US010385689B1

(12) **United States Patent**
Sollami

(10) **Patent No.: US 10,385,689 B1**
(45) **Date of Patent: Aug. 20, 2019**

(54) **BIT HOLDER**

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(73) Assignee: **The Sollami Company**, Herrin, IL (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/928,269**

(22) Filed: **Mar. 22, 2018**

Related U.S. Application Data

(63) Continuation-in-part of application No. 14/512,581, filed on Oct. 13, 2014, now Pat. No. 10,072,501, which is a continuation-in-part of application No. 12/870,289, filed on Aug. 27, 2010, now Pat. No. 8,622,482, application No. 15/928,269, filed on Mar. 22, 2018, which is a continuation-in-part of application No. 15/708,292, filed on Sep. 19, 2017, which is a continuation of application No. 14/628,482, filed on Feb. 23, 2015, now Pat. No. 9,879,531, application No. 15/928,269, filed on Mar. 22, 2018, which is a continuation-in-part of application No. 14/959,551, filed on Dec. 4, 2015, application No. 15/928,269, filed on Mar. 22, 2018, which is a continuation-in-part of application No. 15/699,504, filed on Sep. 8, 2017, which is a continuation-in-part of application No. 14/959,551, filed on Dec. 4, 2015, application No. 15/928,269, filed on Mar. 22, 2018, which is a continuation-in-part of application No. 14/690,679, filed on Apr. 20, 2015.

(60) Provisional application No. 61/891,683, filed on Oct. 16, 2013, provisional application No. 61/944,646, filed on Feb. 26, 2014, provisional application No.
(Continued)

(51) **Int. Cl.**
E21C 35/19 (2006.01)
E21C 35/18 (2006.01)
E21C 35/197 (2006.01)

(52) **U.S. Cl.**
CPC ***E21C 35/18*** (2013.01); ***E21C 35/197*** (2013.01); *E21C 35/19* (2013.01); *E21C 2035/1826* (2013.01)

(58) **Field of Classification Search**
CPC E21C 35/18; E21C 35/183; E21C 35/187; E21C 35/19; E21C 35/1933; E21C 35/1936; E21C 35/193; E21C 35/197; E21C 2035/191
USPC 299/79.1, 81.1, 81.3, 102–111, 113
See application file for complete search history.

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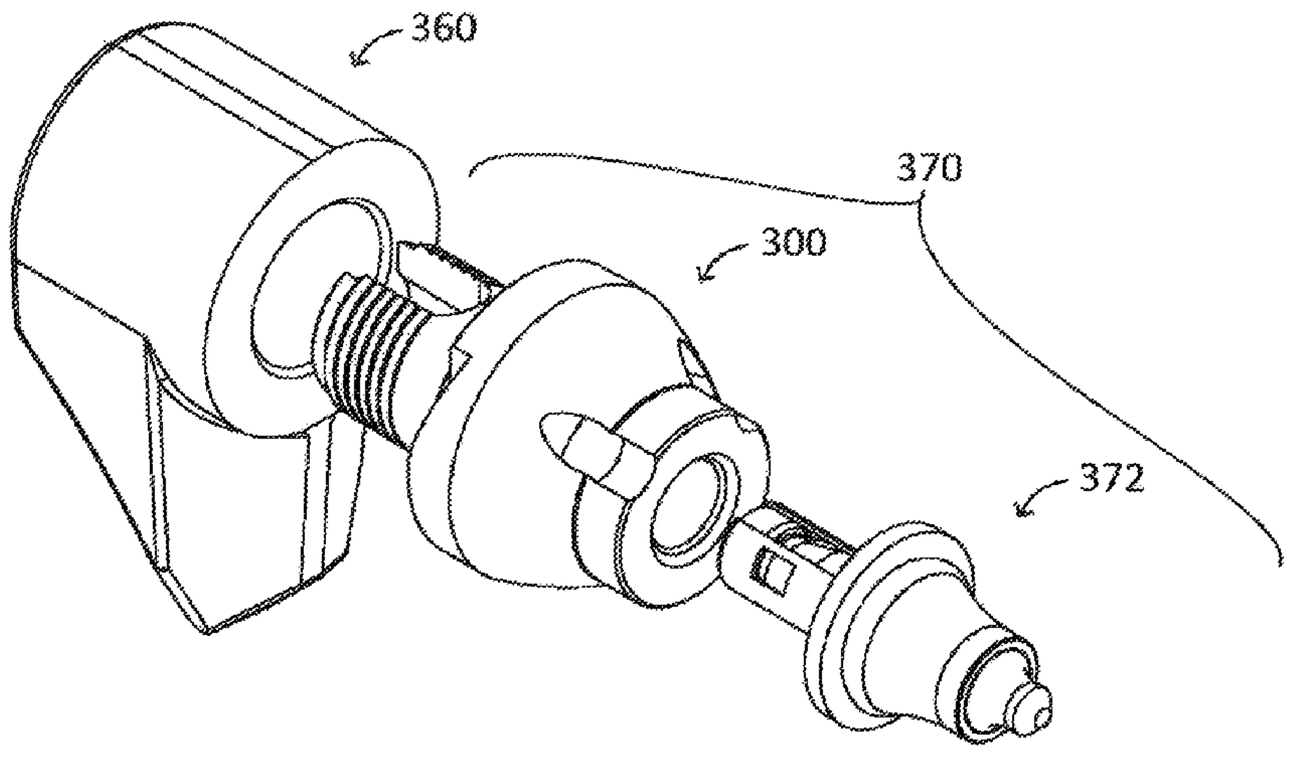
(74) *Attorney, Agent, or Firm* — Mercedes V. O'Connor; Rockman Videbeck & O'Connor

(57) **ABSTRACT**

A unitary bit/holder and/or a bit holder including a body portion and a shank. The body portion and the shank being coaxial and including a bore extending from a forward end of the body portion to the distal end of the shank. The shank further including a segment adjacent a distal end of the shank that includes a plurality of ribs and at least one notch or relief zone between each rib in the plurality of ribs.

17 Claims, 22 Drawing Sheets



Related U.S. Application Data

62/100,764, filed on Jan. 7, 2015, provisional application No. 61/983,291, filed on Apr. 23, 2014.

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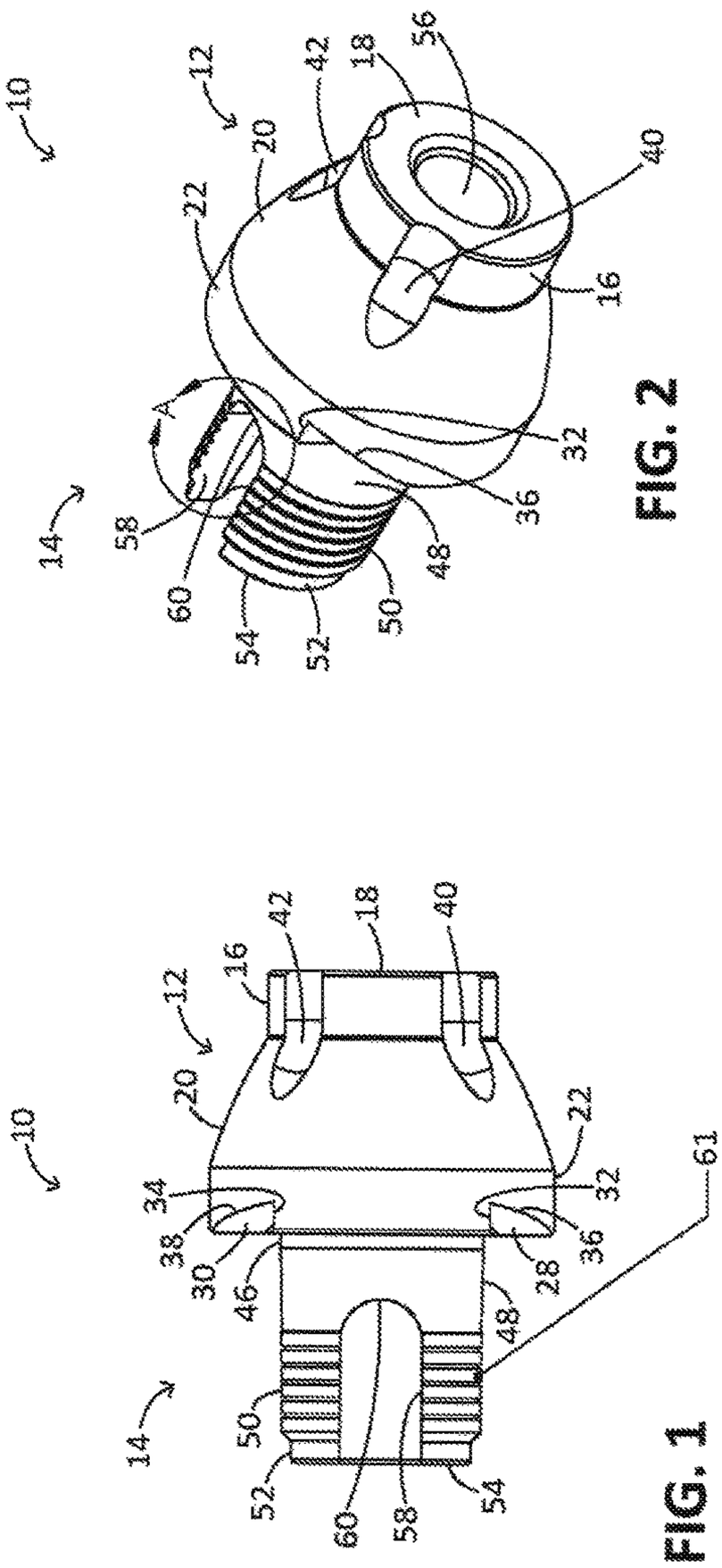


