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(54) **MULTI-PLANE SURGICAL INCISION GUIDE**

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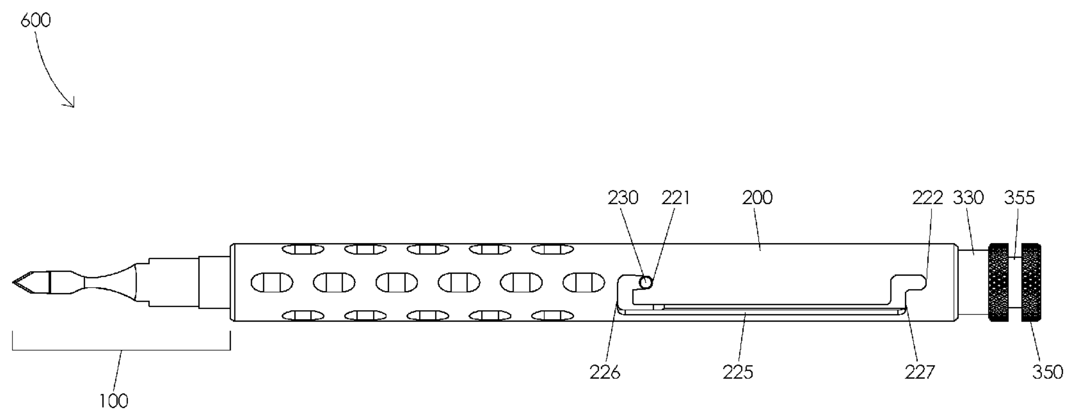
(52) **U.S. Cl.**

CPC ***A61B 17/3211*** (2013.01); ***A61F 9/0133*** (2013.01); *A61B 2017/32113* (2013.01); *A61B 2017/320052* (2013.01)

(57) **ABSTRACT**

A surgical blade may include a surgical incision guide configured to guide a surgical incision. The surgical incision guide may include one or more surgical incision guide marks. A surgical incision guide mark may be configured to provide information about a surgical incision. For example, a surgeon may compare a location of a surgical incision guide with a portion of a tissue to identify an incision depth. Illustratively, a surgeon may compare a location of a surgical incision guide with a portion of a tissue to identify an optimum incision depth to adjust an orientation of a surgical blade.



