

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

STRAUMANN USA, LLC

Petitioner

v.

SMART DENTURE CONVERSIONS, LLC

Patent Owner

U.S. Patent No. 11,937,992

IPR2025-00956

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

STRAUMANN USA, LLC

Petitioner

v.

SMART DENTURE CONVERSIONS, LLC

Patent Owner

U.S. Patent No. 12,156,781

PGR2025-00054

**PETITIONER'S DEMONSTRATIVES
FOR CONSOLIDATED ORAL HEARING**

Background and Prior Art

Basic Components

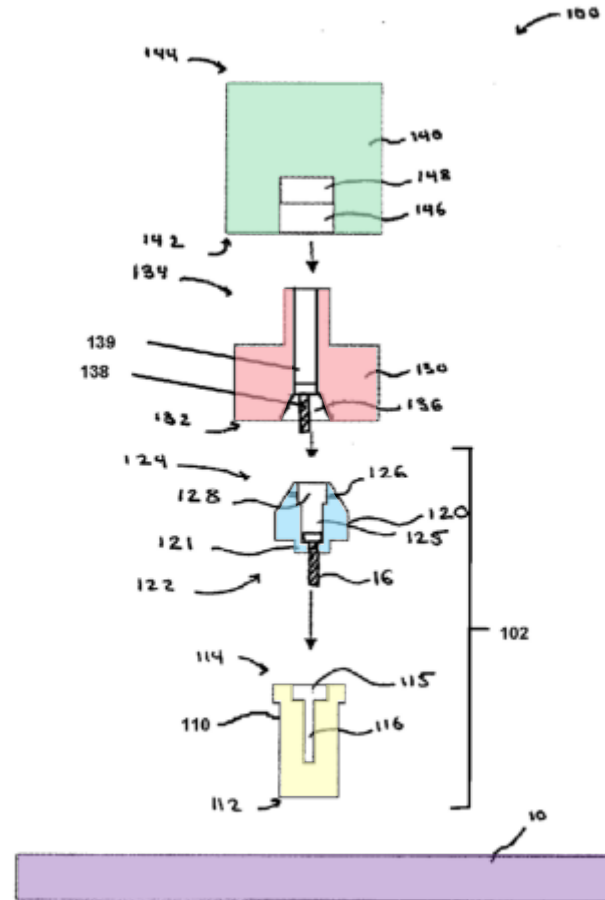


Figure 1

- 140 Prosthesis
- 130 Coping
- 120 Abutment
- 110 Implant
- 10 Patient's Bone

Open Tray / Closed Tray

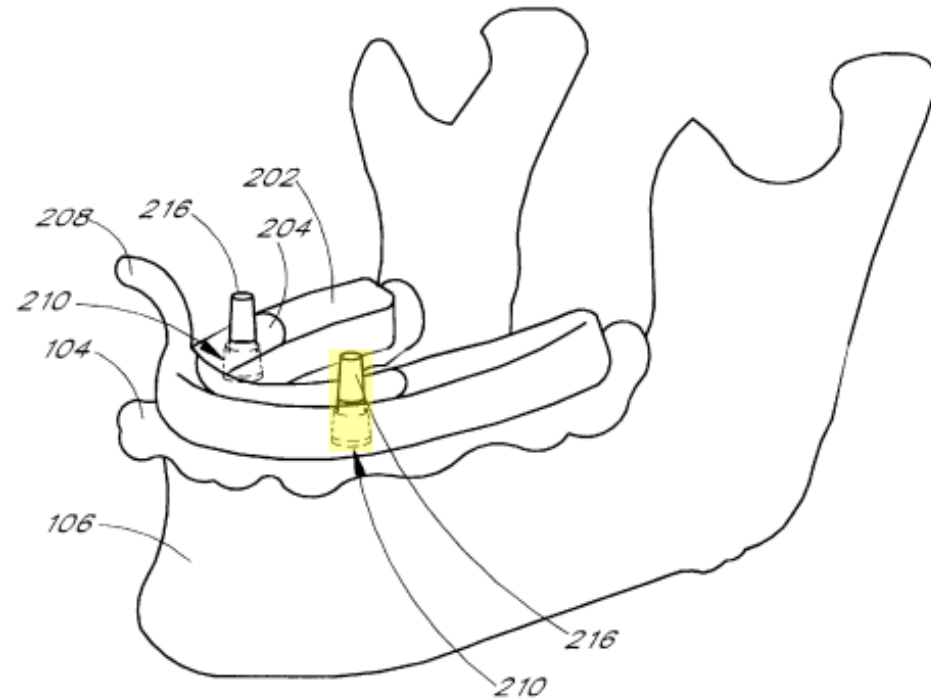


FIG. 2A
(PRIOR ART)

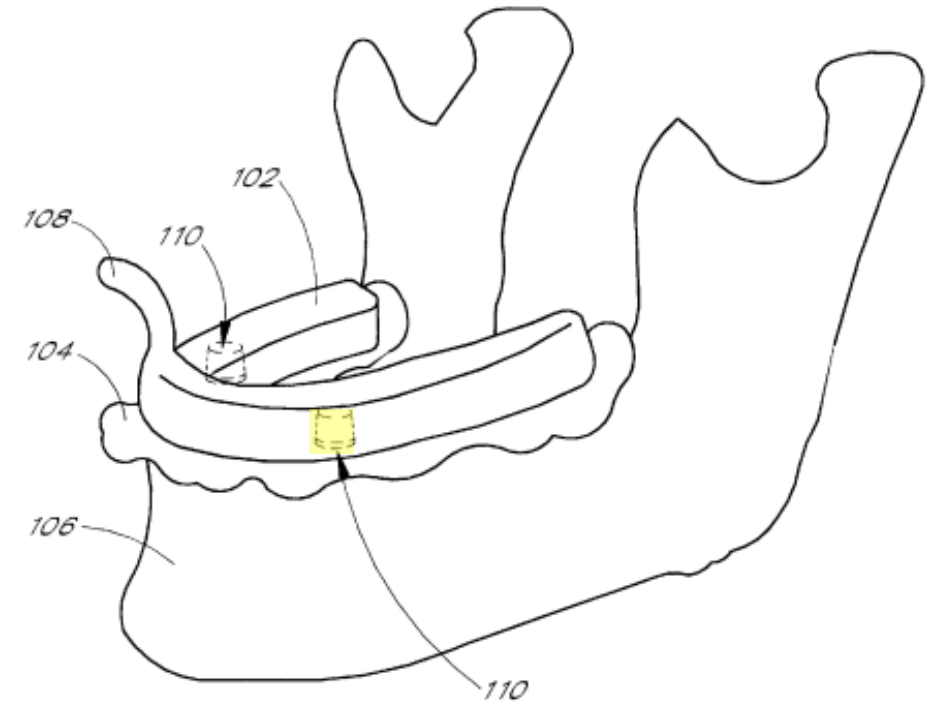


FIG. 1A
(PRIOR ART)

Bernhard

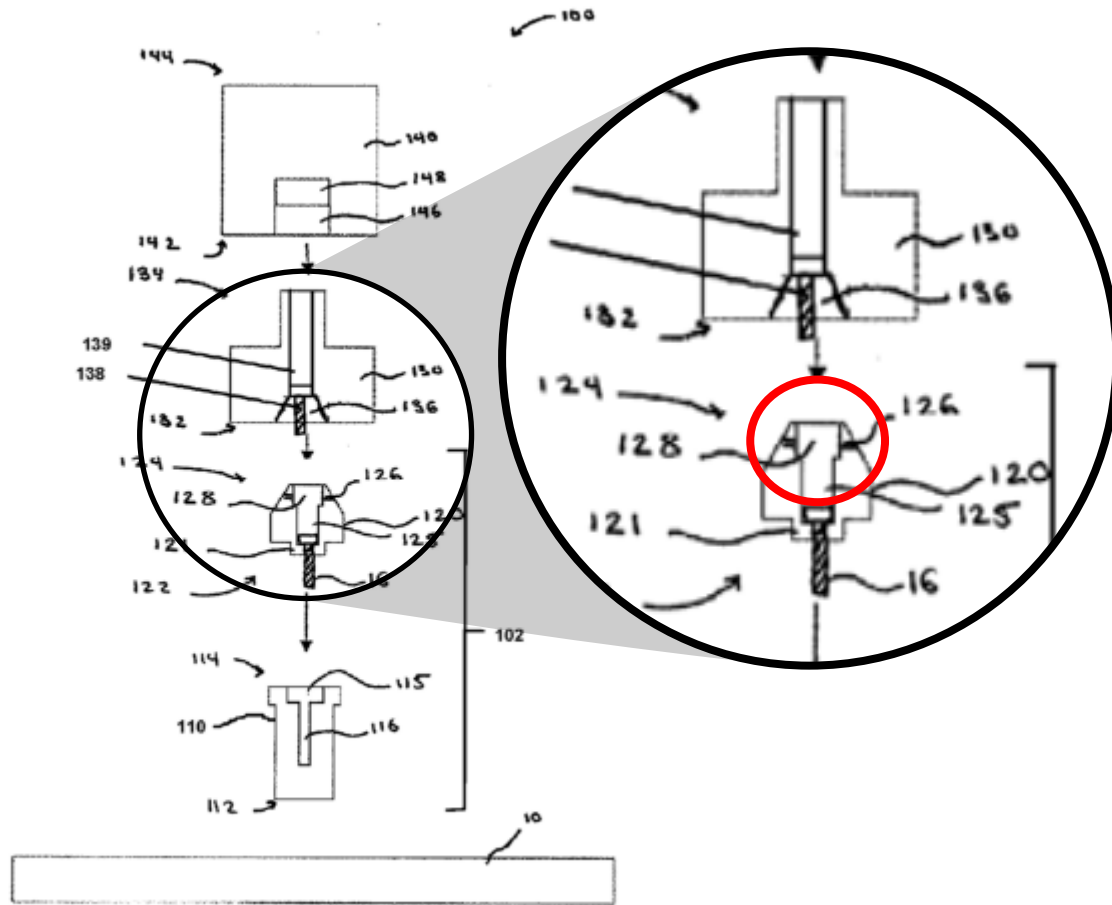


Figure 1

...the provisional connection feature 126 can be designed to allow for a **“snap-fit”** and or a **friction fit connection** between the abutment 120 and the other dental component such as the coping 130...

