Number:	7935051
Patent Number:	8192356
Patent Number:	8182423
Patent Number:	8187179
Patent Number:	8672840
Patent Number:	8708899
Patent Number:	8915846
Application Number:	14263797
Patent Number:	7664544
Application Number:	12427612
Patent Number:	8147421
Application Number:	14865683
Patent Number:	7470236
Patent Number:	8958869
Application Number:	14622585
Patent Number:	7963927

Property Type	Number
Patent Number:	8562539
Patent Number:	8641638
Patent Number:	7991463
Patent Number:	8337410
Patent Number:	8137284
Patent Number:	8192357
Patent Number:	8512235
Patent Number:	8679006
Patent Number:	8663100
Patent Number:	8956283
Patent Number:	9204871
Application Number:	14959454
Application Number:	15059215
Patent Number:	6923814
Patent Number:	6802844
Patent Number:	7691057
Patent Number:	8602982
Patent Number:	8753270
Patent Number:	8747307
Patent Number:	9301743
Application Number:	15058083
Patent Number:	8403841
Patent Number:	8114019
Patent Number:	8133173
Patent Number:	8172750
Patent Number:	8439832
Patent Number:	8343046
Patent Number:	8523768
Patent Number:	8562521
Patent Number:	6764489
Patent Number:	7341590
Patent Number:	6466817
Patent Number:	7177677
Patent Number:	6852126
Patent Number:	7887568
Patent Number:	8460384
Patent Number:	8475496
Patent Number:	9101484

Property Type	Number
Application Number:	14823315
Patent Number:	6500128
Patent Number:	7833251
Patent Number:	6739112
Patent Number:	7162850
Patent Number:	6760616
Patent Number:	7050848
Patent Number:	8090436
Application Number:	13221192
Patent Number:	8068912
Patent Number:	7920922
Patent Number:	8050769
Patent Number:	8055349
Patent Number:	8634904
Patent Number:	8812116
Patent Number:	9037250
Application Number:	14687745
Patent Number:	7776049
Patent Number:	6030401
Patent Number:	6251140
Patent Number:	6290724
Patent Number:	7522953
Patent Number:	8738123
Patent Number:	8977352
Application Number:	14618438
Patent Number:	8005535
Patent Number:	8027716
Patent Number:	8000782
Patent Number:	8265744
Patent Number:	8244343
Patent Number:	8548579
Patent Number:	8768450
Patent Number:	7722613
Patent Number:	7527649
Patent Number:	7905886
Patent Number:	6887248
Patent Number:	7776094
Patent Number:	7657308

Property Type	Number
Patent Number:	8255044
Patent Number:	8942801
Patent Number:	8821396
Patent Number:	8945004
Application Number:	14598043
Patent Number:	9265493
Application Number:	14994640
Patent Number:	8016767
Patent Number:	8355780
Patent Number:	8388527
Patent Number:	8556808
Patent Number:	8500634
Patent Number:	8628469
Patent Number:	8764649
Patent Number:	8753271
Patent Number:	7905840
Patent Number:	8303515
Patent Number:	8591432
Application Number:	14066098
Application Number:	15071540
Patent Number:	7918891
Application Number:	14921760
Patent Number:	8187334
Patent Number:	8246686
Patent Number:	8361156
Patent Number:	8608804
Patent Number:	8574301
Patent Number:	8685105
Patent Number:	8814940
Patent Number:	9180021
Patent Number:	9131947
Application Number:	14855156
Application Number:	11667365
Patent Number:	8538539
Patent Number:	8989866
Patent Number:	8876904
Application Number:	11665039
Application Number:	14526379

Property Type	Number
Patent Number:	7785253
Patent Number:	8568331
Application Number:	11883709
Patent Number:	6945973
Patent Number:	8262705
Patent Number:	7942826
Patent Number:	8784330
Application Number:	14338154
Patent Number:	8206312
Patent Number:	8500653
Application Number:	14959850
Patent Number:	8328851
Patent Number:	8870960
Patent Number:	9168149
Application Number:	14924385
Patent Number:	8442621
Patent Number:	7867277
Patent Number:	9226834
Application Number:	14601224
Patent Number:	8147521
Patent Number:	8652177
Application Number:	14183198
Patent Number:	8740783
Application Number:	14294304
Patent Number:	7815682
Patent Number:	8591431
Patent Number:	6093205
Patent Number:	8167915
Patent Number:	8568317
Application Number:	14881091
Patent Number:	8114162
Patent Number:	7887595
Patent Number:	8313430
Patent Number:	8827900
Patent Number:	9259144
Patent Number:	7338531
Patent Number:	7828855
Patent Number:	7214225

Property Type	Number
Patent Number:	8074591
Patent Number:	6638281
Patent Number:	7611522
Patent Number:	8834526
Patent Number:	8673005
Patent Number:	9186261
Application Number:	14931351
Patent Number:	8255045
Patent Number:	9295396
Application Number:	15080500
Patent Number:	8083796
Patent Number:	9168152
Application Number:	14924490
Patent Number:	8343163
Patent Number:	8591584
Patent Number:	8377135
Patent Number:	8372081
Application Number:	12364507
Patent Number:	9119572
Application Number:	14841270
Patent Number:	9101491
Application Number:	14823329
Patent Number:	8439922
Patent Number:	9192415
Application Number:	14947461
Patent Number:	8343190
Patent Number:	9060813
Patent Number:	9044280
Application Number:	14727676
Patent Number:	8506598
Patent Number:	8292923
Patent Number:	8480712
Patent Number:	8460860
Application Number:	13915569
Application Number:	12150513
Application Number:	13918723
Application Number:	13124608
Patent Number:	8328856

Property Type	Number
Patent Number:	8401632
Patent Number:	7476239
Patent Number:	8876851
Application Number:	14532316
Patent Number:	8623088
Patent Number:	9198696
Patent Number:	8088163
Patent Number:	8292960
Patent Number:	8715355
Patent Number:	5811094
Patent Number:	6355239
Patent Number:	6541024
Patent Number:	6863900
Application Number:	12661206
Application Number:	14744470
Application Number:	12908876
Patent Number:	9144501
Patent Number:	8876869
Patent Number:	8287597
Patent Number:	8920500
Patent Number:	9192482
Application Number:	14918137
Patent Number:	9211148
Application Number:	14970299
Patent Number:	8989349
Application Number:	14667619
Patent Number:	8357184
Patent Number:	8435269
Patent Number:	9050146
Patent Number:	8535320
Application Number:	14029724
Patent Number:	8012212
Patent Number:	8147551
Patent Number:	8591586
Patent Number:	7722673
Patent Number:	7569067
Patent Number:	7320689
Patent Number:	7628813

Property Type	Number
Patent Number:	7927337
Patent Number:	9072504
Patent Number:	8721725
Patent Number:	7267691
Patent Number:	7527629
Patent Number:	8070812
Patent Number:	8409285
Patent Number:	8192493
Patent Number:	7160303
Patent Number:	8983567
Patent Number:	8246657
Application Number:	12945705
Patent Number:	9138217
Patent Number:	8740983
Application Number:	13236600
Patent Number:	8795369
Application Number:	13077977
Patent Number:	7338526
Application Number:	14698667
Patent Number:	9017313
Application Number:	11928940
Application Number:	11929070
Patent Number:	8747476
Application Number:	14299203
Application Number:	13949174
Application Number:	13821224
Patent Number:	8840668
Patent Number:	8992579
Application Number:	13950277
Patent Number:	8940030
Application Number:	14606501
Patent Number:	8840622
Application Number:	14735128
Application Number:	13410213
Application Number:	13425380
Patent Number:	9198698
Application Number:	14949280
Patent Number:	9198692

Property Type	Number
Patent Number:	9307972
Application Number:	13434845
Patent Number:	7957831
Patent Number:	8549888
Application Number:	14049183
Patent Number:	8900137
Patent Number:	8974381
Patent Number:	9113853
Application Number:	14794709
Patent Number:	7942934
Application Number:	14792305
Application Number:	14177100
Application Number:	13684492
Patent Number:	8071083
Patent Number:	9247964
Application Number:	14977532
Application Number:	12424140
Application Number:	13663459
Application Number:	13648253
Patent Number:	8460685
Patent Number:	9198765
Application Number:	14918197
Application Number:	13666933
Application Number:	13668209
Patent Number:	8936626
Application Number:	12332728
Application Number:	13761039
Patent Number:	9066701
Application Number:	13815643
Application Number:	13830508
Application Number:	13830028
Patent Number:	9272072
Application Number:	15057879
Patent Number:	8002802
Patent Number:	7842074
Patent Number:	8801757
Application Number:	14458164
Patent Number:	9060815

Property Type	Number
Application Number:	14748048
Application Number:	14060558
Application Number:	14060561
Application Number:	14066589
Patent Number:	8758411
Application Number:	14073772
Application Number:	14535318
Application Number:	13830120
Application Number:	14178176
Application Number:	14214099
Application Number:	14217358
Application Number:	14216156
Application Number:	14216411
Application Number:	14217101
Application Number:	13874274
Application Number:	14285590
Patent Number:	RE45436
Patent Number:	RE45659
Application Number:	14667599
Application Number:	14842745
Patent Number:	7976546
Patent Number:	8092461
Patent Number:	8366715
Patent Number:	8317801
Patent Number:	8333771
Patent Number:	7758649
Patent Number:	8439952
Patent Number:	7981144
Application Number:	14052015
Patent Number:	9138329
Application Number:	14827972
Application Number:	12084471
Application Number:	14216509
Application Number:	14457108
Patent Number:	8221479
Patent Number:	8951293
Application Number:	14510107
Application Number:	14511038

Property Type	Number
Application Number:	14594272
Application Number:	14597085
Application Number:	14631839
Application Number:	14727831
Patent Number:	9204906
Application Number:	14623988
Application Number:	14703852
Application Number:	14239528
Application Number:	14756198
Application Number:	14456640
Application Number:	14856525
Application Number:	14856467
PCT Number:	US2014059974
Application Number:	14887245
Application Number:	62252248
Application Number:	62175624
Application Number:	62271719
Application Number:	15000033
Application Number:	62278873
Application Number:	15045084
Application Number:	15047049
Application Number:	14634729
Application Number:	62148622
Application Number:	62268430
Application Number:	62160544
Application Number:	62190251
Application Number:	62165078
Application Number:	62261737
Application Number:	62261186
Patent Number:	8177816
Patent Number:	8382842
Patent Number:	7470279
Patent Number:	7160300
Patent Number:	9173682
Application Number:	14553246
Application Number:	14553327
Application Number:	14553408
Application Number:	14553471

Property Type	Number
Application Number:	14738195
Patent Number:	8162948
Patent Number:	8292892
Patent Number:	8100915
Patent Number:	8377067
Patent Number:	9055978
Application Number:	14245660
Patent Number:	9101415
Application Number:	14245775
Patent Number:	9050148
Application Number:	14601834
Application Number:	11328481
Application Number:	12927673
Application Number:	14482562
Patent Number:	8066739
Patent Number:	8894657
Application Number:	13901672
Application Number:	14549201
Patent Number:	9050139
Application Number:	14733222
Application Number:	14041552
Patent Number:	8152810
Patent Number:	8273089
Patent Number:	9211150
Application Number:	13507471
Application Number:	12072354
Application Number:	13507822
Application Number:	13385997
Application Number:	14887246
Application Number:	62262491
Application Number:	62262530
Application Number:	62257158
Application Number:	62306201
Application Number:	62298279
Application Number:	62263945
Application Number:	62266888
Application Number:	62307942
Application Number:	62272618

Property Type	Number
Application Number:	62273350
Application Number:	62273377
Application Number:	62273445
Application Number:	62273390
Application Number:	62273441
Application Number:	62273443
Application Number:	62286166
Application Number:	62294505
Application Number:	62294884
Application Number:	62294979
Application Number:	62294988
Application Number:	62294975
Application Number:	62295001
Application Number:	62294422
Application Number:	62294440
Application Number:	62294989
Application Number:	62294990
Application Number:	62294992
Application Number:	62295008
Application Number:	15044947
Application Number:	15048928
Application Number:	62302725

CORRESPONDENCE DATA

Fax Number: (704)444-8857

Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

Phone: 7043432000
Email: twitcher@mcguirewoods.com
Correspondent Name: TERRY L. WITCHER, PARALEGAL
Address Line 1: MCGUIREWOODS LLP
Address Line 2: 201 N. TRYON STREET, SUITE 3000
Address Line 4: CHARLOTTE, NORTH CAROLINA 28202

ATTORNEY DOCKET NUMBER:	2068279-3006
NAME OF SUBMITTER:	TERRY L. WITCHER, PARALEGAL
SIGNATURE:	/s/ Terry L. Witcher
DATE SIGNED:	07/14/2016
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 49

source=Security Interest in Patents#page1.tif
source=Security Interest in Patents#page2.tif
source=Security Interest in Patents#page3.tif
source=Security Interest in Patents#page4.tif
source=Security Interest in Patents#page5.tif
source=Security Interest in Patents#page6.tif
source=Security Interest in Patents#page7.tif
source=Security Interest in Patents#page8.tif
source=Security Interest in Patents#page9.tif
source=Security Interest in Patents#page10.tif
source=Security Interest in Patents#page11.tif
source=Security Interest in Patents#page12.tif
source=Security Interest in Patents#page13.tif
source=Security Interest in Patents#page14.tif
source=Security Interest in Patents#page15.tif
source=Security Interest in Patents#page16.tif
source=Security Interest in Patents#page17.tif
source=Security Interest in Patents#page18.tif
source=Security Interest in Patents#page19.tif
source=Security Interest in Patents#page20.tif
source=Security Interest in Patents#page21.tif
source=Security Interest in Patents#page22.tif
source=Security Interest in Patents#page23.tif
source=Security Interest in Patents#page24.tif
source=Security Interest in Patents#page25.tif
source=Security Interest in Patents#page26.tif
source=Security Interest in Patents#page27.tif
source=Security Interest in Patents#page28.tif
source=Security Interest in Patents#page29.tif
source=Security Interest in Patents#page30.tif
source=Security Interest in Patents#page31.tif
source=Security Interest in Patents#page32.tif
source=Security Interest in Patents#page33.tif
source=Security Interest in Patents#page34.tif
source=Security Interest in Patents#page35.tif
source=Security Interest in Patents#page36.tif
source=Security Interest in Patents#page37.tif
source=Security Interest in Patents#page38.tif
source=Security Interest in Patents#page39.tif
source=Security Interest in Patents#page40.tif
source=Security Interest in Patents#page41.tif
source=Security Interest in Patents#page42.tif
source=Security Interest in Patents#page43.tif
source=Security Interest in Patents#page44.tif
source=Security Interest in Patents#page45.tif
source=Security Interest in Patents#page46.tif
source=Security Interest in Patents#page47.tif
source=Security Interest in Patents#page48.tif

source=Security Interest in Patents#page49.tif

NOTICE OF GRANT OF SECURITY INTEREST IN PATENTS

United States Patent and Trademark Office

Ladies and Gentlemen:

Please be advised that pursuant to the Security and Pledge Agreement dated as of February 8, 2016 (as amended, modified, extended, restated, renewed, replaced, or supplemented from time to time, the "Agreement") by and among the Grantors party thereto (each an "Grantor" and collectively, the "Grantors") and Bank of America, N.A., as administrative agent (the "Administrative Agent") for the Secured Parties referenced therein, the undersigned Grantor has granted a continuing security interest in and continuing lien upon the patents and patent applications shown on Schedule 1 attached hereto to the Administrative Agent for the ratable benefit of the Secured Parties.

Each of the undersigned Grantors and the Administrative Agent, on behalf of the Secured Parties, hereby acknowledge and agree that the security interest in the foregoing patents and patent applications (a) may only be terminated in accordance with the terms of the Agreement and (b) is not to be construed as an assignment of any patent or patent application.

Very truly yours,

GRANTORS:

NUVASIVE, INC.
IMPULSE MONITORING, INC.

By:_____
Name: Jeremie Sylvain
Title: Authorized Signatory

Acknowledged and Accepted:

BANK OF AMERICA, N.A., as Administrative Agent

By: _____
Name: Tiffany Shin
Title: Assistant Vice President

Schedule 1

See attached.

Reference	Name/Title	Current Owner	CC	Appl. No.	Filing Date	Reg. No.	Reg. Date	Notes	Case Status
PD0023DES1	Dilator	NuVasive, Inc.	US	29/360,368	2010-04-23	D652,921	2012-01-24		Registered
PD0023DES2	Dilator	NuVasive, Inc.	US	29/360,369	2010-04-23	D652,922	2012-01-24		Registered
PD0023DES3	Dilator	NuVasive, Inc.	US	29/360,370	2010-04-23	D652,519	2012-01-17		Registered
PD0023DES4	Dilator	NuVasive, Inc.	US	29/411,162	2012-01-17	D666,292	2012-08-28		Registered
PD0023DES5	Dilator	NuVasive, Inc.	US	29/411,651	2012-01-24	D666,293	2012-08-28		Registered
PD0023DES6	Dilator	NuVasive, Inc.	US	29/411,652	2012-01-24	D666,294	2012-08-28		Registered
PD0074DES1	Intervertebral Implant		US	29/176,060	2003-02-14	D493,533	2004-07-27	No assignment	Registered
PD0074EPDES1	Intervertebral Implant	NuVasive, Inc.	EM	000069562	2003-08-14	000069562	2003-12-09		Registered
PD0099DES1	Graphic User Interface for a Medical Monitor		US	29/192,063	2003-10-17	D533,875	2006-12-19	Assignment from inventors in progress	Registered
PD0099DES3	Graphical User Interface for a Medical Monitor		US	29/399,922	2011-08-19	D752,646	2016-03-29	Assignment from inventors in progress	Registered
PD0099DES4	Graphic User Interface for a Medical Monitor		US	29/559,163	2016-03-24			Assignment from inventors in progress	Pending
PD0104DES1	Intervertebral Implant	NuVasive, Inc.	US	29/227,372	2005-04-11	D530,423	2006-10-17		Registered
PD0104DES2	Intervertebral Implant	NuVasive, Inc.	US	29/306,656	2009-02-28	D594,986	2009-06-23		Registered
PD0137DES1	Electrode Connector	NuVasive, Inc.	US	29/362,506	2010-05-26	D639,741	2011-06-14		Registered
PD0137DES2	Electrode Connector	NuVasive, Inc.	US	29/362,507	2010-05-26	D639,243	2011-06-07		Registered
PD0162DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/381,796	2010-12-22	D708,747	2014-07-08		Registered
PD0163DES1	Intervertebral Implant	NuVasive, Inc.	US	29/439,479	2012-12-11	D733,303	2015-06-30		Registered
PD0197DES1	Favored Angle Screw	NuVasive, Inc.	US	29/508,745	2014-11-10				Pending
PD0225DES1	Intervertebral Implant	NuVasive, Inc.	US	29/376,166	2010-10-01	D671,645	2012-11-27		Registered
PD0225DES2	Intervertebral Implant	NuVasive, Inc.	US	29/438,216	2012-11-27				Pending
PD0228DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/304,928	2008-03-10	D599,019	2009-08-25		Registered
PD0251DES1	Spinal Implant Insertion System	NuVasive, Inc.	US	29/496,752	2014-07-16				Pending
PD0256DES1	Surgical Fixation System	NuVasive, Inc.	US	29/545,063	2015-11-09				Pending
PD0268DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/474,062	2014-05-15				Pending
PD0271DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/479,802	2014-01-20				Pending
PD0291DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/475,314	2013-12-02	D731,063	2015-06-02		Registered
PD0313DES1	Bone Plate	NuVasive, Inc.	US	29/446,437	2013-02-22	D734,853	2015-07-21		Registered
PD0313DES2	Bone Plate	NuVasive, Inc.	US	29/446,441	2013-02-22				Pending
PD0314DES1	Intervertebral Implant	NuVasive, Inc.	US	29/427,492	2012-07-18	D711,537	2014-08-19		Registered
PD0330DES1	Intervertebral Implant	NuVasive, Inc.	US	29/326,326	2008-10-15	D621,509	2010-08-10		Registered
PD0330DES2	Intervertebral Implant	NuVasive, Inc.	US	29/367,504	2010-08-09	D674,092	2013-01-08		Registered

PD0330DES4	Intervertebral Implant	NuVasive, Inc.	US	29/448,485	2013-03-12	D735,336	2015-07-28		Registered
PD0330DES5	Intervertebral Implant	NuVasive, Inc.	US	29/532,085	2015-07-01	D750,252	2016-02-23		Registered
PD0330DES6	Intervertebral Implant	NuVasive, Inc.	US	29/555,472	2016-02-22				Pending
PD0338DES1	Spinal Fusion Implant	NuVasive, Inc.	US	29/486,401	2014-03-28	D741,488	2015-10-20		Registered
PD0338DES2	Spinal Fusion Implant	NuVasive, Inc.	US	29/543,139	2015-10-21				Pending
PD0342DES1	Spinal Distraction Instrument	NuVasive, Inc.	US	29/393,737	2011-06-08	D656,610	2012-03-27		Registered
PD0356DES1	Spinal Implant	NuVasive, Inc.	US	29/369,140	2010-09-02	D658,761	2012-05-01		Registered
PD0356DES2	Spinal Implant	NuVasive, Inc.	US	29/419,794	2012-05-01	D685,475	2013-07-02		Registered
PD0426DES1	Spinous Process Plate	NuVasive, Inc.	US	29/489,679	2014-05-01				Pending
PD0438DES1	Intervertebral Impalnt	NuVasive, Inc.	US	29/459,170	2013-06-26	D725,270	2015-03-24		Registered
PD0470DES1	Retractor Blade	NuVasive, Inc.	US	29/530,069	2015-06-12				Pending
PD0488DES1	Intervertebral Implant	NuVasive, Inc.	US	29/405,583	2011-11-03	D675,320	2013-01-29		Registered
PD0488DES2	Intervertebral Implant	NuVasive, Inc.	US	29/444,346	2013-01-29	D696,402	2013-12-24		Registered
PD0488DES3	Intervertebral Implant	NuVasive, Inc.	US	29/477,585	2013-12-23	D747,485	2016-01-12		Registered
PD0488DES4	Intervertebral Implant	NuVasive, Inc.	US	29/551,272	2016-01-12				Pending
PD0489DES1	Intervertebral Implant	NuVasive, Inc.	US	29/405,584	2011-11-03	D721,808	2015-01-27		Registered
PD0489DES2	Intervertebral Implant	NuVasive, Inc.	US	29/515,792	2015-01-27				Pending
PD0499DES1	Intervertebral Implant	NuVasive, Inc.	US	29/438,314	2012-11-28	D731,061	2015-06-02	Co-ownership, no assignment from Troy Walters	Registered
PD0561DES1	Surgical Instrument	NuVasive, Inc.	US	29/460,276	2013-07-09				Pending
PD0577DES1	Intervertebral Implant	NuVasive, Inc.	US	29/469,512	2013-10-10	D745,159	2015-12-08		Registered
PD0577DES2	Intervertebral Implant	NuVasive, Inc.	US	29/547,760	2015-12-07				Pending
PD0610DES1	Anterior Cervical Bone Plate	NuVasive, Inc.	US	29/504,658	2014-10-08				Pending
PD0619DES1	Combined Intradiscal Insertion Tool and Intradiscal Shim	NuVasive, Inc.	US	29/508,821	2014-11-11				Pending
PD0620DES1	Intervertebral Implant	NuVasive, Inc.	US	29/509,736	2014-11-20				Pending
PD0669DES1	Interspinous Process Spacer	NuVasive, Inc.	US	29/550,016	2015-12-30				Pending
PU0007US1	Nerve Surveillance Cannulae Systems	NuVasive, Inc.	US	09/325,998	1999-06-04	6,564,078	2003-05-13	Security Interest	Registered
PU0007US10	Surgical Access and Nerve Surveillance	NuVasive, Inc.	US	14/622,600	2015-02-13				Pending
PU0007US2	Nerve Surveillance Cannulae Systems	NuVasive, Inc.	US	10/431,619	2003-05-07	7,079,883	2006-07-18		Registered
PU0007US4	Nerve Surveillance Cannulae Systems	NuVasive, Inc.	US	11/982,254	2007-10-31	7,962,191	2011-06-14		Registered

PU0007US5	Nerve Surveillance Cannulae Systems	NuVasive, Inc.	US	11/982,250	2007-10-31	7,693,562	2010-04-06		Registered
PU0007US7	Surgical Access and Nerve Surveillance	NuVasive, Inc.	US	13/160,477	2011-06-14	8,165,653	2012-04-24		Registered
PU0007US8	Surgical Access and Nerve Surveillance	NuVasive, Inc.	US	13/494,908	2012-06-12	8,489,170	2013-07-16		Registered
PU0007US9	Surgical Access and Nerve Surveillance	NuVasive, Inc.	US	13/943,725	2013-07-16	9,014,776	2015-04-21		Registered
PU0008US1	Image Intensifier Reticle System	NuVasive, Inc.	US	09/326,740	1999-06-04	6,266,394	2001-07-24		Registered
PU0013US1	Method of Replacing Nucleus Pulposus and Repairing the Intervertebral Disk	NuVasive, Inc.	US	09/274,217	1999-03-23	6,183,518	2001-02-06		Registered
PU0014US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	10/789,797	2004-02-27	7,819,801	2010-10-26		Registered
PU0014US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/632,373	2009-12-07	7,892,173	2011-02-22		Registered
PU0014US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/030,798	2011-02-18	8,303,498	2012-11-06		Registered
PU0014US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/668,504	2012-11-05	8,550,994	2013-10-08		Registered
PU0014US5	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/756,951	2013-02-01	8,696,559	2014-04-15		Registered
PU0014US6	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/171,347	2014-02-03				Pending
PU0015US1	Annulotomy Closure Device	NuVasive, Inc.	US	09/663,250	2000-09-15	6,964,674	2005-11-15		Registered
PU0015US2	Annulotomy Closure Device and Related Methods	NuVasive, Inc.	US	11/078,541	2005-03-11	7,901,430	2011-03-08		Registered
PU0015US3	Annulotomy Closure Device and Related Methods	NuVasive, Inc.	US	11/982,253	2007-10-31	7,883,527	2011-02-08		Registered
PU0015US4	Annulotomy Closure Device and Related Methods	NuVasive, Inc.	US	11/981,859	2007-10-31	9,277,903	2016-03-08		Registered
PU0015US5	Annulotomy Closure Device and Related Methods	NuVasive, Inc.	US	15/063,249	2016-03-07				Pending
PU0021US1	Bone Graft Harvester	NuVasive, Inc.	US	09/717,838	2000-11-21	6,764,452	2004-07-20		Registered
PU0023US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	10/608,362	2003-06-26	7,582,058	2009-09-01		Registered
PU0023US10	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/297,438	2014-06-05				Pending
PU0023US11	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/297,369	2014-06-05				Pending

PU0023US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/428,081	2009-04-22	7,935,051	2011-05-03		Registered
PU0023US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/635,418	2009-12-10	8,192,356	2012-06-05		Registered
PU0023US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/649,604	2009-12-30	8,182,423	2012-05-22		Registered
PU0023US5	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/650,336	2009-12-30	8,187,179	2012-05-29		Registered
PU0023US6	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/466,398	2012-05-08	8,672,840	2014-03-18		Registered
PU0023US7	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/757,035	2013-02-01	8,708,899	2014-04-29		Registered
PU0023US8	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/865,598	2013-04-18	8,915,846	2014-12-23		Registered
PU0023US9	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/263,797	2014-04-28				Pending
PU0025AU1	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	AU	2002353954	2002-10-30	2002353954	2008-11-13		Registered
PU0025AU2	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	AU	2008240341	2002-10-30	2008240341 B2	2012-07-19		Registered
PU0025DE1	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	DE	02789358.5	2002-10-30	60238861.9-08	2011-01-05		Registered
PU0025GB1	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	GB	02789358.5	2002-10-30	1450681	2011-01-05		Registered
PU0025JP1	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	JP	2003-539520	2002-10-30	4340153	2009-07-10		Registered
PU0025US1	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	US	10/836,105	2002-10-30	7,664,544	2010-02-16		Registered
PU0025US2	System and Methods for Performing Percutaneous Pedicle Integrity Assessments	NuVasive, Inc.	US	12/427,612	2009-04-21				Pending
PU0027AU2	System and Methods for Determining Direction to a Nerve	NuVasive, Inc.	AU	2008200066	2003-01-15	2008200066	2012-01-12		Registered
PU0027EP1	System and Methods for Determining Direction to a Nerve	NuVasive, Inc.	EP	03710727.3	2003-01-15				Pending

PU0027JP1	System and Methods for Determining Direction to a Nerve	NuVasive, Inc.	JP	2004-566886	2003-01-15	4397817	2009-10-30		Registered
PU0027US1	System and Methods for Determining Direction to a Nerve	NuVasive, Inc.	US	11/182,545	2003-01-15	8,147,421	2012-04-03		Registered
PU0027US3	System and Methods for Determining Direction to a Nerve	NuVasive, Inc.	US	14/865,683	2015-09-25				Pending
PU0028AU1	Electromyography System	NuVasive, Inc.	AU	22517/01	2000-11-24	779567	2005-05-26		Registered
PU0028EP1	Electromyography System	NuVasive, Inc.	EP	00986240.0	2000-11-24				Pending
PU0028JP1	Electromyography System	NuVasive, Inc.	JP	2001-539347	2000-11-24	4854900	2011-11-04		Registered
PU0028US1	Electromyography System	NuVasive, Inc.	US	09/722,070	2000-11-24	7,470,236	2008-12-30		Registered
PU0028US10	Electromyography System	NuVasive, Inc.	US	13/726,110	2012-12-22	8,958,869	2015-02-17		Registered
PU0028US11	Electromyography System	NuVasive, Inc.	US	14/622,585	2015-02-13				Pending
PU0028US2	Electromyography System	NuVasive, Inc.	US	10/830,189	2004-04-21	7,963,927	2011-06-21		Registered
PU0028US3	Electromyography System	NuVasive, Inc.	US	11/894,987	2007-08-21	8,562,539	2013-10-22		Registered
PU0028US4	Electromyography System	NuVasive, Inc.	US	11/981,889	2007-10-31	8,641,638	2014-02-04		Registered
PU0028US5	Electromyography System	NuVasive, Inc.	US	11/982,238	2007-10-31	7,991,463	2011-08-02		Registered
PU0028US8	Electromyography System	NuVasive, Inc.	US	13/196,784	2011-08-02	8,337,410	2012-12-25		Registered
PU0029US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	10/682,568	2003-10-08	8,137,284	2012-03-20		Registered
PU0029US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/650,271	2009-12-30	8,192,357	2012-06-05		Registered
PU0029US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/486,093	2012-06-01	8,512,235	2013-08-20		Registered
PU0029US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/756,908	2013-02-01	8,679,006	2014-03-25		Registered
PU0029US5	Sugical Access System and Related Methods	NuVasive, Inc.	US	14/018,173	2013-09-04	8,663,100	2014-03-04		Registered
PU0029US6	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/195,227	2014-03-03	8,956,283	2015-02-17		Registered
PU0029US7	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/599,237	2015-01-16	9,204,871	2015-12-08		Registered
PU0029US8	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/959,454	2015-12-04				Pending
PU0029US9	Surgical Access System and Related Methods	NuVasive, Inc.	US	15/059,215	2016-03-02				Pending
PU0032US1	System and Methods for Cervical Spinal Fusion	NuVasive, Inc.	US	10/283,429	2002-10-29	6,923,814	2005-08-02		Registered
PU0038AU1	Spinal Alignment Apparatus and Methods	NuVasive, Inc.	AU	2002252625	2002-03-26	2002252625	2007-10-11		Registered

PU0038US1	Spinal Alignment Apparatus and Methods	NuVasive, Inc.	US	10/105,971	2002-03-25	6,802,844	2004-10-12		Registered
PU0039US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	10/759,811	2004-01-16	7,691,057	2010-04-06		Registered
PU0039US10	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/856,648	2013-04-04	8,602,982	2013-12-10		Registered
PU0039US11	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/955,950	2013-07-31	8,753,270	2014-06-17		Registered
PU0039US12	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/018,209	2013-09-04	8,747,307	2014-06-10		Registered
PU0039US13	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/287,982	2014-05-27	9,301,743	2016-04-05		Registered
PU0039US14	Surgical Access System and Related Methods	NuVasive, Inc.	US	15/058,083	2016-03-01				Pending
PU0039US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/636,860	2009-12-14	8,403,841	2013-03-26		Registered
PU0039US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/650,123	2009-12-30	8,114,019	2012-02-14		Registered
PU0039US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/650,301	2009-12-30	8,133,173	2012-03-13		Registered
PU0039US5	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/725,685	2010-03-17	8,172,750	2012-05-08		Registered
PU0039US6	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/984,368	2011-01-04	8,439,832	2013-05-14		Registered
PU0039US7	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/417,499	2012-03-12	8,343,046	2013-01-01		Registered
PU0039US8	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/466,531	2012-05-08	8,523,768	2013-09-03		Registered
PU0039US9	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/756,883	2013-02-01	8,562,521	2013-10-22		Registered
PU0040US1	Hinged Anterior Thoracic/Lumbar Plate	NuVasive, Inc.	US	10/108,287	2002-03-27	6,764,489	2004-07-20		Registered
PU0040US2	Hinged Anterior Thoracic/Lumbar Plate	NuVasive, Inc.	US	10/860,850	2004-06-03	7,341,590	2008-03-11		Registered
PU0042AU2	Nerve Proximity and Status Detection System and Method	NuVasive, Inc.	AU	2007200123	2001-06-08	2007200123	2008-11-13		Registered
PU0042JP1	Nerve Proximity and Status Detection System and Method	NuVasive, Inc.	JP	2002-501334	2001-06-08	5405706	2013-11-08		Registered
PU0042US1	Nerve Proximity and Status Detection System and Method	NuVasive, Inc.	US	09/590,632	2000-06-08	6,466,817	2002-10-15		Registered

PU0042US2	Nerve Proximity and Status Detection System and Method	NuVasive, Inc.	US	10/271,388	2002-10-14	7,177,677	2007-02-13		Registered
PU0050CH2	Stackable Interlocking Intervertebral Suport System	NuVasive, Inc.	CH	07025241.6	2001-07-13	1929978	2013-01-23		Registered
PU0050DE2	Stackable Interlocking Intervertebral Suport System	NuVasive, Inc.	DE	07025241.6	2001-07-13	1929978	2013-01-23		Registered
PU0050GB2	Stackable Interlocking Intervertebral Suport System	NuVasive, Inc.	GB	07025241.6	2001-07-13	1929978	2013-01-23		Registered
PU0050US1	Stackable Interlocking Intervertebral Support System	NuVasive, Inc.	US	09/904,179	2001-07-11	6,852,126	2005-02-08		Registered
PU0050US2	Stackable Spinal Support System and Related Methods	NuVasive, Inc.	US	11/053,016	2005-02-08	7,887,568	2011-02-15		Registered
PU0050US3	Stackable Spinal Support System	NuVasive, Inc.	US	11/981,858	2007-10-31	8,460,384	2013-06-11		Registered
PU0050US4	Stackable Spinal Support System	NuVasive, Inc.	US	11/982,251	2007-10-31	8,475,496	2013-07-02		Registered
PU0050US5	Stackable Interlocking Intervertebral Suport System	NuVasive, Inc.	US	13/915,554	2013-06-11	9,101,484	2015-08-11		Registered
PU0050US6	Stackable Interlocking Intervertebral Suport System	NuVasive, Inc.	US	14/823,315	2015-08-11				Pending
PU0052US1	Nerve Movement and Status Detection System and Method	NuVasive, Inc.	US	09/877,713	2001-06-08	6,500,128	2002-12-31		Registered
PU0054US1	System and Method for Performing Spinal Fixation	NuVasive, Inc.	US	11/031,506	2005-01-06	7,833,251	2010-11-16		Registered
PU0055US1	Bone Allograft Packaging System	NuVasive, Inc.	US	09/687,611	2000-10-11	6,739,112	2004-05-25		Registered
PU0055US2	Method of Packaging a bone allograft intended for a Spinal Fusion Procedure	NuVasive, Inc.	US	10/854,663	2004-05-25	7,162,850	2007-01-16		Registered
PU0059US1	Tissue Discrimination and Applications in Medical Proceudres	NuVasive, Inc.	US	09/860,648	2001-05-18	6,760,616	2004-07-06		Registered
PU0059US2	Tissue Discrimination and Applications in Medical Proceudres	NuVasive, Inc.	US	10/812,038	2004-03-29	7,050,848	2006-05-23		Registered
PU0059US4	Tissue Discrimination and Applications in Medical Proceudres	NuVasive, Inc.	US	12/609,004	2009-10-29	8,090,436	2012-01-03		Registered
PU0059US5	Tissue Discrimination and Applications in Medical Proceudres	NuVasive, Inc.	US	13/221,192	2011-08-30				Pending
PU0062AU2	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	AU	2008202081	2002-07-11	2008202081	2011-09-08		Registered
PU0062AU3	System and Methods for Determining Nerve Proximity,	NuVasive, Inc.	AU	2011202118	2002-07-11	2011202118	2013-08-29		Registered

	Direction, and Pathology During Surgery								
PU0062AU4	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	AU	2013204803	2002-07-11	2013204803 B2	2015-11-05		Registered
PU0062AU5	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	AU	2015246103	2002-07-11				Pending
PU0062EP1	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	EP	02756464.0	2002-07-11				Pending
PU0062JP1	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	JP	2003-511700	2002-07-11	4295086	2009-04-17		Registered
PU0062US1	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	10/754,899	2002-07-11	8,068,912	2011-11-29		Registered
PU0062US2	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	12/711,937	2010-02-24	7,920,922	2011-04-05		Registered
PU0062US3	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	12/434,303	2009-05-01	8,050,769	2011-11-01		Registered
PU0062US4	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	13/080,493	2011-04-05	8,055,349	2011-11-08		Registered
PU0062US5	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	13/292,065	2011-11-08	8,634,904	2014-01-21		Registered
PU0062US6	System and Methods for Determining Nerve Proximity, Direction, and Pathology During	NuVasive, Inc.	US	13/465,666	2012-05-07	8,812,116	2014-08-19		Registered

	Surgery								
PU0062US7	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	13/767,355	2013-02-14	9,037,250	2015-05-19		Registered
PU0062US8	System and Methods for Determining Nerve Proximity, Direction, and Pathology During Surgery	NuVasive, Inc.	US	14/687,745	2015-04-15				Pending
PU0063US1	Spinal Implant Inserter, Implant, and Method	NuVasive, Inc.	US	10/264,307	2002-10-02	7,776,049	2010-08-17		Registered
PU0064US1	Vertebral Endplate Decorticator and Osteophyte Resector	NuVasive, Inc.	US	09/168,306	1998-10-07	6,030,401	2000-02-29		Registered
PU0067US1	Interlocking Spinal Inserts	NuVasive, Inc.	US	09/320,236	1999-05-26	6,251,140	2001-06-26		Registered
PU0070US1	Methods for Separating and Stabilizing Adjacent Vertebrae	NuVasive, Inc.	US	09/320,161	1999-05-26	6,290,724	2001-09-18		Registered
PU0071EP1	Systems and Methods for Performing Surgery Procedures and Assessments	NuVasive, Inc.	EP	02778359.6	2002-09-25				Pending
PU0071EP2	Systems and Methods for Performing Surgery Procedures and Assessments	NuVasive, Inc.	EP	12001129.1	2002-09-25				Pending
PU0071US1	System and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	10/809,280	2002-09-25	7,522,953	2009-04-21		Registered
PU0071US10	Systems and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	13/763,816	2013-02-11	8,738,123	2014-05-27		Registered
PU0071US11	Systems and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	14/278,862	2014-05-15	8,977,352	2015-03-10		Registered
PU0071US12	Systems and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	14/618,438	2015-02-10				Pending
PU0071US3	System and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	12/423,559	2009-04-14	8,005,535	2011-08-23		Registered
PU0071US4	System and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	12/426,792	2009-04-20	8,027,716	2011-09-27		Registered
PU0071US5	System and Methods for	NuVasive, Inc.	US	12/628,549	2009-12-01	8,000,782	2011-08-16		Registered

	Performing Surgical Procedures and Assessments								
PU0071US6	System and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	13/210,977	2011-08-16	8,265,744	2012-09-11		Registered
PU0071US7	System and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	13/215,791	2011-08-23	8,244,343	2012-08-14		Registered
PU0071US8	System and Method for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	13/568,236	2012-08-07	8,548,579	2013-10-01		Registered
PU0071US9	Systems and Methods for Performing Surgical Procedures and Assessments	NuVasive, Inc.	US	13/762,624	2013-02-08	8,768,450	2014-07-01		Registered
PU0072US1	Systems and Methods for Removing Body Tissue	NuVasive, Inc.	US	10/527,538	2002-09-11	7,722,613	2010-05-25		Registered
PU0074US2	Intervertebral Implant and Related Methods	NuVasive, Inc.	US	10/367,441	2003-02-14	7,527,649	2009-05-05		Registered
PU0089US1	System and Methods for Performing Transforaminal Lumbar Interbody Fusion	NuVasive, Inc.	US	10/887,542	2004-07-07	7,905,886	2011-03-15		Registered
PU0090US2	Bone Blocks and Methods for Inserting Bone Blocks into Intervertebral Spaces	NuVasive, Inc.	US	10/032,121	2001-12-21	6,887,248	2005-05-03		Registered
PU0090US3	Spinal Implants and Methods for Inserting Spinal Implants Into Intervertebral Spaces	NuVasive, Inc.	US	11/121,394	2005-05-03	7,776,094	2010-08-17		Registered
PU0092AU1	Systems and Methods for Performing Dynamic Pedicle Integrity Assessments	NuVasive, Inc.	AU	2004263152	2004-08-05	2004263152	2009-12-10		Registered
PU0092EP1	Systems and Methods for Performing Dynamic Pedicle Integrity Assessments	NuVasive, Inc.	EP	04780392.9	2004-08-05				Pending
PU0092JP1	Systems and Methods for Performing Dynamic Pedicle Integrity Assessments	NuVasive, Inc.	JP	2006-522771	2004-08-05	4436836	2010-01-08		Registered
PU0092US1	Systems and Methods for Performing Dynamic Pedicle Integrity Assessments	NuVasive, Inc.	US	11/061,184	2004-08-05	7,657,308	2010-02-02		Registered
PU0092US2	Systems and Methods for Performing Dynamic Pedicle	NuVasive, Inc.	US	12/699,017	2010-02-02	8,255,044	2012-08-28		Registered

	Integrity Assessments								
PU0095AU1	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2004275877	2004-09-27	2004275877	2008-12-18		Registered
PU0095AU2	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2008251999	2004-09-27	2008251999	2011-11-03		Registered
PU0095AU3	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2011239260	2004-09-27	2011239260	2013-09-12		Registered
PU0095AU4	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2013204802	2004-09-27	2013204802			Pending
PU0095AU5	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2016200573	2004-09-27				Pending
PU0095EP1	Surgical Access System and Related Methods	NuVasive, Inc.	EP	04785182.9	2004-09-27				Pending
PU0095JP1	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2006-528306	2004-09-27	4463819	2010-02-26		Registered
PU0095JP2	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2009-284152	2004-09-27	5124556	2012-11-02		Registered
PU0095JP3	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2012-084693	2004-09-27	5689846	2015-02-06		Registered
PU0095JP4	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2013-254978	2004-09-27				Pending
PU0095US10	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/299,800	2014-06-09	8,942,801	2015-01-27		Registered
PU0095US11	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/300,003	2014-06-09	8,821,396	2014-09-02		Registered
PU0095US12	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/449,313	2014-08-01	8,945,004	2015-02-03		Registered
PU0095US13	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/598,043	2015-01-15				Pending
PU0095US14	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/599,313	2015-01-16	9,265,493	2016-02-23		Registered
PU0095US15	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/994,640	2016-01-13				Pending
PU0095US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/789,284	2007-04-23	8,016,767	2011-09-13		Registered
PU0095US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/623,016	2009-11-20	8,355,780	2013-01-15		Registered
PU0095US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/650,776	2009-12-31	8,388,527	2013-03-05		Registered
PU0095US5	Surgical Access System and	NuVasive, Inc.	US	13/742,268	2013-01-15	8,556,808	2013-10-15		Registered

	Related Methods								
PU0095US6	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/743,673	2013-01-17	8,500,634	2013-08-06		Registered
PU0095US7	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/954,550	2013-07-30	8,628,469	2014-01-14		Registered
PU0095US8	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/052,271	2013-10-11	8,764,649	2014-07-01		Registered
PU0095US9	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/153,777	2014-01-13	8,753,271	2014-06-17		Registered
PU0098US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	10/967,668	2004-10-18	7,905,840	2011-03-15		Registered
PU0098US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/635,869	2009-12-11	8,303,515	2012-11-06		Registered
PU0098US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/983,627	2011-01-03	8,591,432	2013-11-26		Registered
PU0098US4	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/066,098	2013-10-29				Pending
PU0098US5	Surgical Access Sysem and Related Methods	NuVasive, Inc.	US	15/071,540	2016-03-16				Pending
PU0104US1	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	11/093,409	2005-03-29	7,918,891	2011-04-05		Registered
PU0104US10	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	14/921,760	2015-10-23				Pending
PU0104US2	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	13/079,645	2011-04-04	8,187,334	2012-05-29		Registered
PU0104US3	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	13/440,062	2012-04-05	8,246,686	2012-08-21		Registered
PU0104US4	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	13/441,092	2012-04-06	8,361,156	2013-01-29		Registered
PU0104US5	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	13/747,765	2013-01-23	8,608,804	2013-12-17		Registered
PU0104US6	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	13/748,925	2013-01-24	8,574,301	2013-11-05		Registered
PU0104US7	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	14/066,285	2013-10-29	8,685,105	2014-04-01		Registered
PU0104US8	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	14/171,484	2014-02-03	8,814,940	2014-08-26		Registered
PU0104US9	Systems and Methods for Spinal Fusion	NuVasive, Inc.	US	14/314,823	2014-06-25	9,180,021	2015-11-10		Registered
PU0116US2	Neurophysiological Apparatus and	NuVasive, Inc.	US	12/359,269	2009-01-23	9,131,947	2015-09-15		Registered

	Procedures								
PU0116US3	Neurophysiological Apparatus and Procedures	NuVasive, Inc.	US	14/855,156	2015-09-15				Pending
PU0118EP1	System and Method for Performing Spinal Fixation	NuVasive, Inc.	EP	05797710.0	2005-09-08				Pending
PU0118US1	System and Method for Performing Spinal Fixation	NuVasive, Inc.	US	11/667,365	2007-05-08				Pending
PU0120US1	System and Methods for Assessing the Neuromuscular Pathway Prior to Nerve Testing	NuVasive, Inc.	US	11/665,038	2005-10-07	8,538,539	2013-09-17		Registered
PU0120US2	System and Methods for Assessing the Neuromuscular Pathway Prior to Nerve Testing	NuVasive, Inc.	US	14/029,606	2013-09-17	8,989,866	2015-03-24		Registered
PU0121US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/529,928	2006-09-29	8,876,904	2014-11-04		Registered
PU0121US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/665,039	2005-10-11				Pending
PU0121US3	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/526,379	2014-10-28				Pending
PU0131US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/344,711	2006-01-31	7,785,253	2010-08-31		Registered
PU0132US1	System and Methods for Monitoring During Anterior Surgery	NuVasive, Inc.	US	11/883,710	2006-02-02	8,568,331	2013-10-29		Registered
PU0133DE1	System and Methods for Performing Neurophysiologic Assessments During Surgery	NuVasive, Inc.	DE	06720282.0	2006-02-02	1846094	2011-10-05		Registered
PU0133EP2	System and Methods for Performing Neurophysiologic Assessments During Surgery	NuVasive, Inc.	EP	11176972.5	2006-02-02				Pending
PU0133GB1	System and Methods for Performing Neurophysiologic Assessments During Surgery	NuVasive, Inc.	GB	06720282.0	2006-02-02	1846094	2011-10-05		Registered
PU0133US1	System and Methods for Performing Neurophysiologic Assessments During Surgery	NuVasive, Inc.	US	11/883,709	2006-02-02				Pending
PU0135US1	Slideable Bone Plate System	NuVasive, Inc.	US	10/427,592	2003-05-01	6,945,973	2005-09-20		Registered
PU0135US2	Slidable Bone Plate System	NuVasive, Inc.	US	11/231,493	2005-09-20	8,262,705	2012-09-11		Registered
PU0140US1	Insulated Pedicle Access System and Related Methods	NuVasive, Inc.	US	11/448,237	2006-06-06	7,942,826	2011-05-17		Registered

PU0140US2	Insulated Pedicle Access System and Related Methods	NuVasive, Inc.	US	13/109,981	2011-05-17	8,784,330	2014-07-22		Registered
PU0140US3	Insulated Pedicle Access System and Related Methods	NuVasive, Inc.	US	14/338,154	2014-07-22				Pending
PU0147US1	Multi-Channel Stimulation Threshold Detection Algorithm for Use in Neurophysiology Monitoring	NuVasive, Inc.	US	11/994,409	2006-09-22	8,206,312	2012-06-26		Registered
PU0147US2	Neurophysiology Monitoring System Configured for Rapid Stimulation Threshold Acquisition	NuVasive, Inc.	US	13/533,919	2012-06-26	8,500,653	2013-08-06		Registered
PU0147US4	Multi-Channel Stimulation Threshold Detection Algorithm for Use with Neurophysiology Monitoring Systems	NuVasive, Inc.	US	14/959,850	2015-12-04				Pending
PU0151EP1	Total Disc Replacement System and Related Methods	NuVasive, Inc.	EP	06788651.5	2006-07-28				Pending
PU0151US1	Total Disc Replacement System and Related Methods	NuVasive, Inc.	US	11/989,686	2006-07-28	8,328,851	2012-12-11		Registered
PU0151US2	Total Disc Replacement System and Related Methods	NuVasive, Inc.	US	13/711,561	2012-12-11	8,870,960	2014-10-28		Registered
PU0151US3	Total Disc Replacement System and Related Methods	NuVasive, Inc.	US	14/525,440	2014-10-28	9,168,149	2015-10-27		Registered
PU0151US4	Total Disc Replacement System and Related Methods	NuVasive, Inc.	US	14/924,385	2015-10-27				Pending
PU0152AU1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	AU	2007254173	2007-05-17	2007254173	2013-11-07		Registered
PU0152EP1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	EP	07777170.7	2007-05-17				Pending
PU0152US1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	US	12/301,233	2007-05-17	8,442,621	2013-05-14	In progress to remove incorrect assignment info	Registered
PU0154US1	Spinal Fusion Implant	NuVasive, Inc.	US	11/488,744	2006-07-17	7,867,277	2011-01-11		Registered
PU0154US2	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	13/004,474	2011-01-11	9,226,834	2016-01-05		Registered
PU0155US3	Methods and Apparatus for Treating Spinal Stenosis	NuVasive, Inc.	US	14/601,224	2015-01-20				Pending
PU0157US1	System and Methods for Treating Spinal Deformities	NuVasive, Inc.	US	11/490,995	2006-07-20	8,147,521	2012-04-03		Registered
PU0157US2	Systems and Methods for Treating Spinal Deformities	NuVasive, Inc.	US	13/438,828	2012-04-03	8,652,177	2014-02-18		Registered

PU0157US3	Systems and Methods for Treating Spinal Deformities	NuVasive, Inc.	US	14/183,198	2014-02-18				Pending
PU0158US1	System and Methods for Performing Neurophysiologic Assessments with Pressure Monitoring	NuVasive, Inc.	US	11/490,717	2006-07-20	8,740,783	2014-06-03		Registered
PU0158US3	System and Methods for Performing Neurophisologic Assessments with Pressure Monitoring	NuVasive, Inc.	US	14/294,304	2014-06-03				Pending
PU0163US1	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	11/525,674	2006-09-22	7,815,682	2010-10-19		Registered
PU0168US1	System and Methods for Performing Pedicle Integrity Assessments of the Thoracic Spine	NuVasive, Inc.	US	11/994,411	2006-09-22	8,591,431	2013-11-26		Registered
PU0170US1	Spinal Implant	NuVasive, Inc.	US	09/104,422	1998-06-25	6,093,205	2000-07-25		Registered
PU0180US1	Methods and Apparatus for Treating Spinal Stenosis	NuVasive, Inc.	US	11/540,318	2006-09-28	8,167,915	2012-05-01		Registered
PU0184US1	System and Methods for Nerve Monitoring	NuVasive, Inc.	US	11/528,981	2006-09-27	8,568,317	2013-10-29		Registered
PU0184US3	System and Methods for Nerve Monitoring	NuVasive, Inc.	US	14/881,091	2015-10-12				Pending
PU0190US1	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	11/891,581	2007-08-09	8,114,162	2012-02-14		Registered
PU0191US1	Methods and Apparatus for Spinal Fusion	NuVasive, Inc.	US	11/634,440	2006-12-05	7,887,595	2011-02-15		Registered
PU0193US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/653,173	2007-01-11	8,313,430	2012-11-20		Registered
PU0193US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/682,719	2012-11-20	8,827,900	2014-09-09		Registered
PU0194US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	11/652,705	2007-01-12	9,259,144	2016-02-16		Registered
PU0197AU1	Surgical Fixation System and Related Methods	NuVasive, Inc.	AU	2008316641	2008-10-24	AU 2008316641 B2	2015-09-10		Registered
PU0197CN1	Surgical Fixation System and Related Methods	NuVasive, Inc.	CN	200880122485.4	2008-10-24	ZL200880122485.4	2012-09-05		Registered
PU0197JP1	Surgical Fixation System and Related Methods	NuVasive, Inc.	JP	2010531301	2008-10-24	5599316	2014-08-22		Registered
PU0201JP1	Textile Prosthesis	NuVasive, Inc.; Ellis Developments	JP	2002-533772	2001-10-11	4083008	2008-02-22	Jointly owned	Registered

		Limited							
PU0201US1	Textile Prosthesis	NuVasive, Inc.; Ellis Developments Limited	US	10/398,883	2001-10-11	7,338,531	2008-03-04	Jointly owned	Registered
PU0201US2	Textile Prosthesis	NuVasive, Inc.; Ellis Developments Limited	US	12/042,311	2008-03-04	7,828,855	2010-11-09	Jointly owned	Registered
PU0202CH1	Connector Comprising Filaments	NuVasive, Inc.; Ellis Developments Limited	CH	01974486.1	2001-10-11	1326547	2007-01-24	Jointly owned	Registered
PU0202DE1	Connector Comprising Filaments	NuVasive, Inc.; Ellis Developments Limited	DE	01974486.1	2001-10-11	601 26 299.9	2007-01-24	Jointly owned	Registered
PU0202FR1	Connector Comprising Filaments	NuVasive, Inc.; Ellis Developments Limited	FR	01974486.1	2001-10-11	1326547	2007-01-24	Jointly owned	Registered
PU0202GB1	Connector Comprising Filaments	NuVasive, Inc.; Ellis Developments Limited	GB	01974486.1	2001-10-11	1326547	2007-01-24	Jointly owned	Registered
PU0202IE1	Connector Comprising Filaments	NuVasive, Inc.; Ellis Developments Limited	IE	01974486.1	2001-10-11	1326547	2007-01-24	Jointly owned	Registered
PU0202JP1	Connector	NuVasive, Inc.; Ellis Developments Limited	JP	2002-533755	2001-10-11	4083007	2008-02-22	Jointly owned	Registered
PU0202US1	Connector	NuVasive, Inc.; Ellis Developments Limited	US	10/399,016	2001-10-11	7,214,225	2007-05-08	Jointly owned, assignment from inventors in progress	Registered
PU0215US1	Embroidery Using Soluble Thread	NuVasive, Inc.	US	12/442,944	2007-09-25	8,074,591	2011-12-13		Registered
PU0216US1	Gravity Dependent Pedicle Screw Tap Hole Guide	NuVasive, Inc.	US	10/103,079	2002-03-21	6,638,281	2003-10-28		Registered
PU0216US4	Gravity Dependent Pedicle Screw	NuVasive, Inc.	US	11/034,594	2005-01-13	7,611,522	2009-11-03		Registered

	Tap Hole Guide								
PU0220US1	Methods and Apparatus for Treating Spinal Stenosis		US	11/891,582	2007-08-09	8,834,526	2014-09-16	Non-signing inventor, no assignment	Registered
PU0228US1	System and Methods for Spinal Fusion	NuVasive, Inc.	US	12/044,917	2008-03-07	8,673,005	2014-03-18		Registered
PU0228US2	System and Methods for Spinal Fusion	NuVasive, Inc.	US	14/193,886	2014-02-28	9,186,261	2015-11-17		Registered
PU0228US3	System and Methods for Spinal Fusion	NuVasive, Inc.	US	14/931,351	2015-11-03				Pending
PU0242AU1	Neurophysiologic Monitoring System	NuVasive, Inc.	AU	2008236665	2008-04-03	2008236665 B2	2013-12-05		Registered
PU0242AU2	Neurophysiologic Monitoring System	NuVasive, Inc.	AU	2013204806	2008-04-03	2013204806 B2	2015-10-29		Registered
PU0242EP1	Neurophysiologic Monitoring System	NuVasive, Inc.	EP	08742578.1	2008-04-03				Pending
PU0242US1	Neurophysiologic Monitoring System	NuVasive, Inc.	US	12/080,630	2008-04-03	8,255,045	2012-08-28		Registered
PU0242US2	Neurophysiologic Monitoring System	NuVasive, Inc.	US	13/597,160	2012-08-28	9,295,396	2016-03-29		Registered
PU0242US3	Neurophysiologic Monitoring System	NuVasive, Inc.	US	15/080,500	2016-03-24				Pending
PU0243US1	Implants and Methods for Spinal Fusion	NuVasive, Inc.	US	12/380,693	2009-03-02	8,083,796	2011-12-27		Registered
PU0243US2	Implants and Methods for Spinal Fusion	NuVasive, Inc.	US	13/337,967	2011-12-27	9,168,152	2015-10-27		Registered
PU0243US3	Implants and Methods for Spinal Fusion	NuVasive, Inc.	US	14/924,490	2015-10-27				Pending
PU0249US1	Spinal Impant Installation Device	NuVasive, Inc.	US	12/378,685	2009-02-17	8,343,163	2013-01-01		Registered
PU0257US1	Textile-Based Plate Implant And Related Methods	NuVasive, Inc.	US	12/274,345	2008-11-19	8,591,584	2013-11-26		Registered
PU0258US1	Textile-Based Surgical Implant and Related Methods	NuVasive, Inc.	US	12/416,048	2009-03-31	8,377,135	2013-02-19		Registered
PU0261US1	Vertebral Distraction Assembly and Related Methods	NuVasive, Inc.	US	12/378,936	2009-02-20	8,372,081	2013-02-12		Registered
PU0264US1	Surgical Fixation System and Related Methods	NuVasive, Inc.	US	12/364,507	2009-02-02				Pending
PU0265AU1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	AU	2008317311	2008-10-24	2008317311	2013-10-17		Registered
PU0265DE1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	DE	112008002851.6	2008-10-24				Pending

PU0265US1	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	US	12/739,950	2008-10-24	9,119,572	2015-09-01		Registered
PU0265US2	Surgical Trajectory Monitoring System and Related Methods	NuVasive, Inc.	US	14/841,270	2015-08-31				Pending
PU0269US1	Spinal Surgical Implant and Related Methods	NuVasive, Inc.	US	12/317,867	2008-12-29	9,101,491	2015-08-11		Registered
PU0269US2	Spinal Surgical Implant and Related Methods	NuVasive, Inc.	US	14/823,329	2015-08-11				Pending
PU0270US1	Systems and Methods for Holding and Implanting Bone Anchors	NuVasive, Inc.	US	12/322,815	2009-02-06	8,439,922	2013-05-14		Registered
PU0270US2	Systems and Methods for Holding and Implanting Bone Anchors	NuVasive, Inc.	US	13/894,355	2013-05-14	9,192,415	2015-11-24		Registered
PU0270US3	Systems and Methods for Holding and Implanting Bone Anchors	NuVasive, Inc.	US	14/947,461	2015-11-20				Pending
PU0276US1	Systems and Methods for Spinous Process Fixation	NuVasive, Inc.	US	12/412,354	2009-03-26	8,343,190	2013-01-01		Registered
PU0280US9	Surgical Fixation Systems and Related Methods	NuVasive, Inc.	US	13/647,331	2012-10-08	9,060,813	2015-06-23		Registered
PU0285US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	12/577,661	2009-10-12	9,044,280	2015-06-02		Registered
PU0285US2	Surgical Access System and Related Methods	NuVasive, Inc.	US	14/727,676	2015-06-01				Pending
PU0301US1	Anchors for Spinal Fixation and Correcting Spinal Deformity	NuVasive, Inc.	US	12/803,510	2010-06-28	8,506,598	2013-08-13		Registered
PU0303US1	Systems and Methods for Treating Spinal Stenosis	NuVasive, Inc.	US	12/578,577	2009-10-13	8,292,923	2012-10-23		Registered
PU0305US1	System and Method for Performing Spinal Fixation	NuVasive, Inc.	US	12/535,671	2009-08-04	8,480,712	2013-07-09		Registered
PU0309AU1	Cancellous Bone Treated with Collagenase and Essentially Free of Blood Cells	NuVasive, Inc.	AU	2007250080	2007-05-02	2007250080	2011-12-01		Registered
PU0309CN1	Cancellous Bone Treated with Collagenase and Essentially Free of Blood Cells	NuVasive, Inc.	CN	200780016495.5	2007-05-02	ZL200780016495.5	2011-08-10		Registered
PU0309US1	Cancellous Bone Treated with Collagenase and Essentially Free of Blood Cells	NuVasive, Inc.	US	11/799,606	2007-05-02	8,460,860	2013-06-11		Registered
PU0309US2	Cancellous Bone Product Including Viable Osteogenic Cells	NuVasive, Inc.	US	13/915,569	2013-06-11				Pending
PU0311US1	Cancellous bone treated with collagenase and essentially free of	NuVasive, Inc.	US	12/150,513	2008-04-28				Pending

	blood cells								
PU0315US2	Malleable, Cryopreserved Osteogenic Compositions with Viable Cells	NuVasive, Inc.	US	13/918,723	2013-06-14				Pending
PU0317AU2	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	AU	2015258176	2009-10-15				Pending
PU0317EP1	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	EP	09820909.1	2009-10-15				Pending
PU0317JP1	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	JP	2011-532087	2009-10-15				Pending
PU0317JP2	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	JP	2015-011482	2009-10-15				Pending
PU0317US1	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	US	13/124,608	2009-10-15				Pending
PU0329US1	Surgical Fixation System and Related Methods	NuVasive, Inc.	US	12/579,397	2009-10-14	8,328,856	2012-12-11		Registered
PU0333US1	System and Methods for performing Neurophysiologic Assessments	NuVasive, Inc.	US	12/626,880	2009-11-27	8,401,632	2013-03-19		Registered
PU0334AU1	Polyaxial Bone Screw with Compound Articulation		AU	2006244276	2006-03-30	2006244276 B2	2009-07-16	Jackson assignment in progress	Registered
PU0334CA1	Polyaxial Bone Screw with Compound Articulation		CA	PCT/US2006/012650	2006-03-30	2607157C	2011-09-20	Jackson assignment in progress	Registered
PU0334EP1	Polyaxial Bone Screw with Compound Articulation		EP	06740553.1	2006-03-30			Jackson assignment in progress	Pending
PU0334US1	Polyaxial Bone Screw with Compound Articulation	NuVasive, Inc.	US	11/126,965	2005-05-10	7,476,239	2009-01-13		Registered
PU0335US2	Systems and Methods for Performing Spinal Fusion Surgery	NuVasive, Inc.	US	13/831,711	2013-03-15	8,876,851	2014-11-04		Registered
PU0335US3	System and Methods for Performing Spinal Fusion Surgery	NuVasive, Inc.	US	14/532,316	2014-11-04				Pending
PU0338US1	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	12/329,195	2008-12-05	8,623,088	2014-01-07		Registered
PU0340US1	Cross-Connector and Related Methods	NuVasive, Inc.	US	13/118,323	2011-05-27	9,198,696	2015-12-01		Registered
PU0342US2	Spinal Fusion Cage with Removable Planar Elements	NuVasive, Inc.	US	12/367,487	2009-02-06	8,088,163	2012-01-03		Registered
PU0342US3	Spinal Fusion Cage with Removable Planar Elements	NuVasive, Inc.	US	13/473,366	2012-05-16	8,292,960	2012-10-23		Registered
PU0342US4	Spinal Fusion Cage with Removable Planar Elements	NuVasive, Inc.	US	13/657,289	2012-10-22	8,715,355	2014-05-06		Registered

PU0346US1	Connective Tissue Regeneration Using Human Mesenchymal Stem Cell Preparation	Osiris Therapeutics, Inc.	US	08/420,297	1995-04-11	5,811,094	1998-09-22	Mesoblast International SARL	Registered
PU0347AU1	Uses for Non-Autologous Mesenchymal Stem Cells	Osiris Therapeutics, Inc.	AU	1999029042	1998-03-13	749675	2002-07-04		Registered
PU0347US1	Uses for Non-Autologous Mesenchymal Stem Cells	Osiris Therapeutics, Inc.	US	09/314,855	1999-03-12	6,355,239	2002-03-12	Mesoblast International SARL	Registered
PU0348AU1	Regeneration and Augmentation of Bone Using Mesenchymal Stem Cells	Osiris Therapeutics, Inc.	AU	24622/97	1997-04-17	731468	2001-07-26		Registered
PU0348US1	Regeneration and Augmentation of Bone Using Mesenchymal Stem Cells	Osiris Therapeutics, Inc.	US	09/042,275	1998-03-13	6,541,024	2003-04-01	Mesoblast International SARL	Registered
PU0348US2	Regeneration and Augmentation of Bone Using Mesenchymal Stem Cells	Osiris Therapeutics, Inc.	US	09/840,284	2002-06-26	6,863,900	2005-03-08	Mesoblast International SARL	Registered
PU0349US1	Vertebral Body Replacement	NuVasive, Inc.	US	12/661,206	2010-03-12				Pending
PU0349US3	Vertebral Body Replacement	NuVasive, Inc.	US	14/744,470	2015-06-19				Pending
PU0350US1	Systems and Methods for Neurophysiologic Monitoring	NuVasive, Inc.	US	12/908,876	2010-10-20				Pending
PU0351US1	Fracture Reduction Device and Methods	NuVasive, Inc.	US	13/184,576	2011-07-18	9,144,501	2015-09-29		Registered
PU0352US3	Polyaxial Bone Screw Assembly	NuVasive, Inc.	US	13/311,490	2011-12-05	8,876,869	2014-11-04		Registered
PU0353US1	Method and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	12/799,021	2010-04-16	8,287,597	2012-10-16		Registered
PU0353US2	Methods and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	13/653,335	2012-10-16	8,920,500	2014-12-30		Registered
PU0353US3	Methods and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	14/578,215	2014-12-19	9,192,482	2015-11-24		Registered
PU0353US4	Methods and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	14/918,137	2015-10-20				Pending
PU0356GB1	Laminoplasy Bone Plate System and Template Tool	NuVasive, Inc.	GB	1204773.4	2010-10-04	2486608	2016-03-30		Registered
PU0356US1	Bone Plate System and Related Methods	NuVasive, Inc.	US	13/499,659	2010-10-04	9,211,148	2015-12-15		Registered
PU0356US2	Bone Plate System and Related Methods	NuVasive, Inc.	US	14/970,299	2015-12-15				Pending
PU0357US1	Systems and Methods for	NuVasive, Inc.	US	12/945,821	2010-11-12	8,986,349	2015-03-24		Registered

	Correcting Spinal Deformities								
PU0357US2	Systems and Methods for Correcting Spinal Deformities	NuVasive, Inc.	US	14/667,619	2015-03-24				Pending
PU0358AU1	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	AU	2010318704	2010-11-10	2010318704	2015-10-22		Registered
PU0358AU2	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	AU	2015238910	2010-11-10				Pending
PU0358CN1	Retractor System (as amended)	NuVasive, Inc.	CN	201080061149.0	2010-11-10				Pending
PU0358DE1	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	DE	112010004338.8	2010-11-10				Pending
PU0358GB1	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	GB	1209824.0	2010-11-10	2488284 B	2015-12-09		Registered
PU0358GB2	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	GB	1519048.1	2010-11-10				Pending
PU0358JP1	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	JP	2012-538806	2010-11-10	5844737	2015-11-27		Registered
PU0358US1	Method and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	12/927,415	2010-11-10	8,357,184	2013-01-22		Registered
PU0358US2	Method and Apparatus for Performing Spinal Fusion Surgery	NuVasive, Inc.	US	13/204,573	2011-08-05	8,435,269	2013-05-07		Registered
PU0358US3	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	US	13/509,045	2010-11-10	9,050,146	2015-06-09		Registered
PU0358US4	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	US	13/204,583	2011-08-05	8,535,320	2013-09-17		Registered
PU0358US6	Method and Apparatus for Performing Spinal Surgery	NuVasive, Inc.	US	14/029,724	2013-09-17				Pending
PU0360BR1	Prosthetic Joint of Cervical Intervertebral Discs	Cervitech, Inc.	BR	PI0302378-8	2003-04-07	PI0302378-8	2013-06-04		Registered
PU0360CN1	Prosthetic Joint of Cervical Intervertebral Discs	Cervitech, Inc.	CN	200480009386.7	2004-02-17	ZL200480009386.7	2010-03-24		Registered
PU0360JP1	Prosthetic Joint of Cervical Intervertebral Discs	Cervitech, Inc.	JP	2006-504429	2004-02-17	4617294	2010-10-29		Registered
PU0360KR1	Prosthetic Joint of Cervical Intervertebral Discs	Cervitech, Inc.	KR	10-2005-7018979	2004-02-17	10-1134262	2012-03-30		Registered
PU0360US1	Cervical Intervertebral Disk Prosthesis	Cervitech, Inc.	US	10/407,946	2003-04-07	8,012,212	2011-09-06		Registered
PU0360US2	Method for Implanting an Intervertebral Disk Prosthesis	Cervitech, Inc.	US	11/282,604	2005-11-21	8,147,551	2012-04-03		Registered
PU0360US3	Cervical Intervertebral Prosthesis	Cervitech, Inc.	US	13/438,694	2012-04-03	8,591,586	2013-11-26		Registered
PU0362IL1	Intervertebral Disk Prosthesis	Cervitech, Inc.	IL	172608	2004-06-16	172608	2011-06-29		Registered