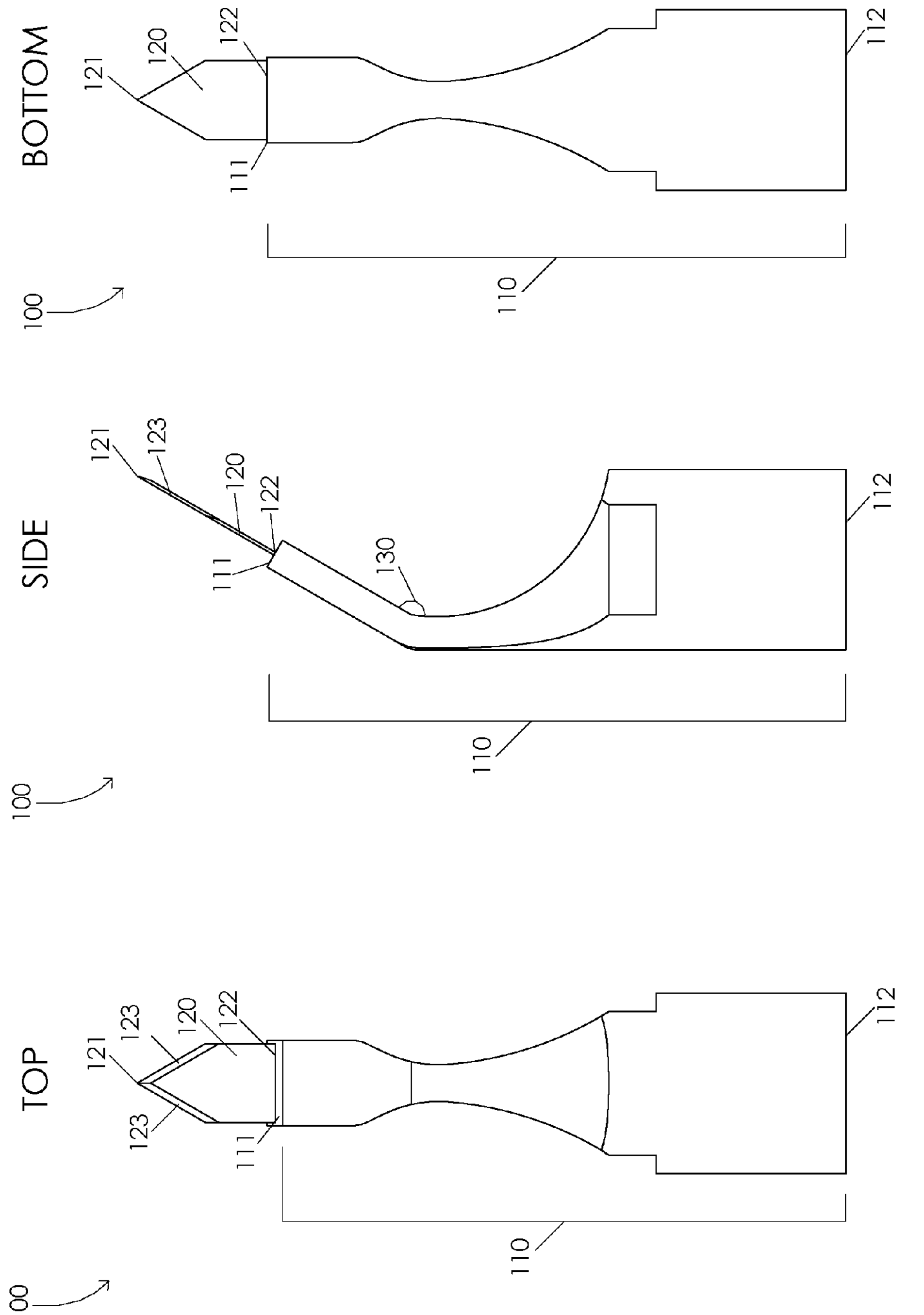


FIG. 1A

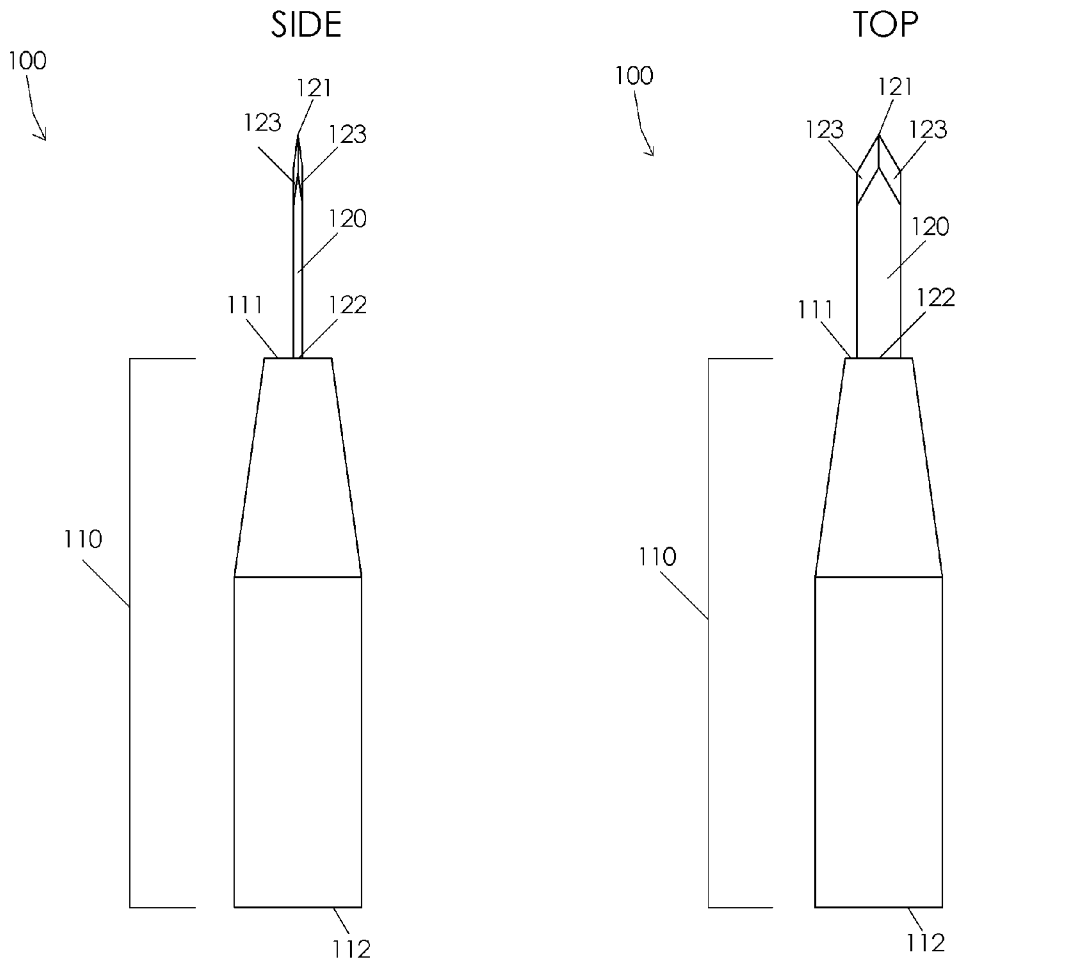

SIDE
TOP
100
121
123
123
120
111
122
110
112
100
121
123
123
120
122
111
110
112

FIG. 1B

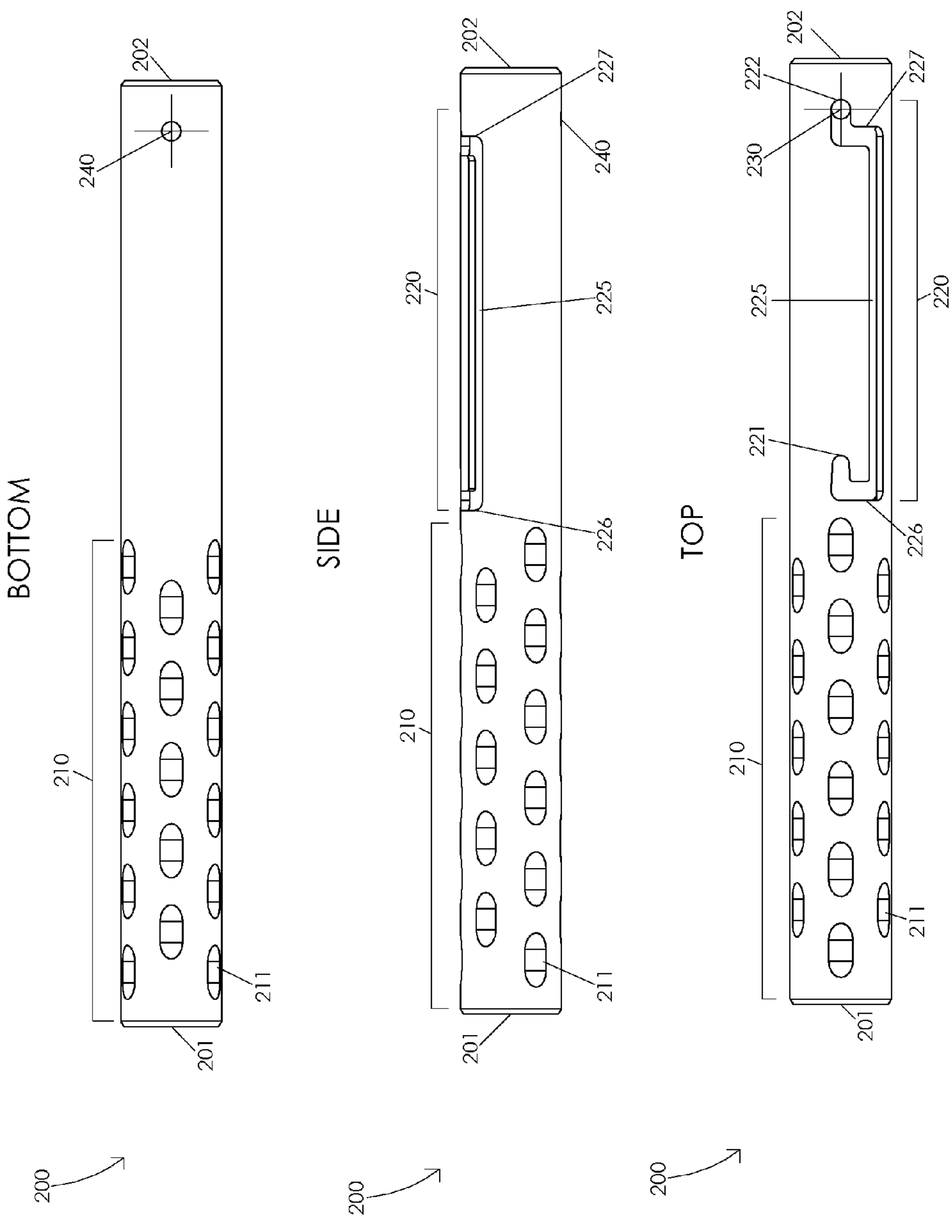

BOTTOM
SIDE
TOP
200
201
202
210
211
220
221
222
225
226
227
230
240

FIG. 2A

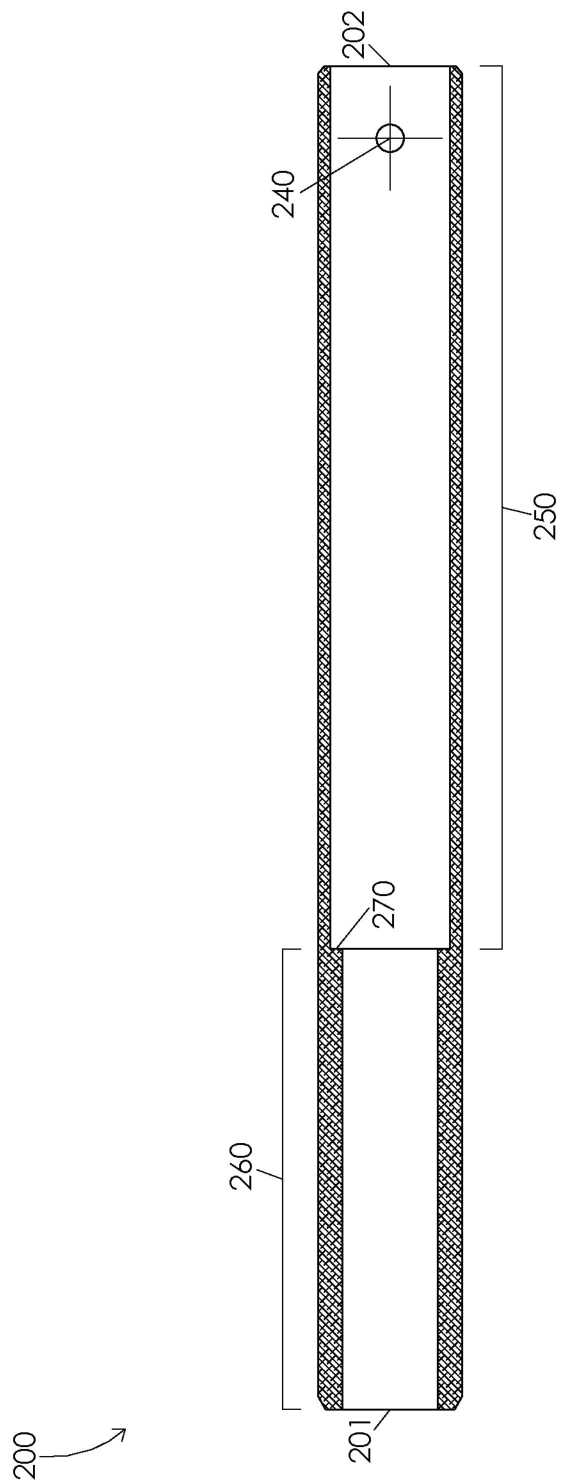


FIG. 2B

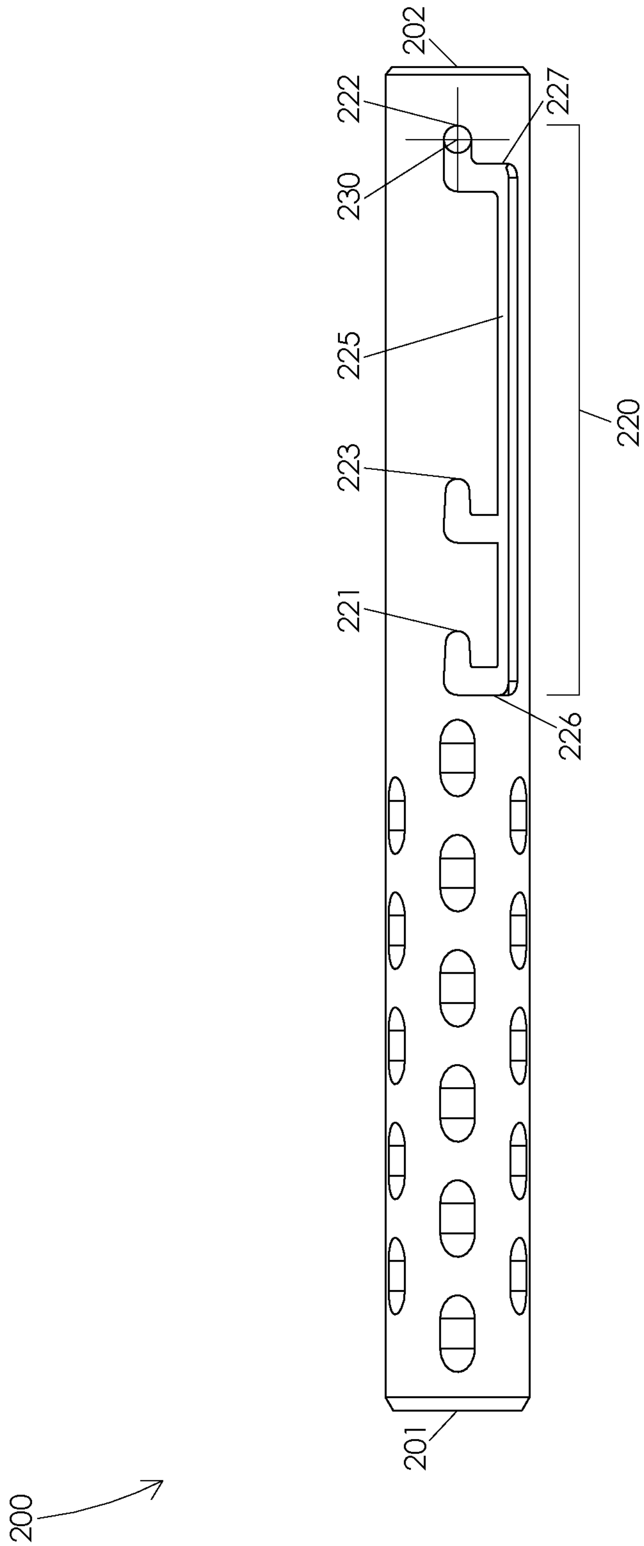


FIG. 2C

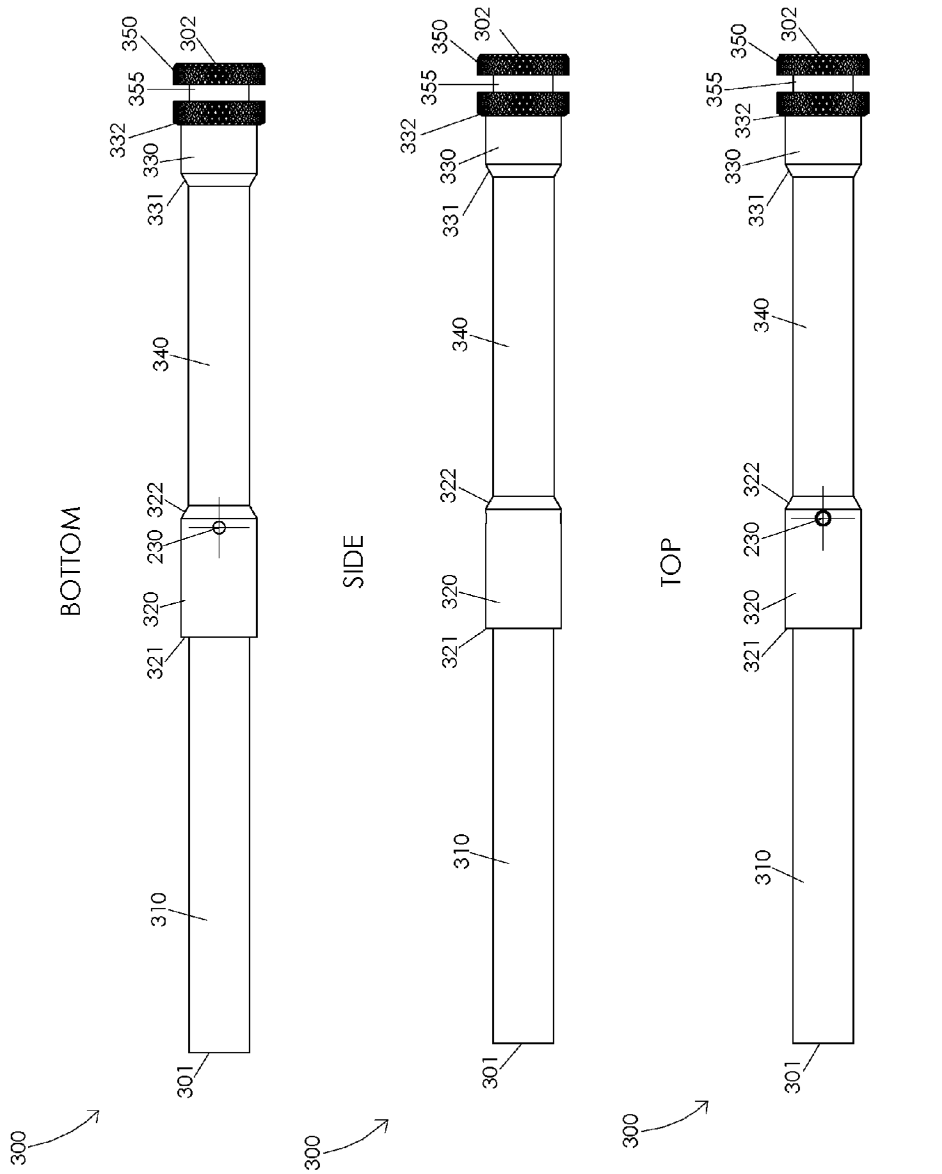

BOTTOM
SIDE
TOP
300
301
302
310
320
321
322
230
330
331
332
340
350
355

FIG. 3

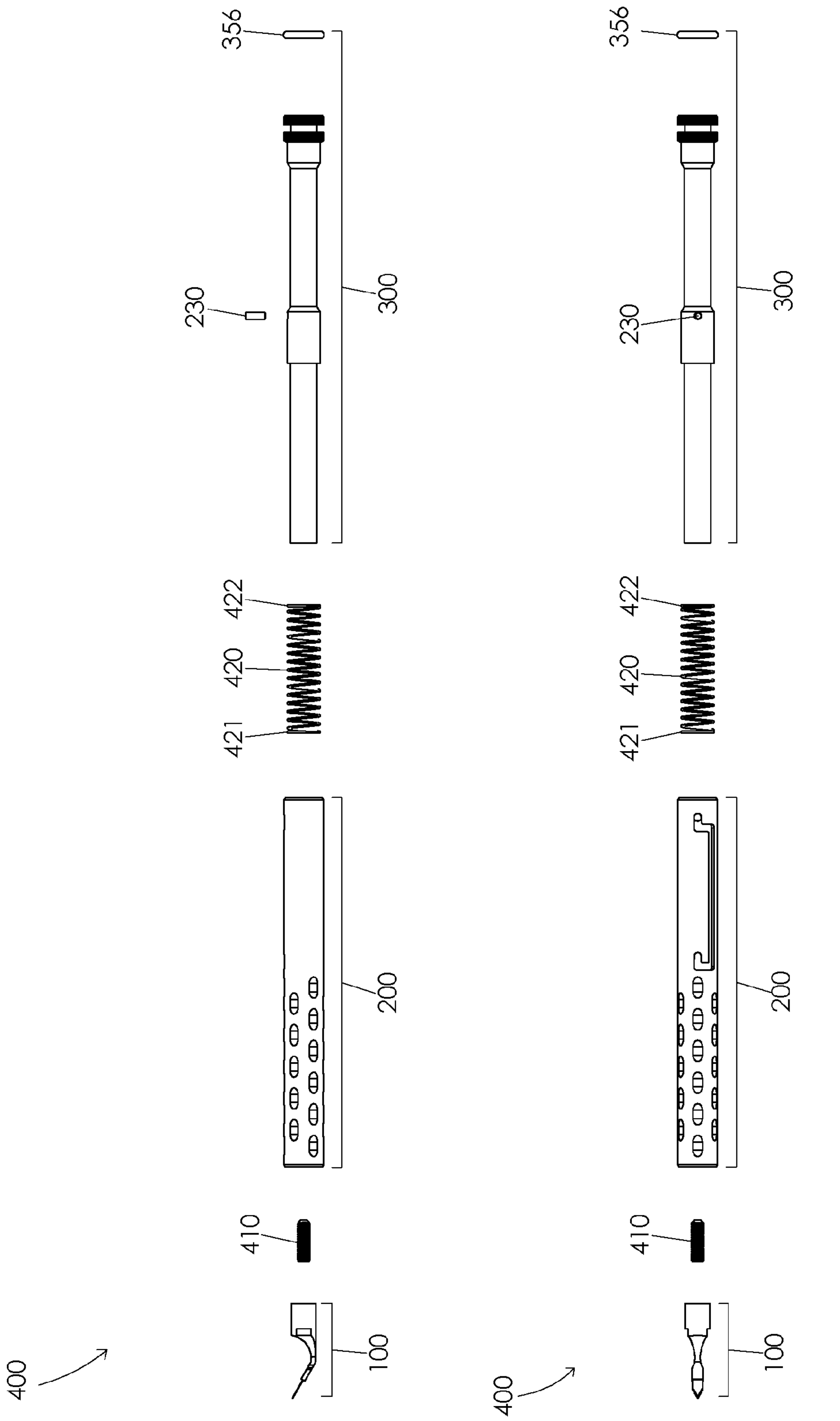

356
230
300
422
420
421
200
410
100
400
356
230
300
422
420
421
200
410
100
400

FIG. 4

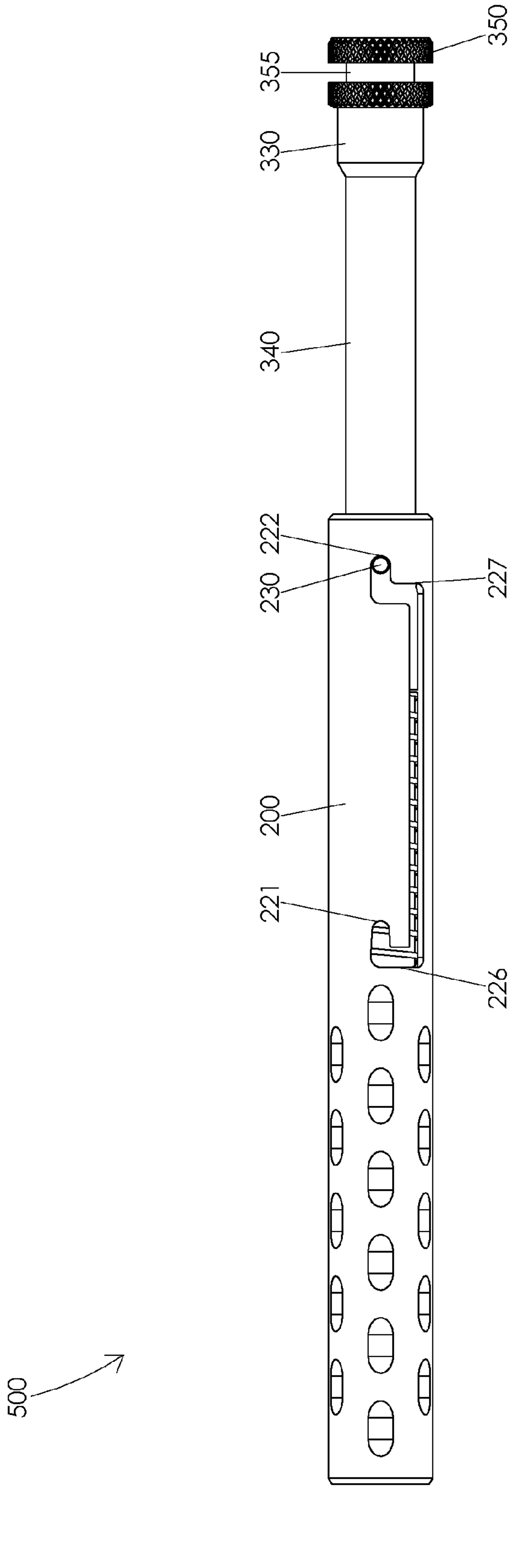


FIG. 5

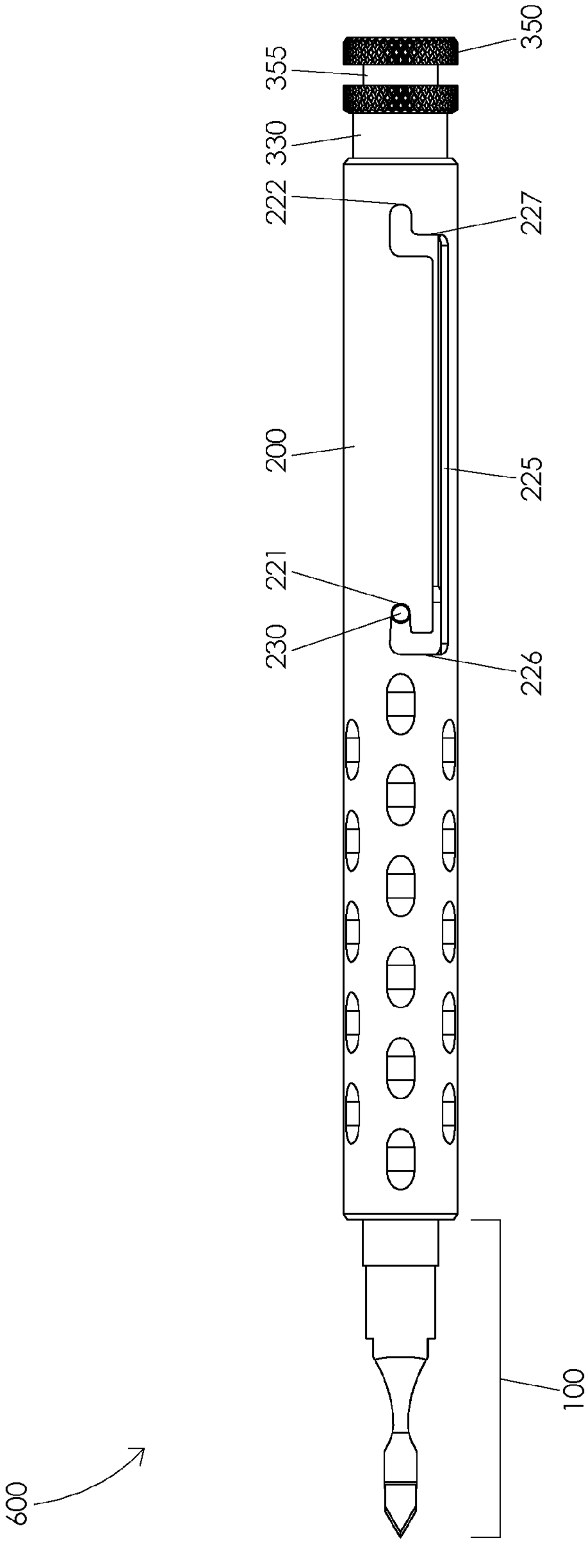


FIG. 6

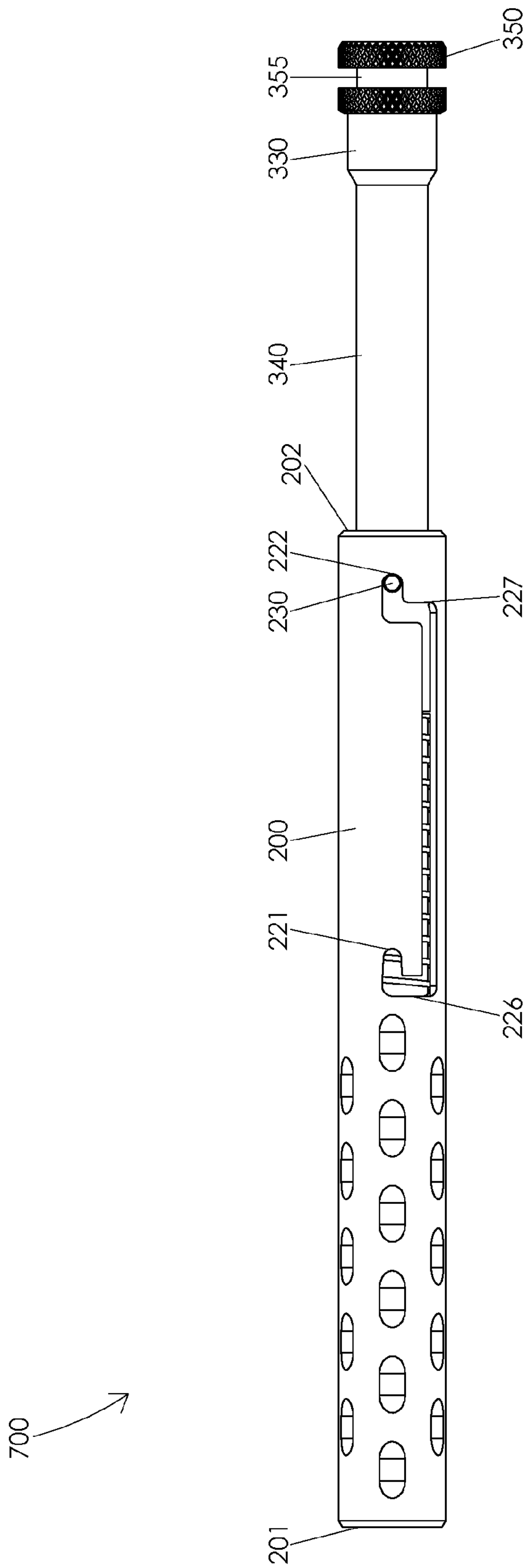


FIG. 7A

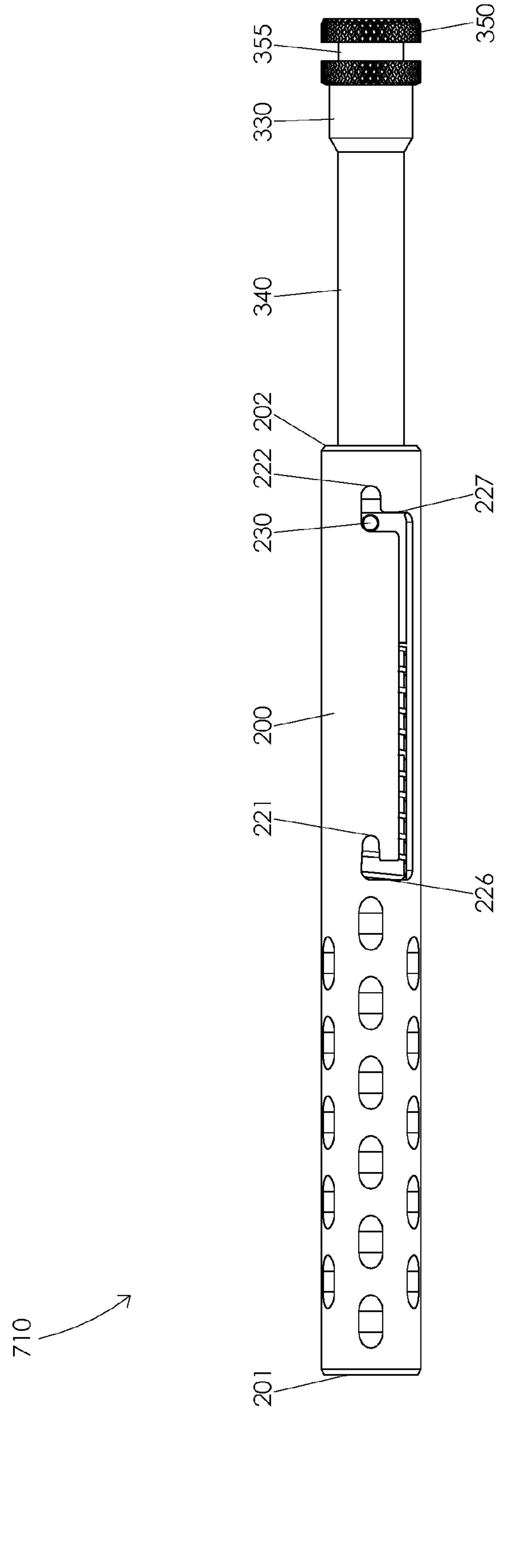


FIG. 7B

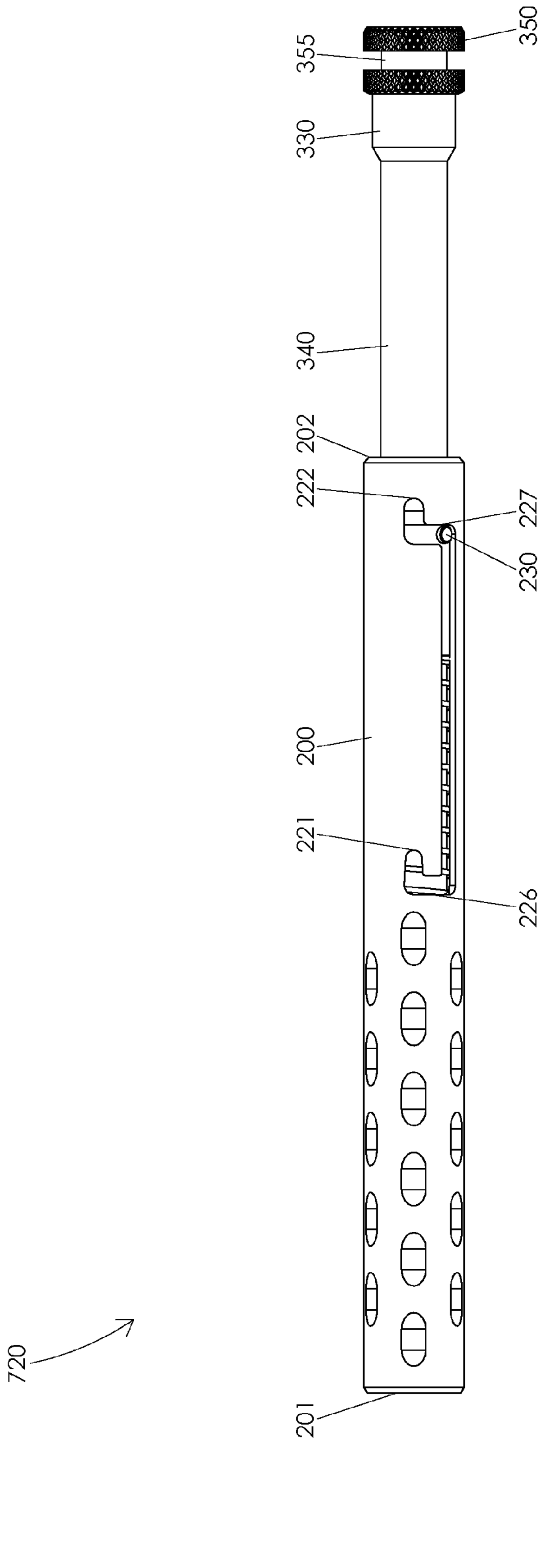


FIG. 7C

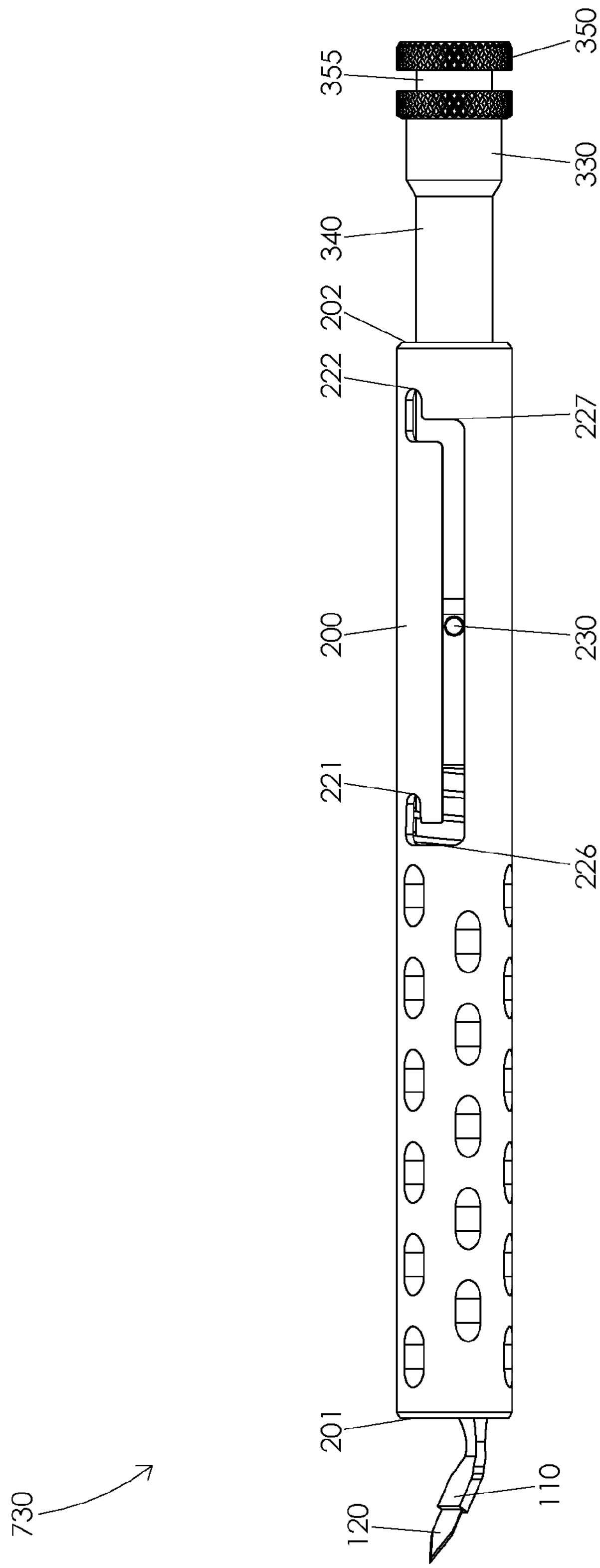


FIG. 7D

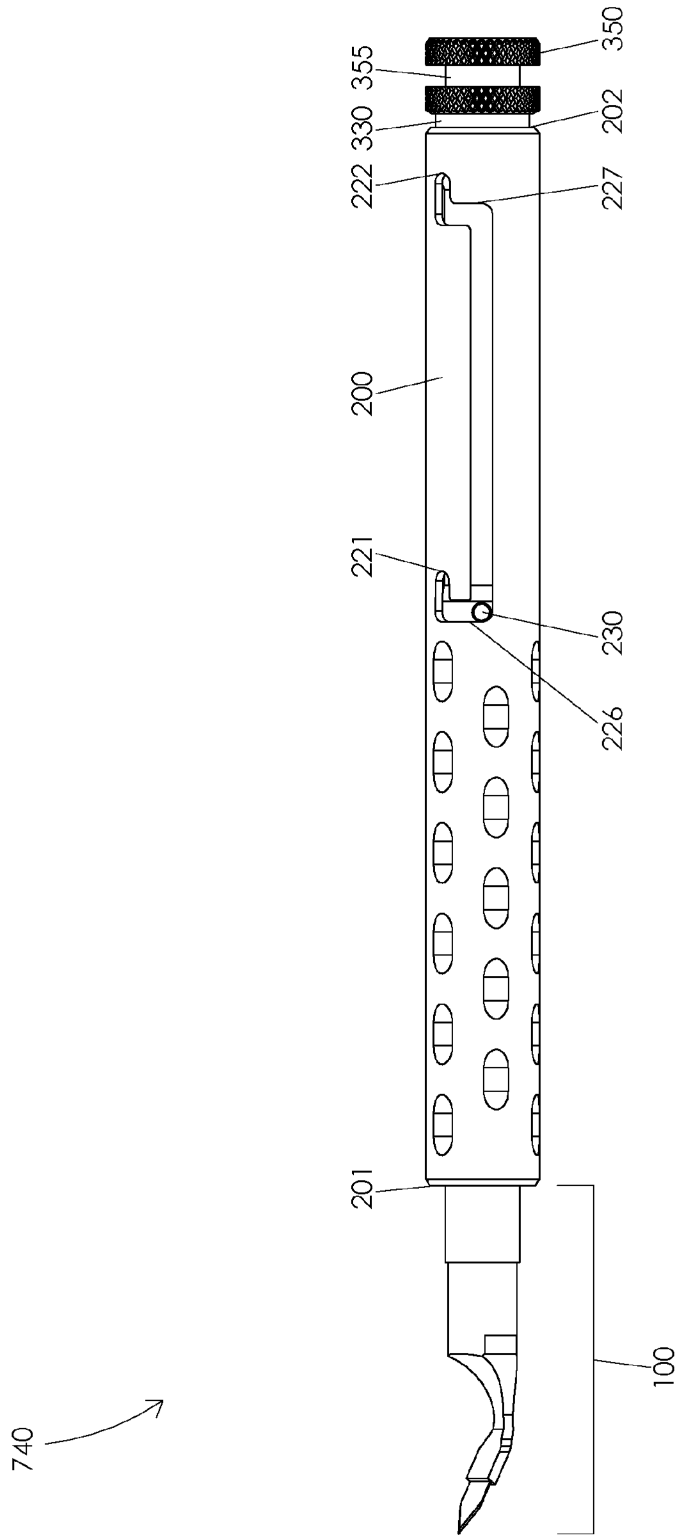


FIG. 7E

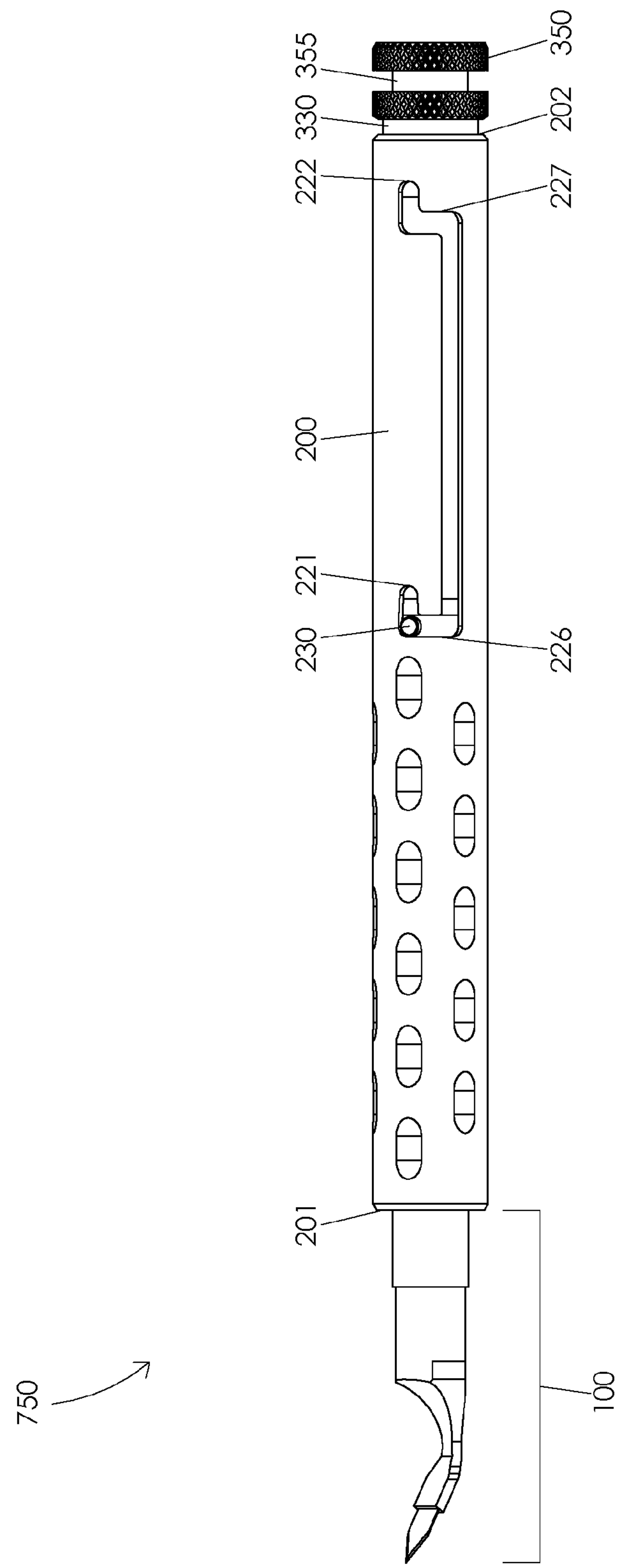


FIG. 7F

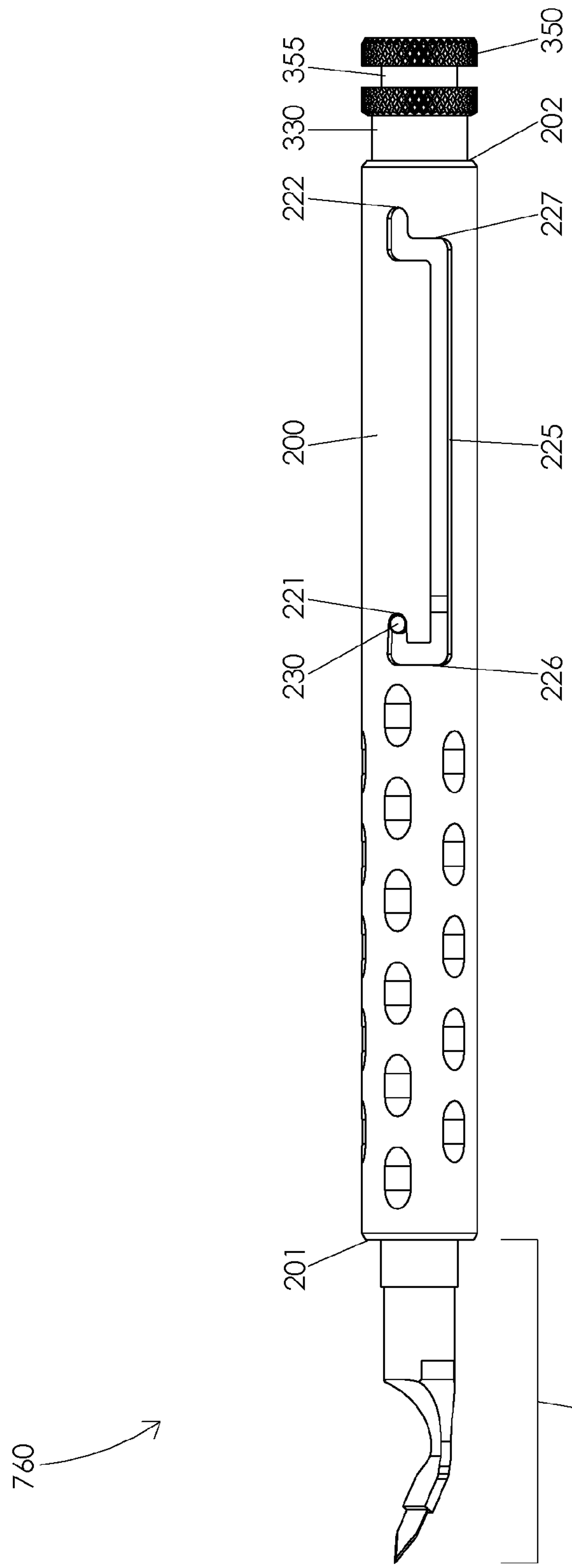


FIG. 7G

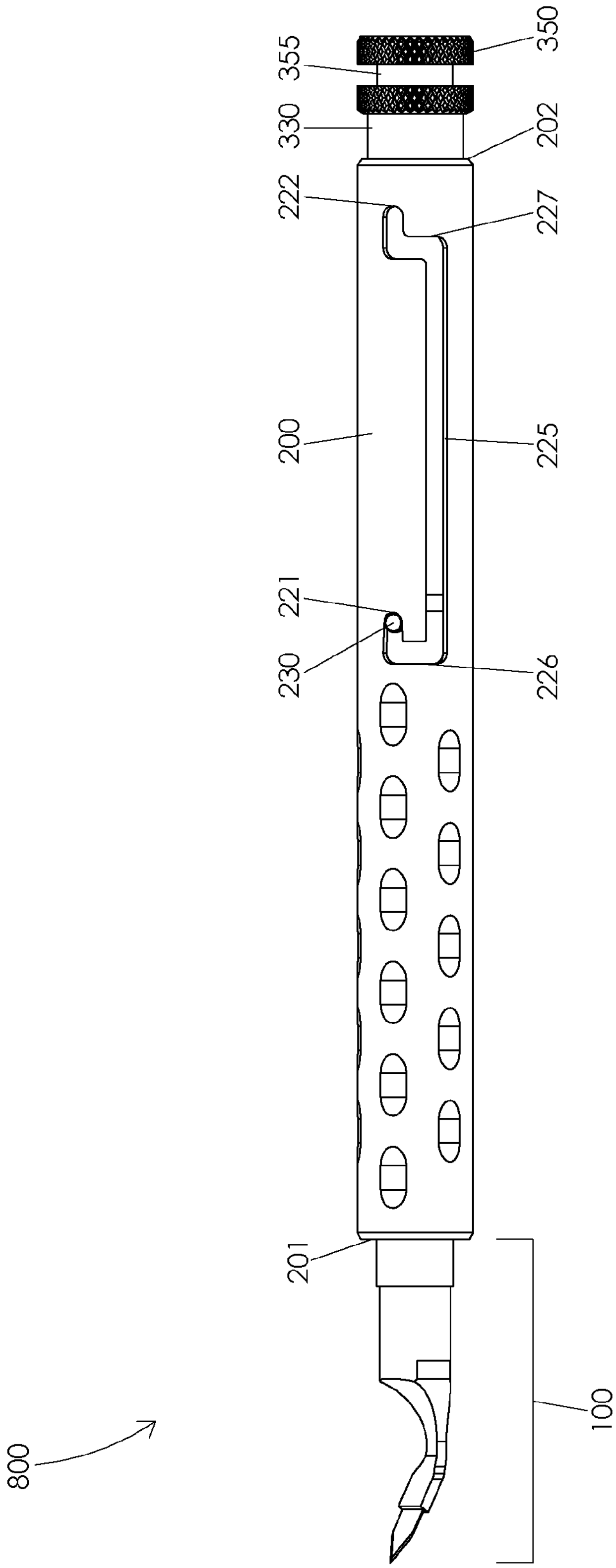


FIG. 8A

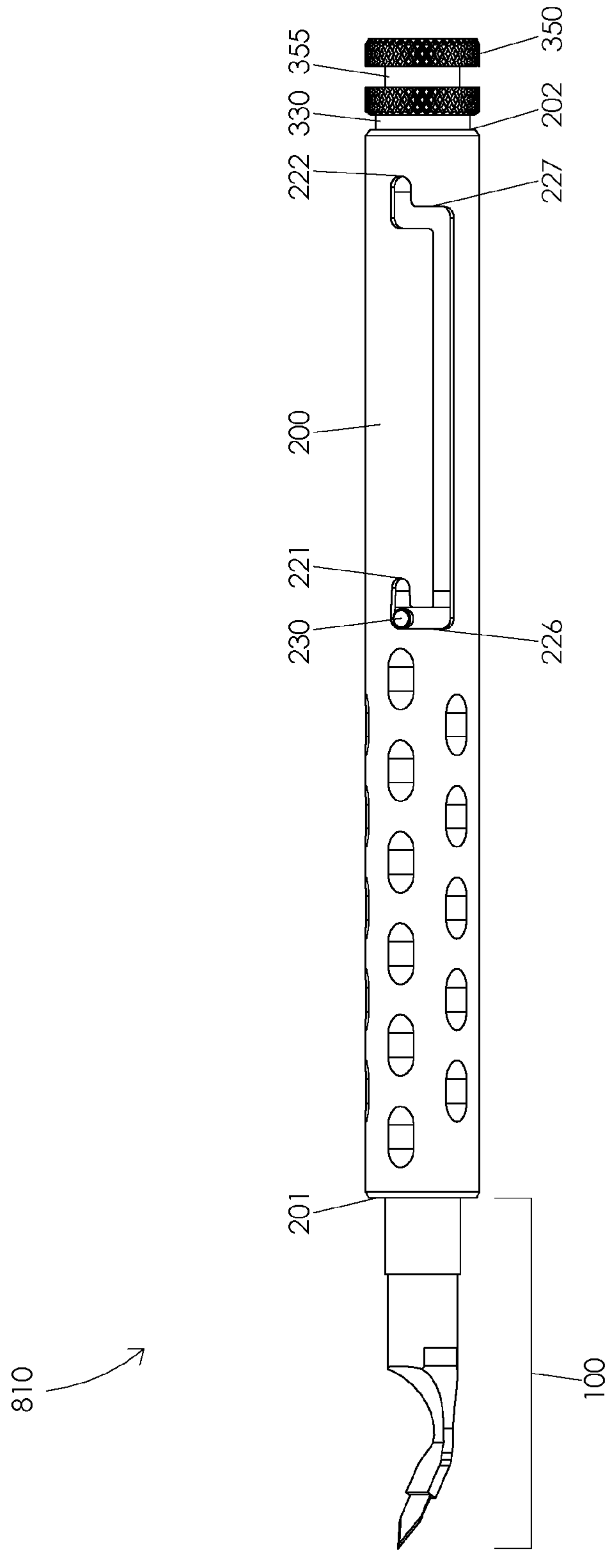


FIG. 8B

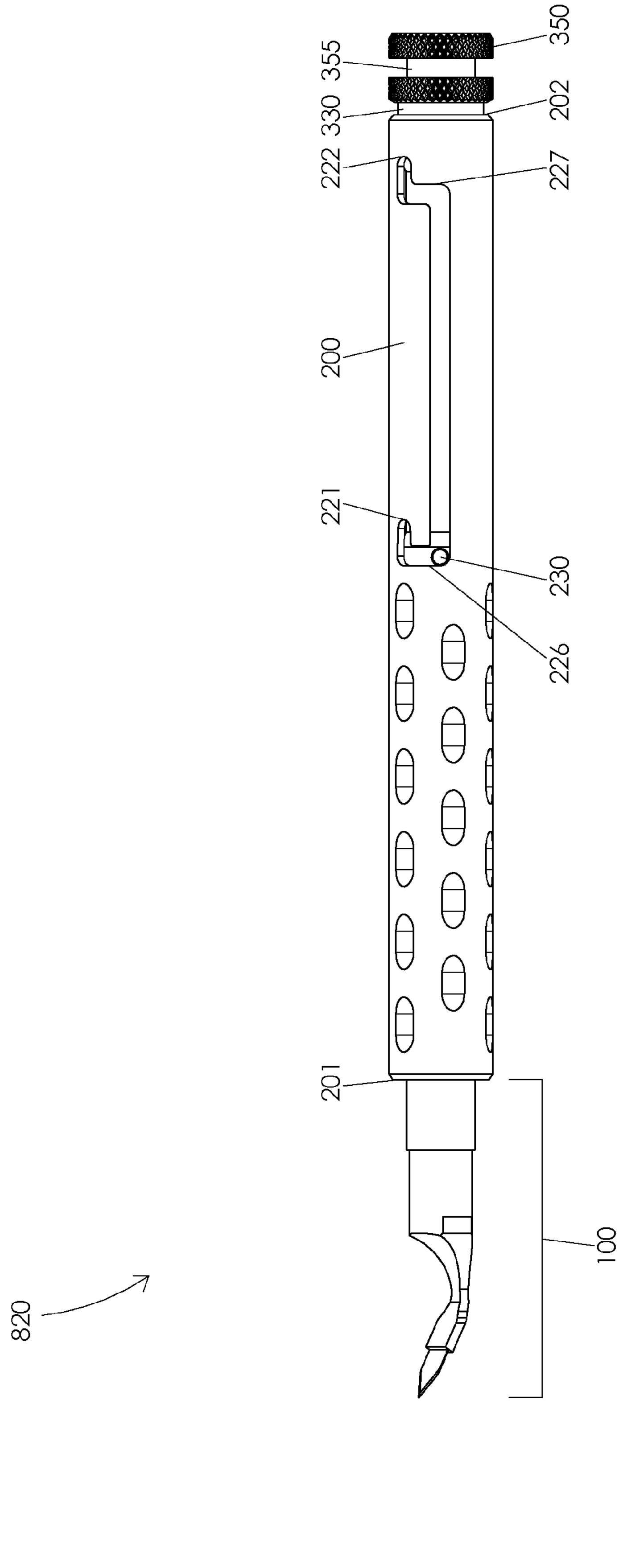


FIG. 8C

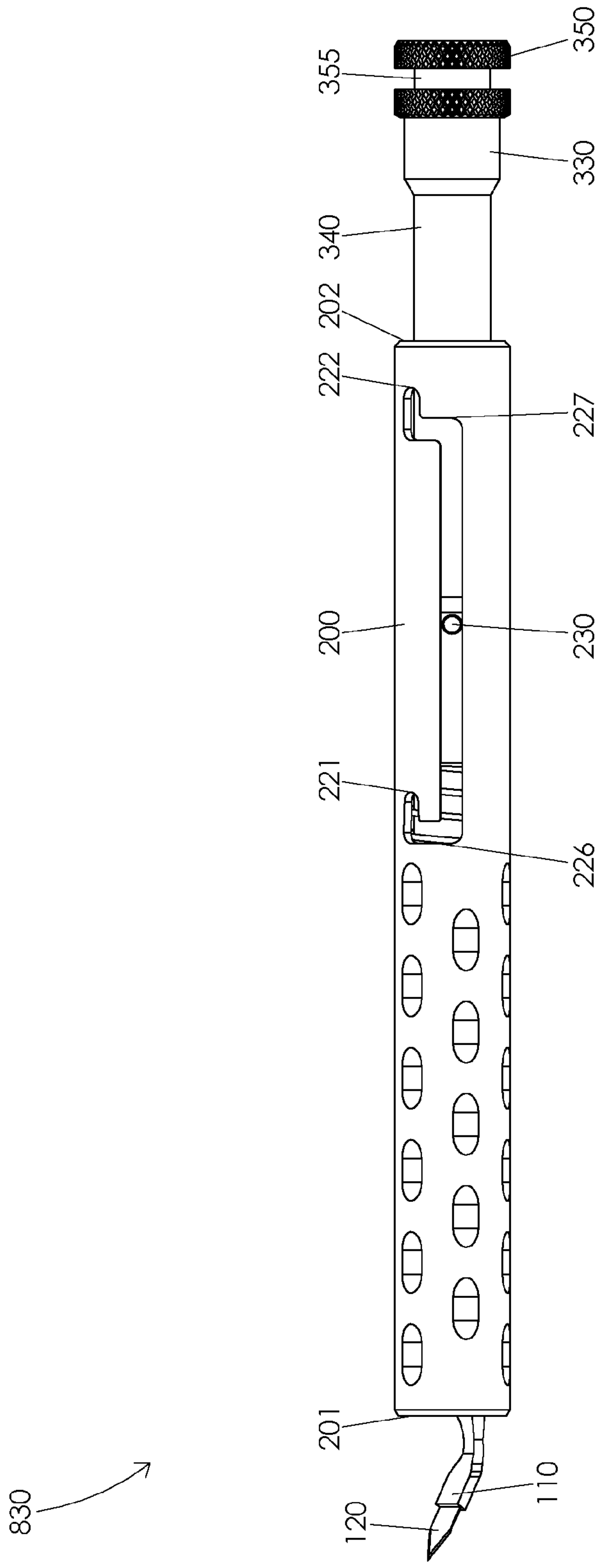


FIG. 8D

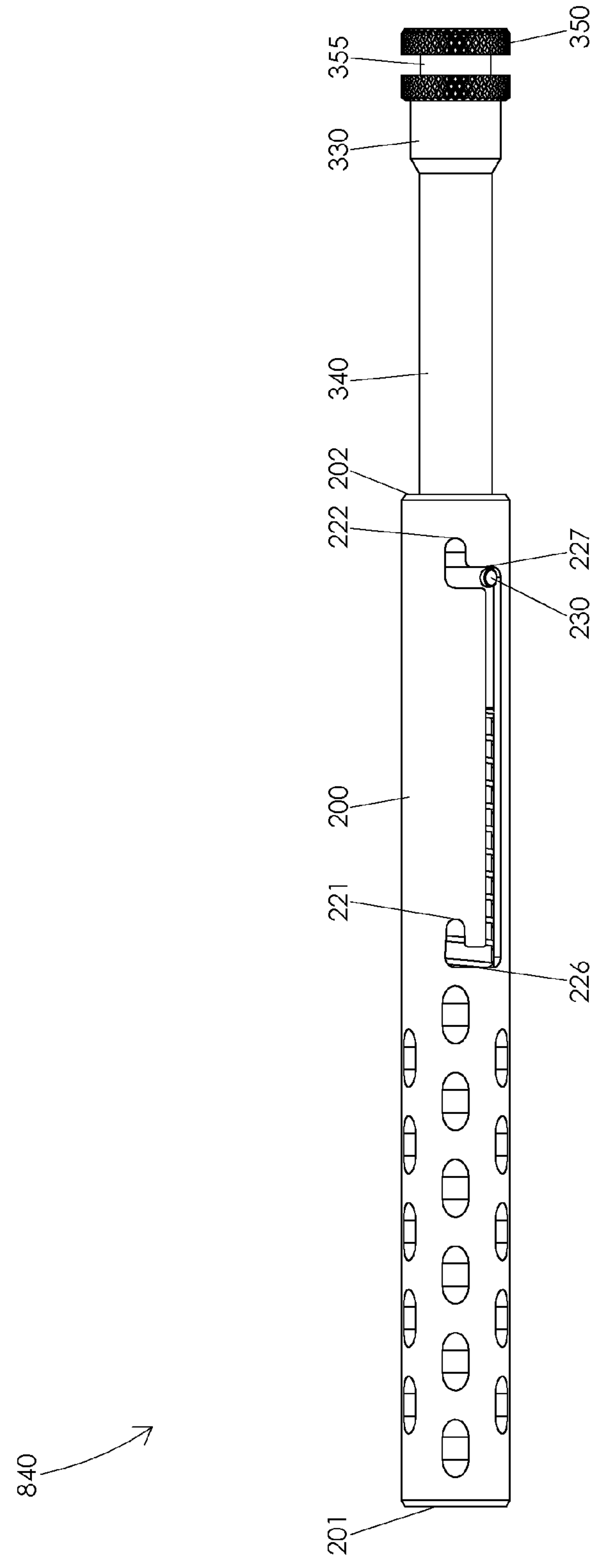


FIG. 8E

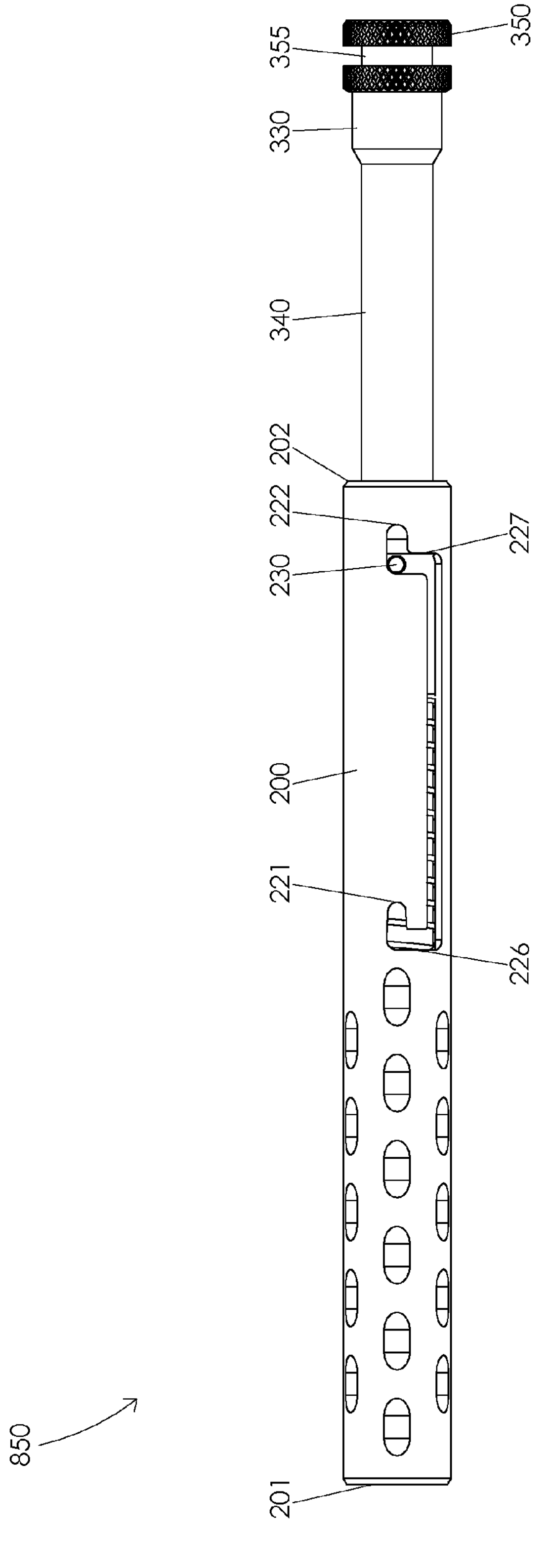


FIG. 8F

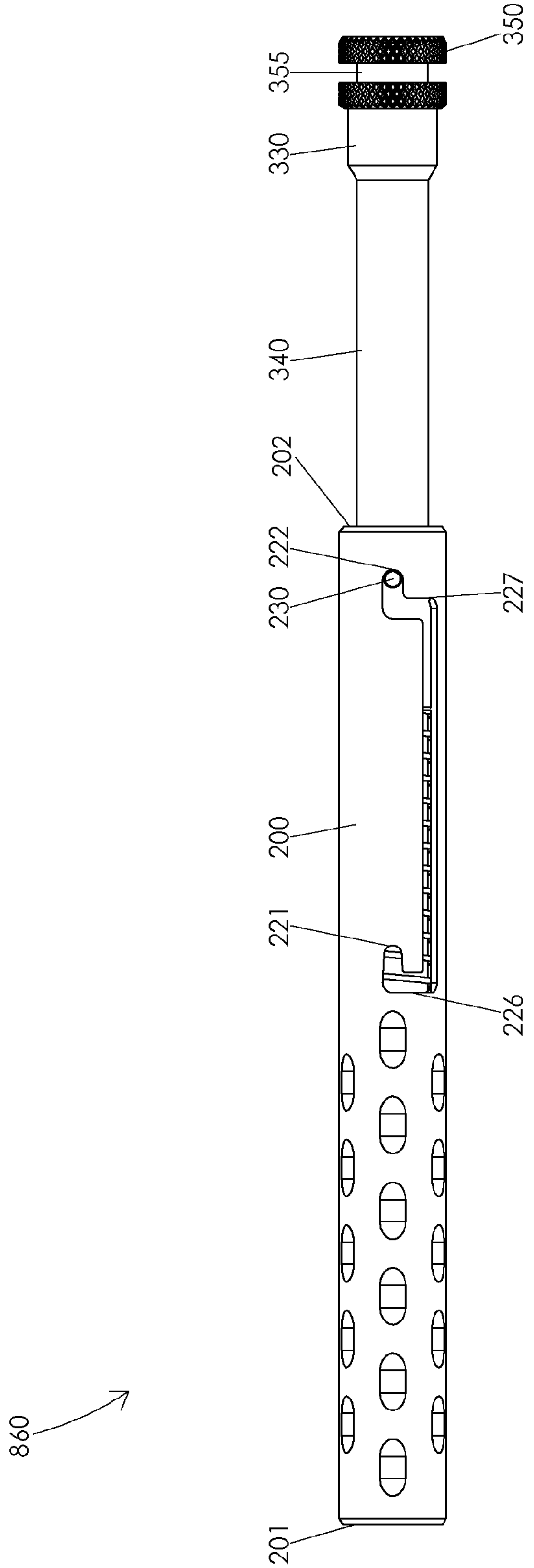


FIG. 8G

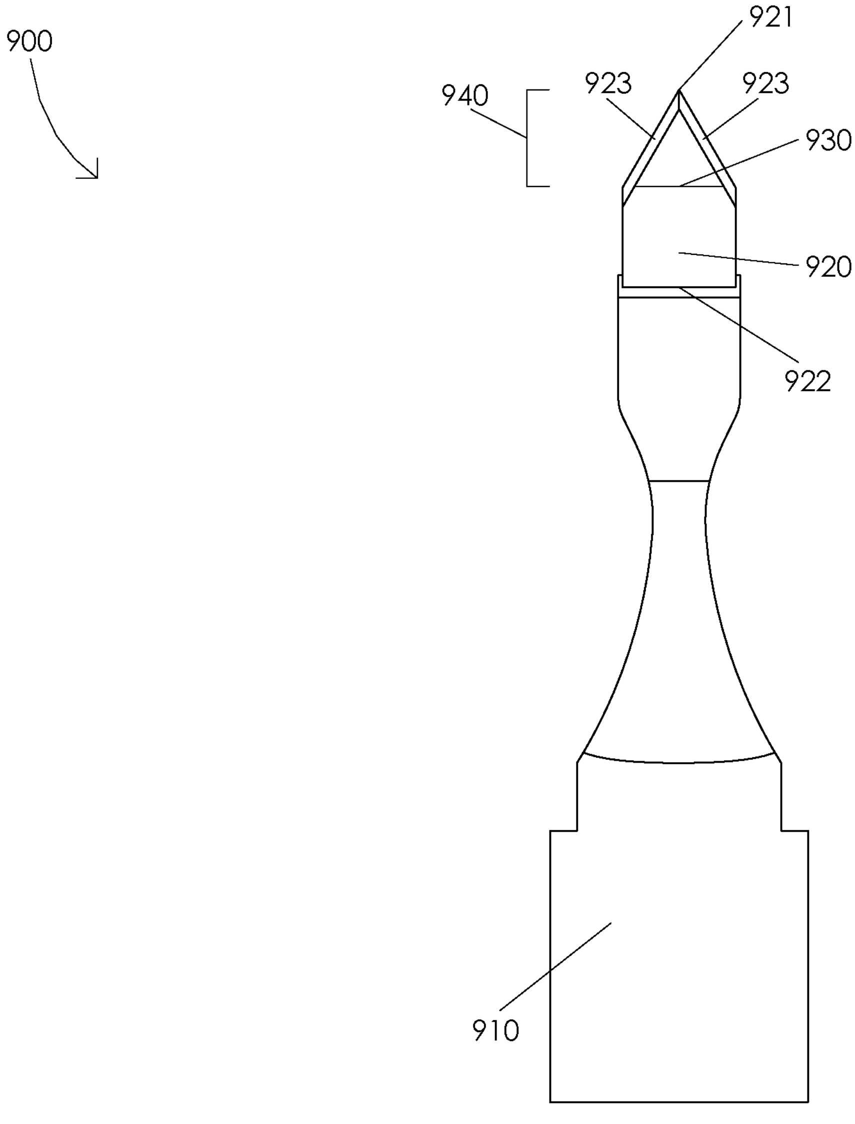


FIG. 9A

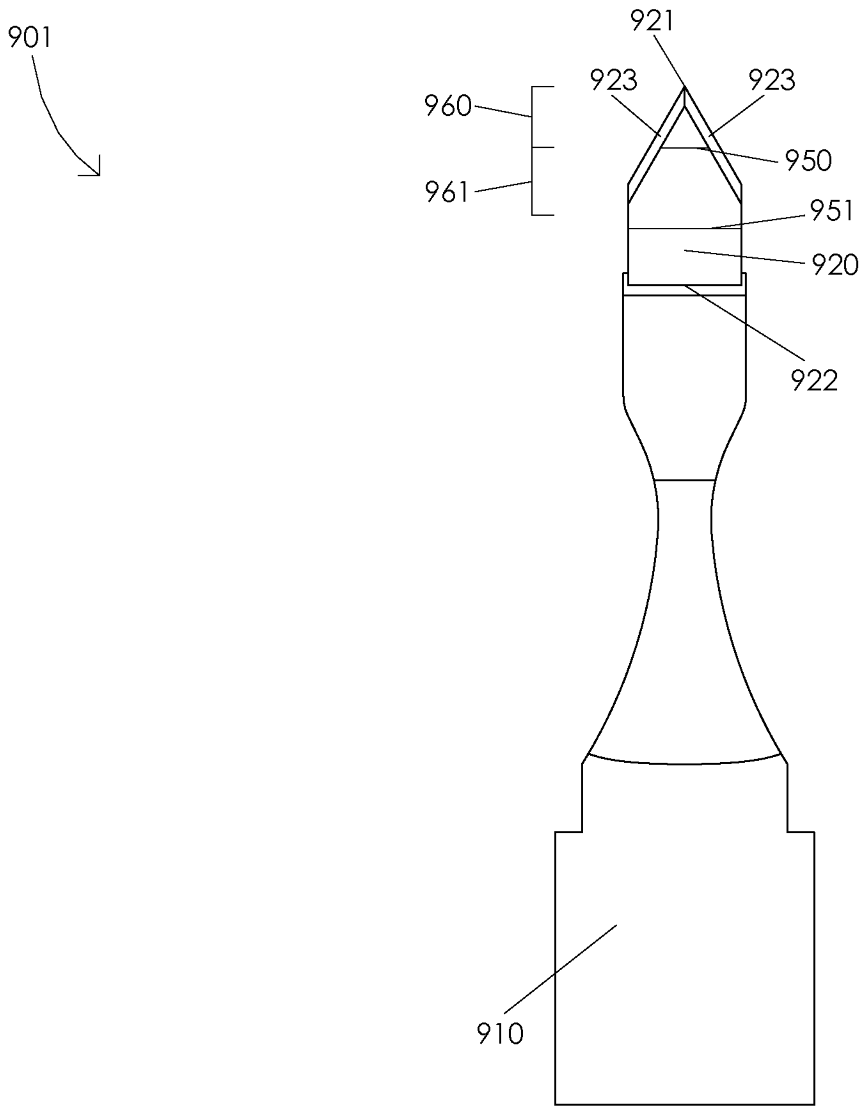


FIG. 9B

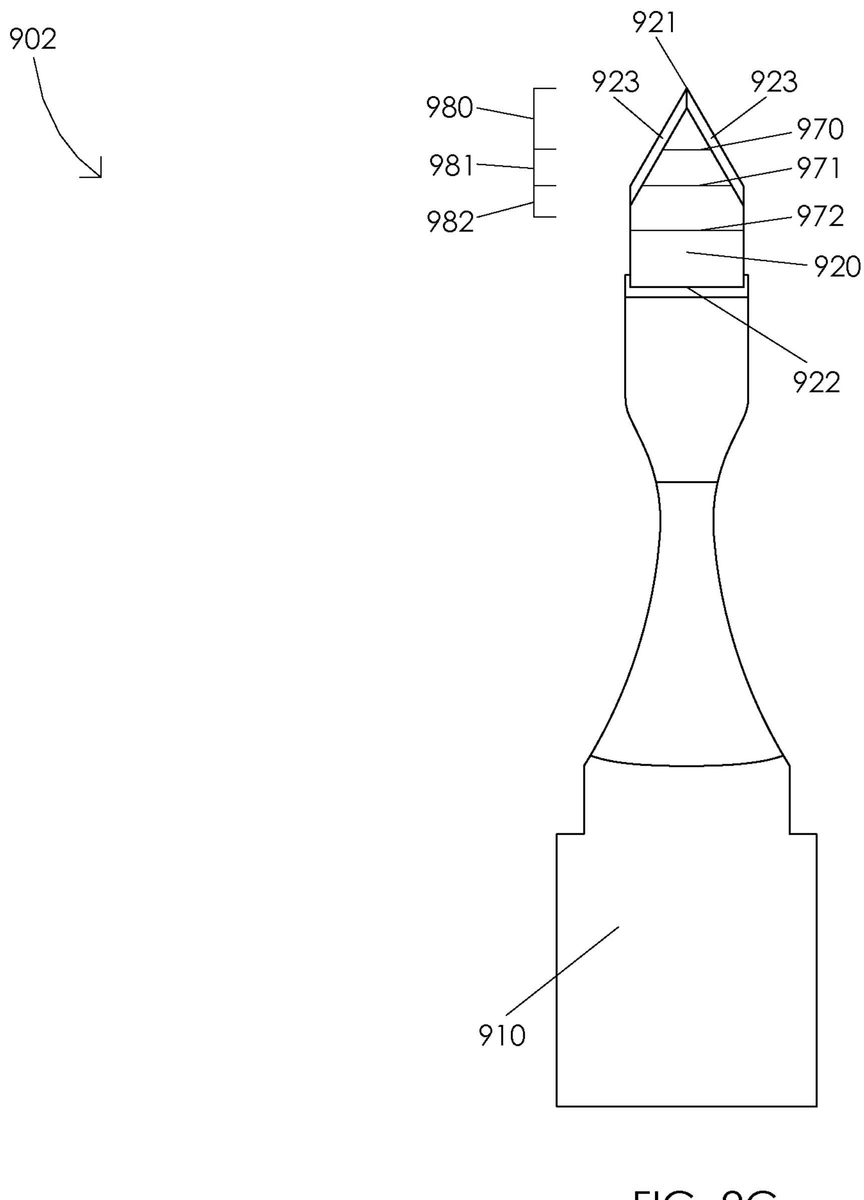


FIG. 9C

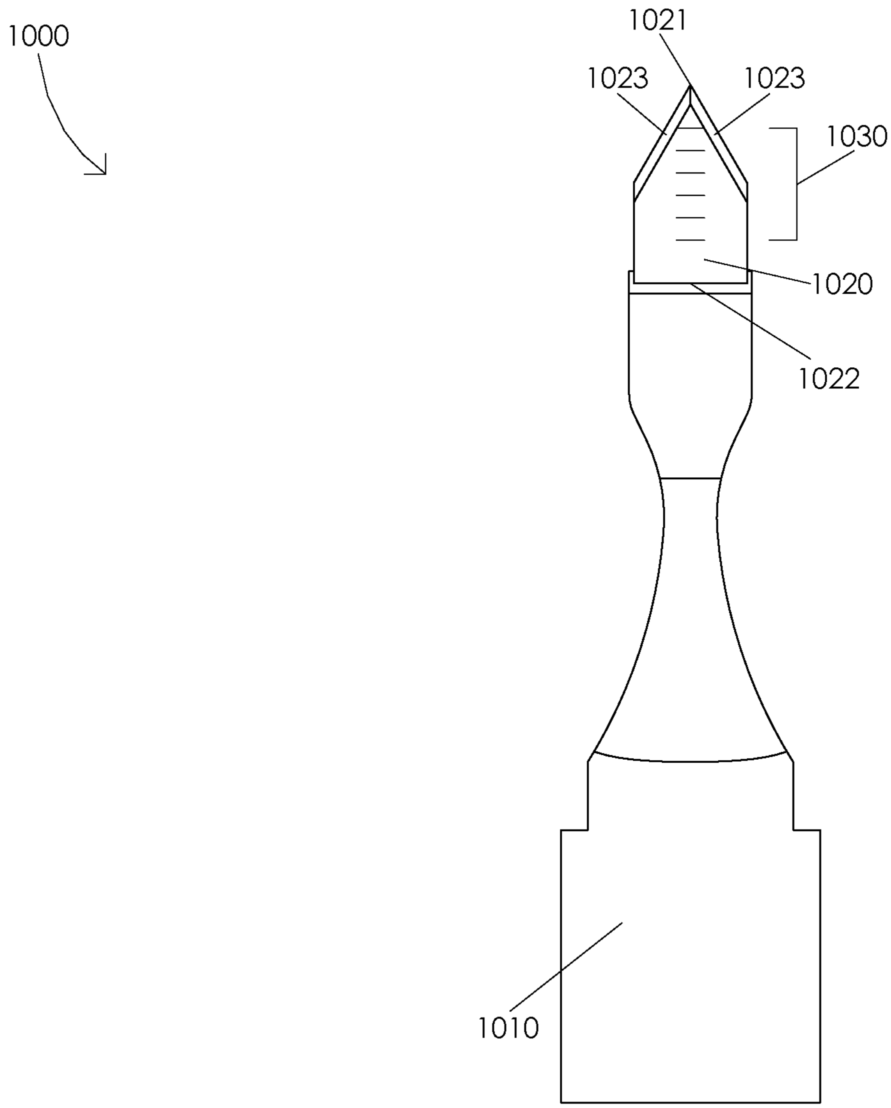


FIG. 10A

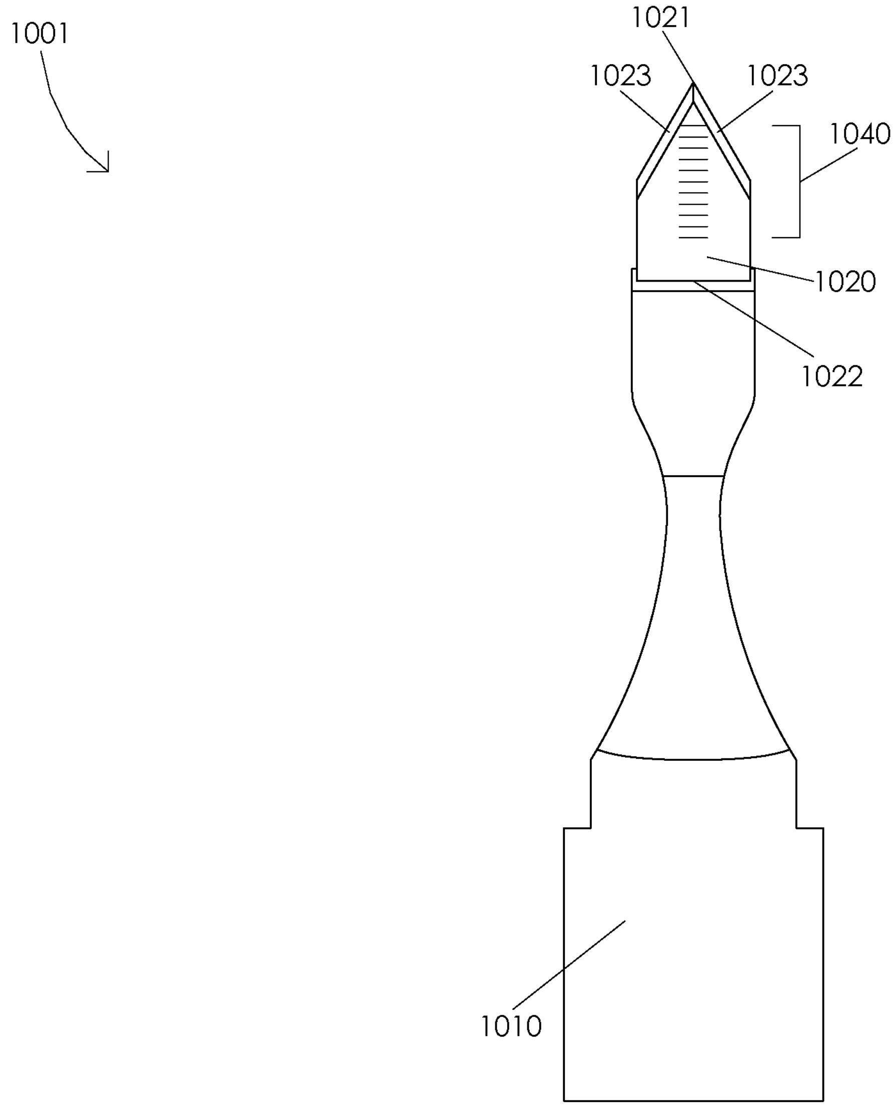


FIG. 10B

MULTI-PLANE SURGICAL INCISION GUIDE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This Application is a continuation of prior application Ser. No. 13/572,349 filed Aug. 10, 2012.

FIELD OF THE INVENTION

[0002] The present disclosure relates to a surgical instrument, and, more particularly, to a surgical instrument for making surgical incisions.

BACKGROUND OF THE INVENTION

[0003] Some surgical procedures require a surgical instrument with an extremely sharp blade. In order to create very precise incisions in a tissue that is difficult to cut due to, e.g., the tissue's biological composition, it is important for a surgeon to have an instrument with an extremely sharp blade. For example, eye surgeons may need to cut a patient's cornea during various surgical procedures, e.g., a common cataract surgery. If a patient's cornea is not cut with an extremely sharp blade, then the force required to make an incision in the patient's cornea with a less than extremely sharp blade may cause the corneal surface to indent before the less than extremely sharp blade pierces the patient's cornea. The corneal surface indentation creates a non-uniform surgical incision which prevents the cornea tissue from healing in a natural position. Rather, the cornea tissue heals in an aspherical position with an imprecise optical surface, e.g., resulting in a corneal astigmatism.

[0004] Unfortunately, surgical instruments with extremely sharp blades present an inherent risk of injury to professionals involved in the packaging, shipping, handling, and use of the surgical instruments for surgical procedures. Although any sharp edge may be capable of causing injury if mishandled, extremely sharp blades can cause significant trauma with very little force. If a small amount of force applied to a conventional blade against a person's tissue may cause a superficial incision in the person's tissue, then the same small amount of force applied to an extremely sharp blade against the person's tissue may be capable of inflicting a deep and serious wound. Thus, there is a need for a surgical instrument with an extremely sharp blade that minimizes the risk of injury to individuals involved in the packaging, shipping, handling, and use of the surgical instrument for surgical procedures.