FIG. 1

FIG. 2

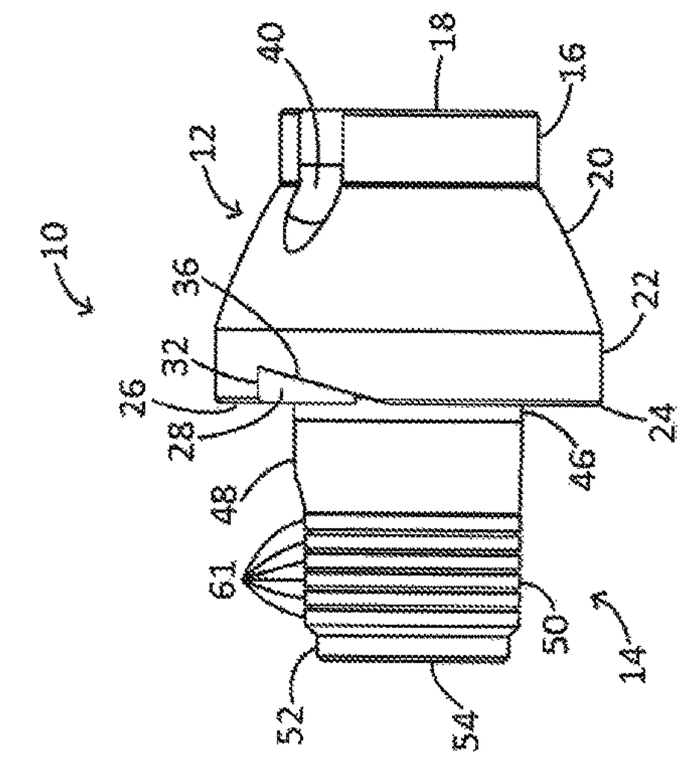


FIG. 3

FIG. 4

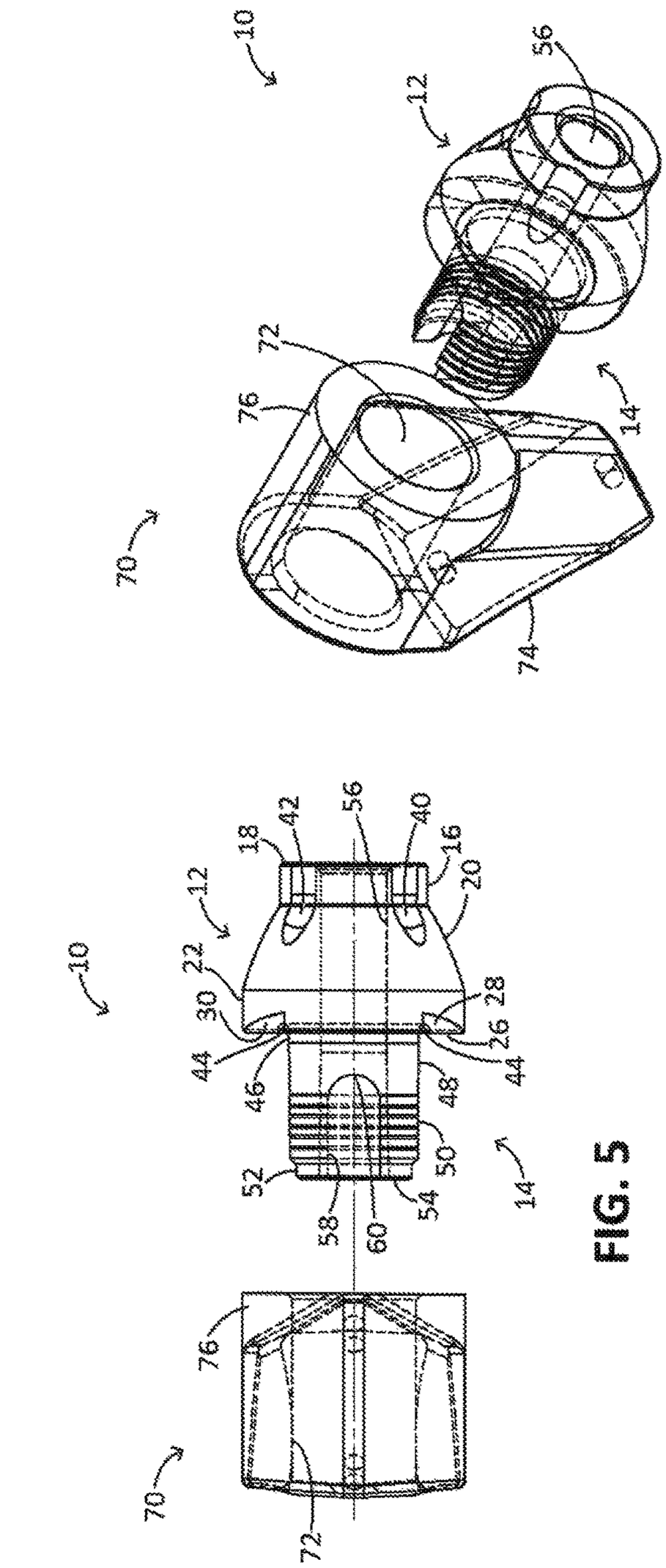
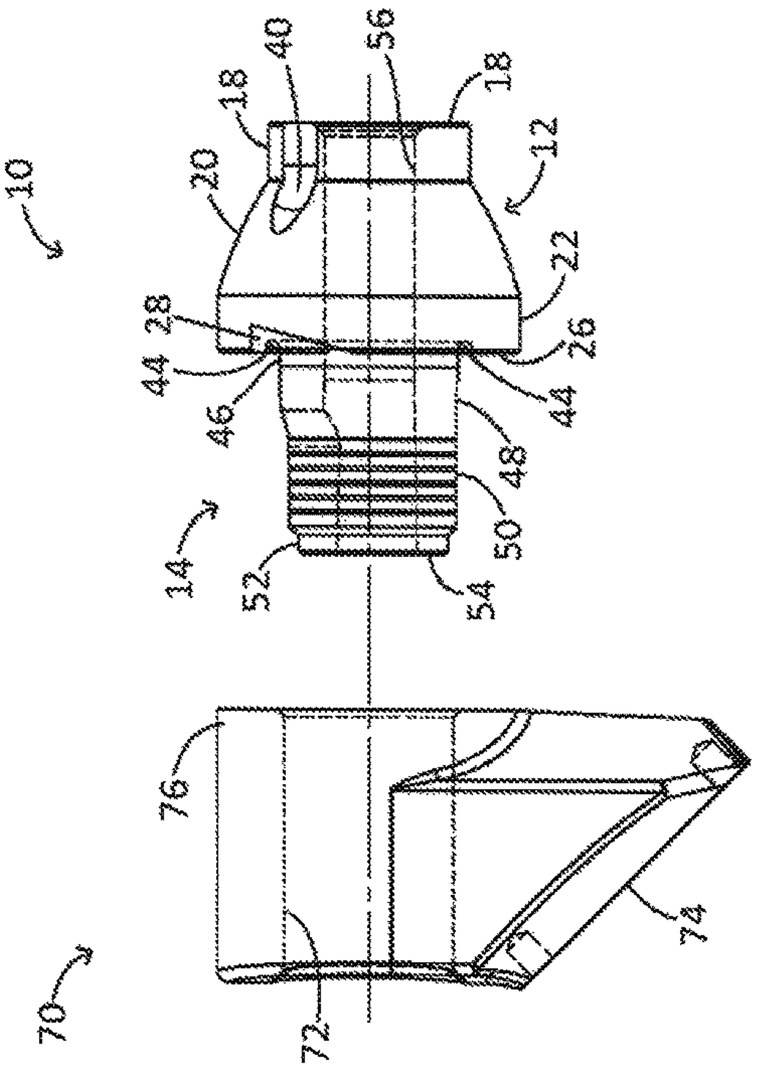


FIG. 7

FIG. 5



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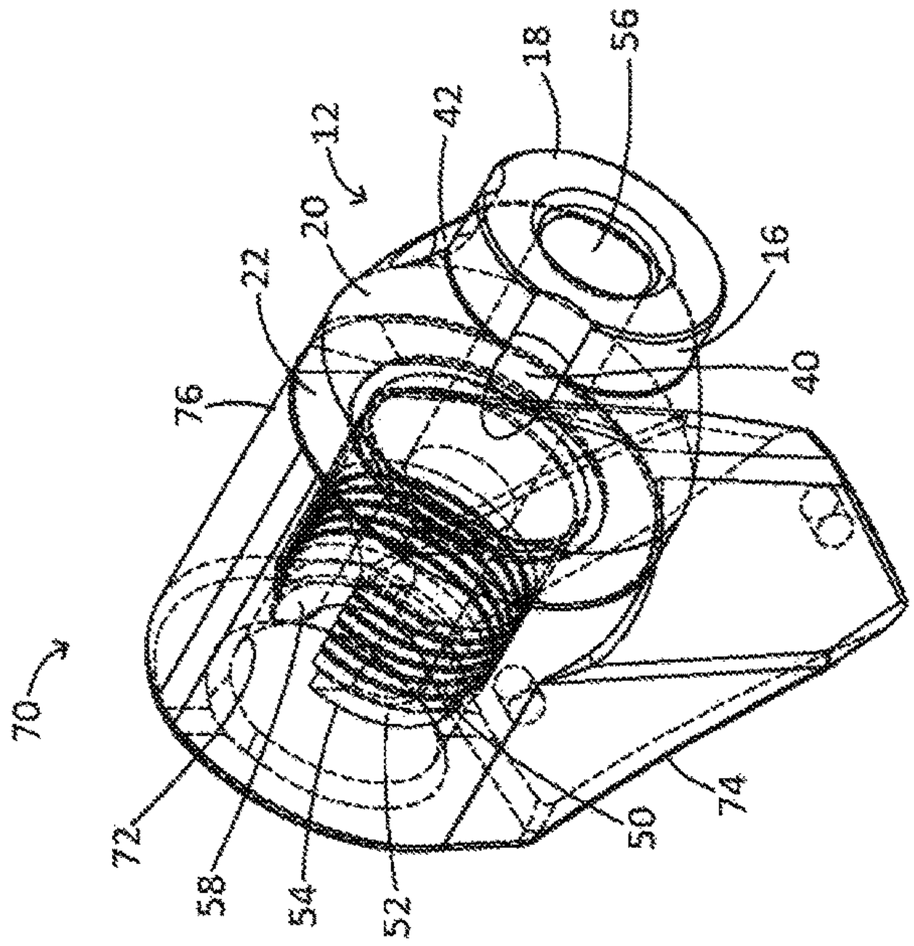

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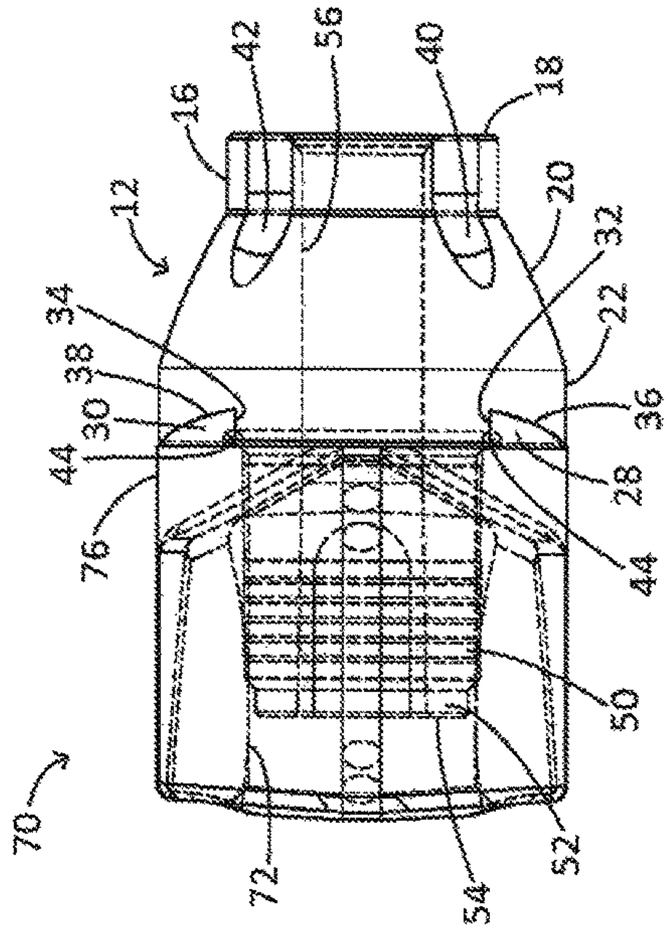