PU0362US1	Intervertebral Disk Prosthesis	Cervitech, Inc.	US	10/623,803	2003-07-22	7,722,673	2010-05-25		Registered
PU0363US2	Insertion Instrument for Cervical Prostheses	Cervitech, Inc.	US	11/155,597	2005-06-20	7,569,067	2009-08-04		Registered
PU0364MX1	Arrangement of a Cervical Prosthesis and Insertion Instrument	Cervitech, Inc.	MX	PA/a/2006/000546	2004-02-04	258142	2008-06-24		Registered
PU0364US1	Multi-Part Cervical Endoprosthesis with Insertion	Cervitech, Inc.	US	10/619,179	2003-07-15	7,320,689	2008-01-22		Registered
PU0365MX1	Set of Cervical Intervertebral Prostheses	Cervitech, Inc.	MX	PA/a/2006/004175	2004-08-13				Pending
PU0365US1	Set of Cervical Intervertebral Prostheses	Cervitech, Inc.	US	10/687,933	2003-10-20	7,628,813	2009-12-08		Registered
PU0368US1	Bone Separator	Cervitech, Inc.	US	10/567,966	2005-04-05	7,927,337	2011-04-19		Registered
PU0368US2	Bone Separator	Cervitech, Inc.	US	13/037,073	2011-02-28	9,072,504	2015-07-07		Registered
PU0369AU1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	AU	2006261207	2006-06-20	2006261207 B2	2012-07-26		Registered
PU0369BR1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	BR	PI0612284-1	2006-06-20				Pending
PU0369CN1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	CN	200680022473.5	2006-06-20	ZL200680022473.5	2010-11-24		Registered
PU0369DE2	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	DE	06754460.1	2006-06-20	50 2006 010 480.6	2011-10-26		Registered
PU0369GB2	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	GB	06754460.1	2006-06-20	1893136	2011-10-26		Registered
PU0369IL1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	IL	185183	2006-06-20	185183	2012-09-29		Registered
PU0369IN1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	IN	354/CHENP/2008	2006-06-20	271537	2016-02-24		Registered
PU0369JP1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	JP	2008-517399	2006-06-20	4764480	2011-06-17		Registered
PU0369KR1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	KR	10-2008-7001577	2006-06-20	10-1356241	2014-01-21		Registered
PU0369MX1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	MX	MX/a/2007/013283	2006-06-20	288458	2011-07-18		Registered
PU0369NZ1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	NZ	561232	2006-06-20	561232	2011-06-07		Registered
PU0369TW1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	TW	95121675	2006-06-16	I400066	2013-07-01		Registered
PU0369US2	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	US	12/753,031	2010-04-01	8,721,725	2014-05-13		Registered

PU0369ZA1	Intervertebral Prosthesis with Self-Tapping Fixing Projections	Cervitech, Inc.	ZA	2007/07589	2006-06-20	2007/07589	2008-10-29			Registered
PU0371CN1	Cervical Intervertebral Prosthesis	Cervitech, Inc.	CN	03805695.X	2003-02-21	ZL03805695.X	2009-09-09			Registered
PU0371IL1	Cervical Intervertebral Prosthesis	Cervitech, Inc.	IL	163560	2003-02-21	163560	2011-03-01			Registered
PU0371KR1	Cervical Intervertebral Prosthesis	Cervitech, Inc.	KR	10-2004-7014210	2003-02-21	10-0961020	2010-05-25			Registered
PU0371US1	Cervical Intervertebral Prosthesis	Cervitech, Inc.	US	10/349,183	2003-01-23	7,267,691	2007-09-11			Registered
PU0374AU1	Instrument for the Insertion of an Intervertebral Articular Prosthesis	Cervitech, Inc.	AU	2004296536	2004-11-24	2004296536	2010-08-12			Registered
PU0374CN1	Instrument for the Insertion of an Intervertebral Articular Prosthesis	Cervitech, Inc.	CN	200480036660.X	2004-11-24	200480036660.X	2008-07-30			Registered
PU0374DE1	Instrument for the Insertion of an Intervertebral Articular Prosthesis	Cervitech, Inc.	DE	04798069.3	2004-11-24	1694215	2010-01-13			Registered
PU0374GB1	Instrument for the Insertion of an Intervertebral Articular Prosthesis	Cervitech, Inc.	GB	04798069.3	2004-11-24	1694215	2010-01-13			Registered
PU0374US1	Instrument Set for Fitting an Intervertebral Joint Prosthesis	Cervitech, Inc.	US	10/731,432	2003-12-10	7,527,629	2009-05-05			Registered
PU0374ZA1	Instrument for the Insertion of an Intervertebral Articular Prosthesis	Cervitech, Inc.	ZA	2006/05651	2004-11-24	2006/5651	2007-10-31			Registered
PU0377KR1	Prosthesis for Partial Replacement of a Vertebral Body	Cervitech, Inc.	KR	10-2006-7027546	2005-05-18					Pending
PU0377US1	Prosthesis for Partial Replacement of a Vertebral Body	Cervitech, Inc.	US	11/125,313	2005-05-10	8,070,812	2011-12-06			Registered
PU0377US2	Prosthesis for Partial Replacement of a Vertebral Body	Cervitech, Inc.	US	13/295,966	2011-11-14	8,409,285	2013-04-02			Registered
PU0378US2	Prosthesis for Bridging a Vertebral Body	Cervitech, Inc.	US	12/683,919	2010-01-07	8,192,493	2012-06-05			Registered
PU0386GB2	Intervertebral Prosthesis	Cervitech, Inc.	GB	02782913.4	2002-10-15	1482875	2009-03-11			Registered
PU0386ZA1	Intervertebral Prosthesis	Cervitech, Inc.	ZA	2004/7101	2002-10-15	2004/7101	2005-08-31			Registered
PU0387US1	Medical Implant with a Secured Bone Screw	Cervitech, Inc.	US	10/349,175	2003-01-23	7,160,303	2007-01-09			Registered
PU0392US1	Systems and Methods for Vessel Avoidance During Spine surgery	NuVasive, Inc.	US	12/848,950	2010-08-02	8,983,567	2015-03-17			Registered
PU0393US1	Spinal Cross Connector	NuVasive, Inc.	US	12/826,590	2010-06-29	8,246,657	2012-08-21			Registered
PU0406US1	Insulated Pedicle Access System and Related Methods	NuVasive, Inc.	US	12/945,705	2010-11-12					Pending
PU0407AU1	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2010318711	2010-11-12	2010318711	2014-08-28			Registered
PU0407DE1	Surgical Access System and Related Methods	NuVasive, Inc.	DE	112010004350.7	2010-11-12					Pending

PU0407GB1	Surgical Access System	NuVasive, Inc.	GB	1209825.7	2010-11-12	2493810	2013-07-03		Registered
PU0407US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/509,064	2010-11-12	9,138,217	2015-09-22		Registered
PU0409US1	Spinal Fusion Implants and Related Methods	NuVasive, Inc.	US	12/945,787	2010-11-12	8,740,983	2014-06-03		Registered
PU0417US1	Neurophysiologic Monitoring	NuVasive, Inc.	US	13/236,600	2011-09-19				Pending
PU0418US1	Fracture Reduction Device and Methods	NuVasive, Inc.	US	13/184,574	2011-07-18	8,795,369	2014-08-05		Registered
PU0420US1	Method and Apparatus for Performing Spine Surgery	NuVasive, Inc.	US	13/077,977	2011-03-31				Pending
PU0422US0	Method and Apparatus for Computerized Surgery	NuVasive, Inc.	US	09/948,940	2001-09-07	7,338,526	2008-03-04		Registered
PU0422US10	Methods and Apparatus for Computerized Surgery	NuVasive, Inc.	US	14/698,667	2015-04-28				Pending
PU0422US2	Method and Apparatus for Computerized Surgery	NuVasive, Inc.	US	11/929,114	2007-10-30	9,017,313	2015-04-28		Registered
PU0422US3	Method and Apparatus for Computerized Surgery	NuVasive, Inc.	US	11/928,940	2007-10-30				Pending
PU0422US4	Method and Apparatus for Computerized Surgery	NuVasive, Inc.	US	11/929,070	2007-10-30				Pending
PU0422US8	Spinal Implant System	NuVasive, Inc.	US	13/428,875	2012-03-23	8,747,476	2014-06-10		Registered
PU0422US9	Spinal Implant System	NuVasive, Inc.	US	14/299,203	2014-06-09				Pending
PU0424US2	Interbody Fusion Implant and Related Methods	NuVasive, Inc.	US	13/949,174	2013-07-23				Pending
PU0428AU1	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2011293853	2011-08-23	2011293853	2015-11-19		Registered
PU0428AU2	Surgical Access System and Related Methods	NuVasive, Inc.	AU	2015252096	2011-08-23				Pending
PU0428CN1	Surgical Access System and Related Methods	NuVasive, Inc.	CN	201180050236.0	2011-08-23				Pending
PU0428DE1	Surgical Access System and Related Methods	NuVasive, Inc.	DE	112011102801.6	2011-08-23				Pending
PU0428GB1	Surgical Access System and Related Methods	NuVasive, Inc.	GB	1302945.9	2011-08-23				Pending
PU0428JP1	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2013-525897	2011-08-23	5763194	2015-06-19		Registered
PU0428JP2	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2014-185179	2011-08-23				Pending
PU0428JP3	Surgical Access System and Related Methods	NuVasive, Inc.	JP	2015-199428	2011-08-23				Pending

PU0428US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/821,224	2011-08-23				Pending
PU0436US1	Spinal Implants, Instruments and Related Methods	NuVasive, Inc.	US	12/945,789	2010-11-12	8,840,668	2014-09-23	In progress to remove incorrect assignment info	Registered
PU0443US1	Lateral Fixation Constructs and Related Methods	NuVasive, Inc.	US	13/415,769	2012-03-08	8,992,579	2015-03-31		Registered
PU0447DE1	Spinal Implants for Rotationally Adjusting Vertebrae	NuVasive, Inc.	DE	112012000567.8	2012-01-25				Pending
PU0447US1	Spinal Implants for Rotationally Adjusting Vertebrae	NuVasive, Inc.	US	13/950,277	2013-07-24				Pending
PU0448US1	Spinal Fixation System and Related Methods	NuVasive, Inc.	US	13/361,855	2012-01-30	8,940,030	2015-01-27		Registered
PU0448US2	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	14/606,501	2015-01-27				Pending
PU0449US1	Implant Installation Assembly and Related Methods	NuVasive, Inc.	US	13/411,465	2012-03-02	8,840,622	2014-09-23		Registered
PU0450US2	Filter Device	NuVasive, Inc.	US	14/735,128	2015-06-09				Pending
PU0453US1	Posterior Cervical Fixation System	NuVasive, Inc.	US	13/410,213	2012-03-01				Pending
PU0454US1	Vertebral Body Replacement and Insertion Methods	NuVasive, Inc.	US	13/425,380	2012-03-20				Pending
PU0455US1	Minimally Invasive Spinal Fixation System and Related Methods	NuVasive, Inc.	US	13/456,210	2012-04-25	9,198,698	2015-12-01		Registered
PU0455US2	Minimally Invasive Spinal Fixation System and Related Methods	NuVasive, Inc.	US	14/949,280	2015-11-23				Pending
PU0457US1	Spinal Fixation Anchor	NuVasive, Inc.	US	13/371,370	2012-02-10	9,198,692	2015-12-01		Registered
PU0458US1	Method and Apparatus for Performing Spinal Fusion Surgery	NuVasive, Inc.	US	13/469,076	2012-05-10	9,307,972	2016-04-12		Registered
PU0467US1	Surgical Access System and Related Methods	NuVasive, Inc.	US	13/434,845	2012-03-29				Pending
PU0468BR1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	BR	PI0911078-0	2009-04-03				Pending
PU0468CN1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	CN	200980115946.X	2009-04-03	CN102036615B	2014-08-13		Registered
PU0468CN2	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	CN	201410335982.X	2009-04-03				Pending
PU0468EP1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	EP	09727829.5	2009-04-03				Pending
PU0468IN1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	IN	6294/CHENP/2010	2009-04-03				Pending

PU0468JP1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	JP	2011-503207	2009-04-03	5572898	2014-07-11		Registered
PU0468KR1	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	KR	10-2010-7024634	2009-04-03				Pending
PU0468US2	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	US	12/246,581	2008-10-07	7,957,831	2011-06-07		Registered
PU0468US3	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	US	12/417,937	2009-04-03	8,549,888	2013-10-08		Registered
PU0468US4	System and Method for Designing and Forming a Surgical Implant	NuVasive, Inc.	US	14/049,183	2013-10-08				Pending
PU0469US1	Tissue Retractor and Related Methods	NuVasive, Inc.	US	13/457,484	2012-04-26	8,900,137	2014-12-02		Registered
PU0469US2	Cervical Retractor	NuVasive, Inc.	US	13/507,111	2012-06-04	8,974,381	2015-03-10		Registered
PU0470US1	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	13/601,986	2012-08-31	9,113,853	2015-08-25		Registered
PU0470US2	Tissue Retraction System and Related Methods	NuVasive, Inc.	US	14/794,709	2015-07-08				Pending
PU0472US2	Osteoinductive Calcium Phosphates	Progentix Orthobiology B.V.	US	12/607,874	2009-10-28	7,942,934	2011-05-17		Registered
PU0472US3	Osteoinductive Calcium Phosphates	Progentix Orthobiology B.V.	US	14/792,305	2015-07-06				Pending
PU0475US1	Vertebral Body Replacement	NuVasive, Inc.	US	14/177,100	2014-02-10				Pending
PU0479US1	Minimally Invasive Facet Release	NuVasive, Inc.	US	13/684,492	2012-11-23				Pending
PU0483US1	Tissue Regeneration	Progentix Orthobiology B.V.	US	11/298,208	2005-12-08	8,071,083	2011-12-06		Registered
PU0484US1	Spinal Cross-Connector	NuVasive, Inc.	US	13/410,218	2012-03-01	9,247,964	2016-02-02		Registered
PU0484US2	Spinal Cross-Connector	NuVasive, Inc.	US	14/977,532	2015-12-21				Pending
PU0487US2	Resorbable Hollow Devices for Implantation and Delivery of Therapeutic Agents	NuVasive, Inc.	US	12/424,140	2009-04-15				Pending
PU0491US1	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	13/663,459	2012-10-29				Pending
PU0492US1	Spinal Fusion Implants and Related Methods	NuVasive, Inc.	US	13/648,253	2012-10-09				Pending
PU0493AU1	Method of Improving the Osteoinductivity of Calcium Phosphate	Progentix Orthobiology B.V.	AU	PCT/NL2006/000210	2006-04-21	2006241047	2011-06-02		Registered

PU0493DE1	Method of Improving the Osteoinductivity of Calcium Phosphate	Progentix Orthobiology B.V.	DE	06733017.5	2006-04-21	1877107	2009-07-24		Registered
PU0493GB1	Method of Improving the Osteoinductivity of Calcium Phosphate	Progentix Orthobiology B.V.	GB	06733017.5	2006-04-21	1877107	2009-07-24		Registered
PU0493JP1	Method of Improving the Osteoinductivity of Calcium Phosphate	Progentix Orthobiology B.V.	JP	2008-555181	2006-04-21				Pending
PU0493US1	Method of Improving the Osteoinductivity of Calcium Phosphate	Progentix Orthobiology B.V.	US	11/919,390	2009-08-31	8,460,685	2013-06-11		Registered
PU0495US1	Expandable Spinal Fusion Implants and Related Methods	NuVasive, Inc.	US	13/665,787	2012-10-31	9,198,765	2015-12-01		Registered
PU0495US2	Expandable Spinal Fusion Implants and Related Methods	NuVasive, Inc.	US	14/918,197	2015-10-20				Pending
PU0496US1	Surgical Fixation System and Related Methods	NuVasive, Inc.	US	13/666,933	2012-11-01				Pending
PU0500US1	Spinal Fusion Implants and Related Methods	NuVasive, Inc.	US	13/668,209	2012-11-02				Pending
PU0504US1	Bi-Cortical Screw Fixation	NuVasive, Inc.	US	13/771,076	2013-02-19	8,936,626	2015-01-20		Registered
PU0505US2	System, Method and Computer Program Product For Real Time Monitoring, Assignment and Balancing of Professional Oversight	Impulse Monitoring, Inc.	US	12/332,728	2008-12-11				Pending
PU0509US1	Systems and Methods for Performing Neurophysiologic Monitoring During Spine Surgery	NuVasive, Inc.	US	13/761,039	2013-02-06				Pending
PU0510US1	Systems and Methods for Performing Neurophysiologic Monitoring during Spine Surgery	NuVasive, Inc.	US	13/761,098	2013-02-06	9,066,701	2015-06-30		Registered
PU0517US1	Systems and Methods for Performing Spinal Surgery	NuVasive, Inc.	US	13/815,643	2013-03-12				Pending
PU0518US1	Directional Dilator for Intraoperative Monitoring	NuVasive, Inc.	US	13/830,508	2013-03-14				Pending
PU0519US1	Systems and Methods for Promoting Sacroiliac Joint Fusion	NuVasive, Inc.	US	13/830,028	2013-03-14				Pending
PU0521US2	Osteoinductive Bone Graft Substitute	NuVasive, Inc.	US	14/697,443	2015-04-27	9,272,072	2016-03-01		Registered
PU0521US3	Osteoinductive Bone Graft Substitute	NuVasive, Inc.	US	15/057,879	2016-03-01				Pending

PU0523US1	Devices and Methods for Inter-Vertebral Orthopedic Device Placement	NuVasive, Inc.	US	11/613,146	2006-12-19	8,002,802	2011-08-23		Registered
PU0524US1	Spinal Stabilization Systems and Methods of Use	NuVasive, Inc.	US	12/072,695	2008-02-26	7,842,074	2010-11-30		Registered
PU0524US2	Spinal Stabilization Systems and Methods of Use	NuVasive, Inc.	US	12/790,754	2010-05-28	8,801,757	2014-08-12		Registered
PU0524US3	Spinal Stabilization Systems and Methods of Use	NuVasive, Inc.	US	14/458,164	2014-08-12				Pending
PU0527US1	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	13/831,696	2013-03-15	9,060,815	2015-06-23		Registered
PU0527US2	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	14/748,048	2015-06-23				Pending
PU0529US1	Expandable Spinal Fusion Implant, Related Instruments and Methods	NuVasive, Inc.	US	14/060,558	2013-10-22				Pending
PU0530US1	Neurophysiologic Monitoring System and Related Methods	NuVasive, Inc.	US	14/060,561	2013-10-22				Pending
PU0531US1	Malleable, Cryopreserved Osteogenic Compositions with Viable Cells	NuVasive, Inc.	US	14/066,589	2013-10-29				Pending
PU0542US1	Implants and Methods for Treating Spinal Disorders	NuVasive, Inc.	US	13/694,105	2012-10-25	8,758,411	2014-06-24		Registered
PU0543US1	Systems and Methods for Performing Neurophysiologic Monitoring During Spine Surgery	NuVasive, Inc.	US	14/073,772	2013-11-06				Pending
PU0543US2	Systems and Methods for Performing Neurophysiologic Monitoring During Spine Surgery	NuVasive, Inc.	US	14/535,318	2014-11-06				Pending
PU0544US1	Systems and Methods for Performing Neurophysiologic Monitoring During Spine Surgery	NuVasive, Inc.	US	13/830,120	2013-03-14				Pending
PU0549US1	Waveform Marker Placement Algorithm For Use in Neurophysiologic Monitoring	NuVasive, Inc.	US	14/178,176	2014-02-11				Pending
PU0550US1	Spinal Alignment Frame	NuVasive, Inc.	US	14/214,099	2014-03-14				Pending
PU0552US1	Expandable Intervertebral Implant and Methods of Use Thereof	NuVasive, Inc.	US	14/217,358	2014-03-17				Pending
PU0553US1	Compounds and Matrices For Use In Bone Growth and Repair	NuVasive, Inc.	US	14/216,156	2014-03-17				Pending
PU0554US1	Spine Balance Assessment	NuVasive, Inc.	US	14/216,411	2014-03-17				Pending

PU0555US1	Rod Reduction Assembly and Related Methods	NuVasive, Inc.	US	14/217,101	2014-03-17				Pending
PU0558US1	Magnetic Spinal Implant for PLIF/TLIF Procedures	NuVasive, Inc.	US	13/874,274	2013-04-30				Pending
PU0559US1	Expandable Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	14/285,590	2014-05-22				Pending
PU0563AU1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	AU	2008350872	2008-02-21	2008350872	2015-01-08		Registered
PU0563CN1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	CN	200880127333.3	2008-02-21	ZL 200880127333.3	2015-06-17		Registered
PU0563CN2	Magnetic Targeting System for Facilitating Navigation	MagRod, LLC	CN	200980127694.2	2009-06-10	ZL200980127694.2	2013-11-06		Registered
PU0563EP1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	EP	08730366.5	2008-02-21				Pending
PU0563IN1	Magnetic Targeting System and Method of Using the Same	MagRod, LLC	IN	6552/DELNP/2010	2008-02-21				Pending
PU0563JP1	Magnetic Targeting System and Method of Using the Same	MagRod, LLC	JP	2010-547604	2008-02-21	5403763	2013-11-08		Registered
PU0563KR1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	KR	10-2010-7020596	2008-02-21	10-1472847	2014-12-09		Registered
PU0563MX1	Magnetic Targeting System and Method of Using the Same	MagRod, LLC	MX	MX/a/2010/009218	2008-02-21				Pending
PU0563NZ1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	NZ	587467	2008-02-21	587467	2013-09-03		Registered
PU0563RE1	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	14/152,985	2014-01-10	RE45,436	2015-03-24		Registered
PU0563RE2	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	14/152,987	2014-01-10	RE45,659	2012-01-10		Registered
PU0563RE3	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	14/667,599	2015-03-24				Pending
PU0563RE4	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	14/842,745	2015-09-01				Pending
PU0563US2	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	12/157,397	2008-06-10	7,976,546	2011-07-12		Registered
PU0563US4	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	12/728,818	2010-03-22	8,092,461	2012-01-10		Registered
PU0563US5	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	13/151,756	2011-06-02	8,366,715	2013-02-05		Registered
PU0563US6	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	13/313,528	2011-12-07	8,317,801	2012-11-27		Registered

PU0563US7	Magnetic Targeting System and Method of Using the Same	NuVasive, Inc.	US	13/313,765	2011-12-07	8,333,771	2012-12-18		Registered
PU0564US1	Reversibly Deformable Implant	NuVasive, Inc.	US	11/462,609	2006-08-04	7,758,649	2010-07-20		Registered
PU0565US1	Connecting Rod for Bone Anchors Having a Bioresorbable Tip	NuVasive, Inc.	US	11/462,566	2006-08-04	8,439,952	2013-05-14		Registered
PU0566CN1	Implant Equipped for Nerve Location and Method of Use	Integrity Intellect Inc.	CN	200880127332.9	2008-02-21	ZL 200880127332.9	2014-03-12		Registered
PU0566US1	Implant Equipped for Nerve Location and Method of Use	NuVasive, Inc.	US	11/534,129	2006-09-21	7,981,144	2011-07-19		Registered
PU0567US1	Systems and Methods for Inserting Cross-Connectors	NuVasive, Inc.	US	14/052,015	2013-10-11				Pending
PU0568AU1	Vertebral Disc Prosthesis	NuVasive, Inc.	AU	2006230808	2006-04-06	2006230808	2012-05-03		Registered
PU0568CN1	Vertebral Disc Prosthesis		CN	200680019708.5	2006-04-06	101222887 B	2012-11-07	Filed in inventor name	Registered
PU0568EP1	Vertebral Disc Prosthesis	NuVasive, Inc.	EP	06721339.7	2006-04-06				Pending
PU0568KR1	Vertebral Disc Prosthesis	NuVasive, Inc.	KR	10-2007-7025789	2006-04-06	1360150	2014-02-03		Registered
PU0568US2	Vertebral Disc Prosthesis	NuVasive, Inc.	US	14/032,143	2013-09-19	9,138,329	2015-09-22		Registered
PU0568US3	Vertebral Disc Prosthesis	NuVasive, Inc.	US	14/827,972	2015-08-17				Pending
PU0569AU1	Method of Reducing Loading Failure for a Prosthetic Component	NuVasive, Inc.	AU	2006308801	2006-11-02	2006308801	2012-07-05		Registered
PU0569AU3	Method of Reducing Loading Failure for a Prosthetic Component	NuVasive, Inc.	AU	2014280965	2006-11-02				Pending
PU0569CN1	Method of Reducing Loading Failure for a Prosthetic Component		CN	200680046378.9	2006-11-02	101340863 B	2013-04-03	Filed in inventor name	Registered
PU0569EP1	Method of Reducing Loading Failure for a Prosthetic Component	NuVasive, Inc.	EP	06804463.5	2006-11-02				Pending
PU0569KR1	Method of Reducing Loading Failure for a Prosthetic Component	NuVasive, Inc.	KR	10-2008-7013434	2006-11-02	1360188	2014-02-03		Registered
PU0569US1	Method of Reducing Loading Failure for a Prosthetic Component	NuVasive, Inc.	US	12/084,471	2006-11-02				Pending
PU0572US1	Magnetically Connectable Interbody Spinal Implat Devices	NuVasive, Inc.	US	14/216,509	2014-03-17				Pending
PU0573US1	Spinal Fusion Implant with Reducible Graft Aperture	NuVasive, Inc.	US	14/457,108	2014-08-11				Pending
PU0574US1	Orthopedic Screw Insert	NuVasive, Inc.	US	12/009,441	2008-01-18	8,221,479	2012-07-17		Registered
PU0574US2	Orthopedic Screw Insert	NuVasive, Inc.	US	13/524,968	2012-06-15	8,951,293	2015-02-10		Registered
PU0575US1	Bone Anchor with Offset Rod Connector	NuVasive, Inc.	US	14/510,107	2014-10-08				Pending
PU0576US1	Systems and Methods for		US	14/511,038	2014-10-09			Assignment from	Pending

	Performing Spine Surgery							inventors in progress	
PU0582US1	Spinal Fusion Implant and Related Methods	NuVasive, Inc.	US	14/594,272	2015-01-12				Pending
PU0583US1	Oblique TLIF Implant and Related Methods	NuVasive, Inc.	US	14/597,085	2015-01-14				Pending
PU0589US1	Minimally Invasive Spinal Fixation System and Related Methods	NuVasive, Inc.	US	14/631,839	2015-02-25				Pending
PU0591US1	Method for Placing Minimally Invasive Pedicle Screws	NuVasive, Inc.	US	14/727,831	2015-06-01				Pending
PU0598US1	Posterior Cervical Fusion System and Techniques	NuVasive, Inc.	US	13/503,050	2010-10-21	9,204,906	2015-12-08		Registered
PU0598US2	System and Method for Posterior Cervical Fusion	NuVasive, Inc.	US	14/623,988	2015-02-17				Pending
PU0600US1	Spinal Fixation Constructs and Related Methods	NuVasive, Inc.	US	14/703,852	2015-05-04				Pending
PU0603AU1	Surgical Retractor System and Methods of Use	NuVasive, Inc.	AU	2012299061	2012-08-17				Pending
PU0603CN1	Surgical Retractor System and Methods of Use	NuVasive, Inc.	CN	201280044606.4	2012-08-17				Pending
PU0603EP1	Surgical Retractor System and Methods of Use	NuVasive, Inc.	EP	12826211.0	2012-08-17				Pending
PU0603JP1	Surgical Retractor System and Methods of Use	NuVasive, Inc.	JP	2014-526262	2012-08-17				Pending
PU0603US1	Surgical Retractor System and Methods of Use	NuVasive, Inc.	US	14/239,528	2012-08-17				Pending
PU0607US1	Minimally Disruptive Retractor and Associated Methods for Spinal Surgery	NuVasive, Inc.	US	14/756,198	2015-08-14				Pending
PU0607WO1	Minimally Disruptive Retractor and Methods	NuVasive, Inc.	WO	PCT/US2015/000084	2015-08-14				Pending
PU0608US1	Lordotic Expandable Interbody Implant	NuVasive, Inc.	US	14/456,640	2014-08-11				Pending
PU0609US1	Systems and Methods for Performing Neurophysiologic Monitoring	NuVasive, Inc.	US	14/856,525	2015-09-16				Pending
PU0611US1	Adjustable Iliac Connector	NuVasive, Inc.	US	14/856,467	2015-09-16				Pending
PU0612AU1	Surgical Spinal Correction		AU	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending
PU0612CN1	Surgical Spinal Correction		CN	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending

PU0612EP1	Surgical Spinal Correction		EP	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending
PU0612JP1	Surgical Spinal Correction		JP	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending
PU0612US1	Surgical Spinal Correction		US	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending
PU0612WO1	Surgical Spinal Correction		WO	PCT/US2014/059974	2014-10-09			Assignment from inventors in progress	Pending
PU0614WO1	Systems and Methods for Performing Neurophysiologic Monitoring During Spine Surgery		WO	PCT/US2014/064449	2014-11-06			Assignment from inventors in progress	Pending
PU0616US1	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	14/887,245	2015-10-19				Pending
PU0617USP2	Pedicle Screw Biomechanical Strength Intraoperative Assessment System and Method		US	62/252,248	2015-11-06			Provisional	Pending
PU0622USP	Anterior Spinal Column Reduction Instrument and Methods		US	62/175,624	2015-06-15			Provisional	Pending
PU0623USP	Adjustable Depth Drill Guide		US	62/271,719	2015-12-28			Provisional	Pending
PU0625US1	Method and Apparatus for Performing Spine Surgery		US	15/000,033	2016-01-19			Assignment from inventors in progress	Pending
PU0626USP2	Systems and Methods for Performing Spine Surgery		US	62/278,873	2016-01-14			Provisional	Pending
PU0627US1	Systems and Methods for Planning, Performing, and Assessing Spinal Correction During Surgery		US	15/045,084	2016-02-16			Assignment from inventors in progress	Pending
PU0628US1	Systems and Methods for Facilitating Surgical Procedures		US	15/047,049	2016-02-18			Assignment from inventors in progress	Pending
PU0630US1	Rod Reduction Assemblies and Related Methods	NuVasive, Inc.	US	14/634,729	2015-02-28				Pending
PU0632USP	Porous Interbody Implant with Contoured Surfaces		US	62/148,622	2015-04-16			Provisional	Pending
PU0632USP2	Spinal Fusion Implant		US	62/268,430	2015-12-16			Provisional	Pending
PU0633USP	Expandable Lordosis Intervertebral Implant		US	62/160,544	2015-05-12			Provisional	Pending
PU0633USP2	Expandable Lordosis Intervertebral Implant		US	62/190,251	2015-07-09			Provisional	Pending

PU0634USP	Methods and Instruments for Performing Leveraged Reduction During Single Position Spine Surgery		US	62/165,078	2015-05-21			Provisional	Pending
PU0635WO1	Systems and Methods for Planning, Performing, and Assessing Spinal Correction During Surgery		WO	PCT/US2015/036301	2015-06-17			Assignment from inventors in progress	Pending
PU0636USP	Planar and Work Rod Correction System and Tecnique		US	62/261,737	2015-12-01			Provisional	Pending
PU0638USP	Deformity Correction Pelvic Tilt Frame and Pelvic Tilt Assessment Feature		US	62/261,186	2015-11-30			Provisional	Pending
PU0640US1	Vertebral Anchor	NuVasive, Inc.	US	11/850,393	2007-09-05	8,177,816	2012-05-15		Registered
PU0641US1	Expandable Support Device and Method of Use	NuVasive, Inc.	US	12/780,744	2010-05-14	8,382,842	2013-02-26		Registered
PU0644US1	Orthopedic Implant Rod Reduction Tool Set and Method		US	10/789,134	2004-02-27	7,470,279	2008-12-30	Jackson assignment in progress	Registered
PU0645AU1	Orthopedic Implant Rod Reduction Tool Set and Method		AU	2004317551	2004-09-29	2004317551	2009-03-19	Jackson assignment in progress	Registered
PU0645CA1	Orthopedic Implant Rod Reduction Tool Set and Method		CA	PCT/US2004/031860	2004-09-29	2555868	2011-09-06	Jackson assignment in progress	Registered
PU0645US1	Orthopedic Implant Rod Reduction Tool Set and Method		US	10/789,149	2004-02-27	7,160,300	2007-01-09	Jackson assignment in progress	Registered
PU0645US10	Method for Implanting a Rod Implant Along a Spine of a Patient		US	14/245,828	2014-04-04	9,173,682	2015-11-03	Jackson assignment in progress	Registered
PU0645US11	Method for Implanting a Rod Implant Along a Spine of a Patient		US	14/553,246	2014-11-25			Jackson assignment in progress	Pending
PU0645US12	System for Implanting a Rod Implant Along a Spine of a Patient		US	14/553,327	2014-11-25			Jackson assignment in progress	Pending
PU0645US13	System for Implanting a Rod Implant Along a Spine of a Patient		US	14/553,408	2014-11-25			Jackson assignment in progress	Pending
PU0645US14	System for Implanting a Rod Implant Along a Spine of a Patient		US	14/553,471	2014-11-25			Jackson assignment in progress	Pending
PU0645US15	Orthopedic Implant Rod Reduction Tool Set and Method		US	14/738,195	2015-06-12			Jackson assignment in progress	Pending
PU0645US2	Orthopedic Implant Rod Reduction Tool Set and Method		US	12/220,185	2008-07-22	8,162,948	2012-04-24	Jackson assignment in progress	Registered
PU0645US3	Orthopedic Implant Rod Reduction Tool Set and Method		US	12/454,152	2009-05-13	8,292,892	2012-10-23	Jackson assignment in progress	Registered

PU0645US4	Orthopedic Implant Rod Reduction Tool Set and Method		US	12/584,413	2009-09-04	8,100,915	2012-01-24	Jackson assignment in progress	Registered
PU0645US5	Orthopedic Implant Rod Reduction Tool Set and Method		US	13/374,932	2012-01-24	8,377,067	2013-02-19	Jackson assignment in progress	Registered
PU0645US6	Orthopedic Implant Rod Reduction Tool Set and Method		US	13/573,660	2012-10-02	9,055,978	2015-06-16	Jackson assignment in progress	Registered
PU0645US7	Bone Anchor Configured to Anchor an Elongated Implant to a Patient Bone		US	14/245,660	2014-04-04			Jackson assignment in progress	Pending
PU0645US8	Method for Implanting an Elongated Implant Along a Spine of a Patient		US	14/245,728	2014-04-04	9,101,415	2015-08-11	Jackson assignment in progress	Registered
PU0645US9	System for Anchoring an Elongated Implant to a Vertebra of a Patient Spine		US	14/245,775	2014-04-04			Jackson assignment in progress	Pending
PU0646US1	Spinal Fixation Tool Attachment Structure		US	11/272,508	2005-11-10	9,050,148	2015-06-09	Jackson assignment in progress	Registered
PU0646US2	Spinal Fixation Tool Attachment Structure		US	14/601,834	2015-01-21			Jackson assignment in progress	Pending
PU0647US1	Dynamic Stabilization Assemblies, Tool Set and Method		US	11/328,481	2006-01-09	7,862,587	2011-01-04	Jackson assignment in progress	Registered
PU0647US2	Dynamic Stabilization Assemblies, Tool Set and Method		US	12/927,673	2010-11-19	9,216,039	2015-12-22	Jackson assignment in progress	Registered
PU0647US3	Dynamic Stabilization Assemblies, Tool Set and Method		US	14/482,562	2014-09-10			Jackson assignment in progress	Pending
PU0648US1	Tool System for Dynamic Spinal Implants		US	11/999,689	2007-12-06	8,066,739	2011-11-29	Jackson assignment in progress	Registered
PU0648US2	Tool System for Dynamic Spinal Implants		US	13/373,735	2011-11-28	8,894,657	2014-11-25	Jackson assignment in progress	Registered
PU0648US3	Tool System for Dynamic Spinal Implants		US	13/901,672	2013-05-24			Jackson assignment in progress	Pending
PU0648US4	Tool System for Dynamic Spinal Implants		US	14/549,201	2014-11-20			Jackson assignment in progress	Pending
PU0649US1	Orthopedic Implant Rod Reduction Tool Set and Method		US	13/815,933	2013-03-15	9,050,139	2015-06-09	Jackson assignment in progress	Registered
PU0649US2	Orthopedic Implant Rod Reduction Tool Set and Method		US	14/733,222	2015-06-08			Jackson assignment in progress	Pending
PU0650US1	Spinal FixationTool Set and Method		US	14/041,552	2013-09-30			Jackson assignment in progress	Pending
PU0651US1	Spinal Fixation Tool Set and Method		US	10/996,289	2004-11-23	8,152,810	2012-04-10	Jackson assignment in progress	Registered

PU0651US2	Spinal Fixation Tool Set and Method		US	11/541,321	2006-09-29	8,273,089	2012-09-25	Jackson assignment in progress	Registered
PU0651US3	Spinal Fixation Tool Set and Method		US	12/924,223	2010-09-23	9,211,150	2015-12-15	Jackson assignment in progress	Registered
PU0651US4	Spinal Fixation Tool Set and Method		US	13/507,471	2012-06-29			Jackson assignment in progress	Pending
PU0652AU1	Poly Axial Bone Screw With Spherical Capture, Compression and Alignment and Retention Structures		AU	2008226963	2008-03-06	2008226963 B2	2011-09-06	Jackson assignment in progress	Registered
PU0652DE1	Poly Axial Bone Screw With Spherical Capture, Compression and Alignment and Retention Structures		DE	08726468.5	2008-03-06	2129310 B1	2012-09-05	Jackson assignment in progress	Registered
PU0652GB1	Poly Axial Bone Screw With Spherical Capture, Compression and Alignment and Retention Structures		GB	08726468.5	2008-03-06	2129310 B1	2012-09-05	Jackson assignment in progress	Registered
PU0652JP1	Poly Axial Bone Screw With Spherical Capture, Compression and Alignment and Retention Structures		JP	2013-001793	2008-03-06			Jackson assignment in progress	Pending
PU0652US1	Polyaxial Bone Screw With Spherical Capture, Compression and Alignment and Retention Structures		US	12/072,354	2008-02-26			Jackson assignment in progress	Pending
PU0652US2	Polyaxial Bone Screw With Spherical Capture, Compression Insert and Alignment and Retention Structures		US	13/507,822	2012-07-31			Jackson assignment in progress	Pending
PU0653BR1	Polyaxial Bone Anchor With Compound Articulation and Pop-On Shank		BR	PCT/US2012/000147	2012-03-16			Jackson assignment in progress	Pending
PU0653CN1	Polyaxial Bone Anchor With Compound Articulation and Pop-On Shank		CN	PCT/US2012/000147	2012-03-16			Jackson assignment in progress	Pending
PU0653JP1	Polyaxial Bone Anchor With Compound Articulation and Pop-On Shank		JP	2014-501061	2012-03-16			Jackson assignment in progress	Pending
PU0653US1	Polyaxial Bone Anchor With Compound Articulation and Pop-		US	13/385,997	2012-03-20			Jackson assignment in progress	Pending

	On Shank								
PU0658US1	Systems and Methods for Performing Spine Surgery	NuVasive, Inc.	US	14/887,246	2015-10-19				Pending
PU0659USP	Spinal Compression Instrument and Related Methods		US	62/262,491	2015-12-03			Provisional	Pending
PU0661USP	Bone Anchor with Increased Angulation Housing		US	62/262,530	2015-12-03			Provisional	Pending
PU0663USP	Pressue-Based Motion Detection for Spine Surgery		US	62/257,158	2015-11-18			Provisional	Pending
PU0665USP	Bone Anchor with Deployable Purchase Element		US	62/306,201	2016-03-10			Provisional	Pending
PU0666USP	Integral Double Rod Spinal Construct		US	62/298,279	2016-02-22			Provisional	Pending
PU0667USP	Immunomodulation with implantation of cellular allograft		US	62/263,945	2015-12-07			Provisional	Pending
PU0668USP	3D Visualization During Surgery with Reduced Radiation Exposure		US	62/266,888	2015-12-14			Provisional	Pending
PU0668USP2	3D Visualization During Surgery with Reduced Radiation Exposure		US	62/307,942	2016-03-14			Provisional	Pending
PU0669USP	Midline Spinous Process Allograft		US	62/272,618	2015-12-29			Provisional	Pending
PU0670USP	Spinous Process Plate System		US	62/273,350	2015-12-30			Provisional	Pending
PU0672USP	Visual, Audible, Tactile Feedback Mechanism		US	62/273,377	2015-12-30			Provisional	Pending
PU0672USP2	Interfixated Interbody Guide		US	62/273,445	2015-12-31			Provisional	Pending
PU0673USP	Expandable Trial Implant		US	62/273,390	2015-12-30			Provisional	Pending
PU0673USP2	Cranial/Caudal Expandable Lordosis Spinal Implant		US	62/273,441	2015-12-31			Provisional	Pending
PU0674USP	Anterolateral Implant Inserter		US	62/273,443	2015-12-31			Provisional	Pending
PU0675USP	Systems and Methods for Performing Spine Surgery		US	62/286,166	2016-01-22			Provisional	Pending
PU0678USP	Disc Preparation Confirmation Tool		US	62/294,505	2016-02-12			Provisional	Pending
PU0679USP	Magnetically Activated Deployable Fixation Interbody Device		US	62/294,884	2016-02-12			Provisional	Pending
PU0680USP	Magnetically Actuated Instruments		US	62/294,979	2016-02-12			Provisional	Pending
PU0681USP	Post-Operatively Adjustable Angled Rod		US	62/294,988	2016-02-12			Provisional	Pending
PU0682USP	Post-Operatively Adjustable Tension Devices		US	62/294,975	2016-02-12			Provisional	Pending
PU0683USP	Magnetically Actuateable Rod Insertion for Minimally Invasive Surgery		US	62/295,001	2016-02-12			Provisional	Pending

PU0684USP	Systems and Methods for Spinous Process Fixation		US	62/294,422	2016-02-12			Provisional	Pending
PU0685USP	Systms and Methods for an Interspinous Spacer		US	62/294,440	2016-02-12			Provisional	Pending
PU0687USP	Surgical Fixation System and Related Methods		US	62/294,989	2016-02-12			Provisional	Pending
PU0688USP	Systems and Methods for Performing Spine Surgery		US	62/294,990	2016-02-12			Provisional	Pending
PU0689USP	Magnetic Disc Prosthesis		US	62/294,992	2016-02-12			Provisional	Pending
PU0690USP	Magnetically Actuated Expandable Interbody Device		US	62/295,008	2016-02-13			Provisional	Pending
PU0692US1	Systems and Methods for Planning, Performing, and Assessing Spinal Correction During Surgery		US	15/044,947	2016-02-16				Pending
PU0693US1	Expandable Rod System To Treat Scoliosis and Method of Using the Same	Ellipse Technologies, Inc.	US	11/172,678	2005-06-30	7,955,357	2011-06-07		Registered
PU0693US2	Expandable Rod System To Treat Scoliosis and Method of Using the Same	Ellipse Technologies, Inc.	US	12/421,569	2009-04-09	8,343,192	2013-01-01		Registered
PU0693US3	Expandable Rod System To Treat Scoliosis and Method of Using the Same	Ellipse Technologies, Inc.	US	13/691,530	2012-11-30	8,852,236	2014-10-07		Registered
PU0693US4	Expandable Rod System To Treat Scoliosis and Method of Using the Same	Ellipse Technologies, Inc.	US	14/321,386	2014-07-01				Pending
PU0693US5	Expandable Rod System To Treat Scoliosis and Method of Using the Same	Ellipse Technologies, Inc.	US	14/601,999	2015-01-21	9,011,499	2015-04-21		Registered
PU0694DE1	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	DE	08730778.1	2008-02-26	2114258	2014-06-25		Registered
PU0694EP2	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	EP	14168308.6	2008-02-26				Pending
PU0694FR1	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	FR	08730778.1	2008-02-26	2114258	2014-06-25		Registered
PU0694GB1	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	GB	08730778.1	2008-02-26	2114258	2014-06-25		Registered

PU0694US1	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	11/760,482	2007-06-08	7,862,502	2011-01-04		Registered
PU0694US2	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	12/259,965	2008-10-28	7,981,025	2011-07-19		Registered
PU0694US3	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	13/158,117	2011-06-10	8,715,159	2014-05-06		Registered
PU0694US4	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	13/649,977	2012-10-11	8,808,163	2014-08-19		Registered
PU0694US5	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	14/328,568	2014-07-10				Pending
PU0694US6	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	14/668,901	2015-03-25	9,271,857	2016-03-01		Registered
PU0694US7	Gastrointestinal Restriction Device	Ellipse Technologies, Inc.	US	14/920,709	2015-10-22				Pending
PU0695US1	Implant System with Resonant-Driven Actuator	Ellipse Technologies, Inc.	US	11/760,488	2007-06-08	8,246,533	2012-08-21		Registered
PU0696CA1	Skeletal Manipulation System	Ellipse Technologies, Inc.	CA	2703562	2008-10-13				Pending
PU0696CN1	Skeletal Manipulation System	Ellipse Technologies, Inc.	CN	200880121423.1	2008-10-13	ZL200880121423.1	2012-11-21		Registered
PU0696CN2	Skeletal Manipulation System	Ellipse Technologies, Inc.	CN	201210404498.9	2008-10-13	ZL201210404498.9	2015-03-04		Registered
PU0696EP1	Skeletal Manipulation System	Ellipse Technologies, Inc.	EP	08845847.6	2008-10-13				Pending
PU0696JP2	Skeletal Manipulation System	Ellipse Technologies, Inc.	JP	2014-081308	2008-10-13	5860496	2015-12-25		Registered
PU0696JP3	Skeletal Manipulation System	Ellipse Technologies,	JP	2015-178762	2008-10-13				Pending

		Inc.							
PU0696US3	Skeletal Manipulation System and Method	Ellipse Technologies, Inc.	US	12/121,499	2008-05-15	8,057,472	2011-11-15		Registered
PU0696US4	Skeletal Manipulation Method	Ellipse Technologies, Inc.	US	13/277,980	2011-10-20	8,419,734	2013-04-16		Registered
PU0696US5	Skeletal Manipulation Method	Ellipse Technologies, Inc.	US	13/849,405	2013-03-22	9,271,781	2016-03-01		Registered
PU0696US6	Skeletal Manipulation Method	Ellipse Technologies, Inc.	US	14/629,426	2015-02-23	9,179,960	2015-11-10		Registered
PU0696US7	Skeletal Manipulation Method	Ellipse Technologies, Inc.	US	14/880,980	2015-10-12				Pending
PU0697US2	Adjustable Implant System	Ellipse Technologies, Inc.	US	13/625,725	2012-09-24	9,198,755	2015-12-01		Registered
PU0697US3	Adjustable Implant System	Ellipse Technologies, Inc.	US	14/885,749	2015-10-16				Pending
PU0698US1	External Adjustment Device for Distraction Device	Ellipse Technologies, Inc.	US	12/615,855	2009-11-10	8,382,756	2013-02-26		Registered
PU0698US2	External Adjustment Device for Distraction Device	Ellipse Technologies, Inc.	US	13/747,028	2013-01-22	9,192,411	2015-11-24		Registered
PU0698US3	External Adjustment Device	Ellipse Technologies, Inc.	US	14/885,227	2015-10-16				Pending
PU0699CN1	Spinal Distraction System	Ellipse Technologies, Inc.	CN	201080008758.X	2010-02-10	ZL201080008758.X	2015-09-16		Registered
PU0699CN2	Spinal Distraction System	Ellipse Technologies, Inc.	CN	201510509680.4	2010-02-10				Pending
PU0699CN3	Spinal Distraction System	Ellipse Technologies, Inc.	CN	20150509301.1	2010-02-10				Pending
PU0699EP1	Spinal Distraction System	Ellipse	EP	10744153.7	2010-02-10				Pending

		Technologies, Inc.							
PU0699JP1	Spinal Distraction System	Ellipse Technologies, Inc.	JP	2011-551126	2010-02-10				Pending
PU0699US1	Non-Invasive Adjustable Distraction System	Ellipse Technologies, Inc.	US	12/391,109	2009-02-23	8,197,490	2012-06-12		Registered
PU0699US2	Non-Invasive Adjustable Distraction System	Ellipse Technologies, Inc.	US	13/477,945	2012-05-22	8,974,463	2015-03-10		Registered
PU0699US3	Non-Invasive Adjustable Distraction System	Ellipse Technologies, Inc.	US	14/332,286	2014-07-15				Pending
PU0700US1	Interspinous Process Device and Method	Ellipse Technologies, Inc.	US	12/761,141	2010-04-15				Pending
PU0701AU1	Bone Growth Device and Method	Ellipse Technologies, Inc.	AU	2010289288	2010-09-03				Pending
PU0701CN1	Bone Growth Device and Method	Ellipse Technologies, Inc.	CN	201080039442.7	2010-09-03	ZL2010-80039442.7	2015-09-09		Registered
PU0701CN2	Bone Growth Device and Method	Ellipse Technologies, Inc.	CN	2015104847223	2010-09-03				Pending
PU0701CN3	Bone Growth Device and Method	Ellipse Technologies, Inc.	CN	201510484965.7	2010-09-03				Pending
PU0701EP1	Bone Growth Device and Method	Ellipse Technologies, Inc.	EP	10814570.7	2010-09-03				Pending
PU0701JP1	Bone Growth Device and Method	Ellipse Technologies, Inc.	JP	2012-528095	2010-09-03	5751642	2015-05-29		Registered
PU0701JP2	Bone Growth Device and Method	Ellipse Technologies, Inc.	JP	2015-098790	2010-09-03				Pending
PU0701KR1	Bone Growth Device and Method	Ellipse Technologies, Inc.	KR	10-2012-7008627	2010-09-03				Pending

PU0701RU1	Bone Growth Device and Method	Ellipse Technologies, Inc.	RU	2012112925	2010-09-03				Pending
PU0701RU2	Bone Growth Device and Method	Ellipse Technologies, Inc.	RU	2016101629	2010-09-03				Pending
PU0701US1	Bone Growth Device and Method	Ellipse Technologies, Inc.	US	12/875,585	2010-09-03	8,449,543	2013-05-28		Registered
PU0701US2	Bone Growth Device and Method	Ellipse Technologies, Inc.	US	13/892,182	2013-05-10				Pending
PU0702US1	External Adjustment Device for Distraction Device	Ellipse Technologies, Inc.	US	13/172,598	2011-06-29	9,248,043	2016-02-02		Registered
PU0702US2	External Adjustment Device for Distraction Device	Ellipse Technologies, Inc.	US	14/995,503	2016-01-14				Pending
PU0704US1	Maintenance Feature in Magnetic Implant	Ellipse Technologies, Inc.	US	13/198,571	2011-08-04	8,734,488	2014-05-27		Registered
PU0704US2	Maintenance Feature in Magnetic Implant	Ellipse Technologies, Inc.	US	14/250,313	2014-04-10	9,186,183	2015-11-17		Registered
PU0704US3	Maintenance Feature in Magnetic Implant	Ellipse Technologies, Inc.	US	14/883,485	2015-10-14				Pending
PU0705US1	System and Method for Altering Rotational Alignment of Bone Sections	Ellipse Technologies, Inc.	US	13/370,966	2012-02-10	8,715,282	2014-05-06		Registered
PU0705US2	Variable Length Device and Method	Ellipse Technologies, Inc.	US	13/371,012	2012-02-10	8,852,187	2014-10-07		Registered
PU0705US3	System and Method for Altering Rotational Alignment of Bone Sections	Ellipse Technologies, Inc.	US	14/146,336	2014-01-02				Pending
PU0705US4	Variable Length Device and Method	Ellipse Technologies, Inc.	US	14/667,620	2015-03-24				Pending
PU0706DE1	Devices and Methods for Non-Invasive Implant Length Sensing	Ellipse Technologies,	DE	112012004130.5	2012-10-02				Pending

		Inc.							
PU0706US1	Devices and Methods for Non-Invasive Implant Length Sensing	Ellipse Technologies, Inc.	US	13/253,065	2011-10-04				Pending
PU0707US6	Spinal Distraction System	Ellipse Technologies, Inc.	US	13/730,773	2012-12-28				Pending
PU0708US1	Adjustable Magnetic Devices and Methods of Using Same	Ellipse Technologies, Inc.	US	14/355,202	2012-10-31				Pending
PU0708US2	Adjustable Magnetic Devices and Methods of Using Same	Ellipse Technologies, Inc.	US	14/301,238	2014-06-10				Pending
PU0708US3	Adjustable Magnetic Devices and Methods of Using Same	Ellipse Technologies, Inc.	US	14/449,761	2014-08-01				Pending
PU0709DE1	Devices and Methods for Detection of Slippage of Magnetic Coupling in Implantable Medical Devices	Ellipse Technologies, Inc.	DE	112013002825.5	2013-06-04				Pending
PU0709US1	Devices and Methods for Detection of Slippage of Magnetic Coupling in Implantable Medical Devices	Ellipse Technologies, Inc.	US	13/490,107	2012-06-06	9,078,711	2015-07-14		Registered
PU0709US2	Devices and Methods for Detection of Slippage of Magnetic Coupling in Implantable Medical Devices	Ellipse Technologies, Inc.	US	14/737,192	2015-06-11				Pending
PU0710US1	Magnetic Implants with Improved Anatomical Compatibility	Ellipse Technologies, Inc.	US	13/525,058	2012-06-15				Pending
PU0711US1	Intramedullary Implant for Replacing Lost Bone	Ellipse Technologies, Inc.	US	13/655,246	2012-10-18	9,044,281	2015-06-02		Registered
PU0711US2	Implantable Dynamic Apparatus Having an Anti Jamming Feature	Ellipse Technologies, Inc.	US	14/451,190	2014-08-04				Pending
PU0712US1	Distraction Devices and Method of Assembling the Same	Ellipse Technologies, Inc.	US	13/791,430	2013-03-08	9,179,938	2015-11-10		Registered
PU0712US2	Systems and Methods for Ultrasonic Detection of Device Distraction	Ellipse Technologies, Inc.	US	14/863,019	2015-09-23				Pending
PU0713AU1	Adjustable Devices for Treating	Ellipse	AU	2013338218	2013-10-28				Pending

	Arthritis of the Knee	Technologies, Inc.							
PU0713BR1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	BR	112015009446.5	2013-10-28				Pending
PU0713CA1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	CA	2889768	2013-10-28				Pending
PU0713CN1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	CN	2013800689268	2013-10-28				Pending
PU0713EP1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	EP	13850787.6	2013-10-28				Pending
PU0713IN1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	IN	3762/DELNP/2015	2013-10-28				Pending
PU0713RU1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	RU	2015120291	2013-10-28				Pending
PU0713US1	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	US	14/065,342	2013-10-28				Pending
PU0713US2	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	US	14/379,742	2013-10-28				Pending
PU0714US1	Noninvasively Adjustable Suture Anchors	Ellipse Technologies, Inc.	US	14/447,391	2014-07-30				Pending
PU0715US1	Adjustable Spinal Implant	Ellipse Technologies, Inc.	US	14/511,084	2014-10-09				Pending
PU0716US1	Methods and Apparatus for Bone Reshaping	Ellipse Technologies, Inc.	US	14/512,119	2014-10-10				Pending
PU0716WO1	Methods and Apparatus for Bone Reshaping	Ellipse Technologies, Inc.	WO	PCT/US2014/060131	2014-10-10				Pending
PU0717US1	System for Informational Magnetic Feedback in Adjustable Implants	Ellipse Technologies, Inc.	US	14/698,665	2015-04-28				Pending

PU0717US2	System for Informational Magnetic Feedback in Adjustable Implants	Ellipse Technologies, Inc.	US	14/932,904	2015-11-04				Pending
PU0717WO1	System for Informational Magnetic Feedback in Adjustable Implants	Ellipse Technologies, Inc.	WO	PCT/US2015/028079	2015-04-28				Pending
PU0717WO2	System for Informational Magnetic Feedback in Adjustable Implants	Ellipse Technologies, Inc.	WO	PCT/US2015/059102	2015-11-04				Pending
PU0718WO1	Remotely Adjustable Interactive Bone Reshaping	Ellipse Technologies, Inc.	WO	PCT/US2015/057010	2015-10-22				Pending
PU0719US1	Systems and Methods for Distraction	Ellipse Technologies, Inc.	US	14/981,762	2015-12-28				Pending
PU0719WO1	Systems and Methods for Distraction	Ellipse Technologies, Inc.	WO	PCT/U2015/000283	2015-12-23				Pending
PU0720US1	Systems and Methods for Vertebral Adjustment	NuVasive, Inc.	US	15/048,928	2016-02-19				Pending
PU0720WO1	Systems and Methods for Vertebral Adjustment	NuVasive, Inc.	WO	PCT/US2016/018797	2016-02-19				Pending
PU0721USP	Adjustable Devices for Treating Arthritis of the Knee	Ellipse Technologies, Inc.	US	62/242,931	2015-10-16				Pending
PU0722USP	Systems and Methods for Treatment of Incontinence	Ellipse Technologies, Inc.	US	62/249,059	2015-10-30				Pending
PU0723USP	External Adjustment Device for Distraction Device	Ellipse Technologies, Inc.	US	62/265,430	2015-12-10				Pending
PU0723USP2	Adjustment Device for Distraction	Ellipse Technologies, Inc.	US	62/276,196	2016-01-07				Pending
PU0724USP	Systems and Methods for Bone Transport	Ellipse Technologies, Inc.	US	62/288,348	2016-01-28				Pending
PU0725USP	Systems and Methods for Controlling Multiple Surgical Variables	Ellipse Technologies, Inc.	US	62/293,755	2016-02-10				Pending
PU0737USP	Systems and Methods for Sagittal		US	62/302,725	2016-03-02			Provisional	Pending


Realignment Planning

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.
Petitioner

v.

NUVASIVE, INC.
Patent Owner

Case IPR2013-00506
Patent Number: 8,361,156

PATENT OWNER NUVASIVE, INC.'S NOTICE OF APPEAL TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Pursuant to 37 C.F.R. § 90.2(a) and 35 U.S.C. §§ 141(c) and 142, NuVasive, Inc. ("Patent Owner") respectfully gives Notice that it hereby appeals to the United States Court of Appeals for the Federal Circuit the February 11, 2015 Final Written Decision of the Patent Trial and Appeal Board ("Board") in IPR2013-00506 that claims 1-14, 19-20, and 23-27 of U.S. Patent No. 8,361,156 ("the '156 patent") are unpatentable, and all other underlying orders, decisions, rulings, and opinions that are adverse to Patent Owner. Patent Owner received the Final Written Decision electronically on the day the decision was entered.

For the limited purpose of providing the Director with the information specified in 37 C.F.R. § 90.2(a)(3)(ii), issues on Patent Owner's appeal may include the Board's determination that claims 1-14, 19-20, and 23-27 of the '156 patent have been shown to be unpatentable under 35 U.S.C. § 103 in view of the grounds of unpatentability identified in the Board's Final Written Decision, challenges to any findings supporting that determination, the Board's failure to properly consider evidence of record, the Board's legal errors in undertaking the obviousness analysis, the Board's findings that conflict with the evidence of record and are not supported by substantial evidence, the Board's findings with respect to objective indicia of non-obviousness, and other issues decided adversely to Patent Owner.

Simultaneous with this filing and in accordance with 37 C.F.R. § 90.2(a)(1), this Notice of Appeal is filed with the Director of the United States Patent and Trademark Office, filed with the Board, and served upon Petitioner in accordance with 37 C.F.R. § 42.6(e). In addition, this Notice of Appeal, along with the required fees,

is being filed with the Clerk's Office for the United States Court of Appeals for the Federal Circuit in accordance with Fed. Cir. R. 15(a)(1).

Respectfully Submitted,

Dated: April 15, 2015

/Michael T. Rosato/
Michael T. Rosato
Reg. No. 52,182

CERTIFICATE OF FILING

I hereby certify that, in addition to being filed electronically through the Patent Trial and Appeal Board's PRPS, the foregoing "Patent Owner Nuvasive, Inc.'s Notice of Appeal to the United States Court of Appeals for the Federal Circuit" was filed by Express Mail on this 15th day of April, 2015, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel, United States Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

CERTIFICATE OF FILING

I hereby certify that a true and correct copy of the foregoing "Patent Owner Nuvasive, Inc.'s Notice of Appeal to the United States Court of Appeals for the Federal Circuit" was filed electronically by CM/ECF on this 15th day of April, 2015, with the Clerk's Office of the United States Court of Appeals for the Federal Circuit, at the following address:

United States Court of Appeals for the Federal Circuit
717 Madison Place, N.W., Suite 401
Washington, D.C. 20439

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e), this is to certify that I caused to be served a true and correct copy of the foregoing "Patent Owner Nuvasive, Inc.'s Notice of Appeal to the United States Court of Appeals for the Federal Circuit" on the Petitioner at the correspondence address of the Petitioner as follows:

Jeff E. Schwartz (jeschwartz@foxrothschild.com;
Seth A. Kramer skramer@foxrothschild.com)
(ipdocket@foxrothschild.com)
Fox Rothschild LLP
1030 15th Street, NW, Washington, DC 20005

Dated: April 15, 2015

/Michael T. Rosato/
Michael T. Rosato

Trials@uspto.gov
571.272.7822

Paper No. 47
Filed: February 11, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.,
Petitioner,

v.

NUVASIVE, INC.,
Patent Owner.

Case IPR2013-00506
Patent 8,361,156 B2

Before SALLY C. MEDLEY, LORA M. GREEN, and STEPHEN C. SIU, *Administrative Patent Judges*.

GREEN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

Petitioner, Medtronic, Inc. ("Medtronic"), filed a Petition requesting *inter partes* review of claims 1–14, 19, 20, and 23–27 ("the challenged claims") of U.S. Patent No. 8,361,156 B2 ("the '156 patent"). Paper 1 ("Pet."). Patent Owner, NuVasive, Inc. ("NuVasive"), filed a Patent Owner

Preliminary Response. Paper 8. We determined that the information presented in the Petition and the Preliminary response demonstrated that there was a reasonable likelihood that Petitioner would prevail in challenging claims 1–14, 19, 20, and 23–27 as unpatentable under 35 U.S.C. § 103(a). Pursuant to 35 U.S.C. § 314, the Board instituted trial on February 13, 2014 , as to the challenged claims of the '156 patent. Paper 9 ("Institution Decision"; "Dec. Inst.").

Patent Owner filed a Response (Paper 21, "PO Resp."), but did not file a motion to amend. Petitioner subsequently filed a Reply. Paper 28 ("Reply"). An oral hearing was held on November 18, 2014. The transcript of the hearing has been entered into the record. Paper 46. Patent Owner also filed a Corrected Motion for Observation on certain cross-examination testimony of Petitioner's declarant, Richard A. Hynes, M.D. (Paper 38, "Hynes Obs.") and a Corrected Motion for Observation on certain cross-examination testimony of Petitioner's declarant, Loic Josse (Paper 39, "Josse Obs."). Petitioner filed a Response to each of Patent Owner's Motions for Observation (Paper 44, "Hynes Obs. Resp."; Paper 43, "Josse Obs. Resp.").

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. Based on the record before us, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–14, 19, 20, and 23–27 of the '156 patent are unpatentable.

B. Related Proceedings

Medtronic filed concurrently another petition for an *inter partes* review of the '156 patent, IPR2013-00504, in which we declined to institute *inter partes* review. IPR2013-00504, Paper 8. Petitioner subsequently filed

another petition for an *inter partes* review, IPR2014-00487, in which we also declined to institute *inter partes* review. IPR2014-00487, Paper 8.

Medtronic indicates further that it is a named counterclaim-defendant in the district court action titled *Warsaw Orthopedic, Inc. v. NuVasive Inc.*, Case No: 3:12-cv-02738-CAB-MDD (S.D. Cal.), which also involves the '156 patent. Pet. 1.

C. The '156 Patent (Ex. 1115)

The '156 patent issued on January 29, 2013, with Matthew Curran and Mark Peterson as the listed co-inventors. The '156 patent is drawn to a spinal implant, and methods of spinal fusion using the implant. Ex. 1115, 1:20–24. A spinal fusion procedure generally involves removing some or all of a diseased spinal disc, and inserting an intervertebral implant into the disc space. *Id.* at 1:30–33. The spinal fusion implant is introduced into the disc space via a lateral approach to the spine, or via a posterior, anterior, antero-lateral, or postero-lateral approach, depending on the size of the implant. *Id.* at 5:29–35. As taught by the '156 patent, the implant is made from a material "having suitable radiolucent characteristics," such as PEEK (poly-ether-ether-ketone). *Id.* at 5:10–15.

The '156 patent teaches further that the implant "may be provided in any number of suitable shapes and sizes depending on the particular surgical procedure or need," and that it "may be dimensioned for use in the cervical and/or lumbar spine." *Id.* at 2:12–16. Thus, before a spinal fusion procedure is performed, "the clinician must first designate the appropriate implant size." *Id.* at 11:10–12.

D. Illustrative Claim

Petitioner challenges claims 1–14, 19, 20, and 23–27 of the '156 patent. Claims 1, 5, and 9 read as follows:

1. A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:

an upper surface including anti-migration elements to contact said first vertebra when said implant is positioned within the interbody space, a lower surface including anti-migration elements to contact said second vertebra when said implant is positioned within the interbody space, a distal wall, a proximal wall, a first sidewall, and a second sidewall generally opposite from the first sidewall, wherein said distal wall, proximal wall, first sidewall, and second sidewall comprise a radiolucent material;

wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width;

at least a first fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space, said first fusion aperture having: a longitudinal aperture length extending generally parallel to the longitudinal length of said implant, and a lateral aperture width extending between said first sidewall to said second sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width; and

at least first and second radiopaque markers oriented generally parallel to a height of the implant, wherein said first radiopaque marker extends into said first sidewall at a position proximate to said

medial plane, and said second radiopaque marker extends into said second sidewall at a position proximate to said medial plane.

5. The spinal fusion implant of claim 1, further including at least one receiving aperture position at said proximal wall wherein said longitudinal length is greater than 40 mm.

9. The spinal fusion implant of claim 1, wherein said maximum lateral width of said implant is approximately 18 mm.

E. Instituted Challenges

Claims	**Basis**	**References**
1–4, 7, 8, 10–14, 19, 20, 23, 24, 26, and 27	§ 103(a)	SVS[1] and Baccelli[2]
5, 6, and 9	§ 103(a)	SVS, Baccelli, and Michelson[3]
25	§ 103(a)	SVS, Baccelli, and Telamon[4]
1–4, 7, 10–14, 19, 20, and 23–27	§ 103(a)	Telamon and Baccelli
5, 6, 8, and 9	§ 103(a)	Telamon, Baccelli, and Michelson

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the

[1] Synthes Vertebral Spacer – PR Brochure, Synthes Spine 2002 ("SVS", Ex. 1106).
[2] Baccelli, US 2003/0028249 A1, filed February 6, 2003 (Ex. 1104).
[3] Michelson, US 5,860,973, issued January 19, 1999 (Ex. 1105).
[4] Medtronic Sofamor Danek, Telamon, Verte-Stack PEEK Vertebral Body Spacer, ©2003 Medtronic Sofamor Danek USA, Inc (Ex. 1107); and Telamon, Posterior Impacted Devices, ©2003 Medtronic Sofamor Danek USA, Inc. (Ex. 1108) (collectively, "Telamon").

specification of the patent in which they appear. 37 C.F.R. § 42.100(b); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). Claim terms also are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998).

In the Institution Decision, we "interpret[ed] the claim language consistently with its plain and ordinary meaning, when read in view of the Specification." *See, e.g.*, Dec. Inst. 6. The parties appear to agree on the interpretation of the claim terms, and we see no reason to depart from our interpretation in the Institution Decision.

B. Patentability

1. Principles of Law

To prevail on its challenges to the patentability of claims, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art;

(2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The level of ordinary skill in the art usually is evidenced by the references themselves. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

Prior art references must be "considered together with the knowledge of one of ordinary skill in the pertinent art." *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (quoting *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)). Moreover, "it is proper to take into account not only specific teachings of the reference but also the inferences which one skilled in the art would reasonably be expected to draw therefrom." *In re Preda*, 401 F.2d 825, 826 (CCPA 1968). That is because an obviousness analysis "need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 550 U.S. at 418; *see In re Translogic Tech., Inc.*, 504 F.3d. 1249, 1259 (Fed. Cir. 2007).

2. Obviousness of Claim 1 under 35 U.S.C. § 103(a) Over One of SVS or Telamin, Combined with Baccelli

Petitioner contends that the combination of one of SVS or Telamon with Baccelli renders obvious independent claim 1. Pet. 14–16; 38–39. Petitioner sets forth claim charts demonstrating where each element of the claim is taught by the reference (*Id.* at 16–18; 39–42), and relies, initially, on the Declaration of Dr. Hynes (Ex. 1101). Patent Owner disagrees with Petitioner's assertions (PO Resp. 32–47), and relies on the Declaration of

Dr. Hansen A. Yuan (Ex. 2020) as evidence that the asserted combination does not render obvious the challenged claims.

a. SVS (Ex. 1106)

SVS discloses a vertebral spacer (or spinal implant) made of a radiolucent polymer that allows fusion to occur through the implant. In one embodiment, the implant measures 22 mm depth by 8 mm width and includes two radiopaque marker pins. Ex. 1106, 1–2.

b. Telamon (Ex. 1107)

Telamon discloses a radiolucent spinal implant measuring 22-26 mm length by 10 mm width. Ex. 1107, p. 2. The implant further includes radiographic markers. *Id.*

c. Baccelli (Ex. 1104)

Baccelli discloses an intervertebral implant. Ex. 1104 ¶ 1. The implant has a front wall (*id.* ¶ 6, Fig. 8 – element 4b) that contains an orifice (*id.* ¶ 39, Fig. 8, element 18) into which a threaded endpiece is connected for placing the implant into position between vertebrae. *Id.* ¶¶ 44–45.

The implant is made of a material that is transparent to X-rays, such as PEEK. *Id.* ¶ 50. One or more markers that are opaque to X-rays may be used to identify the position and/or the presence of the implant when X-rays are taken. *Id.* The radiopaque markers may be positioned within the anterior (i.e., proximal) wall and/or the posterior (i.e., distal) wall of the implant. *Id.* at Figs. 1–4, 8, 9.

The implant may further include spikes positioned symmetrically about the sagittal midplane and extending in the frontal midplane in a

vertical axis. *Id.* ¶ 41, Figs. 1–5, 8, 9. The spikes may be made of a radiopaque material (i.e., a material that is opaque to X-rays). *Id.* ¶ 51.

d. Analysis

Petitioner asserts that SVS and Telamon disclose almost all the limitations of independent claim 1. Pet. 14–15, 38. The SVS and Telamon implants have radiopaque markers in their distal and proximal walls. *Id* at 15, 38. Petitioner asserts that Baccelli also teaches the use of radiopaque markers, wherein the "at least first and second radiopaque markers . . . extend into a first sidewall and a second sidewall at positions proximate to a medial plane of the implant." *Id.* at 15, 39.