[0005] Although extremely sharp blades may facilitate a surgeon's ability to create precise, uniform surgical incisions, there is still a risk that an incision performed with an extremely sharp blade may heal improperly. For example, severed edges of tissue may heal unevenly unless sutures are used to hold the severed edges in a natural position. Unfortunately, suturing delicate tissue may pose additional risks to a patient. However, a surgeon may attempt a multi-plane incision to ensure that a surgical incision heals properly. A surgeon may perform a multi-plane incision by initially penetrating a tissue to a first depth with a blade oriented at a first angle relative to the tissue and then penetrating the tissue to a second depth with the blade oriented at a second angle relative to the tissue. A successful multi-plane incision increases the total surface area of the tissue severed by a surgical blade and also creates a surgical geometry in each side of the tissue severed by the surgical blade wherein two sides of the tissue may only be reunited and heal in a single position, i.e., a natural position.

[0006] Unfortunately, multi-plane surgical incision procedures are difficult for a surgeon to perform accurately. Additionally, it is difficult for a surgeon to repeat an accurate multi-plane incision with precision. Thus, there is a need for a surgical instrument with a surgical incision guide configured to allow surgeons to perform accurate and repeatable multi-plane surgical incisions.

BRIEF SUMMARY OF THE INVENTION

[0007] The present disclosure provides a surgical instrument handle for selectively actuating a surgical blade. Illustratively, the surgical blade may comprise a surgical incision guide configured to guide a surgical incision. In one or more illustrative embodiments, a surgical instrument handle may selectively actuate a surgical blade between a safe position wherein the surgical blade is contained within an outer sleeve and an extended position wherein the surgical blade is at least partially extended from a distal end of the outer sleeve. Illustratively, a surgeon or a surgeon's assistant may receive a surgical instrument handle for selectively actuating a surgical blade in a safe position wherein the surgical blade is contained within an outer sleeve. The surgeon or the surgeon's assistant may then selectively actuate the surgical blade from the safe position to an extended position wherein the surgical blade is at least partially extended from a distal end of the outer sleeve. After completion of all or a portion of a surgical procedure, the surgeon or the surgeon's assistant may then selectively actuate the surgical blade from the extended position to the safe position.

[0008] In one or more embodiments, a surgical instrument may comprise an outer sleeve, an inner handle configured to actuate relative to the outer sleeve, a surgical blade fixed to a distal end of the inner handle, and a detent configured to selectively fix a position of the inner handle relative to the outer sleeve. Illustratively, the surgical instrument may be selectively actuated between a first position of the inner handle relative to the outer sleeve and a second position of the inner handle relative to the outer sleeve. In the first position, the surgical blade may be contained within the outer sleeve. In the second position, the surgical blade may be at least partially extended from a distal end of the outer sleeve for use in a surgical procedure. In one or more embodiments, the surgical blade may comprise a surgical incision guide configured to guide a surgical incision.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The above and further advantages of the present invention may be better understood by referring to the following description in conjunction with the accompanying drawings in which like reference numerals indicate identical or functionally similar elements:

[0010] FIGS. **1**A and **1**B are schematic diagrams illustrating a surgical blade;

[0011] FIGS. **2**A, **2**B, and **2**C are schematic diagrams of an outer sleeve;

[0012] FIG. **3** is a schematic diagram of an inner handle;

[0013] FIG. **4** is a schematic diagram of an exploded view of a surgical instrument handle;

[0014] FIG. **5** is a schematic diagram illustrating a surgical blade in a safe position;

[0015] FIG. **6** is a schematic diagram illustrating a surgical blade in a surgical position;

[0016] FIGS. **7**A, **7**B, **7**C, **7**D, **7**E, **7**F, and **7**G are schematic diagrams illustrating an actuation of a surgical blade from a first fixed position to a second fixed position;

[0017] FIGS. **8**A, **8**B, **8**C, **8**D, **8**E, **8**F, and **8**G are schematic diagrams illustrating an actuation of a surgical blade from a second fixed position to a first fixed position;

[0018] FIGS. **9**A, **9**B, and **9**C are schematic diagrams illustrating a surgical blade;

[0019] FIGS. **10**A and **10**B are schematic diagrams illustrating a surgical blade.

DETAILED DESCRIPTION OF AN ILLUSTRATIVE EMBODIMENT

[0020] FIGS. **1**A and **1**B are schematic diagrams illustrating a surgical blade **100**. FIG. **1**A illustrates a top view, a side view, and a bottom view of surgical blade **100**. FIG. **1**B illustrates a side view and a top view of surgical blade **100**. In one or more embodiments, surgical blade **100** may comprise a blade mount **110** and a blade **120**. Illustratively, blade mount **110** is configured to support blade **120**. Blade mount **110** comprises a blade mount distal end **111** and a blade mount proximal end **112**. In one or more embodiments, blade mount **110** may be configured to orient blade **120** at an angle **130**, e.g., for making surgical incisions. Blade mount **110** may be manufactured from any suitable material, e.g., polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0021] Illustratively, blade **120** may be configured to make surgical incisions. Blade **120** comprises a blade distal end **121**, a blade proximal end **122**, and at least one blade edge **123**. In one or more embodiments, blade proximal end **122** interfaces with blade mount distal end **111**. Blade **120** may be manufactured from any suitable material, e.g., sapphire, diamond, silicon, polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0022] FIGS. **2**A, **2**B, and **2**C are schematic diagrams of an outer sleeve **200**. FIG. **2**A illustrates a top view, a side view, and a bottom view of outer sleeve **200**. In one or more embodiments, outer sleeve **200** may comprise an outer sleeve distal end **201**, an outer sleeve proximal end **202**, an ergonomic surgical safety grip **210**, and an actuation guide **220**. Illustratively, ergonomic surgical safety grip **210** may be configured to prevent undesirable movements of surgical blade **100** during a surgical procedure. For example, ergonomic surgical safety grip **210** may be configured to prevent unintentional movements of surgical blade **100** before a surgical procedure, during a surgical procedure, and after a surgical procedure.