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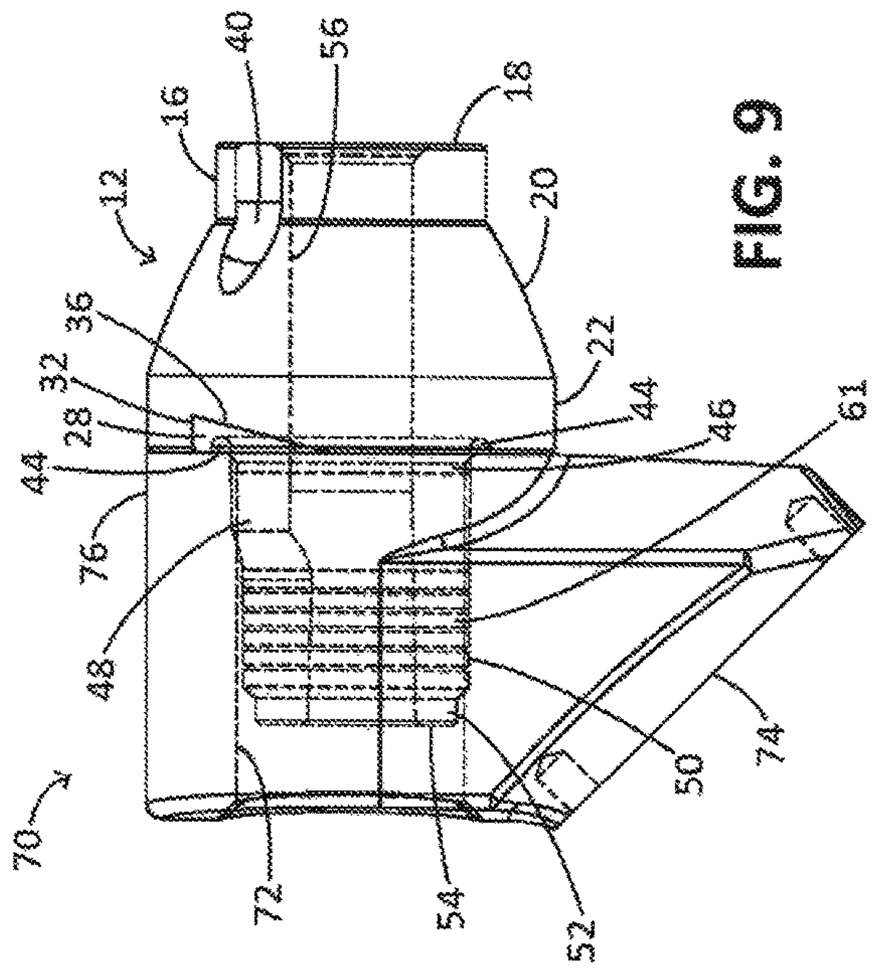

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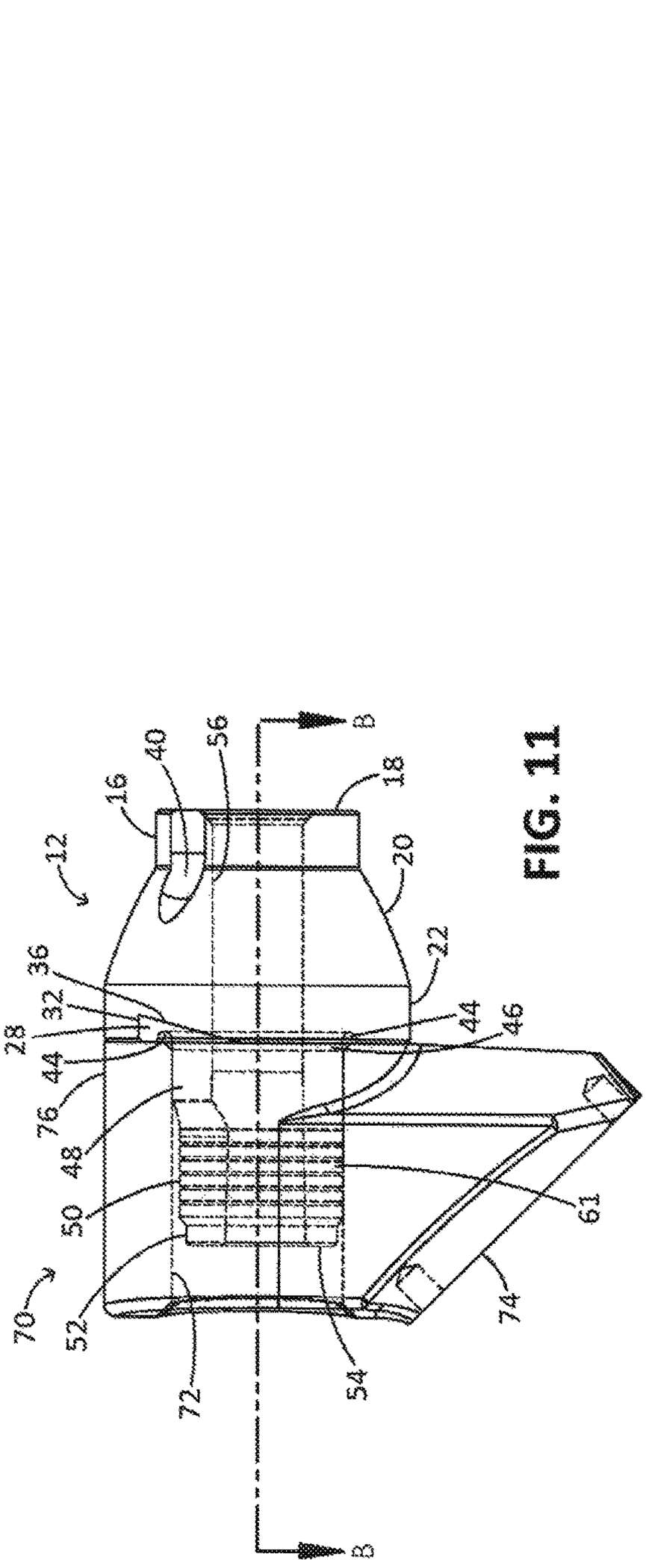
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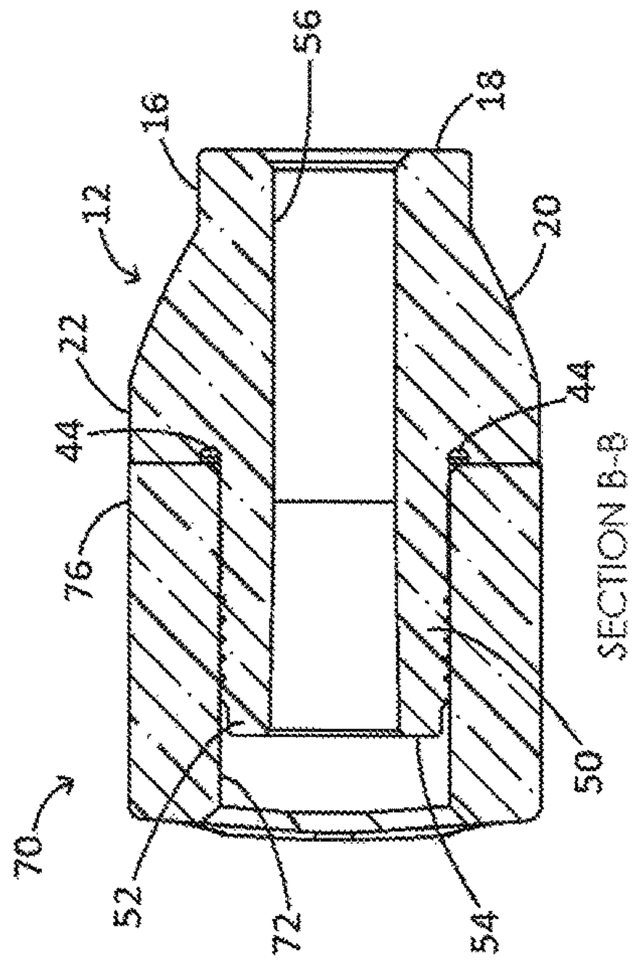
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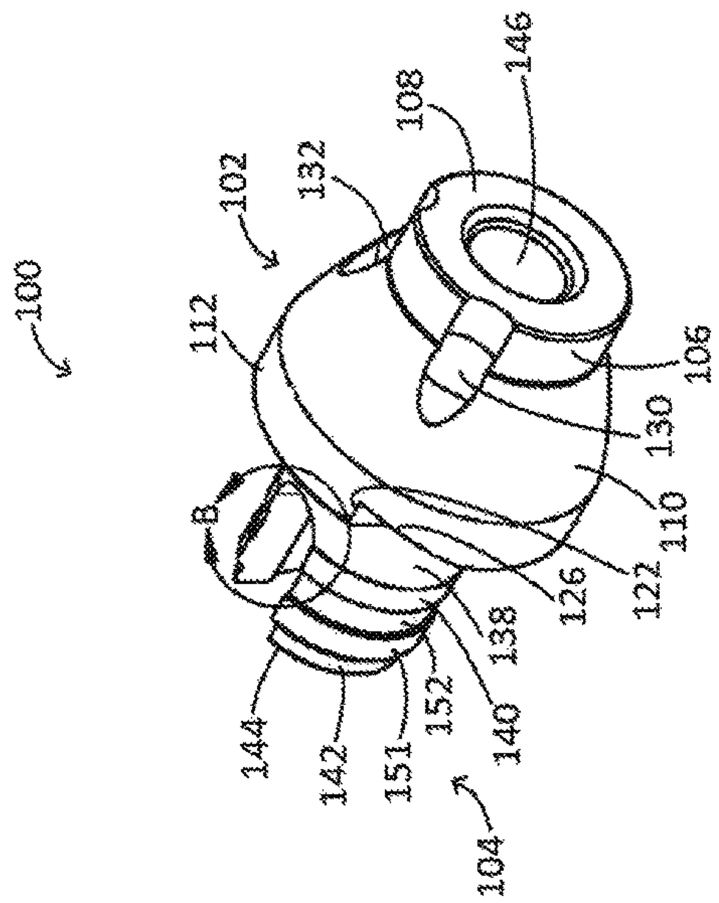
SECTION B-B

FIG. 12



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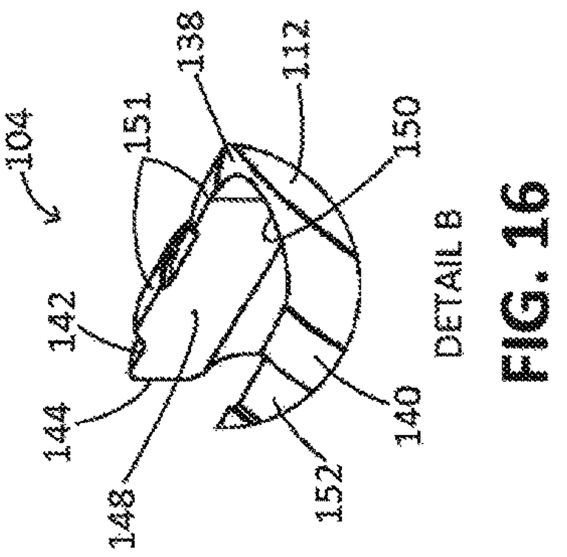

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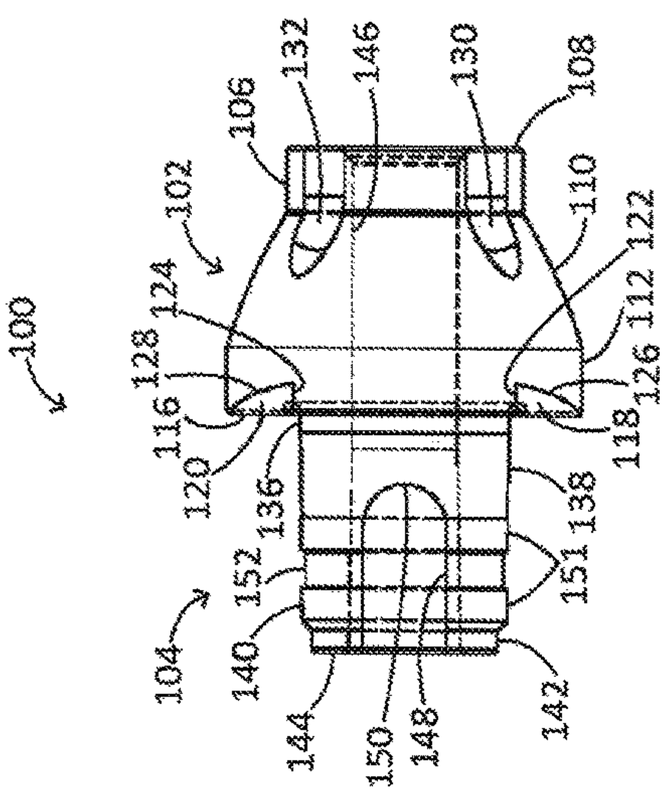