According to Petitioner, it would have been obvious to the ordinary artisan at the time of invention to include the radiopaque markers of Baccelli in the implants of SVS or Telamon in order to provide additional information regarding the location and/or orientation of the implant, both during surgery and after implantation. *Id.* at 15, 39 (citing Ex. 1101 ¶ 68). Petitioner contends further that such a combination is "nothing more than an application of known prior art elements to improve a similar device in the same way." *Id.* at 15, 39.

Patent Owner contends that neither Telamon nor SVS disclose an interbody fusion implant "with radiopaque markers in the medial plane." PO Resp. 33. Patent Owner contends further that the implant designed by Dr. Hynes, the Saber implant, does not include radiopaque markers in the medial plane. *Id.* (citing Ex. 2011; Ex. 2020 ¶ 95). Rather, the markers are only at the proximal and distal ends. *Id.* at 33–34. Thus, Patent Owner contends, "it is plainly apparent that the implant designers for each of Medtronic, Synthes, and DePuy Spine all considered radiopaque markers to

be inappropriate or at least unnecessary in the medial plane for PLIF [posterior lumbar interbody fusion] implants." *Id.* at 34 (citing Ex. 2020 ¶¶ 45, 98–99, and 102). We are not persuaded by Patent Owner's argument, because the question is whether it would have been obvious to one of ordinary skill in the art to combine the cited references, and not whether any specific implants on the market contain a radiopaque marker in a central region.

Patent Owner contends further that none of the references relied upon by Petitioner provide a reason to add a pair of radiopaque markers to the medial plane of a PLIF implant, such as those of Telamon and SVS. *Id.* at 36 (citing Ex. 2020 ¶¶ 89, 98, 99). Patent Owner argues that the reason articulated by Petitioner's expert, Dr. Hynes, of providing additional information "is simply a vague explanation with no rational underpinning." *Id.* at 37 (citing Ex. 1101 ¶ 68). In particular, Patent Owner contends that Dr. Hynes "does not provide a rational explanation for what 'additional information' and certainly does not cite any evidence that what he proposes was 'common sense' in 2004 or ever." *Id.* at 37–38. Patent Owner argues that any information provided by adding markers to the medial plane would be at best redundant, or at worst, a possible source of confusion. *Id.* at 38. Dr. Hynes, Patent Owner contends, engaged in impermissible hindsight to combine Bacelli with SVS and Telamon to arrive at an implant having radiopaque markers at the medial plane. *Id.* at 38–40.

Patent Owner contends that the ordinary artisan would not have added markers to the medial plane "because doing so would add no meaningful 'additional information' beyond that already provided by the existing markers and would increase the likelihood of causing confusion." *Id.* at 49

(citing Ex. 2020 ¶¶ 98–99). Patent Owner cites their expert, Dr. Yuan, in arguing that the "conventional and proper position for radiopaque markers in PLIF implants is at the proximal and distal ends," as they allow the surgeon to determine the location and orientation of the PLIF implant in PLIF implantation procedures. *Id.* at 40–41 (citing Ex. 2020 ¶¶ 45, 98, 99). Thus, having markers as the proximal and distal walls provides all the information necessary for both during and after the surgery. *Id.* at 42.

Moreover, according to Patent Owner, Petitioner's expert, Dr. Hynes, testified that markers in the wrong place may actually create confusion. *Id.* at 43 (citing Ex. 2013, 163:23–164:25). "Every excess marker increases the risk of confusing one marker for another," and, thus, "designers are very purposeful about the number and location of markers added to fusion implants." *Id.* at 44 (citing Ex. 2020, ¶¶ 45–46, 98, 99).

We do not find Patent Owner's arguments persuasive. As Petitioner notes (Reply 11), Baccelli teaches the use of radiopaque markers in the central regions of an implant. *See* Ex. 1104 ¶¶ 41, 51; Figs. 1–5, 8, 9. We also agree with Petitioner that the addition of markers along the medial plan would not confuse a surgeon of ordinary skill in the art, and "vastly underestimates the ordinary skill of surgeons in this field." Reply 11 (citing Ex. 1104, FIG. 2; Ex. 1129).

In that regard, we credit the testimony of Patent Owner's Declarant, Dr. Yuan, that one of ordinary skill in the art would have understood that an implant that "includes two radiopaque markers in the central region [would provide] . . . better align[ment of] the implant" and "also allows a surgeon to see in an anterior-to-posterior x-ray view whether the implant is askew and the degree to which the implant is askew." Ex. 2020 ¶ 60. Given the

relative level of skill in the art, we agree with Dr. Yuan that the use of markers to improve x-ray visualization of the alignment of implants, for example, would have been well within the purview of one of ordinary skill in the art at the time of the invention.

We note that Dr. Yuan testified that one "complication with using markers . . . is that the implant can have too many of them" (Ex. 2020 ¶ 45), and testified also that the use of a radiopaque marker in the central region of an implant "could cause problems, including confusing the surgeon" (Ex. 2020 ¶ 98). Dr. Yuan, however, provides insufficient evidence in support of this contention. For example, Dr. Yuan does not provide persuasive evidence supporting the contention that problems would arise in the use of a radiopaque marker in the central region of an implant, the nature and extent of any potential problems, or how any such problems would confuse a surgeon of ordinary skill in the art and to what extent. Indeed, as previously discussed, Baccelli discloses radiopaque markers in the central region of an implant, and does not disclose that one of ordinary skill in the art is confused by such an arrangement.

As to Patent Owner's argument that Petitioner's Declarant, Dr. Hynes), testified that it would not have been obvious to one of ordinary skill in the art to have incorporated a radiopaque marker in the central region of an implant because doing so may cause confusion, Dr. Hynes merely testifies that using "the wrong marker" in "the wrong place" may "create[] confusion sometimes." Ex. 2013, 164:11, 12–13. As already noted, however, Baccelli discloses the use of such a marker in the central region of an implant, thus suggesting to one of ordinary skill in the art that such a

marker would not have been "wrong" and that the central region would not have been a "wrong place" for such a marker.

Hence, we are not persuaded by Patent Owner's contention that the addition of pair of radiopaque markers to the medial region of an implant would not add any meaningful information and would cause confusion.

Patent Owner contends further that neither Telamon nor SVS disclose an interbody fusion implant with elongate metal fixation spikes, such as those taught by Baccelli, and that the Saber implant designed by Dr. Hynes also did not incorporate such spikes. PO Resp. 34. According to Patent Owner, such spikes "would hinder or interfere with the intended PLIF usage of those implants." *Id.* That is, Patent Owner argues, as the Medtronic, Synthese, and DePuy Spine did not incorporate such spikes, it is "plainly apparent" that the designers "considered such metal fixation spikes to be inappropriate for the PLIF implant." *Id.* at 35. Thus, Patent Owner argues, the ordinary artisan would not have included the metal spikes of Baccelli on the implants of SVS or Telamon. *Id.* at 46.

Petitioner responds that the disclosure of Baccelli was not relied upon for the disclosure of spikes, but for locating radiopaque markers along the medial plane. Reply 12. We agree with Petitioner that the ordinary artisan would understand from the disclosure of Baccelli that radiopaque markers could be also located at the medial plane of the implant. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references

would have suggested to those of ordinary skill in the art." *In re Keller,* 642 F.2d 413, 425 (CCPA 1981) (citations omitted).

3. Obviousness of Claims 5 and 9 under 35 U.S.C. § 103(a) Over One of SVS or Telamin, Combined with Baccelli and Michelson

a. Michelson

The disclosures of SVS, Telamon, and Baccelli are discussed above as to the challenge of claim 1. Michelson discloses a translateral spinal fusion implant. Ex. 1105, 5:44-45. In one embodiment, the implant has "a length in the range of 32 mm to 50 mm, with 42 mm being the preferred length." *Id.* at 10:46-47. The implant may also have "a maximum diameter in the range of 14-26 mm, with the preferred diameter being 20 mm." *Id.* at 7:28-30.

b. Claims 5 and 9

Petitioner contends that the combination of SVS or Telamon with Baccelli and Michelson renders obvious claims 5 and 9. Pet. 21–24, 27–29, 45–49, 52–53. Petitioner sets forth a claim chart demonstrating where each element of the claims is taught by the reference (*id.* at 25–26, 29, 49–50, 53), and relies, initially, on the Declaration of Dr. Hynes (Ex. 1101). Patent Owner disagrees with Petitioner's assertions (PO Resp. 47–59), and relies on the Declaration of Dr. Yuan. (Ex. 2020) as evidence that the asserted combination does not render obvious the challenged claims.

Specifically, as to the limitation of claim 5 that the longitudinal length is greater than 40 mm, Petitioner relies on Michelson for its disclosure of a spinal fusion implant that may have a longitudinal length greater than 40 mm. Pet. 22, 47. According to Petitioner, it would have been obvious to the ordinary artisan to include a longitudinal length greater than 40 mm to the

SVS or Telamon implant, as the implant would span the disc space and provide for more stable support. *Id.* at 22, 47 (Ex. 1101 ¶ 81). Petitioner contends that increasing the length of the SVS or Telamon implant would involve nothing more than routine optimization, requiring only the "exercise of ordinary skill and common sense to apply an identified, predictable solution to a known design need." *Id.* at 24, 49.

Claim 9 adds the limitation that the maximum lateral width of the implant is approximately 18 mm. Petitioner relies on Michelson's teaching of an implant having a width in the range of 14 to 26 mm, as disclosing an embodiment of a lumbar spinal fusion implant having a width of 18 mm. *Id.* at 27,52 . According to Petitioner, the ordinary artisan would have modified the implant of SVS or Telamon to have a maximum width of approximately 18 mm, as Michelson teaches that a greater surface area of contact of the implant with the adjacent vertebra allows for greater stability. *Id.* at 27–28, 52 (citing Ex. 1105, 7:11–20).

Patent Owner contends that the SVS and Telamon "disclose PLIF implants designed with the intended purpose of use in PLIF procedures." PO resp. 47 (citing Ex. 2020, ¶¶ 79, 80, 84, 85). Although Petitioner relies on Michelson to meet the limitation of the implant being lengthened to exceed 40 mm in length, Patent Owner asserts that "Michelson discloses length in excess of 40 mm only for laterally inserted implants." *Id.* Petitioner asserts that modifying the implant of either SVS or Telamon to be greater than 40 mm would eliminate SVS and Telamon's "specifically intended insertion path and usage," making the SVS and Telamon implants inoperable for their intended use in PLIF procedures. *Id.* at 51 (citing Ex. 2020 ¶¶ 105, 106). That is, Patent Owner argues, the increased length would

make the implant of SVS and Telamon unsafe for a posterior insertion path. *Id.* at 51–55. Patent Owner asserts that Petitioner's approach that "require[s] a wholesale abandonment of the *primary reference's* intended PLIF purpose so as to achieve an entirely different use and operation." *Id.* at 53. Patent Owner contends that "[t]he fact that Dr. Hynes proposes modifying the SVS-PR and Telamon implants in a way that would cause them to be unsafe in PLIF procedures is evidence that Dr. Hynes is simply reading the claim language and then improperly inventing combinations using the benefit of hindsight." *Id.* at 56.

Petitioner responds that the claims are drawn to an apparatus, that is, a spinal implant, and are not method claims. Reply 1. Moreover, Petitioner notes that the Specification of the '156 patent states that the implants may be introduced through a variety of approaches. *Id.* (citing Ex. 1115, 5:31–34). Petitioner asserts further that Patent Owner's expert, Dr. Yuan, testifies that he had inserted implants suitable for a PLIF or ALIF approach using a lateral or oblique approach. *Id.* (citing Ex. 2020 ¶ 51).

Petitioner responds further that both Dr. Hynes and Dr. Yuan acknowledge that "a longer implant increases stability and provides more structural support to the adjacent vertebrae." Reply 4 (citing Ex. 1157 ¶¶ 7, 24; Ex. 2020 ¶ 41). Moreover, Petitioner argues, longer implants have been inserted using a posterior approach, and Dr. Yuan in fact "admitted that the disc space can accommodate such implants, much like the ones he himself inserted." *Id.* at 5 (citing Ex. 1173, 62, 121–122, 245). Dr. Yuan also testified that the Telamon implant, "as a vertebral body spacer, could be put in laterally, at an angle, or anteriorly," and that the SVS implant "could be inserted laterally, at an angle, or anteriorally." *Id.* at 7 (citing Ex. 1173, 62,

121–122). Dr. Yuan testified also that "an implant over 40 mm could be inserted posterior laterally (at an angle) from the back and fit in the disc space." *Id.* at 10 (citing Ex. 1173, 233–234). According to Petitioner, Dr. Hynes agrees, and has done such surgeries. *Id.* (citing Ex. 1157 ¶ 5).

After considering the parties respective positions and evidence, we do not find Patent Owner's contentions persuasive SVS discloses that "[t]he Vertebral Spacer is a vertebral body replacement device intended for use in the thoracolumbar spine (T1-L5) to replace a collapsed, damaged, or unstable vertebral body due to tumor or trauma (i.e., fracture)." Ex. 1106, 1. Hence, the "intended purpose" of the implant of SVS is to replace components within vertebrae. Telamon discloses a process of inserting an implant into an intervertebral space to achieve "decompression of the neural elements" and "satisfactory immobilization of the grafted interspace." Ex. 1108, 9. Hence, the "intended purpose" of the implant of Telamon is to achieve immobilization of the grafted interspace (and/or decompression of neural elements). We disagree with Patent Owner that Michelson, which discloses an implant that "engage[s] more of the adjacent vertebrae," and, thus, "permits greater stability" (Ex. 1105, 3:49–51) would have "fully eliminated" the purpose of the SVS or Telamon implants of replacing collapsed, damaged, or unstable intervertebral components or immobilizing the interspace. Instead, the intended purpose of Michelson (a spinal fusion implant) appears to be the same as the intended purpose of either of SVS or Telamon, i.e., to achieve immobilization of the grafted interspace.

As to the argument that inserting a longer implant, such as an implant that is approximately 40 mm in length, posteriorly, would have been dangerous, Petitioner submits evidence supporting the contention that the

insertion of implants measuring over 40 mm in length via a posterior approach is practiced safely in the art and, therefore, we are not persuaded by Patent Owner (PO Resp. 53–54) that "no responsible surgeon" would insert an implant measuring greater than 40 mm in length posteriorly. For example, Petitioner explains that Tohmeh (US Patent No. 8,623,088 B1 (Ex. 1131)) discloses a spinal implant measuring up to 45 mm in length uses a "posterior approach." Reply 5 (citing Ex. 1131, 4:3, 5:32–35). Tohmeh does not disclose that such a practice would be "extremely dangerous to the patient, risking paralysis or death" (PO resp. 53). In addition, as Petitioner explains, Dr. Yuan testified that a spinal implant measuring greater than 40 mm in length would fit within the circumference of the intervertebral space. Reply 5 (citing Ex. 1173, 244–245).

Moreover, even assuming to be true Patent Owner's contention that a responsible surgeon would not insert a 41 mm implant in the PLIF approach, we are not persuaded by Patent Owner's argument because one of ordinary skill in the art, based on Michelson, would have inserted the "41 mm implant" laterally, not posteriorly. Patent Owner presents no evidence that maneuvering the implant to prevent damage to the annulus on the anterior aspect of the disc would have been uniquely challenging or difficult for one of ordinary skill in the art. *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007)). Indeed, Michelson discloses an implant with a length that is greater than 40 mm and does not disclose that inserting such an implant results in damage to the annulus on the anterior aspect of the disc. Ex. 1105, 10:41–46. Hence, Michelson demonstrates that it would have been obvious to one of ordinary skill in the art to have inserted an implant

measuring at least 40 mm in length without damage to the annulus on the anterior aspect of the disc.

As to claim 9, Patent Owner contends again that the intended purpose of the SVS and Telamon implants is PLIF implantation, whereas Michelson teaches a width of 18mm only for laterally inserted implants. PO Resp. 57. According to Patent Owner. "[w]idening the SVS-PR and Telamon PLIF implants to be 18 mm would render them inoperable for their intended purpose of PLIF implantation." *Id.* at 58 (citing Ex. 2020 ¶¶ 109-113). Patent Owner argues that modifying the SVS or Telamon implant would make the implant too wide to be safely inserted posteriorly in a PLIF procedure. *Id.*

Petitioner responds that "it is undisputed that one of ordinary skill in the art would have been motivated to adjust the dimensional footprints of SVS-PR and Telamon, including their respective widths, to provide a more stable implant that better supports its adjacent vertebrae." Reply 6. We conclude that Petitioner has the better position for the same reasons set forth with respect to claim 5. That is, the claim is drawn to an apparatus, and not a method of insertion. It would have well within the level of skill of the ordinary surgeon to determine the appropriate size of the implant. *See, e.g.,* Ex. 1115, 11:10–12 (noting that before a spinal fusion procedure is performed, "the clinician must first designate the appropriate implant size."). Moreover, Michelson specifically teaches an implant having a width of 18mm, and one of ordinary skill in the art, based on Michelson, would have understand that the "18 mm implant" could be laterally, rather than posteriorly.

4. Claims 2–4, 6–8, 10–14, 19, 20, and 23–27

Patent Owner presents no additional argument as to dependent claims 2–4, 6–8, 10–14, 19, 20, and 23–27. PO Resp. 46. Upon review of those claims, as well as the contentions and evidence relied upon by Petitioner, we determine that the preponderance of the evidence of record demonstrates that those claims are rendered also unpatentable over the challenges as based on SVS or Telamon.

5. Secondary Considerations

Before we can determine that the obviousness determinations above render the challenged claims unpatentable, we must consider the evidence of obviousness anew in light of any evidence of secondary considerations of nonobviousness presented by Patent Owner. *See Graham*, 383 U.S. at 17–18 ("Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy."); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) ("This objective evidence must be 'considered as part of all the evidence, not just when the decision maker remains in doubt after reviewing the art.'") (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538–39 (Fed. Cir. 1983)).

"Evidence of commercial success, or other secondary considerations, is only significant if there is a nexus between the claimed invention and the commercial success." *Ormco Corp. v. Align Tech. Inc.*, 463 F.3d 1299, 1311–12 (Fed. Cir. 2006). "For objective evidence to be accorded

substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention." *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). In order to establish a proper nexus, the patent owner must offer proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter. *See Microsoft v. Proxyconn, Inc.*, Case IPR2012-00026, slip op. at 4 (PTAB Mar. 8, 2013) (Paper 32).

Patent Owner contends that the evidence of commercial success demonstrates the non-obviousness of the claimed implants. PO Resp. 59. According to Patent Owner, "the detailed testimony establishes a nexus between NuVasive's CoRoent XL implants and the invention of the '156 patent, and proves the commercial success of the product after NuVasive pioneered the market for lateral, trans-psoas interbody fusion surgeries with the CoRoent XL implant." *Id.* (citing Ex. 2020 ¶¶53-63; Ex. 2030 ¶¶ 7-10 and App. A). Patent Owner asserts further that the fact that Petitioner never practiced the lateral lumbar implants depicted in Michelson '973, and did not introduce its Clydesdale implants until the success of Patent Owner's CoRoent XL, "is telling of [Patent Owner's] commercial success and pioneering efforts." *Id.* (citing Ex. 2030 ¶¶ 7, 9 and App. A at 8).

First, we note that Patent Owner did not even attempt to establish any nexus between the claimed implant and any purported commercial success in its response, but merely cited to the Declaration of Patrick Miles (Ex. 2030) and the Declaration of Dr. Yuan (Ex. 2020), which improperly incorporates such arguments by reference from those Declarations into the Patent Owner response. *See* 37 C.F.R. § 42.6(a)(3) ("Arguments must not

be incorporated by reference from one document into another document."); *see also* Rules of Practice for Trials Before The Patent Trial and Appeal Board and Judicial Review of Patent Trial and Appeal Board Decisions; Final Rule, 77 Fed. Reg. 48,612, 48,617 (Aug. 14, 2012) (prohibition against incorporation by reference is to eliminate abuses that arise from incorporation).

Moreover, Dr. Yuan merely opines that it is his opinion that the CoRoent XL implant embodies the claims of the '156 patent. Ex. 2020 ¶ 53. And although Mr. Miles states that "NuVasive's CoRoent XL implants have enjoyed commercial success" (Ex. 2030 ¶ 9), neither the Declaration, nor Appendix A, explains why that success is due to the characteristics of the claimed invention, rather than to XLIF[5] system as a whole, or to marketing of the implant (*See, e.g.*, Ex. 2030, Appendix A (DLIF marketing plan)). And even assuming that NuVasive's CoRoent XL implant experienced "commercial success," as Patent Owner asserts, Patent Owner has not demonstrated sufficiently that there is a nexus between the merits of the *claimed* invention and the evidence offered. For example, Patent Owner argues that NuVasive "pioneered the market for lateral, trans-psoas interbody fusion surgeries," (PO Resp. 59) but fails to demonstrate sufficiently that any of the disputed claims recite "lateral, trans-psoas interbody fusion surgeries." Thus, Patent Owner's evidence of secondary considerations is entitled to little weight.

[5] According to Mr. Miles, the XLIF (eXtreme Lateral Interbody Fusion) system and procedure include the CoRoent XL implant. Ex. 2030 ¶ 3.

6. Conclusion

After considering Petitioner's and Patent Owner's positions, as well as their supporting evidence, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–4, 7, 8, 10–14, 19, 20, 23, 24, 26, and 27 are rendered obvious under 35 U.S.C. § 103(a) by the combination of SVS and Baccelli; claims 5, 6, and 9 are rendered obvious under 35 U.S.C. § 103(a) by the combination of SVS, Baccelli, and Michelson; claim 25 is rendered obvious under 35 U.S.C. § 103(a) by the combination of SVS, Baccelli, and Telamon; claims 1–4, 7, 10–14, 19, 20, and 23–27 are rendered obvious under 35 U.S.C. § 103(a) by the combination of Telamon and Baccelli; and claims 5, 6, 8, and 9 are rendered obvious under 35 U.S.C. § 103(a) by the combination of Telamon, Baccelli, and Michelson.

C. Patent Owner's Motion to Exclude (Paper 34)

In its Motion to Exclude, Patent Owner seeks to exclude the Declaration of Loic Josse (Ex. 1116, "Josse Declaration"). We did not rely on the Josse Declaration in this decision. Therefore, Patent Owner's motion to exclude is dismissed as moot.

D. Motion for Observation

Patent Owner's observations are directed to the cross-examination testimony of Richard A. Hynes, M.D. (Ex. 2037), who was cross-examined after Petitioner filed its Reply. Paper 38. We have considered Patent Owner's observations and Petitioner's responses in rendering our decision, and have accorded the testimony the appropriate weight.

Patent Owner also submits observations to the cross-examination testimony of Loic Josse. Paper 39. As previously discussed, we did not rely on the Josse Declaration in this decision. Therefore, we have not considered Patent Owner's observations directed to the cross-examination testimony of Loic Josse.

III. CONCLUSION

Petitioner has shown by a preponderance of the evidence that claims 1–14, 19, 20, and 23–27 are unpatentable under 35 U.S.C. § 103(a).

IV. ORDER

Accordingly, it is hereby:

ORDERED that Petitioner has shown by a preponderance of the evidence that claims 1–14, 19, 20, and 23–27 of the '156 patent are unpatentable;

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

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

PETITIONER:

Jeff E. Schwartz
Seth A. Kramer
FOX ROTHSCHILD LLP
jeschwartz@foxrothschild.com
skramer@foxrothschild.com

PATENT OWNER:

Stephen R. Schaefer
Michael T. Hawkins
Stuart Nelson
FISH AND RICHARDSON PC
schaefer@fr.com
hawkins@fr.com
IPR13958-0117IP1@fr.com

Trials@uspto.gov
571-272-7822

Paper 8
Entered: September 11, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.,
Petitioner,

v.

NUVASIVE, INC.,
Patent Owner.

Case IPR2014-00487
Patent 8,361,156 B2

Before SALLY C. MEDLEY, LORA M. GREEN, and STEPHEN C. SIU, *Administrative Patent Judges.*

GREEN, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. BACKGROUND

Medtronic, Inc. ("Medtronic") filed a Petition ("Pet.") requesting an *inter partes* review of claims 1–14, 19, 20, and 23–27 of U.S. Patent No. 8,361,156 B2 (Ex. 1013, "the '156 patent") on March 5, 2014. Paper 1. Patent Owner, NuVasive, Inc. ("NuVasive"), filed a Patent Owner Preliminary Response ("Prelim. Resp."). Paper 6. We have jurisdiction under 35 U.S.C. §§ 6(b) and 314.

Inter partes review is instituted only if the petition supporting the ground demonstrates "that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c) (noting that *inter partes* review is only instituted if the petition demonstrates "that there is a reasonable likelihood that at least one of the claims challenged in the petition is unpatentable").

Based on the circumstances in this case, we exercise our discretion under 35 U.S.C. § 325(d) to deny the Petition, and, therefore, decline to institute *inter partes* review.

A. Related Proceedings

Petitioner states it is a named counterclaim-defendant in a district court case involving the '156 patent, *Warsaw Orthopedic, Inc. v. NuVasive Inc.*, Case No: 3:12-cv-02738-CAB-MDD (S.D. Cal.).. Pet. 1–2.

Petitioner also indicates that it previously filed two other petitions for *inter partes* review of the '156 patent on August 14, 2013: "the '504 Petition" in IPR2013-00504 and "the '506 Petition" in IPR2013-00506. Pet. 2. Petitioner notes that the Board instituted trial as to the '506 Petition as claims 1–14, 19, 20, and 23–27 of the '156 patent ("the '506 Proceeding"), but denied the '504 Petition. *Id.* According to Petitioner, the instant Petition remedies the deficiencies of the '504 Petition, and also "adds new arguments and evidence as to the length disclosure of U.S. Patent Appl. Pub. No. 2002/0165550 to Frey." *Id.*

B. The '156 Patent (Ex. 1013)

The '156 patent is drawn to a spinal implant, and methods of spinal fusion using the implant. '156 patent, col. 1, ll. 20–24. A spinal fusion procedure generally involves removing some, or all, of a diseased spinal disc, and inserting an intervertebral implant into the disc space. *Id.* at col. 1, ll. 30–33. The spinal fusion implant is introduced into the disc space via a lateral approach to the spine, or via a posterior, anterior, antero-lateral, or postero-lateral approach. *Id.* at col. 5, ll. 29–35. As taught by the '156 patent, the implant is made from a material "having suitable radiolucent characteristics," such as poly-ether-ether-ketone (PEEK). *Id.* at col. 5, ll. 10-15.

C. Representative Claim

Medtronic challenges claims 1–14, 19, 20, and 23–27 of the '156 patent. Claim 1 is the only independent claim, and reads as follows (emphasis added):

1. A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:

> an upper surface including anti-migration elements to contact said first vertebra when said implant is positioned within the interbody space, a lower surface including anti-migration elements to contact said second vertebra when said implant is positioned within the interbody space, a distal wall, a proximal wall, a first sidewall, and a second sidewall generally opposite from the first sidewall, wherein said distal wall, proximal wall, first sidewall, and second sidewall comprise a radiolucent material;

wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, *said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width*;

at least a first fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space, said first fusion aperture having: a longitudinal aperture length extending generally parallel to the longitudinal length of said implant, and a lateral aperture width extending between said first sidewall to said second sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width; and

at least first and second radiopaque markers oriented generally parallel to a height of the implant, wherein said first radiopaque marker extends into said first sidewall at a position proximate to said medial plane, and said second radiopaque marker extends into said second sidewall at a position proximate to said medial plane.

D. Prior Art Relied Upon

Medtronic relies upon the following prior art references:

Frey *et al.*, US Patent Appl. Pub. No. 2002/0165550 A1, published November 7, 2002 (Ex. 1003) ("Frey").

Baccelli *et al.*, US Patent Appl. Pub. No. 2003/0028249 A1, published February 6, 2003 (Ex. 1004) ("Baccelli").

Michelson, US 5,860,973, issued January 19, 1999 (Ex. 1005) ("Michelson").

Moret, US Patent Appl. Pub. No. 2003/0100950 A1, published May 29, 2003 (Ex. 1006) ("Moret").

Messerli *et al.*, US Patent Appl. Pub. No. 2003/0139813 A1, published July 24, 2003 (Ex. 1007) ("Messerli").

E. The Asserted Grounds of Unpatentability

Medtronic challenges the patentability of claims of the '156 patent on the following grounds. Pet. 4.

Reference(s)	Basis	Claims challenged
Frey and Baccelli	§ 103	1–8, 10–14, 19, 20, and 23–27
Frey, Baccelli, and Messerli	§ 103	1–8, 10–14, 19, 20, and 23–27
Frey, Baccelli, and Michelson	§ 103	1–14, 19, 20, and 23–27
Frey, Baccelli, and Moret	§ 103	1–8, 10–14, 19, 20, and 23–27
Baccelli and Frey and/or Michelson	§ 103	1–8, 10–14, 19, 20, and 23–27

II. ANALYSIS

Patent Owner argues that Petitioner is seeking *inter partes* review of claims 1–14, 19, 20, and 23–27 of the '156 patent for a third time. Prelim. Resp. 1. According to Patent Owner, the instant Petition "is essentially a duplicate of its previously denied petition in the '504 IPR." *Id.* at 2.

As set forth in 35 U.S.C. § 325(d):

> In determining whether to institute or order a proceeding under this chapter, chapter 30, or chapter 31, the Director may take into account whether, and reject the petition or request because, the same or

substantially the same prior art or arguments previously were presented to the Office.

Petitioner argues that while it "is mindful of 35 U.S.C. § 325(d), the denial of the '504 Petition has no bearing on this Petition." Pet. 2. According to Petitioner, it is responding to "a noted deficiency," and is providing new evidence and argument as to how the previously supplied prior art renders the challenged claims obvious. *Id.* at 2–3. Petitioner argues further that the grounds presented in the instant Petition are not redundant to those that were instituted in the '506 Proceeding, as "those grounds are based on different prior art references and different arguments." *Id.* at 3.

Trial was instituted in the '506 Proceeding on February 13, 2013. That proceeding involves the same patent, as well as the same claims, for which Petitioner is requesting *inter partes* review in the instant Proceeding. While Petitioner argues that the grounds are not redundant to those instituted on in the '506 Proceeding, Petitioner does not provide any specific reasoning to support that argument, other than to state that the grounds are based on different prior art references. Oral argument is currently scheduled for November 18, 2014, in the '506 proceeding.

Moreover, the instant Petition presents the same prior art previously presented in the '504 Petition, and the proposed challenges to the claims are nearly identical to the proposed challenges in the '504 Petition. *Compare* Pet. 4, *with* '504 Petition 3 (same claims are challenged over the same prior art references). As in the '504 Petition, in the instant proceeding Petitioner is relying on Frey (Ex. 1003) for teaching, or suggesting, the limitation of claim 1 that the "implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally

perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width." Pet. 19, 48 (discussion of element "Claim 1 [E]"); *see also* IPR2013-00504, Paper 7, 6 (noting that Frey is relied upon as to all the asserted challenges to teach the recited limitation).

We have considered the papers filed in this proceeding, as well as the Petition and papers filed in the request for *inter partes* review in IPR2013-00504. Petitioner has not provided any persuasive reasoning as to why we should institute *inter partes* review over "the same or substantially the same prior art or arguments" that were presented by the '504 Petition. In addition, Petitioner is involved in the '506 Proceeding, which involves all of the same claims challenged here. Based on the totality of the facts before us, we exercise our discretion under 35 U.S.C. § 325(d), and deny the Petition in this proceeding.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *denied* as to all challenged claims of the '156 patent.

PETITIONER:

Jeff E. Schwartz
Seth A. Kramer
Fox Rothschild LLP
jeschwartz@foxrothschild.com
skramer@foxrothschild.com

PATENT OWNER:

Stephen R. Schaefer
Michael Hawkins
Fish & Richardson P.C. (TC)
schaefer@fr.com
IPR13958-0116IP3@fr.com

Trials@uspto.gov
571-272-7822

Paper 8
Entered: February 13, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.
Petitioner

v.

NUVASIVE, INC.
Patent Owner

Case IPR2013-00504
Patent 8,361,156

Before SALLY C. MEDLEY, LORA M. GREEN, and STEPHEN C. SIU, *Administrative Patent Judges.*

GREEN, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. BACKGROUND

Medtronic, Inc. ("Medtronic") filed a Petition ("Pet.") requesting an *inter partes* review of claims 1–14, 19, 20, and 23–27 of U.S. Patent No. 8,361,156 (Ex. 1013, "the '156 patent") on August 14, 2013. Paper 3. Patent Owner, NuVasive, Inc. ("NuVasive"), filed a preliminary response on November 25, 2013. Paper 7. We have jurisdiction under 35 U.S.C. §§ 6(b) and 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which states:

> THRESHOLD. – The Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Inter partes review is instituted only if the petition supporting the ground demonstrates "that there is a reasonable likelihood that at least one of the claims challenged in the petition is unpatentable." 37 C.F.R. § 42.108(c).

Upon consideration of the Petition, we conclude that Medtronic has not established a reasonable likelihood that it would prevail with respect to any of the challenged claims of the '156 patent. Accordingly, we deny the Petition, and decline to institute *inter partes* review.

A. Related Proceedings

Medtronic indicates that it has filed concurrently another petition for an *inter partes* review of the '156 patent. Pet. 2. Medtronic indicates further that it is a named counterclaim-defendant in the litigation titled *Warsaw Orthopedic, Inc. v.*

NuVasive Inc., Case No: 3:12-cv-02738-CAB-MDD (S.D. Cal.), which also involves the '156 patent. Pet. at 1.

B. The '156 Patent (Ex. 1013)

The '156 patent is drawn to a spinal implant, and methods of spinal fusion using the implant. '156 patent, col. 1, ll. 20–24. A spinal fusion procedure generally involves removing some or all of a diseased spinal disc, and inserting an intervertebral implant into the disc space. *Id.* at col. 1, ll. 30–33. The spinal fusion implant is introduced into the disc space via a lateral approach to the spine, or via a posterior, anterior, antero-lateral, or postero-lateral approach. *Id.* at col. 5, ll. 29–35. As taught by the '156 patent, the implant is made from a material "having suitable radiolucent characteristics," such as PEEK (poly-ether-ether-ketone). *Id.* at col. 5, ll. 10-15.

C. Representative Claim

Medtronic challenges claims 1–14, 19, 20, and 23–27 of the '156 patent. Claim 1 is the only independent claim, and reads as follows (emphasis added):

> 1. A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:
>
> an upper surface including anti-migration elements to contact said first vertebra when said implant is positioned within the interbody space, a lower surface including anti-migration elements to contact said second vertebra when said implant is positioned within the interbody space, a distal wall, a proximal wall, a first sidewall, and a second sidewall generally opposite from the first sidewall, wherein said distal wall, proximal wall, first sidewall, and second sidewall comprise a radiolucent material;

wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, *said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width*;

at least a first fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space, said first fusion aperture having: a longitudinal aperture length extending generally parallel to the longitudinal length of said implant, and a lateral aperture width extending between said first sidewall to said second sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width; and

at least first and second radiopaque markers oriented generally parallel to a height of the implant, wherein said first radiopaque marker extends into said first sidewall at a position proximate to said medial plane, and said second radiopaque marker extends into said second sidewall at a position proximate to said medial plane.

D. Prior Art Relied Upon

Medtronic relies upon the following prior art references:

Michelson ("Michelson"), US 5,860,973, issued January 19, 1999 (Ex. 1005).

Frey *et al.* ("Frey"), US Patent Appl. Pub. No. 2002/0165550 A1, published November 7, 2002 (Ex. 1003).

Baccelli *et al.* ("Baccelli"), US Patent Appl. Pub. No. 2003/0028249 A1, published February 6, 2003 (Ex. 1004).

Messerli *et al.* ("Messerli"), US Patent Appl. Pub. No. 2003/0139813 A1, published July 24, 2003 (Ex. 1007).

Moret, US Patent Appl. Pub. No. 2003/0100950 A1, published May 29, 2003(Ex. 1006).

E. The Asserted Grounds of Unpatentability

Medtronic challenges the patentability of claims of the '156 patent on the following grounds. Pet. 3.

Reference(s)	Basis	Claims challenged
Frey and Baccelli	§ 103	1–8, 10–14, 19, 20, and 23–27
Frey, Baccelli, and Messerli	§ 103	1–8, 10–14, 19, 20, and 23–27
Frey, Baccelli, and Michelson	§ 103	1–14, 19, 20, and 23–27
Frey, Baccelli, and Moret	§ 103	1–8, 10–14, 19, 20, and 23–27
Baccelli and Frey	§ 103	1–8, 10–14, 19, 20, and 23–27

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning in view of the specification as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). For purposes of this Decision, we interpret

the claim language consistently with its plain and ordinary meaning, when read in view of the Specification.

B. Obviousness Challenges.

Claim 1 requires (emphasis added):

> wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, *said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width.*

All of the challenges asserted by Medtronic in this proceeding rely on Frey (Ex. 1003) to teach the above limitation. Frey is drawn to implants that may be inserted into the spinal disc space, as well as techniques for insertion of the implant using a posterior lateral approach. Ex. 1003, ¶¶ [0002] and [0006].

According to Medtronic:

> Frey provides that the implant has a longitudinal length that extends from the proximal wall to the distal wall and a maximum lateral width extending from the first side wall to the second sidewall. As shown in Figure 63 of Frey, the longitudinal length is perpendicular to, and greater than, the maximum lateral width.

Pet. 18; *see id.* at 37, 38, 43, and 48.

Medtronic (Pet. 18) provides the following annotated reproduction of Figure 63 of Frey:

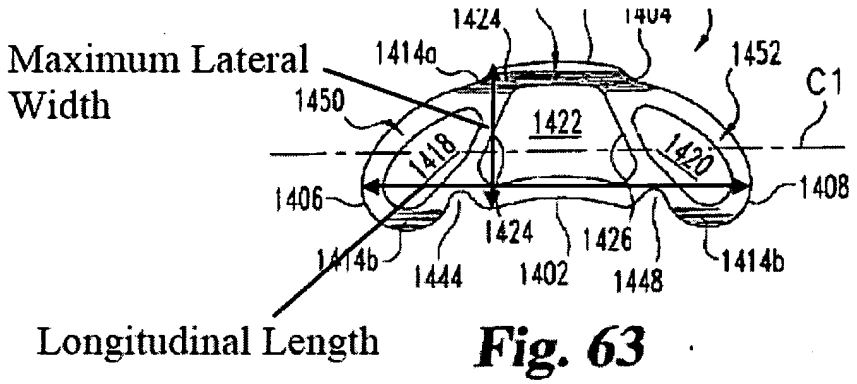


Fig. 63

Figure 63 of Frey shows an elevational view of an implant of Frey. Ex. 1003 ¶¶ 0071, 0075.

As asserted by NuVasive, however, Medtronic does not address the limitation that the "implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length," as required by claim 1. Prelim. Resp. 9-10. That is, while Medtronic identifies the longitudinal length, as well as the maximum lateral width, Medtronic does not specify how the maximum lateral width extends between the two sidewalls along the medial plane of the implant.

Moreover, Medtronic provides the following annotated reproduction of Figure 59 of Frey (Pet. 20):

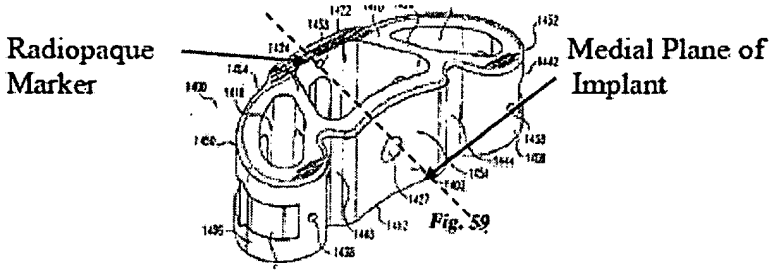


Figure 59 is a perspective view of an implant taught by Frey. Ex. 1003 ¶ 0071.

As can be seen from annotated Figure 59, Medtronic recognizes that the medial plane of the implant would be a plane that intersects the implant approximately at the midpoint of the longitudinal length. The maximal lateral width, as shown in annotated Figure 63, is not at the midpoint of the longitudinal length, but is closer to one end of the implant than the other. Stated differently, Medtronic does not explain how the maximum lateral width of the implant is along a medial plane that is generally perpendicular to the longitudinal length, as required by independent claim 1.

Thus, Medtronic has not demonstrated a reasonable likelihood that it will prevail on any of its challenges.

III. CONCLUSION

For the foregoing reasons, we determine that Medtronic has not demonstrated a reasonable likelihood that it will prevail on its challenges of claims 1–14, 19, 20, and 23–27 of the '156 patent. We, therefore, do not institute an *inter partes* review on any of the asserted grounds as to any of the challenged claims.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that the Petition is *denied* as to all challenged claims of the '156 patent.

PETITIONER:

Jeff E. Schwartz
Seth A. Kramer
Fox Rothschild LLP
jeschwartz@foxrothschild.com
skramer@foxrothschild.com

PATENT OWNER:

Stephen R. Schaefer
Michael T. Hawkins
Fish & Richardson P.C.
Schaefer@fr.com
Hawkins@fr.com
IPR13958-0117IP1@fr.com

Trials@uspto.gov
571-272-7822

Paper 9
Entered: February 13, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDTRONIC, INC.
Petitioner

v.

NUVASIVE, INC.
Patent Owner

Case IPR2013-00506
Patent 8,361,156

Before SALLY C. MEDLEY, LORA M. GREEN, and STEPHEN C. SIU, *Administrative Patent Judges*.

GREEN, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. BACKGROUND

Medtronic, Inc. ("Medtronic") filed a petition ("Pet.") requesting an *inter partes* review of claims 1–14, 19, 20, and 23–27 of U.S. Patent No. 8,361,156 (Ex. 1115), "the '156 patent") on August 14, 2013. Paper 1. Patent Owner, NuVasive, Inc. ("NuVasive"), filed a preliminary response on November 25, 2013. Paper 8. We have jurisdiction under 35 U.S.C. §§ 6(b) and 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which states:

> THRESHOLD. – The Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Inter partes review is instituted only if the petition supporting the ground demonstrates "that there is a reasonable likelihood that at least one of the claims challenged in the petition is unpatentable." 37 C.F.R. § 42.108(c).

Upon consideration of the Petition, we conclude that Medtronic has established a reasonable likelihood that it would prevail with respect to claims 1–14, 19, 20, and 23–27 of the '156 patent. Accordingly, we grant the Petition, and institute an *inter partes* review of claims 1–14, 19, 20, and 23–27 of the '156 patent.

A. Related Proceedings

Medtronic indicates that it has filed concurrently another petition for an *inter partes* review of the '156 patent. Pet. 2. Medtronic indicates further that it is a named counterclaim-defendant in the litigation titled *Warsaw Orthopedic, Inc. v.*

NuVasive Inc., Case No: 3:12-cv-02738-CAB-MDD (S.D. Cal.), which also involves the '156 patent. Pet. 1.

B. The '156 Patent (Ex. 1115)

The '156 patent is drawn to a spinal implant, and methods of spinal fusion using the implant. '156 patent, col. 1, ll. 20–24. A spinal fusion procedure generally involves removing some or all of a diseased spinal disc, and inserting an intervertebral implant into the disc space. *Id.* at col. 1, ll. 30–33. The spinal fusion implant is introduced into the disc space via a lateral approach to the spine, or via a posterior, anterior, antero-lateral, or postero-lateral approach. *Id.* at col. 5, ll. 29–35. As taught by the '156 patent, the implant is made from a material "having suitable radiolucent characteristics," such as PEEK (poly-ether-ether-ketone). *Id.* at col.5, ll. 10-15.

C. Representative Claim

Medtronic challenges claims 1–14, 19, 20, and 23–27 of the '156 patent. Claims 1 is the only independent claim, and reads as follows:

1. A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:

    an upper surface including anti-migration elements to contact said first vertebra when said implant is positioned within the interbody space, a lower surface including anti-migration elements to contact said second vertebra when said implant is positioned within the interbody space, a distal wall, a proximal wall, a first sidewall, and a second sidewall generally opposite from the first sidewall, wherein said distal wall, proximal wall, first sidewall, and second sidewall comprise a radiolucent material;

wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width;

at least a first fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space, said first fusion aperture having: a longitudinal aperture length extending generally parallel to the longitudinal length of said implant, and a lateral aperture width extending between said first sidewall to said second sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width; and

at least first and second radiopaque markers oriented generally parallel to a height of the implant, wherein said first radiopaque marker extends into said first sidewall at a position proximate to said medial plane, and said second radiopaque marker extends into said second sidewall at a position proximate to said medial plane.

D. Prior Art Relied Upon

Medtronic relies upon the following prior art references:

Michelson ("Michelson"), US 5,860,973, issued January 19, 1999 (Ex. 1105).

Frey *et al.* ("Frey"), U.S. Patent Appl. Pub. No. 2002/0165550 A1, published November 7, 2002 (Ex. 1103).

Baccelli *et al.* ("Baccelli"), U.S. Patent Appl. Pub. No. 2003/0028249 A1, published February 6, 2003 (Ex. 1104).

Synthes Vertebral Spacer–PR Brochure, Synthes Spine 2002 ("SVS"; Ex. 1106).

Medtronic Sofamor Danek, Telamon, Verte-Stack PEEK Vertebral Body spacer (Ex. 1107); and Telamon, Posterior Impacted Fusion Devices, 2003 (Ex. 1108) (collectively, "Telamon").

The Asserted Grounds of Unpatentability

Medtronic challenges the patentability of the claims of the '156 patent on the following grounds. Pet. 14, 37–38.

Reference(s)	Basis	Claims challenged
SVS and Baccelli	§ 103	1–4, 7, 8, 11, 12, 14, 19, 20, 23, 24, and 26
SVS, Baccelli, and Frey or Michelson	§ 103	5–8
SVS, Baccelli, and Michelson	§ 103	9
SVS and Baccelli with or without Frey	§ 103	10 and 27
SVS and Baccelli, with or without Frey or Michelson	§ 103	13
SVS, Baccelli, and Telamon or Frey	§103	25
Telamon and Baccelli	§103	1, 2, 4, 7, 10–14, 19, 20, and 23–27
Telamon and Baccelli, with or without Frey	§103	3
Telamon, Baccelli, and Frey or Michelson	§103	5–7
Telamon, Baccelli, Frey, and Michelson or SVS	§103	8
Telamon, Baccelli, and Michelson	§103	9

II. ANALYSIS

A. Claim Interpretation

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning in view of the specification as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.,* 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definition for a claim term must be set forth in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). For purposes of this decision, we interpret the claim language consistently with its plain and ordinary meaning, when read in view of the Specification.

B. Medtronic's Petition Does not meet the Requirements of 37 C.F.R. § 42.22

NuVasive argues[1] that Medtronic fails to state "the precise relief requested" pursuant to 37 C.F.R. § 42.22. Prelim. Resp. 9-10. According to NuVasive, Medtronic included multiple combinations of references in its listed grounds of unpatentability. *Id.* (citing Pet. 3). NuVasive does not demonstrate persuasively, however, that merely including multiple combinations of references is insufficiently precise for purposes of determining the specific proposed ground of

[1] NuVasive argues further that Medtronic has failed to demonstrate how the proposed grounds are not redundant over the other challenges presented in the instant Petition, or over the challenge presented in IPR2013-00506. Prelim. Resp. 10-14. The use of redundancy to decline to institute *inter partes* review as to certain challenges, however, is within the Board's discretion, and is not a basis for contesting a challenge asserted by a petitioner.

unpatentability. We note that Medtronic states with sufficient specificity the references involved in each proposed ground of unpatentability and provides claim charts that describe, with sufficient precision, the portion of the reference relied upon for each claim limitation. *See* e.g., Pet. 13-60.

C. Public Availability of the SVS and Telamon References

NuVasive argues that neither the SVS reference, nor the Telamon reference, is a prior art publication. Prelim. Resp. 14. According to NuVasive, Medtronic has not shown that the SVS and Telamon references "had been 'disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.'" *Id.* (citing *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)).

In particular, regarding the SVS reference, NuVasive argues that Medtronic states that the SVS reference was publicly available as of May 2002 (*see e.g.*, Pet. 3–4), but that Petitioner's declarant states that the SVS reference was publicly available as of a different date, namely June 2002 (*see, e.g.*, Hynes Decl. ¶52). Prelim. Resp. 15. In that regard, we note that both May 2002 and June 2002 predate the presumed priority date of the '156 patent of March 29, 2004. NuVasive does not explain sufficiently how the SVS reference being publicly available in either May or June of 2002 demonstrates that the SVS reference was not publicly available prior to the presumed priority date of the '156 patent.

Regarding the Telamon reference, NuVasive argues that the Telamon reference is "limited only to Medtronic's customers and employees" and is thus "not 'publicly posted' for access by ordinary members of the public seeking a copy." Prelim. Resp. 16 (citations omitted). Medtronic's declarant states that the Telamon reference was "published and publicly available at least as early as

August of 2003" (Phelps Declaration, Ex. 1102 ¶ 3) and provides a memorandum announcing the release of the "Telamon Verte-Stack PEEK Vertebral Body Spacer" including an apparent date of August 2003. Ex. 1102, Appendix B.

Nevertheless, NuVasive asserts that the Telamon reference was only available "at a password-protected website" that was "limited only to Medtronic's customers and employees." Prelim. Resp. 16. NuVasive further asserts that "access [of the website containing the Telamon reference] without authorization is a violation of state and federal law," and that, with respect to the memorandum (Ex. 1102, Appendix B), only "*Medtronic employees* receive copies of Telamon materials." Prelim. Resp. 16-17 (citations omitted).

Although Medtronic's evidence pertaining to the public availability of the Telamon reference is somewhat general, Medtronic has provided evidence to a degree that is sufficient at this stage of the proceeding to demonstrate a reasonable likelihood that Medtronic will prevail.

D. Overview of the Prior Art relied upon by Medtronic

i. SVS (Ex. 1106)

SVS discloses a vertebral spacer (or spinal implant) made of a radiolucent polymer that allows fusion to occur through the implant. In one embodiment, the implant measures 22 mm depth by 8 mm width and includes two radiopaque marker pins. Ex. 1106, pp. 1-2.

ii. Telamon (Ex. 1107)

Telamon discloses a radiolucent spinal implant measuring 22-26 mm length by 10 mm width. Ex. 1107, p. 2. The implant further includes radiographic markers. *Id.*

iii. Baccelli (Ex. 1104)

Baccelli discloses an intervertebral implant. Ex. 1104 ¶ 0001. The implant has a front wall (*id.* at ¶ 0036, Fig. 8 – element 4b) that contains an orifice (*id.* at ¶ 0039, Fig. 8, element 18) into which a threaded endpiece is connected for placing the implant into position between vertebrae. *Id.* at ¶¶ 0044–0045.

The implant is made of a material that is transparent to X-rays, such as PEEK. *Id.* at ¶ 0050. One or more markers that are opaque to X-rays may be used to identify the position and/or the presence of the implant when X-rays are taken. *Id.* The radiopaque markers may be positioned within the anterior (i.e., proximal) wall and/or the posterior (i.e., distal) wall of the implant. *Id.* at Figs. 1–4, 8, 9.

The implant may further include spikes positioned symmetrically about the sagittal midplane and extending in the frontal midplane in a vertical axis. *Id.* at ¶ 0041, Figs. 1–5, 8, 9. The spikes may be made of a radiopaque material (i.e., a material that is opaque to X-rays). *Id.* at ¶ 0051.

iv. Michelson (Ex. 1105)

Michelson discloses a translateral spinal fusion implant. Ex. 1105, col.5, ll. 44-45. In one embodiment, the implant has "a length in the range of 32 mm to 50 mm, with 42 mm being the preferred length." *Id.* at col.10, ll. 46-47. The implant may also have "a maximum diameter in the range of 14-26 mm, with the preferred diameter being 20 mm." *Id.* col.7, ll. 28-30.

E. Challenges based SVS (Ex. 1106)

Medtronic contends that claims 1–4, 7, 8, 11, 12, 14, 19, 20, 23, 24, and 26 are rendered obvious under 35 U.S.C. § 103 by the combination of SVS and Baccelli. *See, e.g.*, Pet. 14–27.

Medtronic relies on SVS for its disclosure of a spinal fusion implant having most of the features of the spinal implant of claim 1. *Id.* at 14-15. The implant of SVS has radiopaque markers in its distal and proximal wall. *Id.* at 15. Medtronic asserts that Baccelli also teaches the use of radiopaque markers, wherein the "at least first and second radiopaque markers . . . extend into a first sidewall and a second sidewall at positions proximate to a medial plane of the implant." *Id.*

Medtronic contends that it would have been obvious to the ordinary artisan at the time of invention to include the radiopaque markers of Baccelli in the implant of SVS in order to provide additional information regarding the location and/or orientation of the implant, both during surgery and after implantation. *Id.* (citing Hynes Decl. ¶ 67). Medtronic contends further that such a combination is "nothing more than an application of known prior art elements to improve a similar device in the same way." Pet. 15.

In its Preliminary Response, NuVasive only presents arguments as to the merits of the challenge as to claims 12 and 13. Claims 12 and 13 both depend from claim 1. Claim 12 recites that the "upper and lower surfaces are generally parallel to one another," while claim 13 recites that the "upper and lower surfaces are generally angled relative to one another." NuVasive asserts that that "the upper and lower surfaces of . . . the [SVS implant] are not generally parallel to one another." Prelim. Resp. 32. NuVasive argues further that Medtronic cannot contend as to claim 12 that the upper and lower surfaces of the SVS implant "are generally parallel to each other," but then contend separately with respect to claim 13 that the upper and lower surfaces "generally angle [relative] to one another." Prelim. Resp. 31 (citing Pet. 31-32).

Medtronic contends that the upper and lower surfaces of the implant disclosed by SVS are generally parallel. Pet. 31. The upper and lower surfaces of

the implant of SVS are convex shaped and are not strictly parallel to each other given the curved shapes of the surfaces. Nevertheless, we agree with Medtronic that one of ordinary skill in the art would have understood that the upper and lower surfaces are "generally" parallel to each other at least because the general overall relative positions of the curved upper and lower surfaces are oriented in approximately the same direction. NuVasive does not provide sufficient evidence demonstrating that the upper and lower surfaces of the implant of SVS are not oriented in approximately the same direction, and are, therefore, not "generally parallel to one another."

As discussed above, the upper and lower surfaces of the implant of SVS are curvilinear. The upper and lower surfaces of the implant of SVS thus contain portions that generally angle relative to one another (e.g., at various curved portions of the surfaces). NuVasive does not provide sufficient evidence demonstrating that the upper and lower surfaces of the SVS implant are not "generally angled relative to one another," as recited in claim 13.

Thus, an upper surface that is generally parallel in at least some aspects to a lower surface meets the claim 12 limitation. Moreover, an upper and lower surface that are generally angled relative to one another in at least some aspect meets the claim 13 limitation. We, therefore, disagree with NuVasive that Medtronic's reliance on a single embodiment showing both generally parallel and generally angled surfaces is improper.

We have considered the arguments and evidence presented by Medtronic and NuVasive, and we are persuaded that Medtronic has demonstrated a reasonable likelihood that independent claim 1 is rendered obvious by the combination of SVS and Baccelli. We have considered the arguments and evidence presented by Medtronic and NuVasive, moreover, as to the obviousness

of dependent claims 2–4, 7, 8, 11, 12, 14, 19, 20, 23, 24, and 26, and are persuaded that Medtronic has demonstrated a reasonable likelihood that it will prevail as to those claims as well.

As to claims 10 and 27, Medtronic provides reasons as to why the ordinary artisan would have combined SVS and Baccelli to arrive at the limitations of those claims. Pet. 29-30, 37. Upon consideration of the evidence and arguments provided by Medtronic, we are persuaded that Medtronic has demonstrated a reasonable likelihood that claims 10 and 27 are rendered obvious by the combination of SVS and Baccelli. Moreover, we conclude that the teachings of Frey are redundant to the teachings of SVS and Baccelli, and thus only institute over the combination of SVS and Baccelli.

Similarly, as to claim 13, as discussed above with respect to claim 12, Medtronic provides reasons as to why the ordinary artisan would have combined SVS and Baccelli to arrive at the limitations of that claim. Pet. 31–32. We thus conclude that the teachings of Frey and Michelson are redundant to the teachings of SVS and Baccelli, and thus only institute over the combination of SVS and Baccelli.

Accordingly, we institute *inter partes* review of claims 1–4, 7, 8, 10–14, 19, 20, 23, 24, 26, and 27 for obviousness over SVS and Baccelli.

Medtronic further cites Frey or Michelson to meet the limitations of dependent claims 5 and 6 (Pet. 22–25) and provides a detailed claim chart showing where the additional limitations may be found. *Id.* at 25–27.

In its Preliminary Response, NuVasive specifically argues the challenge of claim 5. Prelim. Resp. 18–30. Claim 5 depends from claim 1, and specifies that the "longitudinal length is greater than 40 mm."

According to Medtronic, "Michelson discloses a spinal fusion implant that may have a longitudinal length greater than 40 mm." Pet. 22. (citation omitted). NuVasive argues that it would not have been obvious to one of ordinary skill in the art to have combined the teachings of Michelson with that of SVS because such a combination would have rendered the SVS implant "inoperable for its intended purpose" and "would . . . require a 'change in the basic principle under which the [SVS implant] construction was designed to operate.'" Prelim. Resp. 18 (citation omitted).

In particular, NuVasive argues that the "proposed modification to [the SVS implant] would reconstruct the posterior insertion implant so that its leading end would penetrate through the annulus on the anterior aspect of the disc and dangerously protrude from the anterior of the spine." Prelim. Resp. 27. We note that specific dimensions of the body of the vertebrae or disc space are not provided by the SVS brochure. The measurement of the disc space or vertebral body in SVS is not known. It is, therefore, not known, without additional evidence, if the distance from the posterior to anterior edges of the disc space in SVS is less than, equal to, or greater than 40 mm. NuVasive does not provide evidence sufficient to show that using an implant that is greater than 40 mm in length would, in fact, "penetrate through the annulus on the anterior aspect of the disc," the distance between the point of insertion of the implant and the anterior aspect of the disc being unknown in SVS.

Even assuming that the distance between the point of insertion of the implant and the anterior aspect of the disc was disclosed by SVS as being less than 40 mm, NuVasive provides insufficient evidence to demonstrate that, with respect to the level of skill in the art, maneuvering the implant to prevent damage to the annulus on the anterior aspect of the disc would have been challenging uniquely or

difficult for one of ordinary skill in the art. *See Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (citing *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007)). Indeed, Michelson discloses an implant with a length that is greater than 40 mm and does not disclose that inserting such an implant results in damage to the annulus on the anterior aspect of the disc. Ex. 1105, col. 10, ll. 41-46. Hence, Michelson demonstrates that it would have been obvious to one of ordinary skill in the art to have inserted an implant measuring at least 40 mm in length without damage to the annulus on the anterior aspect of the disc.

Medtronic relies on Frey and Michelson for similar teachings; we thus find the use of both references redundant, and only institute over the combination of SVS, Baccelli, and Michelson. Medtronic also relies on Michelson to meet the additional limitations of dependent claim 9, and provides reasons as to why the ordinary artisan would have combined Michelson with SVS and Baccelli. Pet. 27–29. Upon consideration of the evidence and arguments provided by Medtronic, we are persuaded that Medtronic has demonstrated a reasonable likelihood that dependent claims 5, 6, and 9 are rendered obvious by the combination of SVS, Baccelli, and Michelson. Accordingly, we institute *inter partes* review of claims 5, 6, and 9 for obviousness over SVS, Baccelli, and Michelson.

Medtronic additionally relies on Telamon or Frey to meet the limitation of dependent claim 25, and provides reasons as to why the ordinary artisan would have combined the teachings of the references to arrive at the claimed limitations. Pet. 34–36. The teachings of Frey relied upon by Medtronic are redundant to those of Baccelli. As we are persuaded that Medtronic has demonstrated a reasonable likelihood that claim 25 is rendered obvious by the combination of SVS, Baccelli,

and Telamon, we institute *inter partes* review of that claim only over that combination.

F. Challenges based on Telamon (Ex. 1107 and Ex. 1108).

Medtronic contends that claims 1, 2, 4, 7, 10–14, 19, 20, and 23–27 are rendered obvious under 35 U.S.C. § 103 by the combination of Telamon and Baccelli. *See, e.g.*, Pet. 37–60.

Medtronic relies on Telamon for its disclosure of a spinal fusion implant having most of the features of the spinal implant of claim 1. *Id.* at 38. The implant of Telamon has radiopaque markers in its distal and proximal wall. *Id.* Medtronic asserts that Baccelli also teaches the use of radiopaque markers, wherein the "at least first and second radiopaque markers . . . extend into a first sidewall and a second sidewall at positions proximate to a medial plane of the implant." *Id.* at 39.

Medtronic contends that it would have been obvious to the ordinary artisan at the time of invention to include the radiopaque markers of Baccelli in the implant of Telamon in order to provide additional information regarding the location and/or orientation of the implant, both during surgery and after implantation. *Id.* (citing Hynes Decl. ¶ 67). Medtronic contends further that such a combination is "nothing more than an application of known prior art elements to improve a similar device in a same way." Pet. 39.

In its Preliminary Response, NuVasive only presents arguments as to the merits of the challenge as to claims 12 and 13. Prelim. Resp. 30–32. As noted above in the analysis of the obviousness challenge based on SVS, claims 12 and 13 both depend from claim 1. Claim 12 recites that the "upper and lower surfaces are generally parallel to one another," while claim 13 recites that the "upper and lower surfaces are generally angled relative to one another." NuVasive asserts that that

"the upper and lower surfaces of . . . the [Telamon implant] are not generally parallel to one another." Prelim. Resp. 32. NuVasive argues further that Medtronic cannot contend as to claim 12 that the upper and lower surfaces of the Telamon implant "are generally parallel to each other," but then contend separately with respect to claim 13 that the upper and lower surfaces "generally angle [relative] to one another." Prelim. Resp. 31 (citing Pet. 31-32).

The upper and lower surfaces of the implant of Telamon are curvilinear. Ex. 1107, 2. That is, the upper and lower surfaces of the implant of Telamon are convex shaped, and are not strictly parallel to each other given the curved shapes of the surfaces. Nevertheless, we agree with Medtronic on this record that one of ordinary skill in the art would have understood that the upper and lower surfaces are "generally" parallel to each other at least because the general overall relative positions of the curved upper and lower surfaces are oriented in approximately the same direction.

The upper and lower surfaces of the implant of Telamon also contain portions that generally angle relative to one another (e.g., at various curved portions of the surfaces). NuVasive does not provide sufficient evidence demonstrating that the upper and lower surfaces of the Telamon implant are not "generally angled relative to one another," as recited in claim 13.

Thus, an upper surface that is generally parallel in at least some aspects to a lower surface meets the claim 12 limitation. Moreover, an upper and lower surface that are generally angled relative to one another in at least some aspect meets the claim 13 limitation. We, therefore, disagree with NuVasive that Medtronic's reliance on a single embodiment showing both generally parallel and generally angled surfaces is improper.

We have considered the arguments and evidence presented by Medtronic, and we are persuaded that Medtronic has demonstrated a reasonable likelihood that independent claim 1 is rendered obvious by the combination of Telamon and Baccelli. We have considered Medtronic's arguments and evidence, moreover, as to the obviousness of dependent claims 2, 4, 7, 10–14, 19, 20, and 23–27, and are persuaded that Medtronic has demonstrated a reasonable likelihood that it will prevail as to those claims as well.

As to claim 3, Medtronic provides reasons why the ordinary artisan would have combined Telamon and Baccelli to arrive at the limitations of that claim. Pet. 42-45. Upon consideration of the evidence and arguments provided by Medtronic, we are persuaded that Medtronic has demonstrated a reasonable likelihood that claim 3 is rendered obvious by the combination of Telamon and Baccelli. Accordingly, we institute *inter partes* review of claim 3 for obviousness over Telamon and Baccelli. Moreover, we conclude that the teachings of Frey are redundant to the teachings of Telamon and Baccelli, and thus only institute over the combination of Telamon and Baccelli.

Accordingly, we institute *inter partes* review of claims 1–4, 7, 10–14, 19, 20, and 23–27 for obviousness over Telamon and Baccelli.

Medtronic further cites Frey or Michelson to meet the limitations of dependent claims 5 and 6, (Pet. 45–49), and provides a detailed claim chart pointing out where the additional limitations may be found. *Id.* at 49–51.

In its Preliminary Response, NuVasive specifically argues the challenge of claim 5 for the same reasons set forth above with respect to the challenge based on SVS. Prelim. Resp. 18–30. Specifically, NuVasive argues that the "proposed modification to [the Telamon implant] would reconstruct the posterior insertion implant so that its leading end would penetrate through the annulus on the anterior

aspect of the disc and dangerously protrude from the anterior of the spine." Prelim. Resp. 27. Similarly to SVS, Telamon does not provide the specific dimensions of the body of the vertebrae or disc. The measurement of the disc space or vertebral body in Telamon is not known. It is, therefore, not known, without additional evidence, if the distance from the posterior to anterior edges of the disc space in Telamon is less than, equal to, or greater than 40 mm. NuVasive does not provide evidence sufficient to show that using an implant that is greater than 40 mm in length would, in fact, "penetrate through the annulus on the anterior aspect of the disc," the distance between the point of insertion of the implant and the anterior aspect of the disc being unknown in Telamon.

Even assuming that the distance between the point of insertion of the implant and the anterior aspect of the disc was disclosed by Telamon as being less than 40 mm, NuVasive provides insufficient evidence to demonstrate that, with respect to the level of skill in the art, maneuvering the implant to prevent damage to the annulus on the anterior aspect of the disc would have been challenging uniquely or difficult for one of ordinary skill in the art. *See Leapfrog Enters.*, 485 F.3d at 1157. Indeed, Michelson discloses an implant with a length that is greater than 40 mm and does not disclose that inserting such an implant results in damage to the annulus on the anterior aspect of the disc. Ex. 1105, col. 10, ll. 41-46. Hence, Michelson demonstrates that it would have been obvious to one of ordinary skill in the art to have inserted an implant measuring at least 40 mm in length without damage to the annulus on the anterior aspect of the disc.

In the challenge of claims 5 and 6, Medtronic relies on Frey and Michelson for similar teachings. We find the use of both references redundant, and only institute over the combination of Telamon, Baccelli, and Michelson. Medtronic also relies on Michelson to meet the additional limitations of dependent claims 8

and 9, and provides reasons as to why the ordinary artisan would have combined Michelson with Telamon and Bacelli. Pet. 49–53. Upon consideration of the evidence and arguments provided by Medtronic, we are persuaded that Medtronic has demonstrated a reasonable likelihood that dependent claims 8 and 9 are rendered obvious by the combination of Telamon, Baccelli, and Michelson.

Accordingly, we institute *inter partes* review of claims 5, 6, 8, and 9 for obviousness over Telamon, Baccelli, and Michelson.

III. CONCLUSION

For the foregoing reasons, we determine that Medtronic has demonstrated a reasonable likelihood that it will prevail on its challenges of claims 1–14, 19, 20, and 23–27 of the '156 patent.

At this stage of the proceeding, the Board has not made a final determination as to the patentability of any challenged claim.

IV. ORDER

It is ORDERED that the petition is *granted* as to claims 1–14, 19, 20, and 23–27 with respect to the following grounds:

Claims 1–4, 7, 8, 10–14, 19, 20, 23, 24, 26, and 27 as obvious under 35 U.S.C. § 103 by the combination of SVS and Baccelli;

Claims 5, 6, and 9 as obvious under 35 U.S.C. § 103(a) by the combination of SVS, Baccelli, and Michelson;

Claim 25 as obvious under 35 U.S.C. § 103(a) by the combination of SVS, Baccelli, and Telamon;

Claims 1–4, 7, 10–14, 19, 20, and 23–27 as obvious under 35 U.S.C. § 103(a) by the combination of Telamon and Baccelli; and

Claims 5, 6, 8, and 9 as obvious under 35 U.S.C. § 103(a) by the combination of Telamon, Baccelli, and Michelson.

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '156 patent is hereby instituted commencing on the entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial;

FURTHER ORDERED that all other grounds presented in Medtronic's petition are *denied*, and no ground other than those specifically granted above is authorized for the *inter partes* review as to claims 1–14, 19, 20, and 23–27; and

FURTHER ORDERED that an initial conference call with the Board is scheduled for Thursday, February 27, 2014, at 3PM. The parties are directed to the Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,765-66 (Aug. 14, 2012) for guidance in preparing for the initial conference call, and should be prepared to discuss any proposed changes to the Scheduling Order entered herewith and any motions the parties anticipate filing during the trial.

PETITIONER:

Jeff E. Schwartz
Seth A. Kramer
Fox Rothschild LLP
jeschwartz@foxrothschild.com
skramer@foxrothschild.com

PATENT OWNER:

Stephen R. Schaefer
Michael T. Hawkins
Fish & Richardson P.C.
Schaefer@fr.com
Hawkins@fr.com
IPR13958-0117IP1@fr.com

UNITED STATES PATENT AND TRADEMARK OFFICE
Certificate

Patent No. 8,361,156 B2 Patented: January 29, 2013

On petition requesting issuance of a certificate for correction of inventorship pursuant to 35 U.S.C. 256, it has been found that the above identified patent, through error and without any deceptive intent, improperly sets forth the inventorship.

Accordingly, it is hereby certified that the correct inventorship of this patent is: Matthew Curran, Carlsbad, CA (US); Mark Peterson, Medford, CA (US); and Luiz Pimenta, Sao Paulo (BR).

Signed and Sealed this Twenty-fifth Day of June 2013.

EDUARDO C. ROBERT
Supervisory Patent Examiner
Art Unit 3733
Technology Center 3700

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4	1088

26191 7590 05/29/2013
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
BRAY, STUART SAMUEL	
ART UNIT	**PAPER NUMBER**
3733	

NOTIFICATION DATE	DELIVERY MODE
05/29/2013	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

In re Patent No. 8,631,156 CURRAN ET AL.	:	
Issue Date: January 29, 2013	:	**DECISION GRANTING**
Appl No.: 13/441,092	:	**PETITION**
Filed: April 06, 2012	:	*37 CFR 1.324*
For: SYSTEMS AND METHODS FOR SPINAL FUSION	:	

This is a decision on the petition filed April 17, 2013 to correct inventorship under 37 CFR 1.324.

The petition is granted.

The patented file is being forwarded to Certificate of Corrections Branch for issuance of a certificate naming only the actual inventor or inventors.

/Eduardo C. Robert/

EDUARDO C. ROBERT
Supervisory Patent Examiner
Art Unit 3733
Technology Center 3700

FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

DATE: May 22, 2013
TO: Certificates of Correction Branch
FROM: EDUARDO C. ROBERT
SPE, Art Unit 3733
SUBJECT: REQUEST FOR CERTIFICATE OF CORRECTION

Please issue a Certificate of Correction in U. S. Letters Patent No. 8,361,156 as specified on the attached Certificate.