Bernhard

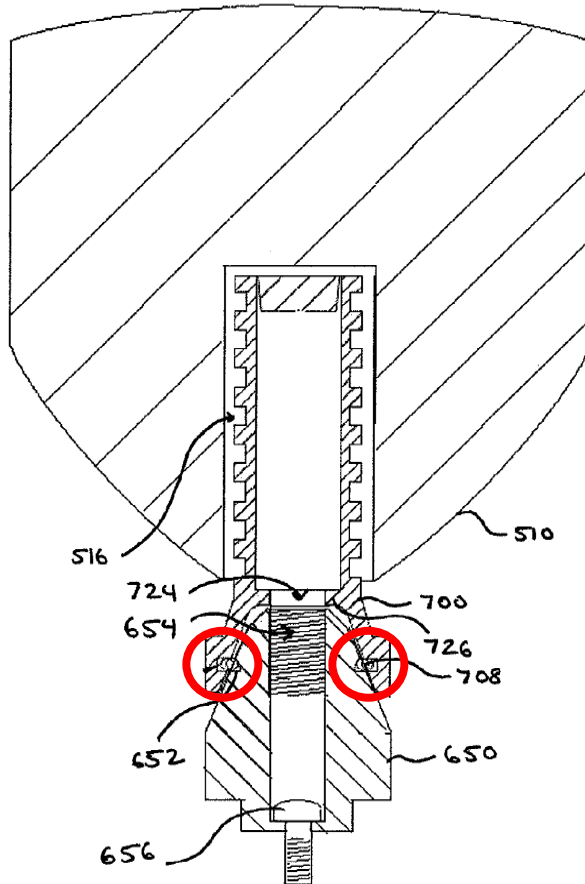


Figure 8

Since the coping is attached to the prosthesis via the cured bonding agent and/or acrylic and because the coping can be attached to the anchoring unit using a “snap-fit,” a friction fit, or other similar **provisional connection feature**, removal of the prosthesis can result in the copings being detached from the anchoring unit.

Poovey

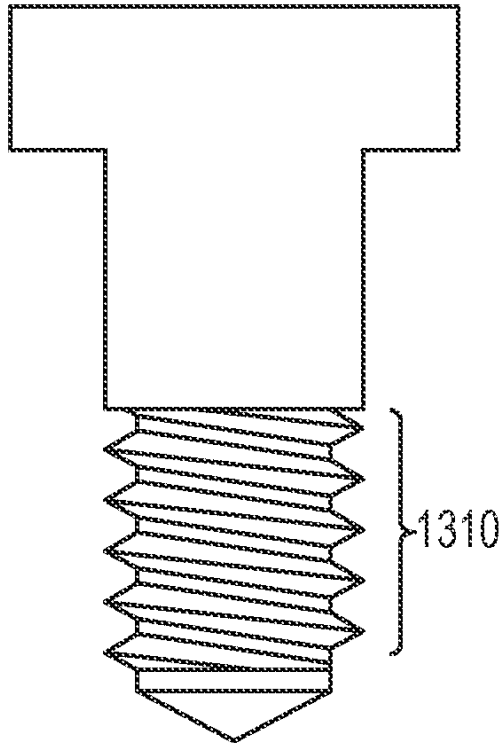


FIG. 13

The threading and/or sleeve coating of the impression coping securing screw is preferably a plastic or silicone material with enough **flexibility to be pulled out** of the implant with low resistance such that it is not difficult for the dental professional and does not cause pain or stress to the patient.

By using a screw that is metal with flexible or heat labile plastic threads that are large enough to be screwed into the implant, but are able to be pulled out without much force, the impression coping is then used in a **closed tray method**, which is easier for the dentist and more comfortable for the patient. But the dentist would have the **benefit of accuracy of the traditional open-tray method** in which the implant coping is unscrewed prior to impression removal.

Derey

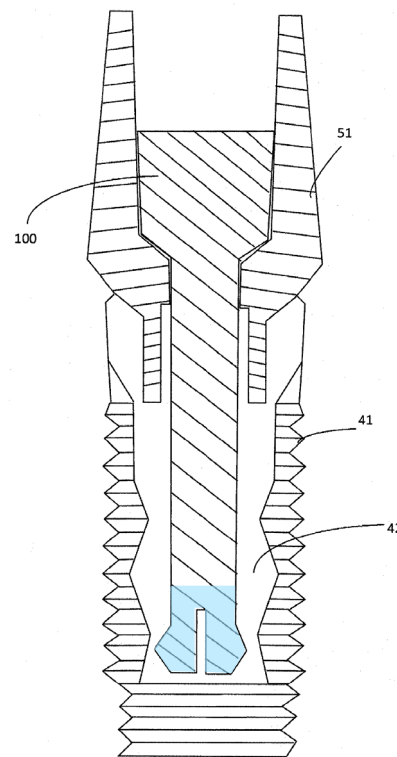


Fig. 6

...if an upper pulling force is applied to the construction 51, the legs of device 100 will surrender their grip and the construction 51 can be easily detached from the implant 41.

The Kofford '992 and '781 Patents

Kofford – Separable Cap

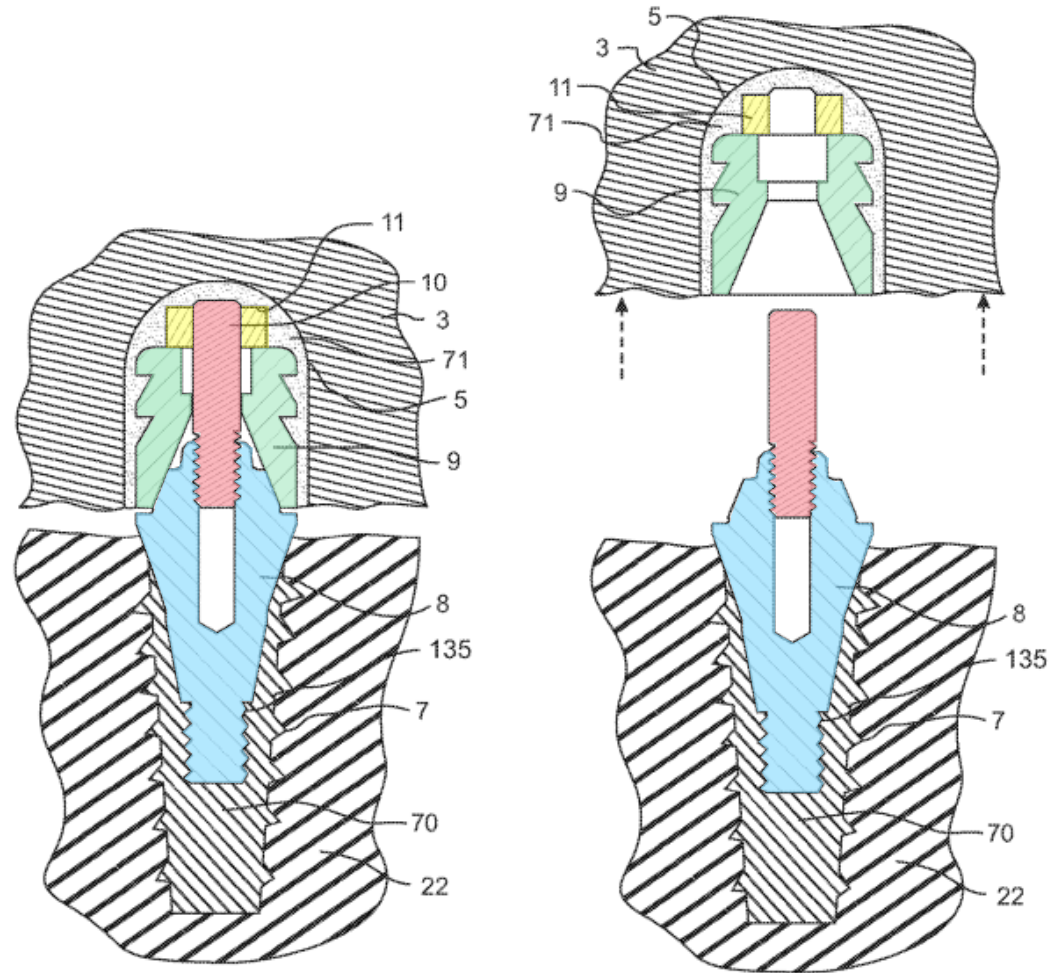
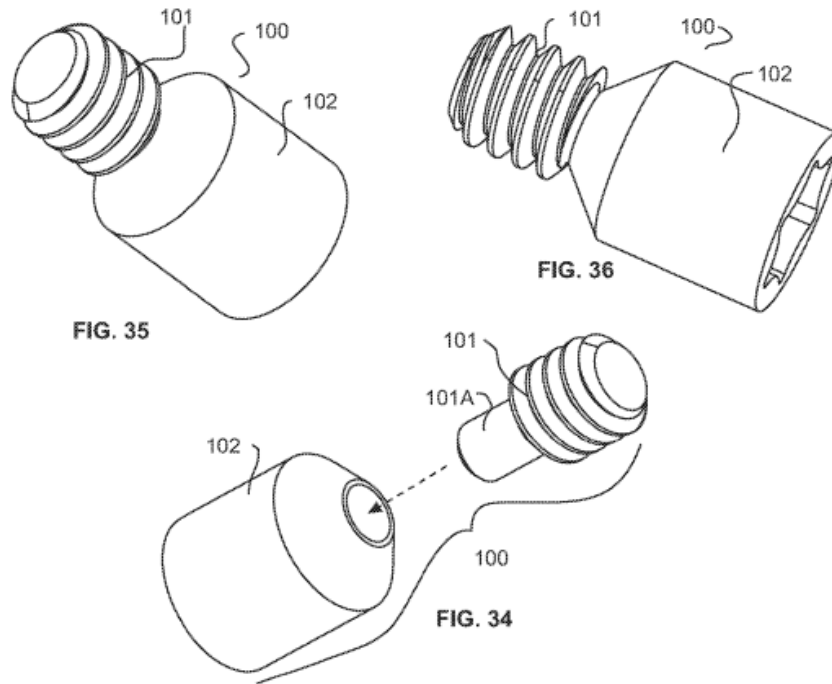


FIG. 5

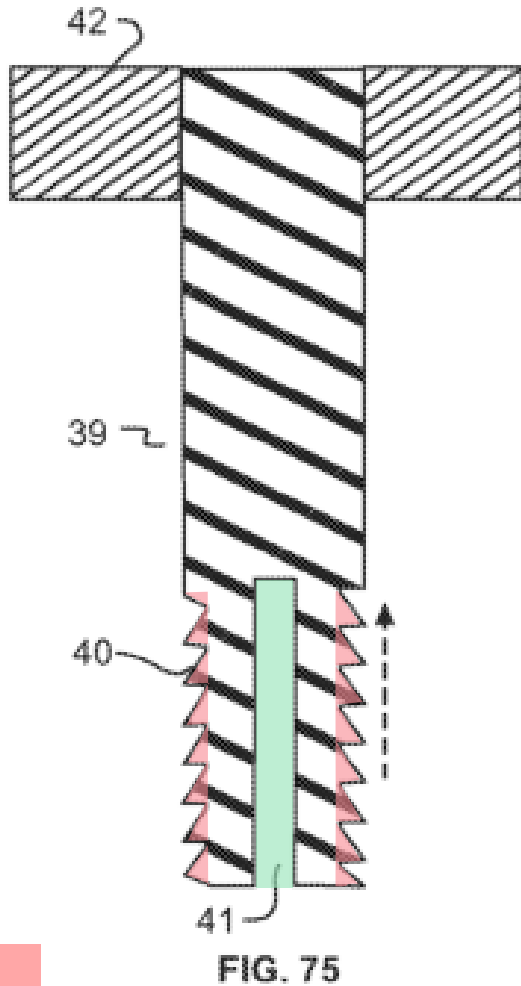
FIG. 6

- 11 Cap
- 9 Coping
- 10 Post
- 8 Abutment

Kofford – Separable Cap



Kofford – Fig. 75



In some embodiments, the threaded end of the post portion of the temporary fastener has a deflecting feature that allows the post to engage or disengage the abutment threads through axial motion instead of a rotary screw motion.