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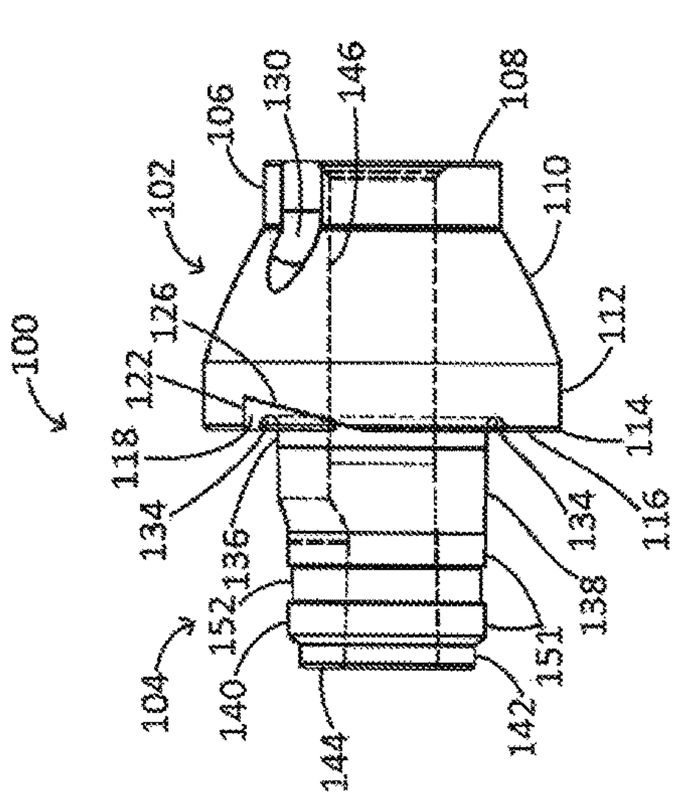

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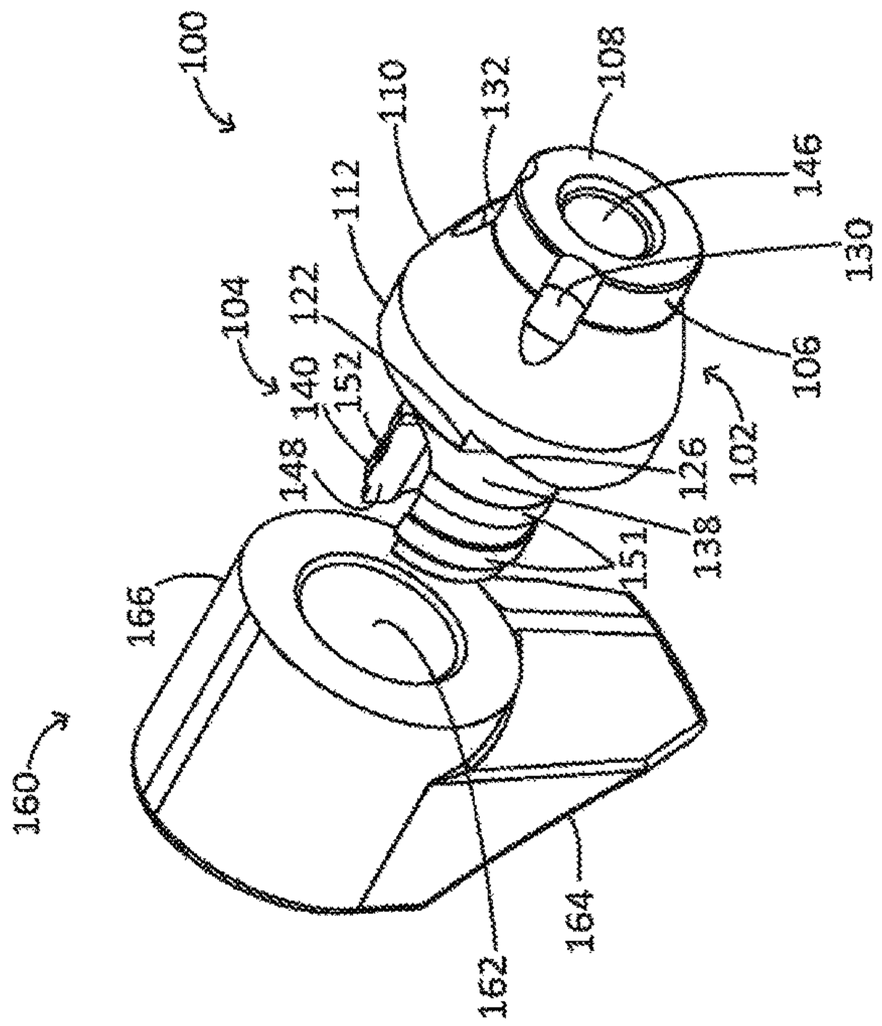

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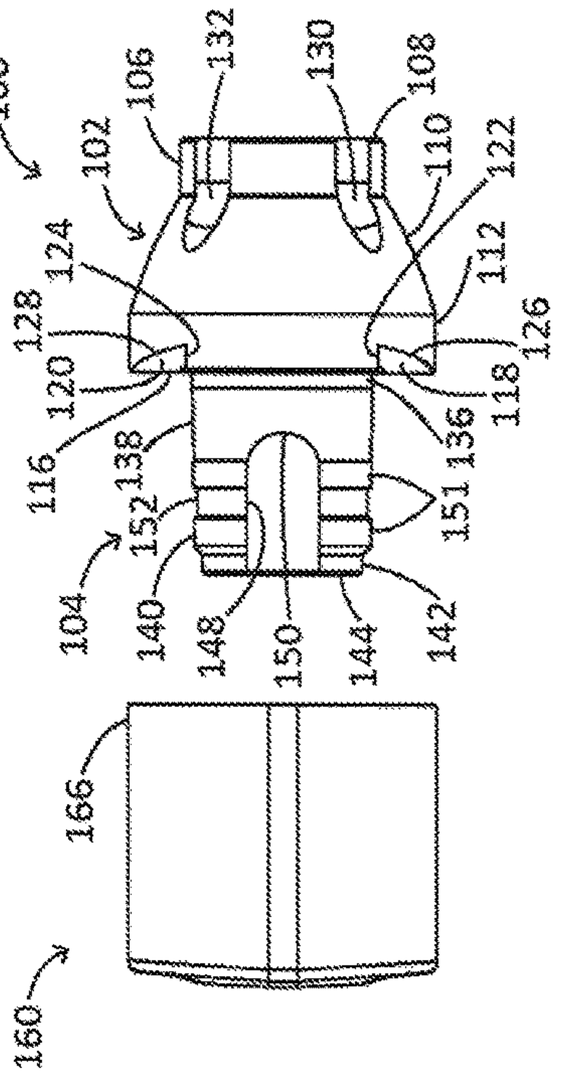

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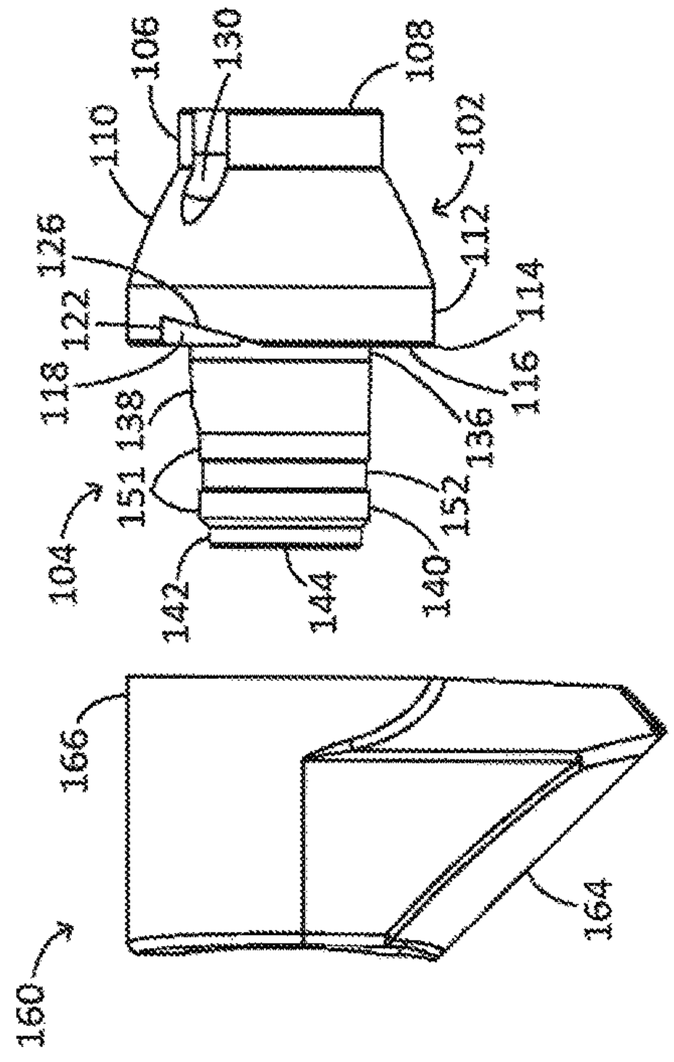

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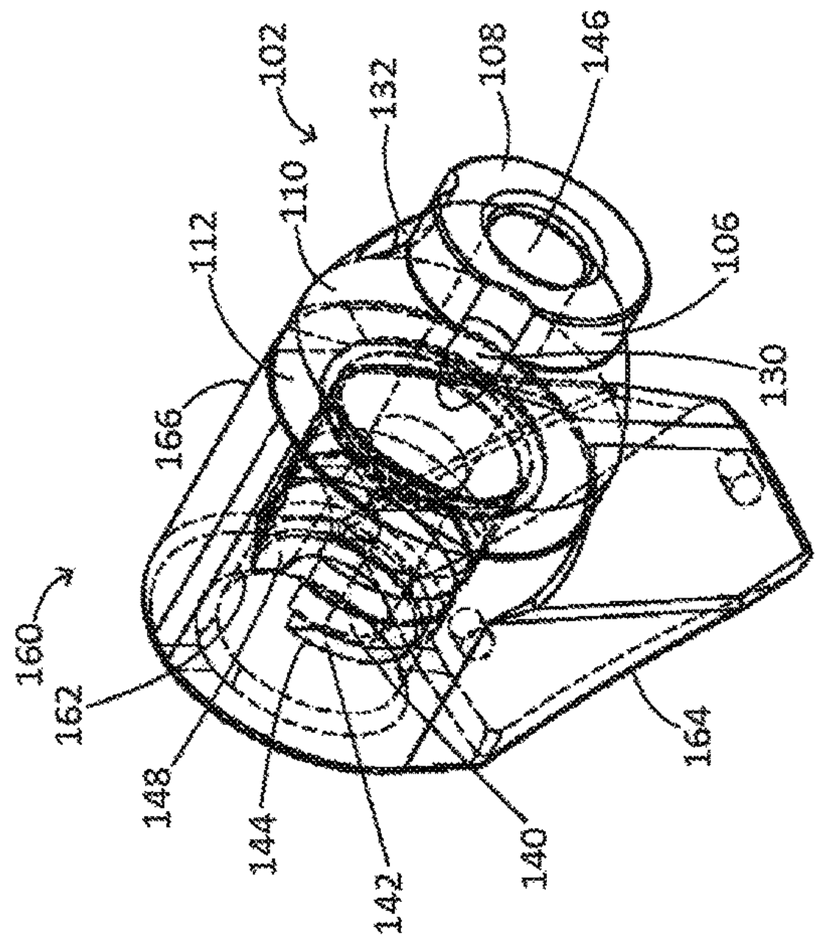