/Eduardo C. Robert/

EDUARDO C. ROBERT, SPE
Art Unit 3733

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE

Patent No. 8,361,156
Patented: January 29, 2013

On petition requesting issuance of a certificate for correction of inventorship pursuant to 35 U.S.C. 256, it has been found that the above identified patent, through error and without deceptive intent, improperly sets forth the inventorship. Accordingly, it is hereby certified that the correct inventorship of this patent is:

Matthew Curran, Carlsbad, CA; Mark Peterson, Medford, CA; Luiz Pimenta, Sao Paulo, Brasil

/Eduardo C. Robert/

EDUARDO C. ROBERT
Supervisory Patent Examiner
Art Unit 3733

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
ASSISTANT SECRETARY OF COMMERCE AND
COMMISSIONER OF PATENTS AND TRADEMARKS
P. O. Box 1450
Alexandria, VA 22313-1450

May 28, 2013

Patent No.: 8,361,156 B2
Applicaton No.: 13/441,092
Applicant : Matthew Curran, et al.
Issued : January 29, 2013
For : **SYSTEMS AND METHODS FOR SPINAL FUSION**
Docket No. : **13958-0099003/104US4**

Re: Notice Sent in Error to Applicant "RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT dated April 24, 2013

The following communication is being sent due to the Office forwarding correspondence to applicant in error. The notice "RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT"dated April 24, 2013, indicating that the request to correct inventorship under 37 CFR 1.48 (a) is deficient because a new or corrected application data sheet has not been submitted, was not the proper response required for the document filed by applicant, Petition to Correct Inventorship under 1.324. The notice was sent to applicant error and petition to correct inventorship filed April 17, 2013 will be reviewed by appropriate SPE in the assigned Art Unit.

Further correspondence concerning this matter should be filed and directed to SPE Eduardo Robert, Art Unit 3733, Technology Center 3700.

Antonio Johnson
(571)272-0483
Office of Data Management
Certificates of Correction Branch

FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS MN 55440-1022

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4

CONFIRMATION NO. 1088

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

IMPROPER CFR REQUEST

OC000000060597383

Date Mailed: 04/24/2013

RESPONSE TO REQUEST FOR CORRECTED FILING RECEIPT

Power of Attorney, Claims, Fees, System Limitations, and Miscellaneous

In response to your request for a corrected Filing Receipt, the Office is unable to comply with your request because:

- The request to correct inventorship under 37 CFR 1.48(a) is deficient because a new or corrected application data sheet has not been submitted.

/mabebe/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: STUART SAMUEL BRAY
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		

Title : SYSTEMS AND METHODS FOR SPINAL FUSION

Attn.: Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF REQUEST FOR CERTIFICATE OF CORRECTION

Applicant hereby requests that a certificate of correction be issued for the above patent in accordance with the attached request.

One or more of the errors sought to be corrected were made by Applicants, therefore please apply the $100 required fee of 37 CFR §1.20(a) together with any other charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: April 17, 2013

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60825543.doc

PTO/SB/44 (09-07)
Approved for use through 08/31/2013. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

(Also Form PTO-1050)

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 8,361,156

APPLICATION NO.: 13/441,092

ISSUE DATE: : January 29, 2013

INVENTOR(S) : Matthew Curran

It is certified that an error appears or errors appear in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title Page, Inventors, please insert -- Luiz Pimenta, Sao Paulo, Brasil --

MAILING ADDRESS OF SENDER (Please do not use customer number below):

Minneapolis Minneapolis, Minnesota 55402

Electronic Patent Application Fee Transmittal

Application Number:	13441092
Filing Date:	06-Apr-2012
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Filer:	Michael T. Hawkins/Beth Bauer
Attorney Docket Number:	13958-0099003/104US4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Certificate of Correction	1811	1	100	100
Processing Fee Correcting Inventorship	1816	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**230**

Electronic Acknowledgement Receipt

EFS ID:	15545435
Application Number:	13441092
International Application Number:	
Confirmation Number:	1088
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Customer Number:	26191
Filer:	Michael T. Hawkins/Beth Bauer
Filer Authorized By:	Michael T. Hawkins
Attorney Docket Number:	13958-0099003/104US4
Receipt Date:	17-APR-2013
Filing Date:	06-APR-2012
Time Stamp:	17:08:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$230
RAM confirmation Number	4457
Deposit Account	061050
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request under Rule 48 correcting inventorship	099003pet.pdf	62584 d4ec92be157d9a43b0f51121fe46f23fc3b52f7b	no	1
Warnings:					
Information:					
2	Oath or Declaration filed	0099003Pimenta2.pdf	80204 9dddebb1f2818a47ca744d4e2907d6b2308bf6b5	no	1
Warnings:					
Information:					
3	Oath or Declaration filed	0099003Curran2.pdf	102257 b80246820a4ca716f883b35c707fe552baf1e2f3	no	1
Warnings:					
Information:					
4	Oath or Declaration filed	0099003Peterson2.pdf	120148 3b711645b0859852c044cf9ee6ef467ed3171d7f	no	1
Warnings:					
Information:					
5	Request under Rule 48 correcting inventorship	099003assignee2.pdf	63907 5c74e45fc44dc4dba4c5e392b95ae6ffbdb49fd9	no	1
Warnings:					
Information:					
6	Assignee showing of ownership per 37 CFR 3.73.	099003cert2.pdf	76497 b084b8185a12c15cc91cc9e73ad94625f4d49af4	no	1
Warnings:					
Information:					
7	Request for Certificate of Correction	099003reqcoc.pdf	120801 53612e0e92e96146bb228cd93920877144e6d209	no	2
Warnings:					
Information:					
8	Fee Worksheet (SB06)	fee-info.pdf	31506 a697e13ebc2a947c5cfb07bcfa9b1c5c960d85a5	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	657904	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: NuVasive, Inc.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: Stuart Samuel Bray
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CONSENT OF ASSIGNEE TO CORRECT INVENTORSHIP

As an officer of the concern to which the noted application has been assigned, I hereby consent to the correction of inventorship of this issued patent from the naming of MATTHEW CURRAN and MARK PETERSON to the naming of MATTHEW CURRAN, MARK PETERSON, and LUIZ PIMENTA.

Respectfully submitted,

Date: 9/16/13

Jonathan Spangler, Esq.
Vice President and Chief Patent Counsel
NuVasive, Inc.
7475 Lusk Boulevard
San Diego, CA 92121

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: STUART SAMUEL BRAY
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE UNDER 37 CFR §3.73(b)

Under 37 CFR §3.73(b) NUVASIVE, INC., a corporation, certifies that it is the assignee of the entire right, title and interest in the patent application identified above by virtue of assignments from the inventors of the patent application identified above. The assignments were recorded in the Patent and Trademark Office at

Reel 029470, Frame 0734 on December 14, 2012; and

Reel 030212, Frame 0928 on April 15, 2013.

The undersigned, whose title is supplied below, is empowered to act on behalf of the assignee.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief and believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents issued thereon.

Date: 4/16/13

Respectfully submitted,

Jonathan Spangler, Esq.
Vice President and Chief Patent Counsel of
NuVasive, Inc.

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: Stuart Samuel Bray
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION TO CORRECT INVENTORSHIP
UNDER 37 C.F.R. § 1.324(a)

Applicant requests correction of inventorship for the above-captioned issued patent by the addition of the following inventor:

LUIZ PIMENTA

Applicant submits herewith the following:

1) Inventor's Declaration to Correct Inventorship by LUIZ PIMENTA;

2) Declarations by current named Inventors: MATTHEW CURRAN and MARK PETERSON;

3) Consent of Assignee to Correct Inventorship;

4) Certificate Under 37 C.F.R. §3.73(b); and

5) Certificate of Correction.

Please apply the $230 ($130 in payment for the petition fee of §1.20(b), $100 in payment for the Certificate of Correction fee of §1.20(a)) and any other charges or credits to Deposit Account No. 06-1050, referencing Attorney Docket No. 13958-0099003.

Date: April 17, 2013

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: NuVasive, Inc.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: Stuart Samuel Bray
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INVENTOR'S DECLARATION TO CORRECT INVENTORSHIP

I, MARK PETERSON declare:

1. That I am an original named inventor of the noted patent application.

2. That through error, without any deceptive intention on my part or that of any actual inventor, the above-captioned application was filed naming MATTHEW CURRAN and MARK PETERSON, rather than MATTHEW CURRAN, MARK PETERSON and LUIZ PIMENTA. This error was discovered after the application was filed.

3. That I hereby consent to the correction of inventorship to include LUIZ PIMENTA, as described in paragraph 2, hereinabove.

4. That all statements made herein of my own knowledge and true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 4/17/13

MARK PETERSON
840 Royal Avenue, Suite #1
Medford, OR 97504
United States

Fish & Richardson P.C.
3200 RBC Plaza
60 South Sixth Street
Minneapolis, Minnesota 55402
Telephone: (612) 335-5070
Facsimile: (612) 288-9696

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : NuVasive, Inc.
Patent No. : 8,361,156
Issue Date : January 29, 2013
Serial No. : 13/441,092
Filed : April 6, 2012
Title : SYSTEMS AND METHODS FOR SPINAL FUSION

Art Unit : 3733
Examiner : Stuart Samuel Bray
Conf. No. : 1088

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INVENTOR'S DECLARATION TO CORRECT INVENTORSHIP

I, LUIZ PIMENTA hereby declare:

1. That I am an original named inventor of the noted patent application.

2. That through error, without any deceptive intention on my part or that of any actual inventor, the above-captioned application was filed naming MATTHEW CURRAN and MARK PETERSON, rather than MATTHEW CURRAN, MARK PETERSON and LUIZ PIMENTA. This error was discovered after the application was filed.

3. That all statements made herein of my own knowledge and true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 03/05/13

03/05/13

LUIZ PIMENTA
Rua Vergueiro,1.421 – Top Towers Offices
Torre Sul – Sala 305 | Paraíso, 04101-000
São Paulo/Brasil

Fish & Richardson P.C.
3200 RBC Plaza
60 South Sixth Street
Minneapolis, Minnesota 55402
Telephone: (612) 335-5070
Facsimile: (612) 288-9696

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: NuVasive, Inc.	Art Unit	: 3733
Patent No.	: 8,361,156	Examiner	: Stuart Samuel Bray
Issue Date	: January 29, 2013	Conf. No.	: 1088
Serial No.	: 13/441,092		
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INVENTOR'S DECLARATION TO CORRECT INVENTORSHIP

I, MATTHEW CURRAN hereby declare:

1. That I am an original named inventor of the noted patent application.

2. That through error, without any deceptive intention on my part or that of any actual inventor, the above-captioned application was filed naming MATTHEW CURRAN and MARK PETERSON, rather than MATTHEW CURRAN, MARK PETERSON and LUIZ PIMENTA. This error was discovered after the application was filed.

3. That I hereby consent to the correction of inventorship to include LUIZ PIMENTA, as described in paragraph 2, hereinabove.

4. That all statements made herein of my own knowledge and true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 3/27/13

MATTHEW CURRAN
3218 Rancho Quartillo
Carlsbad, CA 92009
United States

Fish & Richardson P.C.
3200 RBC Plaza
60 South Sixth Street
Minneapolis, Minnesota 55402
Telephone: (612) 335-5070
Facsimile: (612) 288-9696

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	01/29/2013	8361156	13958-0099003/104US4	1088

26191 7590 01/09/2013

FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Matthew Curran, Carlsbad, CA;
Mark Peterson, Medford, CA;

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	214	737448	10/16/1996	EPO				
	215	796593	9/24/1997	EPO				
	216	809974	4/15/1998	EPO				
	217	809975	4/15/1998	EPO				
	218	811356	4/15/1998	EPO				
	219	880938	2/12/1998	EPO				
	220	2015507	1/5/1999	CA				
	221	00/45712	8/10/2000	WIPO				
	222	00/45713	8/10/2000	WIPO				
	223	01/41681	6/14/2001	WIPO				
	224	01/49333	7/12/2001	WIPO				
	225	90/00037	1/11/1990	WIPO				
Change(s) applied to document, /K.S.S/ 12/18/2012	226	91/06261	~~5/16/1992~~	WIPO 05/1991				
	227	92/14423	9/3/1992	WIPO				
	228	94/04100	3/3/1994	WIPO				
	229	94/10928	5/26/1994	WIPO				
	230	95/01810	1/19/1995	WIPO				
	231	96/08205	3/21/1996	WIPO				
	232	96/17564	3/13/1996	WIPO				
	233	96/41582	12/27/1996	WIPO				
	234	97/20513	6/12/1997	WIPO				
	235	97/33525	9/18/1997	WIPO				
	236	97/37620	10/16/1997	WIPO				
	237	98/09586	3/12/1998	WIPO				
	238	98/14142	4/9/1998	WIPO				
	239	98/17208	4/30/1998	WIPO				
	240	98/25539	6/18/1998	WIPO				

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	163	6,258,125	7/10/2001	Paul et al.			
	164	6,277,149	8/21/2001	Boyle et al.			
Change(s) applied	165	6,319,257	11/20/2001	Carignan et al.			
to document,	166	6,371,989	~~4/16/2001~~	Chauvin et al. April 16, 2002			
/S.D./	167	6,383,221	5/7/2002	Scarborough et al.			
12/21/2012	168	6,409,766	6/25/2002	Brett			
	169	6,425,772	7/30/2002	Bernier et al.			
	170	6,432,140	8/13/2002	Lin			
	171	6,440,142	8/27/2002	Ralph et al.			
	172	6,442,814	9/3/2002	Landry et al.			
	173	6,447,547	9/10/2002	Michelson			
	174	6,454,806	9/24/2002	Cohen et al.			
	175	6,468,311	10/22/2002	Boyd et al.			
	176	6,491,724	12/10/2002	Ferree			
	177	6,527,773	3/4/2003	Lin et al.			
	178	6,547,823	4/15/2004	Scarborough et al.			
	179	6,595,998	7/22/2003	Johnson et al.			
	180	6,626,905	9/30/2003	Schmiel et al.			
	181	6,635,086	10/21/2003	Lin			
	182	6,648,895	11/18/2003	Burkus et al.			
	183	6,672,019	1/6/2004	Wenz			
	184	6,676,703	1/13/2004	Biscup			
	185	6,706,067	3/16/2004	Shimp et al.			
	186	6,743,255	6/1/2004	Ferree			
	187	6,746,484	6/8/2004	Liu et al.			
	188	6,755,841	6/29/2004	Fraser et al.			
	189	6,761,739	7/13/2004	Shepard			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	28	5,092,572	3/3/1992	Litwak et al.			
	29	5,133,717	7/28/1992	Chopin			
	30	5,133,755	7/28/1992	Brekke			
	31	5,171,278	12/15/1992	Pisharodi			
	32	5,192,327	3/9/1993	Brantigan			
	33	5,217,497	6/8/1993	Mehdian			
	34	5,263,953	11/23/1993	Bagby			
	35	5,269,785	12/14/1993	Bonutti			
	36	5,284,153	2/8/1994	Raymond et al.			
	37	5,290,494	3/1/1994	Coombes et al.			
Change(s) applied to document, /S.D./ 12/21/2012	38	5,300,076	~~5/5/1994~~	Lerich e	April 5, 1994		
	39	5,304,210	4/19/1994	Crook			
	40	5,306,307	4/26/1994	Senter et al.			
	41	5,306,309	4/26/1994	Wagner et al.			
	42	5,322,505	6/21/1994	Krause et al.			
	43	5,334,205	8/2/1994	Cain			
	44	5,336,223	8/9/1994	Rogers			
	45	5,364,400	11/15/1994	Rego, Jr. et al.			
	46	5,395,372	3/7/1995	Holt et al.			
	47	5,397,363	3/14/1995	Gelbard			
	48	5,397,364	3/14/1995	Kozak			
	49	5,405,391	4/11/1995	Henderson et al.			
	50	5,413,602	5/9/1995	Metz-Stavenhagen			
	51	5,425,772	6/20/1995	Brantigan			
	52	5,431,658	7/11/1995	Moskovich			
	53	5,443,514	8/22/1995	Steffee			
	54	5,443,515	8/22/1995	Cohen, et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	3,486,505	12/30/1969	Morrison			
	2	3,518,993	7/7/1970	Blake			
	3	3,604,487	9/14/1971	Gilbert			
	4	3,745,995	7/17/1973	Kraus			
	5	3,848,601	11/19/1974	Ma et al.			
	6	3,867,728	2/25/1975	Stubstad et al.			
	7	4,026,304	5/31/1971	Levy			
Change(s) applied to document, /S.D./ 12/21/2012	8	4,026,305	5/31/1971	Brownlee et al.			
	9	~~4,454,374~~	10/8/1985	Jacobson 4,545,374			
	10	4,501,269	2/26/1985	Bagby			
	11	4,646,738	3/3/1987	Trott			
	12	4,657,550	4/14/1987	Daher			
	13	4,743,256	5/10/1988	Brantigan			
	14	4,781,591	11/1/1988	Allen			
	15	4,834,757	5/30/1989	Brantigan			
	16	4,877,020	10/31/1989	Vich			
	17	4,878,915	11/7/1989	Brantigan			
	18	4,932,975	6/12/1990	Main et al.			
	19	4,950,296	8/21/1990	McIntyre			
	20	4,961,740	10/9/1990	Ray et al.			
	21	4,962,766	10/16/1990	Herzon			
	22	5,015,247	5/14/1991	Michelson			
	23	5,026,373	6/25/1991	Ray et al.			
	24	5,047,055	9/10/1991	Bao et al.			
	25	5,055,104	10/8/1991	Ray			
	26	5,062,845	11/5/1991	Kuslich et al.			
	27	5,071,437	12/10/1991	Steffee			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Serial No.	: 13/441,092	Examiner	: STUART SAMUEL BRAY
Filed	: April 6, 2012	Confirmation No.:	1088
		Notice of Allowance Date:	December 13, 2012
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

MAIL STOP ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE OF ALLOWANCEAND COMMENTS IN RESPONSE TO THE EXAMINER'S REASONS FOR ALLOWANCE

In response to the Notice of Allowance mailed December 13, 2012, enclosed is a completed issue fee transmittal form PTOL-85b. Applicant recognizes that in accordance with M.P.E.P. § 1302.14, the Examiner's reasons for allowance need not set forth all of the details as to why the claims are allowed. In the above-referenced application, Applicant does not concede that the Examiner's stated reasons for allowance are the only reasons for which the claims are allowable. Applicant agrees that the particular claim elements identified in the Examiner's reasons for allowance are not disclosed or suggested by any reasonable combination of prior art references in the record, yet the claims are patentable for other reasons—including the inventive combination of all of the recited claim elements considered as a whole.

The issue fee and publication fees in the amount of $2070 are being paid concurrently herewith. In addition, please apply any other necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: December 17, 2012

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60811828.doc

PART B – FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 4 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Legibly mark-up with any corrections or use Block 1)

26191 7590 12/13/2012

FISH & RICHARDSON P.C.
P.O. Box 1022
Minneapolis, MN 55440-1022

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	**04/06/2012**	**Matthew Curran**	**13958-0099003**	**1088**

TITLE OF INVENTION: **SYSTEMS AND METHODS FOR SPINAL FUSION**

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	**NO**	**$1770**	$300	**$2070**	**03/13/2013**

EXAMINER	ART UNIT	CLASS-SUBCLASS
BRAY, STUART SAMUEL	**3733**	**623-017160**

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

[ ] Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

[ ] "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. **Fish & Richardson P.C.**
2. _____
3. _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE (CITY and STATE OR COUNTRY)

NuVasive, Inc. **San Diego, CA**

Please check the appropriate assignee category or categories (will not be printed on the patent): [ ] individual [X] corporation or other private group entity [ ] government

4a. The following fee(s) are enclosed:
[X] Issue Fee
[X] Publication Fee (No small entity discount permitted)
[ ] Advance Order - # of Copies _____

4b. Payment of Fee(s):
[ ] A check in the amount of the fee(s) is enclosed.
[ ] Payment by credit card. Form PTO-2038 is attached.
[X] The Director is hereby authorized to charge the required fee(s), or credit any overpayment, to Deposit Account Number 06-1050 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

[ ].a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. [ ]b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.
NOTE: The issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant, a registered agent or; or the assignee or other party in interest as shown by the records of the Untied States Patent and Trademark Office.

(Authorized Signature) /Michael T. Hawkins/ (Date) **December 17, 2012**

Typed or Printed Name **Michael T. Hawkins** Registration No. 57,867

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMIT THIS FORM WITH FEE(S)

Electronic Patent Application Fee Transmittal

Application Number:	13441092
Filing Date:	06-Apr-2012
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Filer:	Michael T. Hawkins/Kayla Olson
Attorney Docket Number:	13958-0099003/104US4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1770	1770
Publ. Fee- early, voluntary, or normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**2070**

Electronic Acknowledgement Receipt

EFS ID:	14481532
Application Number:	13441092
International Application Number:	
Confirmation Number:	1088
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Customer Number:	26191
Filer:	Michael T. Hawkins/Jodi Budge
Filer Authorized By:	Michael T. Hawkins
Attorney Docket Number:	13958-0099003/104US4
Receipt Date:	17-DEC-2012
Filing Date:	06-APR-2012
Time Stamp:	10:18:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$2070
RAM confirmation Number	10015
Deposit Account	061050
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Issue Fee Payment (PTO-85B)	IssueFee.pdf	99393 6ef7eb50d5a73de05af4c8bf5f84022c17681dba	no	2
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	31708 8f4a7df62ea4a0b65ce582e4ce33e431d2dbbecb	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	131101	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

26191 7590 12/13/2012
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER
BRAY, STUART SAMUEL

ART UNIT	PAPER NUMBER
3733	

DATE MAILED: 12/13/2012

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4	1088

TITLE OF INVENTION: Systems and Methods for Spinal Fusion

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	03/13/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

26191 7590 12/13/2012
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4	1088

TITLE OF INVENTION: Systems and Methods for Spinal Fusion

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1770	$300	$0	$2070	03/13/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BRAY, STUART SAMUEL	3733	623-017160

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:

❑ Issue Fee

❑ Publication Fee (No small entity discount permitted)

❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**

❑ A check is enclosed.

❑ Payment by credit card. Form PTO-2038 is attached.

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4	1088

26191 7590 12/13/2012
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER	
BRAY, STUART SAMUEL	

ART UNIT	PAPER NUMBER
3733	

DATE MAILED: 12/13/2012

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	13/441,092	CURRAN ET AL.	
	Examiner	Art Unit	
	STUART S. BRAY	3733	

All participants (applicant, applicant's representative, PTO personnel):

(1) *STUART S. BRAY*.

(3) *Michael Hawkins*.

(2) _____.

(4) _____.

Date of Interview: *28 November 2012*.

Type: ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description: _____.

Issues Discussed ☐101 ☐112 ☐102 ☒103 ☐Others
(For each of the checked box(es) above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *1 and 28*.

Identification of prior art discussed: *Michelson, Boriani, Kuntz*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Examiner called Applicant to discuss adding specific features to the independent device claim to distinguish the location of the radioopaque markers. Applicant agreed to amend claim 1 to add the orientation relative to the height of the implant. Claim 5 was also amended, and the method claims were cancelled. .

Applicant recordation instructions: It is not necessary for applicant to provide a separate record of the substance of interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/STUART S BRAY/ Examiner, Art Unit 3733	/ELLEN C HAMMOND/ Primary Examiner, Art Unit 3733

Notice of Allowability	Application No.	Applicant(s)	
	13/441,092	CURRAN ET AL.	
	Examiner	Art Unit	
	STUART S. BRAY	3733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the claims filed 4/5/2012*.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are *1-27*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 4/6/2012 10/18/2012
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☒ Interview Summary (PTO-413), Paper No./Mail Date *20121128* .
5. ☒ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/ELLEN C HAMMOND/ Primary Examiner, Art Unit 3733	/Stuart S Bray/ Examiner, Art Unit 3733

EXAMINER'S AMENDMENT

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Michael Hawkins on 11/28/2012.

The application has been amended as follows:

In claim 1

Line 20 of claim 1, "perpendicular to said longitudinal length of said implant" is **deleted and replaced with** - - parallel to a height of the implant - -

In claim 5,

Line 2 of claim 5, "is" is **replaced with** - - at - -.

Line 2, - - wherein said longitudinal length is greater than 40mm - - is **added after** "proximal wall"

In claim 26,

Line 2 of claim 26, "an implant" is **deleted and replaced with** - - said implant - -

Claims 28-46 **are cancelled.**

The following is an examiner's statement of reasons for allowance: the claims in the instant application have not been rejected using prior art because no reference or reasonable combination thereof could be found which disclose or suggest a spinal fusion implant with a longitudinal length that is greater than the maximum width and with two radiopaque markers parallel to an implant height, in the sidewalls of the implant.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STUART S. BRAY whose telephone number is (571)270-7648. The examiner can normally be reached on Mon-Thurs 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, ***please contact the examiner's supervisor, Eduardo C. Robert, at* 571-272-4719**. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

If there are any inquiries that are not being addressed by first contacting the Examiner or the Supervisor, you may send an email inquiry to TC3700_Workgroup_D_Inquiries@uspto.gov.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/STUART S BRAY/
Examiner, Art Unit 3733

/ELLEN C HAMMOND/
Primary Examiner, Art Unit 3733

Notice of References Cited	Application/Control No. 13/441,092	Applicant(s)/Patent Under Reexamination CURRAN ET AL.	
	Examiner STUART S. BRAY	Art Unit 3733	Page 1 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-3,486,505 A	12-1969	MORRISON GORDON M	606/90
*	B	US-3,518,993 A	07-1970	BLAKE LAWRENCE W	606/142
*	C	US-3,745,995 A	07-1973	Kraus, Werner	602/2
*	D	US-3,848,601 A	11-1974	Ma et al.	606/86A
*	E	US-3,867,728 A	02-1975	Stubstad et al.	623/17.16
*	F	US-4,026,304 A	05-1977	Levy, Didya D.	607/51
*	G	US-4,026,305 A	05-1977	Brownlee et al.	607/32
*	H	US-4,454,374 A	06-1984	Pollack, Ronald M.	174/68.3
*	I	US-4,501,269 A	02-1985	Bagby, George W.	606/279
*	J	US-4,646,738 A	03-1987	Trott, Arthur F.	606/170
*	K	US-4,657,550 A	04-1987	Daher, Youssef H.	623/17.11
*	L	US-4,743,256 A	05-1988	Brantigan, John W.	128/898
*	M	US-6,304,487 B1	10-2001	Pawletko et al.	365/185.22

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Notice of References Cited	Application/Control No. 13/441,092	Applicant(s)/Patent Under Reexamination CURRAN ET AL.	
	Examiner STUART S. BRAY	Art Unit 3733	Page 2 of 2

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2008/0015701 A1	01-2008	Garcia et al.	623/017.16
*	B	US-2012/0078374 A1	03-2012	Villiers et al.	623/17.16
*	C	US-8,246,686 B1	08-2012	Curran et al.	623/17.16
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	6187	(623/17.11-17.16).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/28 15:11
L3	453	l2 and marker	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/28 15:12
L4	56	l2 and (opaque near4 marker)	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/28 15:12
L5	17	("20080015701" | "20120078374" | "3486505" | "3518993" | "3745995" | "3848601" | "3867728" | "4026304" | "4026305" | "4454374" | "4501269" | "4646738" | "4657550" | "4743256" | "6304487").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/28 15:23
S1	3	"13440062"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/26 10:45
S2	5	"13079645"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/26 10:49
S3	210	("20020058950" | "20030105528" | "20030139812" | "20040153155" | "20050197702" | "20070191945" | "3486505" | "3518993" | "3604487" | "3745995" | "3848601" | "3867728" | "4026304" | "4026305" | "4454374" | "4501269" | "4646738" | "4657550" | "4743256" | "4781591" | "4834757" | "4877020" | "4878915" | "4932975" | "4950296" | "4961740" | "4962766" | "5015247" | "5026373" | "5047055" | "5055104" | "5062845" | "5071437" | "5092572" | "5133717" | "5133755" | "5171278" | "5192327" | "5217497" | "5263953" | "5269785" | "5284153" | "5290494" | "5300076" | "5304210" | "5306307" | "5306309" | "5322505" | "5334205" | "5336223" | "5364400" | "5395372" | "5397363" | "5397364" | "5405391" | "5413602" | "5425772" | "5431658" | "5443514" | "5443515" | "5445639" | "5454811" | "5458638" | "5484403" | "5484437" | "5489307" | "5489308" | "5514180" | "5522879" | "5522899" | "5524624" | "5527312" | "5534030" | "5540688" | "5545222" | "5562736" |	US-PGPUB; USPAT; USOCR	OR	OFF	2012/11/27 14:03

		"5565005" | "5571190" | "5571192" | "5593409" | "5609636" | "5611800" | "5611810" | "5632747" | "5645598" | "5653761" | "5653762" | "5658336" | "5658337" | "5662710" | "5665122" | "5669909" | "5676703" | "5683394" | "5683400" | "5683464" | "5690629" | "5700264" | "5700291" | "5700292" | "5702449" | "5702451" | "5702453" | "5702454" | "5702455" | "5703451" | "5707373" | "5711957" | "5716415" | "5720748" | "5720751" | "5728159" | "5741253" | "5741261" | "5755797" | "5766252" | "5772661" | "5775331" | "5775797" | "5779642" | "5782830" | "5782919" | "5785710" | "5797909" | "5800549" | "5800550" | "5814084" | "5851208" | "5860973" | "5865845" | "5865848" | "5885299" | "5888219" | "5888224" | "5893890" | "5904719" | "5910315" | "5942698" | "5954769" | "5968098" | "5993474" | "6003426" | "6004326" | "6008433" | "6015436" | "6033405" | "6039761" | "6042582" | "6045580" | "6048342" | "6059829" | "6063088" | "6083225" | "6096080" | "6102948" | "6120503" | "6120506" | "6132472" | "6143033" | "6159211" | "6159215" | "6193756" | "6200347" | "6224607" | "6224631" | "6241769" | "6241771" | "6251140" | "6258125" | "6277149" | "6319257" | "6371989" | "6383221" | "6409766" | "6425772" | "6432140" | "6440142" | "6442814" | "6447547" | "6454806" | "6468311" | "6491724" | "6527773" | "6547823" | "6595998" | "6626905" | "6635086" | "6648895" | "6672019" | "6676703" | "6706067" | "6743255" | "6746484" | "6755841" | "6761739" | "6824564" | "6923814" | "6942698" | "6964687" | "6979353" | "6984245" | "6986788" | "6989031" | "7018416" | "D472634" | "D473650" | "D503801" | "D530423").PN.				

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	2	(spinal and fusion and migration and aperture and (radiopaque or radioopaque) and parallel and marker).clm.	US-PGPUB	OR	OFF	2012/11/28 15:39
L7	2	(spinal and migration and aperture and (radiopaque or radioopaque) and parallel and marker).clm.	US-PGPUB	OR	OFF	2012/11/28 15:39
L8	2	(spinal and migration and (radiopaque or radioopaque) and parallel and marker).clm.	US-PGPUB	OR	OFF	2012/11/28 15:40
L9	3	(spinal and aperture and (radiopaque or radioopaque) and parallel and marker).clm.	US-PGPUB	OR	OFF	2012/11/28 15:40

11/28/2012 3:44:27 PM
C:\Users\sbray1\Documents\EAST\Workspaces\13441092.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Serial No.	: 13/441,092	Examiner	: Unknown
Filed	: April 6, 2012	Conf. No.	: 1088
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 form. Foreign patent documents are enclosed; cited U.S. patents and patent application publications will be provided on request.

This statement is being filed within three months of the filing date of the application or before the receipt of a first Office Action on the merits. Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: October 18, 2012

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60801273.doc

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. 13/441,092
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	4,349,921	9/21/1982	Kuntz			
	2	5,306,309	4/26/1994	Wagner et al.			
	3	5,514,180	5/7/1996	Heggeness et al.			
	4	5,607,424	3/4/1997	Tropiano			
	5	5,645,596	7/8/1997	Kim et al.			
	6	8,021,430	9/20/2011	Michelson			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	7	93/01771	2/4/1993	WIPO				
	8	95/08306	3/30/1995	WIPO			Eng. Abs.	

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document

Examiner Signature /Stuart Bray/	Date Considered 11/28/2012
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 1088

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/441,092	04/06/2012	623	3733	13958-0099003/104US4

APPLICANTS

Matthew Curran, Carlsbad, CA;
Mark Peterson, Medford, CA;

**** CONTINUING DATA ***************************

This application is a CON of 13/440,062 04/05/2012 PAT 8,246,686
which is a CON of 13/079,645 04/04/2011 PAT 8,187,334
which is a CON of 11/093,409 03/29/2005 PAT 7,918,891
which claims benefit of 60/557,536 03/29/2004

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

04/19/2012

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☐ No Verified and Acknowledged /STUART SAMUEL BRAY/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		CA	20	46	2

ADDRESS

FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022
UNITED STATES

TITLE

Systems and Methods for Spinal Fusion

FILING FEE RECEIVED		
2810	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07).

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
13441092	CURRAN ET AL.
Examiner	**Art Unit**
STUART S BRAY	3733

ORIGINAL		INTERNATIONAL CLASSIFICATION														
CLASS	SUBCLASS	CLAIMED									NON-CLAIMED					
623	17.16	A	6	1	F	2 / 44 (2006.01.01)										

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	17		33										
2	2	18	18		34										
3	3	19	19		35										
4	4	20	20		36										
5	5	21	21		37										
6	6	22	22		38										
7	7	23	23		39										
8	8	24	24		40										
9	9	25	25		41										
10	10	26	26		42										
11	11	27	27		43										
12	12		28		44										
13	13		29		45										
14	14		30		46										
15	15		31												
16	16		32												

/STUART S BRAY/ Examiner.Art Unit 3733 (Assistant Examiner)	11/28/2012 (Date)	**Total Claims Allowed:** 27
/ELLEN C HAMMOND/ Primary Examiner, Art Unit 3733 (Primary Examiner)		O.G. Print Claim(s) 1 (Date)
		O.G. Print Figure 18

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13441092	CURRAN ET AL.
	Examiner	Art Unit
	STUART S BRAY	3733

SEARCHED			
Class	Subclass	Date	Examiner
623	17.11-17.19	11/28/2012	SSB

SEARCH NOTES		
Search Notes	Date	Examiner
review pros history from parent cases	11/27/2012	SSB

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
	interference search printout	11/28/2012	SSB

/STUART S BRAY/ Examiner.Art Unit 3733	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13441092	CURRAN ET AL.
	Examiner	Art Unit
	STUART S BRAY	3733

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/27/2012								
1	1	=								
2	2	=								
3	3	=								
4	4	=								
5	5	=								
6	6	=								
7	7	=								
8	8	=								
9	9	=								
10	10	=								
11	11	=								
12	12	=								
13	13	=								
14	14	=								
15	15	=								
16	16	=								
17	17	=								
18	18	=								
19	19	=								
20	20	=								
21	21	=								
22	22	=								
23	23	=								
24	24	=								
25	25	=								
26	26	=								
27	27	=								
	28	-								
	29	-								
	30	-								
	31	-								
	32	-								
	33	-								
	34	-								
	35	-								
	36	-								

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13441092	CURRAN ET AL.
	Examiner	**Art Unit**
	STUART S BRAY	3733

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	11/27/2012								
	37	-								
	38	-								
	39	-								
	40	-								
	41	-								
	42	-								
	43	-								
	44	-								
	45	-								
	46	-								

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)	Applicant Matthew Curran et al.	
(37 CFR §1.98(b))	Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	3,486,505	12/30/1969	Morrison			
	2	3,518,993	7/7/1970	Blake			
	3	3,604,487	9/14/1971	Gilbert			
	4	3,745,995	7/17/1973	Kraus			
	5	3,848,601	11/19/1974	Ma et al.			
	6	3,867,728	2/25/1975	Stubstad et al.			
	7	4,026,304	5/31/1971	Levy			
	8	4,026,305	5/31/1971	Brownlee et al.			
	9	4,454,374	10/8/1985	Jacobson			
	10	4,501,269	2/26/1985	Bagby			
	11	4,646,738	3/3/1987	Trott			
	12	4,657,550	4/14/1987	Daher			
	13	4,743,256	5/10/1988	Brantigan			
	14	4,781,591	11/1/1988	Allen			
	15	4,834,757	5/30/1989	Brantigan			
	16	4,877,020	10/31/1989	Vich			
	17	4,878,915	11/7/1989	Brantigan			
	18	4,932,975	6/12/1990	Main et al.			
	19	4,950,296	8/21/1990	McIntyre			
	20	4,961,740	10/9/1990	Ray et al.			
	21	4,962,766	10/16/1990	Herzon			
	22	5,015,247	5/14/1991	Michelson			
	23	5,026,373	6/25/1991	Ray et al.			
	24	5,047,055	9/10/1991	Bao et al.			
	25	5,055,104	10/8/1991	Ray			
	26	5,062,845	11/5/1991	Kuslich et al.			
	27	5,071,437	12/10/1991	Steffee			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)	Applicant Matthew Curran et al.	
(37 CFR §1.98(b))	Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	28	5,092,572	3/3/1992	Litwak et al.			
	29	5,133,717	7/28/1992	Chopin			
	30	5,133,755	7/28/1992	Brekke			
	31	5,171,278	12/15/1992	Pisharodi			
	32	5,192,327	3/9/1993	Brantigan			
	33	5,217,497	6/8/1993	Mehdian			
	34	5,263,953	11/23/1993	Bagby			
	35	5,269,785	12/14/1993	Bonutti			
	36	5,284,153	2/8/1994	Raymond et al.			
	37	5,290,494	3/1/1994	Coombes et al.			
	38	5,300,076	5/5/1994	Lerich			
	39	5,304,210	4/19/1994	Crook			
	40	5,306,307	4/26/1994	Senter et al.			
	41	5,306,309	4/26/1994	Wagner et al.			
	42	5,322,505	6/21/1994	Krause et al.			
	43	5,334,205	8/2/1994	Cain			
	44	5,336,223	8/9/1994	Rogers			
	45	5,364,400	11/15/1994	Rego, Jr. et al.			
	46	5,395,372	3/7/1995	Holt et al.			
	47	5,397,363	3/14/1995	Gelbard			
	48	5,397,364	3/14/1995	Kozak			
	49	5,405,391	4/11/1995	Henderson et al.			
	50	5,413,602	5/9/1995	Metz-Stavenhagen			
	51	5,425,772	6/20/1995	Brantigan			
	52	5,431,658	7/11/1995	Moskovich			
	53	5,443,514	8/22/1995	Steffee			
	54	5,443,515	8/22/1995	Cohen, et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	55	5,445,639	8/29/1995	Kuslich, et al.			
	56	5,454,811	10/3/1995	Huebner			
	57	5,458,638	10/17/1995	Kuslich et al.			
	58	5,484,403	1/16/1996	Yoakum et al.			
	59	5,484,437	1/16/1996	Michelson			
	60	5,489,307	2/6/1996	Kuslich et al.			
	61	5,489,308	2/6/1996	Kuslich et al.			
	62	5,514,180	5/7/1996	Heggeness et al.			
	63	5,522,879	6/4/1996	Scopelianos			
	64	5,522,899	6/4/1996	Michelson			
	65	5,524,624	6/11/1996	Tepper et al.			
	66	5,527,312	6/18/1996	Ray			
	67	5,534,030	7/9/1996	Navarro et al.			
	68	5,540,688	7/30/1996	Navas			
	69	5,545,222	8/13/1996	Bonutti			
	70	5,562,736	10/8/1996	Ray et al.			
	71	5,565,005	10/15/1996	Erickson et al.			
	72	5,571,190	11/5/1996	Ulrich			
	73	5,571,192	11/5/1996	Schonhoffer			
	74	5,593,409	1/14/1997	Michelson			
	75	5,609,636	3/11/1997	Kohrs et al.			
	76	5,611,800	3/18/1997	Davis et al.			
	77	5,611,810	3/18/1997	Arnold et al.			
	78	5,632,747	5/27/1997	Scarborough et al.			
	79	5,645,598	7/8/1997	Brosnahan et al.			
	80	5,653,761	8/5/1997	Pisharodi			
	81	5,653,762	8/5/1997	Pisharodi			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)	Applicant Matthew Curran et al.	
(37 CFR §1.98(b))	Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	82	5,658,336	8/19/1997	Pisdharodi			
	83	5,658,337	8/19/1997	Kohrs et al.			
	84	5,662,710	9/2/1997	Bonutti			
	85	5,665,122	9/9/1997	Kambin			
	86	5,669,909	9/23/1997	Zdeblick et al.			
	87	5,676,703	10/14/1997	Gelbard			
	88	5,683,394	11/4/1997	Rinner			
	89	5,683,400	11/4/1997	McGuire			
	90	5,683,464	11/4/1997	Wagner et al.			
	91	5,690,629	11/25/1997	Asher et al.			
	92	5,700,264	12/23/1997	Zucherman et al.			
	93	5,700,291	12/23/1997	Kuslich et al.			
	94	5,700,292	12/23/1997	Marguiles			
	95	5,702,449	12/30/1997	McKay			
	96	5,702,451	12/30/1997	Biedermann et al.			
	97	5,702,453	12/30/1997	Rabbe et al.			
	98	5,702,454	12/30/1997	Baumgartner			
	99	5,702,455	12/30/1997	Saggar			
	100	5,703,451	12/30/1997	Yamamichi et al.			
	101	5,707,373	1/13/1998	Sevrain et al.			
	102	5,711,957	1/27/1998	Patat et al.			
	103	5,716,415	2/10/1998	Steffee			
	104	5,720,748	2/24/1998	Kuslich et al.			
	105	5,720,751	2/24/1998	Jackson			
	106	5,728,159	3/17/1998	Stroever et al.			
	107	5,741,253	4/21/1998	Michelson			
	108	5,741,261	4/21/1998	Moskovitz et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	109	5,755,797	5/26/1998	Baumgartner			
	110	5,766,252	6/16/1998	Henry et al.			
	111	5,772,661	6/30/1998	Michelson			
	112	5,775,331	7/7/1998	Raymond et al.			
	113	5,775,797	7/7/1998	Henstra			
	114	5,779,642	7/14/1998	Nightengale			
	115	5,782,830	7/21/1998	Farris			
	116	5,782,919	7/21/1998	Zdeblick et al.			
	117	5,785,710	7/28/1998	Michelson			
	118	5,797,909	8/25/1998	Michelson			
	119	5,800,549	9/1/1998	Bao et al.			
	120	5,800,550	9/1/1998	Sertich			
	121	5,814,084	9/29/1998	Grivas et al.			
	122	5,851,208	12/22/1998	Trott			
	123	5,860,973	10/30/1996	Michelson			
	124	5,865,845	2/2/1999	Thalgott			
	125	5,865,848	2/2/1999	Baker			
	126	5,885,299	3/23/1999	Winslow et al.			
	127	5,888,219	3/30/1999	Bonutti			
	128	5,888,224	3/30/1999	Beckers et al.			
	129	5,893,890	4/13/1999	Pisharodi			
	130	5,904,719	5/18/1999	Errico et al.			
	131	5,910,315	6/8/1999	Stevenson et al.			
	132	5,942,698	8/24/1999	Stevens			
	133	5,954,769	9/21/1999	Rosenlicht			
	134	5,968,098	10/19/1999	Winslow			
	135	5,993,474	11/30/1999	Ouchi			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)	Applicant Matthew Curran et al.	
(37 CFR §1.98(b))	Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	136	6,003,426	12/21/1999	Kobayashi et al.			
	137	6,004,326	12/21/1999	Castro et al.			
	138	6,008,433	12/28/1999	Stone			
	139	6,015,436	1/18/2000	Schunhuffer			
	140	6,033,405	3/7/2000	Winslow et al.			
	141	6,039,761	3/21/2000	Li et al.			
	142	6,042,582	3/28/2000	Ray			
	143	6,045,580	4/4/2000	Scarborough et al.			
	144	6,048,342	4/11/2000	Zucherman et al.			
	145	6,059,829	5/9/2000	Schlapfer et al.			
	146	6,063,088	5/16/2000	Winslow			
	147	6,083,225	7/4/2000	Winslow et al.			
	148	6,096,080	8/1/2000	Nicholson et al.			
	149	6,102,948	8/15/2000	Brosnahan III			
	150	6,120,503	9/19/2000	Michelson			
	151	6,120,506	9/19/2000	Kohrs et al.			
	152	6,132,472	10/17/2000	Bonutti			
	153	6,143,033	11/7/2000	Paul et al.			
	154	6,159,211	12/12/2000	Boriani et al.			
	155	6,159,215	12/12/2000	Urbahns et al.			
	156	6,193,756	2/27/2001	Studer et al.			
	157	6,200,347	3/13/2001	Anderson			
	158	6,224,607	5/1/2001	Michelson			
	159	6,224,631	5/1/2001	Kohrs			
	160	6,241,769	6/5/2001	Nicholson et al.			
	161	6,241,771	6/5/2001	Gresser et al.			
	162	6,251,140	6/26/2001	Marino et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	163	6,258,125	7/10/2001	Paul et al.			
	164	6,277,149	8/21/2001	Boyle et al.			
	165	6,319,257	11/20/2001	Carignan et al.			
	166	6,371,989	4/16/2001	Chauvin et al.			
	167	6,383,221	5/7/2002	Scarborough et al.			
	168	6,409,766	6/25/2002	Brett			
	169	6,425,772	7/30/2002	Bernier et al.			
	170	6,432,140	8/13/2002	Lin			
	171	6,440,142	8/27/2002	Ralph et al.			
	172	6,442,814	9/3/2002	Landry et al.			
	173	6,447,547	9/10/2002	Michelson			
	174	6,454,806	9/24/2002	Cohen et al.			
	175	6,468,311	10/22/2002	Boyd et al.			
	176	6,491,724	12/10/2002	Ferree			
	177	6,527,773	3/4/2003	Lin et al.			
	178	6,547,823	4/15/2004	Scarborough et al.			
	179	6,595,998	7/22/2003	Johnson et al.			
	180	6,626,905	9/30/2003	Schmiel et al.			
	181	6,635,086	10/21/2003	Lin			
	182	6,648,895	11/18/2003	Burkus et al.			
	183	6,672,019	1/6/2004	Wenz			
	184	6,676,703	1/13/2004	Biscup			
	185	6,706,067	3/16/2004	Shimp et al.			
	186	6,743,255	6/1/2004	Ferree			
	187	6,746,484	6/8/2004	Liu et al.			
	188	6,755,841	6/29/2004	Fraser et al.			
	189	6,761,739	7/13/2004	Shepard			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	190	6,824,564	11/30/2004	Crozet			
	191	6,923,814	8/2/2005	Hildebrand et al.			
	192	6,942,698	9/13/2005	Jackson			
	193	6,964,687	11/15/2005	Bernard et al.			
	194	6,979,353	12/27/2005	Bresina			
	195	6,984,245	1/10/2006	McGahan et al.			
	196	6,986,788	1/17/2006	Paul et al.			
	197	6,989,031	1/24/2006	Michelson			
	198	7,018,416	3/28/2006	Hanson et al.			
	199	2002/0058950	5/16/2002	Winterbottom et al.			
	200	2003/0105528	6/5/2003	Shimp et al.			
	201	2003/0139812	7/24/2003	Garcia et al.			
	202	2004/0153155	8/5/2004	Chung et al.			
	203	2005/0197702	9/8/2005	Coppes et al.			
	204	2007/0191945	8/16/2007	Yu et al.			
	205	D472,634	4/1/2003	Anderson			
	206	D473,650	4/22/2003	Anderson			
	207	D503,801	4/5/2005	Jackson			
	208	D530,423	10/17/2006	Miles et al.			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	209	369603	5/23/1990	EPO				
	210	517030	5/19/1992	EPO				
	211	667127	8/16/1995	EPO				
	212	706876	4/17/1996	EPO				
	213	716840	6/19/1996	EPO				

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	214	737448	10/16/1996	EPO				
	215	796593	9/24/1997	EPO				
	216	809974	4/15/1998	EPO				
	217	809975	4/15/1998	EPO				
	218	811356	4/15/1998	EPO				
	219	880938	2/12/1998	EPO				
	220	2015507	1/5/1999	CA				
	221	00/45712	8/10/2000	WIPO				
	222	00/45713	8/10/2000	WIPO				
	223	01/41681	6/14/2001	WIPO				
	224	01/49333	7/12/2001	WIPO				
	225	90/00037	1/11/1990	WIPO				
	226	91/06261	5/16/1992	WIPO				
	227	92/14423	9/3/1992	WIPO				
	228	94/04100	3/3/1994	WIPO				
	229	94/10928	5/26/1994	WIPO				
	230	95/01810	1/19/1995	WIPO				
	231	96/08205	3/21/1996	WIPO				
	232	96/17564	3/13/1996	WIPO				
	233	96/41582	12/27/1996	WIPO				
	234	97/20513	6/12/1997	WIPO				
	235	97/33525	9/18/1997	WIPO				
	236	97/37620	10/16/1997	WIPO				
	237	98/09586	3/12/1998	WIPO				
	238	98/14142	4/9/1998	WIPO				
	239	98/17208	4/30/1998	WIPO				
	240	98/25539	6/18/1998	WIPO				

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))	Applicant Matthew Curran et al.	
	Filing Date April 6, 2012	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	241	99/08627	2/25/1999	WIPO				
	242	99/38461	8/5/1999	WIPO				

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
	243	Alleyne et al., "Current and future approaches to lumbar disc surgery: A literature review," Medscape Orthopedics & Sports Medicine, 1, [www.medscape.com/Medscape/OrthoSportsMed/1997/v01.n11/…/mos3057], (1997)
	244	Benini et al., "Undercutting decompression and posterior fusion with translaminar facet screw fixation in degenerative lumbar spinal stenosis: Technique and results," Neuro-Orthopedics, 17/18, 159-172 (1995)
	245	Kambin et al., "History and current status of percutaneous arthroscopic disc surgery," Spine, 21(24S):57S-61S (1996)
	246	Stein et al., "Percutaneous facet joint fusion: Preliminary experience," Journal of Vascular and Interventional Radiology, 4:69-74 (1993)
	247	Vamvanij et al., "Surgical treatment of internal disc disruption: An outcome study of four fusion techniques," Journal of Spinal Disorders, 11(5):375-382 (1998)
	248	Baulot et al., "Complementary anterior spondylodesis by thoracoscopy. Technical note regarding an observation," Lyon Surg., 90(5):347-351 (1994)
	249	Berry et al., "A morphometric study of human lumbar and selected thoracic vertebrae, study of selected vertebrae," Spine 12(4):362-367 (1996)
	250	Crock, "A Short Practice of Spinal Surgery," Second, revised edition, published by Springer-Verlag/Wein, New York (1993)
	251	Crock, "Anterior Lumbar Interbody Fusion," Clinical Orthopaedics & Related Research, Marshall R. Urist, Editor-in-Chief, J. B. Lippincott Company (1982)
	252	Edeland, "Some additional suggestions for an intervertebral disc prosthesis," Journal of Biomedical Engineering, 7:57-62 (1985)
	253	Kemp, "Anterior fusion of the spine for infective lesions in adults," Journal of Bone & Joint Surgery, 55B(4):715-734 (1973)
	254	NuVasive, Inc., Corrected Final Invalidity Contentions Regarding US 5,860,973, US 6,592,586 and US 6,945,933 filed in the United States District Court, Southern District of California on June 14, 2010 (and 23 appendices)
	255	CoRoent™ Marketing Brochure (9004001 A.0), NuVasive, Inc., 2004, 2 pages
	256	CoRoent™ Marketing Brochure (9004001 C.0), NuVasive, Inc., 2005, 2 pages
	257	CoRoent™ XL & XLR Marketing Brochure (9004225 A.0), NuVasive, Inc., 2005, 2 pages
	258	CoRoent® XL & XLR Marketing Brochure (9004225 B.0), NuVasive, Inc., 2006, 2 pages
	259	CoRoent® XL & XLR Marketing Brochure (9004225 C.0), NuVasive, Inc., 2007, 2 pages

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)	Applicant Matthew Curran et al.	
(37 CFR §1.98(b))	Filing Date April 6, 2012	Group Art Unit Unknown

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	260	CoRoent® XL Marketing Brochure (9500039 A.0), NuVasive, Inc., 2006, 8 pages

Examiner Signature	Date Considered
/Stuart Bray/	11/28/2012

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Disclosure Form (PTO-1449)

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /S.B./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: 3733
Serial No.	: 13/441,092	Examiner	: Unknown
Filed	: April 6, 2012	Conf. No.	: 1088
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

MAIL STOP AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 form. Foreign patent documents are enclosed; cited U.S. patents and patent application publications will be provided on request.

This statement is being filed within three months of the filing date of the application or before the receipt of a first Office Action on the merits. Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: October 18, 2012

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60801273.doc

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. 13/441,092
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	4,349,921	9/21/1982	Kuntz			
	2	5,306,309	4/26/1994	Wagner et al.			
	3	5,514,180	5/7/1996	Heggeness et al.			
	4	5,607,424	3/4/1997	Tropiano			
	5	5,645,596	7/8/1997	Kim et al.			
	6	8,021,430	9/20/2011	Michelson			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	7	93/01771	2/4/1993	WIPO				
	8	95/08306	3/30/1995	WIPO			Eng. Abs.	

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Electronic Acknowledgement Receipt

EFS ID:	14014879
Application Number:	13441092
International Application Number:	
Confirmation Number:	1088
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Customer Number:	26191
Filer:	Michael T. Hawkins/Beth Bauer
Filer Authorized By:	Michael T. Hawkins
Attorney Docket Number:	13958-0099003/104US4
Receipt Date:	18-OCT-2012
Filing Date:	06-APR-2012
Time Stamp:	11:15:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Foreign Reference	WO9301771.pdf	1164717 e322965792aaf54adee568d20ddf3cfbdcc5da5f	no	28

Warnings:	
Information:	

2	Foreign Reference	WO9508306.pdf	1478733 d42b4cc4b4de551f0545d11edb3d8665a1c69bcd	no	46
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	099003ids.pdf	113560 6e5714dd4ad516d2fdcc5cf36ad66615f5767993	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
			Total Files Size (in bytes):	2757010	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 :		(11) International Publication Number:
A61F 2/44	A1	WO 93/01771
		(43) International Publication Date: 4 February 1993 (04.02.93)

(21) International Application Number: PCT/US92/05859

(22) International Filing Date: 22 July 1992 (22.07.92)

(30) Priority data:
733,710 22 July 1991 (22.07.91) US

(71) Applicant: CALCITEK, INC. [US/US]; 2320 Faraday Avenue, Carlsbad, CA 92008 (US).

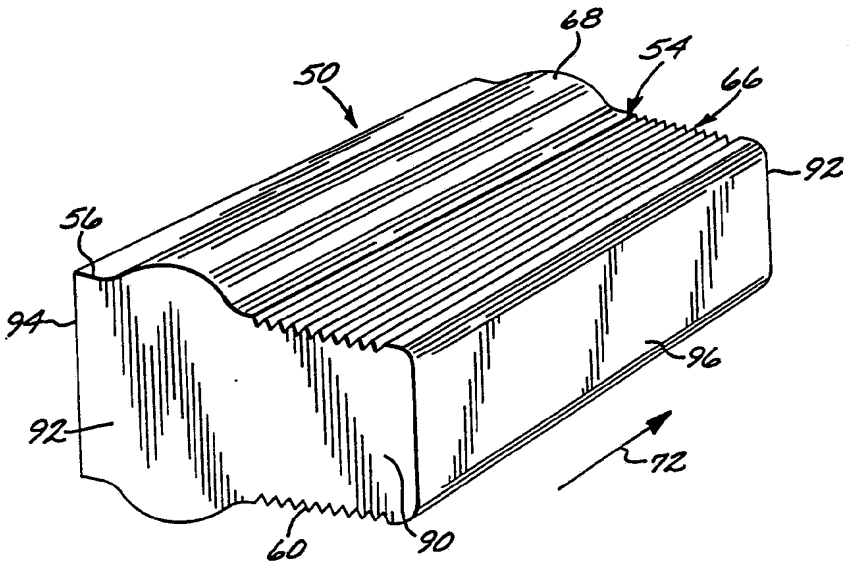
(72) Inventors: SENTER, Howard, J. ; 1760 Beechwood Blvd., Pittsburgh, PA 15217 (US). WAGNER, William, R. ; 1225 Via Ramon, Escondido, CA 92029 (US). LARIVIERE, Richard, L. ; 3515 Ryan Drive, Escondido, CA 92025 (US).

(74) Agents: GARMONG, Gregory, O.; 13126 Silver Saddle Lane, Poway, CA 92064 (US) et al.

(81) Designated States: JP, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, MC, NL, SE).

Published
With international search report.

(54) Title: SPINAL DISK IMPLANT



(57) Abstract

A spinal disk implant (50) comprises a solid body (90) having four sides (54, 54a, 94, 96) and a pair of spaced-apart, opposed bases (92). Each transverse face (54, 54a) has an anterior platform (56) adjacent to the anterior face (94). A posterior ledge (60) is oriented at an insertion angle (I) relative to an opposed posterior ledge (60a) of the opposed transverse face (54a). At least one of the posterior ledges (54, 54a) has a pattern of serrations (66). There is a ridge (68) on at least one of the transverse faces (54, 54a), positioned between the anterior platform (56) and the posterior ledge (60) and extending in the direction perpendicular to the bases (92). The implant (50) is desirably formed at least in part from a material that bonds with natural bone after implant, such as the ceramic hydroxylapatite.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	FI	Finland	ML	Mali
AU	Australia	FR	France	MN	Mongolia
BB	Barbados	GA	Gabon	MR	Mauritania
BE	Belgium	GB	United Kingdom	MW	Malawi
BF	Burkina Faso	GN	Guinea	NL	Netherlands
BG	Bulgaria	GR	Greece	NO	Norway
BJ	Benin	HU	Hungary	PL	Poland
BR	Brazil	IE	Ireland	RO	Romania
CA	Canada	IT	Italy	RU	Russian Federation
CF	Central African Republic	JP	Japan	SD	Sudan
CG	Congo	KP	Democratic People's Republic of Korea	SE	Sweden
CH	Switzerland			SN	Senegal
CI	Côte d'Ivoire	KR	Republic of Korea	SU	Soviet Union
CM	Cameroon	LI	Liechtenstein	TD	Chad
CS	Czechoslovakia	LK	Sri Lanka	TG	Togo
DE	Germany	LU	Luxembourg	US	United States of America
DK	Denmark	MC	Monaco		
ES	Spain	MG	Madagascar		

Description

Spinal Disk Implant

Technical Field

This invention relates to implants surgically placed into the human body, and, more particularly, to an implant placed between two vertebrae to fuse them together.

Background Art

The human spine is composed of a column of 33 bones, termed vertebrae, and their joining structures. The 24 vertebrae nearest the head, collectively termed the presaccral vertebrae, are separate bones capable of individual movement. The bodies of the presaccral vertebrae are generally connected by anterior and posterior longitudinal ligaments and by discs of fibrocartilage, termed intervertebral disks, positioned between opposing faces of adjacent vertebral bodies. These mobile vertebrae may be classified by their position and function into either cervical, thoracic, or lumbar vertebrae. The remaining 9 vertebrae are fused to form the saccrum (5 vertebrae) and the coccyx (4 vertebrae) and are incapable of individual movement. This column of vertebrae and intervertebral disks form a central axis for supporting the load of the head and torso. The vertebral body and the dorsal vertebral arch of each of the 24 mobile presaccral vertebrae enclose an opening, termed the vertebral foramen, through which the spinal cord, a column of nerve tissue which communicates nerve impulses between the brain and the rest of the body, and the spinal nerve roots pass and are protected from damage.

The presaccral vertebrae are normally held in a precise relation to each other by the intervertebral disks, the longitudinal ligaments,

and the musculature of the body. These vertebrae can move relative to adjacent vertebrae in various manners, permitting the head to be turned relative to the body and providing a wide range of flexibility to the spine. The movement between individual pairs of vertebrae is limited to prevent local pressure on the spinal cord or excessive bending of the spinal cord. Such pressure or bending could possibly result in disorders associated with blockage of the nerve impulses traveling along the spinal cord, in turn producing pain, paresthesia, or loss of motor control which must be resolved by removing the causative condition.

The nerve conduction disorders may also be associated with the intervertebral disks or the bones themselves. One such condition is a herniation of the intervertebral disk, in which a small amount of tissue protrudes from the sides of the disk into the foramen to compress the spinal cord. A second common condition involves the development of small bone spurs, termed osteophytes, along the posterior surface of the vertebral body, again impinging on the spinal cord.

Upon identification of the abnormality causing the conduction disorders, surgery may be required to correct the problem if more conservative treatment fails. For those problems associated with the formation of osteophytes or herniations of the intervertebral disk, one such surgical procedure is intervertebral discectomy. In this procedure, the involved vertebral bodies are exposed and the intervertebral disk is removed, thus removing the offending tissue, or providing access for the removal of the bone osteophytes. A second procedure, termed a spinal fusion, may then be required to fix the vertebral bodies together to

prevent movement and maintain the space originally occupied by the intervertebral disk. Although there may result some minor loss of flexibility in the spine, because of the large number of vertebrae the loss of mobility is usually acceptable.

During a spinal fusion following a discectomy, an implant is inserted into the intervertebral space. This intervertebral implant is often a bone graft removed from another portion of the patient's body, termed an autograft. The use of bone taken from the patient's body has the important advantage of avoiding rejection of the implant, but has some shortcomings. There is always a risk in opening a second surgical site for obtaining the implant, which can lead to infection or pain for the patient, and the site of the implant is weakened by the removal of bony material. The bone implant may not be perfectly shaped and placed, leading to slippage or absorption of the implant, or failure of the implant to fuse with the vertebrae.

Other options for a graft source for the implant are bone removed from cadavers, termed an allograft, or from another species, termed a xenograft. In these cases, while there is the benefit of not having a second surgical site as a possible source of infection or pain, there is the increased difficulty with graft rejection and the risk of transmitting communicable diseases.

An alternative approach to using a bone graft is to use a manufactured implant made of a synthetic material that is biologically compatible with the body and the vertebrae. Several compositions and geometries of such implants have been utilized, ranging from simple blocks of material to carefully shaped implants, with varying success. No fully satisfactory implant has been reported. In some instances, the implanting surgery is readily

accomplished, but the results are unsatisfactory due to side effects or dislocation of the implant. In other instances, the implant requires a complex surgical procedure that is difficult to perform and still may not lead to correction of the problem for the reasons indicated.

There is therefore a need for an improved spinal disk implant, which is both readily utilized in a surgical procedure and has a high probability of success without undesirable side effects. The present invention fulfills this need, and further provides related advantages.

Disclosure of Invention

The present invention provides a surgical implant, and its method of use, that is implanted between two vertebrae during a procedure in which the two vertebrae are fused together. The surgical disk implant is readily manufactured of biologically compatible materials in the required shape and with preselected dimensions, so that a properly dimensioned implant is available for the particular vertebrae being fused together. The disk implant of the invention may be readily implanted by established surgical procedures, with minimal chances of surgical difficulty. The geometry of the implant ensures good load bearing and support through the fused vertebrae, and minimizes the likelihood of the implant dislocating relative to the vertebrae either during surgery or during the post-operative fusing process.

In accordance with the invention, a spinal disk implant comprises a solid body having four sides and a pair of spaced-apart, opposed bases. The four sides include spaced-apart, opposed

anterior and posterior faces, and a pair of spaced-apart, opposed transverse faces. Each transverse face has an anterior platform adjacent to the anterior face. The anterior platform is spaced apart from the opposed anterior platform by a maximum anterior platform spacing. A posterior ledge is oriented at an insertion angle relative to an opposed posterior ledge of the opposed transverse face. At least one of the posterior ledges has thereon a pattern of serrations. There is a ridge on at least one of the transverse faces, positioned between the anterior platform and the posterior ledge and extending in the direction perpendicular to the bases. The top of the ridge is spaced apart from the opposed transverse face by an amount greater than the anterior platform spacing. There may be a ridge on one or both transverse faces.

The spinal disk implant is a generally rectangular block of material, which has three distinct regions. The anterior platform on each transverse face are preferably, but not necessarily, parallel to each other and spaced apart by the desired spacing of the vertebrae. The disk implant is surgically implanted so that the anterior cortical bone regions of the vertebrae contact the anterior platforms on the opposing transverse faces, precisely defining the final separation of the vertebrae. This separation is maintained after implantation to a good degree of accuracy, because the majority of the load carried by the vertical spinal column is reacted through the anterior cortical bone of the vertebrae and the anterior platform region of the surgical disk implant.

The posterior ledge is preferably, although not necessarily, tapered inwardly to permit the implant to be inserted between the vertebrae during the surgical procedure. The surface of the

intermediate ridge is preferably smooth for the same reason. The serrations of the posterior ledge, acting together with the intermediate ridge, key the engagement of the implant with each vertebra and prevent dislocation of the implant with respect to the vertebrae. The principal keying engagement is with the cancellous bone region of the vertebrae. Preferably, a relatively small portion of the load borne by the spine is carried through the posterior ledge and the ridge, because their contact with the cancellous bone makes settling in of the implant into the vertebrae a greater concern in this region. The anterior platform and/or the posterior ledge and/or the ridge can be bowed outwardly slightly, to match the shape of the contacted vertebrae more precisely.

The spinal disk implant may alternatively be described in terms of the functional relations of its structural elements. In accordance with this aspect of the invention, a spinal disk implant is placed between two adjacent vertebrae previously originally having a spinal disk therebetween, each vertebra having an anterior cortical bone region and a central cancellous bone region. The disk implant comprises a solid body of substantially the same height as the natural spacing between the anterior cortical bone regions of the two adjacent vertebrae and of equal-to or lesser width than the spinal disk originally between the two vertebrae. The disk implant has means for supportively engaging the cortical bone regions of the adjacent vertebrae, the means for supportively engaging including opposing, spaced apart anterior platforms, and means for achieving keying engagement of the implant with the cancellous bone region of each vertebra to prevent dislocation of the implant with respect to the two vertebrae after implantation of the implant between

the two vertebrae.

The spinal disk implant is preferably made in whole or in part of a ceramic material such as (calcium) hydroxylapatite. Hydroxylapatite ("HA") has a composition and crystal structure similar to that of the mineral phase of natural bone, and has proven biocompatibility with natural bone. Alternatively, the spinal disk implant may be made in whole or in part of a biocompatible orthopedic polymer ("BOP"), or other suitable material. The implant may be made in its entirety of such materials, or may be made of a metal such as a titanium alloy, or a metal covered with a layer of the ceramic such as HA or BOP. Additionally, the spinal disk implant may be made with its surface microporous so that it may be impregnated with therapeutic agents prior to implantation. The implant may then function as a delivery vehicle for the impregnated therapeutic agents, such as antibiotics or bone stimulating factors such as bone morphogenic protein ("BMP") or osteogenin.

The present invention provides an advance in the art of intervertebral disk implants. The implant of the invention may be readily placed surgically, and is designed to provide load bearing capability to the spine while minimizing the likelihood of dislocation of the implant. Other features and advantages of the invention will be apparent from the following more detailed description of the preferred embodiments, taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

Brief Description of Drawings

Figure 1 is a side elevational view of the spine;

Figure 2 is a plan view of a cervical vertebra;

Figure 3 is an elevational view of the spinal disk implant of the invention;

Figure 4 is a perspective view of the spinal disk implant of Figure 3;

Figure 5 is another embodiment of the spinal disk implant;

Figure 6 is a diagrammatic depiction of the surgical procedure for implanting the spinal disk implant of the invention, wherein Figure 6A is a detail of Figure 1, Figure 6B is the same region as Figure 6A after removing the natural intervertebral disk, Figure 6C depicts the formation of a retaining groove in the vertebrae, Figure 6D depicts placement of the spinal implant of Figure 3, Figure 6E depicts insertion of the spinal implant, and Figure 6F depicts the implant in place between the vertebrae;

Figure 7 is a plan view of a cervical vertebra similar to the view of Figure 2, with the properly positioned spinal disk implant indicated in phantom lines;

Figure 8 is a perspective view similar to Figure 4 of another embodiment of the invention;

Figure 9 is an anterior elevational view of another embodiment of the spinal disk implant;

Figure 10 is a posterior elevational view of another embodiment of the spinal disk implant; and

Figure 11 is an anterior elevational view of another embodiment of the spinal disk implant.

Best Mode for Carrying Out The Invention

Figure 1 depicts a human spine 20. The spine 20 is formed from thirty-three individual vertebrae 22, with the 24 uppermost vertebrae in most cases separated by intervertebral disks 24. The spine 20 is described as having an anterior side 26 and a posterior side 28.

Figure 2 depicts one of the vertebrae, here one of the cervical vertebrae 30. (A cervical vertebra has been chosen for illustration, but the other vertebra are similar in relevant aspects and differ primarily in details of geometry.) The vertebra 30 includes a vertebral body region 32, and various processes 34. A cervical disk 36, indicated in phantom lines, overlies the vertebral body region 32 in the natural condition. A central opening through the vertebra 30 is the foramen 38, through which the spinal cord and the spinal nerve roots pass.

The vertebral body region 32 includes two distinct types of natural bone. A layer of cortical bone is found at an anterior edge 42 of the vertebral body region 32. The cortical bone is a hard, dense type of bone, having high strength. A central portion 44 of the vertebral body region 32 is made of cancellous bone, which is a more resilient, weaker, and less dense type of bone.

A spinal disk implant 50, shown in Figures 3 and 4, has a structure designed for implantation between the vertebral body regions of two adjacent vertebrae 22. This spinal disk implant 50 is readily inserted between the vertebrae during a surgical procedure, produces a load-bearing joint in which the majority of the load on the spine 20 is borne through the cortical bone, and is highly resistant to dislocation away from its proper

position between the vertebrae.

The implant 50 is a right-angled prismatic body 90 having four sides and a pair of spaced-apart, opposed parallel bases 92. The four sides include spaced apart anterior and posterior faces 94 and 96, and a pair of spaced-apart, opposed transverse faces 54. In the elevational view of Figure 3, the preferred embodiment of the implant 50 is seen to be bilaterally symmetric about a transverse central plane 52 positioned between the pair of opposing, spaced-apart transverse faces 54.

Each transverse face 54 includes three regions. An anterior platform 56 of each transverse face 54 is parallel (in the illustrated embodiment) to an opposing anterior platform 56a on an opposing transverse face 54a. The two anterior platforms 56 and 56a are separated by a preselected distance 58, which is substantially equal to the natural spacing between the two vertebrae between which the implant 50 is to be placed. This spacing criterion provides the basis for selecting appropriately sized implants 50.