[0023] In one or more embodiments, ergonomic surgical safety grip **210** may comprise one or more grip points **211**. Illustratively, grip points **211** may be configured to conform to a surgeon's finger tips. In one or more embodiments, grip points **211** may be configured to increase a total contact area between a surgeon's finger tips and ergonomic surgical safety grip **210**. Illustratively, grip points **211** may be manufactured as one or more indents in outer sleeve **200**, e.g., to increase a total contact area between a surgeon's finger tips and ergonomic surgical safety grip **210**. In one or more embodiments, grip points **211** may be manufactured as one or more apertures in outer sleeve **200**. Illustratively, ergonomic surgical safety grip **210** may comprise a sleeve configured to fit over outer sleeve **200**. Ergonomic surgical safety grip **210** may be manufactured from any suitable material, e.g., polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0024] Illustratively, actuation guide **220** may be configured to guide an actuation of surgical blade **100**. In one or more embodiments, actuation guide **220** may comprise a distal detent **221**, a proximal detent **222**, and an actuation channel **225**. Actuation channel **225** may comprise an actuation channel distal end **226** and an actuation channel proximal end **227**. Illustratively, an actuation pin **230** may be configured to actuate in conjunction with surgical blade **100**. In one or more embodiments, distal detent **221** may be configured to temporarily fix actuation pin **230** in a distal position in actuation guide **220**, and proximal detent **222** may be configured to temporarily fix actuation pin **230** in a proximal position in actuation guide **220**. Illustratively, actuation channel **225** may be configured to allow actuation pin **230** to actuate between a distal position and a proximal position in actuation guide **220**. For example, actuation channel **225** may be configured to allow actuation pin **230** to actuate between actuation channel proximal end **227** and actuation channel distal end **226**. In one or more embodiments, actuation pin **230** may be accessed, e.g., for replacement, repair, etc., via an actuation pin access port **240**.

[0025] FIG. **2**B illustrates a view of a cross-section of outer sleeve **200**. In one or more embodiments, an interior of outer sleeve **200** may comprise an outer sleeve proximal core **250**, outer sleeve distal core **260**, and a pressure mechanism distal interface **270**. Illustratively, outer sleeve distal core **260** may be configured to conform to blade mount **110**.

[0026] FIG. **2**C illustrates a top view of outer sleeve **200**. In one or more embodiments, actuation guide **220** may comprise a distal detent **221**, a proximal detent **222**, and an intermediate detent **223**. Illustratively, proximal detent **222** may be configured to fix actuation pin **230** in an intermediate position in actuation guide **220**.

[0027] FIG. **3** is a schematic diagram of an inner handle **300**. FIG. **3** illustrates a top view, a side view, and a bottom view of inner handle **300**. Inner handle **300** comprises an inner handle distal end **301** and an inner handle proximal end **302**. Illustratively, inner handle **300** may be configured to actuate relative to outer sleeve **200**. In one or more embodiments, inner handle **300** may comprise a pressure mechanism foundation **310**, a distal outer sleeve interface **320**, a proximal outer sleeve interface **330**, an inner handle base **340**, and an actuation control apparatus **350**. Illustratively, distal outer sleeve interface **320** and proximal outer sleeve interface **330** may be configured to conform to the dimensions of outer sleeve proximal core **250**.