FIG. 75 is a cross-sectional view of a temporary screw embodiment incorporating a split post that has deflecting sections with screw threads shaped to facilitate axial separation without unscrewing the post threads.

FIG. 75 shows a temporary attachment post 39 having a slot 41 and asymmetric threads or serrations 40 that allow the temporary attachment post to be inserted through rotation for alignment for coping pick-up but may be subsequently extracted with a separation force in the axial direction.

...the split post bottom structure shown in FIG. 75 which allows axial extraction...

40 Asymmetric Threads

41 Slot

Kofford – Fig. 75

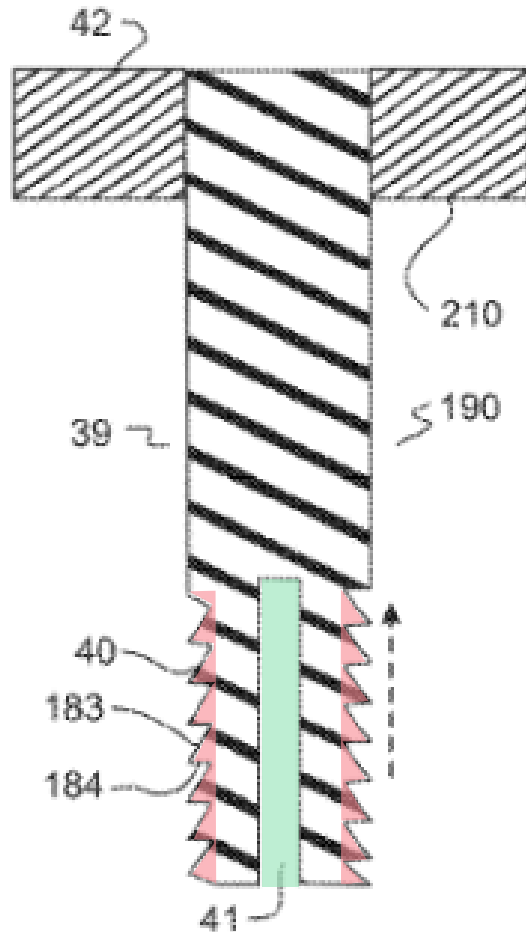


FIG. 75

In some embodiments, the threaded end of the post portion of the temporary fastener has a deflecting feature that allows the post to engage or disengage the abutment threads through axial motion instead of a rotary screw motion.

FIG. 75 is a cross-sectional view of a temporary screw embodiment incorporating a split post that has deflecting sections with screw threads shaped to facilitate axial separation without unscrewing the post threads.

FIG. 75 shows a temporary **fastener 190 with a head 42 portion and an attachment post portion 39.** **The attachment post portion 39 is shown as** having a slot 41 and asymmetric threads or serrations 40 **that have proximal flank 183 and a distal flank 184.** **This asymmetric threading that allow— still allows** the temporary attachment post **portion 39** to be inserted through rotation **like other temporary screw embodiments** for coping pick-up. **The post 39** but may be subsequently extracted with a separation force in the axial direction.

...the split post bottom structure shown in FIG. 75 which allows axial extraction...

40 Asymmetric Threads

41 Slot

Person of Ordinary Skill in the Art

POSA – Competing Definitions

Straumann's POSA Definition

The field of the ... patent is the design of dental implants and prostheses. A person of ordinary skill in the art (POSA), ... would have at least a bachelor's degree in mechanical engineering, biomedical engineering, materials science engineering, or an equivalent degree, plus at least five years of **experience working with (researching, developing and/or designing) dental implants and prostheses**, including familiarity and experience with fasteners (threaded and otherwise) used to connect prostheses, implants and related components. A POSA could also have less formal education but commensurately more practical experience, or vice versa.

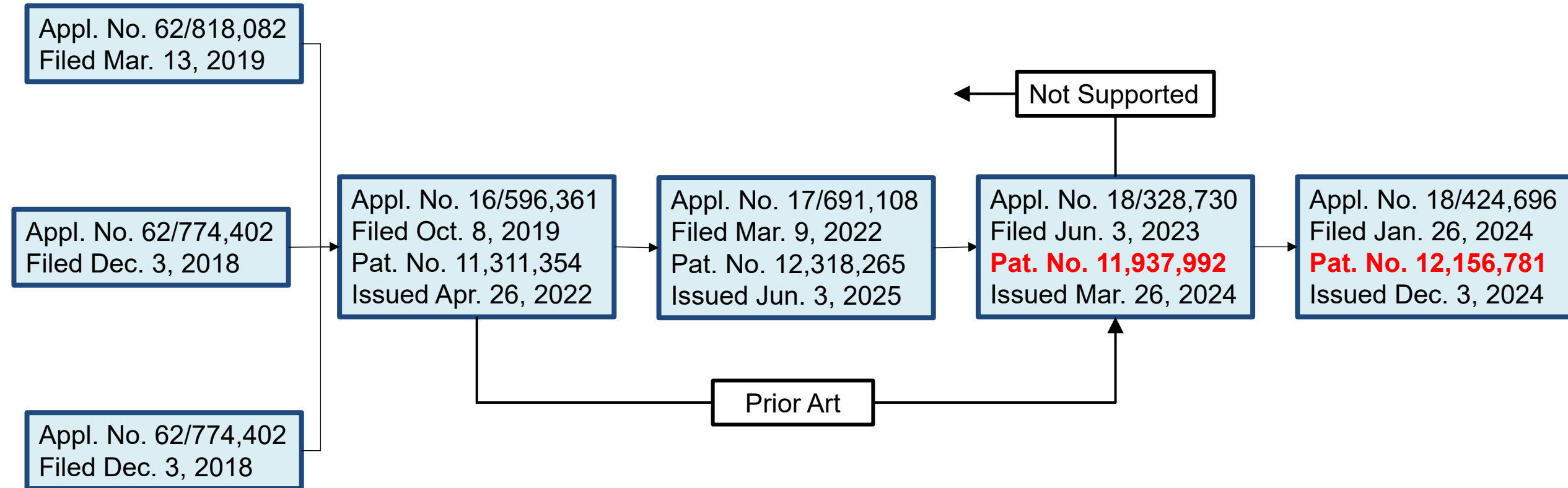
SDC's POSA Definition

A POSA would be an individual having a bachelor's degree in mechanical engineering or an equivalent technical degree with at least three years of **experience in the field, such as experience with the design of bone implants, anchors, and/or screws**. A person with a higher technical engineering degree and two years of experience in a related field would also qualify as a POSA. A POSA may consult with a dentist, oral surgeon, prosthodontist, or periodontist who has experience with dental implants and prosthetics on patients.