A posterior ledge 60 is tapered inwardly, toward the central plane 52. The angular orientation between the two posterior ledges 60 and 60a is an insertion angle I. An end 62 of the posterior ledge 60 closest to the anterior platform 56 is spaced from a corresponding end 62a of the opposing posterior ledge 60a by a distance 64, which is preferably equal to or less than the distance 58. The angle I (between the two posterior ledges 60 and 60a) is from 0 degrees (no taper) to about 10 degrees, is preferably from about 0.5 to about 10 degrees, and is most preferably about 5.2 +/-1 degrees. The implant is operable with no taper. However, testing has indicated that an insertion angle I of more than about 0.5 degrees imparts a

slight wedge shape to the implant and significantly aids in achieving a smooth surgical insertion of the implant between the vertebrae. If the insertion angle is more than about 10 degrees, the geometry of the implant makes achieving full contact with the vertebrae difficult, and can interfere with satisfactory post-operative fusion.

A pattern of serrations 66, extending perpendicular to the plane of the illustration of Figure 3 and thence in the direction perpendicular to the bases 92, is present on the posterior ledge 60. The serrations are desirably in the form of protrusions outwardly from the posterior ledge 60 extending across a portion of the surface. The serrations may be small teeth, continuous small ridges, bumps, or other equivalently performing structure. The serrations 66 interlock with the cancellous bone of the vertebrae to inhibit dislocation (movement) of the implant 50 relative to the vertebrae after implantation.

On the transverse face 54, positioned between the anterior platform 56 and the posterior ledge 60, is an intermediate ridge 68. The ridge 68 extends perpendicular to the plane of the illustration of Figure 3 and thus perpendicular to the bases 92. The top of the ridge 68 is separated from the top of the ridge 68a on the opposing transverse face 54a by a distance 70. The distance 70 is greater than either the distance 58 or 64. The ridge 68 is preferably smooth, without serrations, to permit it to be surgically implanted in the manner to be described subsequently.

Dislocation (movement) of any spinal implant is a serious concern, and the present implant 50 is designed to avoid such movement. Dislocation of the implant 50 posteriorly toward the foramen 38 is of particular concern, because such dislocation could

result in the implant 50 impinging against the spinal cord. The combination of the ridge 68, the serrations 66, and the slightly wedge-shaped configuration of the implant 50 all aid in avoiding dislocation of the implant 50, and particularly in avoiding dislocation in the direction of the spinal cord.

The implant may be interpreted as being formed by extending a planar section of the shape shown in Figure 3 in the direction perpendicular to the bases 92, sometimes termed a prism generator 72. The result in the case of the preferred embodiment is a right prismatic body that is bilaterally symmetric about the transverse central plane 52, but other forms of the invention may not have the bilateral symmetry about the plane 52.

In the embodiment of Figures 3-5, the structure of each transverse face 54 is a mirror image of the other, symmetric face 54a. Other embodiments of the implant need not be symmetric about a central plane, but can be asymmetric for use in particular procedures. Figure 8 illustrates an asymmetric implant 50' having two asymmetric features. (Features corresponding to those of Figures 3-5 bear the same numbering.) There is only one ridge 68, and the pattern of serrations 66 is found on only one of the transverse faces 54. Also, in this case the serrations 66 are in the form of dimples rather than the form shown in Figures 3-5. These asymmetries need not be used together, and, for example, an operable implant may have only one ridge but serrations on both transverse faces. In another example, there may be one ridge only, on one of the transverse faces, and one set of serrations only, on the same or the opposed transverse face.

Figure 8 also shows another feature not found in the embodiment of Figures 3-5. A pattern of

serrations 100 is formed on at least one of the anterior platforms 56, to provide a gripping action with the cortical bone region of the vertebra. The pattern of serrations 100 can be placed on neither, one, or both of the anterior platforms 56.

Three other embodiments of the invention are shown in Figures 9-11. Figure 9 is an elevational view from the anterior face side of an implant 110, whose construction is similar to that shown in Figure 4, except that one or both of the anterior platforms 56 is bowed outwardly (i.e., of convex shape) relative to the body of the implant. Figure 10 is an elevational view from the posterior face side of an implant 112, whose construction is similar to that shown in Figure 4, except that one or both of the posterior ledges 60 is bowed outwardly (i.e., of convex shape) relative to the body of the implant. Figure 11 is an elevational view of an implant 116, except that one or both of the ridges 68 is bowed outwardly (i.e., of convex shape) relative to the body of the implant. The shape of the bowed anterior platform 56, posterior ledge 60, or ridge 68 is not critical. It may be close to an arc of a circle, or not. The corners are typically rounded slightly to reduce stresses. The shape may be conveniently described as the ratio of the height of the bow above the end points, the dimension a in Figure 9-11, divided by the distance between the bases 92, the dimension b in Figures 9-11. Preferably, for a bowed construction, the degree of bowing as measured by a/b is more than 0 and no greater than about 0.2.

The outward bowing of the anterior platform 56, the posterior ledge 60, or the ridge 68 can be provided to more closely match the available surface of the vertebra, and also reduce concentrated stresses on the surface of the implant that might

cause its premature failure. That is, in some instances it may be desirable to form the exposed face of the vertebra to a slightly concave shape, to which the convex shape of the implant conforms more closely.

The various features discussed in relation to the embodiments of Figures 3-5 and 8-11 may be used in various combinations for particular requirements and procedures, as long as the limitations of the invention as set forth herein are met.

Returning to a discussion of the preferred implant 50 of Figures 3-5 (which is also applicable to the other implants of Figures 8-10), the implant 50 is desirably made from a material that, after surgical implantation, bonds to the natural bone of the adjacent vertebrae to form a rigid structure. The implant is preferably made from a ceramic, most preferably the ceramic calcium hydroxylapatite, having a chemical formula Ca10(PO4)6(OH)2. The use of such materials in implants is known, see for example US Patent 4,863,476, whose disclosure is incorporated by reference. The implant 50 may also be made from a composite material such as the carbon-fiber reinforced plastics disclosed in US Patent 4,904,261, whose disclosure is incorporated by reference. The implant may also be made from a biocompatible orthopedic polymer ("BOP"), such as a copolymer of methylmethacrylate and N-vinylpyrrolidone and calcium gluconate, reinforced with polyamide fibers. Such a material is known in the art, and is described, for example, in G. Lozes et al., "Discectomies of the Lower Cervical spine Using Interbody Biopolymer (BOP) Implants", Acta Neurochir (Wien), vol. 96, pages 88-93 (1989). In some instances, the implant may be made from an uncoated biocompatible metal, such as titanium or a titanium alloy such as Ti-6Al-4V, or a nonreactive metal such

as gold, or such a metal coated with a layer of the ceramic.

Another approach for the construction of the implant is shown in Figure 5. A coated implant 74 is prepared by providing a piece of metal 76, such as titanium or titanium alloy, in the shape of the implant but slightly undersize in all dimensions. A coating 78 of ceramic or polymer, of the types described previously, is applied over the piece of metal 76 to enlarge the implant 74 to the proper final dimensions.

The implant 50 may be made microporous, so that it functions as a delivery vehicle for antibiotics or bone stimulating factors such as bone morphogenic protein or osteogenin, which are introduced into the implant before implantation surgery. In the case of the preferred ceramic hydroxylapatite construction of the implant, the density and/or surface morphology of the ceramic can be varied in the sintering process so that it retains the materials to be delivered. The delivery of chemicals by this approach is known in the art, see, for example, H.A Benghuzzi et al., "The Effects of Density of the Ceramic Delivery Devices on Sustained Release of Androgens in Castrated Rodents," 17th Annual Meeting of the Society for Biomaterials, May 1-5, 1991, page 159.

Any of the implants discussed herein is surgically implanted by a technique indicated schematically in Figure 6. Figure 6A is a detail of Figure 1, illustrating two vertebrae 22 and the intervertebral disk 24 between them. In an anterior discectomy, the disk 24 is first removed, Figure 6B, and the facing surfaces of the vertebrae 22 smoothed. A facing, opposed groove 80 is ground into both the superior vertebra 22a and the inferior vertebra 22b (or only one vertebra if the implant to

be used has only one ridge), using a drill 86 with a burr end, Figure 6C. The groove 80 extends transversely to the vertebrae, in a transverse direction 84 (shown in Figure 2). The groove 80 is positioned to produce a flush placement of the implant, in the manner to be described in relation to Figure 6F. The radius of the groove 80 is substantially the same as the radius of the ridge 68, ensuring a close contact between the ridge 68 and the inside of the groove 80.

The implant of the geometry discussed herein is selected with the spacing 58 about that of the spacing between the anterior edges 42 of the vertebrae 22. The implant 50 is placed adjacent the vertebrae 22a and 22b, with the tapered end of the posterior ledge 60 inserted between the vertebrae 22a and 22b as shown in Figures 6D and 6E. The implant 50 is then tapped with a surgical hammer on the exposed end to drive the implant between the vertebrae. The spine 20 is typically distended slightly during this final stage of insertion to ease the insertion. Figure 6F illustrates the final placement of the implant 50 or 74 between the vertebrae 22a and 22b.

Figure 7 shows a plan view of the implant 50 properly positioned with respect to the vertebra 22. The implant 50 is positioned in the anterior region of the vertebral body 32, well away from the foramen 38 to avoid contact of the implant with the spinal cord. The lateral width 82 of the implant 50 or 74 is less than or equal to that of the vertebral body region 32 of the vertebra 22. The anterior platform 56 is aligned with the anterior edge 42 of the vertebra 22, which is made of hard cortical bone. The primary reaction path for the largest spinal loading is through the anterior edge regions of the vertebrae and the anterior platform 56 of the

implant. The ridge 68, posterior ledge 60, and pattern of serrations 66 on the posterior ledge 60 are aligned primarily with the central portion 44 of the vertebra 22, which is made of softer and more resilient cancellous bone. The ridge 68 and the serrations 66 tend to lock the implant 50 or 74 into place and prevent dislocation of the implant, by a keying action. The ridge 68 keys with the groove 80, while the pattern of serrations 66 tends to interlock with the cancellous bone. The serrations also increase the bonding area during subsequent interaction between the natural bone of the vertebra and the implant material.

The present approach provides an implant and process or technique for its use. The implant is of a design and material of construction selected to improve the fusion of the adjacent vertebrae, and to permit the implant to be readily implanted. Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.

Claims

1. A spinal disk implant, comprising a solid body having four sides and a pair of spaced-apart, opposed bases, the four sides including spaced-apart, opposed anterior and posterior faces, and

a pair of spaced-apart, opposed transverse faces, each transverse face having

an anterior platform adjacent to the anterior face, the anterior platform being spaced apart from an opposed anterior platform by a maximum anterior platform spacing, and

a posterior ledge oriented at an insertion angle relative to an opposed posterior ledge of an opposed transverse face, at least one of the posterior ledges having thereon a pattern of serrations; and

a ridge on at least one of the transverse faces positioned between the anterior platform and the posterior ledge and extending in a direction perpendicular to the bases, a top of the ridge being spaced apart from the opposed transverse face by an amount greater than the anterior platform spacing.

2. The implant of claim 1, wherein the implant is made of a material that bonds to natural bone.

3. The implant of claim 1, wherein the implant is made at least in part of a biocompatible orthopedic polymer material, a ceramic or a ceramic-coated metal.

4. The implant of claim 3, wherein the ceramic is hydroxylapatite.

5. The implant of claim 3, wherein the metal is selected from the group consisting of titanium and a titanium alloy.

6. The implant of claim 1, wherein the implant is microporous.

7. The implant of claim 1, wherein the insertion angle is from 0 to about 10 degrees.

8. The implant of claim 1, further including a pattern of serrations on at least one of the anterior platforms, the pattern of serrations extending in a direction perpendicular to the bases.

9. The implant of claim 1, wherein at least one of the anterior platforms, the posterior platforms, or the ridge is bowed outwardly when viewed perpendicular to the anterior face.

10. The implant of claim 1, wherein the ridge is bowed outwardly when viewed perpendicular to the anterior face.

11. A process for implanting a spinal implant, comprising the steps of:

providing a spinal implant comprising a solid body having four sides and a pair of spaced-apart, opposed bases, the four sides including spaced-apart, opposed anterior and posterior faces, and a pair of spaced-apart, opposed transverse faces, each transverse face having an anterior platform adjacent to the anterior face, the anterior platform being spaced apart from the opposed anterior platform by a maximum anterior platform spacing, and a posterior ledge oriented at an insertion angle relative to an opposed posterior ledge of the opposed transverse face, at least one of the posterior ledges having thereon a pattern of serrations, and a ridge on at least one of the transverse faces positioned between the anterior platform and the posterior ledge and extending in the direction perpendicular to the bases, the top

of the ridge being spaced apart from the opposed transverse face by an amount greater than the anterior platform spacing; and

placing the spinal implant between two vertebrae of a person's body, with the ridge of the spinal implant lying transverse to the vertebrae and the anterior platform placed between the anterior cortical bone regions of the vertebrae.

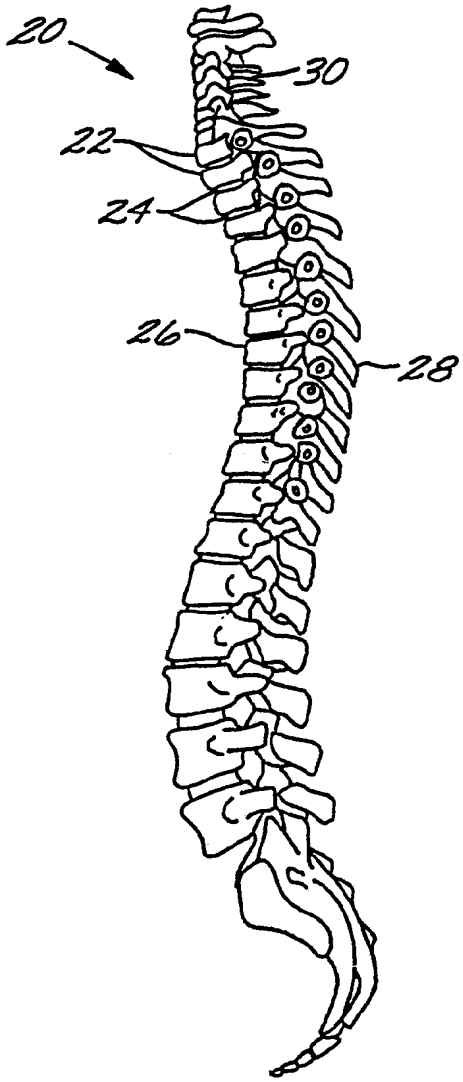


FIG. 1

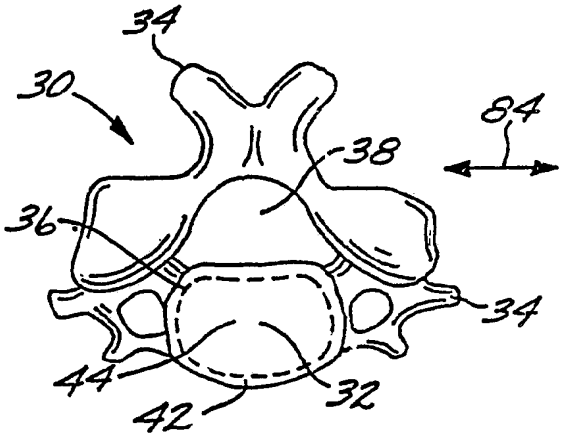


FIG. 2

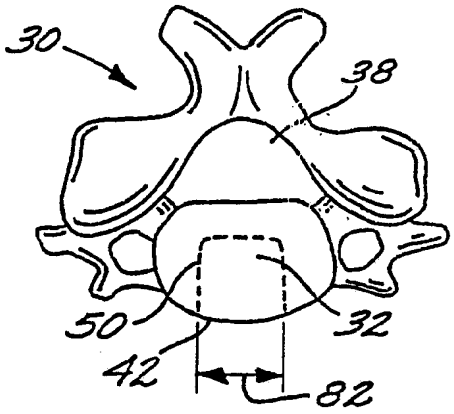
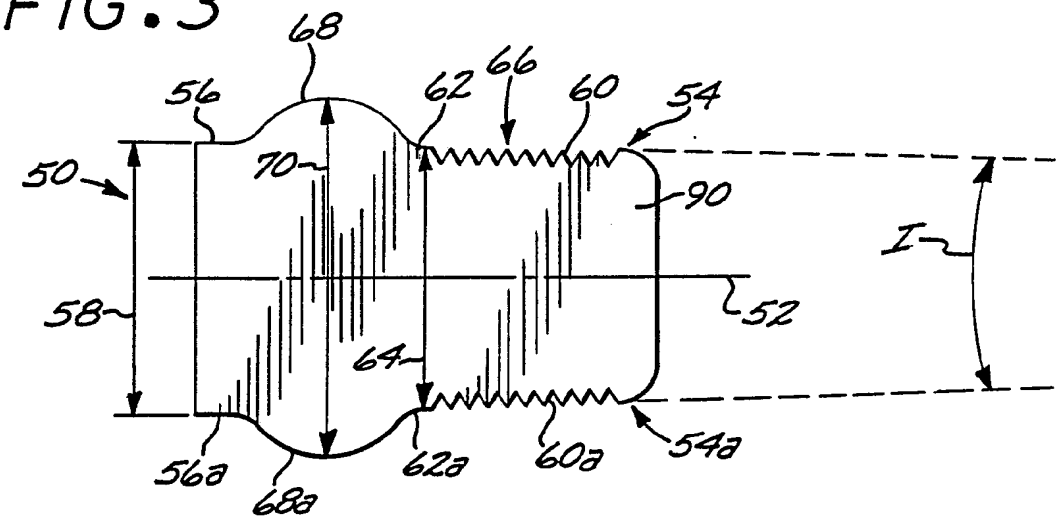


FIG. 7

SUBSTITUTE SHEET

FIG. 3



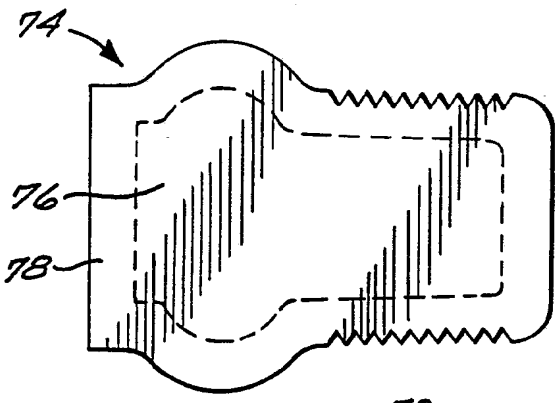


FIG. 5

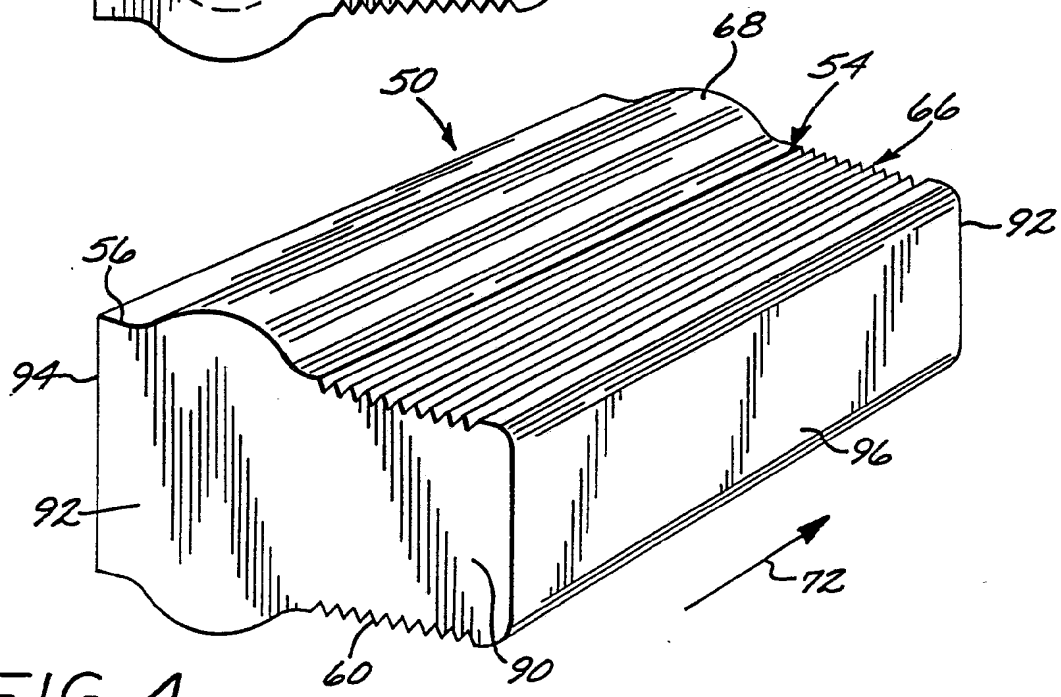


FIG. 4

SUBSTITUTE SHEET

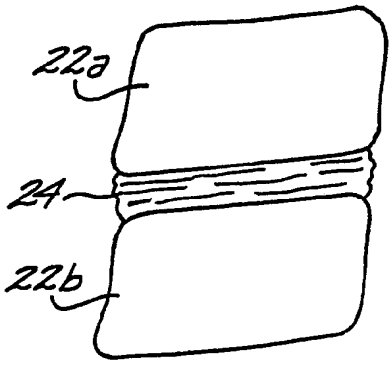


FIG.6A

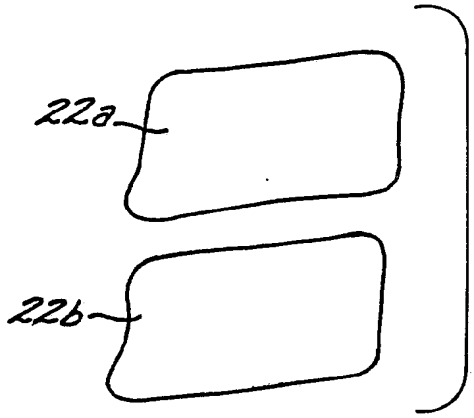


FIG.6B

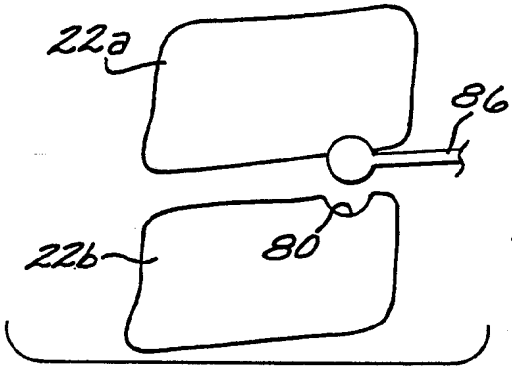


FIG.6C

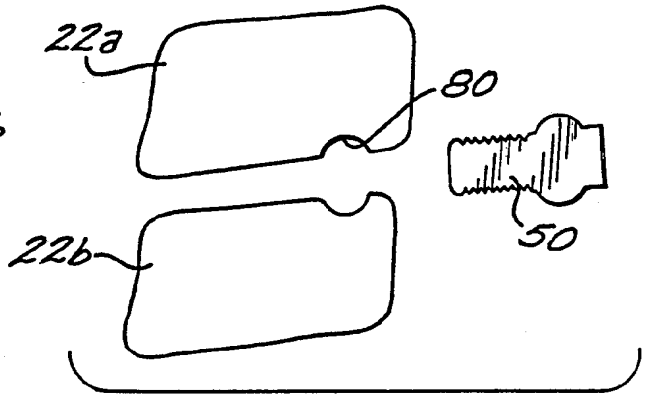


FIG.6D

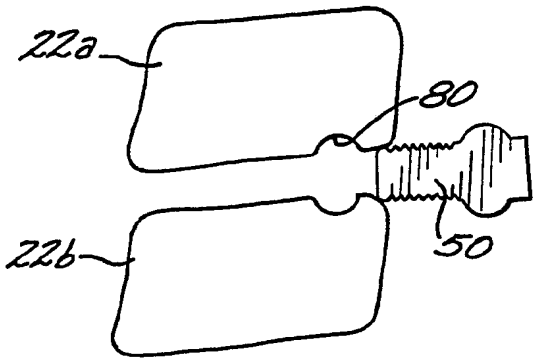


FIG.6E

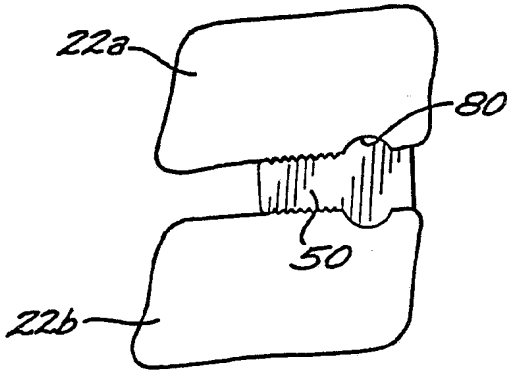


FIG.6F

FIG. 8

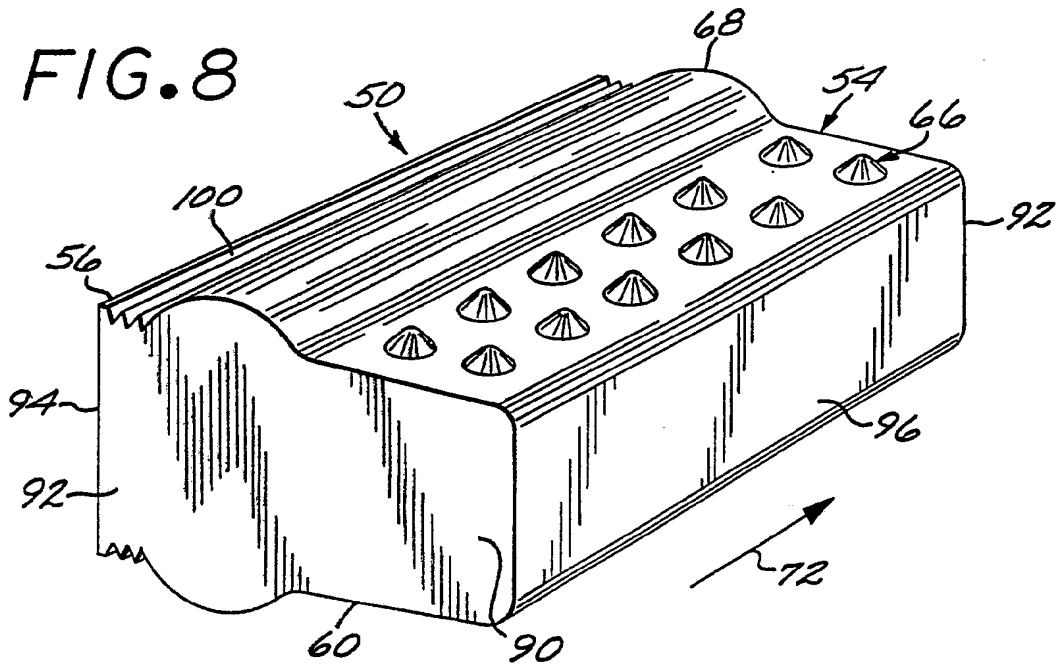


FIG. 9

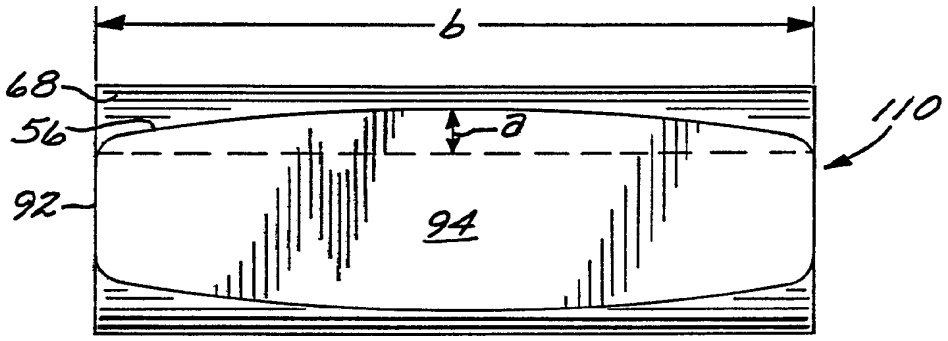
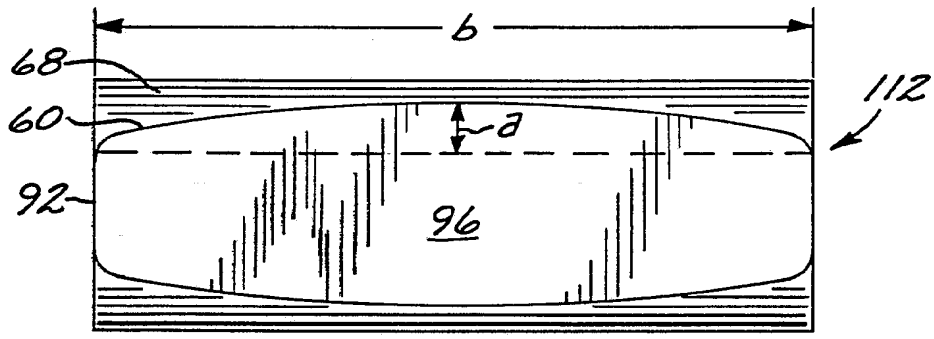


FIG. 10



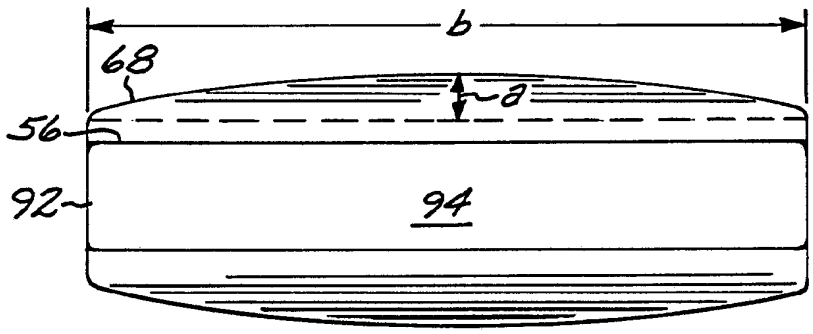


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US92/05859

A. CLASSIFICATION OF SUBJECT MATTER
IPC(5) :A61F 2/44
US CL :623/17
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. :

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	EP, A, 0042271 (Kuntz) 23 December 1981, entire document.	1 & 9-11 --- 2-8
X --- Y	WO, A, 91/05521 (Gross et al.) 02 May 1991. entire document	1 & 9-11 --- 2-8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be part of particular relevance
"E" earlier document published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
21 AUGUST 1992

Date of mailing of the international search report
16 OCT 1992

Name and mailing address of the ISA/
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231
Facsimile No. NOT APPLICABLE

Authorized officer
ELIZABETH BURKE
Telephone No. (703) 308-2996

Form PCT/ISA/210 (second sheet)(July 1992)★

PCT WELTORGANISATION FÜR GEISTIGES EIGENTUM
Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

(51) Internationale Patentklassifikation 6 :
A61F 2/44, 2/46

A1

(11) Internationale Veröffentlichungsnummer: WO 95/08306

(43) Internationales Veröffentlichungsdatum: 30. März 1995 (30.03.95)

(21) Internationales Aktenzeichen: PCT/CH94/00184

(22) Internationales Anmeldedatum: 20. September 1994 (20.09.94)

(30) Prioritätsdaten:
9300982 21. September 1993 (21.09.93) BE

(71) Anmelder *(für alle Bestimmungsstaaten ausser US)*: SYNTHES AG, CHUR [CH/CH]; Grabenstrasse 15, CH-7002 Chur (CH).

(72) Erfinder; und
(75) Erfinder/Anmelder *(nur für US)*: BECKERS, Louis, François, Charles [BE/BE]; Peulisbaan 22, B-2820 Rijmenam (BE). SCHLÄPFER, Johannes, Fridolin [CH/CH]; Leimen, CH-8750 Glarus (CH).

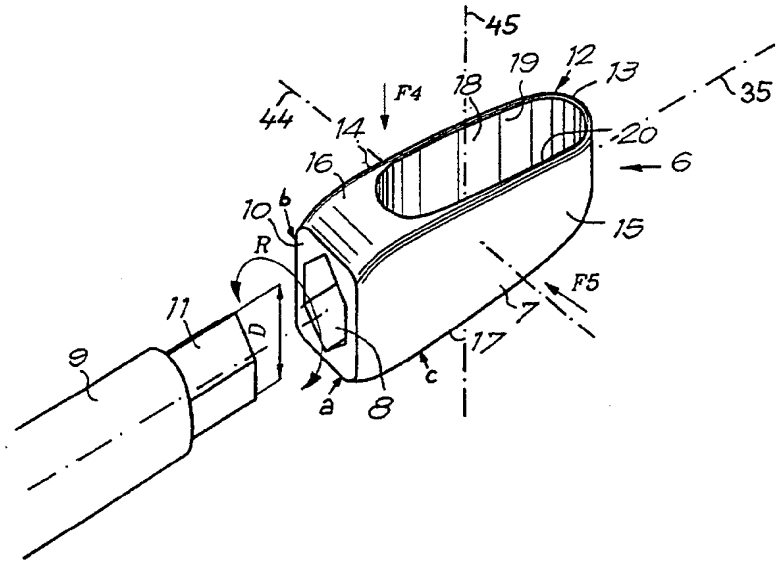
(74) Anwalt: LUSUARDI, Werther, G.; Dr. Lusuardi AG, Kreuzbühlstrasse 8, CH-8008 Zürich (CH).

(81) Bestimmungsstaaten: CA, JP, US, europäisches Patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Veröffentlicht
Mit internationalem Recherchenbericht.

(54) Title: IMPLANT FOR THE INTERVERTEBRAL SPACE

(54) Bezeichnung: IMPLANTAT FÜR DEN ZWISCHENWIRBELRAUM



(57) Abstract

The implant (6) for the intervertebral space (25) consists of a substantially cuboid body (7) with a device (8, 26) for gripping with a tool (9).

(57) Zusammenfassung

Das Implantat (6) für den Zwischenwirbelraum (25) besteht aus einem im wesentlichen quaderförmigen Körper (7) mit einer Vorrichtung (8, 26) zur Ergreifung mit einem Werkzeug (9).

LEDIGLICH ZUR INFORMATION

Codes zur Identifizierung von PCT-Vertragsstaaten auf den Kopfbögen der Schriften, die internationale Anmeldungen gemäss dem PCT veröffentlichen.

AT	Österreich	**GA**	Gabon	**MR**	Mauretanien
AU	Australien	**GB**	Vereinigtes Königreich	**MW**	Malawi
BB	Barbados	**GE**	Georgien	**NE**	Niger
BE	Belgien	**GN**	Guinea	**NL**	Niederlande
BF	Burkina Faso	**GR**	Griechenland	**NO**	Norwegen
BG	Bulgarien	**HU**	Ungarn	**NZ**	Neuseeland
BJ	Benin	**IE**	Irland	**PL**	Polen
BR	Brasilien	**IT**	Italien	**PT**	Portugal
BY	Belarus	**JP**	Japan	**RO**	Rumänien
CA	Kanada	**KE**	Kenya	**RU**	Russische Föderation
CF	Zentrale Afrikanische Republik	**KG**	Kirgisistan	**SD**	Sudan
CG	Kongo	**KP**	Demokratische Volksrepublik Korea	**SE**	Schweden
CH	Schweiz	**KR**	Republik Korea	**SI**	Slowenien
CI	Côte d'Ivoire	**KZ**	Kasachstan	**SK**	Slowakei
CM	Kamerun	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Tschad
CS	Tschechoslowakei	**LU**	Luxemburg	**TG**	Togo
CZ	Tschechische Republik	**LV**	Lettland	**TJ**	Tadschikistan
DE	Deutschland	**MC**	Monaco	**TT**	Trinidad und Tobago
DK	Dänemark	**MD**	Republik Moldau	**UA**	Ukraine
ES	Spanien	**MG**	Madagaskar	**US**	Vereinigte Staaten von Amerika
FI	Finnland	**ML**	Mali	**UZ**	Usbekistan
FR	Frankreich	**MN**	Mongolei	**VN**	Vietnam

Implantat für den Zwischenwirbelraum

Die Erfindung bezieht sich auf ein Implantat für den Zwischenwirbelraum gemäss dem Oberbegriff des Patentanspruchs 1. Solche Implantate sind hauptsächlich dazu bestimmt, Knochenbrücken an Wirbelkörpern zu fördern und welche nach der Resektion von Diskus bzw. Zwischenwirbelscheibe zwischen Wirbelkörper und Rückgrat angebracht werden.

Es ist bekannt, dass bei Beschädigung einer Zwischenwirbelscheibe diese entfernt und der entstandene Raum mit kortiko-spongiösem Knochen gefüllt werden kann.

Bei dieser Methode werden die Wirbelkörper zuerst weitmöglichst mit Hilfe von Spreizer auseinandergedehnt. Eine Spezialtechnik besteht darin, dass keilförmige Elemente - sogenannte Dilatatoren - zwischen die beiden Wirbelkörper eingeführt werden, um sie schrittweise auseinander zu dehnen. Dabei wird abwechselnd links und rechts jeweils ein Dilatator mit einem 1 mm grösseren Durchmesser von posterior angebracht. Nachdem die grösstmögliche Dehnung erreicht ist, werden die Dilatatoren durch den obengenannten kortiko-spongiösen Knochen ersetzt.

Diese bekannte Technik hat den Nachteil, dass der Knochen schwierig zu handhaben und in die richtige Position zu bringen ist, wobei Korrekturen nahezu ausgeschlossen sind. Ein weiterer Nachteil dieser Technik besteht darin, dass im Zwischenwirbelraum eine rechteckige oder zylinderförmige Aussparung ausgestochen und/oder ausgefräst werden muss, um die Knochenpfropfen zwischen die ursprünglich konkaven Seiten der angrenzenden Wirbelkörper bringen zu können, was umständlich ist und zusätzlich zur Beschädigung der Wirbelkörper führt.

Hier will die Erfindung Abhilfe schaffen. Der Erfindung liegt die Aufgabe zugrunde, ein Implantat für den Zwischenwirbelraum zu schaffen, welches aufgrund seiner spezifischen Form und der Einbringungsart eine äusserst stabile Verklemmung zwischen den Wirbelkörpern ermöglicht, ohne dass dabei die Oberfläche der knöchernen Deckplatte der Wirbelkörper beschädigt wird.
Eine weitere Aufgabe der Erfindung liegt in der Schaffung eines Implantates für den Zwischenwirbelraum zu schaffen, welches ohne Verwendung von Dilatatoren eingebracht werden kann.

Die Erfindung löst die gestellte Aufgabe mit einem Implantat für den Zwischenwirbelraum, welches die Merkmale des Anspruchs 1 aufweist.
Weitere vorteilhafte Ausgestaltungen der Erfindung sind in den abhängigen Ansprüchen gekennzeichnet.

Da das erfindungsgemässe Implantat mit einer Vorrichtung zur Ergreifung durch ein Werkzeug versehen ist, kann relativ mühelos eine externe Kraft darauf ausgeübt werden, die es ermöglicht, das Implantat nach der Anbringung zu bewegen oder es eventuell wieder herauszunehmen.

Die Vorrichtungen zur Ergreifung durch ein Werkzeug können als Ansatzpunkte derart gestaltet sein, dass eine Rotationskraft und/oder eine axiale Kraft und/oder eine seitliche Kraft auf das Implantat ausgeübt werden kann.

Bei einer vorteilhaften Ausführungsform sind diese Ansatzpunkte zumindest so gestaltet, dass sie die Ausübung einer Rotationskraft auf das Implantat ermöglichen, wobei das Implantat dabei unterschiedliche Querschnittslängen aufweisen muss, damit es durch die Drehung des Implantats mehr oder weniger eingeklemmt wird oder selbst in einer Position völlig lose sitzen und somit mühelos zwischen die Wirbelkörper gebracht werden kann und in einer anderen Position die erforderliche Einklemmung aufweist.

Bei einer anderen Ausführungsform weist der Körper des Implantats in einer Ebene ein linsenförmig zugeschnittenes Profil auf, das grösstenteils mit der bikonkaven Form der sagittalen Schnittfläche des Zwischenwirbelraums übereinstimmt, wobei derselbe Körper in der anderen Ebene hauptsächlich parallele, flache oder nur leicht gebogene Seiten und ein abgerundetes Ende aufweist, damit er in den Zwischenwirbelraum

gedrückt werden kann, ohne eine Aussparung in den Wirbelkörper stechen zu müssen und ohne die Umrandung des Wirbelkörpers zu beschädigen.

Das Implantat ist vorzugsweise hohl, damit es mit Knochenmaterial gefüllt werden kann.

Um die Erfindung besser zu verdeutlichen, werden nachstehend einige Beispiele vorteilhafter Ausführungsformen - auf die sich die Erfindung jedoch nicht beschränkt - mit Verweisen nach den entsprechenden Zeichnungen beschrieben.

Es zeigen:

Fig. 1 eine schematische Darstellung zweier Wirbelkörper, die mit zwei Dilatatoren auseinandergedehnt sind;

Fig. 2 einen Querschnitt entlang der Linie II-II in Fig. 1, wobei ein Dilatator durch einen kleinen Knochenquader ersetzt ist;

Fig. 3 eine perspektivische Darstellung eines erfindungsgemässen Implantats mit einem dazu verwendbaren Werkzeug;

Fig. 4 eine Aufsicht in Richtung des Pfeiles F4 der Fig. 3;

Fig. 5 eine Aufsicht in Richtung des Pfeiles F5 der Fig. 3;

Fig. 6 einen Querschnitt entlang der Linie VI-VI in Fig. 4;

Fig. 7 eine schematische Darstellung des Implantats nach Fig. 3 nach erfolgter Einführung zwischen zwei Wirbelkörpern;

Fig. 8 eine schematische Darstellung des Implantats nach Fig. 3 nach erfolgter Einführung zwischen zwei Wirbelkörpern und Rotation um 90°;

Fig. 9 eine schematische Darstellung einer weiteren Ausführungsform der Erfindung mit einem dazu verwendbaren Werkzeug;

Fig. 10 einen Querschnitt durch ein erfindungsgemässes Implantat mit einseitiger Abrundung;

Fig. 11 einen Querschnitt durch ein erfindungsgemässes Implantat mit doppelseitiger Abrundung über die Diagonale;

Fig. 12 einen Querschnitt durch eine paarige Anordnung zweier spiegelsymmetrischer erfindungsgemässer Implantate;

Fig. 13 eine schematische Darstellung paarig angeordneter, spiegelsymmetrischer erfindungsgemässer Implantate mit deren Hilfe der Bandscheibenraum distrahiert werden kann;

Fig. 14 eine schematische Darstellung von zwei flach im Bandscheibenraum liegenden Implantaten, die über ein drittes Implantat anterior verbunden sind, vor und nach der Rotation in die Konkavität der Deckplatten der angrenzenden Wirbelkörper;

Fig. 15 eine perspektivische Darstellung eines erfindungsgemässen Implantates mit einem Längsschnitt zur Aufnahme von spongiösen Knochenmaterial oder osteokonduktives bzw. osteoinduktives Material und einer Querperforation der Wände für das Knochenwachstum;

Fig. 16 eine perspektivische Darstellung eines erfindungsgemässen Implantates mit längsstrukturierten Kontaktflächen zwischen Implantat und Knochen, wobei die Längsstrukturierung derart gestaltet ist, dass das Rotieren des Implantates in die Konkavität der Deckplatten nur in einer Richtung möglich ist;

Fig. 17 eine perspektivische Darstellung eines erfindungsgemässen Implantates mit querstrukturierten Kontaktflächen zwischen Implantat und Knochen, wobei die Querstrukturierung derart gestaltet ist, dass die eine Strukturierung eine Translation in anteriorer und die andere eine Translation in posteriorer Richtung verhindert. Die Verhinderung der Translation in anteriorer Richtung führt zu einer Entlastung des verbliebenen Annulus, der nach jüngster Forschung innerviert ist und damit auf anterioren Druck mit Schmerzsignalen reagieren könnte.

Die Erfindung und Weiterbildungen der Erfindung werden im folgenden anhand der teilweise schematischen Darstellungen mehrerer Ausführungsbeispiele noch näher erläutert.

Anhand der Figuren 1 und 2 wird vorerst die bekannte Technik beschrieben.
Wenn eine Zwischenwirbelscheibe entnommen wird, werden, wie in Fig. 1 dargestellt, die zwei angrenzenden Wirbelkörper 1 und 2 soweit als möglich auseinandergedehnt, um die Dilatatoren 3 anbringen zu können. Nachdem die Wirbelkörper 1 und 2 sich im gewünschten Abstand befinden, werden die Dilatatoren 3, wie in Fig. 2 dargestellt, durch die Knochenpfropfen 4 ersetzt, die nach dem Ausstechen einer Aussparung in den Wirbelkörpern 1 und 2 mit einem Andruckelement 5 zwischen die Wirbelkörper gepfropft werden. Es ist ersichtlich, dass diese Technik die in der Beschreibungseinleitung genannten Nachteile aufweist.

Das in den Fig. 3 - 6 dargestellte, erfindungsgemässe Implantat, überwindet nun diese Nachteile und erlaubt, dass es schnell eingebracht und zusätzlich, falls erforderlich, unter Kraftanwendung zwischen zwei Wirbelkörpern geklemmt werden kann. Das Implantat 6 besteht im wesentlichen aus einem Körper 7 mit einer Vorrichtung 8 zur Ergreifung durch ein Werkzeug 9.
Die Vorrichtungen 8 zur Ergreifung durch eine Werkzeug 9 sind so gestaltet, dass eine Rotationskraft, eine axiale Kraft und/oder eine seitliche Kraft auf das Implantat 6 ausgeübt werden kann, vorzugsweise in allen Richtungen.

Vorteilhafterweise sind, wie in den Fig. 3 - 6 dargestellt, die Vorrichtungen 8 derart gestaltet, dass darauf mindestens eine Rotationskraft R ausgeübt werden kann und in Verbindung damit das Implantat so gestaltet ist, dass es verschiedene Durchmesser oder Querschnittslängen aufweist, damit durch Drehung an den genannten Vorrichtungen 8 der Körper 7 des Implantats 6 mit grossen oder kleinen Abständen zwischen die Wirbelkörper 1 und 2 gebracht werden kann.

Die Vorrichtungen 8 bestehen bei der Ausführungsform nach den Fig. 3 - 6 aus einer in der Innenseite des Körpers 7 angebrachten Aussparung am hinteren axialen Ende 10 des Implantats 6. Die Aussparung ermöglicht es, ein Werkzeug 9 einzuführen. Wie dargestellt, kann die Aussparung aus einer axialen mehrkantigen, z.B. sechskantigen Öffnung bestehen, wobei hierbei ein Werkzeug 9 verwendet werden muss, das mit einem sechskantigen Ende 11 in der Form eines Imbusschlüssels versehen ist.

Die Verwendung einer in der Innenseite angebrachten Öffnung für das Einführen eines Werkzeugs 9, also die vorgenannte Aussparung, bietet den Vorteil, dass am Implantat 6 keine störenden Elemente hervorstehen.

Der Körper 7 weist vorzugsweise eine besondere Form mit einem oder mehreren der hiernach aufgeführten Kennzeichen auf:

- das vordere axiale Ende 12 des Körpers 7 sollte abgerundet oder keilförmig ausgebildet sein, da dies die Einführung in den Zwischenwirbelraum 25 erleichtert;
- die Abrundung 13 am vorderen axialen Ende 12 des Körpers 7 verläuft vorzugsweise nur entlang einem Querschnitt parallel zum kleinsten Durchmesser D1 - siehe Fig. 4 - und nicht nach dem dazu im rechten Winkel stehenden Querschnitt, wie in Fig. 5 dargestellt.
- die Seiten 14 und 15, durch die der kleinste Durchmesser verläuft, sind mit Ausnahme der Abrundung 13 vorzugsweise parallel und flach;
- bei Seitenansicht weist der Körper 7 wie in Fig. 5 dargestellt ein abgekantetes, linsenförmiges Profil auf, also ein Profil, das mit der natürlichen bikonkaven Form übereinstimmt, die ein Zwischenwirbelraum in der sagittalen Schnittfläche aufweist. Die Übergänge zwischen den Seiten 14 und 15 und die Seiten 16 und 17 sind abgerundet;
- die Seiten 16 und 17 sind vorzugsweise entlang einem Querschnitt mindestens teilweise und besser vollkommen flach; die Tatsache, dass die Seiten 17 und 18 in Querrichtung mindestens teilweise flach sind, bietet den Vorteil, dass sie in eingeklemmtem Zustand Kippstabilität bieten;
- der Körper 7 weist eine oder mehrere Öffnungen oder Aussparungen für die Füllung mit Pfropfmaterial auf; gemäss den Fig. 3 bis 6 wird eine durchgehende, sich von Seite 16 bis Seite 17 erstreckende Öffnung 18 bevorzugt; die Öffnung 18

besteht vorzugsweise aus einem länglichen Schlitz mit den parallelen Wänden 19 und 20; die vorgenannte Aussparung 8 kann sich dabei auf Wunsch bis in die Öffnung 18 erstrecken.

- Das Implantat wird vorzugsweise aus Titan oder einer für Implantate geeigneten Titanlegierung gefertigt.
- Die Öffnung 18 oder der Schlitz im Körper 7 des Implantats der Fig. 3 kann angebracht werden, wenn mehrere vertikale Bohrungen im Körper 7 gemacht und die Zwischenwände danach weggefräst werden;
- vorzugsweise weist das Implantat 6, und genauer gesagt der Körper 7 eine Länge L von ungefähr 22 mm auf und wird ausgehöhlt, bis ungefähr auf eine Wanddicke W1 von 1,5 mm bestehen bleibt. Das hintere axiale Ende 10 mit der Vorrichtung 8 weist vorzugsweise einen Mindestdurchmesser von 6 mm auf; um zu erreichen, dass die Mindestwanddicke W2 an der Stelle der Vorrichtung 8 und die Dicke D des Werkzeugs grösstmöglich ist, wird die vorgenannte Aussparung so angebracht, dass die Richtung ihres grössten Durchmessers mit der des grössten Durchmessers des Körpers 7 übereinstimmt.

Anhand der Fig. 7 und 8 wird nun nachstehend die Verwendung und das Anbringen des Implantats 6 zwischen zwei Wirbelkörpern 1 und 2 beschrieben.

In Fig. 7 wird dargestellt, wie das Implantat 6 auf dem Ende eines einem Schlüssel ähnelnden entsprechenden Werkzeugs 9 zwischen den beiden Wirbelkörpern 1 und 2 angebracht werden kann. Das Implantat 6 wird dabei mit dem kleinsten Durchmesser

D1 zwischen die zueinander gerichteten Seiten 22 und 23 der Wirbelkörper 1 und 2 eingeführt. Dabei ist es bereits mit Knochenpfropfen 24 gefüllt. Um das Implantat 6 danach passend oder klemmend zwischen den Wirbelkörpern 1 und 2 anzubringen, wird der Schlüssel 21 des Werkzeugs 9 um 90° gedreht, damit, nach Entfernung des Werkzeugs 9, ein wie in Fig. 8 dargestellter Zustand erreicht wird. Da die Knochenpfropfen 24 an die Wirbelkörper 1 und 2 anschliessen, kann das Implantat 6 durch Verwachsung der Knochenpfropfen 24 festen Halt erreichen.

Das Implantat 6 kann ohne besondere Hilfsmittel eingebracht werden, der Vorgang kann jedoch vereinfacht werden, wenn die Wirbel vorher mittels ovaler Dilatatoren an der linken und rechten Seite auseinandergedehnt und so lange in dieser Position beibehalten werden, bis an der anderen Seite ein Implantat 6 eingeklemmt ist. Da die Anwesenheit des Implantats 6 dann wiederum verhindert, dass sich die Wirbelflächen erneut zusammenschieben, kann jetzt der letzte Dilatator entfernt und eventuell durch ein zweites Implantat 6 ersetzt werden. Normalerweise müssen zwei Implantate 6 angebracht werden.

Aus den Fig. 7 und 8 wird deutlich ersichtlich, dass bei der Verwendung eines drehbaren Implantats 6 mit unterschiedlichen Durchmessern D1 und D2 dieses frei und ohne viel Mühe zwischen die Wirbelkörper 1 und 2 eingeführt werden kann und es andererseits durch Drehung in perfekten Halt zwischen die Wirbelkörper gebracht werden kann. Daher ist es auch nicht

erforderlich, den Zwischenwirbelraum 25 für den Erhalt eines rechteckigen oder zylinderförmigen Raumes auszustechen oder auszufräsen.

Da der Körper 7 des Implantats 6 unterschiedliche Durchmesser D1 und D2 aufweist, ist er einfach aus dem Zwischenwirbelraum 25 zu entfernen. Es ist eindeutig, dass das Implantat 6 nach dem Einklemmen erneut gelöst werden kann, wenn es in entgegengesetzte Richtung gedreht wird, bis sich der kleinste Durchmesser D1 zwischen den Wirbelkörpern 1 und 2 befindet.

Wenn ein Implantat 6 verwendet wird, das einen Körper 7 mit einer Form aufweist, die mit der natürlichen bikonkaven Form des Zwischenwirbelraums 25 übereinstimmt, entsteht automatisch ein perfekter Anschluss zwischen den Seiten 22 und 23 der Wirbelkörper 1 und 2 und den Seiten 16 und 17 des mit Knochenpfropfen 24 verpfropften Implantats 6.

Die Technik des Drehens des Implantates 6 hat folgende Vorteile:

- Wenn die Deckplatten konkav gewölbt sind, dann bringt das Rotieren die Möglichkeit, das Implantat 6 derart zu gestalten, dass es in einer Dimension flach ist und in der anderen Dimension der Geometrie der Deckplatte entspricht. Die flache Dimension erleichtert das Einschieben von posterior; die gewölbte Fläche ergibt einen optimalen Kontakt mit den Deckplatten;
- wenn die Deckplatten flach sind, dann kann das Rotieren benutzt werden, um den Bandscheibenraum zu spreizen;

- eine Querverzahnung der Oberfläche des Implantates ist möglich, da das Implantat erst nach der Insertion gedreht wird.

Selbstverständlich kann das Implantat 6 in verschiedenen Formen verwirklicht werden. Anstelle einer Aussparung für einen Sechskantimbusschlüssel können auch andere Aussparungsformen verwendet werden, die z.B. aus vierkantigen, rechteckigen oder ovalen Öffnungen bestehen.

Obwohl die Vorrichtungen 8 zur Ergreifung durch ein Werkzeug 9 vorzugsweise in der Innenseite des Implantats 4 angebracht sind, ist dies nicht unbedingt erforderlich. Sie können auch aus einem vorstehenden Teil oder aus einer bestimmten Formgebung des hinteren axialen Endes 10 bestehen, so dass der vorstehende Teil oder das hintere axiale Ende 10 an einem geeigneten Werkzeug befestigt werden kann, um die erforderliche Kraft ausüben zu können.

Nach einer anderen Ausführungsform der Erfindung sind die Vorrichtungen 8 nicht ausschliesslich dafür vorgesehen, dass darauf eine Rotationskraft, sondern zugleich eine Axialkraft ausgeübt werden kann und zwar sowohl eine Druck-, wie eine Zug-Kraft, damit, falls erforderlich, das Implantat 6 bei der Anbringung zwischen den Wirbelkörpern 1 und 2 eingedrückt und bei eventueller erneuter Entnahme, bei Verklemmung, eine Zugkraft darauf ausgeübt werden kann. Damit ist es jederzeit möglich, das Implantat 6 während des Eingriffs erneut zu entfernen.

Eine derartige Ausführungsform ist anhand der Fig. 9 dargestellt. Die Vorrichtungen 8 verbinden dabei ein erstes Ansatzelement 26, welches die Ausübung einer Rotationskraft zulässt, mit einem zweiten Ansatzelement 27, welches die Ausübung einer axialen Druck- und Zugkraft auf das Implantat 6 ermöglicht und dazu mit einer Axialsperre versehen ist.

Das erste Ansatzelement 26 besteht aus einer wie in der Ausführungsform nach Fig. 3 dargestellten Aussparung. Das zweite Ansatzelement 27 besteht aus einer zusätzlichen Aussparung, z.B. in Form eines Schlitzes in der Wand der obengenannten sechskantigen Öffnung, in den die Sperrelemente 28 des betreffenden Werkzeugs 9 greifen können. Wie in Fig. 9 dargestellt, können die Sperrelemente 28 aus Kugeln oder ähnlichem bestehen, die, nachdem das sechskantige Ende 11 des Werkzeugs 9 in die sechskantige Aussparung eingeführt wurde, radial nach aussen gedrückt werden und in den obengenannten Schlitz greifen.

Das Werkzeug 9 kann dabei verschiedene Formen aufweisen und auf unterschiedliche Art bedient werden. Gemäss Fig. 9 wird dies mit einem mit einem Keil 30 verbundenen Umschaltgriff 29 bewerkstelligt, der wiederum die Sperrelemente 28 auseinanderdrückt oder löst.

Bei einer anderen Variante ist das Schlüsselende gespalten, der Aussendurchmesser kann durch Andrücken oder Anschrauben eines inneren Stifts vergrössert werden, damit der Schlüssel in der Öffnung des Implantats 6, in das er eingeführt wird, eingeklemmt werden kann.

Nach einer anderen Variante können auch am vorderen axialen Ende 12 mit der Abrundung 13 des Implantats 6 Ansatzmöglichkeiten für ein Werkzeug 9 vorgesehen werden. Diese Ansatzmöglichkeiten können von unterschiedlicher Art sein und sind vorzugsweise derart gestaltet, dass sie, gleich wie die Vorrichtungen 8, die Ausübung einer Rotationskraft, einer axialen Kraft und/oder einer seitlichen Kraft auf das Implantat 6 ermöglichen. Die Ansatzmöglichkeiten bestehen aus einer mehrkantigen, z.B. sechskantigen Öffnung, die die Anbringung eines Schlüssels mit entsprechendem Endstück ermöglicht, damit eine Torsionskraft auf das Implantat 6 ausgeübt werden kann, nachdem es nicht ausreichend fest angewachsen ist und auf abdominalem Weg entfernt werden muss. Diese Erfindung bezieht sich selbstverständlich auch auf Implantate 6, die an einem Ende mit Ansatzvorrichtung versehen sind, die eine Anbringung der Implantate auf abdominalem Weg ermöglichen.

In den Fig. 10 und 11 sind erfindungsgemässe Implantate dargestellt, welche einen teilweise abgerundeten Querschnitt aufweisen.

Fig. 10 zeigt den Körper 7 eines Implantates 6, welcher an der oberen Kante des vorderen axialen Endes 12 eine Abrundung 31 aufweist. Der Radius der einseitigen Abrundung 31 ist derart bemessen ist, dass a) die Differenz zwischen der grösseren Seite des rechteckigen Querschnittes und der Diagonale über die abgerundete Kante kleiner als 3 mm, vorzugsweise 1 - 2 mm beträgt; und b) die kleinere Fläche um weniger als die Hälfte, vorzugsweise um weniger als ein Drittel reduziert ist, d.h. die tragende Fläche sollte mindestens 2/3 der Gesamtbreite des Implantates entsprechen.

Fig. 11 zeigt den Körper 7 eines Implantates 6 im Querschnitt, wobei das Implantat im Querschnitt über die Diagonale je eine Abrundung 32 aufweist. Die Radien der gegenseitigen Abrundungen 32 sind derart bemessen, dass a) die Differenz zwischen der grösseren Seite des Querschnittes und der Diagonale über die abgerundeten Kanten kleiner als 3 mm, vorzugsweise 0,5 - 1,0 mm beträgt und b) die kleinere Fläche des Implantates um weniger als die Hälfte, vorzugsweise kleiner als ein Drittel reduziert ist.

In Fig. 12 sind zwei bezüglich der Symmetrieachse 33 symmetrisch angeordnete Paare von Implantaten 6 dargestellt, wobei die beiden oberen Implantate 6 im Abschnitt (a) solche gemäss der Fig. 10 und die beiden unteren Implantate 6 im Abschnitt (b) solche gemäss der Fig. 11 darstellen.

Beim Aufrichten (Rotieren) eines wie in Fig. 6 gezeigten Implantates 6 wird der Zwischenwirbelraum 25 um etwa 3-4 mm überdehnt, was zu einem Einbrechen der Deckplatten und permanenten Überdehnen des Bindegewebes führen kann. Wenn die Kanten nun eine Abrundung (31,32) aufweisen, wird die Überdehnung stark reduziert, damit ist aber auch die Stabilität der aufgerichteten Implantate reduziert oder die gepaarten Implantate sind spiegelsymmetrisch angeordnet um sich gegenseitig zu stabilisieren (siehe Fig. 13).

Die Aufrichtung mittels zweier Implantate 6, welche mit Abrundungen 31 oder 32 versehen sind führt bei geeignet gewählten Radien der Abrundungen 31 oder 32 zu einer Überdistrahierung des Zwischenwirbelraumes 25 von nur 1 mm; dafür sind aber die einzelnen aufgerichteten Implantate 6 nicht allzu stabil; sie können so leicht zurückkippen wie sie aufzurichten waren. In Fig. 13 schützen sich die beiden Implantate 6 durch die spiegelsymmetrische Geometrie gegenseitig vor dem Umkippen, da die Implantate 6 nur im Verbund und nicht einzeln umkippen können.

In Fig. 13 sind zwei spiegelsymmetrische angeordnete Implantate 6 gemäss Fig. 11 dargestellt. Die Abrundungen 32 der Körper 7 kommen dabei symmetrisch zueinander zu liegen. Die Körper 7 der Implantate 6 liegen nach deren Einführung horizontal zwischen den Wirbelkörper 1 und 2 und können dann mittels eines geeigneten Werkzeugs 9 um 90° in die schwarz gezeichnet Stellung 7' rotiert werden um den Zwischenwirbelraum 25 distrahieren zu können. Der rechteckige Querschnitt der Körper 7 ist derart

beschaffen, dass nach der Rotation des Implantates 6 um 90° in die Konkavität der Deckplatten der angrenzenden Wirbelkörper 1,2 eine Distraktion des Zwischenwirbelraumes 25 zwischen 1 und 4 mm, vorzugsweise zwischen 2 - 3 mm, verbleibt.

In Fig. 14 sind zwei flach im Zwischenwirbelraum 25 (Zeichnungsebene) liegende Implantate 6 dargestellt, die über ein Konnektor 34 anterior miteinander verbunden sind. Im linken Teil der Fig. 14 ist die Stellung vor der Rotation der Implantate 6 dargestellt, im rechten Teil der Fig. 14 nach erfolgter Rotation um 90° in die Konkavität der Deckplatten der angrenzenden Wirbelkörper.
Das posteriore Ende der Implantate 6 bleibt frei und ist nur anterior durch den Konnektor 34 verbunden, so dass (a) der Abstand zwischen dem linken und rechten Implantat 6 und deren Ausrichtung zueinander aufrechterhalten wird, (b) die Implantate 6 um ihre Längsachse 35 drehbar sind, und (c) die beiden Implantate 6 vor deren Implantation und/oder in situ mit dem Konnektor 34 koppelbar sind.

In Fig. 15 ist ein Implantat 6 mit einem Längsschnitt 35 zur Aufnahme von spongiösen Knochenmaterial oder osteokonduktives bzw. osteoinduktives Material und Querperforationen 36 der Wände für das Knochenwachstum dargestellt. Der Durchmesser der Perforationen 36 ist vorzugsweise derart konzipiert ist, dass (a) in die Längsöffnung 36 gepresste Spongiosa nicht seitlich austritt, und (b) die in der Spongiosa enthaltene Flüssigkeit beim Stopfen der Implantate 6 seitlich austreten

und nach der Implantation wieder zurückdiffundieren kann, um ein postoperatives Schwellen der Spongiosa zu bewirken; und (c) Knochen durch die Perforationen 37 in das Implantat (6) hineinwachsen kann.

In Fig. 16 ist ein Implantat 6 dargestellt, dessen Kontaktflächen zwischen Implantat 6 und Knochen mit einer Längsstrukturierung 38 versehen ist. Die Längsstrukturierung 38 ist vorzugsweise derart gestaltet, dass das Rotieren des Implantates 6 in die Konkavität der Deckplatten nur in einer Richtung möglich ist, wie dies durch die Pfeile 39,40 angedeutet ist.

In Fig. 17 ist ein Implantat 6 dargestellt, dessen Kontaktflächen zwischen Implantat 6 und Knochen mit einer Querstrukturierung 41 versehen ist. Die Querstrukturierung 41 ist vorzugsweise derart gestaltet, dass die eine Kontaktfläche eine Translation in anteriorer und die andere eine Translation in posteriorer Richtung verhindert, wie dies durch die Pfeile 42,43 angedeutet ist. Die Verhinderung der Translation in anteriorer Richtung führt zu einer Entlastung des verbliebenen Annulus, der nach jüngster Forschung innerviert ist und damit auf anterioren Druck mit Schmerzsignalen reagieren könnte.

Diese Erfindung ist keinesfalls auf die als Beispiele gegebenen und in den Abbildungen dargestellten Modelle begrenzt - derartige Dilatatoren und das dazugehörende Werkzeug können in

unterschiedlichen Formen und Grössen gefertigt werden, ohne dabei aus dem Rahmen der Definitionen, die in der Zusammenfassung im Anhang gegeben werden, zu fallen.

Patentansprüche

1. Implantat (6) für den Zwischenwirbelraum (25), dadurch gekennzeichnet, dass es aus einem im wesentlichen quaderförmigen Körper (7) mit einer Vorrichtung (8) zur Ergreifung durch ein Werkzeug (9) besteht.

2. Implantat nach Anspruch 1, dadurch gekennzeichnet, dass die Vorrichtung (8) derart beschaffen ist, dass sie die Ausübung einer Rotationskraft auf das Implantat (6) ermöglicht.

3. Implantat nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass die Vorrichtung (8) mindestens aus einer in der Innenseite des Körpers (7) vorgesehenen Aussparung besteht, in welche das, vorzugsweise schlüsselähnliche, Werkzeug (9) einführbar ist.

4. Implantat nach Anspruch 3, dadurch gekennzeichnet, dass die Aussparung aus einem in der Innenseite des Körpers (7) vorgesehenen Innen-Sechskant besteht.

5. Implantat nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, dass die Vorrichtung (8) so gestaltet ist, dass mindestens die Ausübung einer Axial-, Druck- oder Zug-Kraft auf das Implantat (6) möglich ist.

6. Implantat nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass es eine Vorrichtung (8) in der Form einer inneren Aussparung zur Anbringung eines Werkzeugs (9) aufweist, und dass in der Aussparung zwei Ansatzelemente (27) vorgesehen sind, die eine axiale Sperrung für das Werkzeug (9) aufweisen.

7. Implantat nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, dass die Vorrichtung (8) so gestaltet ist, dass mindestens die Ausübung einer seitlichen Kraft auf das Implantat (6) möglich ist.

8. Implantat nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, dass es verschiedene Durchmesser (D1, D2) aufweist.

9. Implantat nach Anspruch 8, dadurch gekennzeichnet, dass die Seiten (14 und 15), zwischen denen sich der kleinste Durchmesser (D1) erstreckt, grösstenteils parallel und flach sind.

10. Implantat nach Anspruch 8 oder 9, dadurch gekennzeichnet, dass das Implantat (6) am Längsschnitt des grössten Durchmessers (D2) ein abgekantetes, linsenförmiges Profil aufweist.

11. Implantat nach Anspruch 10, dadurch gekennzeichnet, dass die Seiten (15,16), die das abgekantete, linsenförmige Profil einschliessen, in Querrichtung zum Implantat (6) mindestens teilweise flach sind.

12. Implantat nach einem der Ansprüche 1 bis 11, dadurch gekennzeichnet, dass mindestens eines seiner axialen Enden (10;12) abgerundet ist.

13. Implantat nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, dass der Körper (7) eine oder mehrere Öffnungen (18) zur Füllung mit Pfropfmaterial (24) aufweist, wobei die Öffnungen derart angebracht sind, dass das Pfropfmaterial (24) bei der endgültigen Position des Implantats (6) die Wirbelkörper (1,2) berührt.

14. Implantat nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, dass das Implantat (6) mit einer durchgehenden Öffnung (18) versehen ist, die die Form einer länglichen Rille mit parallelen Wänden (19, 20) aufweist.

15. Implantat nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, dass es an zwei seiner Enden mit Vorrichtungen (8,26) versehen ist.

16. Implantat nach einem der Ansprüche 1 bis 15, dadurch gekennzeichnet, dass es aus Titan oder einer Titanlegierung besteht.

17. Implantat nach einem der Ansprüche 1 bis 16, dadurch gekennzeichnet, dass es einen rechteckigen Querschnitt mit einer einseitigen Abrundung (31) aufweist.

18. Implantat nach Anspruch 17, dadurch gekennzeichnet, dass der Radius der einseitigen Abrundung (31) derart bemessen ist, dass

a) die Differenz zwischen der grösseren Seite des rechteckigen Querschnittes und der Diagonalen über die abgerundete Kante kleiner als 3 mm, vorzugsweise 1 - 2 mm beträgt;

und

b) die Kontaktfläche zum Knochen durch die Abrundung (31) um weniger als die Hälfte, vorzugsweise weniger als ein Drittel reduziert ist.

19. Implantat nach einem der Ansprüche 1 bis 18, dadurch gekennzeichnet, dass es einen rechteckigem Querschnitt mit einer doppelseitigen Abrundung (32) über die Diagonale aufweist.

20. Implantat nach Anspruch 19, dadurch gekennzeichnet, dass die Radien der doppelseitigen Abrundungen (32) derart bemessen sind, dass

a) die Differenz zwischen der grösseren Seite des Querschnittes und der Diagonalen über die abgerundeten Kanten kleiner als 3 mm, vorzugsweise 0,5 - 1,0 mm beträgt und

b) die kleinere Fläche des Implantates um weniger als die Hälfte, vorzugsweise weniger als ein Viertel reduziert ist.

21. Implantat nach Anspruch 19 oder 20, dadurch gekennzeichnet, dass es derart ausgebildet ist, dass bei paariger Anordnung solcher Implantate deren gerundete Kanten symmetrisch zueinander zu liegen kommen.

22. Implantat nach einem der Ansprüche 19 bis 21, dadurch gekennzeichnet, dass es einen rechteckigen Querschnitt aufweist, welcher derart beschaffen ist, dass nach der Rotation des Implantates in die Konkavität der Deckplatten der angrenzenden Wirbelkörper eine Distraktion des Zwischenwirbelraumes (25) zwischen 1 und 4 mm, vorzugsweise zwischen 2 - 3 mm, verbleibt.

23. Implantat nach einem der Ansprüche 19 bis 21, dadurch gekennzeichnet, dass es einen Querschnitt aufweist, der zu einem Quadrat reduziert ist und dass nach der Rotation des Implantates in die Konkavität der Endplatten der angrenzenden Wirbelkörper keine Distraktion des Zwischenwirbelraumes (25) verbleibt.