[0028] In one or more embodiments, distal outer sleeve interface **320** may be configured to contain actuation pin **230**. Illustratively, distal outer sleeve interface **320** may comprise a pressure mechanism proximal interface **321** and a distal actuation guide **322**. In one or more embodiments, distal actuation guide **322** may be configured to minimize a friction force during an actuation of inner handle **300**. Illustratively, proximal outer sleeve interface **330** may comprise a proximal actuation guide **331** and an actuation control apparatus interface **332**. In one or more embodiments, proximal actuation guide **331** may be configured to minimize a friction force during an actuation of inner handle **300**.

[0029] In one or more embodiments, actuation control apparatus **350** may be configured to initiate an actuation of surgical blade **100**. Illustratively, actuation control apparatus

350 may be configured to manipulate an actuation of surgical blade **100**. For example, actuation control apparatus **350** may be configured to control a lateral actuation of surgical blade **100** relative to outer sleeve **200**. In one or more embodiments, actuation control apparatus **350** may be configured to control a rotational actuation of surgical blade **100** relative to outer sleeve **200**. Illustratively, actuation control apparatus **350** may comprise a diamond or knurl grip pattern configured to improve a surgeon's or an assistant's ability to grasp actuation control apparatus **350**. Actuation control apparatus **350** may be manufactured from any suitable material, e.g., polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0030] In one or more embodiments, actuation control apparatus **350** may comprise a blade indication signal **355**. Illustratively, blade indication signal **355** may be a visual signal, e.g., a color, configured to indicate one or more properties of surgical blade **100**. In one or more embodiments, blade indication signal **355** may comprise a solid or multicolored mark configured to indicate one or more properties of blade **120**. For example, a particular color or color combination displayed by blade indication signal **355** may indicate a particular property of blade **120**, e.g., a length of blade **120**, a width of blade **120**, a surgical geometry of blade **120**, a composition material of blade **120**, etc. Illustratively, blade indication signal **355** may be configured to display specific colors wherein the colors yellow, beige, black, blue, red, brown, green, and grey may indicate blade **120** dimension lengths of 1.0 mm, 1.8 mm, 2.2 mm, 2.4 mm, 2.65 mm, 2.8 mm, 3.0 mm, and 3.2 mm, respectively.

[0031] FIG. **4** is a schematic diagram of an exploded view of a surgical instrument handle **400**. FIG. **4** illustrates an exploded top view and an exploded side view of surgical instrument handle **400**. In one or more embodiments, surgical instrument handle **400** may comprise a surgical blade **100**, an outer sleeve **200**, an actuation pin **230**, an inner handle **300**, a fixation mechanism **410**, and a pressure mechanism **420**. Illustratively, fixation mechanism **410** is configured to attach blade mount proximal end **112** and inner handle distal end **301**. In one or more embodiments, fixation mechanism **410** may comprise a set screw configured to firmly attach blade mount proximal end **112** to inner handle distal end **301**. In one or more embodiments, fixation mechanism **410** may comprise an adhesive material configured to attach blade mount proximal end **112** to inner handle distal end **301**, or fixation mechanism **410** may comprise one or more magnets configured to attach blade mount proximal end **112** to inner handle distal end **301**.