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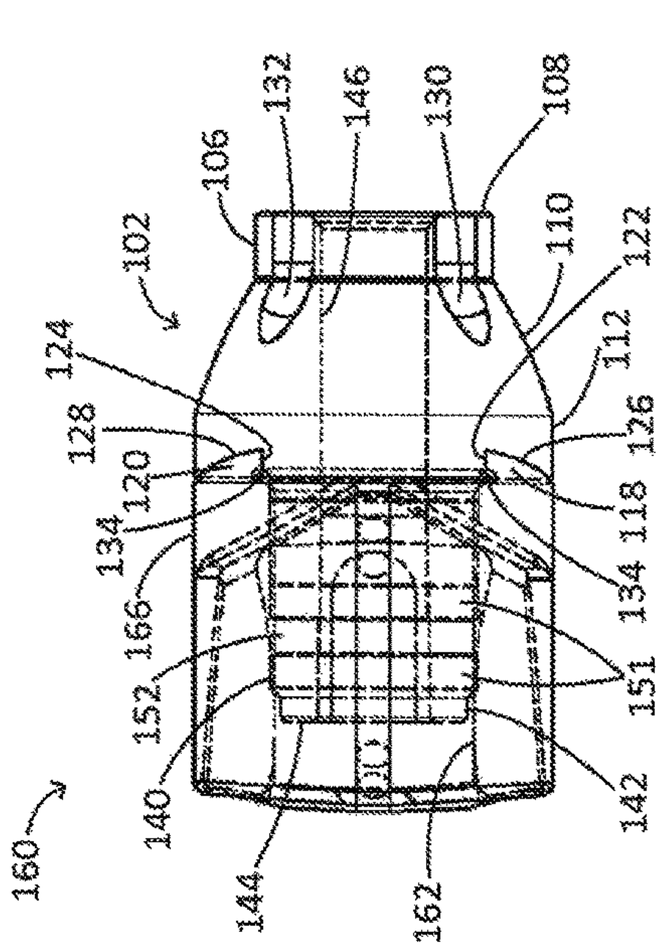