24. Implantat nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, dass das posteriore Ende des Implantats (6) derart beschaffen ist, dass ein linkes und ein rechtes Implantat anterior derart mit einem Konnektor (34) verbindbar sind, dass
(a) der Abstand zwischen dem linken und rechten Implantat (6) und deren Ausrichtung aufrechterhalten wird;
(b) die Implantate (6) um ihre Längsachse (35) drehbar sind; und
(c) die zwei Implantate (6) vor deren Implantation und/oder in situ mit dem Konnektor (34) koppelbar sind.

25. Implantat nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, dass es derart beschaffen ist, dass es vor dessen Implantation oder in situ mit einem zweiten Implantat (6) verhakbar ist, wobei die Verbindung
(a) den Abstand und den Winkel zwischen den Implantaten (6) aufrecht erhält; und
(b) eine Rotation der Implantate (6) um ihre Längsachse (35) in die Konkavität der Deckplatten der angrenzenden Wirbelkörper (1,2) zulässt.

26. Implantat nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, dass es derart beschaffen ist, dass es nach der Rotation um seine Längsachse (35) in die Konkavität der Deckplatten medial über ein weiteres Implantat winkelstabil verbindbar ist.

27. Implantat nach einem der Ansprüche 19 bis 26, dadurch gekennzeichnet, dass es an seiner Oberfläche beschichtet ist, vorzugsweise mit Hydroxylapatit oder Titanplasma.

28. Implantat nach einem der Ansprüche 13, 14 und einem der Ansprüche 19 - 27, dadurch gekennzeichnet, dass es perforierte Wände aufweist, wobei die Perforationen (37) vorzugsweise lochartig sind und der Durchmesser der Löcher derart konzipiert ist, dass
(a) in die Längsöffnung gepresste Spongiosa nicht seitlich austritt, und

(b) die in der Spongiosa enthaltene Flüssigkeit beim Stopfen der Implantate seitlich austreten und nach der Implantation wieder zurückdiffundieren kann, um ein postoperatives Schwellen der Spongiosa zu bewirken; und
(c) Knochen durch die Perforation in das Implantat hineinwachsen kann.

29. Implantat nach einem der Ansprüche 19 - 28, dadurch gekennzeichnet, dass die eine Kontaktfläche zwischen Implantat und Knochen eine Rasterung in der Längsrichtung des Implantates aufweist.

30. Implantat nach einem der Ansprüche 19 - 28, dadurch gekennzeichnet, dass beide Kontaktflächen zwischen Implantat und Knochen eine Rasterung in der Längsrichtung des Implantates aufweisen.

31. Implantat nach einem der Ansprüche 29 oder 30, dadurch gekennzeichnet, dass die Geometrie der Rasterung ein Rotieren des Implantates in eine Richtung zulässt und in die andere Richtung verhindert.

32. Implantat nach einem der Ansprüche 19 - 28, dadurch gekennzeichnet, dass die eine Kontaktfläche zwischen Implantat und Knochen eine Querrasterung aufweist.

33. Implantat nach einem der Ansprüche 19 - 28, dadurch gekennzeichnet, dass beide Kontaktflächen zwischen Implantat und Knochen eine Querrasterung aufweisen.

34. Implantat nach einem der Ansprüche 32 oder 33, dadurch gekennzeichnet, dass die Geometrie der Rasterung ein Verschieben des Implantates in anteriorer Richtung verhindert.

35. Implantat nach einem der Ansprüche 32 oder 33, dadurch gekennzeichnet, dass die Geometrie der Rasterung ein Verschieben des Implantates in posteriorer Richtung verhindert.

36. Implantat nach Anspruch 32, dadurch gekennzeichnet, dass die Geometrie der Rasterung der beiden Kontaktflächen zwischen Implantat und Knochen derart gestaltet ist, dass die eine Rasterung ein Verschieben des Implantates in anteriorer Richtung und die andere ein Verschieben in posteriorer Richtung verhindert.

37. Implantat nach einem der Ansprüche 29 oder 32, dadurch gekennzeichnet, dass es eine Längsrasterung der einen und eine Querrasterung der anderen Kontaktfläche aufweist.

38. Implantat nach einem der Ansprüche 32 - 35 oder 37, dadurch gekennzeichnet, dass die Querrasterung der einzelnen Kontaktflächen derart ausgelegt ist, dass ein Verschieben in posteriorer und anteriorer Richtung verhindert wird.

39. Implantat nach einem der Ansprüche 13,14 und einem der Ansprüche 19-17 und 29-38, dadurch gekennzeichnet, dass die Wände (19) und (20) Querschlitze aufweisen.

40. Implantat nach Anspruch 39, dadurch gekennzeichnet, dass die Hohlräume und Schlitze mit einem osteokonduktiven oder osteoinduktiven Material, vorzugsweise Hydroxylapatit, gefüllt sind, so dass der Knochen von den Deckplatten der angrenzenden Wirbelkörper und von der Seite her einwachsen kann.

41. Implantat für den Zwischenwirbelraum (25) mit

a) einer im wesentlichen quaderförmigen Gestalt mit den Kantenlängen a,b,c;

b) einer vorderen axialen Endfläche (12) und einer hinteren axialen Endfläche (10), welche von der Längsachse (35) durchstossen werden;

c) zwei Seitenflächen (14,15) welche von einer Querachse (44) durchstossen werden; und

d) einer Oberfläche (16) und einer Unterfläche (17)) welche von einer Querachse (45) durchstossen werden;

dadurch gekennzeichnet, dass

e) das Implantat (6) eine Vorrichtung (8) zur Ergreifung durch ein Werkzeug (9) aufweist; und

f) die vordere axialen Endfläche (12) und/oder die hinteren axialen Endfläche (10) rechteckig ausgebildet sind.

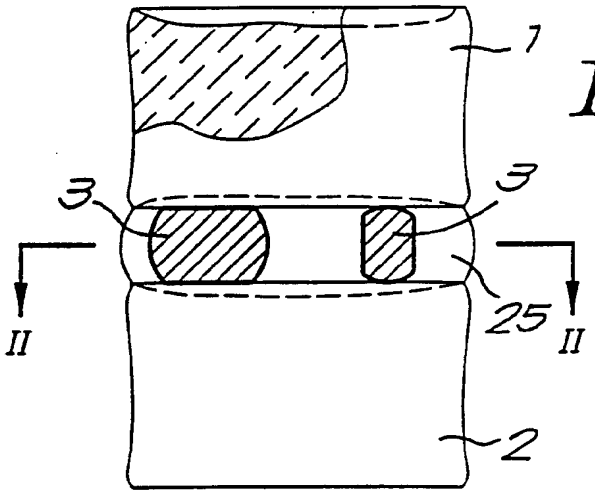


Fig.1

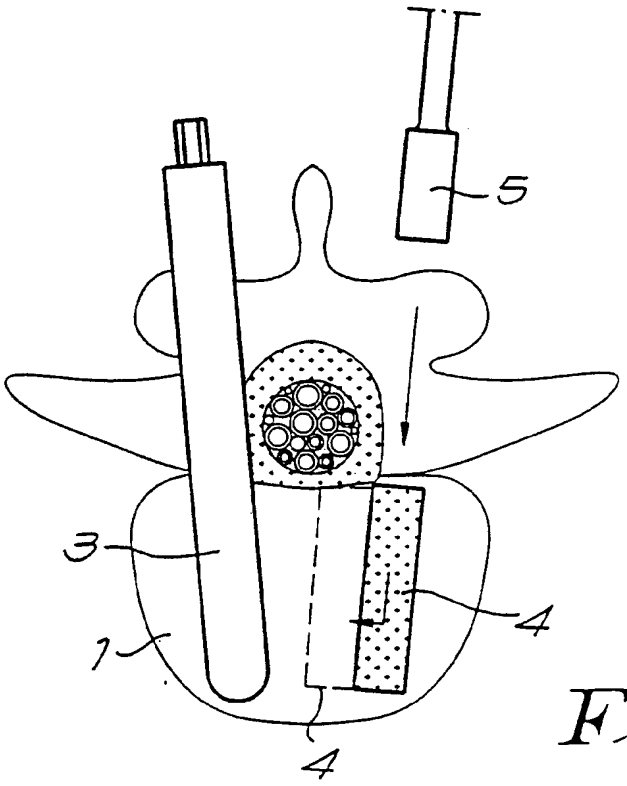


Fig. 2

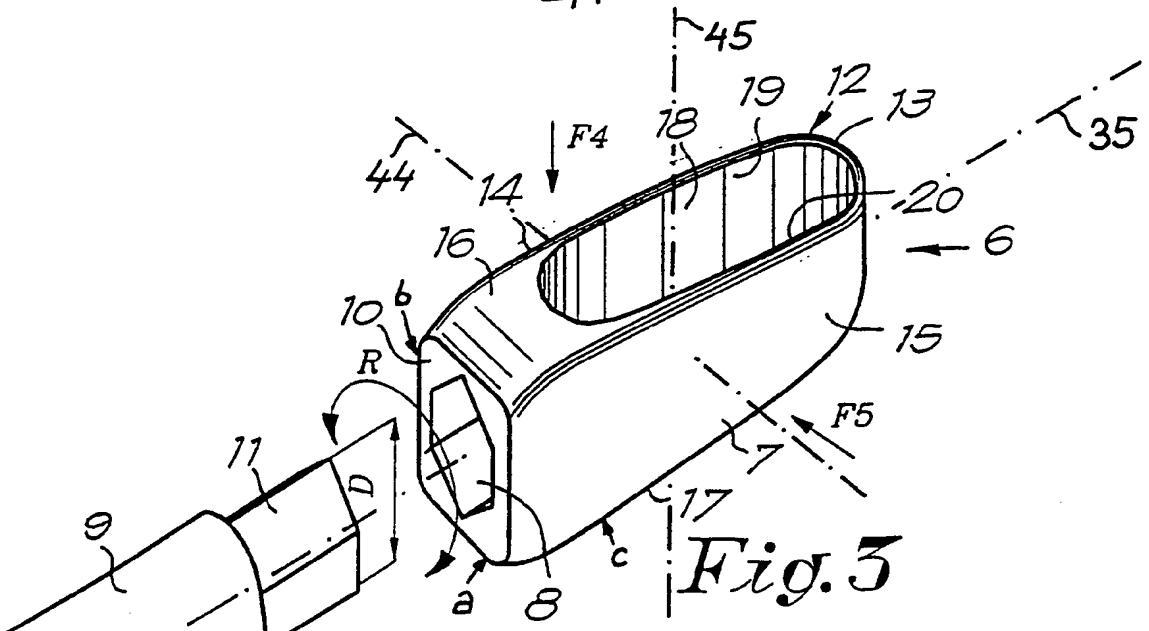


Fig. 3

Fig. 4

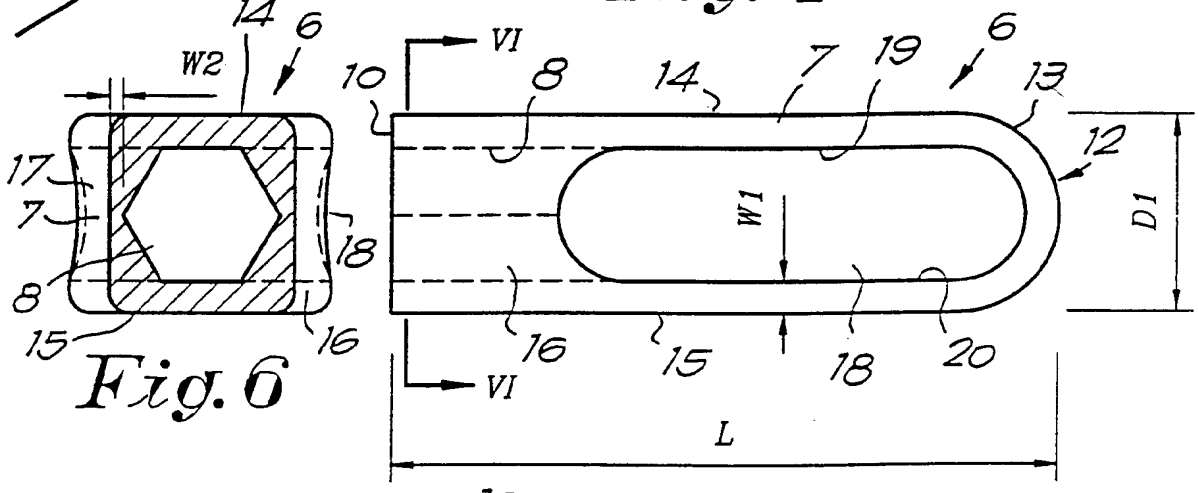


Fig. 6

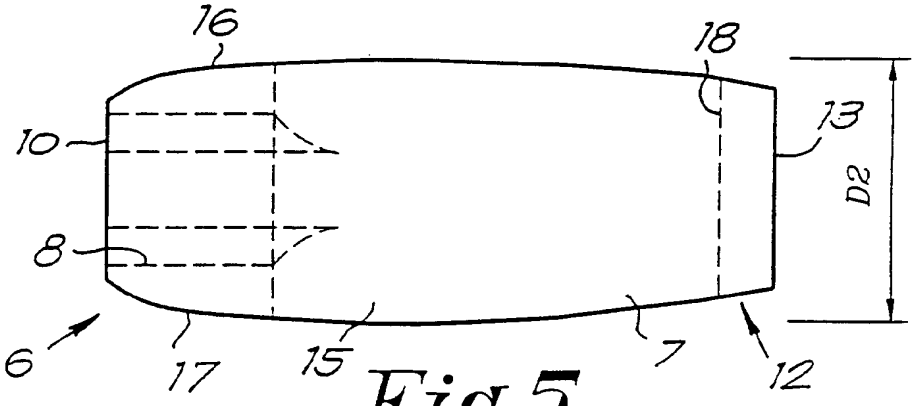


Fig. 5

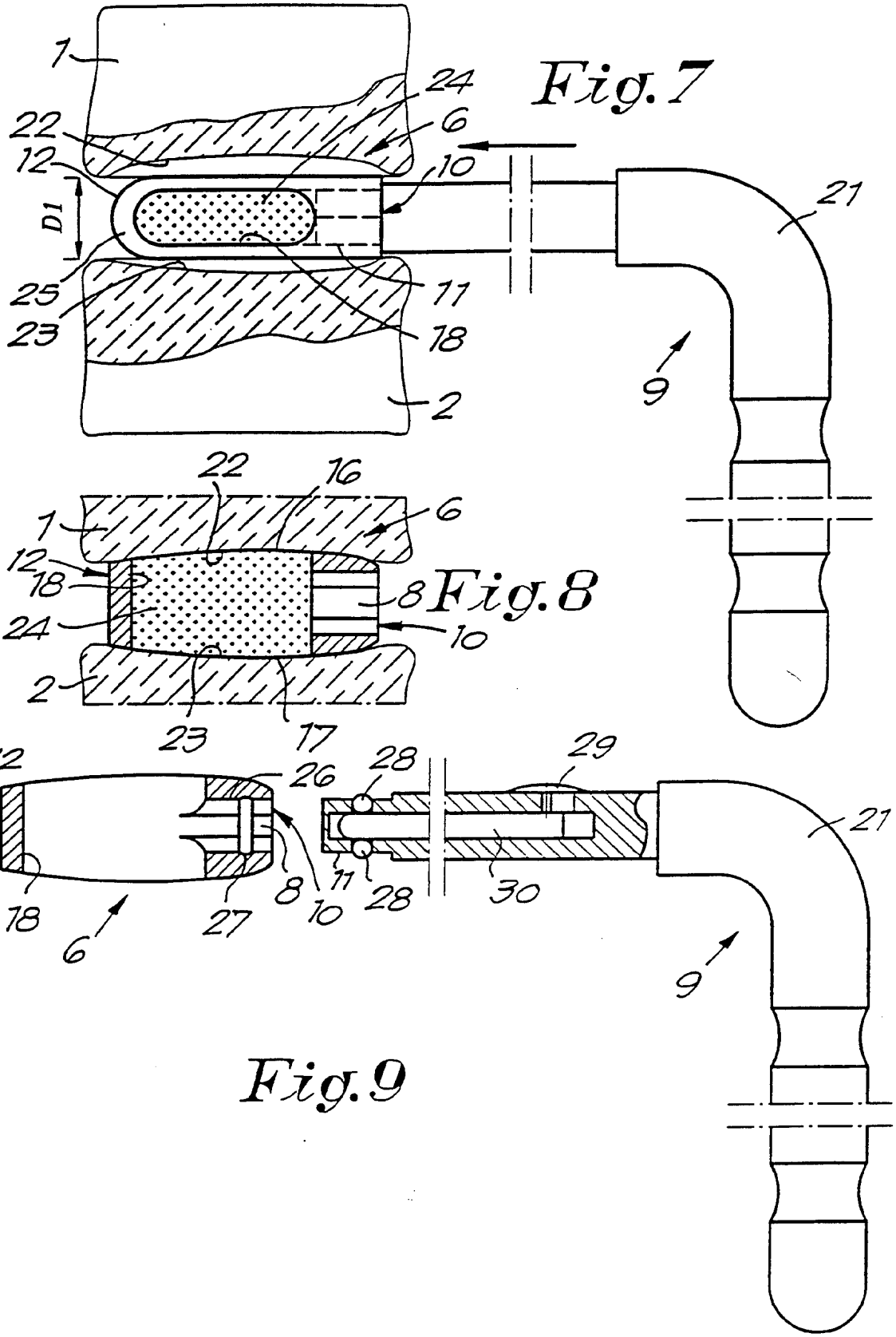


Fig. 7

Fig. 8

Fig. 9

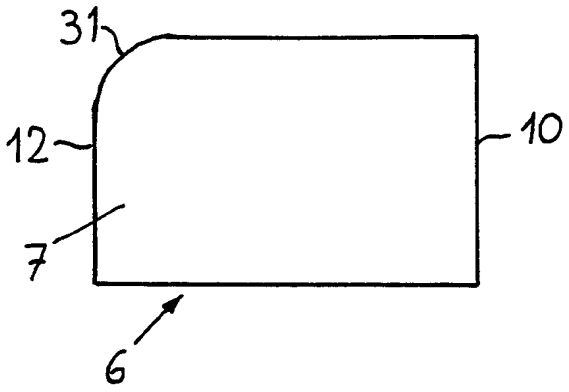


Fig. 10

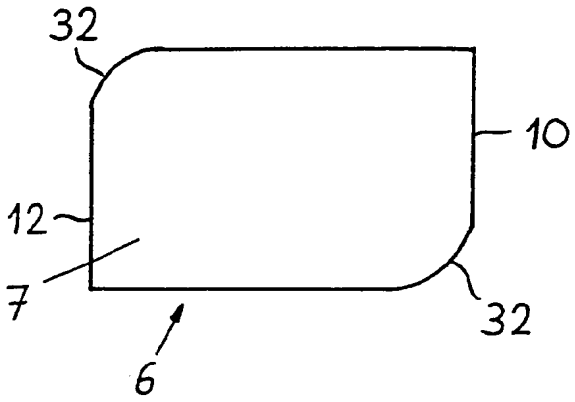


Fig. 11

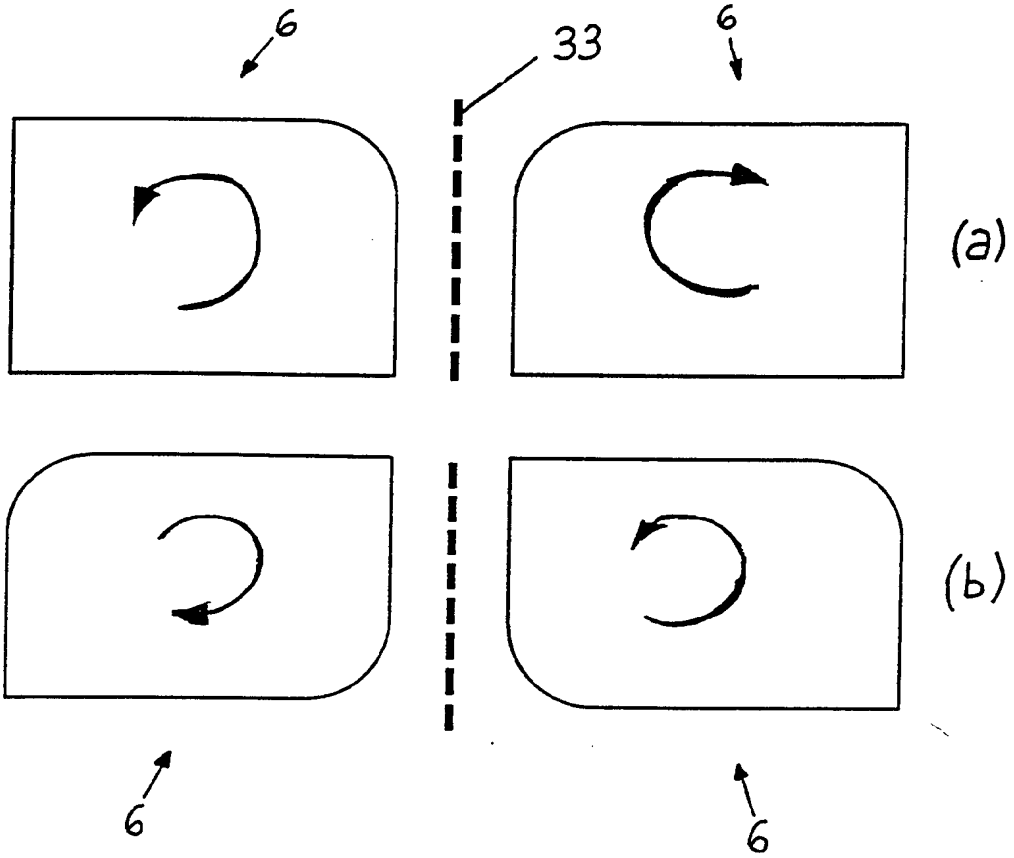


Fig. 12

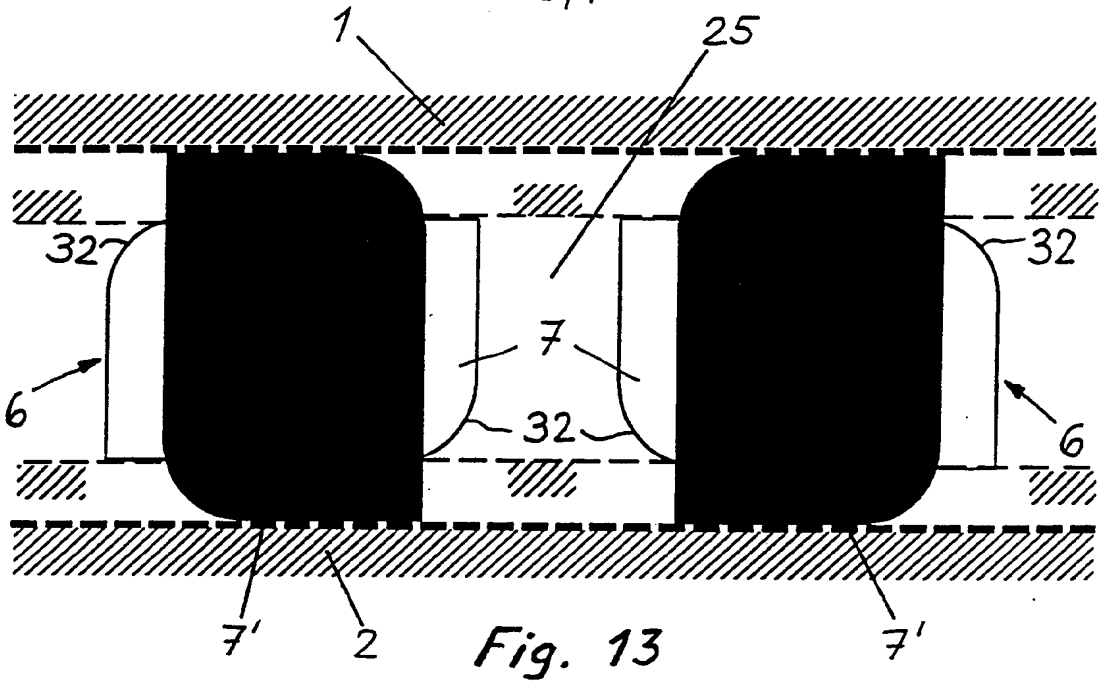


Fig. 13

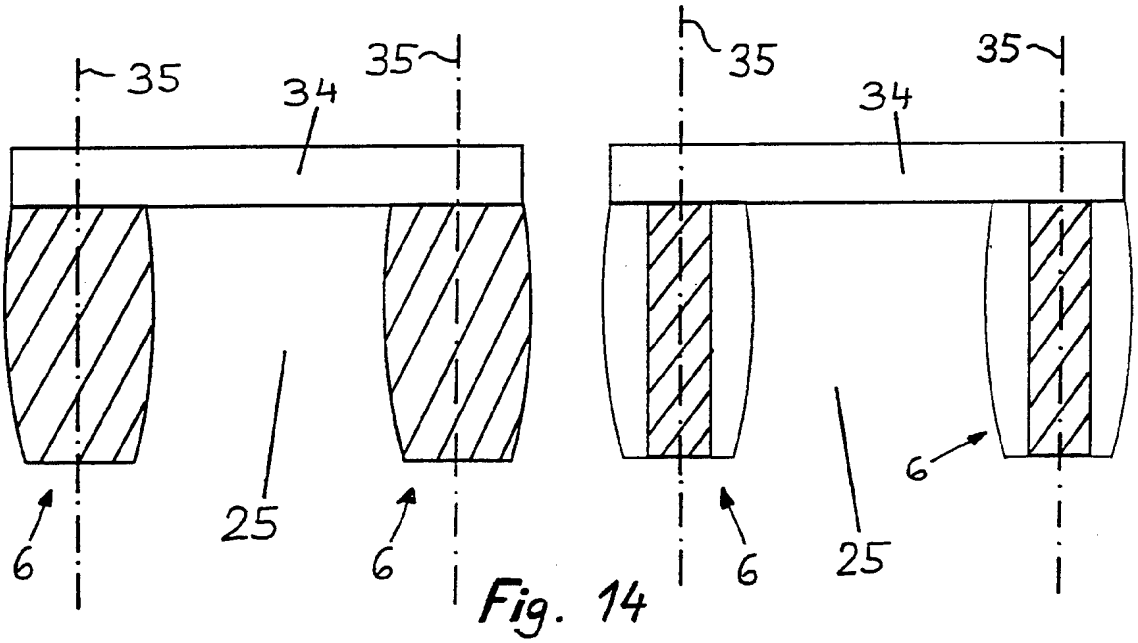


Fig. 14

Fig. 15

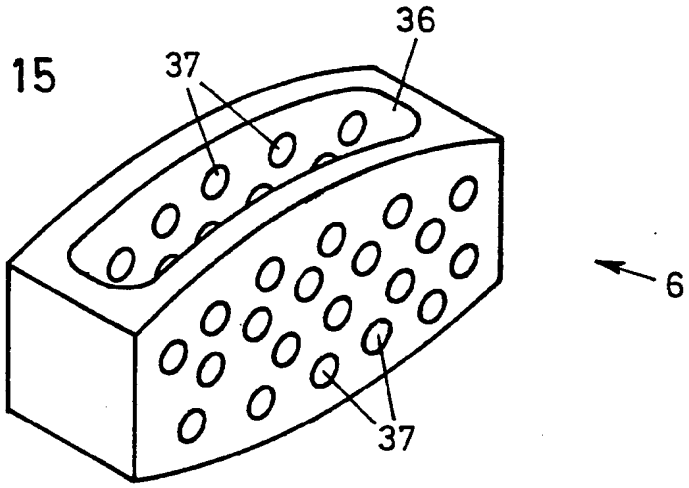


Fig. 16

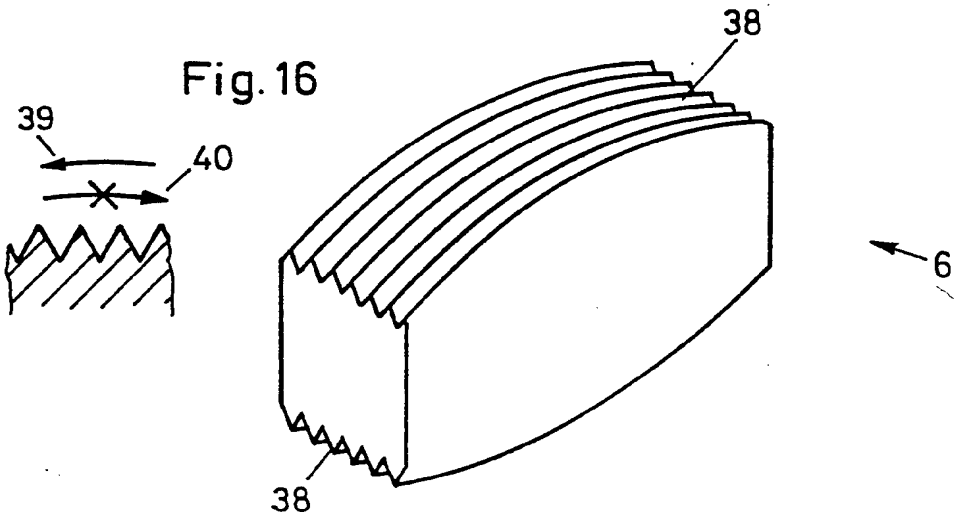
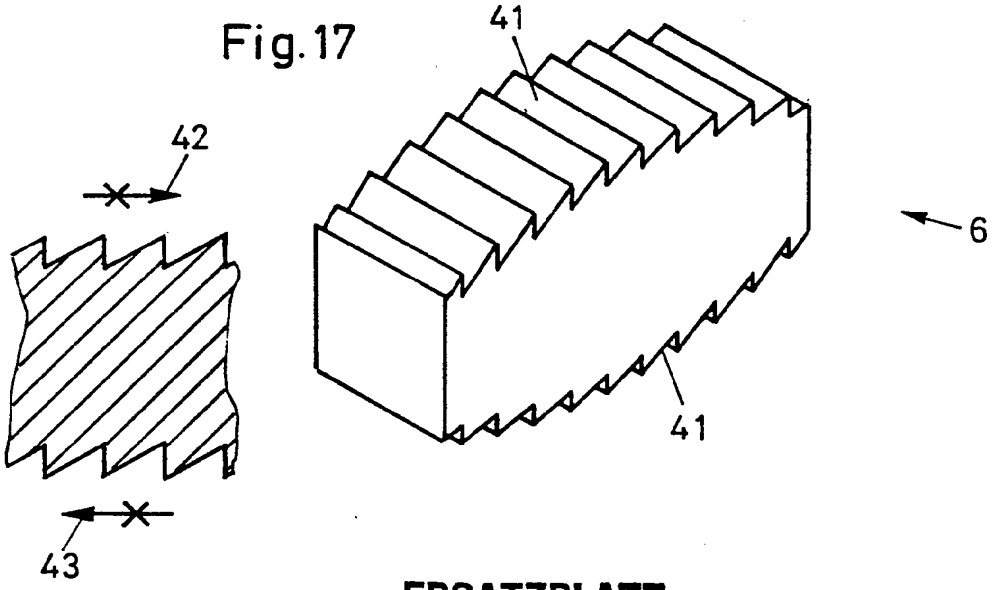


Fig. 17



INTERNATIONAL SEARCH REPORT

Inter. nal Application No
PCT/CH 94/00184

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61F2/44 A61F2/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,90 00037 (MICHELSON) 11 January 1990	1-3,8,9, 12,13, 17,41
Y	see the whole document	5,10
A		4,28,40

Y	US,A,3 486 505 (MORRISON) 30 December 1969	5
A	see column 2, line 21 - line 68; claims 2-4	1,13,40

Y	US,A,4 349 921 (KUNTZ) 21 September 1982 see column 6, line 19 - line 24; figures 2-4	10

	-/--	

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 December 1994	09. 01. 95

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Klein, C

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP,A,0 307 241 (BRANTIGAN) 15 March 1989 see the whole document	1-3,8,9, 13,14,16 28-33, 35,40
X	WO,A,89 12431 (MICHELSON) 28 December 1989	1-3,13
A	see page 13, line 11 - page 16, line 37; figures 4-5	4,15,28, 40
A	EP,A,0 260 044 (SHEPPERD) 16 March 1988 see column 7, line 28 - column 8, line 21; claim 15	16,27,39
A	US,A,5 092 893 (SMITH) 3 March 1992 see column 5, line 7 - line 23; figures 1,5	24
A	WO,A,93 01771 (CALCITEK) 4 February 1993 see abstract; figure 4	37
A	WO,A,92 14423 (MADHAVAN) 3 September 1992 see page 8, line 11; figures 5,6	39
A	EP,A,0 493 698 (HÄRLE) 8 July 1992	
A	US,A,4 772 287 (RAY) 20 September 1988	

INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/CH 94/00184

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO-A-9000037	11-01-90	AU-A-	3965489	23-01-90
		EP-A-	0425542	08-05-91
		JP-T-	3505416	28-11-91
US-A-3486505	30-12-69	NONE		
US-A-4349921	21-09-82	NONE		
EP-A-0307241	15-03-89	US-A-	4834757	30-05-89
		CA-A-	1292596	03-12-91
		DE-A-	3876909	04-02-93
		US-A-	4878915	07-11-89
		AU-B-	614609	05-09-91
		AU-A-	3436389	16-10-89
		JP-T-	3503133	18-07-91
		WO-A-	8909035	05-10-89
WO-A-8912431	28-12-89	US-A-	5015247	14-05-91
		AU-A-	3838789	12-01-90
		CA-A-	1332999	15-11-94
		EP-A-	0419564	03-04-91
EP-A-0260044	16-03-88	JP-A-	63145650	17-06-88
		US-A-	4863476	05-09-89
US-A-5092893	03-03-92	NONE		
WO-A-9301771	04-02-93	US-A-	5306307	26-04-94
		EP-A-	0612230	31-08-94
WO-A-9214423	03-09-92	US-A-	5171278	15-12-92
		AU-A-	1454192	15-09-92
		EP-A-	0571555	01-12-93
		JP-T-	6504704	02-06-94
EP-A-0493698	08-07-92	DE-A-	4101526	02-07-92
		EP-A-	0623323	09-11-94
US-A-4772287	20-09-88	DE-A-	3871460	02-07-92
		EP-A,B	0304305	22-02-89

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-4772287		JP-A-	1070041	15-03-89
		US-A-	4904260	27-02-90

INTERNATIONALER RECHERCHENBERICHT

Interna ies Aktenzeichen
PCT/CH 94/00184

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK 6 A61F2/44 A61F2/46

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
IPK 6 A61F

Recherchierte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie°	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
X	WO,A,90 00037 (MICHELSON) 11. Januar 1990	1-3,8,9, 12,13, 17,41
Y	siehe das ganze Dokument	5,10
A		4,28,40

Y	US,A,3 486 505 (MORRISON) 30. Dezember 1969	5
A	siehe Spalte 2, Zeile 21 - Zeile 68; Ansprüche 2-4	1,13,40

Y	US,A,4 349 921 (KUNTZ) 21. September 1982 siehe Spalte 6, Zeile 19 - Zeile 24; Abbildungen 2-4	10

	-/--	

[X] Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen

[X] Siehe Anhang Patentfamilie

° Besondere Kategorien von angegebenen Veröffentlichungen :
"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist
"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist
"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)
"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht
"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist
"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zumVerständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist
"X" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann allein aufgrund dieser Veröffentlichung nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden
"Y" Veröffentlichung von besonderer Bedeutung; die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist
"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche	Absendedatum des internationalen Recherchenberichts
19. Dezember 1994	09. 01. 95

Name und Postanschrift der Internationale Recherchenbehörde	Bevollmächtigter Bediensteter
Europäisches Patentamt, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Klein, C

Formblatt PCT/ISA/210 (Blatt 2) (Juli 1992)

C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie°	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
X	EP,A,0 307 241 (BRANTIGAN) 15. März 1989	1-3,8,9, 13,14,16
A	siehe das ganze Dokument	28-33, 35,40
X	WO,A,89 12431 (MICHELSON) 28. Dezember 1989	1-3,13
A	siehe Seite 13, Zeile 11 - Seite 16, Zeile 37; Abbildungen 4-5	4,15,28, 40
A	EP,A,0 260 044 (SHEPPERD) 16. März 1988 siehe Spalte 7, Zeile 28 - Spalte 8, Zeile 21; Anspruch 15	16,27,39
A	US,A,5 092 893 (SMITH) 3. März 1992 siehe Spalte 5, Zeile 7 - Zeile 23; Abbildungen 1,5	24
A	WO,A,93 01771 (CALCITEK) 4. Februar 1993 siehe Zusammenfassung; Abbildung 4	37
A	WO,A,92 14423 (MADHAVAN) 3. September 1992 siehe Seite 8, Zeile 11; Abbildungen 5,6	39
A	EP,A,0 493 698 (HÄRLE) 8. Juli 1992	
A	US,A,4 772 287 (RAY) 20. September 1988	

INTERNATIONALER RECHERCHENBERICHT

Inter. nales Aktenzeichen
PCT/CH 94/00184

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie		Datum der Veröffentlichung
WO-A-9000037	11-01-90	AU-A-	3965489	23-01-90
		EP-A-	0425542	08-05-91
		JP-T-	3505416	28-11-91
US-A-3486505	30-12-69	KEINE		
US-A-4349921	21-09-82	KEINE		
EP-A-0307241	15-03-89	US-A-	4834757	30-05-89
		CA-A-	1292596	03-12-91
		DE-A-	3876909	04-02-93
		US-A-	4878915	07-11-89
		AU-B-	614609	05-09-91
		AU-A-	3436389	16-10-89
		JP-T-	3503133	18-07-91
		WO-A-	8909035	05-10-89
WO-A-8912431	28-12-89	US-A-	5015247	14-05-91
		AU-A-	3838789	12-01-90
		CA-A-	1332999	15-11-94
		EP-A-	0419564	03-04-91
EP-A-0260044	16-03-88	JP-A-	63145650	17-06-88
		US-A-	4863476	05-09-89
US-A-5092893	03-03-92	KEINE		
WO-A-9301771	04-02-93	US-A-	5306307	26-04-94
		EP-A-	0612230	31-08-94
WO-A-9214423	03-09-92	US-A-	5171278	15-12-92
		AU-A-	1454192	15-09-92
		EP-A-	0571555	01-12-93
		JP-T-	6504704	02-06-94
EP-A-0493698	08-07-92	DE-A-	4101526	02-07-92
		EP-A-	0623323	09-11-94
US-A-4772287	20-09-88	DE-A-	3871460	02-07-92
		EP-A,B	0304305	22-02-89

INTERNATIONALER RECHERCHENBERICHT

Internales Aktenzeichen
PCT/CH 94/00184

Im Recherchenbericht angeführtes Patentdokument	Datum der Veröffentlichung	Mitglied(er) der Patentfamilie		Datum der Veröffentlichung
US-A-4772287		JP-A-	1070041	15-03-89
		US-A-	4904260	27-02-90

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/441,092	04/06/2012	Matthew Curran	13958-0099003/104US4

CONFIRMATION NO. 1088

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

PUBLICATION NOTICE

OC000000056013880

Title: Systems and Methods for Spinal Fusion

Publication No.US-2012-0209388-A1
Publication Date:08/16/2012

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/441,092

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	46 minus 20 =	* 26			OR	x 60 =	1560
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2810

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/441,092	04/06/2012	3733	2810	13958-0099003/104US4	46	2

CONFIRMATION NO. 1088

UPDATED FILING RECEIPT

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

Date Mailed: 05/10/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Matthew Curran, Carlsbad, CA;
Mark Peterson, Medford, CA;

Assignment For Published Patent Application

NuVasive, Inc., San Diego, CA

Power of Attorney: The patent practitioners associated with Customer Number 26191

Domestic Priority data as claimed by applicant

This application is a CON of 13/440,062 04/05/2012
which is a CON of 13/079,645 04/04/2011 PAT 8187334
which is a CON of 11/093,409 03/29/2005 PAT 7918891
which claims benefit of 60/557,536 03/29/2004

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 04/19/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/441,092**

Projected Publication Date: 08/16/2012

Non-Publication Request: No

Early Publication Request: No

Title

Systems and Methods for Spinal Fusion

Preliminary Class

623

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: Unknown
Serial No.	: 13/441,092	Examiner	: Unknown
Filed	: April 6, 2012	Conf. No.	: 1088
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS

Responsive to the Notice to File Corrected Application Papers mailed April 27, 2012, applicant as a large entity submits herewith the following:

☒ Substitute drawings (5 Sheets) in compliance with 37 CFR §1.84. No new matter has been added.

It is understood that this perfects the application and no additional papers or filing fees are required.

Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: May 2, 2012

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60768330.doc

CERTIFICATE OF (A) MAILING BY FIRST CLASS MAIL OR (B) TRANSMISSION
I hereby certify under 37 CFR §1.8(a) that this correspondence is either (A) addressed as set out in 37 CFR §1.1(a) and being deposited with the United States Postal Service as first class mail with sufficient postage, or (B) being transmitted by facsimile in accordance with 37 CFR § 1.6(d) or via the Office electronic filing system in accordance with 37 CFR § 1.6(a)(4), on the date indicated below.

May 2, 2012
Date of Deposit or Transmission

/Theresa Russek/
Signature

Theresa Russek
Typed or Printed Name of Person Signing Certificate

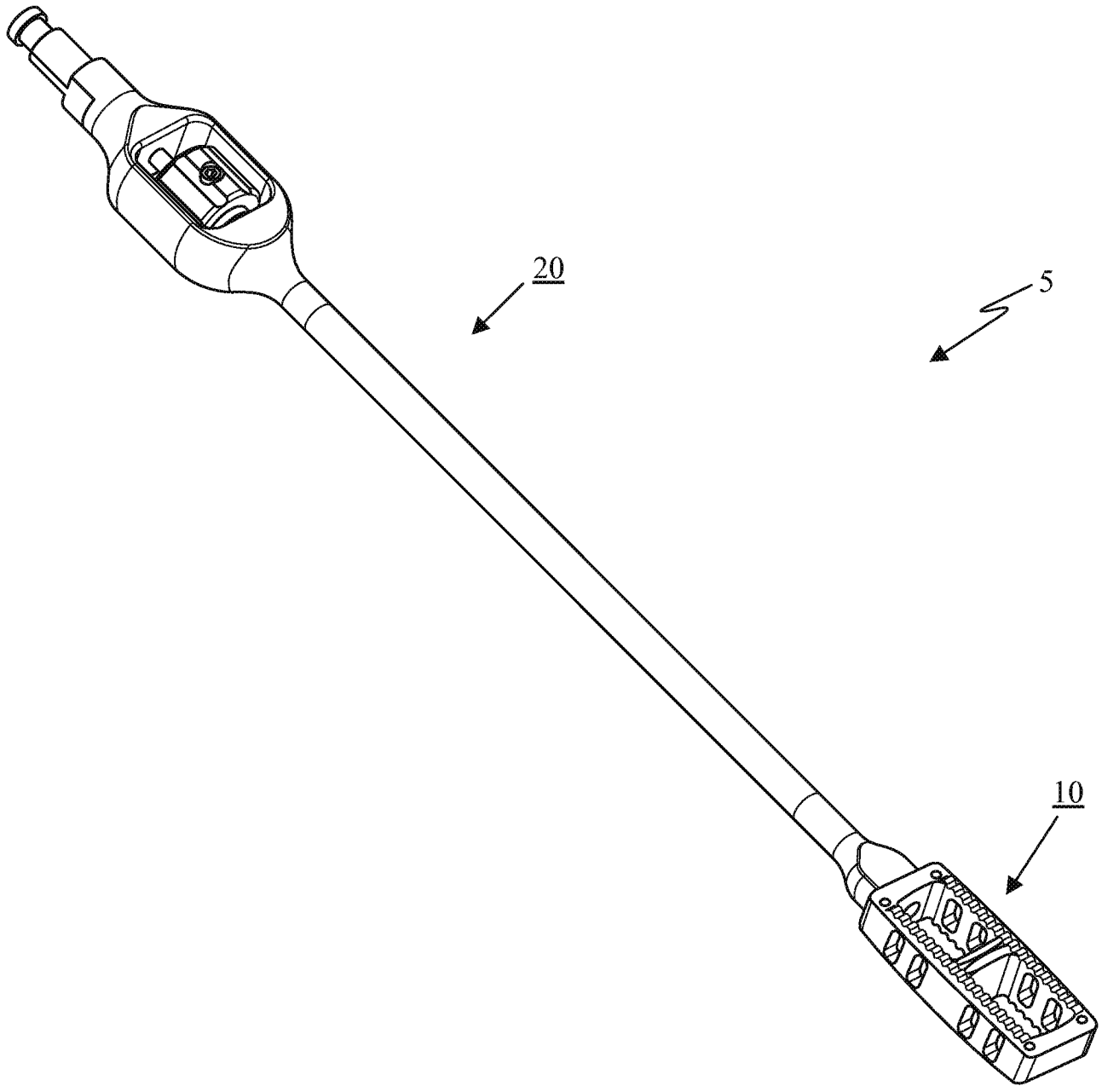


FIG. 1

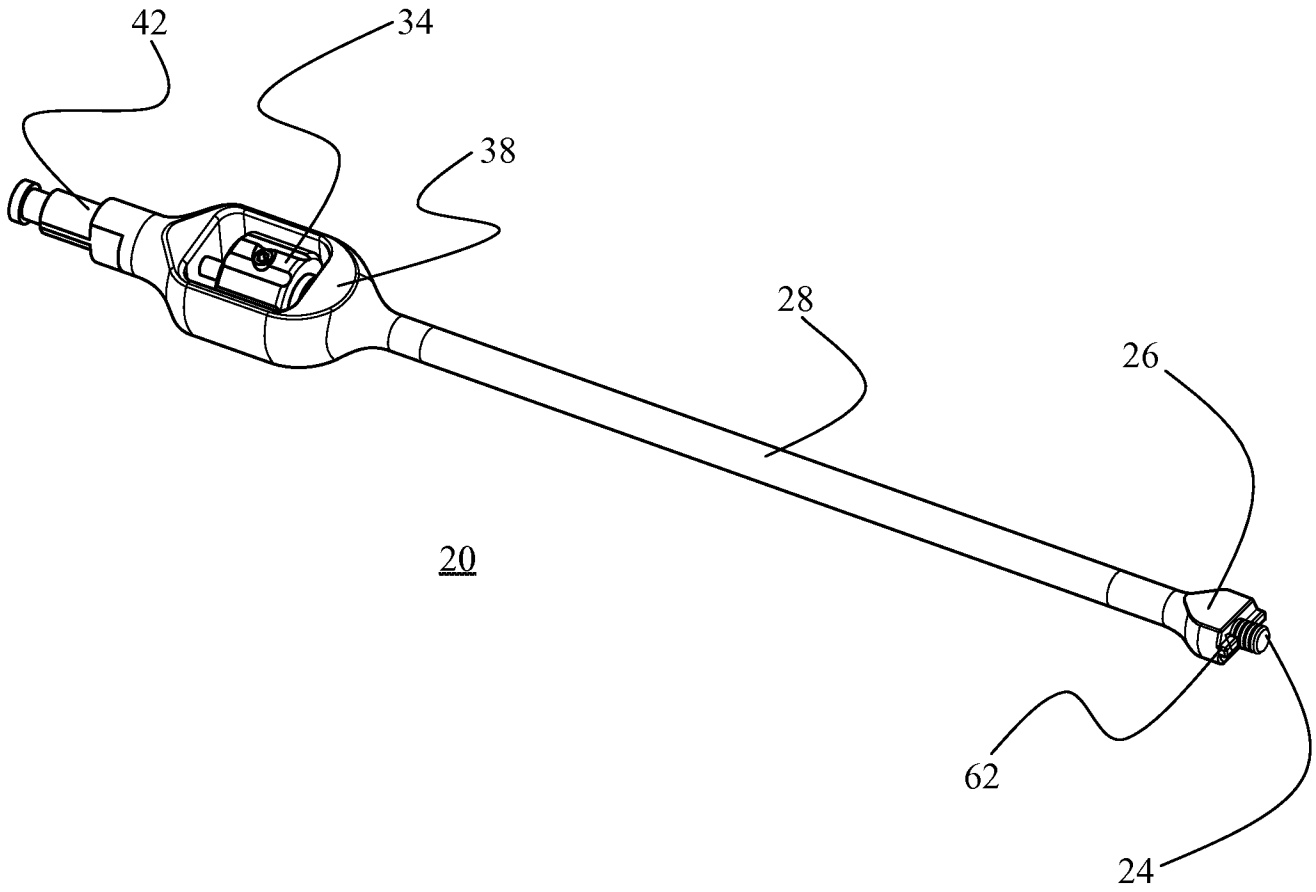


FIG. 7

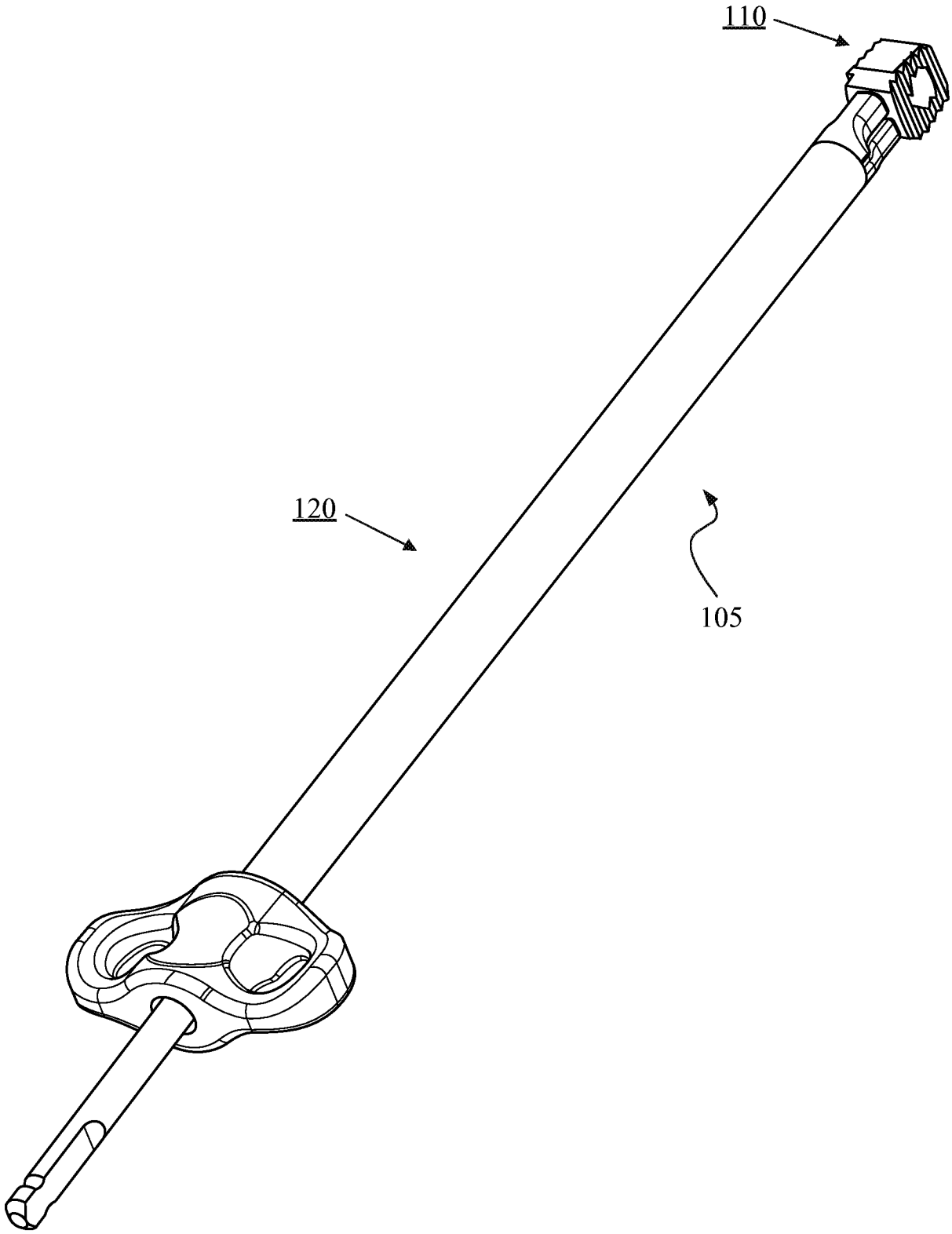


FIG. 10

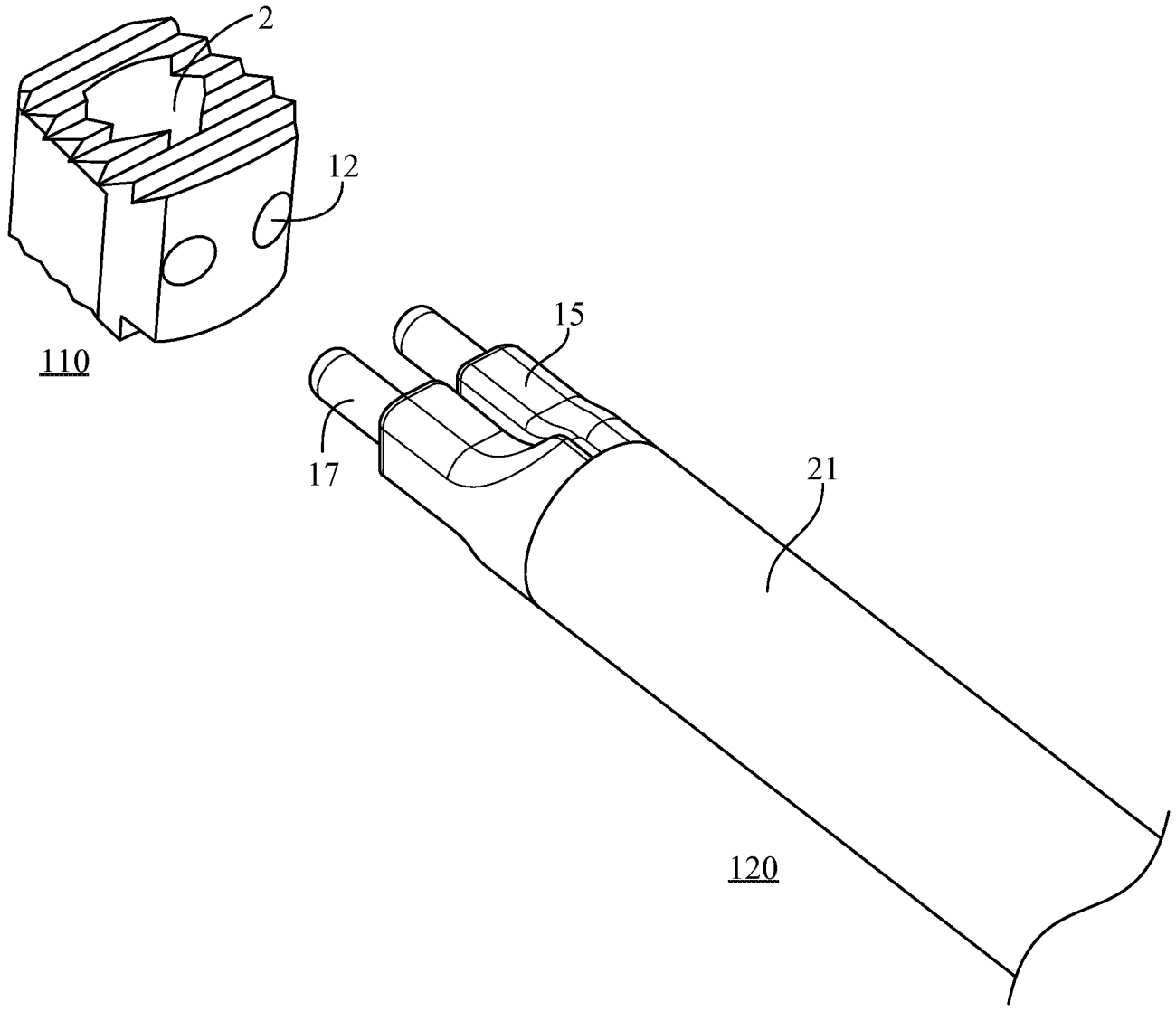


FIG. 15

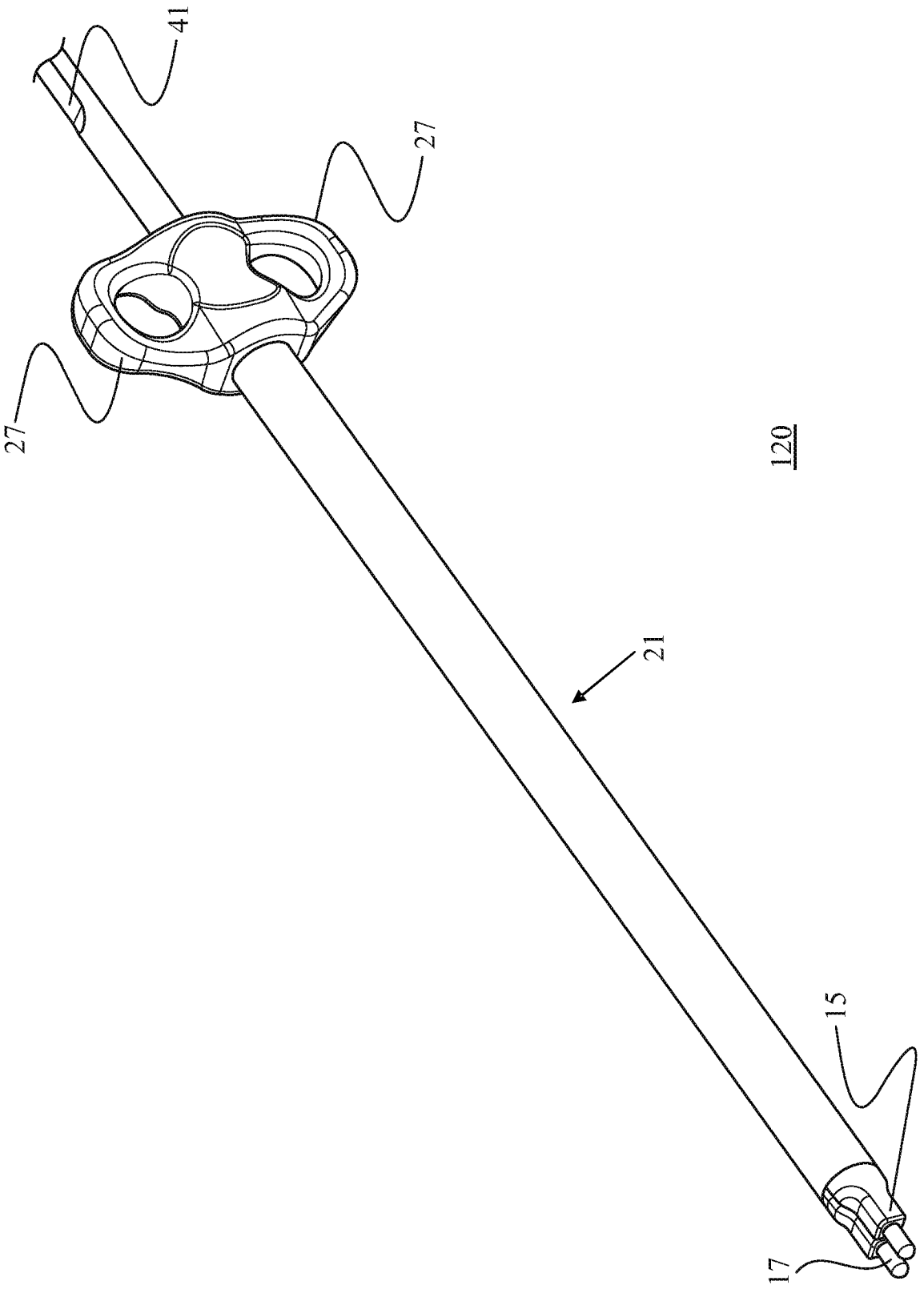


FIG. 16

Electronic Acknowledgement Receipt

EFS ID:	12688544
Application Number:	13441092
International Application Number:	
Confirmation Number:	1088
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Customer Number:	26191
Filer:	Michael T. Hawkins/Theresa Russek
Filer Authorized By:	Michael T. Hawkins
Attorney Docket Number:	13958-0099003
Receipt Date:	02-MAY-2012
Filing Date:	06-APR-2012
Time Stamp:	16:59:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Response to Pre-Exam Formalities Notice	response.pdf	53428 1fc2f57c1753552ca3b5292220dfcc6fbfb9e65e	no	1

Warnings:	
Information:	

2	Drawings-only black and white line drawings	figures.pdf	80445 0ce4baef4ee450d93689adfdce4f94818534ee9b	no	5

Warnings:	
Information:	
Total Files Size (in bytes):	133873

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/441,092	04/06/2012	Matthew Curran	13958-0099003

CONFIRMATION NO. 1088

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

FORMALITIES LETTER

OC000000053940130

Date Mailed: 04/27/2012

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings submitted to the Office are not electronically reproducible because portions of figures 1, 7, 10, 15, 16 are missing and/or blurry.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/eggolla/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/441,092	04/06/2012	Matthew Curran	13958-0099003

CONFIRMATION NO. 1088

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

POA ACCEPTANCE LETTER

OC000000053824772

Date Mailed: 04/27/2012

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/06/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hkquach/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/441,092

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	380
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	620
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	250
TOTAL CLAIMS (37 CFR 1.16(i))	46 minus 20 =	* 26			OR	x 60 =	1560
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 250 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2810

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/441,092	04/06/2012	3733	2810	13958-0099003	46	2

CONFIRMATION NO. 1088

26191
FISH & RICHARDSON P.C. (TC)
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

FILING RECEIPT

OC000000053940129

Date Mailed: 04/27/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Matthew Curran, Carlsbad, CA;
Mark Peterson, Medford, CA;

Assignment For Published Patent Application

NuVasive, Inc., San Diego, CA

Power of Attorney: The patent practitioners associated with Customer Number 26191

Domestic Priority data as claimed by applicant

This application is a CON of 13/440,062 04/05/2012
which is a CON of 13/079,645 04/04/2011
which is a CON of 11/093,409 03/29/2005 PAT 7918891
which claims benefit of 60/557,536 03/29/2004

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 04/19/2012

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/441,092**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No

Title

Systems and Methods for Spinal Fusion

Preliminary Class

623

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

FISH & RICHARDSON P.C.

Street Address
3200 RBC PLAZA
60 SOUTH SIXTH STREET
MINNEAPOLIS, MINNESOTA
55402

Mail Address
P.O. BOX 1022
MINNEAPOLIS, MINNESOTA
55440-1022

Telephone
612 335-5070

Facsimile
877 769-7945

Web Site
WWW.FR.COM

Frederick P. Fish
1855-1930

W.K. Richardson
1859-1951

FR

ATLANTA
AUSTIN
BOSTON
DALLAS
DELAWARE
HOUSTON
MUNICH
NEW YORK
SILICON VALLEY
SOUTHERN CALIFORNIA
TWIN CITIES
WASHINGTON, DC

April 6, 2012

Attorney Docket No.: 13958-0099003/104US4

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Presented for filing is a new continuation patent application of:

Applicant: MATTHEW CURRAN AND MARK PETERSON

Title: SYSTEMS AND METHODS FOR SPINAL FUSION

Assignee:

Enclosed are the following papers, including those required to receive a filing date under 37 C.F.R. § 1.53(b):

	Pages
Specification	25
Claims	10
Abstract	1
Declaration	3
Drawing(s)	20

Enclosures:

— Application Data Sheet, 5 pages.
— New disclosure information, including:
Information disclosure statement, 1 page.
PTO-1449, 11 pages.
References, 0 items.
— Statement under rule 3.73, 9 pages.

This application is continuation of United States Patent Application Serial Number 13/440,062 filed April 5, 2012, which is a continuation of United States Patent Application Serial Number 13/079,645 filed April 4, 2011, which is continuation of United States Patent Application Serial Number 11/093,409 filed March 29, 2005 (now U.S. Patent No. 7,918,891), which claims the benefit of the filing date under 35 USC 119(e) of United States Provisional Application entitled "Systems and Methods for Spinal Fusion," serial No. 60/557,536 filed March 29, 2004.

Basic Filing Fee			$380
Search Fee			$620
Examination Fee			$250
Total Claims 46	over 20	**26 x $60**	$1560
Independent Claims 2	over 3	**0 x $250**	$0
Fee for Multiple Dependent claims			$0
Application size fee for each 50 pages over 100 No (25 +20)*.75) - 100)/50 = No0 x			$0
Total Filing fee			$2810

The filing fee in the amount of $2810 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply all charges or credits to Deposit Account No. 06-1050, referencing Attorney Docket No. 13958-0099003.

If this application is found to be incomplete, or if a telephone conference would otherwise be helpful, please call the undersigned at (612) 335-5070.

Please direct all correspondence to the following:

26191
PTO Customer Number

Respectfully submitted,

/Michael T. Hawkins/

Michael T. Hawkins
Reg. No. 57,867
Enclosures
MTH/kmo
60763337.doc

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	13958-0099003
	Application Number	
Title of Invention	Systems and Methods for Spinal Fusion	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Matthew		Curran	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Carlsbad	State/Province	CA	Country of Residence i	US

Citizenship under 37 CFR 1.41(b) i: US

Mailing Address of Applicant:

Address 1	3218 Rancho Quartillo		
Address 2			
City	Carlsbad	State/Province	CA
Postal Code	92009	Country i	US

Applicant 2 Remove

Applicant Authority ◉ Inventor ○ Legal Representative under 35 U.S.C. 117 ○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Mark		Peterson	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Medford	State/Province	CA	Country of Residence i	US

Citizenship under 37 CFR 1.41(b) i: US

Mailing Address of Applicant:

Address 1	840 Royal Avenue Suite #1		
Address 2			
City	Medford	State/Province	CA
Postal Code	97504	Country i	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	13958-0099003
	Application Number	
Title of Invention	Systems and Methods for Spinal Fusion	

Customer Number	26191		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	Systems and Methods for Spinal Fusion		
Attorney Docket Number	13958-0099003	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	20	Suggested Figure for Publication (if any)	2

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	26191		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation of	13/440,062	2012-04-05
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13440062	Continuation of	13079645	2011-04-04

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	13958-0099003
	Application Number	
Title of Invention	Systems and Methods for Spinal Fusion	

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13079645	Continuation of	11093409	2005-03-29
Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11093409	non provisional of	60557536	2004-03-29

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			◯ Yes ◯ No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1 Remove

If the Assignee is an Organization check here. ☒			
Organization Name	NuVasive, Inc.		
Mailing Address Information:			
Address 1	7475 Lusk Boulevard		
Address 2			
City	San Diego	**State/Province**	CA
Country [i] US		Postal Code	92121
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button. Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Michael T. Hawkins/			Date (YYYY-MM-DD)	2012-04-06
First Name	Michael T.	Last Name	Hawkins	Registration Number	57867

PTO/SB/14 (11-08)
Approved for use through 09/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	13958-0099003
	Application Number	
Title of Invention	Systems and Methods for Spinal Fusion	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SYSTEMS AND METHODS FOR SPINAL FUSION

CROSS-REFERENCE TO RELATED APPLICATION

This application is continuation of United States Patent Application Serial Number 13/440,062 filed April 5, 2012, which is a continuation of United States Patent Application Serial Number 13/079,645 filed April 4, 2011, which is continuation of United States Patent Application Serial Number 11/093,409 filed March 29, 2005 (now U.S. Patent No. 7,918,891), which claims the benefit of the filing date under 35 USC 119(e) of United States Provisional Application entitled "Systems and Methods for Spinal Fusion," serial No. 60/557,536 filed March 29, 2004, the entire contents of these prior applications are incorporated herein by reference.

BACKGROUND OF THE INVENTION

I. Field of the Invention

The present invention relates generally to spinal surgery and, more particularly, to a system and method for spinal fusion comprising a spinal fusion implant of non-bone construction releasably coupled to an insertion instrument dimensioned to introduce the spinal fusion implant into any of a variety of spinal target sites.

II. Discussion of the Prior Art

Currently there are nearly 500,000 spine lumbar and cervical fusion procedures performed each year in the United States. Such procedures are commonly performed to correct problems, such as chronic back or neck pain, which result from degenerated intervertebral discs

or trauma. Generally, spinal fusion procedures involve removing some or all of the diseased or damaged disc, and inserting one or more intervertebral implants into the resulting disc space. Introducing the intervertebral implant serves to restore the height between adjacent vertebrae ("disc height"), which reduces if not eliminates neural impingement commonly associated with a damaged or diseased disc.

Autologous bone grafts are widely used intervertebral implant for lumbar fusion. Autologous bone grafts are obtained by harvesting a section of bone from the iliac crest of the patient and thereafter implanting the article of autologous bone graft to effect fusion. While generally effective, the use of autologous bone grafts suffers certain drawbacks. A primary drawback is the morbidity associated with harvesting the autologous graft from the patient's iliac crest. Another related drawback is the added surgical time required to perform the bone-harvesting.

Allograft bone grafts have been employed with increased regularity in an effort to overcome the drawbacks of autologous bone grafts. Allograft bone grafts are harvested from cadaveric specimens, machined, and sterilized for implantation. While allograft bone grafts eliminate the morbidity associated with iliac crest bone harvesting, as well as decrease the overall surgical time, they still suffer certain drawbacks. A primary drawback is supply constraint, in that the tissue banks that process and produce allograft bone implants find it difficult to forecast allograft given the inherent challenges in forecasting the receipt of cadavers. Another related drawback is that it is difficult to manufacture the allograft with consistent shape and strength characteristics given the variation from cadaver to cadaver.

The present invention is directed at overcoming, or at least improving upon, the disadvantages of the prior art.

SUMMARY OF THE INVENTION

The present invention overcomes the drawbacks of the prior art by providing a spinal fusion system and related methods involving the use of a spinal fusion implant of non-bone construction. The non-bone construction of the spinal fusion implant of the present invention overcomes the drawbacks of the prior art in that it is not supply limited (as with allograft) and does not require harvesting bone from the patient (as with autograft). The spinal fusion implant of the present invention may be comprised of any suitable non-bone composition, including but not limited to polymer compositions (e.g. poly-ether-ether-ketone (PEEK) and/or poly-ether-ketone-ketone (PEKK)), ceramic, metal or any combination of these materials.

The spinal fusion implant of the present invention may be provided in any number of suitable shapes and sizes depending upon the particular surgical procedure or need. The spinal fusion implant of the present invention may be dimensioned for use in the cervical and/or lumbar spine without departing from the scope of the present invention. For lumbar fusion, the spinal fusion implant of the present invention may be dimensioned, by way of example only, having a width ranging between 9 and 18 mm, a height ranging between 8 and 16 mm, and a length ranging between 25 and 45 mm. For cervical fusion, the spinal fusion implant of the present invention may be dimensioned, by way of example only, having a width about 11 mm, a height ranging between 5 and 12 mm, and a length about 14 mm.