[0032] Illustratively, pressure mechanism **420** may comprise a pressure mechanism distal end **421** and a pressure mechanism proximal end **422**. In one or more embodiments, surgical instrument handle **400** may be assembled by fitting pressure mechanism **420** on pressure mechanism foundation **310** by, e.g., guiding pressure mechanism proximal end **422** over inner handle distal end **301** until pressure mechanism proximal end **422** abuts pressure mechanism proximal interface **321**. Illustratively, pressure mechanism **420** may be disposed between pressure mechanism distal interface **270** and pressure mechanism proximal interface **321**. For example, pressure mechanism distal end **421** may abut pressure mechanism distal interface **270** and pressure mechanism proximal end **422** may abut pressure mechanism proximal interface **321**. In one or more embodiments, pressure mechanism **420** may be coupled to pressure mechanism foundation **310**. For example, pressure mechanism **420** and pressure mechanism foundation **310** may be manufactured from a single suitable material or a combination of suitable materials.

[0033] Illustratively, pressure mechanism **420** may be configured to provide a force. In one or more embodiments, pressure mechanism **420** may be configured to provide a constant or uniform force. In one or more other embodiments, pressure mechanism **420** may be configured to provide a variable force. For example, pressure mechanism **420** may comprise a spring or a coil. In one or more embodiments, pressure mechanism **420** may comprise a spring with a spring constant in a range of 0.01 N/mm to 5.0 N/mm. In one or more other embodiments, pressure mechanism **420** may comprise a spring with a spring constant less than 0.01 N/mm or greater than 5.0 N/mm. Illustratively, pressure mechanism **420** may comprise a pneumatic system. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force to resist an actuation. For example, pressure mechanism **420** may be configured to provide a resistive force to resist an actuation of surgical blade **100** from an enclosed position wherein surgical blade **100** is contained within outer sleeve **200** to an extended position wherein surgical blade **100** is at least partially extended from outer sleeve distal end **201**. Illustratively, pressure mechanism **420** may be configured to provide a resistive force that resists actuation pin **230** from an egression out of distal detent **221** or proximal detent **222**. In one or more embodiments, pressure mechanism **420** may be configured to provide a facilitating force to facilitate an actuation. For example, pressure mechanism **420** may be configured to provide a facilitating force to facilitate an actuation of surgical blade **100** from an extended position wherein surgical blade **100** is at least partially extended from outer sleeve distal end **201** to an enclosed position wherein surgical blade **100** is contained within outer sleeve **200**.

[0034] In one or more embodiments, blade indication signal **355** may comprise a blade indication band **356**. Illustratively, blade indication band **356** may be configured to fit over a portion of actuation control apparatus **350**. For example, blade indication band **356** may be a single color or a combination of single colors configured to indicate one or more properties of surgical blade **100**. Illustratively, a blade indication band **356** of a particular color or color combination may indicate a particular property of blade **120**, e.g., a length of blade **120**, a width of blade **120**, a surgical geometry of blade **120**, a composition material of blade **120**, etc.

[0035] FIG. **5** is a schematic diagram illustrating a surgical blade **100** in a safe position **500**. In one or more embodiments, surgical blade **100** may be in safe position **500** when actuation pin **230** is temporarily fixed in proximal detent **222**. Illustratively, surgical blade **100** may be contained in outer sleeve **200** when actuation pin **230** is temporarily fixed in proximal detent **222**. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force that resists actuation pin **230** from an egression out of proximal detent **222**.

[0036] FIG. **6** is a schematic diagram illustrating a surgical blade **100** in a surgical position **600**. In one or more embodiments, surgical blade **100** may be in surgical position **600** when actuation pin **230** is temporarily fixed in distal detent **221**. Illustratively, surgical blade **100** may extend from outer sleeve distal end **201** when actuation pin **230** is temporarily fixed in distal detent **221**. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force that resists actuation pin **230** from an egression out of distal detent **221**.

[0037] FIGS. **7**A, **7**B, **7**C, **7**D, **7**E, **7**F, and **7**G are schematic diagrams illustrating an actuation of a surgical blade **100** from a first fixed position **700** to a second fixed position **760**. FIG. **7**A illustrates a surgical blade **100** in a first fixed position **700**. Illustratively, first fixed position **700** may comprise a safe position **500** wherein surgical blade **100** may be contained within outer sleeve **200**. For example, in first fixed position **700**, actuation pin **230** may be temporarily fixed in proximal detent **222**.

[0038] FIG. **7**B illustrates an egress **710** of actuation pin **230** from proximal detent **222**.

[0039] Illustratively, egress **710** of actuation pin **230** from proximal detent **222** may be accomplished by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward outer sleeve distal end **201**. For example, a surgeon or a surgeon's assistant may cause an egress **710** of actuation pin **230** from proximal detent **222** by, e.g., grasping actuation control apparatus **350** and pushing inner handle **300** into outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force that resists an egress **710** of actuation pin **230** out of proximal detent **222**.

[0040] FIG. **7**C illustrates an ingress **720** of actuation pin **230** into actuation channel **225**. Illustratively, ingress **720** of actuation pin **230** into actuation channel **225** may be accomplished by a rotation of actuation control apparatus **350** after an egress **710** of actuation pin **230** from proximal detent **222**. For example, after causing an egress **710** of actuation pin **230** from proximal detent **222**, a surgeon or a surgeon's assistant may cause an ingress **720** of actuation pin **230** into actuation channel **225** by, e.g., grasping actuation control apparatus **350** and rotating inner handle **300** relative to outer sleeve **200**.

[0041] FIG. **7**D illustrates an actuation **730** of actuation pin **230** along actuation channel **225**, e.g., away from actuation channel proximal end **227** and toward actuation channel distal end **226**. Illustratively, an actuation **730** of actuation pin **230** along actuation channel **225** may be accomplished by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward outer sleeve distal end **201** after an ingress **720** of actuation pin **230** into actuation channel **225**. For example, after causing an ingress **720** of actuation pin **230** into actuation channel **225**, a surgeon or a surgeon's assistant may cause an actuation **730** of actuation pin **230** along actuation channel **225** by, e.g., grasping actuation control apparatus **350** and pushing inner handle **300** into outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force that resists an actuation **730** of actuation pin **230** along actuation channel **225**.

[0042] FIG. **7**E illustrates an ingress alignment **740** of actuation pin **230** with distal detent **221**. Illustratively, ingress alignment **740** of actuation pin **230** with distal detent **221** may be accomplished by guiding an actuation **730** of actuation pin **230** to actuation channel distal end **226**.

[0043] FIG. **7**F illustrates actuation pin **230** in a position for ingress **750** into distal detent **221**. Illustratively, actuation pin **230** may be guided to position for ingress **750** into distal detent **221** by a rotation of actuation control apparatus **350** after an ingress alignment **740** of actuation pin **230** with distal detent **221**. For example, after causing an ingress alignment **740** of actuation pin **230** with distal detent **221**, a surgeon or a surgeon's assistant may guide actuation pin **230** to position for ingress **750** into distal detent **221** by, e.g., grasping actuation control apparatus **350** and rotating inner handle **300** relative to outer sleeve **200**.

[0044] FIG. **7**G illustrates a surgical blade **100** in a second fixed position **760**. Illustratively, surgical blade **100** may be temporarily fixed in a second fixed position **760** by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward outer sleeve proximal end **202** after actuation pin **230** is in position for ingress **750** into distal detent **221**. For example, after guiding actuation pin **230** to position for ingress **750** into distal detent **221**, a surgeon or a surgeon's assistant may temporarily fix surgical blade **100** in a second fixed position **760** by, e.g., grasping actuation control apparatus **350** and pulling inner handle **300** out of outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a facilitating force that facilitates an actuation of actuation pin **230** from position for ingress **750** to a second fixed position **760**.

[0045] FIGS. **8**A, **8**B, **8**C, **8**D, **8**E, **8**F, and **8**G are schematic diagrams illustrating an actuation of a surgical blade from a second fixed position **760** to a first fixed position **700**. FIG. **8**A illustrates a surgical blade **100** in a second fixed position **760**. Illustratively, second fixed position **760** may comprise a surgical position **600** wherein surgical blade **100** may be at least partially extended from outer sleeve **200**. For example, surgical blade **100** may be in second fixed position **760** when actuation pin **230** is temporarily fixed in distal detent **221**.

[0046] FIG. **8**B illustrates an egress **810** of actuation pin **230** from distal detent **221**. Illustratively, egress **810** of actuation pin **230** from distal detent **221** may be accomplished by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward outer sleeve distal end **201**. For example, a surgeon or a surgeon's assistant may cause an egress **810** of actuation pin **230** from distal detent **222** by, e.g., grasping actuation control apparatus **350** and pushing inner handle **300** into outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a resistive force that resists an egress **810** of actuation pin **230** out of distal detent **221**.

[0047] FIG. **8**C illustrates an ingress **820** of actuation pin **230** into actuation channel **225**. Illustratively, ingress **820** of actuation pin **230** into actuation channel **225** may be accomplished by a rotation of actuation control apparatus **350** after an egress **810** of actuation pin **230** from distal detent **221**. For example, after causing an egress **810** of actuation pin **230** from distal detent **221**, a surgeon or a surgeon's assistant may cause an ingress **820** of actuation pin **230** into actuation channel **225** by, e.g., grasping actuation control apparatus **350** and rotating inner handle **300** relative to outer sleeve **200**.

[0048] FIG. **8**D illustrates an actuation **830** of actuation pin **230** along actuation channel **225**, e.g., away from actuation channel distal end **226** and toward actuation channel proximal end **227**. Illustratively, an actuation **830** of actuation pin **230** along actuation channel **225** may be accomplished by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward inner handle proximal end **302** after an ingress **820** of actuation pin **230** into actuation channel **225**. For example, after causing an ingress **820** of actuation pin **230** into actuation channel **225**, a surgeon or a surgeon's assistant may cause an actuation **830** of actuation pin **230** along actuation channel **225** by, e.g., grasping actuation control apparatus **350** and pulling inner handle **300** out of outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a facilitating force that facilitates an actuation **830** of actuation pin **230** along actuation channel **225**.

[0049] FIG. **8**E illustrates an ingress alignment **840** of actuation pin **230** with proximal detent **222**. Illustratively, ingress alignment **840** of actuation pin **230** with proximal detent **222** may be accomplished by guiding an actuation **830** of actuation pin **230** to actuation channel proximal end **227**.

[0050] FIG. **8**F illustrates actuation pin **230** in a position for ingress **850** into proximal detent **222**. Illustratively, actuation pin **230** may be guided to position for ingress **850** into proximal detent **222** by a rotation of actuation control apparatus **350** after an ingress alignment **840** of actuation pin **230** with proximal detent **222**. For example, after causing an ingress alignment **840** of actuation pin **230** with proximal detent **222**, a surgeon or a surgeon's assistant may guide actuation pin **230** to position for ingress **850** into proximal detent **222** by, e.g., grasping actuation control apparatus **350** and rotating inner handle **300** relative to outer sleeve **200**.

[0051] FIG. **8**G illustrates a surgical blade **100** in a first fixed position **700**. Illustratively, surgical blade **100** may be temporarily fixed in a first fixed position **700** by an application of a force vector, e.g., applied to actuation control apparatus **350**, with a direction oriented toward inner handle proximal end **302** after actuation pin **230** is in position for ingress **850** into proximal detent **222**. For example, after guiding actuation pin **230** to position for ingress **850** into proximal detent **222**, a surgeon or a surgeon's assistant may temporarily fix surgical blade **100** in a first fixed position **700** by, e.g., grasping actuation control apparatus **350** and pulling inner handle **300** out of outer sleeve **200**. In one or more embodiments, pressure mechanism **420** may be configured to provide a facilitating force that facilitates an actuation of actuation pin **230** from position for ingress **850** to a first fixed position **700**.

[0052] In one or more embodiments, actuation guide **220** may comprise a distal detent **221**, a proximal detent **222**, and an intermediate detent **223**. Illustratively, intermediate detent **223** may be configured to temporarily fix surgical blade **100** in a third fixed position relative to outer sleeve **200**; distal detent **221** may be configured to temporarily fix surgical blade **100** in a second fixed position **760** relative to outer sleeve **200**; and proximal detent **222** may be configured to temporarily fix surgical blade **100** in a first fixed position **700** relative to outer sleeve **200**. For example, while temporarily fixed in a third fixed position relative to outer sleeve **200**, surgical blade **100** may extend a first distance from outer sleeve distal end **201**. Illustratively, while temporarily fixed in a second fixed position **760** relative to outer sleeve **200**, surgical blade **100** may extend a second distance from outer sleeve distal end **201**, wherein the second distance from outer sleeve distal end **201** may be greater than the first distance from outer sleeve distal end **201**.

[0053] In one or more embodiments, intermediate detent **223** may be configured to temporarily fix surgical blade **100** in a first position relative to outer sleeve **200** wherein surgical blade **100** extends a first distance from outer sleeve distal end **201** and blade **120** has a first exposed blade width. Illustratively, distal detent **221** may be configured to temporarily fix surgical blade **100** in a second position relative to outer sleeve **200** wherein surgical blade **100** extends a second distance from outer sleeve distal end **201** and blade **120** has a second exposed blade width. In one or more embodiments, the second exposed blade width may be greater than the first exposed blade width. For example, a surgeon or a surgeon's assistant may selectively actuate surgical blade **100** from a first position relative to outer sleeve **200** to a second position relative to outer sleeve **200**. Illustratively, while temporarily fixed in the first position relative to outer sleeve **200**, surgical blade **100** may be configured to make a surgical incision, e.g., of a first width, and while temporarily fixed in the second position relative to outer sleeve **200**, surgical blade **100** may be configured to make a surgical incision, e.g., of a second width.

[0054] In one or more embodiments, pressure mechanism **420** may be configured to provide a variable resistive force to resist an actuation of actuation pin **230**. For example, pressure mechanism **420** may be configured to provide a first resistive force with a first magnitude to resist an actuation of actuation pin **230** when actuation pin **230** is in a first position relative to outer sleeve **200**. Illustratively, pressure mechanism **420** may be configured to provide a second resistive force with a second magnitude to resist an actuation of actuation pin **230** when actuation pin **230** is in a second position relative to outer sleeve **200**.

[0055] In one or more embodiments, pressure mechanism **420** may be configured to provide a first resistive force with a first magnitude that resists an egress **710** of actuation pin **230** out of proximal detent **222**. Illustratively, pressure mechanism **420** may be configured to provide a second resistive force with a second magnitude that resists an actuation **730** of actuation pin **230** along actuation channel **225**. In one or more embodiments, the first magnitude of the first resistive force may not be identical to the second magnitude of the second resistive force. For example, the second magnitude of the second resistive force may be greater than the first magnitude of the first resistive force.

[0056] Illustratively, pressure mechanism **420** may be configured to provide a variable resistive force to resist an actuation of actuation pin **230** along actuation channel **225** wherein the magnitude of the variable resistive force increases as actuation pin **230** is actuated from actuation channel proximal end **227** towards actuation channel distal end **226**. In one or more embodiments, pressure mechanism **420** may be configured to provide a variable resistive force to resist an actuation of actuation pin **230** wherein the variable resistive force has a maximum magnitude when actuation pin **230** is located at actuation channel distal end **226**. For example, pressure mechanism **420** may be configured to provide a small resistive force to resist an egress **710** of actuation pin **230** from proximal detent **222** and a large resistive force to resist an egress **810** of actuation pin **230** from distal detent **221**. Illustratively, pressure mechanism **420** may be configured to allow a surgeon or a surgeon's assistant to initiate an actuation of surgical blade **100** from a safe position **500** to a surgical position **600** with a smaller force magnitude, e.g., applied to actuation control apparatus **350**, than a force magnitude that may be required to initiate an actuation of surgical blade **100** from a surgical position **600** to a safe position **500**.

[0057] FIG. **9**A is a schematic diagram illustrating a surgical blade **900**. In one or more embodiments, surgical blade **900** may comprise a blade mount **910** and a blade **920**. Illustratively, blade mount **910** may be configured to support blade **920**. Blade mount **910** may be manufactured from any suitable material, e.g., polymers, metals, metal alloys, etc., or from any combination of suitable materials. Illustratively, blade **920** may be configured to make surgical incisions. Blade **920** comprises a blade distal end **921**, a blade proximal end **922**, and at least one blade edge **923**. Blade **920** may be manufactured from any suitable material, e.g., sapphire, diamond, silicon, polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0058] In one or more embodiments, surgical blade **900** may comprise a surgical incision guide **930**. Illustratively, surgical incision guide **930** may be configured to provide information, e.g., information about a surgical incision. For example, surgical incision guide **930** may be located at a specific distance **940** from blade distal end **921**. Illustratively, a surgeon may compare a location of an outer surface of a tissue with a location of surgical incision guide **930** during a surgical incision, e.g., to provide information about the surgical incision. For example, surgical incision guide **930** may be configured to indicate a surgical incision depth of blade **920** in a tissue. In one or more embodiments, surgical incision guide **930** may be configured to indicate a desired surgical incision depth, e.g., to inform a surgeon that blade **920** is penetrating a tissue at a desirable depth. Illustratively, surgical incision guide **930** may be configured to indicate an undesirable surgical incision depth, e.g., to inform a surgeon that blade **920** is penetrating a tissue at an undesirable depth.