FIG. 20

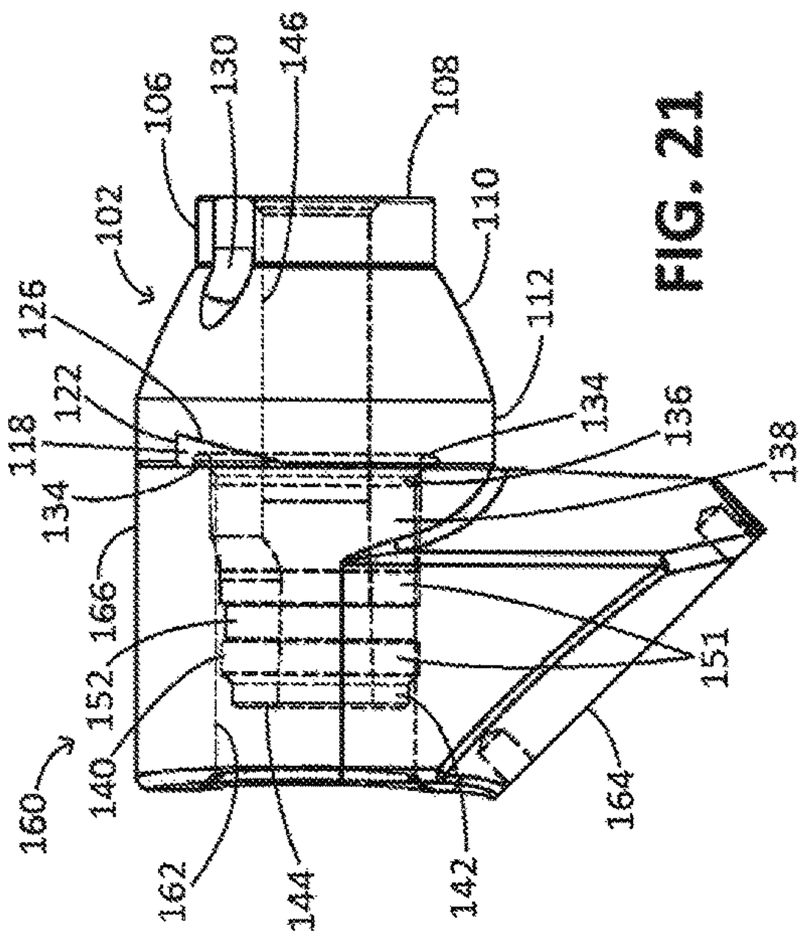

FIG. 21

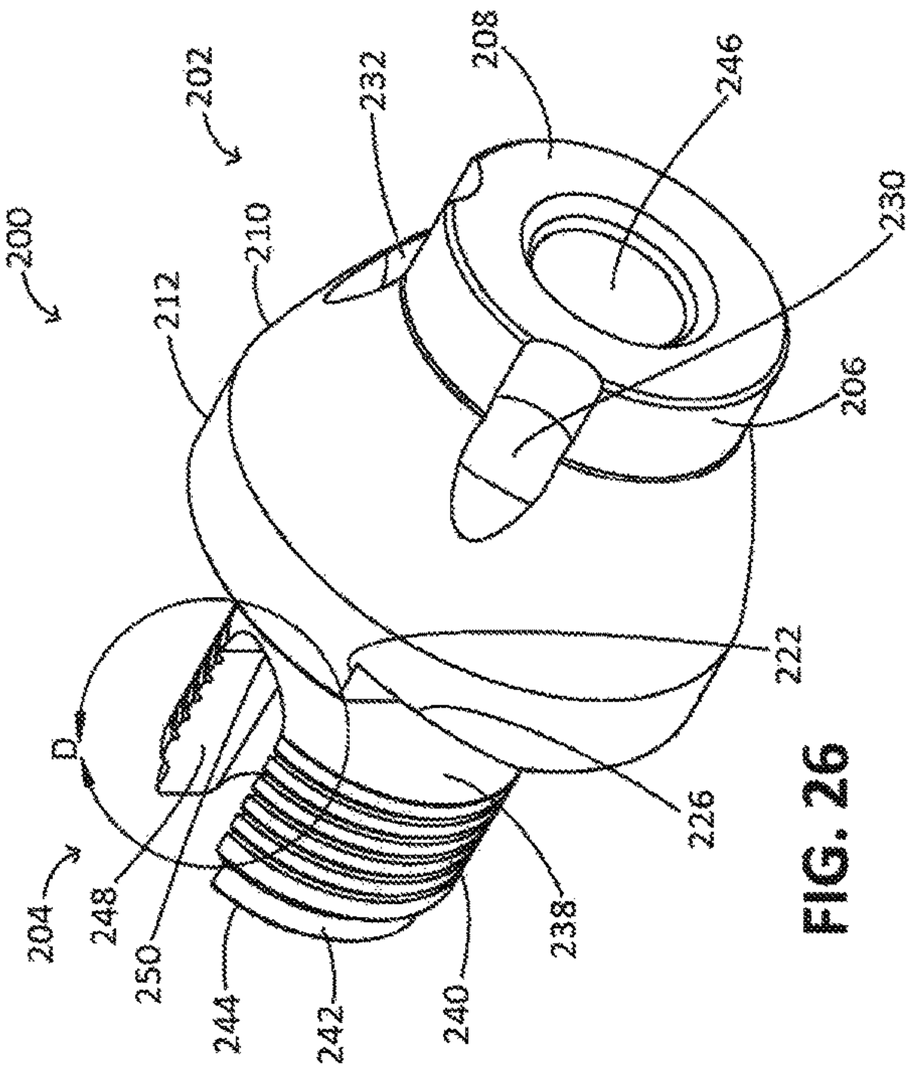

FIG. 23

FIG. 26

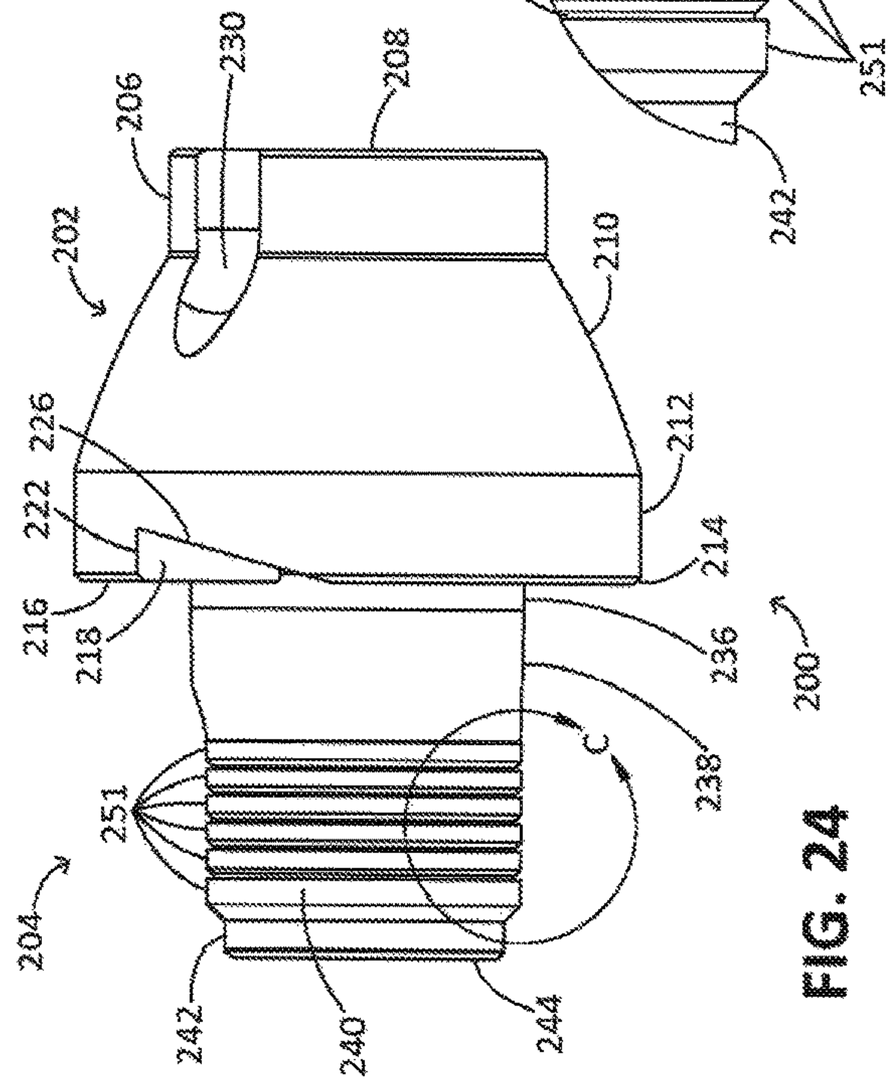

FIG. 24

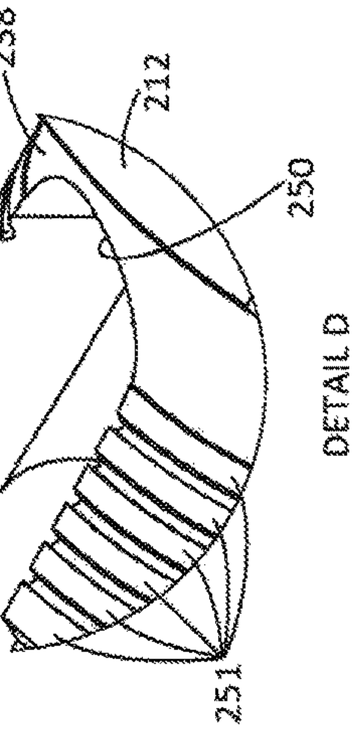

FIG. 27

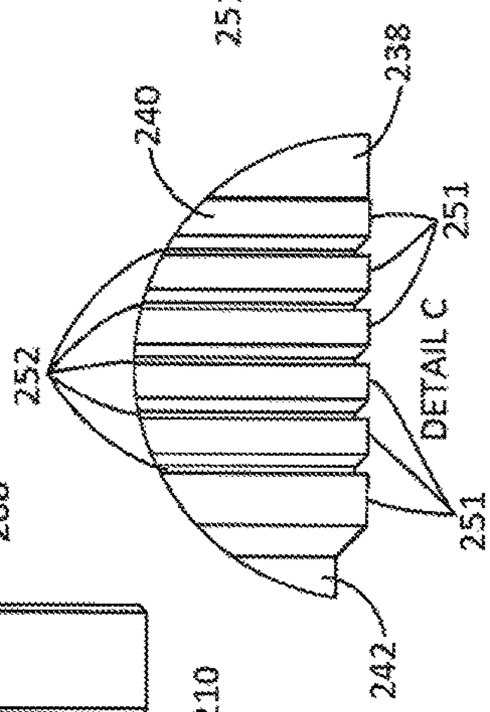

FIG. 25

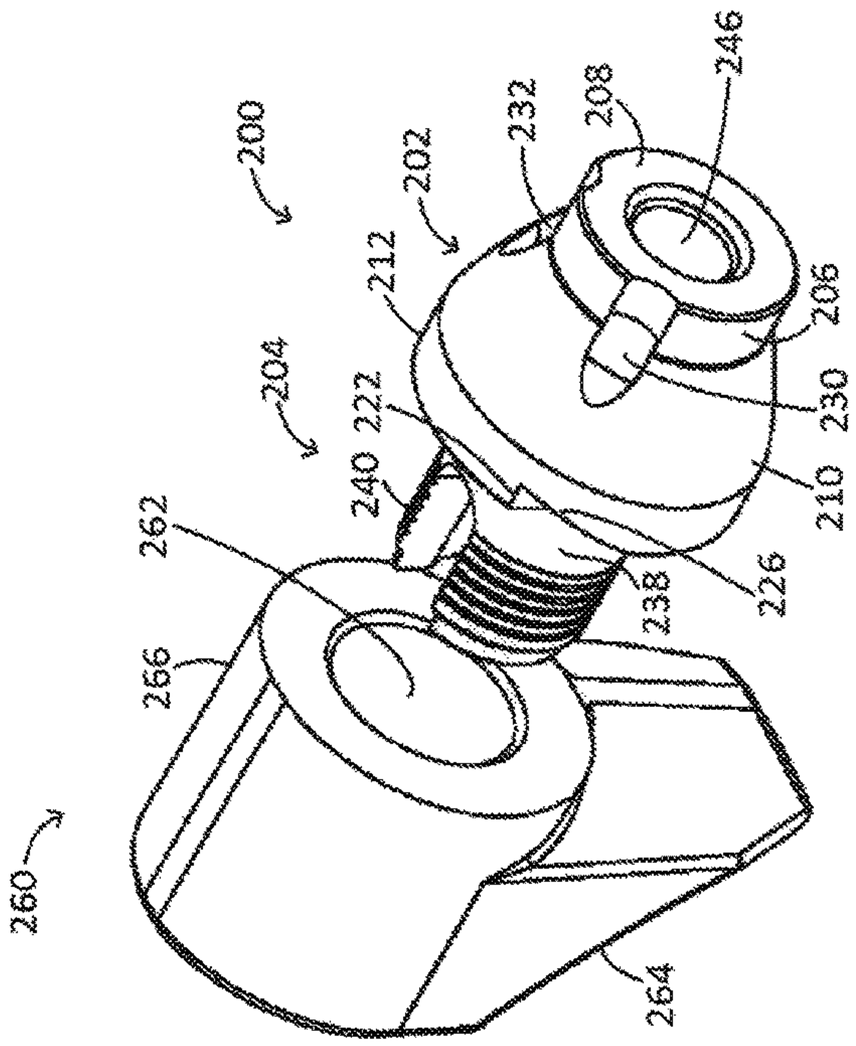

FIG. 30