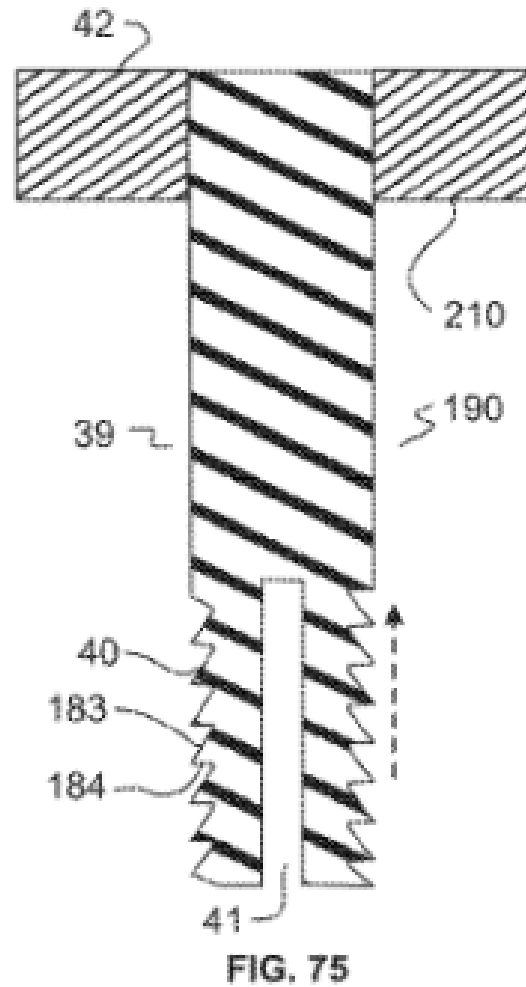
Thread Geometry and Slot

956 IPR Grounds 1-3
054 PGR Grounds 1-2

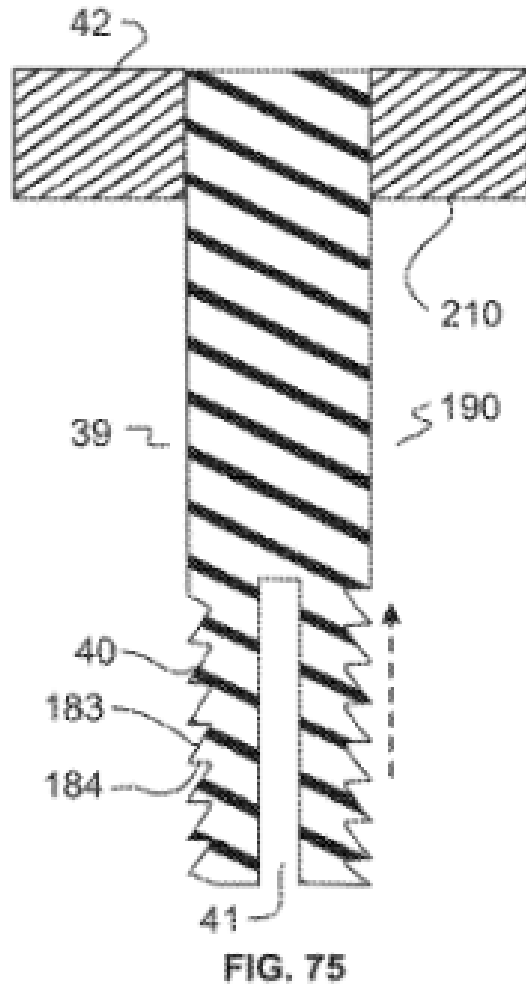
Patent Family



Thread Geometry



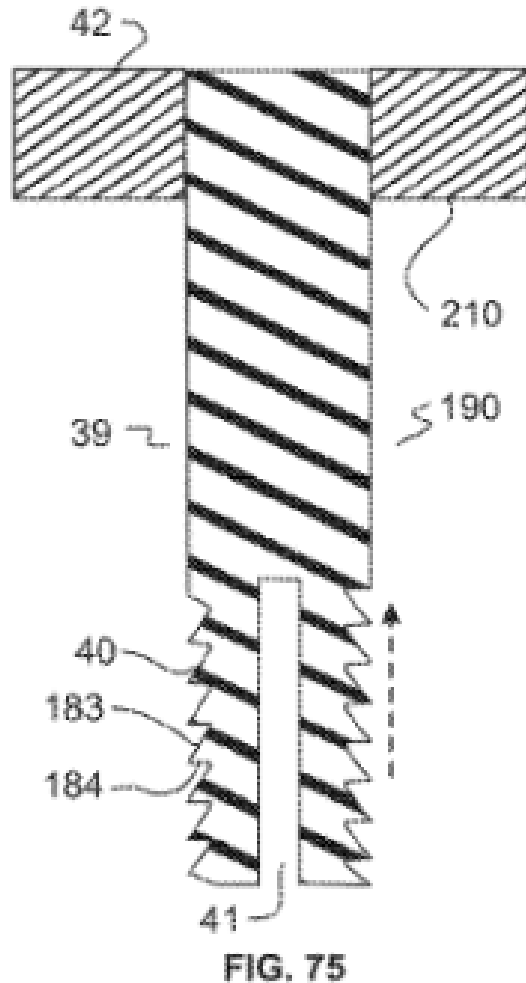
Thread Geometry – '992 Claim Language



'992 Patent, Cl. 1: "...threads in a pattern that is shaped differently from a pattern of the threads of the definitive screw..."

'992 Patent, Cl. 9: "...threading profile that is different from the male threading profile of the shaft of the definitive screw..."

Thread Geometry – '781 Claim Language



'781 Patent, Cl. 1: "...wherein the first threading contact area is less than the second threading contact area."

'781 Patent, Cl. 8: "...a volume of definitive screw post material ... is greater than a volume of temporary fastener shaft material..."

'781 Patent, Cl. 10: "...wherein the shaft threading contour does not essentially match the implant abutment threads contour..."

Thread Geometry – Shorthand

054 Petition

For example, the independent claims 1, 6, 8 and 10 are not limited to temporary fasteners with buttress threads, as described and as depicted in Figure 75. Instead, these claims encompass any **thread pattern that is different** than the definitive screw and implant abutment threads. Claim 1 requires the temporary fastener to have a **“threading contact area”** with the implant abutment that is **“less than”** the **“threading contact area”** of the definitive screw with the abutment. Ex. 1001, 26:14–24. Claim 8 requires the definitive screw to have a **“volume” of “post material”** that is **“greater than”** a **“volume” of “shaft material”** of the temporary fastener. *Id.*, 27:51–60. Claim 10 requires the temporary fastener to have a **“shaft threading contour”** that **“does not essentially match”** the **“implant abutment threads contour.”** *Id.*, 28:16–20. Finally, claim 6 does not include any limitation that requires the thread pattern of the temporary fastener to be different or not different than the definitive screw and implant abutment thread pattern, and therefore the claim **encompasses all different thread patterns.** *Id.*, 26:50–27:10.

Thread Geometry – Shorthand

054 Petition

a. The Full Scope of the Different Thread Pattern Limitations Is Not Supported

First, the '781 patent specification does not support the full scope of the limitations in claims 1, 6, 8 and 10 that encompass any temporary fastener **thread pattern that is different** than the definitive screw and implant abutment thread pattern. Ex. 1002, ¶¶155–161.

As explained above, the independent claims are not limited to temporary fasteners with buttress threads, as described and as depicted in Figure 75, but instead are much broader. Claim 1 merely requires the temporary fastener to have a **“threading contact area”** with the implant abutment that is **“less than”** the **“threading contact area”** of the definitive screw with the abutment. Ex. 1001, 26:14–24. Claim 8 requires the definitive screw to have a **“volume” of “post material”** that is **“greater than”** a **“volume” of “shaft material”** of the temporary fastener. *Id.*, 27:51–60. Claim 10 requires the “temporary fastener” to have a **“shaft threading contour”** that **“does not essentially match”** the **“implant abutment threads contour.”** *Id.*, 28:16–20. Finally, claim 6 does not include any limitation that requires the thread pattern of the temporary fastener to be the same or different than the definitive screw and implant abutment thread pattern, and therefore **encompasses all different thread patterns.** *Id.*, 26:50–27:9.

Thread Geometry – Shorthand

PO Response

Claims 1, 6, 8 and 10 describe temporary fasteners with thread contours that are **different** from the definitive screw's and/or abutment's. The specification discloses not just one, but at least **three** such embodiments.

The specification discloses temporary fasteners with asymmetric threads **different** than the definitive screws' symmetric threads.

The '781 Patent likewise discloses slotted temporary fasteners with symmetric threads, resulting in a thread contour **different** from the definitive screw's.

A fastener with an interference fit also has “a threading profile that is **different** from that of the definitive screw.

Thread Geometry – Shorthand

PO Response

First, no combination of prior art references shows the required limitations in each independent claim requiring (1) the male threads of the temporary fastener be **mismatched** and **different** from (2) the abutment's female threads and the definitive screw's matching male threads.

However, Petitioner's thought experiment glosses over a key aspect of the invention, which appears in each independent claim—but **nowhere** in Petitioner's prior art: viz., the **inventive concept of a mismatch** between (1) the temporary fastener's threading and (2) the definitive screw's or female abutment's threading, which permits the temporary fastener to be screwed (or rotationally engaged and torqued in) in and pulled out axially. Each independent claim contains several limitations going to this precise concept. For example, limitations 1(g)-(k) describe in detail a...

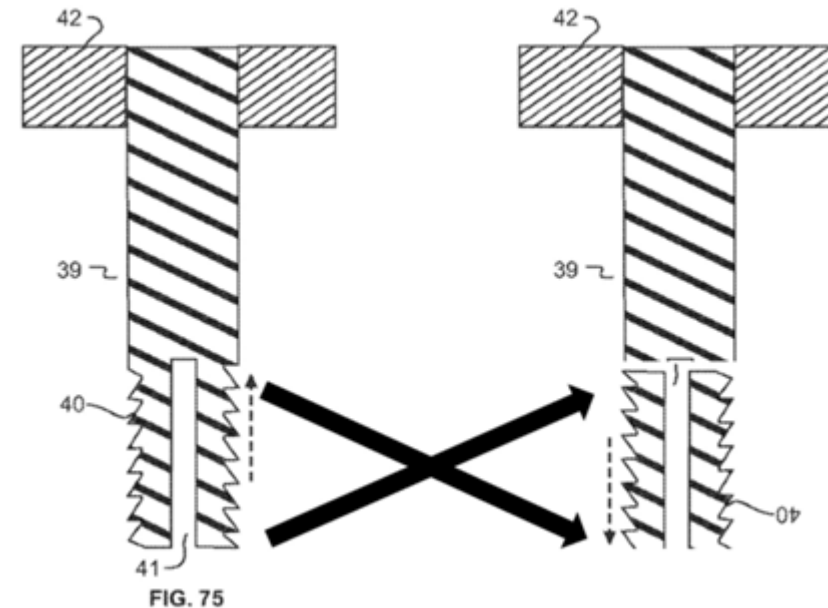
Thread Geometry – Shorthand

'730 Application Prosecution History

As a result of the open space from the **different thread profile** of the temporary screw compared to the definitive screw in FIG. 9, the temporary screw threading of FIG. 75 has **less surface area contact** with the female implant abutment threading, has **less material volume** within the engagement depth with the implant abutment and can have a smaller radial extent or width than the definitive screw.

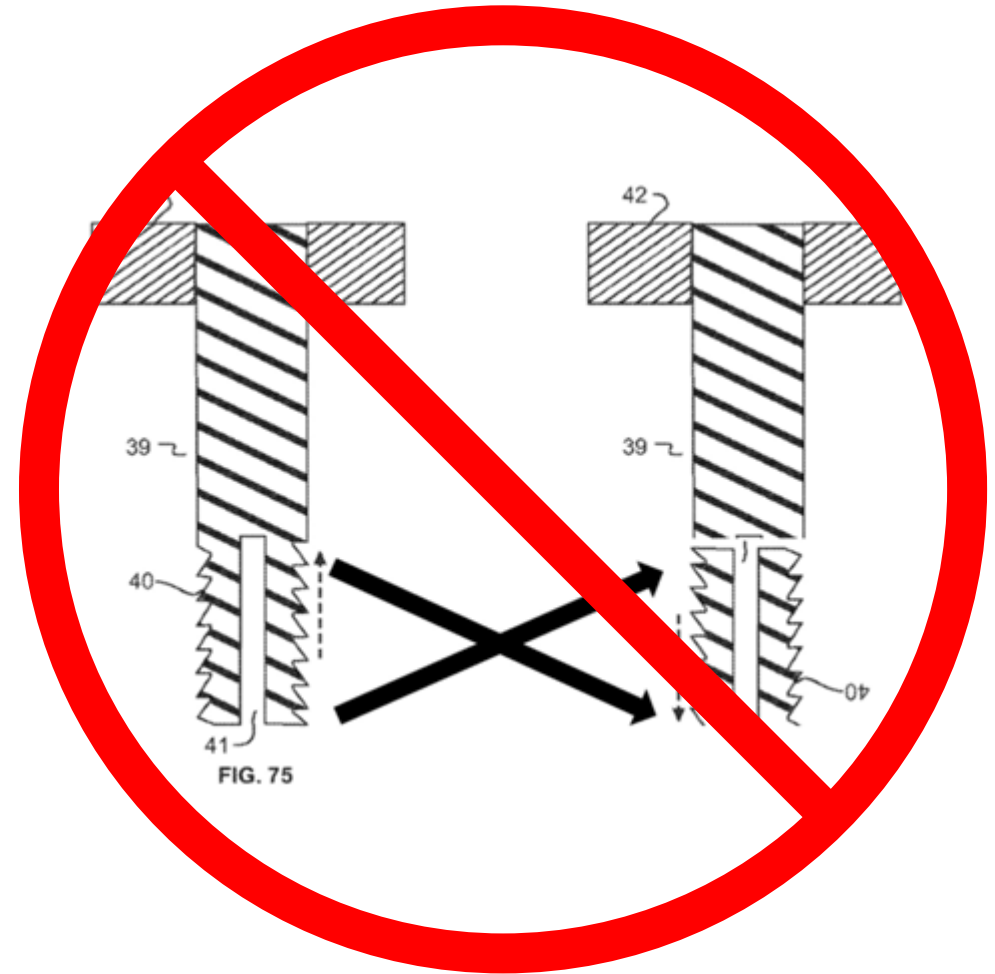
SDC's Arguments: Asymmetric Threads

Although the threads could be designed to provide engagement with the implant abutment threads through axial motion in the opposite direction to the arrow shown in Fig. 75, rotation to a design torque on engagement is generally preferred.