[0059] In one or more embodiments, surgical incision guide **930** may be configured to guide a multi-plane surgical incision. A surgeon may perform a multi-plane incision by initially penetrating a tissue to a first depth with blade **920** oriented at a first angle relative to the tissue and then penetrating the tissue to a second depth with blade **920** oriented at a second angle relative to the tissue. Illustratively, surgical incision guide **930** may be configured to indicate that blade **920** is at an optimal depth within a tissue, e.g., by a comparison of an outer surface of the tissue with a location of surgical incision guide **930**, for a surgeon to change surgical incision planes within the tissue. For example, when a surgeon is performing a multi-plane surgical incision, surgical incision guide **930** may be configured to guide the surgeon to penetrate blade **920** to a first depth in a tissue wherein blade **920** may be orientated at a first angle relative to a plane normal to a portion of the surface of the tissue. After penetrating blade **920** to the first depth in the tissue at the first angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a second angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a second depth in the tissue.

[0060] Illustratively, surgical incision guide **930** may comprise a visual signal configured to differentiate a first portion of blade **920** from a second portion of blade **920**. For example, surgical incision guide **930** may comprise a marking, e.g., a line, on the surface of blade **920**. Illustratively, surgical incision guide **930** may comprise a biocompatible paint or ink. Surgical incision guide **930** may be manufactured by any suitable means for marking a portion of blade **920**. In one or more embodiments, surgical incision guide **930** may be manufactured by etching, e.g., laser etching, a marking on blade **920**. Illustratively, surgical incision guide **930** may be configured to minimize friction, e.g., between blade **920** and a tissue during a surgical procedure. For example, surgical incision guide **930** may be configured to minimize variation in a geometry of a portion of blade **920**.

[0061] In one or more embodiments, blade **920** may comprise information about blade **920**. Illustratively, one or more dimensions of blade **920** may be marked on blade **920**, e.g., by laser etching or by biocompatible paint or ink, or by any other suitable means. For example, a blade **920** with a width of, e.g., 2.0 mm, may have the numbers and distance units "2.0 mm" marked on a portion of blade **920**. Illustratively, a blade **920** with a width of, e.g., 2.0 mm, may have the numbers "2.0" or the number "2" marked on a portion of blade **920**.

[0062] In one or more embodiments, blade **920** may comprise information about a location of surgical incision guide **930** on blade **920**. Illustratively, information about a location of surgical incision guide **930** may be marked on blade **920**, e.g., by laser etching or by biocompatible paint or ink, or by any other suitable means. For example, a distance between a location of surgical incision guide **930** and blade distal end **921** may be marked on a portion of blade **920**. Illustratively, if a distance between surgical incision guide **930** and blade distal end **921** is, e.g., 0.25 mm, the numbers and the distance units "0.25 mm" may be marked on a portion of blade **920**. For example, if a distance between surgical incision guide **930** and blade distal end **921** is, e.g., 0.25 mm, the numbers "0.25" or the number "0.25" may be marked on a portion of blade **920**.

[0063] FIG. 9B is a schematic diagram illustrating a surgical blade **901**. In one or more embodiments, surgical blade **901** may comprise a first surgical incision guide **950** and a second surgical incision guide **951**. Illustratively, first surgical incision guide **950** may be located at a first specific distance **960** from blade distal end **921**. In one or more embodiments, second surgical incision guide **951** may be located at a second specific distance **961** from first surgical incision guide **950**.

[0064] Illustratively, first surgical incision guide **950** and second surgical incision guide **951** may be configured to provide information, e.g., information about a surgical incision. For example, first surgical incision guide **950** and second surgical incision guide **951** may be configured to indicate a safe or desirable range of surgical penetration depths. Illustratively, a surgeon may need to penetrate blade **920** at least a required depth in a particular tissue, but also need to not penetrate blade **920** more than an undesirable depth in the particular tissue. In one or more embodiments, first surgical incision guide **950** may be configured to indicate a required surgical penetration depth and second surgical incision guide **951** may be configured to indicate an undesirable surgical penetration depth in a particular tissue.

[0065] In one or more embodiments, first surgical incision guide **950** and second surgical incision guide **951** may be configured to guide a multi-plane surgical incision. Illustratively, first surgical incision guide **950** may be configured to indicate that blade **920** is at a first optimal depth within a tissue, e.g., by a comparison of an outer surface of the tissue with a location of first surgical incision guide **950**, for a surgeon to change surgical incision planes within the tissue. In one or more embodiments, second surgical incision guide **951** may be configured to indicate that blade **920** is at a second optimal depth within a tissue for the surgeon to change surgical incision planes within the tissue.

[0066] For example, when a surgeon is performing a multi-plane surgical incision, first surgical incision guide **950** may be configured to guide the surgeon to penetrate blade **920** to a first depth in a tissue wherein blade **920** may be orientated at a first angle relative to a plane normal to a portion of the surface of the tissue. After penetrating blade **920** to the first depth in the tissue at the first angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a second angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a second depth in the tissue. Illustratively, second surgical incision guide **951** may be configured to guide the surgeon to penetrate blade **920** to a second depth in the tissue wherein blade **920** may be oriented at a second angle relative to the plane normal to the portion of the surface of the tissue. After penetrating blade **920** to the second depth in the tissue at the second angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a third angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a third depth in the tissue.

[0067] FIG. **9**C is a schematic diagram illustrating a surgical blade **902**. In one or more embodiments, surgical blade **902** may comprise a first surgical incision guide **970**, a second surgical incision guide **971**, and a third surgical incision guide **972**. Illustratively, first surgical incision guide **970** may be located at a first specific distance **980** from blade distal end **921**. In one or more embodiments, second surgical incision guide **971** may be located at a second specific distance **981** from first surgical incision guide **970**. Illustratively, third surgical incision guide **972** may be located at a third specific distance **982** from second surgical incision guide **971**.

[0068] In one or more embodiments, first surgical incision guide **970**, second surgical incision guide **971**, and third surgical incision guide **972** may be configured to guide a multi-plane surgical incision. Illustratively, first surgical incision guide **970** may be configured to indicate that blade **920** is at a first optimal depth within a tissue, e.g., by a comparison of an outer surface of the tissue with a location of first surgical incision guide **970**, for a surgeon to change surgical incision planes within the tissue. In one or more embodiments, second surgical incision guide **971** may be configured to indicate that blade **920** is at a second optimal depth within a tissue for the surgeon to change surgical incision planes within the tissue. Illustratively, third surgical incision guide **972** may be configured to indicate that blade **920** is at a third optimal depth within a tissue for the surgeon to change surgical incision planes within the tissue.

[0069] For example, when a surgeon is performing a multi-plane surgical incision, first surgical incision guide **970** may be configured to guide the surgeon to penetrate blade **920** to a first depth in a tissue wherein blade **920** may be orientated at a first angle relative to a plane normal to a portion of the surface of the tissue. After penetrating blade **920** to the first depth in the tissue at the first angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a second angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a second depth in the tissue. Illustratively, second surgical incision guide **971** may be configured to guide the surgeon to penetrate blade **920** to a second depth in the tissue wherein blade **920** may be oriented at a second angle relative to the plane normal to the portion of the surface of the tissue. After penetrating blade **920** to the second depth in the tissue at the second angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a third angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a third depth in the tissue. Illustratively, third surgical incision guide **972** may be configured to guide the surgeon to penetrate blade **920** to a third depth in the tissue wherein blade **920** may be oriented at a third angle relative to the plane normal to the portion of the surface of the tissue. After penetrating blade **920** to the third depth in the tissue at the third angle relative to the plane normal to the portion of the surface of the tissue, the surgeon may adjust an orientation of blade **920** to a fourth angle relative to the plane normal to the portion of the surface of the tissue, and then the surgeon may penetrate blade **920** to a fourth depth in the tissue.

[0070] FIG. **10**A is a schematic diagram illustrating a surgical blade **1000**. In one or more embodiments, surgical blade **1000** may comprise a blade mount **1010** and a blade **1020**. Illustratively, blade mount **1010** may be configured to support blade **1020**. Blade mount **1010** may be manufactured from any suitable material, e.g., polymers, metals, metal alloys, etc., or from any combination of suitable materials. Illustratively, blade **1020** may be configured to make surgical incisions. Blade **1020** comprises a blade distal end **1021**, a blade proximal end **1022**, and at least one blade edge **1023**. Blade **1020** may be manufactured from any suitable material, e.g., sapphire, diamond, silicon, polymers, metals, metal alloys, etc., or from any combination of suitable materials.

[0071] In one or more embodiments, surgical blade **1000** may comprise a universal surgical incision guide **1030**. Illustratively, universal surgical incision guide **1030** may comprise a plurality of surgical guide marks configured to provide information, e.g., information about a surgical incision. For example, a plurality of surgical guide marks of universal surgical incision guide **1030** may be located on blade **1020** at discrete distances from blade distal end **1021** and the plurality of surgical guide marks of universal surgical incision guide **1030** may be configured to indicate a surgical incision depth in a tissue. Illustratively, a first surgical guide mark of universal surgical incision guide **1030** may be located, e.g., 0.5 mm from blade distal end **1021**; a second surgical guide mark of universal surgical incision guide **1030** may be located, e.g., 1.0 mm from blade distal end **1021**; a third surgical guide mark of universal surgical incision guide **1030** may be located, e.g., 1.5 mm from blade distal end **1021**; a fourth surgical guide mark of universal surgical incision guide **1030** may be located, e.g., 2.0 mm from blade distal end **1021**, etc. In one or more embodiments, universal surgical incision guide **1030** may be configured to guide a multi-plane surgical incision. For example, one or more surgical guide marks of universal surgical incision guide **1030** may be configured to indicate an optimal depth within a tissue for a surgeon to adjust a surgical incision plane within the tissue. Illustratively, universal surgical incision guide **1030** may be configured to train a surgeon, e.g., to correctly perform a multi-plane surgical incision.

[0072] In one or more embodiments, blade **1020** may comprise information about blade **1020**. Illustratively, one or more dimensions of blade **1020** may be marked on blade **1020**, e.g., by laser etching or by biocompatible paint or ink, or by any other suitable means. For example, a blade **1020** with a width of, e.g., 2.0 mm, may have the numbers and distance units "2.0 mm" marked on a portion of blade **1020**. Illustratively, a blade **1020** with a width of, e.g., 2.0 mm, may have the numbers "2.0" or the number "2" marked on a portion of blade **1020**.

[0073] In one or more embodiments, blade **1020** may comprise information about a location of one or more surgical guide marks of surgical incision guide **1030** on blade **1020**. Illustratively, information about a location of one or more surgical guide marks of surgical incision guide **1030** may be marked on blade **1020**, e.g., by laser etching or by biocompatible paint or ink, or by any other suitable means. For example, a distance between a location of one or more surgical guide marks of surgical incision guide **1030** and blade distal end **1021** may be marked on a portion of blade **1020**.

[0074] In one or more embodiments, if a distance between a first surgical guide mark of surgical incision guide **1030** and blade distal end **1021** is, e.g., 0.5 mm, the numbers and the distance units "0.5 mm" may be marked on a portion of blade **1020**. For example, if a distance between a first surgical guide mark of surgical incision guide **1030** and blade distal end **1021** is, e.g., 0.5 mm, the numbers "0.5" or the number "0.5" may be marked on a portion of blade **1020**. Illustratively, if a distance between a second surgical guide mark of surgical incision guide **1030** and blade distal end **1021** is, e.g., 1.0 mm, the numbers and the distance units "1.0 mm" may be marked on a portion of blade **1020**. For example, if a distance between a second surgical guide mark of surgical incision guide **1030** and blade distal end **1021** is, e.g., 1.0 mm, the numbers "1.0" or the number "1" may be marked on a portion of blade **1020**.

[0075] FIG. **10**B is a schematic diagram illustrating a surgical blade **1001**. In one or more embodiments, surgical blade **1001** may comprise a universal surgical incision guide **1040**. Illustratively, universal surgical incision guide **1040** may comprise a plurality of surgical guide marks configured to provide information, e.g., information about a surgical incision. For example, a plurality of surgical guide marks of universal surgical incision guide **1040** may be located on blade **1020** at discrete distances from blade distal end **1021** and the plurality of surgical guide marks of universal surgical incision guide **1040** may be configured to indicate a surgical incision depth in a tissue. Illustratively, a first surgical guide mark of universal surgical incision guide **1040** may be located, e.g., 0.25 mm from blade distal end **1021**; a second surgical guide mark of universal surgical incision guide **1040** may be located, e.g., 0.5 mm from blade distal end **1021**; a third surgical guide mark of universal surgical incision guide **1040** may be located, e.g., 0.75 mm from blade distal end **1021**; a fourth surgical guide mark of universal surgical incision guide **1040** may be located, e.g., 1.0 mm from blade distal end **1021**, etc. In one or more embodiments, universal surgical incision guide **1040** may be configured to guide a multi-plane surgical incision. For example, one or more surgical guide marks of universal surgical incision guide **1040** may be configured to indicate an optimal depth within a tissue for a surgeon to adjust a surgical incision plane within the tissue.

[0076] The foregoing description has been directed to particular embodiments of this invention. It will be apparent; however, that other variations and modifications may be made to the described embodiments, with the attainment of some or all of their advantages. Specifically, it should be noted that the principles of the present invention may be implemented in any instrument regardless of the instrument's purpose or use. Furthermore, while this description has been written in terms of an ophthalmic surgical blade, the teachings of the present invention are equally suitable to any instrument where the functionality of the invention may be employed. Therefore, it is the object of the appended claims to cover all such variations and modifications as come within the true spiry it and scope of the invention.

What is claimed is:

1. An instrument comprising:

an outer sleeve of the instrument having an outer sleeve distal end and an outer sleeve proximal end;

an actuation guide of the outer sleeve having a distal detent and a proximal detent;

an actuation channel of the actuation guide having an actuation channel distal end and an actuation channel proximal end;

an outer sleeve proximal core of the outer sleeve having an actuation pin access port and a pressure mechanism distal interface;

an outer sleeve distal core of the outer sleeve wherein the outer sleeve distal core is disposed between the outer sleeve distal end and the outer sleeve proximal core and wherein the outer sleeve proximal core is disposed between the outer sleeve proximal end and the outer sleeve distal core;

an inner handle of the instrument having an inner handle distal end and an inner handle proximal end;

a pressure mechanism foundation of the inner handle;

an inner handle base of the inner handle;

a distal outer sleeve interface of the inner handle having a pressure mechanism proximal interface, a distal actuation guide, and an actuation pin wherein the distal outer sleeve interface is disposed between the pressure mechanism foundation and the inner handle base;

a proximal outer sleeve interface of the inner handle having a proximal actuation guide and an actuation control apparatus interface;

an actuation control apparatus of the inner handle wherein the proximal outer sleeve interface is disposed between the actuation control apparatus and the inner handle base;

a blade mount having a blade mount distal end and a blade mount proximal end, the blade mount fixed to the inner handle;

a blade having a blade distal end, a blade proximal end, and at least one blade edge wherein the blade is disposed in the blade mount; and

a pressure mechanism having a pressure mechanism distal end and a pressure mechanism proximal end, the pressure mechanism is disposed over the pressure mechanism foundation of the inner handle wherein the pressure mechanism proximal end abuts the pressure mechanism proximal interface of the inner handle and the pressure mechanism distal end abuts the pressure mechanism distal interface of the outer sleeve and wherein the distal outer sleeve interface is disposed in the outer sleeve proximal core wherein the actuation pin is disposed in the actuation guide.

2. The instrument of claim **1** further comprising:

a first surgical incision guide of the blade; and

a second surgical incision guide of the blade.

3. The instrument of claim **2** wherein the first surgical incision guide and the second surgical incision guide are configured to indicate a range of surgical penetration depths of the blade in a tissue.

4. The instrument of claim **2** wherein the first surgical incision guide and the second surgical incision guide are configured to guide a multi-plane surgical incision in a tissue.

5. The instrument of claim **2** further comprising:

a third surgical incision guide of the blade.

6. The instrument of claim **5** wherein the first surgical incision guide, the second surgical incision guide, and the third surgical incision guide are configured to guide a multi-plane incision in a tissue.

7. The instrument of claim **1** wherein the pressure mechanism is a spring.

8. The instrument of claim **7** wherein the pressure mechanism has a spring constant in a range of 0.01 N/mm to 5.0 N/mm.

9. The instrument of claim **7** wherein the pressure mechanism has a spring constant of less than 0.01 N/mm.

10. The instrument of claim **7** wherein the pressure mechanism has a spring constant of greater than 5.0 N/mm.

11. The instrument of claim **1** wherein the pressure mechanism is a pneumatic system.

12. The instrument of claim **1** wherein the pressure mechanism is configured to provide a force.

13. The instrument of claim **12** wherein the force is configured to resist an actuation of the actuation pin.

14. The instrument of claim **12** wherein the force is configured to facilitate an actuation of the actuation pin.

15. The instrument of claim **1** further comprising:

an ergonomic surgical safety grip of the outer sleeve.

16. The instrument of claim **15** further comprising:

a plurality of grip points wherein each grip point of the plurality of grip points is configured to increase a total contact area between a surgeon's fingertip and the ergonomic surgical safety grip.

17. The instrument of claim **1** further comprising:

a blade indication signal of the actuation control apparatus.

18. The instrument of claim **17** wherein the blade indication signal is configured to visually indicate a length of the blade.

19. The instrument of claim **17** wherein the blade indication signal is configured to visually indicate a width of the blade.

20. The instrument of claim **17** wherein the blade indication signal is configured to visually indicate s geometry of the blade.

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