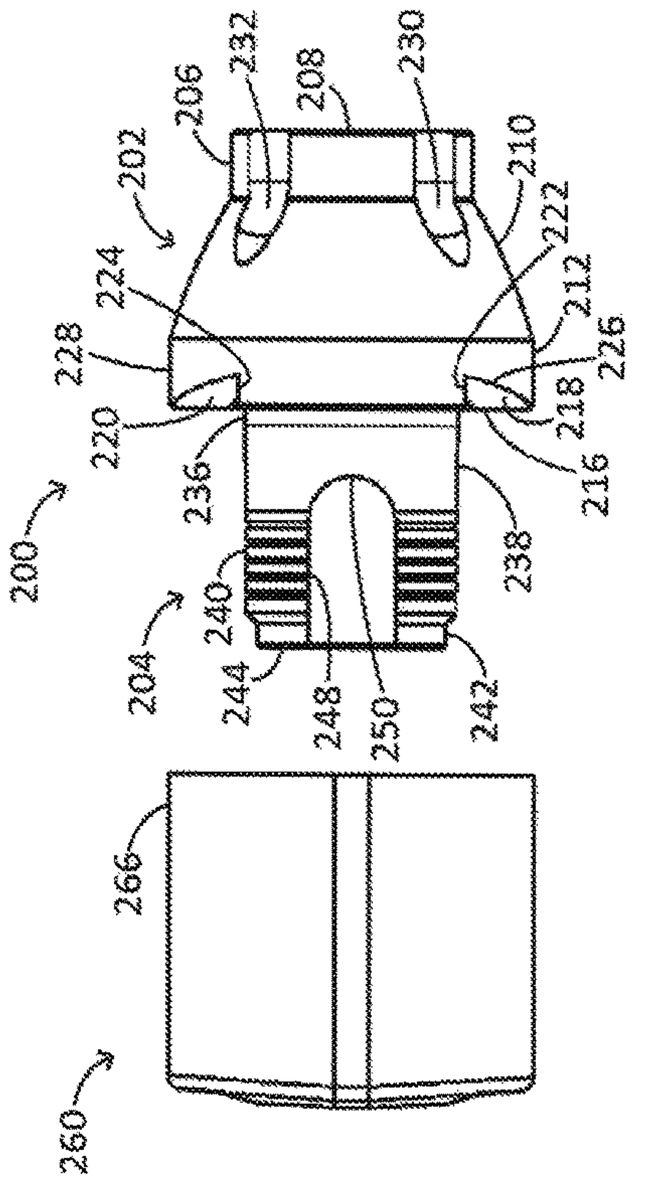

FIG. 28

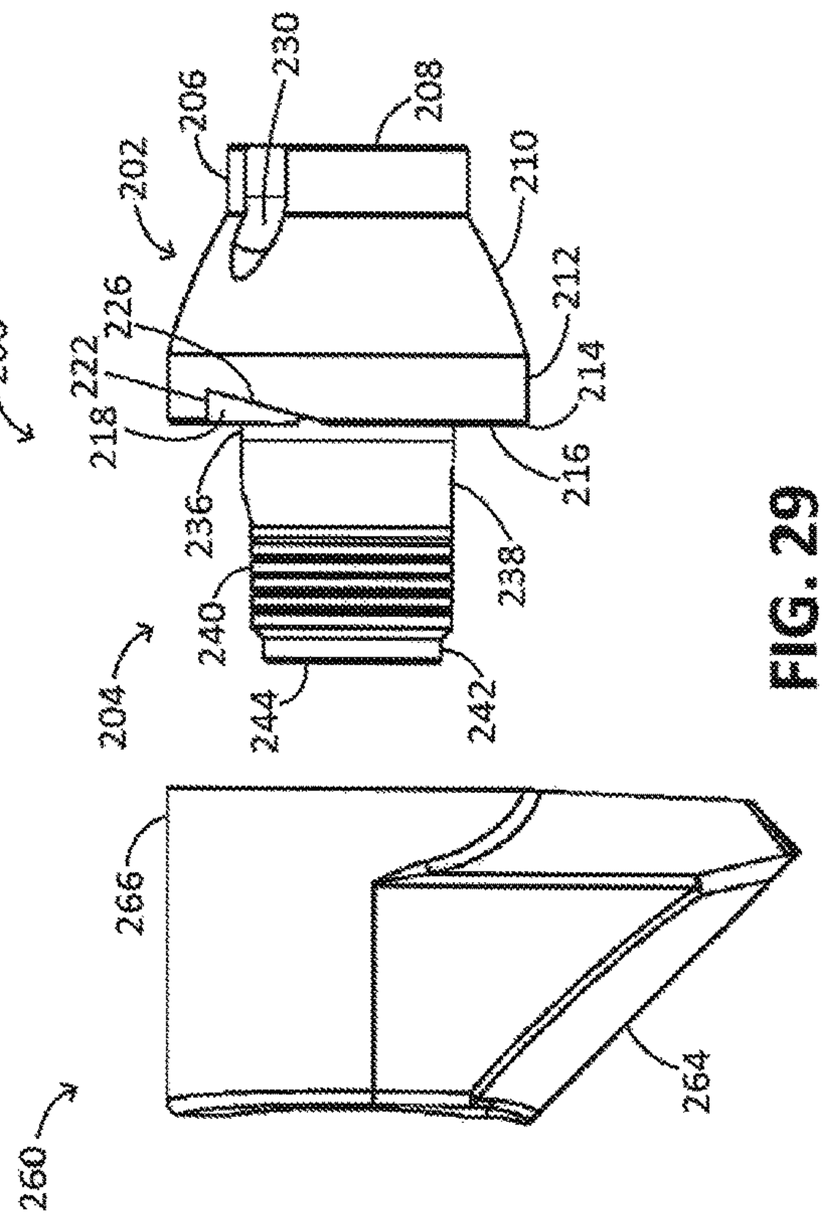

FIG. 29

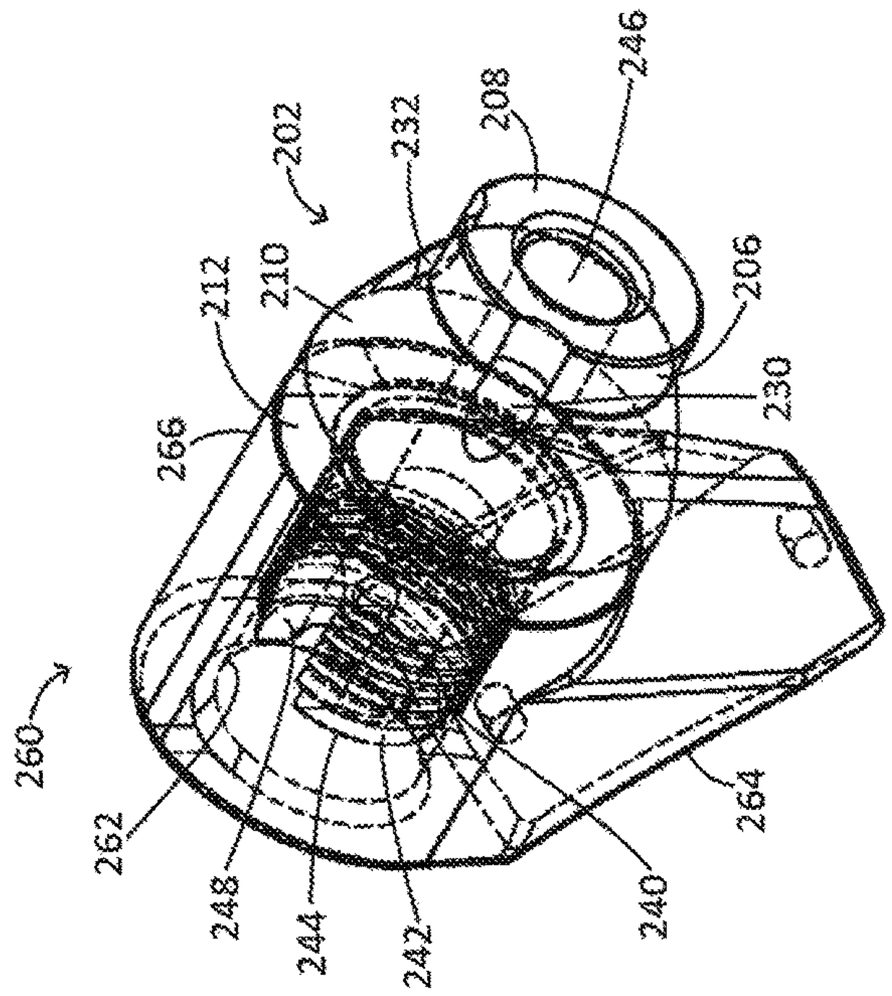

FIG. 33

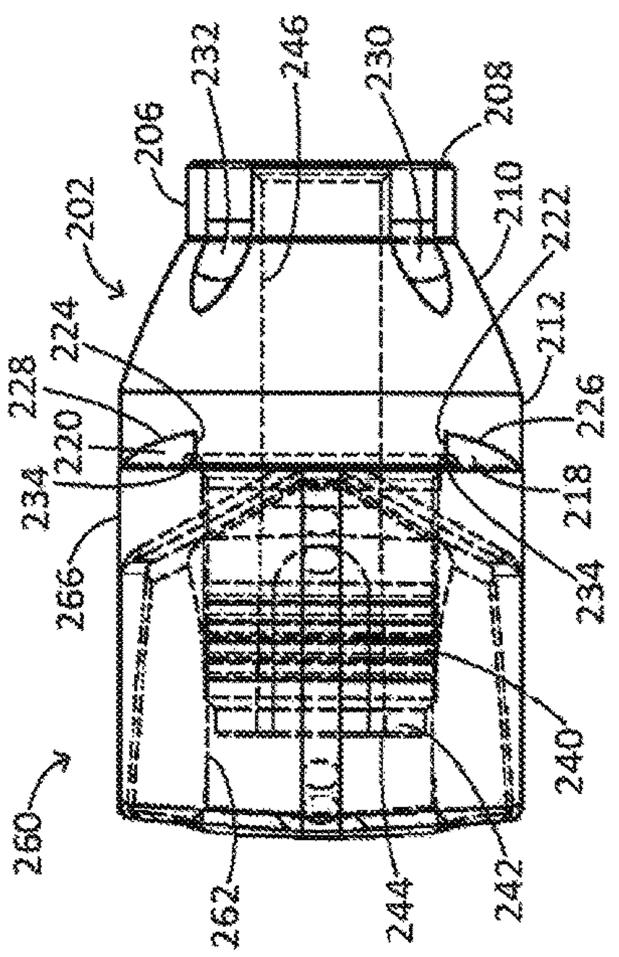

FIG. 31

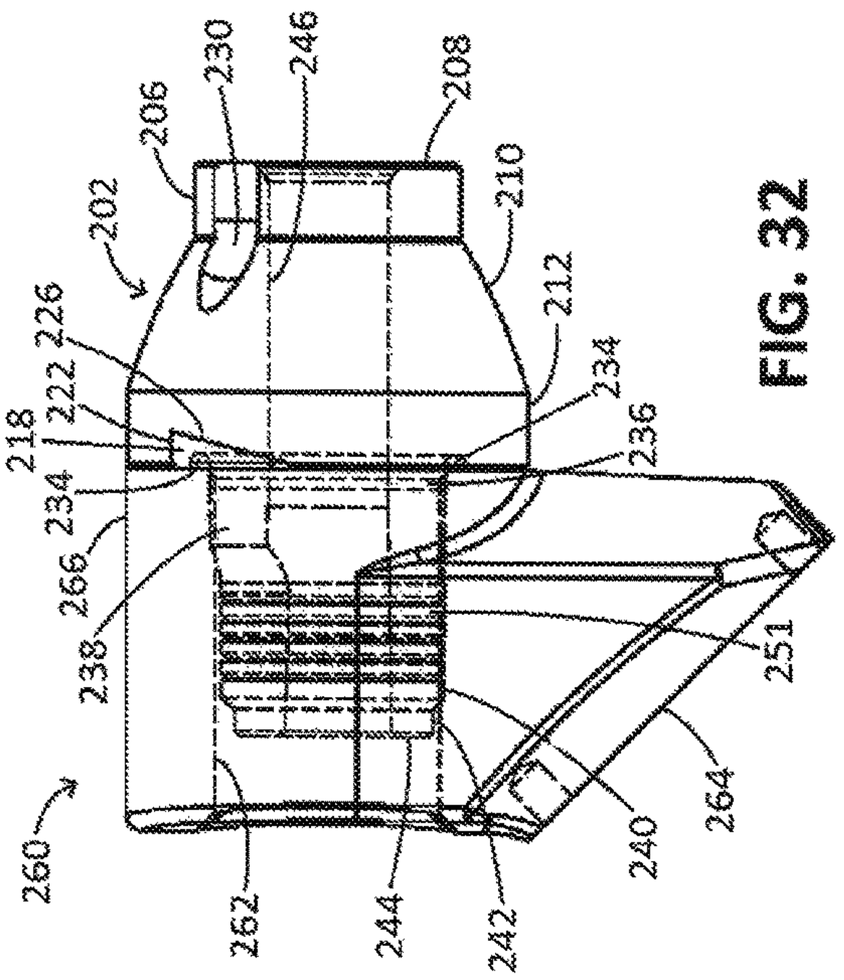

FIG. 32

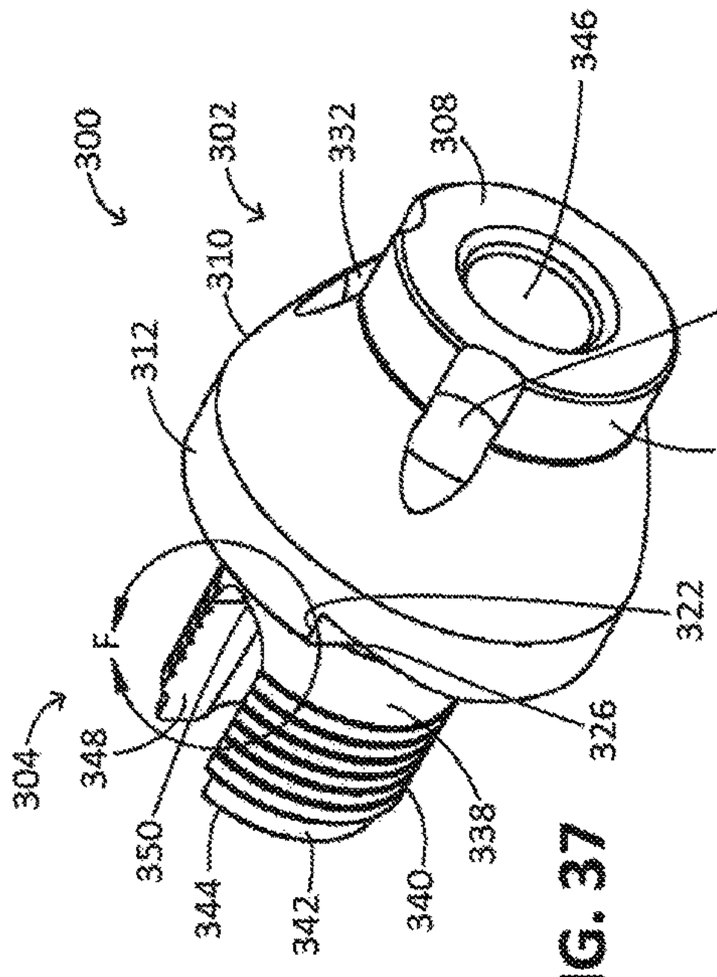

FIG. 37

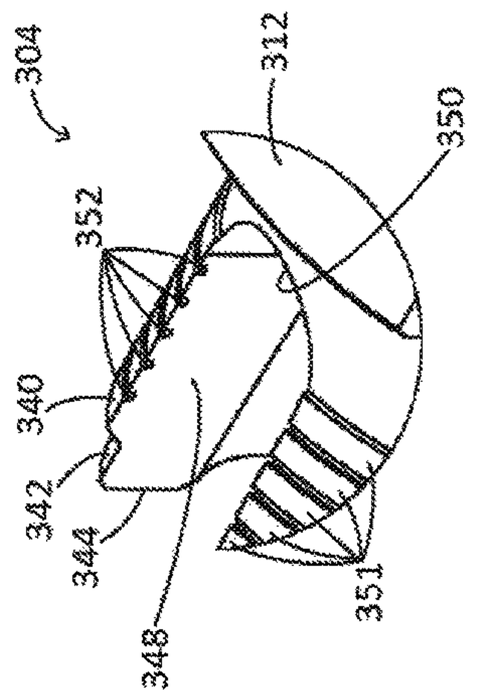