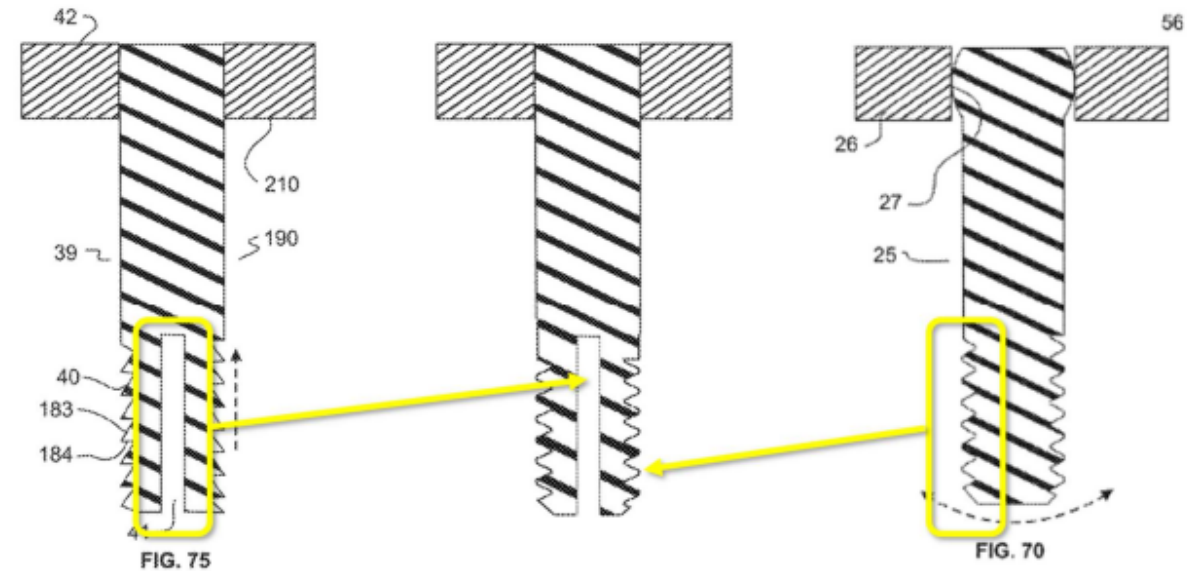
SDC's Arguments: Asymmetric Threads

Although the threads could be designed to provide engagement with the implant abutment threads through axial motion in the opposite direction to the arrow shown in Fig. 75, rotation to a design torque on engagement is generally preferred.



SDC's Arguments: Symmetric Threads with Slot

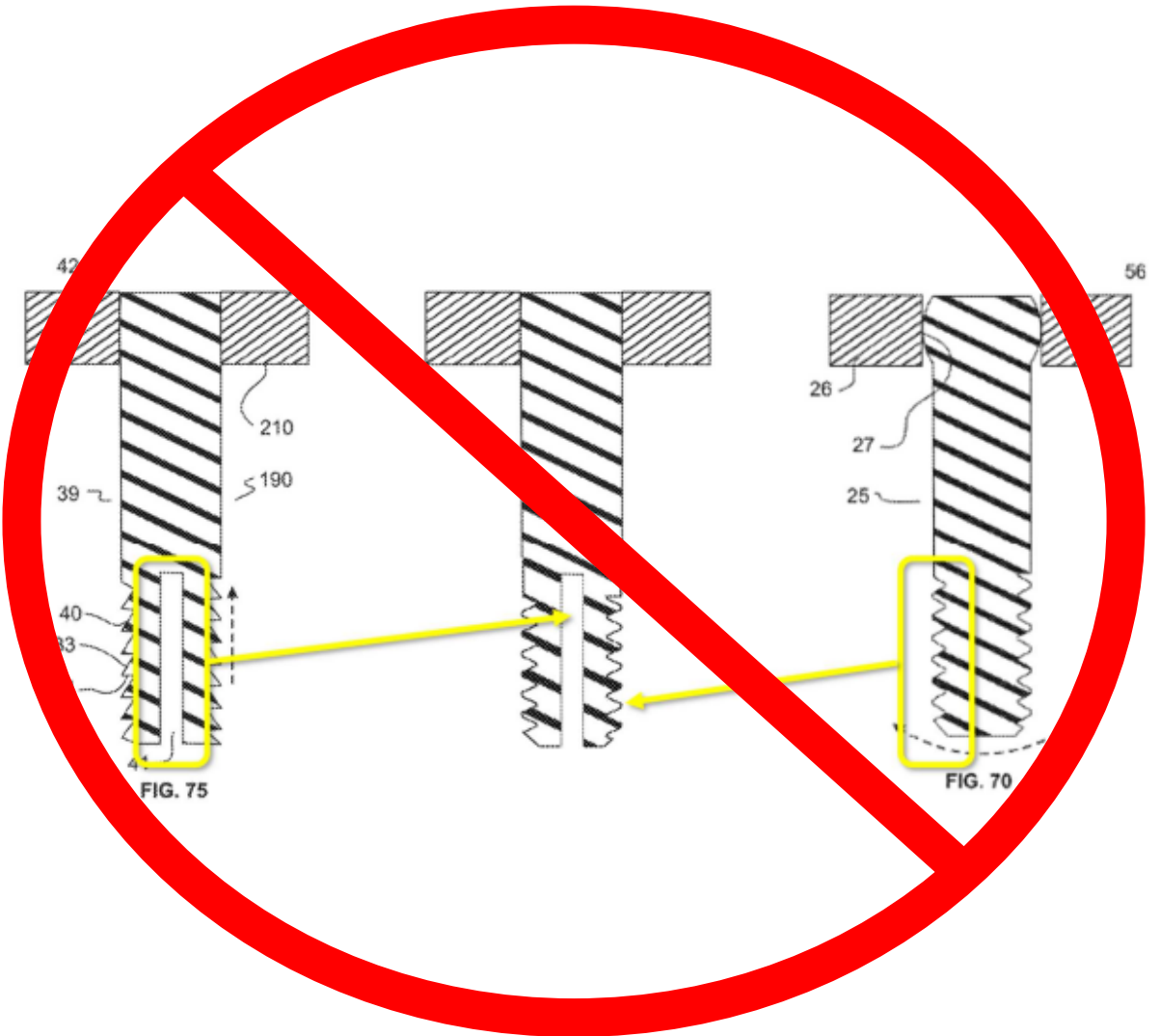
“...features, structures, or characteristics may be combined in any suitable manner in one or more embodiments without limitation.”



SDC's Arguments: Symmetric Threads with Slot

“...features, structures, or characteristics may be combined in any suitable manner in one or more embodiments without limitation.”

The claimed subject matter must be described in the specification “as an integrated whole rather than as a collection of independent limitations.” See *Novozymes A/S v. DuPont Nutrition Biosciences APS*, 723 F.3d 1336, 1349 (Fed. Cir. 2013).



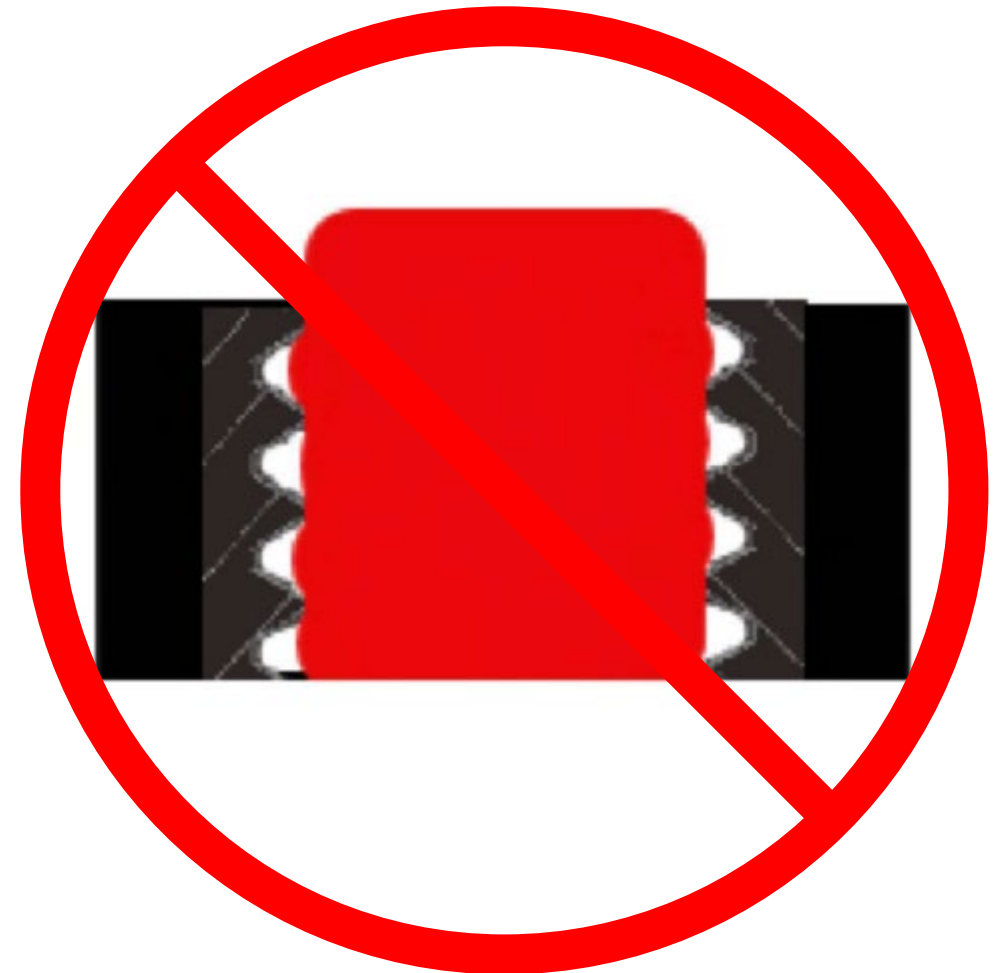
SDC's Arguments: Interference Fit

Similarly, an interference fit between the bottom of the post with the threads may also be designed to provide sufficient engagement to provide adequate alignment and fixing of the coping for the pick-up bonding process described earlier.