The spinal fusion implant of the present invention may be provided with any number of additional features for promoting fusion, such as apertures extending between the upper and lower vertebral bodies which allow a boney bridge to form through the spinal fusion implant of the present invention. Such fusion-promoting apertures may be dimensioned to receive any number of suitable osteoinductive agents, including but not limited to bone morphogenic protein (BMP) and bio-resorbable polymers, including but not limited to any of a variety of poly (D,L-lactide-co-glycolide) based polymers. The spinal fusion implant of the present invention is preferably equipped with one or more lateral openings which aid it provides in visualization at the time of implantation and at subsequent clinical evaluations.

The spinal fusion implant of the present invention may be provided with any number of suitable anti-migration features to prevent spinal fusion implant from migrating or moving from the disc space after implantation. Suitable anti-migration features may include, but are not necessarily limited to, angled teeth formed along the upper and/or lower surfaces of the spinal fusion implant and/or spike elements disposed partially within and partially outside the upper and/or lower surfaces of the spinal fusion implant. Such anti-migration features provide the additional benefit of increasing the overall surface area between the spinal fusion implant of the present invention and the adjacent vertebrae, which promotes overall bone fusion rates.

The spinal fusion implant of the present invention may be provided with any number of features for enhancing the visualization of the implant during and/or after implantation into a spinal target site. According to one aspect of the present invention, such visualization

enhancement features may take the form of the spike elements used for anti-migration, which may be manufactured from any of a variety of suitable materials, including but not limited to a metal, ceramic, and/or polymer material, preferably having radiopaque characteristics. The spike elements may also take any of a variety of suitable shapes, including but not limited to a generally elongated element disposed within the implant such that the ends thereof extend generally perpendicularly from the upper and/or lower surfaces of the implant. The spike elements may each comprise a unitary element extending through upper and lower surfaces or, alternatively, each spike element may comprise a shorter element which only extends through a single surface (that is, does not extend through the entire height of the implant). In any event, when the spike elements are provided having radiodense characteristics and the implant is manufactured from a radiolucent material (such as, by way of example only, PEEK and/or PEKK), the spike elements will be readily observable under X-ray or fluoroscopy such that a surgeon may track the progress of the implant during implantation and/or the placement of the implant after implantation.

The spinal implant of the present invention may be introduced into a spinal target site through the use of any of a variety of suitable instruments having the capability to releasably engage the spinal implant. In a preferred embodiment, the insertion instrument permits quick, direct, accurate placement of the spinal implant of the present invention into the intervertebral space. According to one embodiment, the insertion instrument includes a threaded engagement element dimensioned to threadably engage into a receiving aperture formed in the spinal fusion implant of the present invention. According to another embodiment, the insertion instrument includes an elongate fork member and a generally tubular lock member.

BRIEF DESCRIPTION OF THE DRAWINGS

Many advantages of the present invention will be apparent to those skilled in the art with a reading of this specification in conjunction with the attached drawings, wherein like reference numerals are applied to like elements and wherein:

Figure 1 is a perspective view of a spinal fusion system of the present invention, including a lumbar fusion implant releasably coupled to an insertion instrument according to one embodiment of the present invention;

Figure 2 is a perspective view of the lumbar fusion implant of FIG. 1, illustrating (among other things) fusion apertures extending between top and bottom surfaces, a plurality of visualization apertures extending through the side walls, and a variety of anti-migration features according to one embodiment of the present invention;

Figure 3 is a top view of the lumbar fusion implant of FIG. 1, illustrating (among other things) the fusion apertures and the anti-migration features according to one embodiment of the present invention;

Figure 4 is a side view of the lumbar fusion implant of FIG. 1, illustrating (among other things) the visualization apertures, the anti-migration feature, and a receiving aperture for releasably engaging the insertion instrument of FIG. 1 according to one embodiment of the present invention;

Figure 5 is an end view of the lumbar fusion implant of FIG. 1, illustrating (among other things) the receiving aperture formed in the proximal end, the anti-migration features, and the visualization apertures according to one embodiment of the present invention;

Figure 6 is an enlarged side view of the lumbar fusion implant of FIG. 1 releasably coupled to the distal end of the insertion instrument of FIG. 1 according to one embodiment of the present invention;

Figure 7 is a perspective view of the insertion instrument of FIG. 1 in a fully assembled form according to one embodiment of the present invention;

Figure 8 is an enlarged perspective view of the distal region of the insertion instrument of FIG. 1 according to one embodiment of the present invention;

Figure 9 is a perspective exploded view of the insertion instrument of FIG. 1, illustrating the component parts of the insertion instrument according to one embodiment of the present invention;

Figure 10 is a perspective view of a spinal fusion system of the present invention, including a cervical fusion implant releasably coupled to a cervical insertion instrument according to one embodiment of the present invention;

Figure 11 is a perspective view of the proximal side of the cervical fusion implant of FIG. 10, illustrating (among other things) fusion apertures extending between top and bottom surfaces, a plurality of visualization apertures extending through the lateral walls, a plurality of receiving apertures, and a variety of anti-migration features according to one embodiment of the present invention;

Figure 12 is a perspective view of the distal side cervical fusion implant of FIG. 10, illustrating (among other things) the visualization apertures and anti-migration features;

Figure 13 is a top view of the cervical fusion implant of FIG. 10, illustrating (among other things) the fusion apertures and anti-migration features according to one embodiment of the present invention;

Figure 14 is a side view of the cervical fusion implant of FIG. 10, illustrating (among other things) the visualization apertures, the anti-migration features, and one of two receiving apertures provided in the proximal end for releasably engaging the cervical insertion instrument of FIG. 10 according to one embodiment of the present invention;

Figure 15 is a perspective view of the cervical fusion implant of the present invention just prior to attachment to the cervical insertion device according to one embodiment of the present invention;

Figure 16 is a perspective view of the insertion instrument of FIG. 10 in a fully assembled form according to one embodiment of the present invention;

Figure 17 is a perspective exploded view of the insertion instrument of FIG. 10, illustrating the component parts of the insertion instrument according to one embodiment of the present invention;

Figures 18 and 19 are perspective and side views, respectively, illustrating the "enhanced visualization" feature of the present invention as employed within a lumbar fusion implant according to one embodiment of the present invention;

Figures 20 and 21 are perspective and side views, respectively, illustrating the "enhanced visualization" feature of the present invention as employed within a lumbar fusion implant according to one embodiment of the present invention; and

Figures 22 and 23 are perspective and side views, respectively, illustrating the "enhanced visualization" feature of the present invention as employed within a cervical fusion implant according to one embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Illustrative embodiments of the invention are described below. In the interest of clarity, not all features of an actual implementation are described in this specification. It will of course be appreciated that in the development of any such actual embodiment, numerous

implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which will vary from one implementation to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the art having the benefit of this disclosure. The system to facilitate bone fusion and related methods disclosed herein boasts a variety of inventive features and components that warrant patent protection, both individually and in combination.

FIG. 1 illustrates, by way of example only, a spinal fusion system 5 for performing spinal fusion between adjacent lumbar vertebrae, including an exemplary spinal fusion implant 10 and an exemplary insertion instrument 20 provided in accordance with the present invention. The spinal fusion implant 10 may be comprised of any suitable non-bone composition having suitable radiolucent characteristics, including but not limited to polymer compositions (e.g. poly-ether-ether-ketone (PEEK) and/or poly-ether-ketone-ketone (PEKK)) or any combination of PEEK and PEKK. The spinal fusion implant 10 of the present invention may be dimensioned, by way of example only, having a width ranging between 9 and 18 mm, a height ranging between 8 and 16 mm, and a length ranging between 25 and 45 mm.

As will be described in detail below, the insertion instrument 20 is configured to releasably maintain the exemplary spinal fusion implant 10 in the proper orientation during insertion into a lumbar disc space and thereafter release to deposit the implant 10. The exemplary spinal fusion implant 10, having been deposited in the disc space, facilitates spinal fusion over time by maintaining a restored disc height as natural bone growth occurs through

and/or past the implant 10, resulting in the formation of a boney bridge extending between the adjacent vertebral bodies. The implant 10 is particularly suited for introduction into the disc space via a lateral (trans-psoas) approach to the spine, but may be introduced in any of a variety of approaches, such as posterior, anterior, antero-lateral, and postero-lateral, without departing from the scope of the present invention (depending upon the sizing of the implant 10).

The spinal fusion implant 10 of the present invention may be provided with any number of additional features for promoting fusion, such as apertures 2 extending between the upper and lower vertebral bodies which allow a boney bridge to form through the spinal fusion implant 10. According to a still further aspect of the present invention, this fusion may be facilitated or augmented by introducing or positioning various osteoinductive materials within the apertures 2 and/or adjacent to the spinal fusion implant 10. Such osteoinductive materials may be introduced before, during, or after the insertion of the exemplary spinal fusion implant 10, and may include (but are not necessarily limited to) autologous bone harvested from the patient receiving the spinal fusion implant 10, bone allograft, bone xenograft, any number of non-bone implants (e.g. ceramic, metallic, polymer), bone morphogenic protein, and bio-resorbable compositions, including but not limited to any of a variety of poly (D,L-lactide-co-glycolide) based polymers.

The spinal fusion implant 10 of the present invention is preferably equipped with one or more visualization apertures 4 situated along the lateral sides, which aid in visualization at the time of implantation and at subsequent clinical evaluations. More specifically, based on the generally radiolucent nature of the implant 10, the visualization apertures 4 provide the ability to

visualize the interior of the implant 10 during X-ray and/or other suitable imaging techniques which are undertaken from the side (or "lateral") perspective of the implant 10. If fusion has taken place, the visualization apertures 4 will provide a method for the surgeon to make follow up assessments as to the degree of fusion without any visual interference from the spinal fusion implant 10. Further, the visualization apertures 4 will provide an avenue for cellular migration to the exterior of the spinal fusion implant 10. Thus the spinal fusion implant 10 will serve as additional scaffolding for bone fusion on the exterior of the spinal fusion implant 10.

FIGS. 2-5 depict various embodiments of the exemplary spinal fusion implant 10. Some common attributes are shared among the various embodiments. More specifically, each spinal fusion implant 10 has a top surface 31, a bottom surface 33, lateral sides 14, a proximal side 22, and a distal side 16. In one embodiment, the top and bottom surfaces 31, 33 are generally parallel. It can be appreciated by one skilled in the art that although the surfaces 31, 33 are generally parallel to one another, they may be provided in any number of suitable shapes, including but not limited to concave and/or convex. When provided as convex shapes, the top and bottom surfaces 31, 33 may better match the natural contours of the vertebral end plates. Although not shown, it will be appreciated that the top and bottom surfaces 31, 33 may be angled relative to one another to better match the natural lordosis of the lumbar and cervical spine or the natural kyphosis of the thoracic spine.

The exemplary spinal fusion implant 10 also preferably includes anti-migration features designed to increase the friction between the spinal fusion implant 10 and the adjacent contacting surfaces of the vertebral bodies so as to prohibit migration of the spinal fusion implant 10 after

implantation. Such anti-migration features may include ridges 6 provided along the top surface 31 and/or bottom surface 33. Additional anti-migration features may also include a pair of spike elements 7 disposed within the proximal region of the implant 10, a pair of spike elements 8 disposed within the distal region of the implant 10, and a pair of spike elements 9 disposed within the central region of the implant 10. Spike elements 7, 8, 9 may extend from the top surface 31 and/or bottom surface 33 within the respective proximal, distal and central regions of the implant 10. The spike elements 7, 8, 9 may be manufactured from any of a variety of suitable materials, including but not limited to a metal, ceramic, and/or polymer material, preferably having radiopaque characteristics. The spike elements 7, 8, 9 may also take any of a variety of suitable shapes, including but not limited to a generally elongated element disposed within the implant 10 such that the ends thereof extend generally perpendicularly from the upper and/or lower surfaces 31, 33 of the implant 10. As best appreciated in FIG. 4, the spike elements 7, 8, 9 may each comprise a unitary element extending through upper and lower surfaces 31, 33. Alternatively, each spike element 7, 8, 9 may comprise a shorter element which only extends through a single surface 31, 33 (that is, does not extend through the entire height of the implant 10). In any event, when the spike elements 7, 8, 9 are provided having radiodense characteristics and the implant 10 is manufactured from a radiolucent material (such as, by way of example only, PEEK and/or PEKK), the spike elements 7, 8, 9 will be readily observable under X-ray or fluoroscopy such that a surgeon may track the progress of the implant 10 during implantation and/or the placement of the implant 10 after implantation.

The spinal fusion implant 10 has two large fusion apertures 2, separated by a medial support 50, extending in a vertical fashion through the top surface 31 and bottom surface 33.

The fusion apertures 2 function primarily as an avenue for bony fusion between adjacent vertebrae. The fusion apertures 2 may be provided in any of a variety of suitable shapes, including but not limited to the generally rectangular shape best viewed in FIG. 3, or a generally circular, oblong and/or triangular shape or any combination thereof. The spinal fusion implant 10 may have a plurality of visualization apertures 4 which allow a clinician to make visual observations of the degree of bony fusion un-obscured by the lateral side 14 to facilitate further diagnosis and treatment. The visualization apertures 4 may be provided in any of a variety of suitable shapes, including but not limited to the generally oblong shape best viewed in FIG. 4, or a generally circular, rectangular and/or triangular shape or any combination thereof.

The spinal fusion implant 10 may be provided with any number of suitable features for engaging the insertion instrument 20 without departing from the scope of the present invention. As best viewed in FIGS. 4-6, one engagement mechanism involves providing a threaded receiving aperture 12 in the proximal sidewall 22 of the spinal fusion implant 10 of the present invention. The threaded receiving aperture 12 is dimensioned to threadably receive a threaded connector 24 on the insertion instrument 20 (as will be described in greater detail below). The receiving aperture 12 extends inwardly from the proximal side 22 in a generally perpendicular fashion relative to the proximal side 22. Although shown as having a generally circular cross-section, it will be appreciated that the receiving aperture 12 may be provided having any number of suitable shapes or cross-sections, including but not limited to rectangular or triangular. In addition to the receiving aperture 12, the spinal fusion implant 10 is preferably equipped with a pair of grooved purchase regions 60, 61 extending generally horizontally from either side of the receiving aperture 12. The grooved purchase regions 60, 61 are dimensioned to receive

corresponding distal head ridges 62, 63 on the insertion instrument 20 (as will be described in greater detail below), which collectively provide an enhanced engagement between the implant 10 and instrument 20.

FIGS. 6-9 detail the exemplary insertion instrument 20 according to one embodiment of the invention. The exemplary insertion instrument 20 includes an elongate tubular element 28 and an inserter shaft 44. The elongate tubular element 28 is constructed with a distal head 26 at its distal end, distal head ridges 62, 63 on the distal end of the distal head 26, a thumbwheel housing 38 at its proximal end and a handle 42 at its proximal end. The elongate tubular element 28 is generally cylindrical and of a length sufficient to allow the device to span from the surgical target site to a location sufficiently outside the patient's body so the handle 42 and thumbwheel housing 38 can be easily accessed by a clinician or a complimentary controlling device.

The elongate tubular element 28 is dimensioned to receive a spring 46 and the proximal end of the inserter shaft 44 into the inner bore 64 of the elongate tubular element 28. The inserter shaft 44 is dimensioned such that the threaded connector 24 at the distal end of the inserter shaft 44 just protrudes past the distal head ridges 62, 63 to allow engagement with the receiving aperture 12 of the spinal fusion implant 10. It should be appreciated by one skilled in the art that such a construction allows the inserter shaft 44 to be able to rotate freely within the elongate tubular element 28 while stabilized by a spring 46 to reduce any slidable play in the insertion instrument 20.

The handle 42 is generally disposed at the proximal end of the insertion instrument 20. The handle 42 is fixed to the thumbwheel housing 38 allowing easy handling by the clinician. Because the handle 42 is fixed the clinician has easy access to the thumbwheel 34 and can stably turn the thumbwheel 34 relative to the thumbwheel housing 38. Additionally, the relative orientation of the thumbwheel housing 38 to the handle 42 orients the clinician with respect to the distal head 26 and distal head ridge 62. By way of example, the thumbwheel housing 38 holds a thumbwheel 34, a set screw 32, and a spacer 36. The inserter shaft 44 is attached to the thumbwheel 34 and is freely rotatable with low friction due to the spacer 36. One skilled in the art can appreciate myriad methods of assembling a housing similar to the above described.

FIG. 6 details the distal head ridge of the exemplary insertion instrument 20 coupled to the spinal fusion implant 10 through the purchase regions 60, 61. The distal head ridges 62, 63 are dimensioned to fit slidably into the purchase regions 60, 61 with low friction to allow accurate engagement of the threaded connector 24 to the receiving aperture 12 of the spinal fusion implant 10. In the presented embodiment, the outer dimension of the threaded connector 24 is smaller than the largest outer dimension of the distal head 26 and elongate tubular element 28. Alternatively, other methods of creating a gripping surface are contemplated including but not limited to knurling or facets.

In order to use the system to perform a spinal fusion procedure, the clinician must first designate the appropriate implant size. After the spinal fusion implant 10 is chosen, the distal head ridges 62, 63 of the inserter shaft 44 are inserted into the purchase regions 60, 61 of the spinal fusion implant 10. At that time the spinal fusion implant 10 and insertion instrument 20

are slidably engaged with one another. Before the clinician can manipulate the combined spinal fusion implant 10 and insertion instrument 20, they must be releasably secured together. In order to secure the spinal fusion implant 10 onto the threaded connector 24 of the inserter instrument 20, the clinician employs the thumbwheel 34 to rotate the inserter shaft 44 and threaded connector 24. The rotation of the threaded connector 24 will releasably engage the receiving aperture of the spinal fusion implant 10 and stabilize the insertion instrument 20 relative to the spinal fusion implant 10.

A clinician can utilize the secured system in either an open or minimally invasive spinal fusion procedure. In either type of procedure, a working channel is created in a patient that reaches the targeted spinal level. After the creation of that channel, the intervertebral space may be prepared via any number of well known preparation tools, including but not limited to kerrisons, rongeurs, pituitaries, and rasps. After preparation, the insertion instrument 20 is used to place a spinal fusion implant 10 into the prepared intervertebral space. Once the implant 10 is inserted into the prepared space, the implant 10 is released from the insertion instrument 20 by rotating the thumbwheel 34 to disengage the threaded connector 24 from the receiving aperture 12. That motion removes the compressive force on the purchase regions 60, 61 between the distal head 26 and the distal head ridges 62, 63 of the spinal fusion implant 10 and allows the insertion instrument to be slidably removed from the implant 10. After the threaded connector 24 is disengaged from the implant 10, the insertion instrument 20 is removed from the working channel and the channel is closed. As previously mentioned, additional materials may be included in the procedure before, during or after the insertion of the spinal fusion implant 10 to aid the natural fusion of the targeted spinal level.

FIG. 10 illustrates a spinal fusion system 105 for performing spinal fusion between adjacent cervical vertebrae, including an exemplary spinal fusion implant 110 and an exemplary cervical insertion instrument 120 provided in accordance with the present invention. The spinal fusion implant 110 may comprise of any suitable non-bone composition having suitable radiolucent characteristics, including but not limited to polymer compositions (e.g. poly-ether-ether-ketone (PEEK) and/or poly-ether-ketone-ketone (PEKK)) or any combination of PEEK and PEKK. The spinal fusion implant 110 may be provided in any number of suitable sizes, such as, by way of example only, a width ranging between 11 to 14 mm, a height ranging between 5 and 12 mm, and a length ranging from 14 and 16 mm.

As will be described in detail below, the cervical insertion instrument 120 is configured to releasably maintain the exemplary cervical fusion implant 110 in the proper orientation for insertion. The cervical fusion implant 110 may be simultaneously introduced into a disc space while locked within the cervical insertion instrument 120 and thereafter released. The exemplary cervical fusion implant 110, having been deposited in the disc space, effects spinal fusion over time as the natural bone healing process integrates and binds the implant with the adjacent vertebral bodies. This fusion may be facilitated or augmented by introducing or positioning various materials in a space created within or adjacent to the cervical fusion implant 110. Those materials may be introduced before, during, or after the insertion of the exemplary cervical fusion implant 110. The additional material may include bone autograft harvested from the patient receiving the spinal fusion implant 10, one or more additional bone allograft, bio-

resorbables or xenograft implants, any number of non-bone implants, and any number of fusion promoting compounds such as bone morphogenic protein.

FIGS. 11-14 depict various embodiments of the exemplary cervical fusion implant 110. Some common attributes are shared among the various embodiments. More specifically, each cervical fusion implant 110 has a top surface 31, a bottom surface 33, lateral sides 14, a proximal side 22, and a distal side 16. In one embodiment, the top and bottom surfaces 31, 33 are generally parallel. It can be appreciated by one skilled in the art that although the surfaces are generally parallel, that the top 31 and bottom 33 surfaces may be angled with respect to one another to match the natural curve of the spine (i.e. lordosis or kyphosis). By way of example, implants for the cervical or lumbar regions of the spine will have anterior height greater than the posterior height to match the natural lordosis in those regions. Inversely, the implants designed for implantation into the thoracic region will be manufactured with a posterior height greater than the anterior height to match the natural kyophosis in that region. Additionally, the angled surface can aid in overall fit within the vertebral disc space.

The cervical fusion implant 110 preferably includes two receiving apertures 12 which are centrally aligned on the proximal side 22. The receiving apertures 12 extend inwardly from the proximal side 22 in a generally perpendicular fashion relative to the proximal side 22. Although shown as having a generally circular cross-section, it will be appreciated that the receiving aperture 12 may be provided having any number of suitable shapes or cross-sections, including but not limited to rectangular or triangular.

The exemplary cervical fusion implant 110 also preferably includes anti-migration features such as anti-migration teeth 6 along the top surface 31 and bottom surface 33. Additional anti-migration features may include a plurality of proximal anti-migration spikes 68 and/or distal anti-migration spikes 70 integrated vertically through the cervical fusion implant 110. The anti-migration features increase the friction between the cervical fusion implant 110 and the adjacent contacting surfaces of the vertebral bodies. That friction prohibits migration of the cervical fusion implant 110 during the propagation of natural bony fusion. It should be appreciated by one skilled in the art that such anti-migration teeth 6 can be oriented in a any manner other than generally vertically (as shown) without departing from the scope of the present invention. Moreover, as described above, the spikes 68, 70 may be constructed from any of a variety of radiopaque materials, including but not limited to a metal, ceramic, and/or polymer material. When the spike elements 68, 70 are provided having such radiodense characteristics, and the implant 110 is manufactured from a radiolucent material (such as, by way of example only, PEEK and/or PEKK), the spike elements 68, 70 will be readily observable under X-ray or fluoroscopy such that a surgeon may track the progress of the implant 110 during implantation and/or the placement of the implant 110 after implantation.

The cervical fusion implant 110 has one large fusion aperture 2, extending in a vertical fashion through the top surface 31 and bottom surface 33 which will function primarily as the avenue for bony fusion between adjacent vertebrae. The cervical fusion implant 110 may have a plurality of visualization apertures 4 which can also serve as an avenue of bony fusion on the lateral sides 14 via cell migration or additional adjuvants. The visualization apertures 4 serve an

additional function of allowing a clinician to make visual observations of the degree of bony fusion un-obscured by the lateral side 14 to facilitate further diagnosis and treatment.

FIG. 15 illustrates, by way of example, the orientation of the cervical fusion implant 110 prior to attachment to the cervical insertion instrument 120 by a clinician. One skilled in the art would appreciate that although the current embodiment shows a slidable engagement, various other methods of engagement are contemplated, such as, threadable or hooking features.

FIGS. 16-17 detail the tubular lock member 21 of the exemplary cervical inserter instrument 110. The tubular lock member 21 includes a central bore 25 dimensioned to receive the proximal end of the elongate fork member 11 therein. The internal dimension of the central bore 25 is smaller than the largest freestanding outer dimension of the taper feature 19. As a result, the portion of the elongate fork member 11 that may be received by the central bore 25 of the tubular lock member 21 is limited by interference between the distal end of the tubular lock member 21 and the taper feature 19 of the elongate fork member 11. In the present embodiment, the outer dimension of the threaded feature 13 of the elongate fork member 11 is smaller than the largest outer dimension of the taper feature 19 on the elongate fork member 11. A thread feature 23 (not shown) at the proximal end of the tubular lock member 21 is situated inside the central bore 25. The thread feature 23 matches the thread feature 13 on the elongate fork member 11 so that they can be threadably attached to one another. To ease the rotation of the tubular lock member 21 by hand, two semi-circular wings 27 may be provided protruding laterally outward from either side of the tubular lock member 21. Alternatively, other methods of creating a gripping surface are contemplated including but not limited to knurling or facets.

A clinician can utilize the secured system in either an open or minimally invasive spinal fusion procedure. In either type of procedure, a working channel is created in a patient that reaches the targeted spinal level. After the creation of that channel, the intervertebral space would be prepared (via known instruments as described above). After preparation, the insertion instrument 120 is used to place a cervical fusion implant 110 into the prepared intervertebral space. Once the cervical fusion implant 110 is inserted into the prepared space, the implant 110 is released from the cervical insertion instrument 120 by retracting the tubular lock member 21 from the elongate fork member 11 by rotating the tubular lock member 21 with respect to the elongate fork member 11 in the opposite direction from that used to initially secure the implant 110. That motion removes the compressive force on the purchase region 39 between the apertures 12 of the cervical fusion implant 110 and allows the engagement features 17 to be slidably removed from the apertures 12. After the engagement features 17 are disengaged from the cervical fusion implant 110, the cervical inserter instrument 120 is removed from the working channel and the channel is closed. As previously mentioned, additional materials may be included in the procedure before, during or after the insertion of the cervical fusion implant 110 to aid the natural fusion of the targeted spinal level.

In order to use the system to perform a spinal fusion procedure, the clinician must first designate the appropriate implant size. After the cervical fusion implant 110 is chosen, the engagement features 17 of the elongate fork member 11 are inserted into the apertures 12 on the implant 110. At that time the cervical fusion implant 110 and elongate fork member 11 are slidably engaged with one another. Before the clinician can manipulate the combined cervical

fusion implant 110 and elongated fork member 11, they must be releasably secured together. In order to secure the cervical fusion implant 110 onto the elongate fork member 11, the clinician would next employ the tubular lock member 21. The clinician would insert the proximal end of the elongate fork member 11 into the central bore 25 of the tubular lock member 21 at its distal end. The tubular lock member 21 would then be advanced over the elongate fork member 11 until the thread feature 13 of that member and the thread feature 23 of the tubular lock member 21 become engaged.

Once engaged, advancement of the tubular lock member requires rotation of the tubular lock member 21 with respect to the elongate fork member 11. Preferably, after only a small amount of engagement of the thread features the distal end of the tubular lock member 21 would contact the taper feature 19 of the elongate fork member 11. The tubular lock member 21 would be advanced creating greater interference as the distal end approaches the distal end of the taper feature 19 which has the larger outer dimension. The increasing interference would laterally displace the clamping arms 15 of the elongate fork member 11 towards each other. Since the engagement features 17 of the elongate fork member 11 were initially inserted into the apertures 12 of the exemplary cervical fusion implant 110, the displacement of the clamping arms 15 would create a compressive force on the purchase region 39 separating the apertures 12 of the exemplary cervical fusion implant 110. That compressive force allows a clinician to manipulate the system without the exemplary cervical fusion implant 110 becoming disengaged from the cervical inserter instrument 120.

The enhanced visualization features of the implants 10, 110 are explained in greater detail with reference to FIGS. 18-23. FIG. 18 illustrates an implant 10 dimensioned particularly for use in a posterior approach (PLIF) having (by way of example only) a width ranging between 9 and 11 mm, a height ranging between 8 and 14 mm, and a length ranging between 25 and 30 mm. FIG. 19 illustrates the implant 10 of FIG. 18 from a side perspective via as taken via X-ray or fluoroscopy techniques, clearly showing the location of the spike elements 7 and 8 (there is no central spike element 9 as with FIG. 1) relative to the implant 10 and visualization apertures 4. FIG. 20 illustrates an implant 10 dimensioned particularly for use in a lateral approach (XLIF™ by NuVasive) having (by way of example only) a width of approximately 18 mm, a height ranging between 8 and 16 mm, and a length ranging between 40 and 45 mm. FIG. 21 illustrates the implant 10 of FIG. 20 from a side perspective via as taken via X-ray or fluoroscopy techniques, clearly showing the location of the spike elements 7, 8, 9 relative to the implant 10 and visualization apertures 4. FIG. 22 illustrates an implant 110 dimensioned particularly for use in the cervical spine having (by way of example only) a width of approximately 11 mm, a height ranging between 5 and 12 mm, and a length of approximately 14 mm. FIG. 23 illustrates the implant 110 of FIG. 22 from a side perspective via as taken via X-ray or fluoroscopy techniques, clearly showing the location of the spike elements 66 relative to the implant 110 and visualization apertures 4. In this fashion, a surgeon may easily track the progress of the implant 10, 110 during implantation and/or after implantation by visualizing the spike elements 7,8,9 and 66, respectively, under X-ray and/or fluoroscopy according to the present invention.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and are herein

described in detail. It should be understood, however, that the description herein of specific embodiments is not intended to limit the invention to the particular forms disclosed, but on the contrary, the invention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

For example, while described herein primarily with reference to the lumbar and cervical spinal surgery, it is to be readily appreciated that the spinal fusion implants of the present invention may be suitable for accomplishing fusion in the thoracic spine without departing from the scope of the present invention. Moreover, it is to be readily appreciated that the insertion tools described herein may be employed with implants of any number of suitable constructions, including but not limited to metal, ceramic, plastic or composite.

WHAT IS CLAIMED IS:

1. A spinal fusion implant of non-bone construction positionable within an interbody space between a first vertebra and a second vertebra, said implant comprising:

an upper surface including anti-migration elements to contact said first vertebra when said implant is positioned within the interbody space, a lower surface including anti-migration elements to contact said second vertebra when said implant is positioned within the interbody space, a distal wall, a proximal wall, a first sidewall, and a second sidewall generally opposite from the first sidewall, wherein said distal wall, proximal wall, first sidewall, and second sidewall comprise a radiolucent material;

wherein said implant has a longitudinal length extending from a proximal end of said proximal wall to a distal end of said distal wall, said implant has a maximum lateral width extending from said first sidewall to said second sidewall along a medial plane that is generally perpendicular to said longitudinal length, and said longitudinal length is greater than said maximum lateral width;

at least a first fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space, said first fusion aperture having: a longitudinal aperture length extending generally parallel to the longitudinal length of said implant, and a lateral aperture width extending between said first sidewall to said second sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width; and

at least first and second radiopaque markers oriented generally perpendicular to said longitudinal length of said implant, wherein said first radiopaque marker extends into said first

sidewall at a position proximate to said medial plane, and said second radiopaque marker extends into said second sidewall at a position proximate to said medial plane.

2. The spinal fusion implant of claim 1, wherein the first and second radiopaque markers are substantially equally spaced apart from said proximal end of said proximal wall by a first longitudinal distance.

3. The spinal fusion implant of claim 1, further comprising a third radiopaque marker that extends into said distal wall, and a fourth radiopaque marker that extends into said proximal wall.

4. The spinal fusion implant of claim 3, wherein said third radiopaque marker extends entirely through a height of said distal wall, and wherein said fourth radiopaque marker extends entirely through a height of said proximal wall.

5. The spinal fusion implant of claim 1, further including at least one receiving aperture position is said proximal wall.

6. The spinal fusion implant of claim 5, wherein said threaded receiving aperture is configured to releasably mate with an inserter tool.

7. The spinal fusion implant of claim 6, wherein said receiving aperture comprises a threaded receiving aperture extending into said proximal wall and having a central axis generally parallel to said longitudinal length of said implant.

8. The spinal fusion implant of claim 7, further comprising a pair of lateral grooves positioned in said proximal wall and extending laterally of said threaded receiving aperture.

9. The spinal fusion implant of claim 1, wherein said maximum lateral width of said implant is approximately 18 mm.

10. The spinal fusion implant of claim 1, wherein said radiolucent material comprises PEEK.

11. The spinal fusion implant of claim 1, wherein said implant includes at least one visualization aperture extending through at least one of said first sidewall and said second sidewall.

12. The spinal fusion implant of claim 1, wherein said upper and lower surfaces are generally parallel to one another.

13. The spinal fusion implant of claim 1, wherein said upper and lower surfaces are generally angled relative to one another to approximately correspond to lordosis of a lumbar spine when said implant is positioned within the interbody space.

14. The spinal fusion implant of claim 1, wherein said first fusion aperture is one of generally rectangular and generally oblong in shape.

15. The spinal fusion implant of claim 1, further comprising a medial support extending between the first and second sidewalls

16. The spinal fusion implant of claim 15, wherein said medial support is positioned along said medial plane.

17. The spinal fusion implant of claim 1, further including a second fusion aperture extending through said upper surface and lower surface and configured to permit bone growth between the first vertebra and the second vertebra when said implant is positioned within the interbody space.

18. The spinal fusion implant of claim 17, wherein said second fusion aperture is separated from said first fusion aperture by a medial support.

19. The spinal fusion implant of claim 1, wherein said anti-migration elements of said upper surface comprise a plurality of ridges.

20. The spinal fusion implant of claim 19, wherein said plurality of ridges extend generally perpendicular to said longitudinal length.

21. The spinal fusion implant of claim 1, wherein said anti-migration elements of said upper surface comprise spike elements.

22. The spinal fusion implant of claim 21, wherein said spike elements protrude to pointed tips configured to engage said first vertebra.

23. The implant of claim 1, wherein said maximum lateral width of said implant is greater than a lateral width of the distal end of said distal wall and is greater than a lateral width of the proximal end of said proximal wall.

24. The implant of claim 1, wherein said implant has a height extending from said upper surface to said lower surface, wherein said maximum lateral width is greater than said height.

25. The spinal fusion implant of claim 1, wherein the lateral aperture width of said first fusion aperture is more than two time greater than a lateral thickness of said first sidewall and is more than two time greater than a lateral thickness of said second sidewall.

26. The spinal fusion implant of claim 1, wherein said elongate body of at least one of said radiopaque markers is shorter than an implant height extending from said upper surface to said lower surface.

27. The spinal fusion implant of claim 1, further comprising an osteoinductive material positioned with said first fusion aperture.

28. A method of introducing a spinal fusion implant of non-bone construction via a lateral trans-psoas surgical approach, the method comprising:

preparing an intervertebral disc space for receiving a spinal fusion implant;

releasably attaching the spinal fusion implant to an inserter tool, a distal end portion of the inserter tool having a threaded connector that threadably engages with a threaded receiving aperture positioned in a proximal wall of the spinal fusion implant, wherein the spinal fusion implant has a maximum longitudinal length extending from a proximal end of the proximal wall to a distal end of a distal wall;

inserting the spinal fusion implant into the intervertebral disc space via a lateral, trans-psoas path to the intervertebral disc space, the spinal fusion implant comprising an upper surface including anti-migration elements to contact a first vertebra adjacent to the intervertebral disc space, a lower surface including anti-migration elements to contact a second vertebra adjacent to the intervertebral disc space, the distal wall, the proximal wall, an anterior sidewall to face an anterior aspect of the intervertebral disc space, and a posterior sidewall to face a posterior aspect of the intervertebral disc space, each of the distal wall, proximal wall, first sidewall, and second sidewall comprising a radiolucent material, wherein the spinal fusion implant further comprises at least three radiopaque markers having elongate bodies oriented generally perpendicular to the maximum longitudinal length of the implant, wherein a first of the at least three radiopaque markers extends into the distal wall, a second of the at least three radiopaque markers extends into the proximal wall, and a third of the at least three radiopaque markers extends into a central region of the spinal fusion implant including portions of the anterior and posterior sidewalls positioned generally centrally between the proximal wall and the distal wall.

29. The method of claim 28, further comprising releasing the spinal fusion implant from the inserter tool.

30. The method of claim 29, wherein the spinal fusion implant is released from the inserter tool by rotating a first component of the inserter tool positioned along a proximal portion of the inserter tool relative to a second component of the inserter tool.

31. The method of claim 29, wherein the first component of the inserter tool rotates together with the threaded connector at the distal end portion of the inserter tool, and wherein the second component of the inserter tool includes head protrusions at the distal end portion of the inserter tool, the head protrusions being configured to mate with lateral grooves positioned in the proximal wall of the spinal fusion implant.

32. The method of claim 28, wherein the inserter tool has a longitudinal length that is more than four times greater than the maximum longitudinal length of the spinal fusion implant.

33. The method of claim 28, further comprising establishing a working corridor to a targeted spinal site so as to define the lateral, trans-psoas path to the intervertebral disc space.

34. The method of claim 33, wherein the step of preparing the intervertebral disc space includes introducing one or more preparation tools via the working corridor, the preparation tools including one or more of kerrisons, rongeurs, pituitaries, and rasps.

35. The method of claim 28, further comprising positioning an osteoinductive material within at least a first fusion aperture of the spinal fusion implant extending through the upper surface and the lower surface, the first fusion aperture having: a longitudinal aperture length extending generally parallel to the maximum longitudinal length of the implant, and a lateral aperture width extending between the anterior sidewall to the posterior sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width.

36. The method of claim 35, further comprising positioning the osteoinductive material within a second fusion aperture of the spinal fusion implant, the second fusion aperture extending through said upper surface and lower surface, and the second fusion aperture being separated from the first fusion aperture by a medial support.

37. The method of claim 28, further comprising using a medical imaging technique to view the first, second, and third radiopaque markers of the spinal infusion implant in an individual image after inserting the spinal fusion implant into the intervertebral disc space via the lateral, trans-psoas path.

38. The method of claim 28, wherein at least a portion of the central region defining a maximum lateral width of the spinal fusion implant extending from the anterior sidewall to the posterior sidewall, wherein the maximum longitudinal length of the implant is at least two and half times greater than the maximum lateral width.

39. The method of claim 38, wherein the maximum lateral width of the implant is greater than a lateral width of the distal end of the distal wall and is greater than a lateral width of the proximal end of the proximal wall.

40. The method of claim 38, wherein the maximum lateral width of said implant is approximately 18 mm.

41. The method of claim 28, wherein the spinal fusion implant inserted into the intervertebral disc space includes at least a first fusion aperture extending through the upper surface and lower surface for permitting bone growth between the first vertebra and the second vertebra, the first fusion aperture having: a longitudinal aperture length extending generally parallel to the maximum longitudinal length of the implant, and a lateral aperture width extending between the anterior sidewall and the posterior sidewall, wherein the longitudinal aperture length is greater than the lateral aperture width.

42. The method of claim 28, wherein the spinal fusion implant inserted into the intervertebral disc space includes a fourth radiopaque marker, the fourth radiopaque marker having an elongate body oriented generally perpendicular to the maximum longitudinal length of the implant, the fourth radiopaque marker extending into the central region at a position spaced apart from the third radiopaque marker.

43. The method of claim 28, wherein the spinal fusion implant inserted into the intervertebral disc space comprises said radiolucent material of PEEK.

44. The method of claim 28, wherein the spinal fusion implant inserted into the intervertebral disc space includes one or more visualization aperture extending through at least one of said first sidewall and said second sidewall

45. The method of claim 28, wherein the spinal fusion implant inserted into the intervertebral disc space includes a medial support extending between the anterior and posterior sidewalls.

46. The method of claim 45, wherein the medial support is positioned along the central region.

ABSTRACT

A system and method for spinal fusion comprising a spinal fusion implant of non-bone construction releasably coupled to an insertion instrument dimensioned to introduce the spinal fusion implant into any of a variety of spinal target sites.