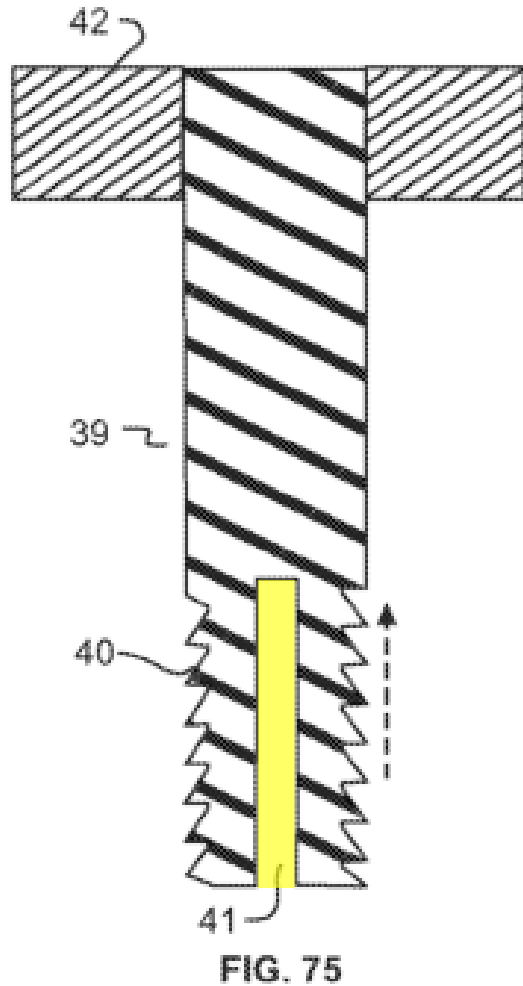


SDC's Arguments: Interference Fit

Although the descriptions above use rotational engagement of the bottom of the post with internal threads of the abutment as a preferred approach, this is not meant to be limiting. Alternate approaches for engaging a temporary attachment post with abutment threads through **axial insertion** without rotation are considered to be part of this disclosure. For example, the split post bottom structure shown in FIG. 75 which allows axial extraction can also be used for axial insertion. Similarly, an interference fit between the bottom of the post with the threads may also be designed to provide sufficient engagement to provide adequate alignment and fixing of the coping for the pick-up bonding process described earlier.



Slot – Fig. 75



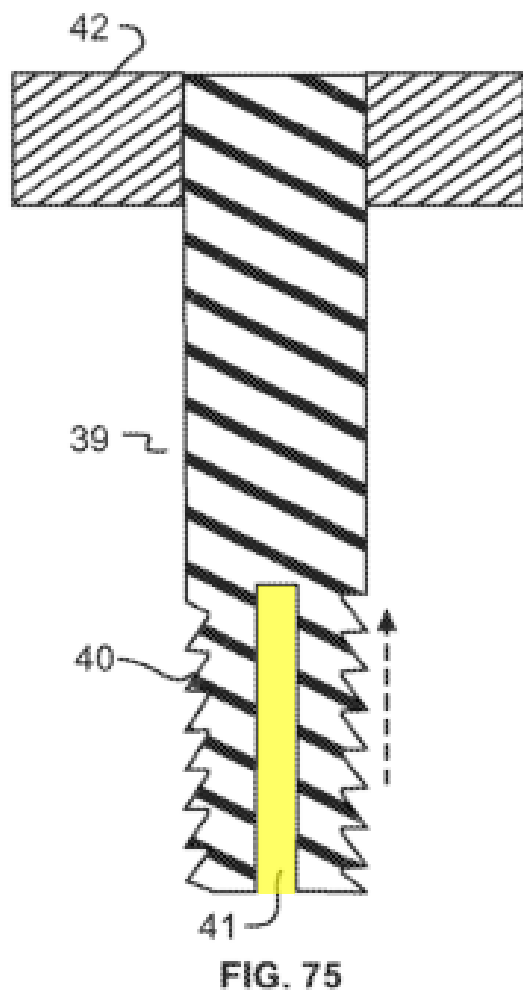
In some embodiments, the threaded end of the post portion of the temporary fastener has a **deflecting feature** that allows the post to engage or disengage the abutment threads through axial motion instead of a rotary screw motion.

FIG. 75 is a cross-sectional view of a temporary screw embodiment incorporating a **split post** that has deflecting sections with screw threads shaped to facilitate axial separation without unscrewing the post threads.

FIG. 75 shows a temporary attachment post 39 having a **slot 41** and asymmetric threads or serrations 40 that allow the temporary attachment post to be inserted through rotation for alignment for coping pick-up but may be subsequently extracted with a separation force in the axial direction.

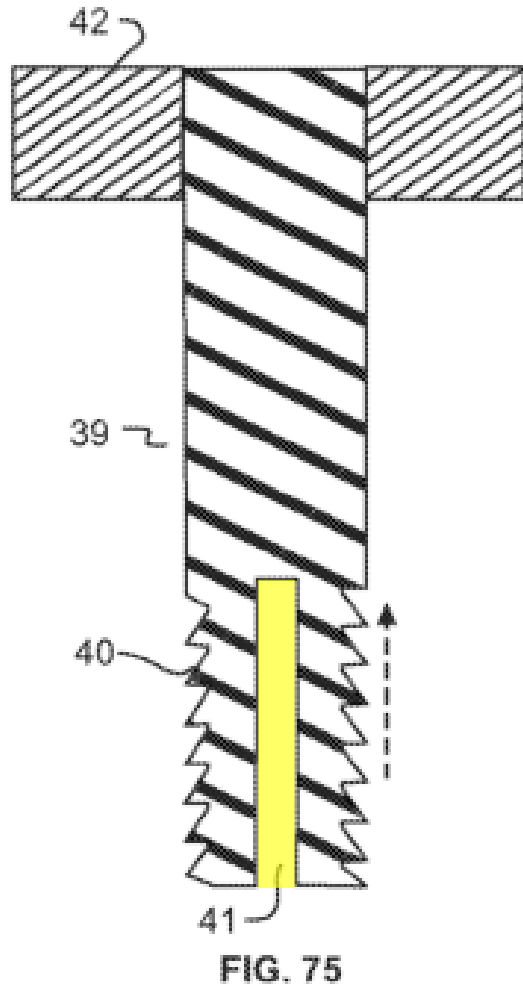
...the **split post** bottom structure shown in FIG. 75 which allows axial extraction.

Slot – '992 Claim Language



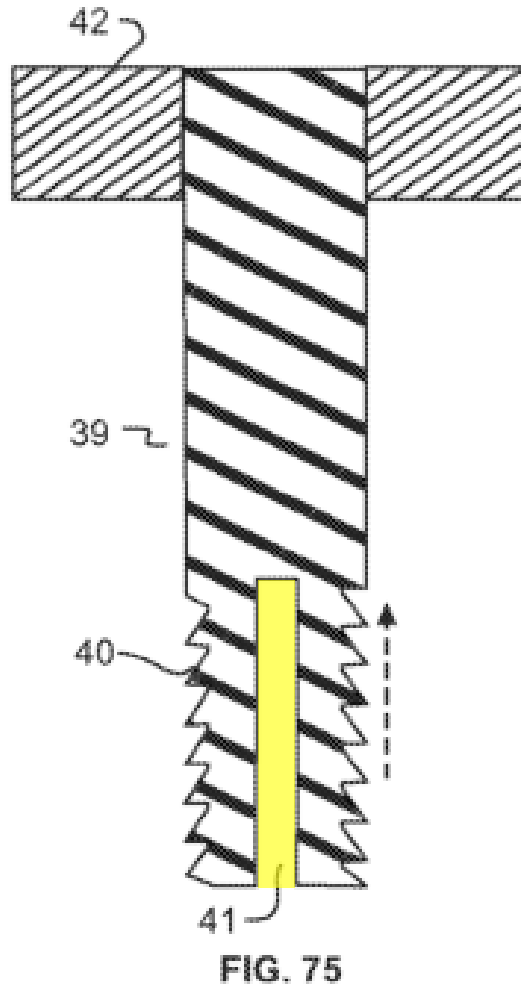
'992 Patent, Cl. 1: "...an axial force in a proximal direction from pick-up processing releases the coping and the temporary screw from the implant abutment."

Slot – '781 Claim Language



'781 Patent, Cl. 1: "...wherein the temporary fastener is configured to release at least a portion of the temporary fastener and the coping from the implant abutment as a unit when an axial release force is applied in a proximal direction to the temporary fastener..."

SDC's Arguments: Slot Is Not Important



In some embodiments, the threaded end of the post portion of the temporary fastener has a **deflecting feature** that allows the post to engage or disengage the abutment threads through axial motion instead of a rotary screw motion.

FIG. 75 is a cross-sectional view of a temporary screw embodiment incorporating **a split post that has deflecting sections with screw threads shaped to facilitate axial separation** without unscrewing the post threads.

FIG. 75 shows a temporary attachment post 39 having **a slot 41 and asymmetric threads or serrations 40 that allow** the temporary attachment post to be inserted through rotation for alignment for coping pick-up but may be subsequently extracted with a separation force in the axial direction.

...the split post bottom structure shown in FIG. 75 which **allows axial extraction**.

SDC's Arguments: Two Species

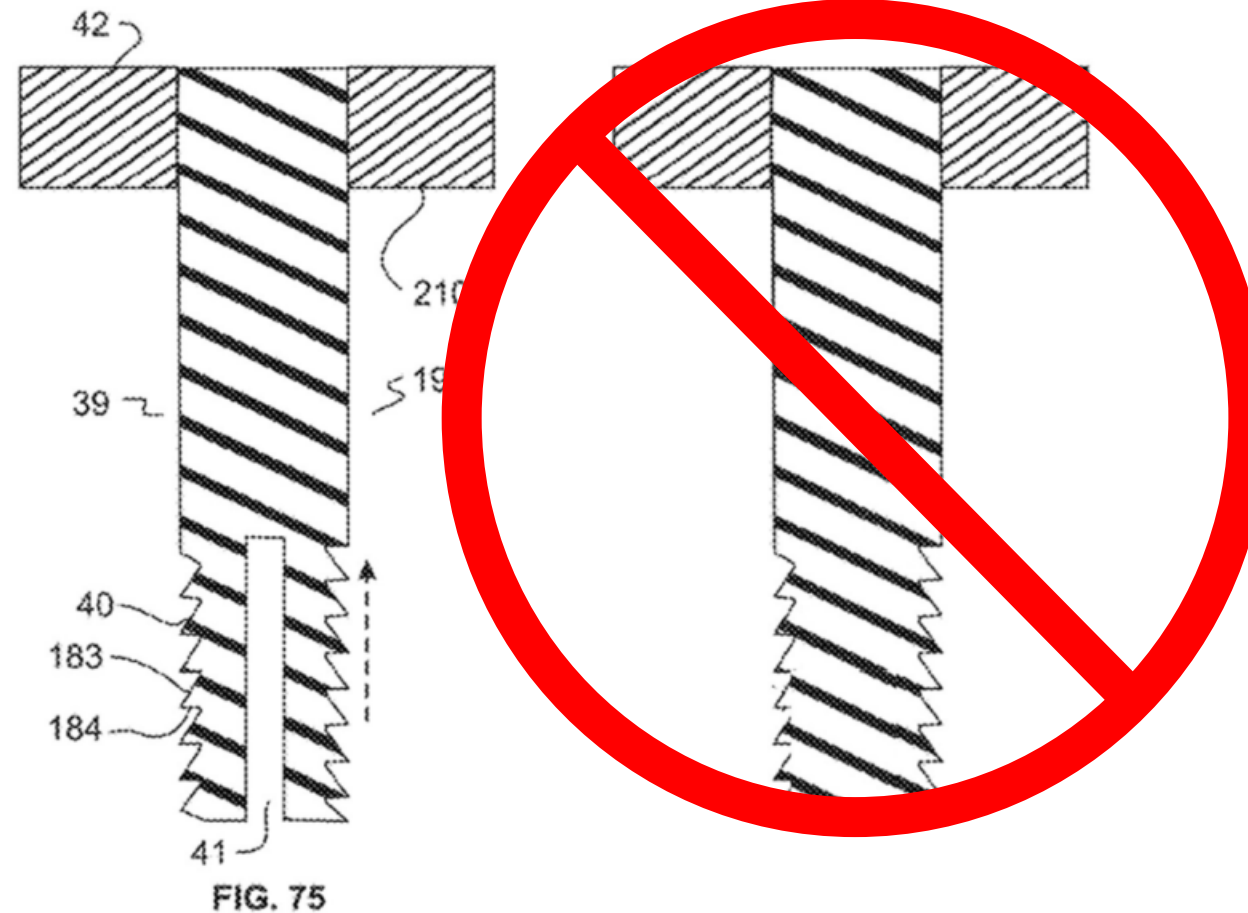


Fig. 75

Not in Patent

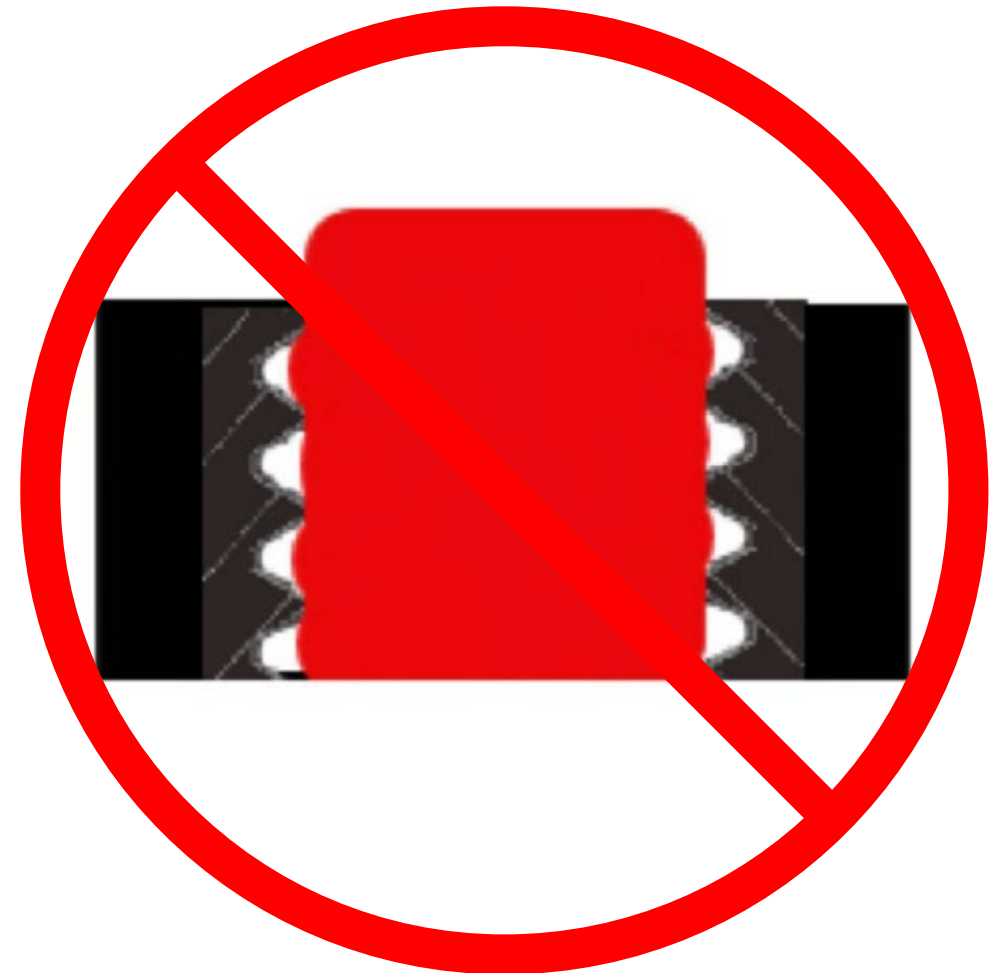
SDC's Arguments: Interference Fit

Similarly, an interference fit between the bottom of the post with the threads may also be designed to provide sufficient engagement to provide adequate alignment and fixing of the coping for the pick-up bonding process described earlier.



SDC's Arguments: Interference Fit

Although the descriptions above use rotational engagement of the bottom of the post with internal threads of the abutment as a preferred approach, this is not meant to be limiting. Alternate approaches for engaging a temporary attachment post with abutment threads through **axial insertion** without rotation are considered to be part of this disclosure. For example, the split post bottom structure shown in FIG. 75 which allows axial extraction can also be used for axial insertion. Similarly, an interference fit between the bottom of the post with the threads may also be designed to provide sufficient engagement to provide adequate alignment and fixing of the coping for the pick-up bonding process described earlier.



'781 Patent, Cl. 6: Functional Claiming

'781 Patent, Cl. 6: "...wherein the temporary fastener is configured to release at least a portion of the temporary fastener and the coping from the implant abutment as a unit in response to an axial release force that is applied only in a proximal direction to the temporary fastener whereby the axial release force is applied without rotation of the temporary fastener..."

Obviousness

956 IPR Grounds 4-6
054 PGR Grounds 3-4

Bernhard

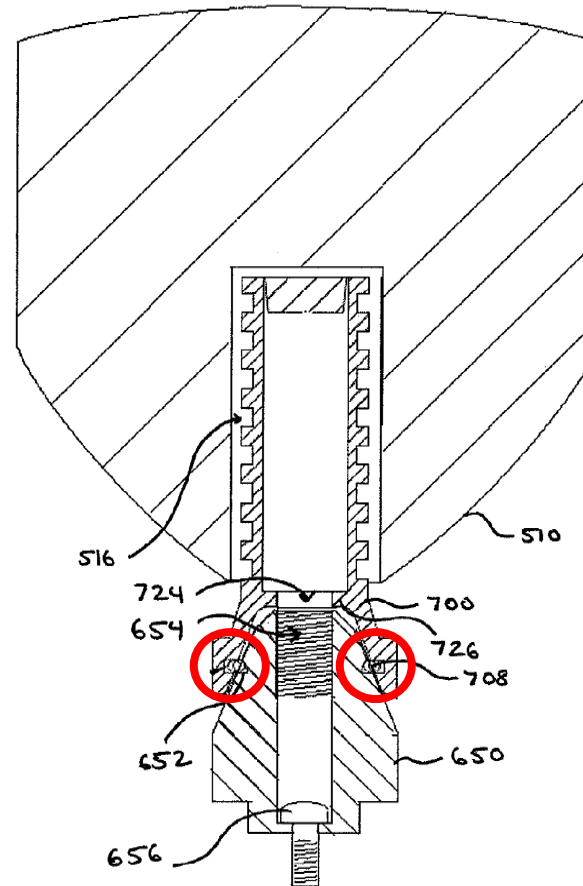


Figure 8

Poovey

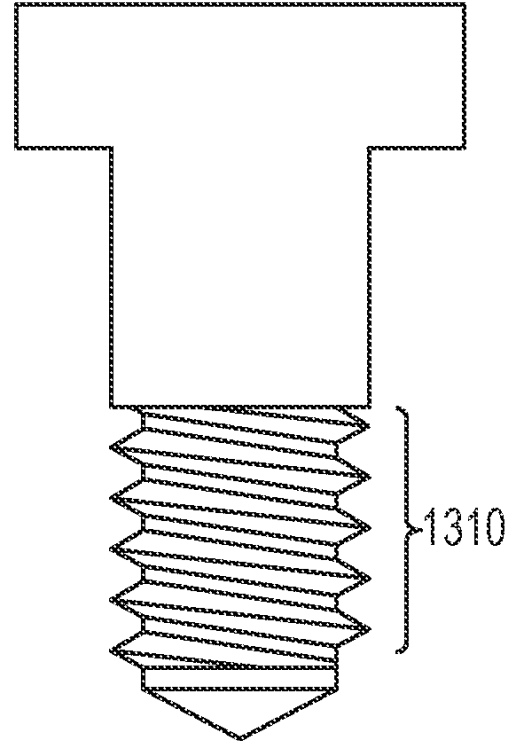
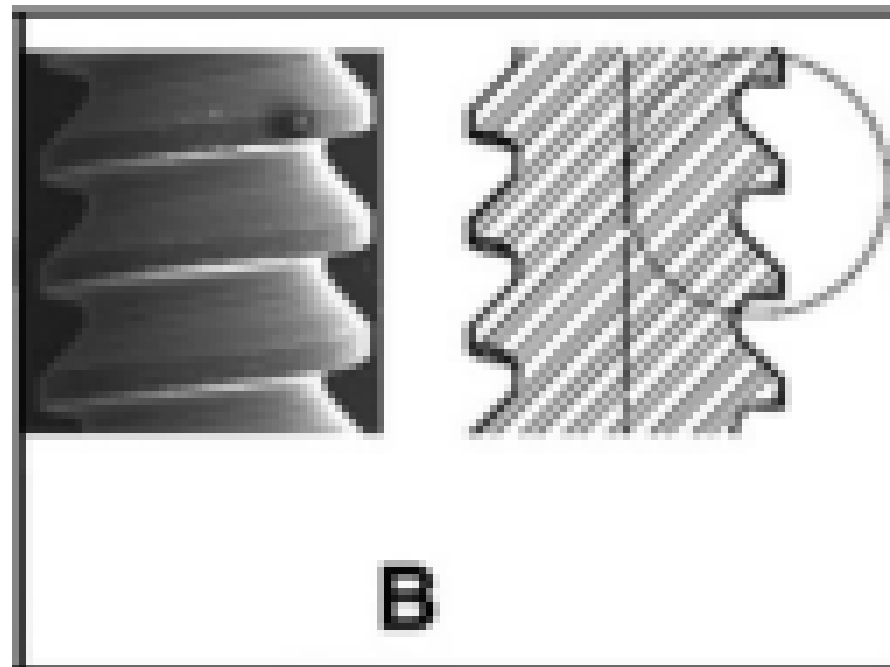