5

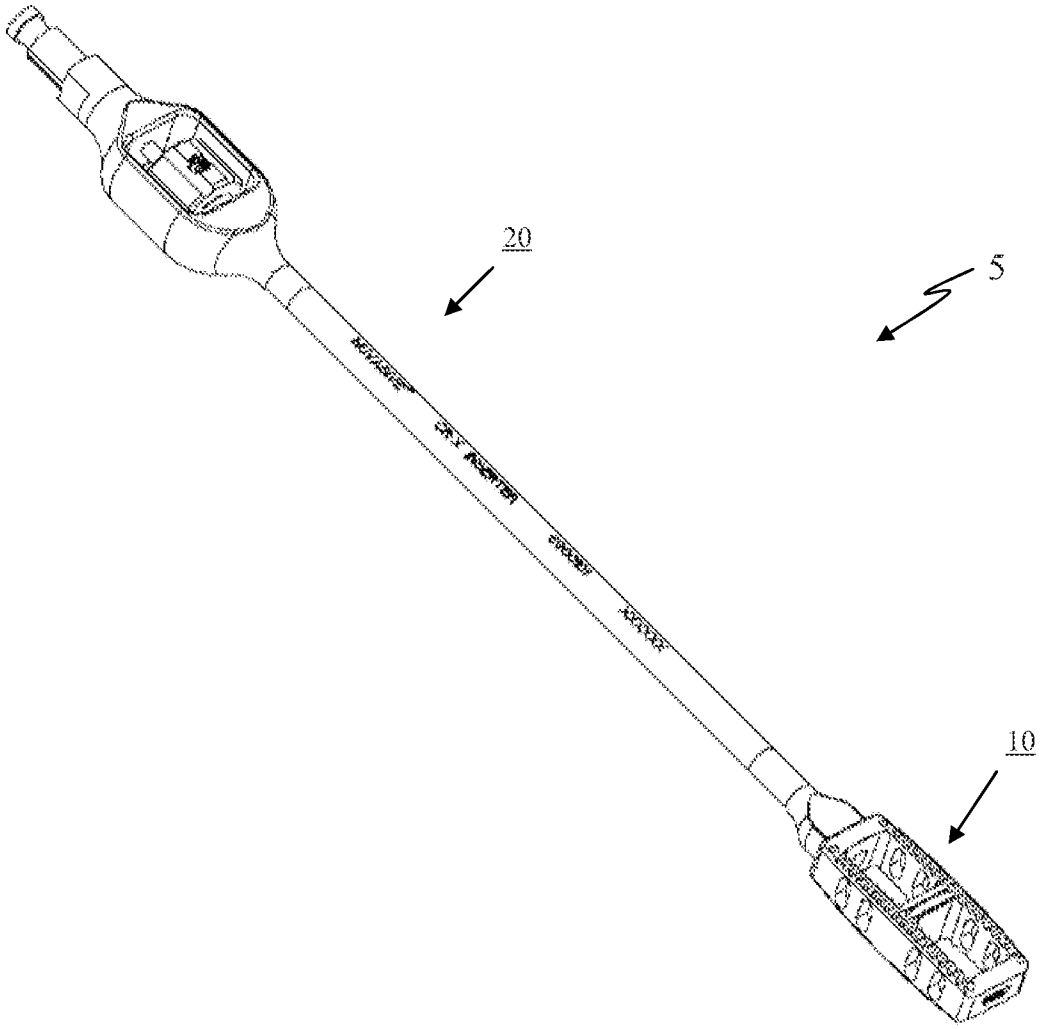


FIG. 1

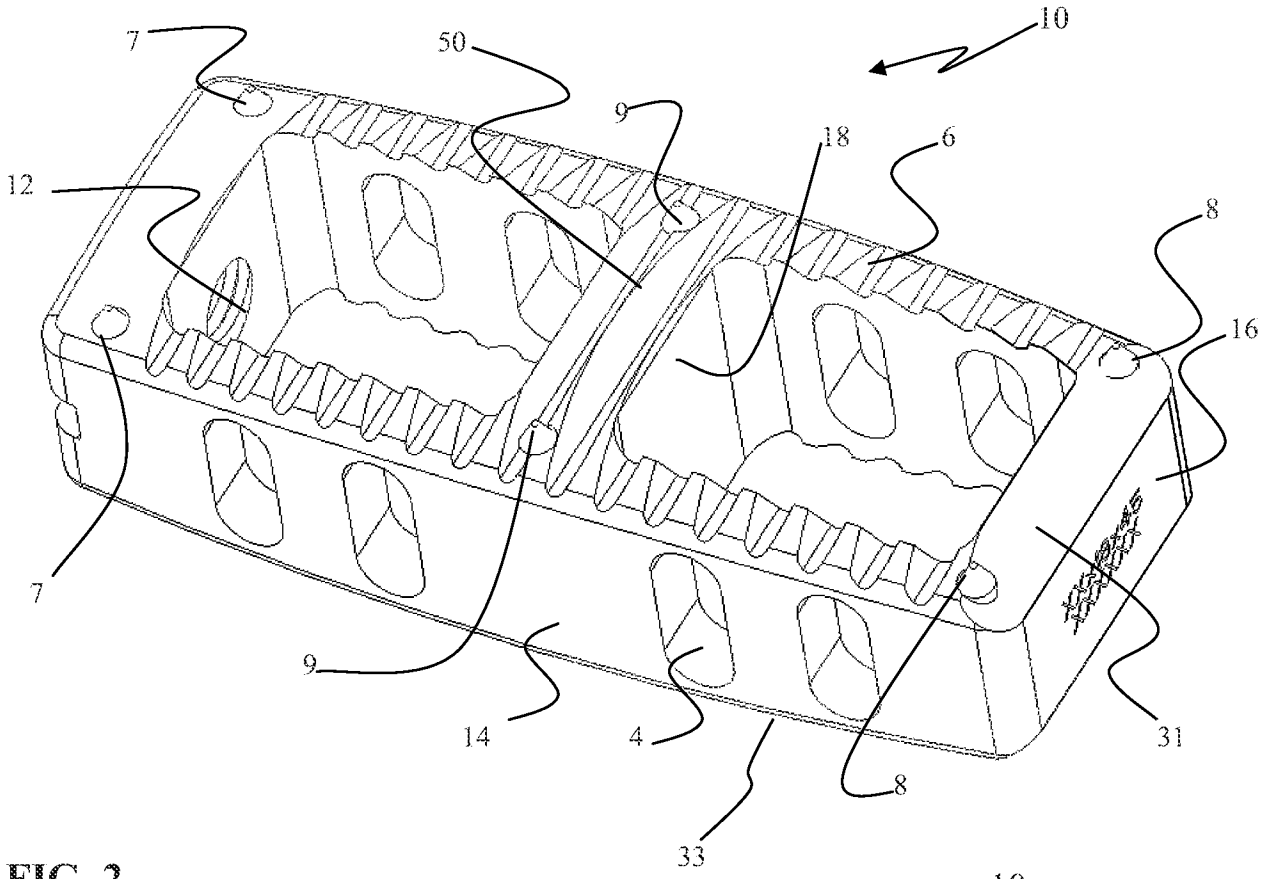


FIG. 2

10

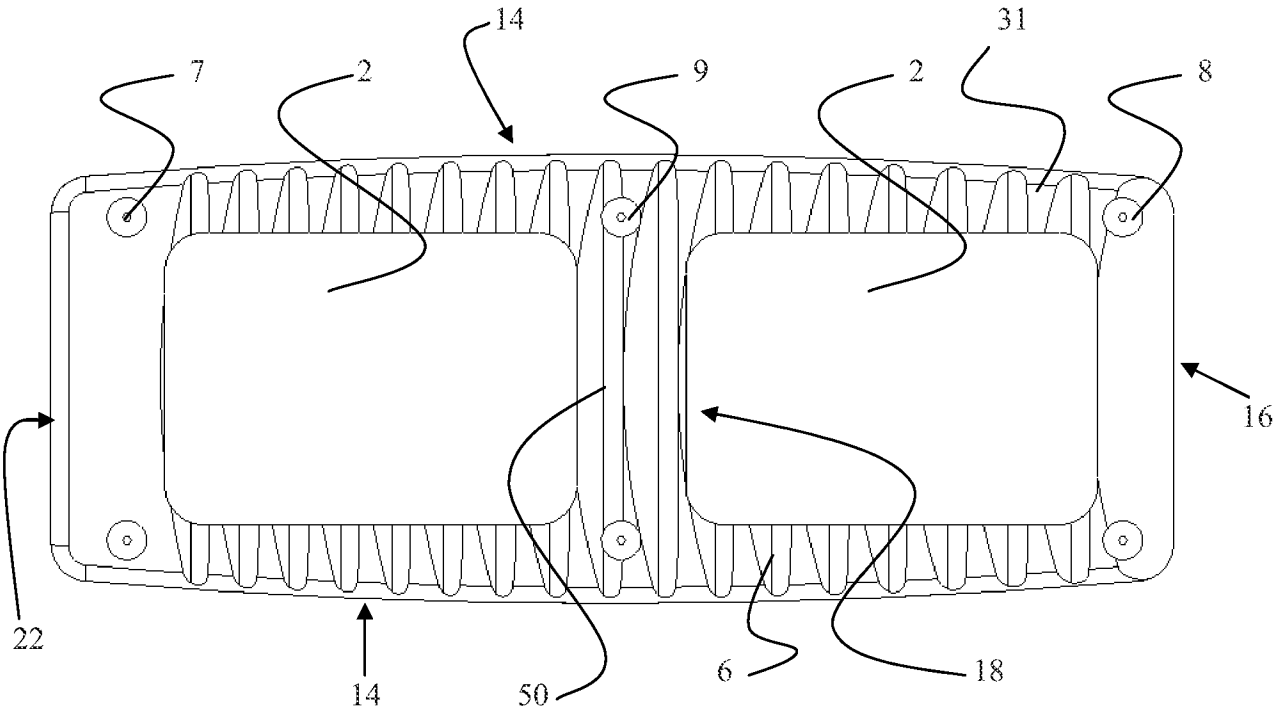


FIG. 3

10

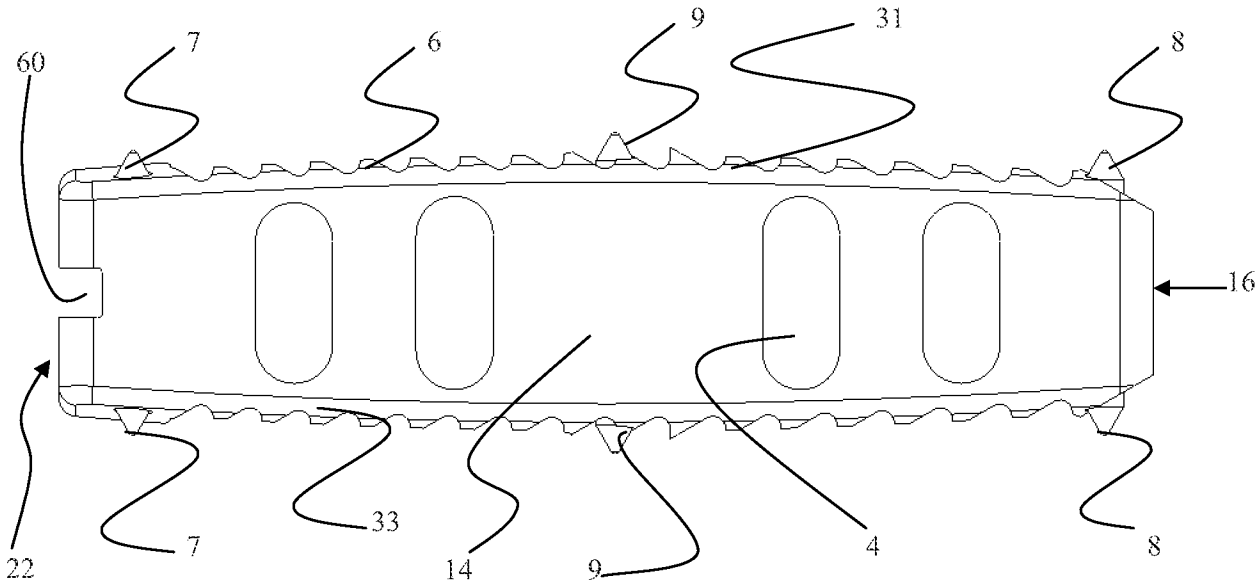


FIG. 4

10

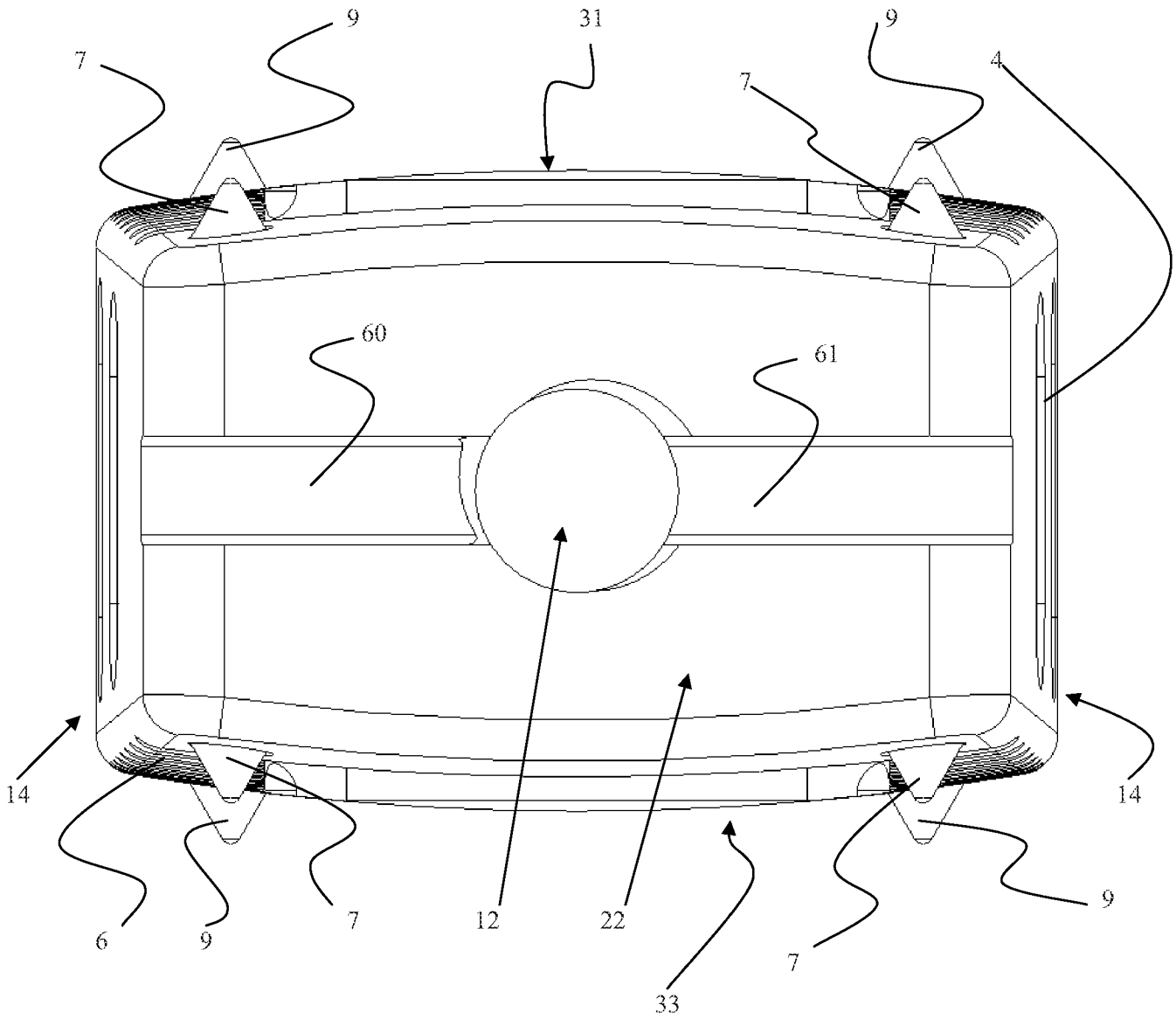


FIG. 5

10

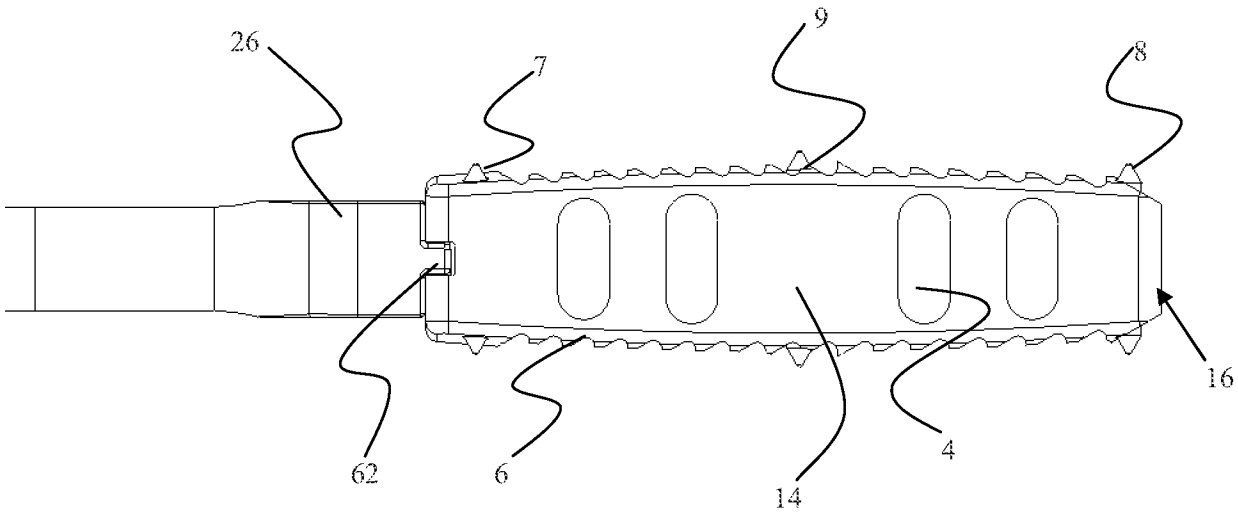


FIG. 6

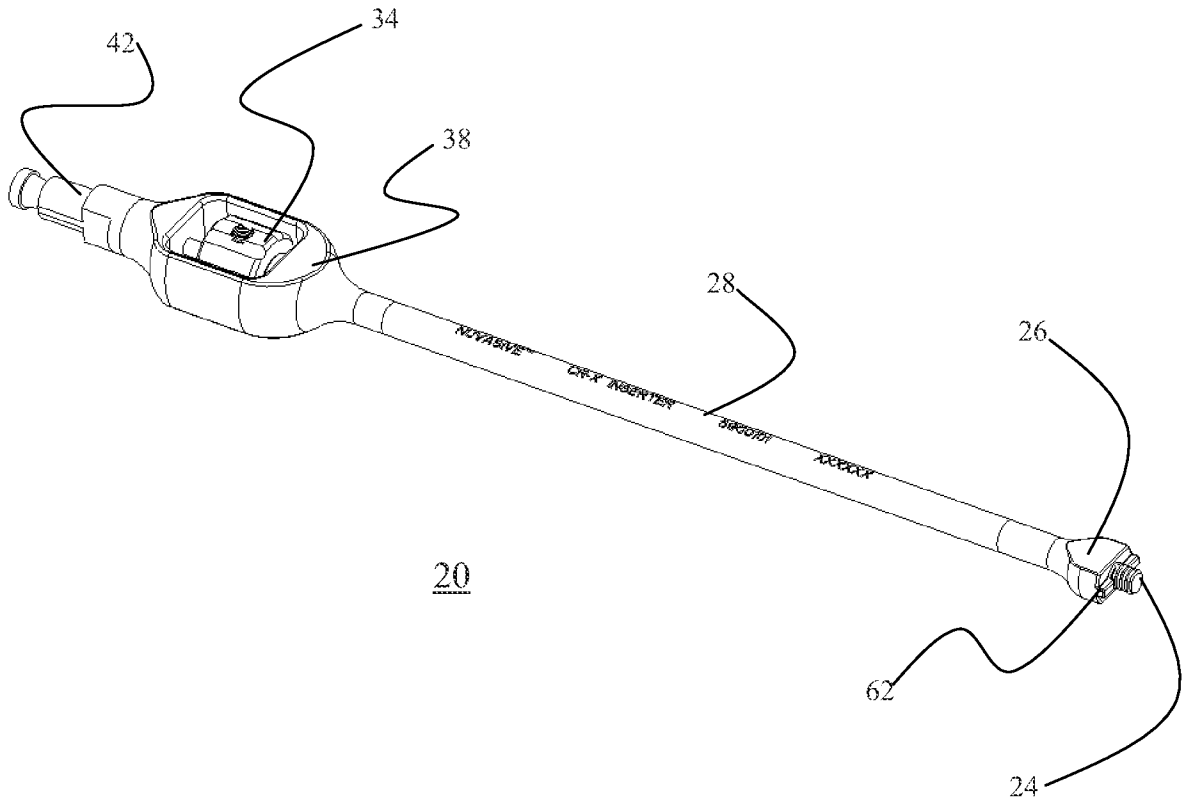


FIG. 7

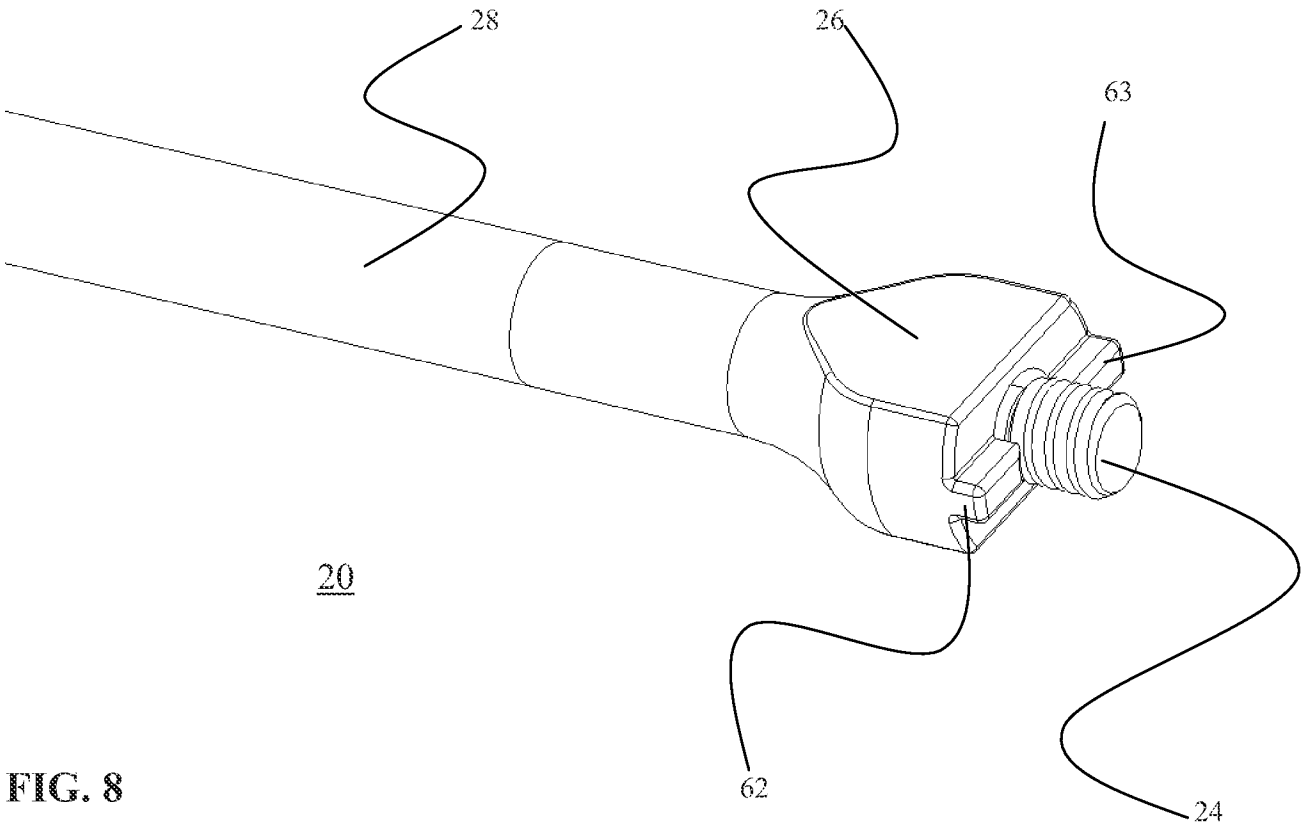


FIG. 8

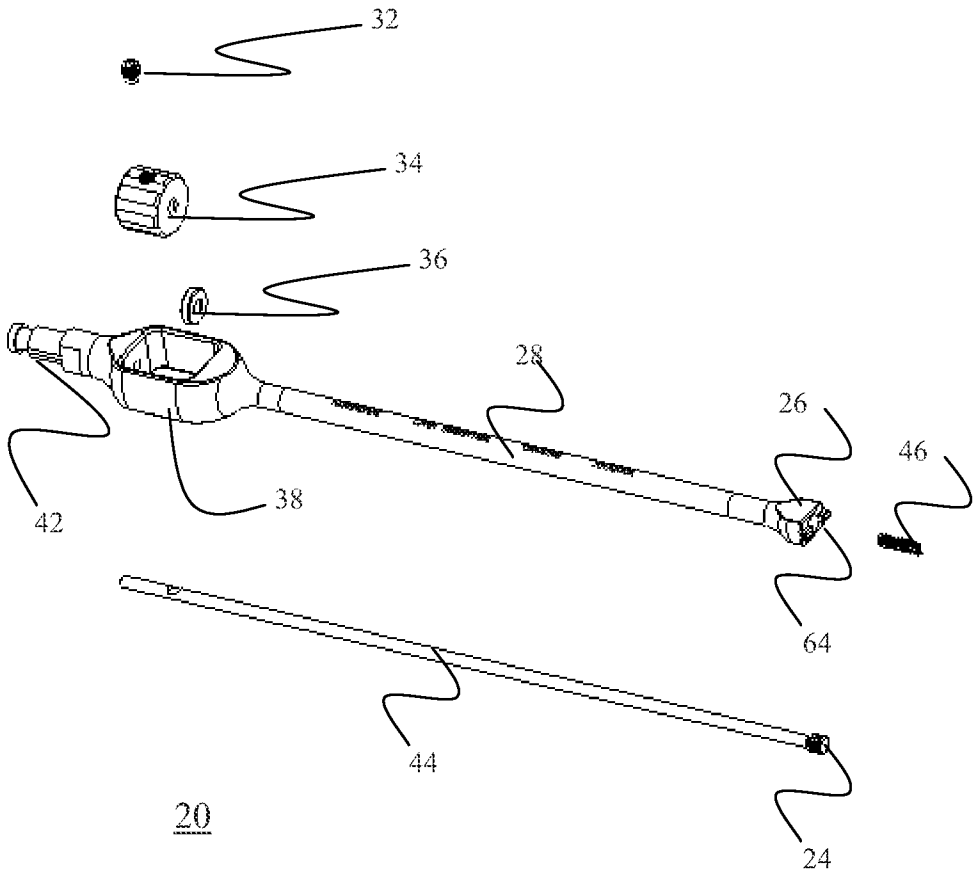


FIG. 9

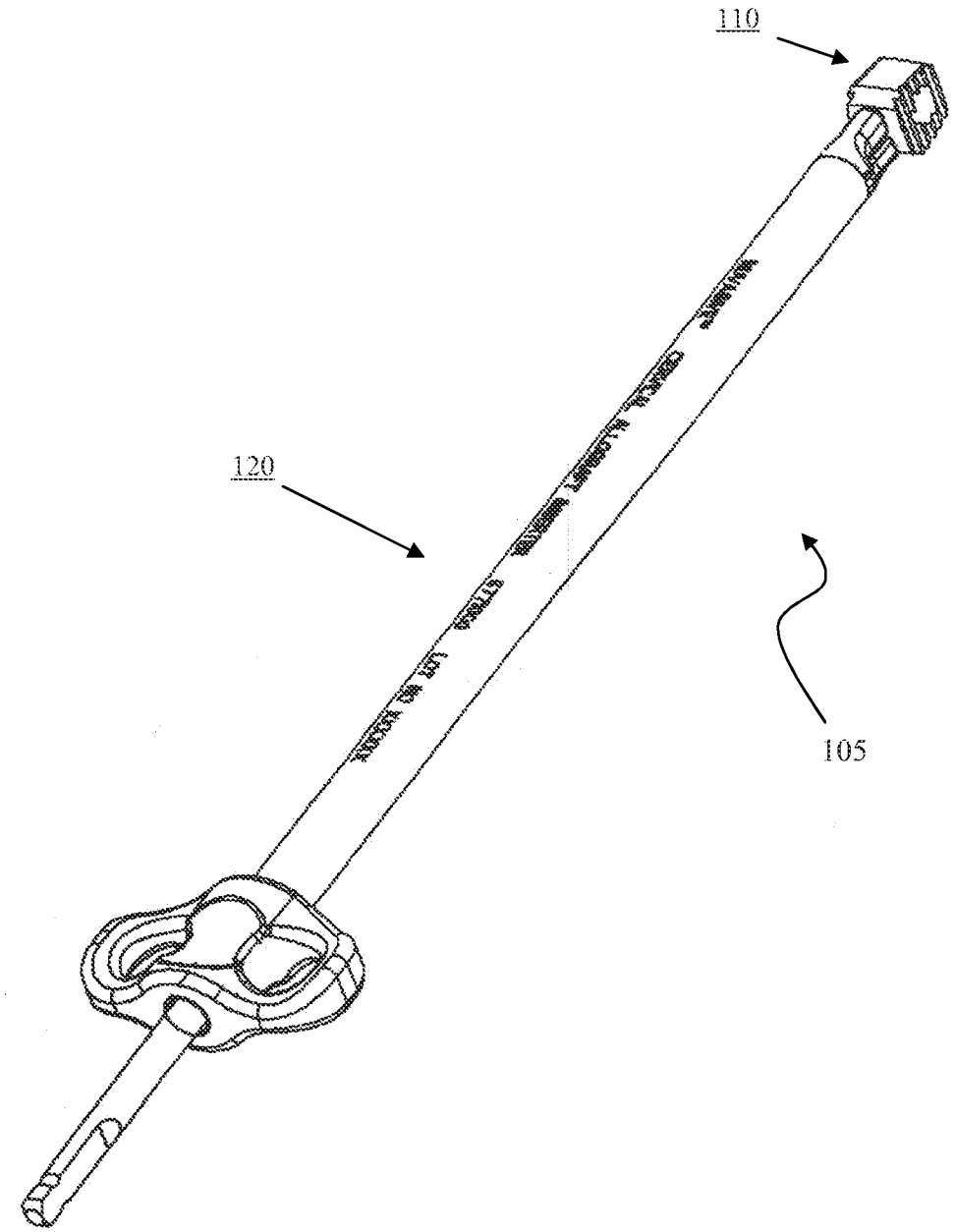


FIG. 10

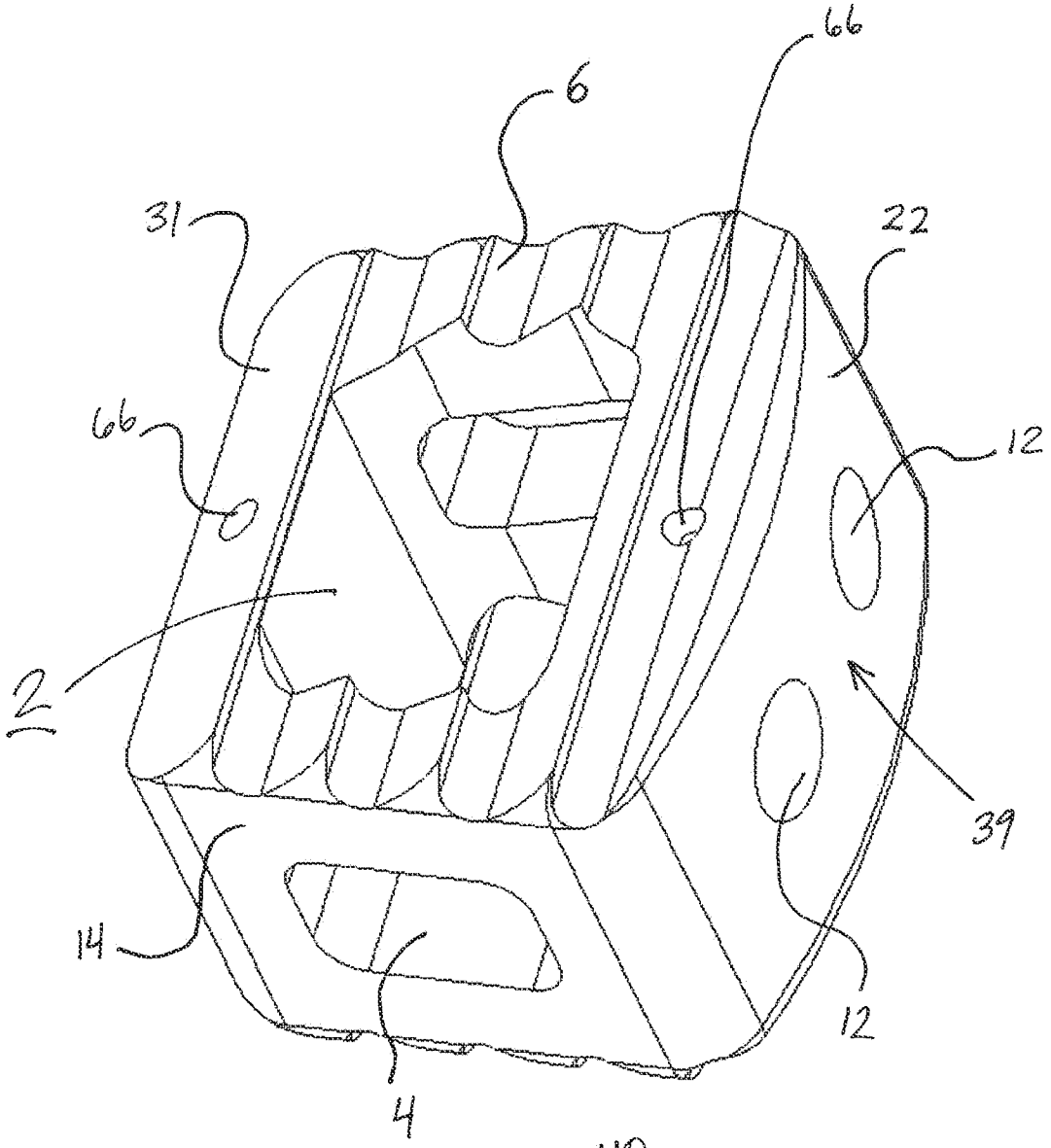


Fig. 11

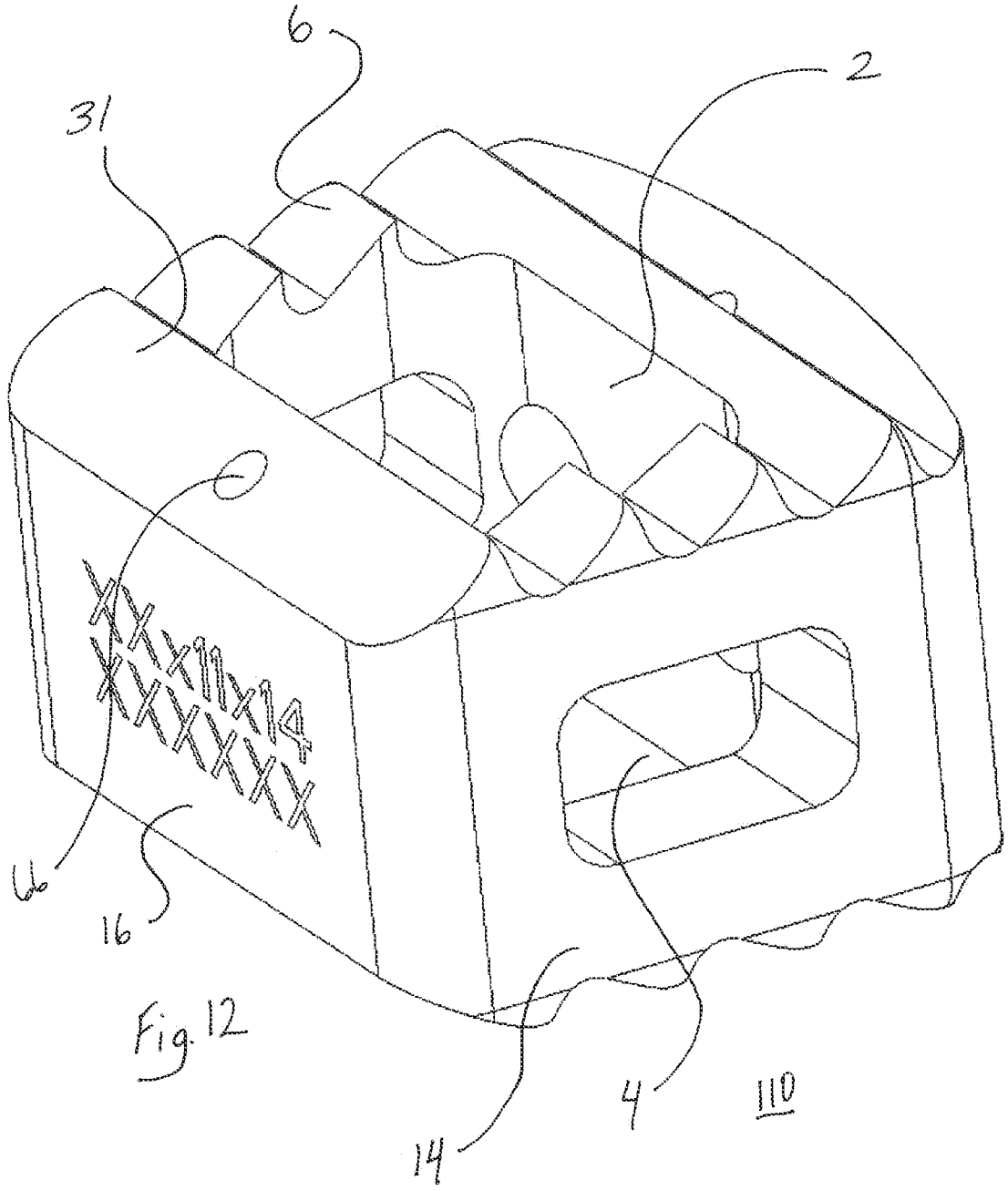


Fig. 12

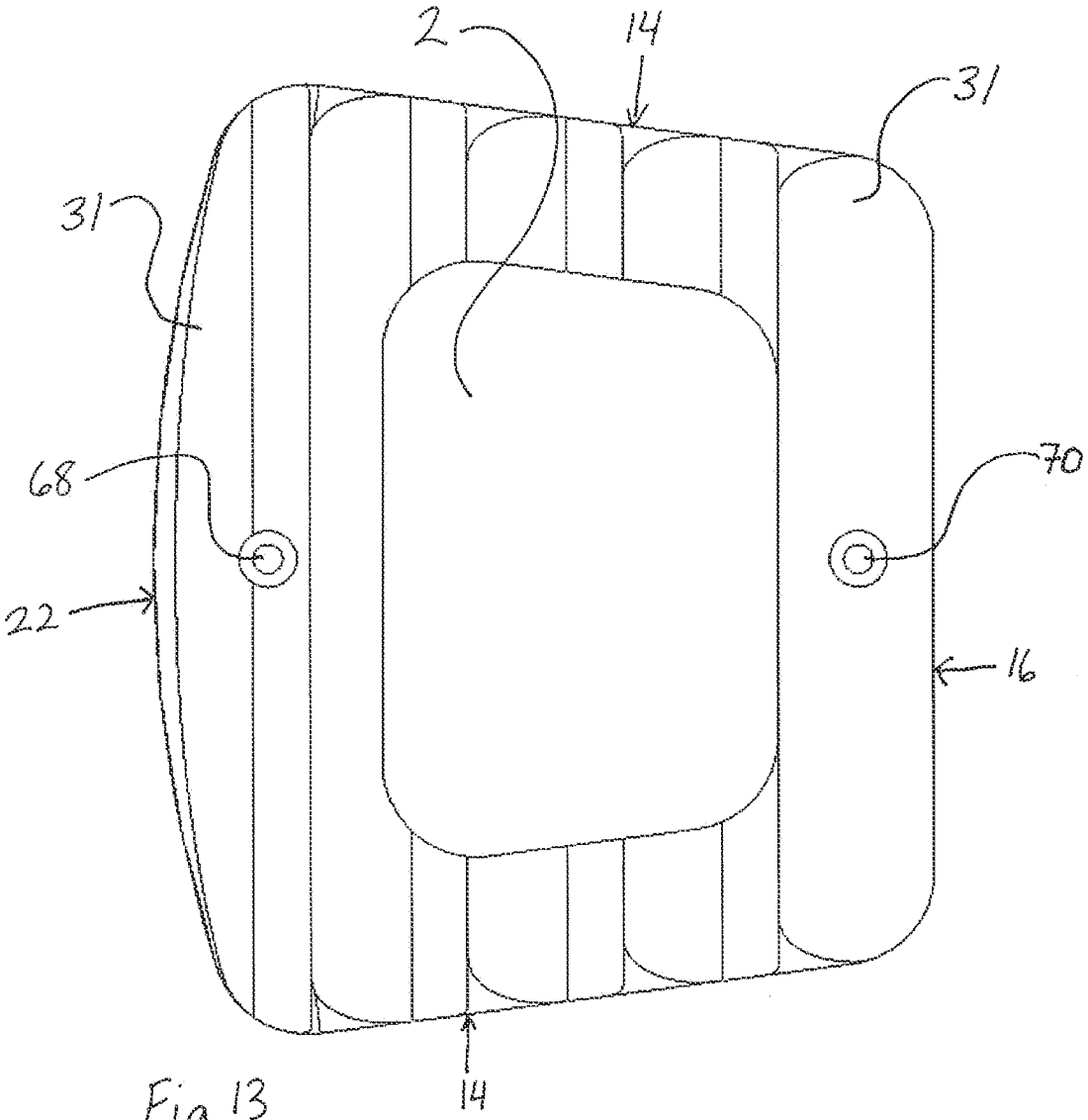


Fig. 13

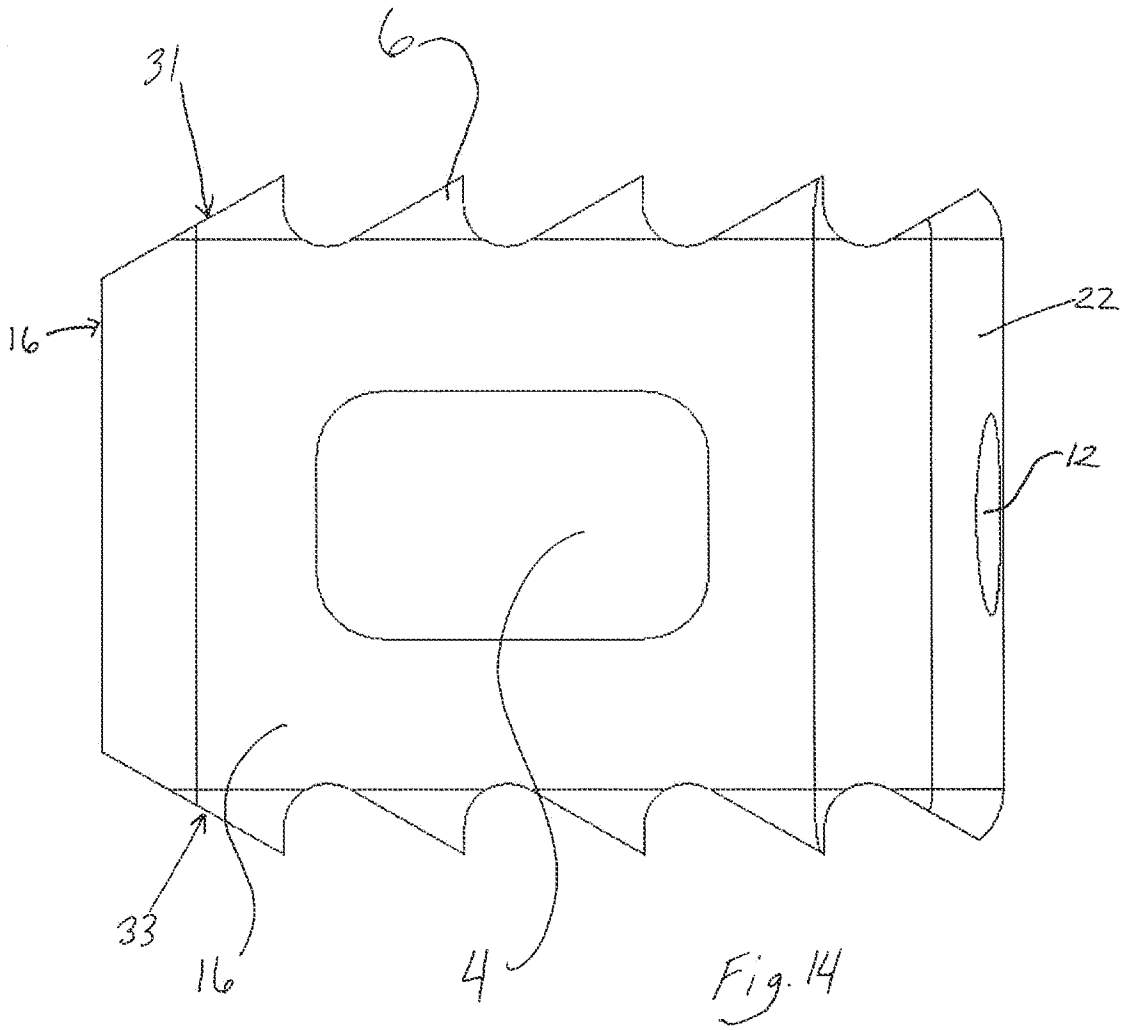


Fig. 14

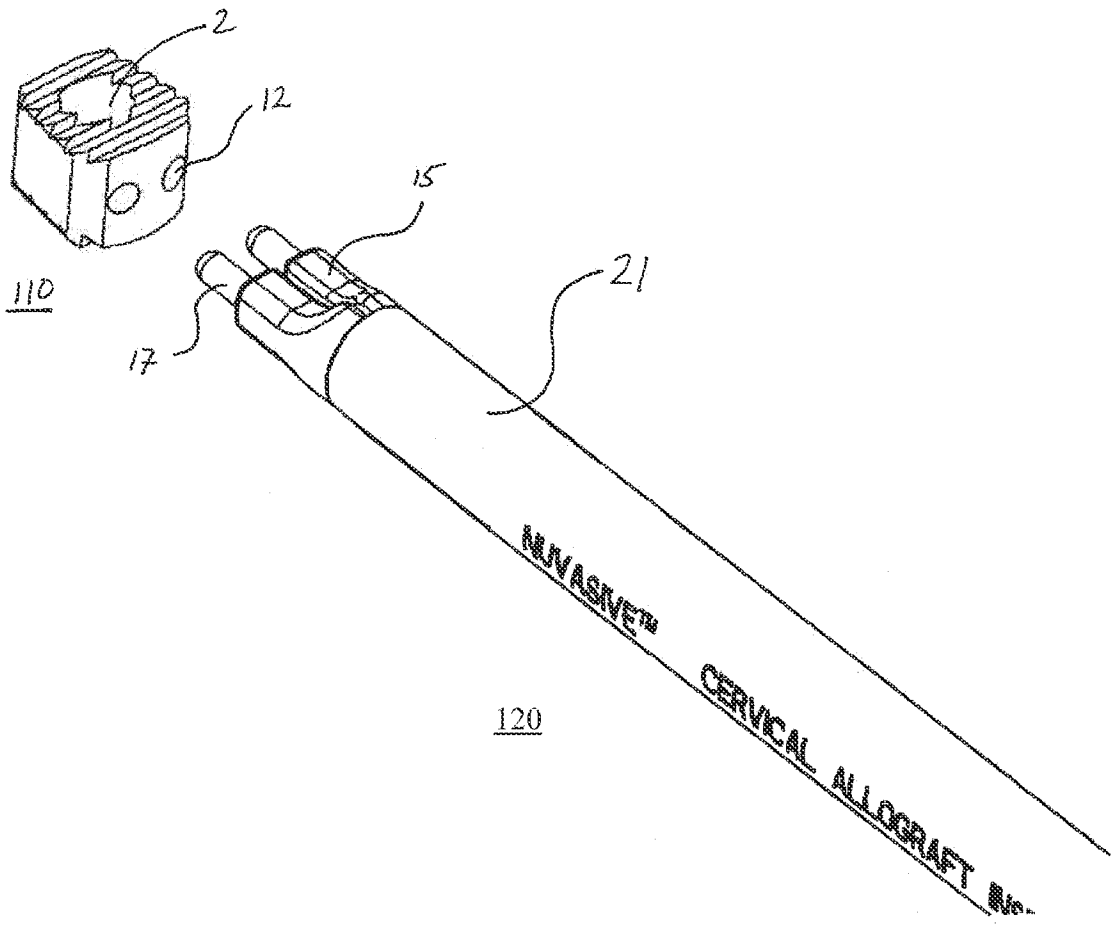


FIG. 15

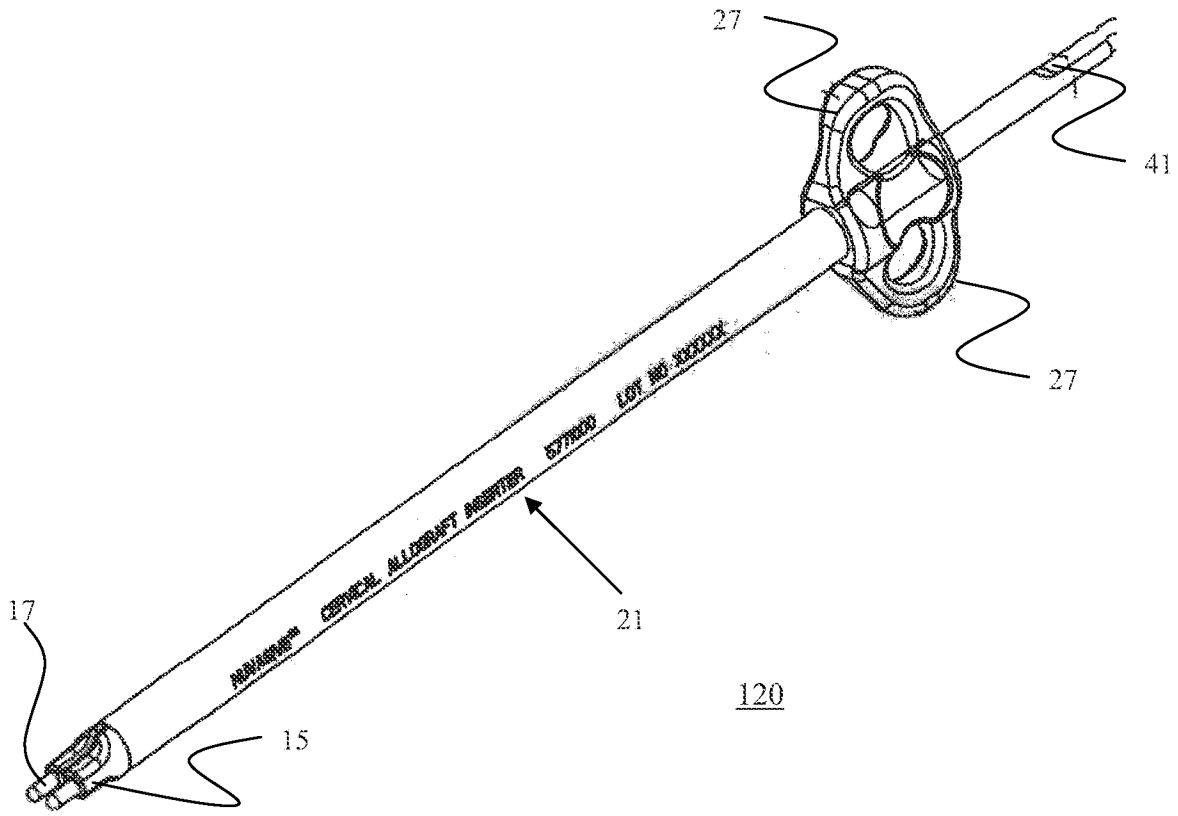


FIG. 16

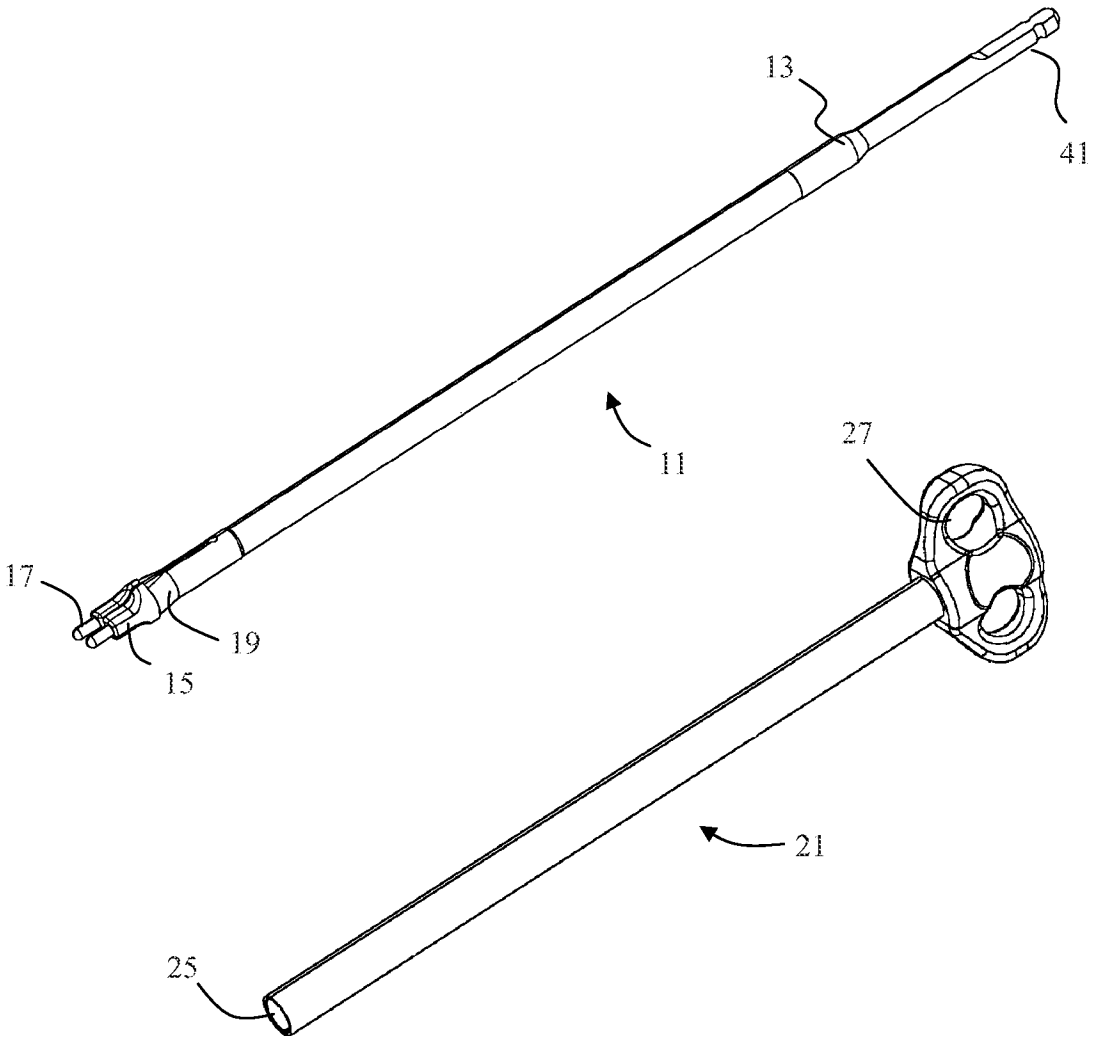


FIG. 17

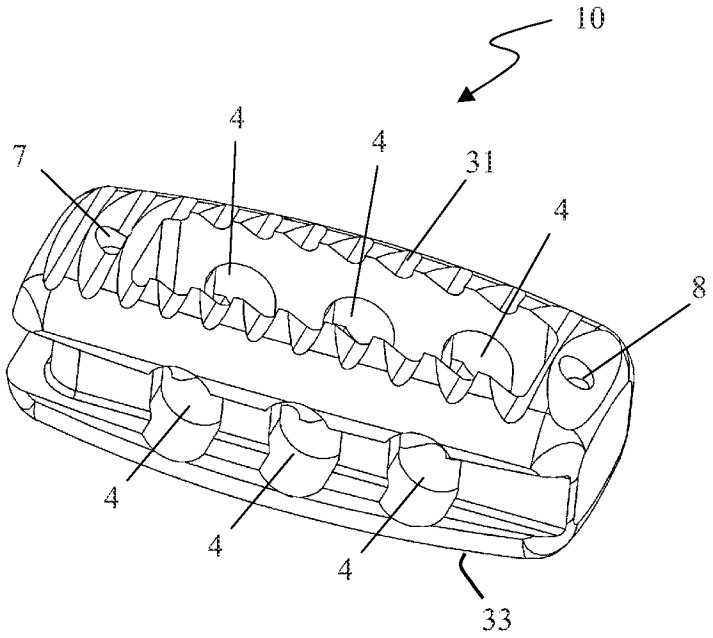


FIG. 18

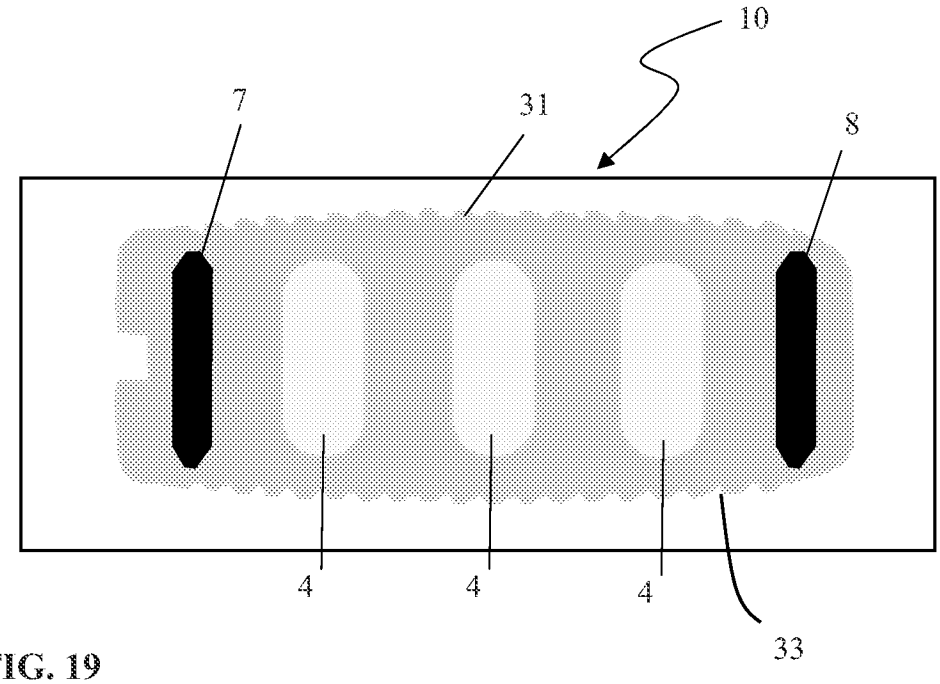
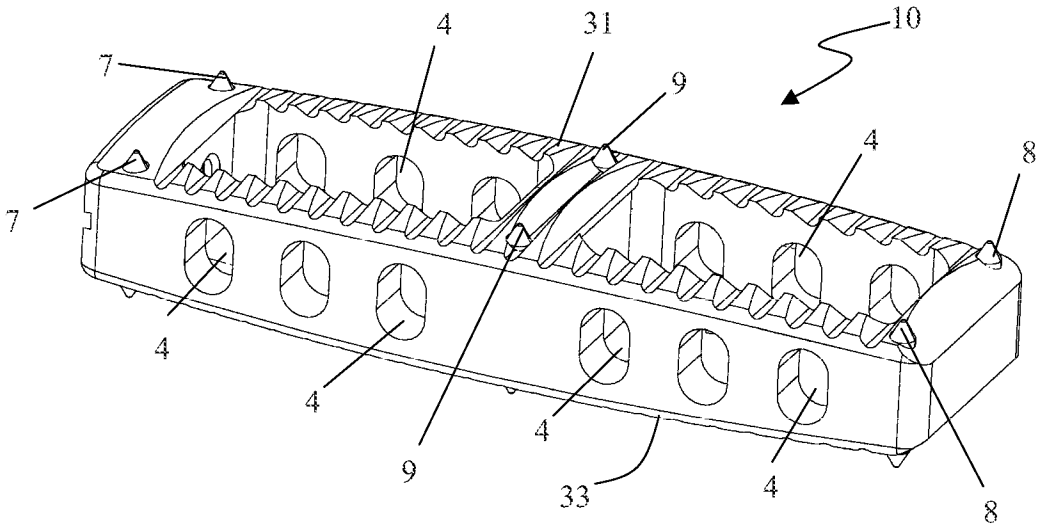


FIG. 19

FIG. 20



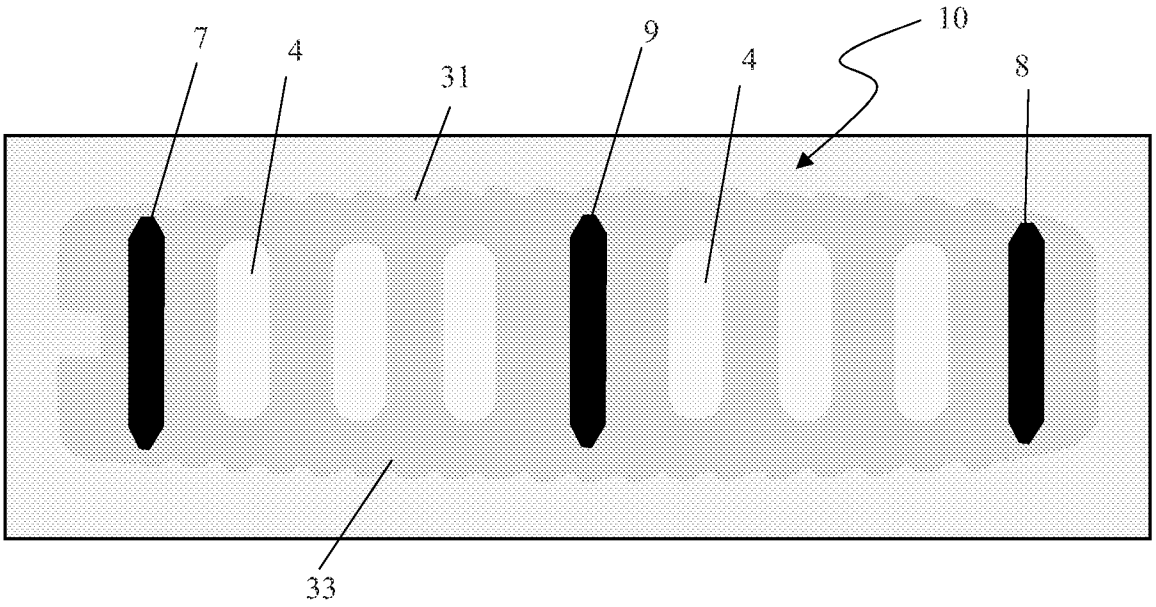


FIG. 21

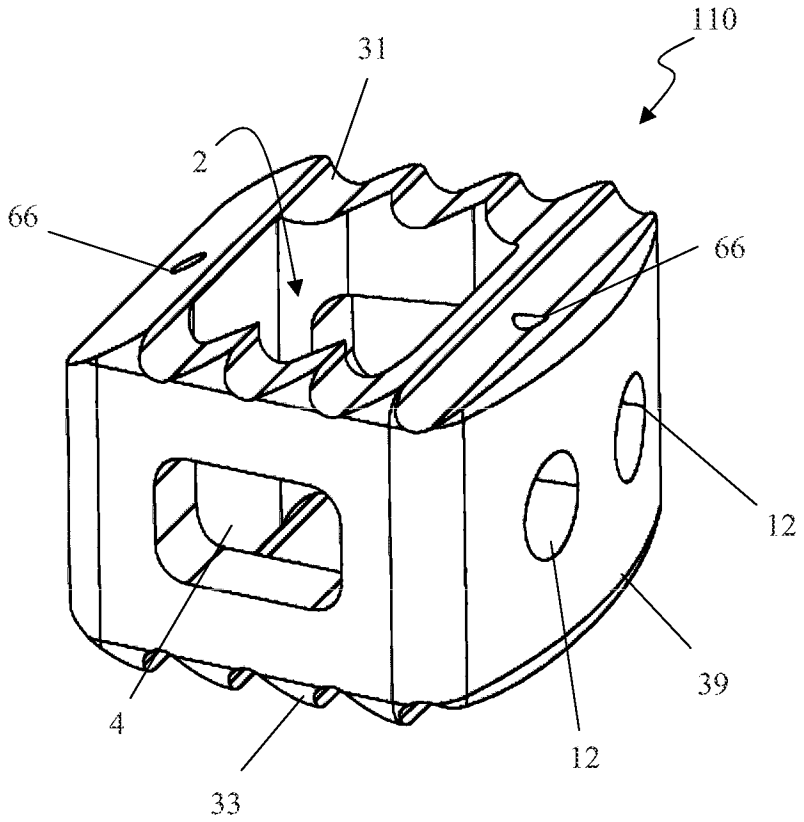


FIG. 22

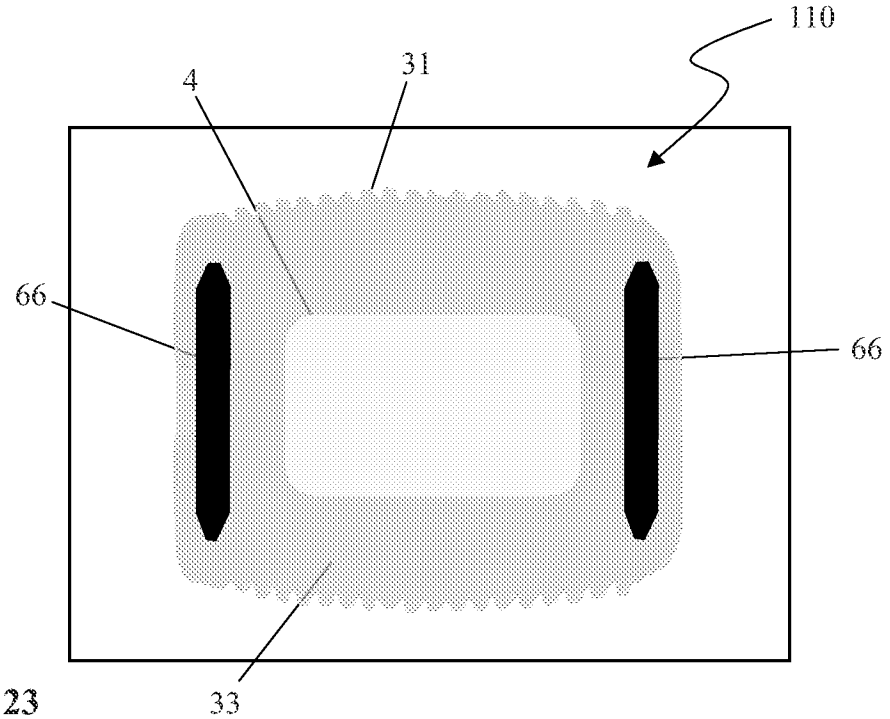


FIG. 23

PTO/SB/01 (04-05)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted With Initial Filing **OR** ☑ Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

Attorney Docket Number	104US1
First Named Inventor	Matthew Curran
COMPLETE IF KNOWN	
Application Number	11/093,409
Filing Date	March 29, 2005
Art Unit	3738
Examiner Name	n/a

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Systems and Methods for Spinal Fusion

(Title of the Invention)

the specification of which

☐ is attached hereto

OR

☑ was filed on (MM/DD/YYYY) 03/29/2005 as United States Application Number or PCT International Application Number 11/093,409 and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

PTO/SB/01 (04-05)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☑ The address associated with Customer Number: 30,328 OR ☐ Correspondence address below

Name		
Address		
City	State	ZIP
Country	Telephone	Email

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
Matthew	Curran

Inventor's Signature	Date
	7/26/05

Residence: City	State	Country	Citizenship
Carlsbad	CA	USA	US

Mailing Address
3218 Rancho Quartillo

City	State	Zip	Country
Carlsbad	CA	92009	USA

NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
Mark	Peterson

Inventor's Signature	Date

Residence: City	State	Country	Citizenship
Medford	OR	USA	US

Mailing Address
840 Royal Avenue Suite #1

City	State	Zip	Country
Medford	OR	97504	USA

☐ Additional inventors or a legal representative are being named on the _____ supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.

PTO/SB/01 (04-05)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION — Utility or Design Patent Application

Direct all correspondence to: ☑ The address associated with Customer Number:	30,328	OR ☐	Correspondence address below

Name		
Address		
City	State	ZIP
Country	Telephone	Email

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])		Family Name or Surname	
Matthew		Curran	
Inventor's Signature			Date
Residence: City	State	Country	Citizenship
Carlsbad	CA	USA	US
Mailing Address			
3218 Rancho Quartillo			
City	State	Zip	Country
Carlsbad	CA	92009	USA

NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])		Family Name or Surname	
Mark		Peterson	
Inventor's Signature	Mark Peterson		Date 7/26/05
Residence: City	State	Country	Citizenship
Medford	OR	USA	US
Mailing Address			
840 Royal Avenue Suite #1			
City	State	Zip	Country
Medford	OR	97504	USA

☐ Additional inventors or a legal representative are being named on the ____ supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.

PTO/SB/81 (01-09)
Approved for use through 11/30/2011. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS

Application Number	13/079,645
Filing Date	April 4, 2011
First Named Inventor	Curran
Title	System and Methods for Spinal Fusion
Art Unit	3733
Examiner Name	Bray, Stuart S.
Attorney Docket Number	104US2

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith: **26191**

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified application to:

☐ The address associated with the above-mentioned Customer Number.

OR

☒ The address associated with Customer Number: **26191**

OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the:

☐ Applicant/Inventor.

OR

☒ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on _____.

SIGNATURE of Applicant or Assignee of Record

Signature		Date	March 20, 2012
Name	Jonathan Spangler	Telephone	(858) 909-1800
Title and Company	Vice President and Chief Patent Counsel, NuVasive Inc.		

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Matthew Curran et al.

Application No./Patent No.: 13/079,645 Filed/Issue Date: 4/4/2011

Entitled: System and Methods for Spinal Fusion

NuVasive, Inc., a corporation
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or
2. ☐ an assignee of less than the entire right, title and interest.
The extent (by, percentage) of its ownership interest is _____%

in the patent application/patent identified above by virtue of either:

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel (), Frame (), or for which a copy thereof is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: _____ To _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To _____
The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.
[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.8]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Michael T. Hawkins/	March 21, 2012
Signature	Date
Michael T. Hawkins , 57,867	(612) 335-5070
Printed or Typed Name	Telephone Number
Attorney for Applicant	
Title	

60759550.doc

NUVASIVE™
Creative Spine Technology

Fax

To:	Shelley Cape	**From:**	Alonzo Branch
Company:	US Patent Office		858-909-1902
Fax:	612-677-3572	**Pages:**	6
Phone:	619-522-8134	**Date:**	07/29/05
Re:		**CC:**	

- **Comments:**

Hi Shelly,

Sorry for the PDF's. I'm faxing everything now. Standby!!!

Pls give me a call or email when you get this.

Thanks, Al

NuVasive™, Inc.
4545 Towne Centre Court
San Diego, CA 92121
t: 858.909.1878
f: 858.909-2078
Toll Free: 800.455.1476
www.nuvasive.com

Form PTO-1595 (Rev. 07/05)
OMB No. 0651-0027 (exp. 6/30/2008)

U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

RECORDATION FORM COVER SHEET
PATENTS ONLY

To the Director of the U.S. Patent and Trademark Office: Please record the attached documents or the new address(es) below.

1. Name of conveying party(ies)

Matthew Curran
Mark Peterson

Additional name(s) of conveying party(ies) attached? ☐ Yes ☑ No

2. Name and address of receiving party(ies)

Name: NuVasive, Inc.
Internal Address:
Street Address: 4545 Towne Centre Court
City: San Diego
State: CA
Country: United States Zip: 92121

Additional name(s) & address(es) attached? ☐ Yes ☑ No

3. Nature of conveyance/Execution Date(s):

Execution Date(s) 26-Jul-2005

☑ Assignment ☐ Merger
☐ Security Agreement ☐ Change of Name
☐ Joint Research Agreement
☐ Government Interest Assignment
☐ Executive Order 9424, Confirmatory License
☐ Other

4. Application or patent number(s): ☐ This document is being filed together with a new application.

A. Patent Application No.(s)
11/093,409

B. Patent No.(s)

Additional numbers attached? ☐ Yes ☑ No

5. Name and address to whom correspondence concerning document should be mailed:

Name: Jonathan Spangler
Internal Address: NuVasive, Inc.
Street Address: 4545 Towne Centre Court
City: San Diego
State: CA Zip: 92121
Phone Number: 858-243-0029
Fax Number: 858-909-2007
Email Address: jspangler@nuvasive.com

6. Total number of applications and patents involved: 1

7. Total fee (37 CFR 1.21(h) & 3.41) $ 40.00

☐ Authorized to be charged by credit card
☑ Authorized to be charged to deposit account
☐ Enclosed
☐ None required (government interest not affecting title)

8. Payment Information

a. Credit Card Last 4 Numbers
Expiration Date

b. Deposit Account Number 50-2040

Authorized User Name Jonathan Spangler

9. Signature:

August 1, 2005
Signature Date

Jonathan Spangler
Name of Person Signing

Total number of pages including cover sheet, attachments, and documents: 4

Documents to be recorded (including cover sheet) should be faxed to (571) 273-0140, or mailed to:
Mail Stop Assignment Recordation Services, Director of the USPTO, P.O.Box 1450, Alexandria, V.A. 22313-1450

Application No. 11/093,409
Attorney Docket No. 104US1

ASSIGNMENT OF PATENT APPLICATION

WHEREAS, *Matthew Curran*, of 3218 Rancho Quartillo, Carlsbad CA, 92009; and *Mark Peterson, M.D.*, of 840 Royal Avenue Suite #1, Medford OR, 97504; hereinafter referred to as "Assignors," are the inventors of the invention described and set forth in the below-identified application for United States Letters Patent:

Title of Invention: SYSTEMS AND METHODS FOR SPINAL FUSION

Date(s) of execution of Declaration: 7-26-05

Filing Date: March 29, 2005

Application No.: 11/093,409

WHEREAS, *NuVasive, Inc.*, a Corporation of the State of Delaware, located at 4545 Towne Centre Court, San Diego, CA, 92121, hereinafter referred to as "Assignee," is desirous of acquiring an interest in the invention and application and in any U.S. Letters Patent and Registrations which may be granted on the same;

For good and valuable consideration, receipt of which is hereby acknowledged by Assignors, Assignors have assigned, and by these presents do assign to Assignee all right, title and interest in and to the invention and application and to all foreign counterparts (including patent, utility model and industrial designs), and in and to any Letters Patent and Registrations which may hereafter be granted on the same in the United States and all countries throughout the world, and to claim the priority from the application as provided by the Paris Convention. The right, title and interest is to be held and enjoyed by Assignee and Assignee's successors and assigns as fully and exclusively as it would have been held and enjoyed by Assignors had this Assignment not been made, for the full term of any Letters Patent and Registrations which may be granted thereon, or of any division, renewal, continuation in whole or in part, substitution, conversion, reissue, prolongation or extension thereof.

Assignors further agree that they will, without charge to Assignee, but at Assignee's expense, (a) cooperate with Assignee in the prosecution of U.S. Patent applications and foreign counterparts on the invention and any improvements, (b) execute, verify, acknowledge and deliver all such further papers, including patent applications and instruments of transfer, and (c) perform such other acts as Assignee lawfully may request to obtain or maintain Letters Patent and Registrations for the invention and improvements in any and all countries, and to vest title thereto in Assignee, or Assignee's successors and assigns.

Assignors hereby authorize and request Jonathan Spangler, Esq. 4545 Towne Centre Court, San Diego, CA, 92121, to insert herein above the application number and filing date of said application when known.

IN TESTIMONY WHEREOF, Assignors have signed their names on the dates indicated.

Dated: 7/26/05

Matthew Curran

Dated: _____

Mark Peterson, M.D.

Application No. 11/093,409
Attorney Docket No. 104US1

ASSIGNMENT OF PATENT APPLICATION

WHEREAS, *Matthew Curran*, of 3218 Rancho Quartillo, Carlsbad CA, 92009; and *Mark Peterson, M.D.*, of 840 Royal Avenue Suite #1, Medford OR, 97504; hereinafter referred to as "Assignors," are the inventors of the invention described and set forth in the below-identified application for United States Letters Patent:

Title of Invention: SYSTEMS AND METHODS FOR SPINAL FUSION

Date(s) of execution of Declaration: 7-26-05

Filing Date: March 29, 2005

Application No.: 11/093,409

WHEREAS, *NuVasive, Inc.*, a Corporation of the State of Delaware, located at 4545 Towne Centre Court, San Diego, CA, 92121, hereinafter referred to as "Assignee," is desirous of acquiring an interest in the invention and application and in any U.S. Letters Patent and Registrations which may be granted on the same;

For good and valuable consideration, receipt of which is hereby acknowledged by Assignors, Assignors have assigned, and by these presents do assign to Assignee all right, title and interest in and to the invention and application and to all foreign counterparts (including patent, utility model and industrial designs), and in and to any Letters Patent and Registrations which may hereafter be granted on the same in the United States and all countries throughout the world, and to claim the priority from the application as provided by the Paris Convention. The right, title and interest is to be held and enjoyed by Assignee and Assignee's successors and assigns as fully and exclusively as it would have been held and enjoyed by Assignors had this Assignment not been made, for the full term of any Letters Patent and Registrations which may be granted thereon, or of any division, renewal, continuation in whole or in part, substitution, conversion, reissue, prolongation or extension thereof.

Assignors further agree that they will, without charge to Assignee, but at Assignee's expense, (a) cooperate with Assignee in the prosecution of U.S. Patent applications and foreign counterparts on the invention and any improvements, (b) execute, verify, acknowledge and deliver all such further papers, including patent applications and instruments of transfer, and (c) perform such other acts as Assignee lawfully may request to obtain or maintain Letters Patent and Registrations for the invention and improvements in any and all countries, and to vest title thereto in Assignee, or Assignee's successors and assigns.

Assignors hereby authorize and request Jonathan Spangler, Esq. 4545 Towne Centre Court, San Diego, CA, 92121, to insert herein above the application number and filing date of said application when known.

IN TESTIMONY WHEREOF, Assignors have signed their names on the dates indicated.

Dated: _____

Matthew Curran

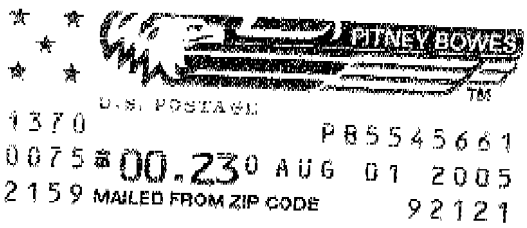
Dated: 7/26/05

Mark Peterson

Mark Peterson, M.D.

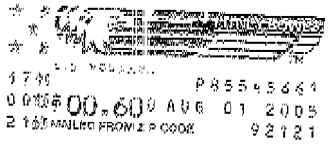
Please date stamp this postcard evidencing receipt by the US Patent and Trademark Office of the following materials deposited in First Class Mail on August 1, 2005 regarding App. Ser. No. 11/093,409 (104US1):

1. Recordation Form Cover Sheet, Patents (1 pg);
2. Assignment of Patent Application (2 pgs); and
3. Return Postcard (1 pg).



Jonathan Spangler, Esq.
Chief Patent Counsel
NuVasive, Inc.
4545 Towne Center Court
San Diego, CA 92121

NUVASIVE®
4545 Towne Centre Court
San Diego, CA 92121



MAIL STOP ASSIGNMENT RECORDATION SERVICES
DIRECTOR OF THE USPTO
PO BOX 1450
ALEXANDRIA VA 22313-1450

Creative Spine Technology®

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Matthew Curran et al.	Art Unit	: Unknown
Serial No.	: Unassigned	Examiner	: Unknown
Filed	: April 6, 2012		
Title	: SYSTEMS AND METHODS FOR SPINAL FUSION		

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Please consider the references listed on the enclosed PTO-1449 form.

Under 35 U.S.C. § 120, this application relies on the earlier filing date of application serial number, 13/440,062 filed on April 5, 2012. All of the references listed on the attached 1449 were submitted to and/or cited by the Office in the prior application and, therefore, are not provided herewith. Copies can be provided upon request.

This statement is being filed with the application. Please apply any necessary charges or credits to Deposit Account 06-1050, referencing the above attorney docket number.

Respectfully submitted,

Date: April 6, 2012

/Michael T. Hawkins/
Michael T. Hawkins
Reg. No. 57,867

Customer Number 26191
Fish & Richardson P.C.
Telephone: (612) 335-5070
Facsimile: (877) 769-7945

60762850.doc

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	1	3,486,505	12/30/1969	Morrison			
	2	3,518,993	7/7/1970	Blake			
	3	3,604,487	9/14/1971	Gilbert			
	4	3,745,995	7/17/1973	Kraus			
	5	3,848,601	11/19/1974	Ma et al.			
	6	3,867,728	2/25/1975	Stubstad et al.			
	7	4,026,304	5/31/1971	Levy			
	8	4,026,305	5/31/1971	Brownlee et al.			
	9	4,454,374	10/8/1985	Jacobson			
	10	4,501,269	2/26/1985	Bagby			
	11	4,646,738	3/3/1987	Trott			
	12	4,657,550	4/14/1987	Daher			
	13	4,743,256	5/10/1988	Brantigan			
	14	4,781,591	11/1/1988	Allen			
	15	4,834,757	5/30/1989	Brantigan			
	16	4,877,020	10/31/1989	Vich			
	17	4,878,915	11/7/1989	Brantigan			
	18	4,932,975	6/12/1990	Main et al.			
	19	4,950,296	8/21/1990	McIntyre			
	20	4,961,740	10/9/1990	Ray et al.			
	21	4,962,766	10/16/1990	Herzon			
	22	5,015,247	5/14/1991	Michelson			
	23	5,026,373	6/25/1991	Ray et al.			
	24	5,047,055	9/10/1991	Bao et al.			
	25	5,055,104	10/8/1991	Ray			
	26	5,062,845	11/5/1991	Kuslich et al.			
	27	5,071,437	12/10/1991	Steffee			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	28	5,092,572	3/3/1992	Litwak et al.			
	29	5,133,717	7/28/1992	Chopin			
	30	5,133,755	7/28/1992	Brekke			
	31	5,171,278	12/15/1992	Pisharodi			
	32	5,192,327	3/9/1993	Brantigan			
	33	5,217,497	6/8/1993	Mehdian			
	34	5,263,953	11/23/1993	Bagby			
	35	5,269,785	12/14/1993	Bonutti			
	36	5,284,153	2/8/1994	Raymond et al.			
	37	5,290,494	3/1/1994	Coombes et al.			
	38	5,300,076	5/5/1994	Lerich			
	39	5,304,210	4/19/1994	Crook			
	40	5,306,307	4/26/1994	Senter et al.			
	41	5,306,309	4/26/1994	Wagner et al.			
	42	5,322,505	6/21/1994	Krause et al.			
	43	5,334,205	8/2/1994	Cain			
	44	5,336,223	8/9/1994	Rogers			
	45	5,364,400	11/15/1994	Rego, Jr. et al.			
	46	5,395,372	3/7/1995	Holt et al.			
	47	5,397,363	3/14/1995	Gelbard			
	48	5,397,364	3/14/1995	Kozak			
	49	5,405,391	4/11/1995	Henderson et al.			
	50	5,413,602	5/9/1995	Metz-Stavenhagen			
	51	5,425,772	6/20/1995	Brantigan			
	52	5,431,658	7/11/1995	Moskovich			
	53	5,443,514	8/22/1995	Steffee			
	54	5,443,515	8/22/1995	Cohen, et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	55	5,445,639	8/29/1995	Kuslich, et al.			
	56	5,454,811	10/3/1995	Huebner			
	57	5,458,638	10/17/1995	Kuslich et al.			
	58	5,484,403	1/16/1996	Yoakum et al.			
	59	5,484,437	1/16/1996	Michelson			
	60	5,489,307	2/6/1996	Kuslich et al.			
	61	5,489,308	2/6/1996	Kuslich et al.			
	62	5,514,180	5/7/1996	Heggeness et al.			
	63	5,522,879	6/4/1996	Scopelianos			
	64	5,522,899	6/4/1996	Michelson			
	65	5,524,624	6/11/1996	Tepper et al.			
	66	5,527,312	6/18/1996	Ray			
	67	5,534,030	7/9/1996	Navarro et al.			
	68	5,540,688	7/30/1996	Navas			
	69	5,545,222	8/13/1996	Bonutti			
	70	5,562,736	10/8/1996	Ray et al.			
	71	5,565,005	10/15/1996	Erickson et al.			
	72	5,571,190	11/5/1996	Ulrich			
	73	5,571,192	11/5/1996	Schonhoffer			
	74	5,593,409	1/14/1997	Michelson			
	75	5,609,636	3/11/1997	Kohrs et al.			
	76	5,611,800	3/18/1997	Davis et al.			
	77	5,611,810	3/18/1997	Arnold et al.			
	78	5,632,747	5/27/1997	Scarborough et al.			
	79	5,645,598	7/8/1997	Brosnahan et al.			
	80	5,653,761	8/5/1997	Pisharodi			
	81	5,653,762	8/5/1997	Pisharodi			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	82	5,658,336	8/19/1997	Pisdharodi			
	83	5,658,337	8/19/1997	Kohrs et al.			
	84	5,662,710	9/2/1997	Bonutti			
	85	5,665,122	9/9/1997	Kambin			
	86	5,669,909	9/23/1997	Zdeblick et al.			
	87	5,676,703	10/14/1997	Gelbard			
	88	5,683,394	11/4/1997	Rinner			
	89	5,683,400	11/4/1997	McGuire			
	90	5,683,464	11/4/1997	Wagner et al.			
	91	5,690,629	11/25/1997	Asher et al.			
	92	5,700,264	12/23/1997	Zucherman et al.			
	93	5,700,291	12/23/1997	Kuslich et al.			
	94	5,700,292	12/23/1997	Marguiles			
	95	5,702,449	12/30/1997	McKay			
	96	5,702,451	12/30/1997	Biedermann et al.			
	97	5,702,453	12/30/1997	Rabbe et al.			
	98	5,702,454	12/30/1997	Baumgartner			
	99	5,702,455	12/30/1997	Saggar			
	100	5,703,451	12/30/1997	Yamamichi et al.			
	101	5,707,373	1/13/1998	Sevrain et al.			
	102	5,711,957	1/27/1998	Patat et al.			
	103	5,716,415	2/10/1998	Steffee			
	104	5,720,748	2/24/1998	Kuslich et al.			
	105	5,720,751	2/24/1998	Jackson			
	106	5,728,159	3/17/1998	Stroever et al.			
	107	5,741,253	4/21/1998	Michelson			
	108	5,741,261	4/21/1998	Moskovitz et al.			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	109	5,755,797	5/26/1998	Baumgartner			
	110	5,766,252	6/16/1998	Henry et al.			
	111	5,772,661	6/30/1998	Michelson			
	112	5,775,331	7/7/1998	Raymond et al.			
	113	5,775,797	7/7/1998	Henstra			
	114	5,779,642	7/14/1998	Nightengale			
	115	5,782,830	7/21/1998	Farris			
	116	5,782,919	7/21/1998	Zdeblick et al.			
	117	5,785,710	7/28/1998	Michelson			
	118	5,797,909	8/25/1998	Michelson			
	119	5,800,549	9/1/1998	Bao et al.			
	120	5,800,550	9/1/1998	Sertich			
	121	5,814,084	9/29/1998	Grivas et al.			
	122	5,851,208	12/22/1998	Trott			
	123	5,860,973	10/30/1996	Michelson			
	124	5,865,845	2/2/1999	Thalgott			
	125	5,865,848	2/2/1999	Baker			
	126	5,885,299	3/23/1999	Winslow et al.			
	127	5,888,219	3/30/1999	Bonutti			
	128	5,888,224	3/30/1999	Beckers et al.			
	129	5,893,890	4/13/1999	Pisharodi			
	130	5,904,719	5/18/1999	Errico et al.			
	131	5,910,315	6/8/1999	Stevenson et al.			
	132	5,942,698	8/24/1999	Stevens			
	133	5,954,769	9/21/1999	Rosenlicht			
	134	5,968,098	10/19/1999	Winslow			
	135	5,993,474	11/30/1999	Ouchi			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	136	6,003,426	12/21/1999	Kobayashi et al.			
	137	6,004,326	12/21/1999	Castro et al.			
	138	6,008,433	12/28/1999	Stone			
	139	6,015,436	1/18/2000	Schunhuffer			
	140	6,033,405	3/7/2000	Winslow et al.			
	141	6,039,761	3/21/2000	Li et al.			
	142	6,042,582	3/28/2000	Ray			
	143	6,045,580	4/4/2000	Scarborough et al.			
	144	6,048,342	4/11/2000	Zucherman et al.			
	145	6,059,829	5/9/2000	Schlapfer et al.			
	146	6,063,088	5/16/2000	Winslow			
	147	6,083,225	7/4/2000	Winslow et al.			
	148	6,096,080	8/1/2000	Nicholson et al.			
	149	6,102,948	8/15/2000	Brosnahan III			
	150	6,120,503	9/19/2000	Michelson			
	151	6,120,506	9/19/2000	Kohrs et al.			
	152	6,132,472	10/17/2000	Bonutti			
	153	6,143,033	11/7/2000	Paul et al.			
	154	6,159,211	12/12/2000	Boriani et al.			
	155	6,159,215	12/12/2000	Urbahns et al.			
	156	6,193,756	2/27/2001	Studer et al.			
	157	6,200,347	3/13/2001	Anderson			
	158	6,224,607	5/1/2001	Michelson			
	159	6,224,631	5/1/2001	Kohrs			
	160	6,241,769	6/5/2001	Nicholson et al.			
	161	6,241,771	6/5/2001	Gresser et al.			
	162	6,251,140	6/26/2001	Marino et al.			

Examiner Signature	Date Considered

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	163	6,258,125	7/10/2001	Paul et al.			
	164	6,277,149	8/21/2001	Boyle et al.			
	165	6,319,257	11/20/2001	Carignan et al.			
	166	6,371,989	4/16/2001	Chauvin et al.			
	167	6,383,221	5/7/2002	Scarborough et al.			
	168	6,409,766	6/25/2002	Brett			
	169	6,425,772	7/30/2002	Bernier et al.			
	170	6,432,140	8/13/2002	Lin			
	171	6,440,142	8/27/2002	Ralph et al.			
	172	6,442,814	9/3/2002	Landry et al.			
	173	6,447,547	9/10/2002	Michelson			
	174	6,454,806	9/24/2002	Cohen et al.			
	175	6,468,311	10/22/2002	Boyd et al.			
	176	6,491,724	12/10/2002	Ferree			
	177	6,527,773	3/4/2003	Lin et al.			
	178	6,547,823	4/15/2004	Scarborough et al.			
	179	6,595,998	7/22/2003	Johnson et al.			
	180	6,626,905	9/30/2003	Schmiel et al.			
	181	6,635,086	10/21/2003	Lin			
	182	6,648,895	11/18/2003	Burkus et al.			
	183	6,672,019	1/6/2004	Wenz			
	184	6,676,703	1/13/2004	Biscup			
	185	6,706,067	3/16/2004	Shimp et al.			
	186	6,743,255	6/1/2004	Ferree			
	187	6,746,484	6/8/2004	Liu et al.			
	188	6,755,841	6/29/2004	Fraser et al.			
	189	6,761,739	7/13/2004	Shepard			

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary) (37 CFR §1.98(b))		Applicant Matthew Curran et al.	
		Filing Date April 6, 2012	Group Art Unit Unknown

U.S. Patent Documents

Examiner Initial	Desig. ID	Document Number	Publication Date	Patentee	Class	Subclass	Filing Date If Appropriate
	190	6,824,564	11/30/2004	Crozet			
	191	6,923,814	8/2/2005	Hildebrand et al.			
	192	6,942,698	9/13/2005	Jackson			
	193	6,964,687	11/15/2005	Bernard et al.			
	194	6,979,353	12/27/2005	Bresina			
	195	6,984,245	1/10/2006	McGahan et al.			
	196	6,986,788	1/17/2006	Paul et al.			
	197	6,989,031	1/24/2006	Michelson			
	198	7,018,416	3/28/2006	Hanson et al.			
	199	2002/0058950	5/16/2002	Winterbottom et al.			
	200	2003/0105528	6/5/2003	Shimp et al.			
	201	2003/0139812	7/24/2003	Garcia et al.			
	202	2004/0153155	8/5/2004	Chung et al.			
	203	2005/0197702	9/8/2005	Coppes et al.			
	204	2007/0191945	8/16/2007	Yu et al.			
	205	D472,634	4/1/2003	Anderson			
	206	D473,650	4/22/2003	Anderson			
	207	D503,801	4/5/2005	Jackson			
	208	D530,423	10/17/2006	Miles et al.			

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	209	369603	5/23/1990	EPO				
	210	517030	5/19/1992	EPO				
	211	667127	8/16/1995	EPO				
	212	706876	4/17/1996	EPO				
	213	716840	6/19/1996	EPO				

Examiner Signature	Date Considered

EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	214	737448	10/16/1996	EPO				
	215	796593	9/24/1997	EPO				
	216	809974	4/15/1998	EPO				
	217	809975	4/15/1998	EPO				
	218	811356	4/15/1998	EPO				
	219	880938	2/12/1998	EPO				
	220	2015507	1/5/1999	CA				
	221	00/45712	8/10/2000	WIPO				
	222	00/45713	8/10/2000	WIPO				
	223	01/41681	6/14/2001	WIPO				
	224	01/49333	7/12/2001	WIPO				
	225	90/00037	1/11/1990	WIPO				
	226	91/06261	5/16/1992	WIPO				
	227	92/14423	9/3/1992	WIPO				
	228	94/04100	3/3/1994	WIPO				
	229	94/10928	5/26/1994	WIPO				
	230	95/01810	1/19/1995	WIPO				
	231	96/08205	3/21/1996	WIPO				
	232	96/17564	3/13/1996	WIPO				
	233	96/41582	12/27/1996	WIPO				
	234	97/20513	6/12/1997	WIPO				
	235	97/33525	9/18/1997	WIPO				
	236	97/37620	10/16/1997	WIPO				
	237	98/09586	3/12/1998	WIPO				
	238	98/14142	4/9/1998	WIPO				
	239	98/17208	4/30/1998	WIPO				
	240	98/25539	6/18/1998	WIPO				

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No. 13958-0099003	Application No. Unassigned
Information Disclosure Statement by Applicant (Use several sheets if necessary)		Applicant Matthew Curran et al.	
(37 CFR §1.98(b))		Filing Date April 6, 2012	Group Art Unit Unknown

Foreign Patent Documents or Published Foreign Patent Applications

Examiner Initial	Desig. ID	Document Number	Publication Date	Country or Patent Office	Class	Subclass	Translation Yes	Translation No
	241	99/08627	2/25/1999	WIPO				
	242	99/38461	8/5/1999	WIPO				

Other Documents (include Author, Title, Date, and Place of Publication)

Examiner Initial	Desig. ID	Document
	243	Alleyne et al., "Current and future approaches to lumbar disc surgery: A literature review," Medscape Orthopedics & Sports Medicine, 1, [www.medscape.com/Medscape/OrthoSportsMed/1997/v01.n11/…/mos3057], (1997)
	244	Benini et al., "Undercutting decompression and posterior fusion with translaminar facet screw fixation in degenerative lumbar spinal stenosis: Technique and results," Neuro-Orthopedics, 17/18, 159-172 (1995)
	245	Kambin et al., "History and current status of percutaneous arthroscopic disc surgery," Spine, 21(24S):57S-61S (1996)
	246	Stein et al., "Percutaneous facet joint fusion: Preliminary experience," Journal of Vascular and Interventional Radiology, 4:69-74 (1993)
	247	Vamvanij et al., "Surgical treatment of internal disc disruption: An outcome study of four fusion techniques," Journal of Spinal Disorders, 11(5):375-382 (1998)
	248	Baulot et al., "Complementary anterior spondylodesis by thoracoscopy. Technical note regarding an observation," Lyon Surg., 90(5):347-351 (1994)
	249	Berry et al., "A morphometric study of human lumbar and selected thoracic vertebrae, study of selected vertebrae," Spine 12(4):362-367 (1996)
	250	Crock, "A Short Practice of Spinal Surgery," Second, revised edition, published by Springer-Verlag/Wein, New York (1993)
	251	Crock, "Anterior Lumbar Interbody Fusion," Clinical Orthopaedics & Related Research, Marshall R. Urist, Editor-in-Chief, J. B. Lippincott Company (1982)
	252	Edeland, "Some additional suggestions for an intervertebral disc prosthesis," Journal of Biomedical Engineering, 7:57-62 (1985)
	253	Kemp, "Anterior fusion of the spine for infective lesions in adults," Journal of Bone & Joint Surgery, 55B(4):715-734 (1973)
	254	NuVasive, Inc., Corrected Final Invalidity Contentions Regarding US 5,860,973, US 6,592,586 and US 6,945,933 filed in the United States District Court, Southern District of California on June 14, 2010 (and 23 appendices)
	255	CoRoent™ Marketing Brochure (9004001 A.0), NuVasive, Inc., 2004, 2 pages
	256	CoRoent™ Marketing Brochure (9004001 C.0), NuVasive, Inc., 2005, 2 pages
	257	CoRoent™ XL & XLR Marketing Brochure (9004225 A.0), NuVasive, Inc., 2005, 2 pages
	258	CoRoent® XL & XLR Marketing Brochure (9004225 B.0), NuVasive, Inc., 2006, 2 pages
	259	CoRoent® XL & XLR Marketing Brochure (9004225 C.0), NuVasive, Inc., 2007, 2 pages

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Substitute Form PTO-1449 (Modified) U.S. Department of Commerce Patent and Trademark Office **Information Disclosure Statement by Applicant** (Use several sheets if necessary) (37 CFR §1.98(b))	Attorney Docket No. 13958-0099003	Application No. Unassigned
	Applicant Matthew Curran et al.	
	Filing Date April 6, 2012	Group Art Unit Unknown

Other Documents (include Author, Title, Date, and Place of Publication)		
Examiner Initial	Desig. ID	Document
	260	CoRoent® XL Marketing Brochure (9500039 A.0), NuVasive, Inc., 2006, 8 pages

Examiner Signature	Date Considered
EXAMINER: Initials citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.	

Substitute Disclosure Form (PTO-1449)

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Filer:	Michael T. Hawkins/Kayla Olson
Attorney Docket Number:	13958-0099003/ 104US4

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Claims in excess of 20	1202	26	60	1560
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2810**

Electronic Acknowledgement Receipt

EFS ID:	12485297
Application Number:	13441092
International Application Number:	
Confirmation Number:	1088
Title of Invention:	Systems and Methods for Spinal Fusion
First Named Inventor/Applicant Name:	Matthew Curran
Customer Number:	26191
Filer:	Michael T. Hawkins/Jodi Budge
Filer Authorized By:	Michael T. Hawkins
Attorney Docket Number:	13958-0099003/ 104US4
Receipt Date:	06-APR-2012
Filing Date:	
Time Stamp:	11:24:21
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	$2810
RAM confirmation Number	8706
Deposit Account	061050
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Transmittal of New Application	Transmittal.pdf	88102 a6ad3b29ac4b1afe4c4d3bebb36e09601bdd4172	no	2
Warnings:					
Information:					
2	Application Data Sheet	ADS.pdf	1030943 aa104ea66d0946bb3408ab85b5b846a2b215e4a5	no	5
Warnings:					
Information:					
3		App.pdf	130312 d5ab636b7dd64e8df01fc1b17dbaf3399b45a3f2	yes	36

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	25
Claims	26	35
Abstract	36	36

Warnings:					
Information:					
4	Drawings-only black and white line drawings	Figures.pdf	1245651 fce8f216a76f22e57b7dbdfb1327c4aa0701d39c	no	20
Warnings:					
Information:					
5	Oath or Declaration filed	Declaration.pdf	152444 8379c1aff65ea641bc67813b1b9b3bed7221dac7	no	3
Warnings:					
Information:					
6	Assignee showing of ownership per 37 CFR 3.73(b).	POA.pdf	326009 a9016a282cd409af911c10c70a126c9e4f435269	no	9
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
7	Transmittal Letter	IDS.pdf	57405 5c6338ffd043909414554bbd1b1d9e2cfe703753	no	1
Warnings:					

Information:					
8	Information Disclosure Statement (IDS) Form (SB08)	1449.pdf	150399 bb298dfc5dd6dc6876071e64ae54b8536acd61b8	no	11
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
9	Fee Worksheet (SB06)	fee-info.pdf	36236 c25ce9595a810c1cd6e54b83b0c87b5683ade6b7	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	3217501	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

SCORE Placeholder Sheet for IFW Content

Application Number: 13441092 Document Date: 4/6/2012

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

To access the documents in the SCORE database, refer to instructions developed by SIRA.

At the time of document entry (noted above):

- Examiners may access SCORE content via the eDAN interface.
- Other USPTO employees can bookmark the current SCORE URL (http://es/ScoreAccessWeb/).
- External customers may access SCORE content via the Public and Private PAIR interfaces.

Form Revision Date: February 8, 2006