FIG. 13

Gracco



Derey

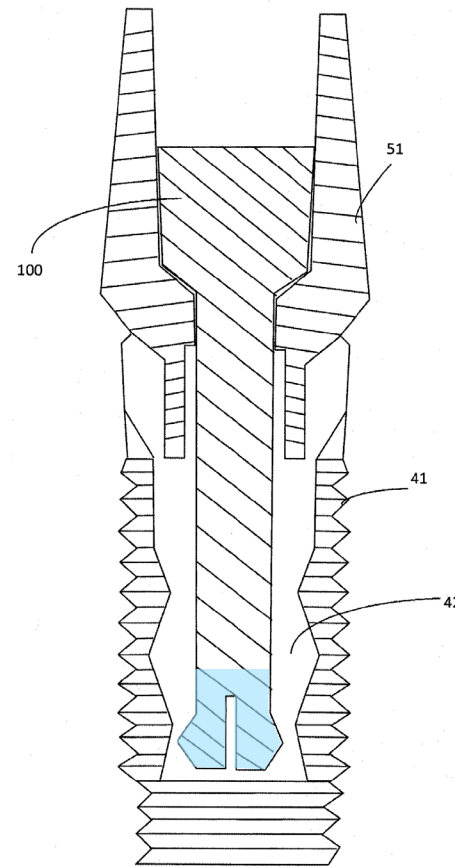
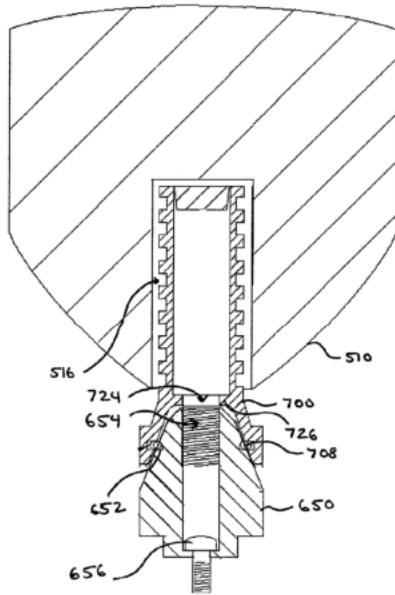


Fig. 6

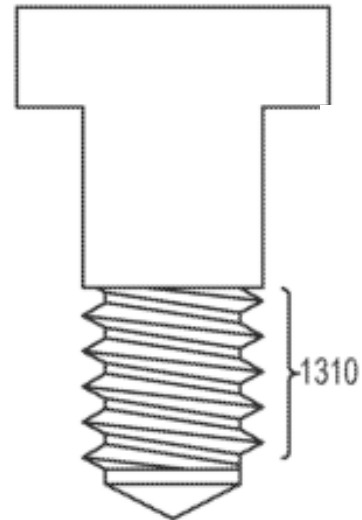
Motivation to Combine

Bernhard



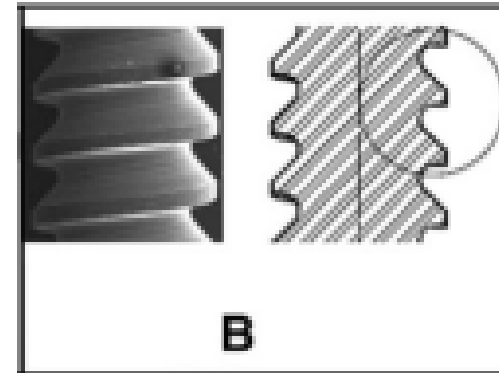
Allows
Axial Removal

Poovey



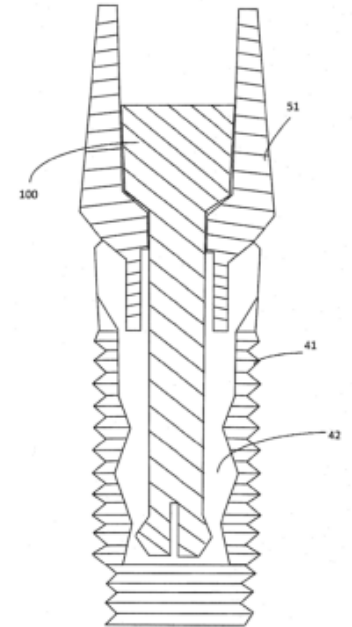
Increases
Stability

Gracco



Increases Ease of
Axial Removal

Derey



Increases Ease of
Axial Removal

SDC's Arguments: "Mismatch" Concept Is Missing

SDC

The idea of mismatching the threads between the temporary and definitive screws is one of the principal innovations differentiating the invention from prior technology... It is the creative 'spark' that makes this invention novel.

Bernhard, Poovey, and Gracco nowhere teach using mismatched threads.

Federal Circuit

"Where, as here, the grounds for obviousness are based on a specific combination of references, arguments that 'attack the disclosures of the two references individually' lack merit." *Palo Alto Networks, Inc. v. Centripetal Networks, LLC*, 122 F.4th 1378, 1386 (Fed. Cir. 2024).

SDC's Arguments: "Mismatch" Concept Is Missing

SDC

The idea of mismatching the threads between the temporary and definitive screws is one of the principal innovations differentiating the invention from prior technology... It is the creative 'spark' that makes this invention novel.

Bernhard, Poovey, and Gracco nowhere teach using mismatched threads.

None of these references teach that concept, alone or in combination.

Expert Brunski

'992 Patent, Cl. 1

"...the temporary screw would be designed to have asymmetric buttress threads These asymmetric buttress threads would be in a thread pattern shaped differently from the thread pattern of the matching, symmetric threads of the shaft 754 of the fastener 750 and the bore 654 of the abutment 650."

'781 Patent, Cl. 1

"...unlike the symmetric threads of the shaft 754 of the threaded fastener 750, the buttress threads of the temporary fastener would not match and would not fully contact and occupy the symmetric threads of the bore 654 of the implant abutment 650. Therefore, the buttress threads would contact a smaller area of the symmetric threads in the bore 654 of the abutment 650 than the matching, symmetric threads of the shaft 754 of the threaded fastener 750."

SDC's Arguments: No Need to Add Gracco or Derey

SDC

...the proposed motivation for adding Gracco is to address issues that Poovey, supposedly, ***already solved***. That makes no sense. A POSA would not be motivated to add Gracco to Bernhard-Poovey.

But as with Gracco, there is no reason for a POSA to dig around after Derey—because these are all problems that, according to Brunski, Bernhard and Poovey ***already solved***.

Prior Art

Bernhard

Generally, the threshold force required to overcome the provisional connection feature and detach the components should be chosen such that injury to the patient's bone is avoided.

Poovey

The threading and/or sleeve coating of the impression coping securing screw is preferably a plastic or silicone material with enough flexibility to be pulled out of the implant with low resistance such that it is not difficult for the dental professional and does not cause pain or stress to the patient.

SDC's Arguments: No Need to Add Gracco or Derey

SDC

...the proposed motivation for adding Gracco is to address issues that Poovey, supposedly, **already solved**. That makes no sense. A POSA would not be motivated to add Gracco to Bernhard-Poovey.

But as with Gracco, there is no reason for a POSA to dig around after Derey—because these are all problems that, according to Brunski, Bernhard and Poovey **already solved**.

Expert Brunski

“Based on the foregoing, a POSA would have been motivated to design the temporary screw to have an asymmetric **buttress thread** with a shorter thread depth and a smaller (shallower) proximal thread angle, instead of a symmetric thread with a larger (steeper) proximal thread angle (as depicted in Figure 13 of Poovey below), in order to **make the screw easier to pull out** while maintaining its secure and stable threaded connection.”

“Based on Derey, a POSA would have been motivated to design the threaded temporary screw to have a **slot** in the distal shaft portion to create a split-post structure with **deflecting legs**, because this would make it **easier to pull the temporary screw out** of the abutment while still ensuring that the temporary connection is stable and secure.”

'781 Patent – Other Section 112 Issues

054 PGR Grounds 1-2

Indefiniteness – “Essentially Match”

Claim

'781 Patent, Cl. 10(g): “...wherein the shaft threading contour **does not essentially match** the implant abutment threads contour, and...”

Specification

The terms “about” and “essentially” mean ± 10 percent.

Written Description – “Securing the Coping”

Claim

'781 Patent, Cl. 1(d): “...a definitive screw having a proximal head end having a tool interface and a distal post portion having threads **configured for securing the coping to the threads of the implant abutment...**”



SDC

“...a definitive screw having a proximal head end having a tool interface and a distal post portion having threads **configured for securing the coping to the threads of the implant abutment...**”

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on September 2, 2026, true and accurate copies of Petitioner's Demonstratives for Consolidated Oral Hearing were served on counsel for Patent Owner via electronic mail to:

Kelsey I. Nix (Lead Counsel)
knix@smithlaw.com

John L. Gibbons (Back-up Counsel)
jgibbons@smithlaw.com

Jonathan V. Lewis (Back-up Counsel)
jlewis@smithlaw.com

Andrew D. Kasnevich (Back-up Counsel)
akasnevich@kdwfirm.com

Daniel J. Whittle (Back-up Counsel)
dan.whittle@patentleverage.com

/s/ Georg Reitboeck
Georg C. Reitboeck
(admitted pro hac vice)
Counsel for Petitioner Straumann USA, LLC