FIG. 38

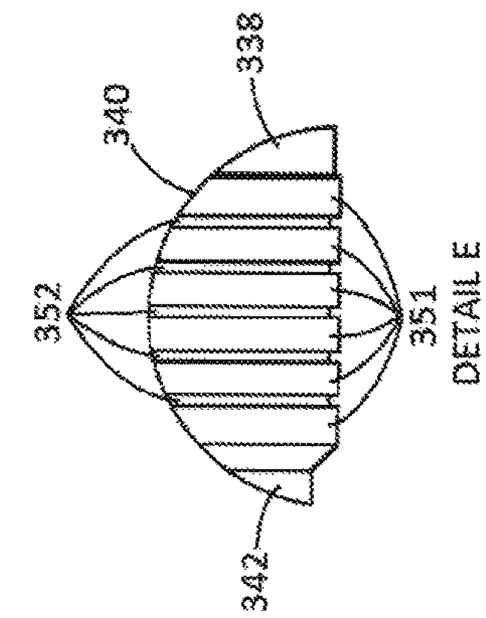

FIG. 36

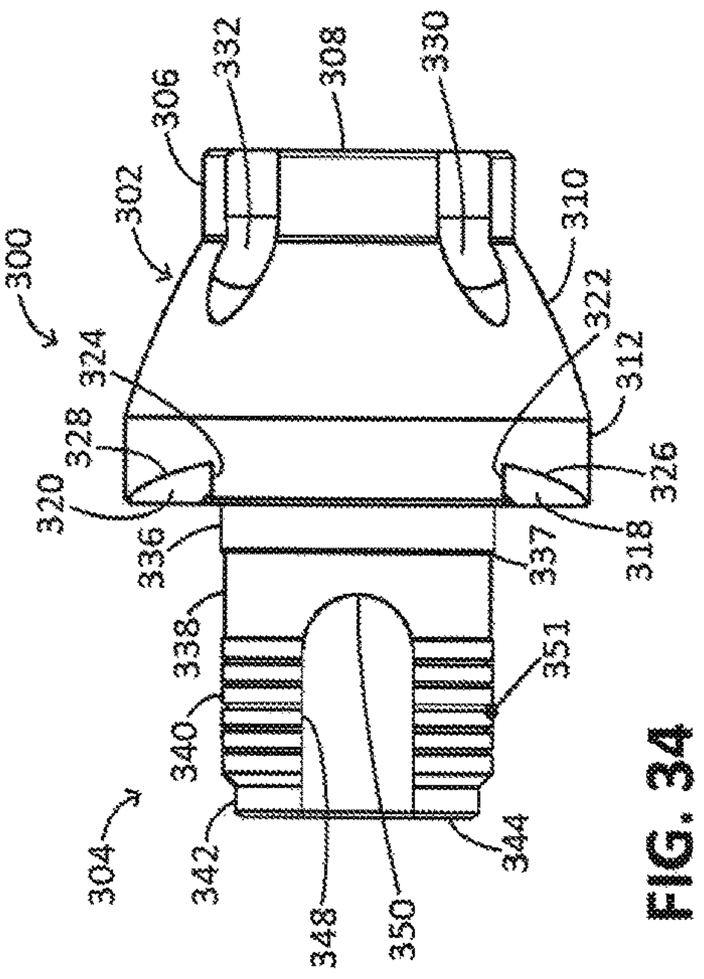

FIG. 34

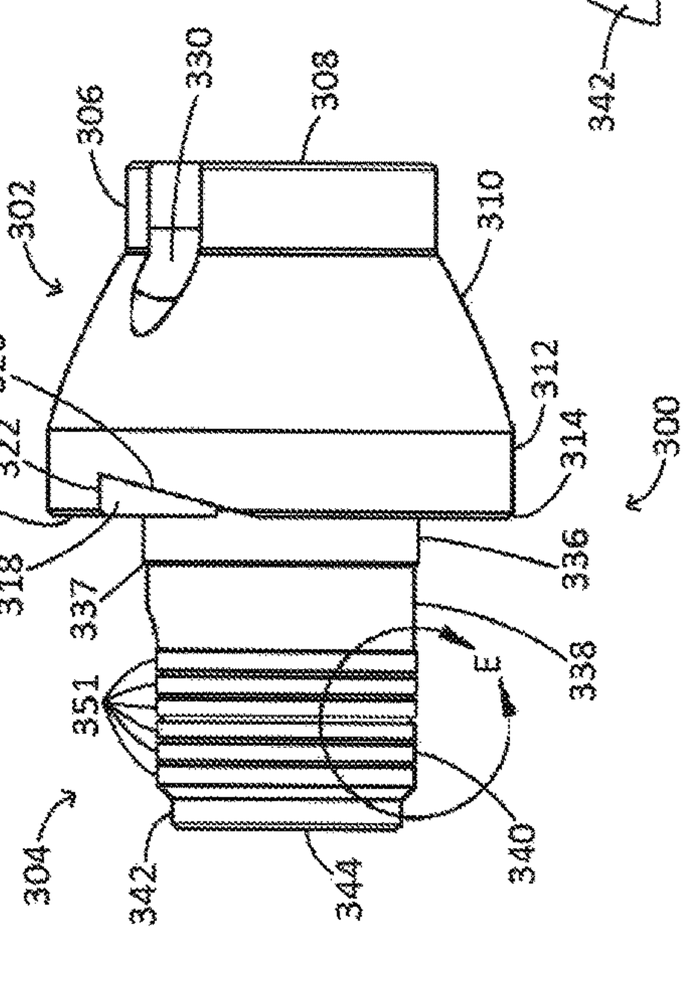

FIG. 35

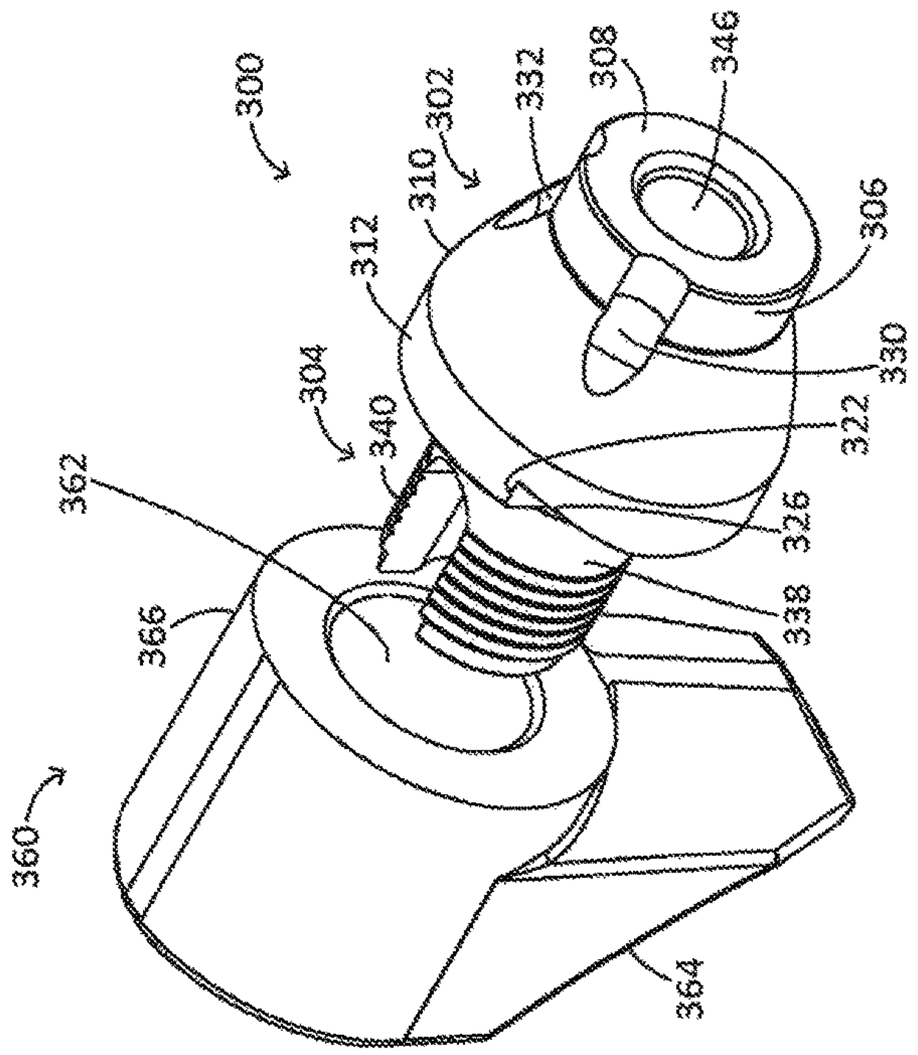

FIG. 41

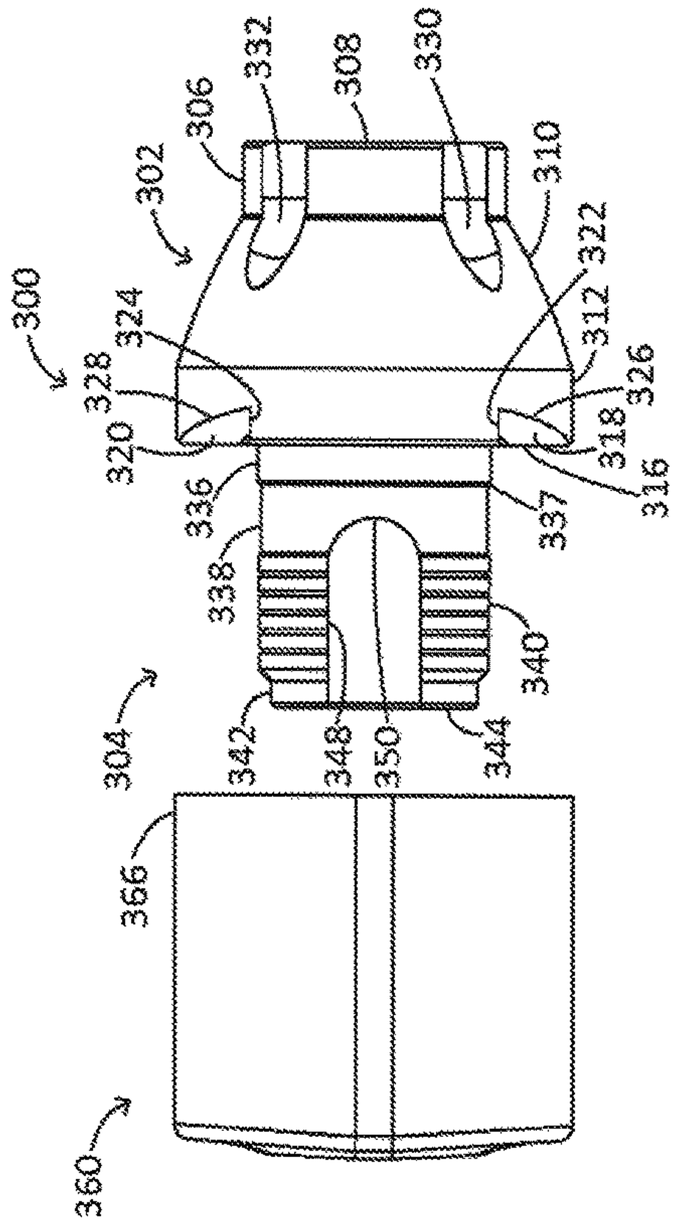

FIG. 39

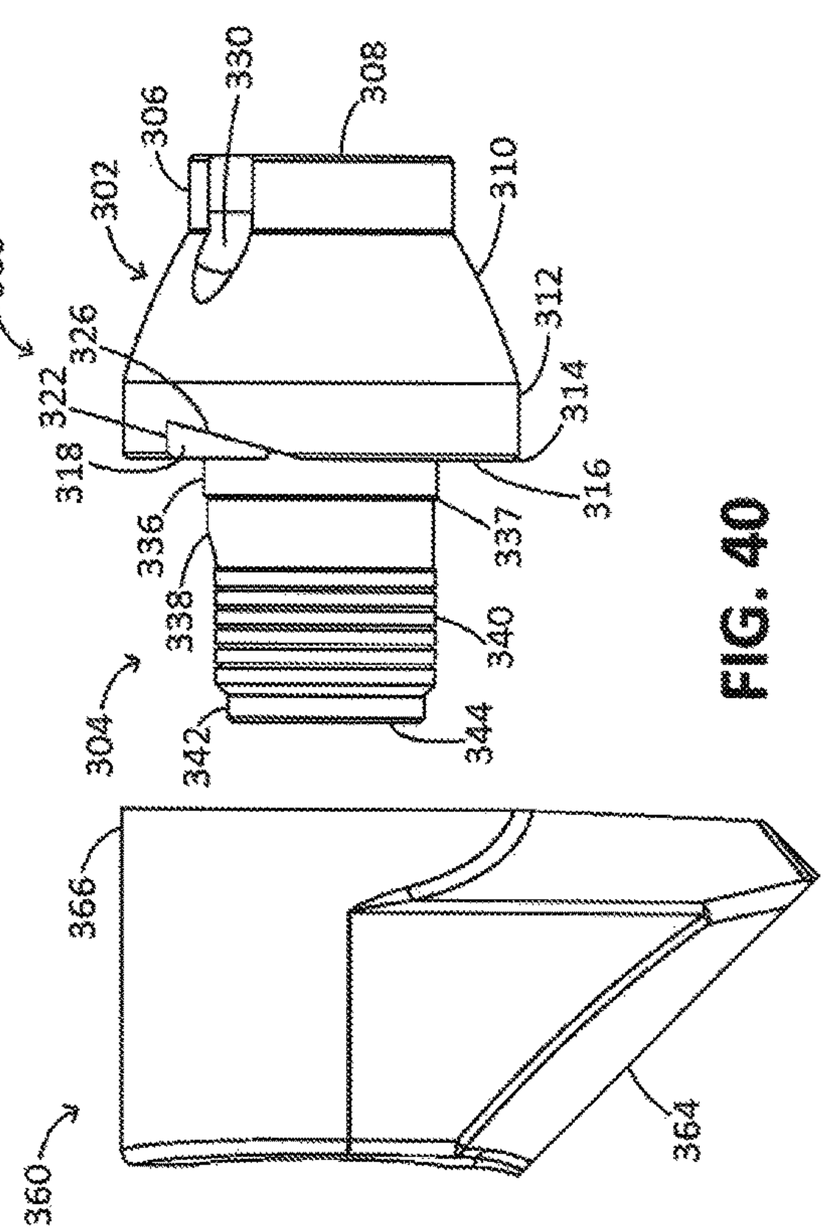

FIG. 40

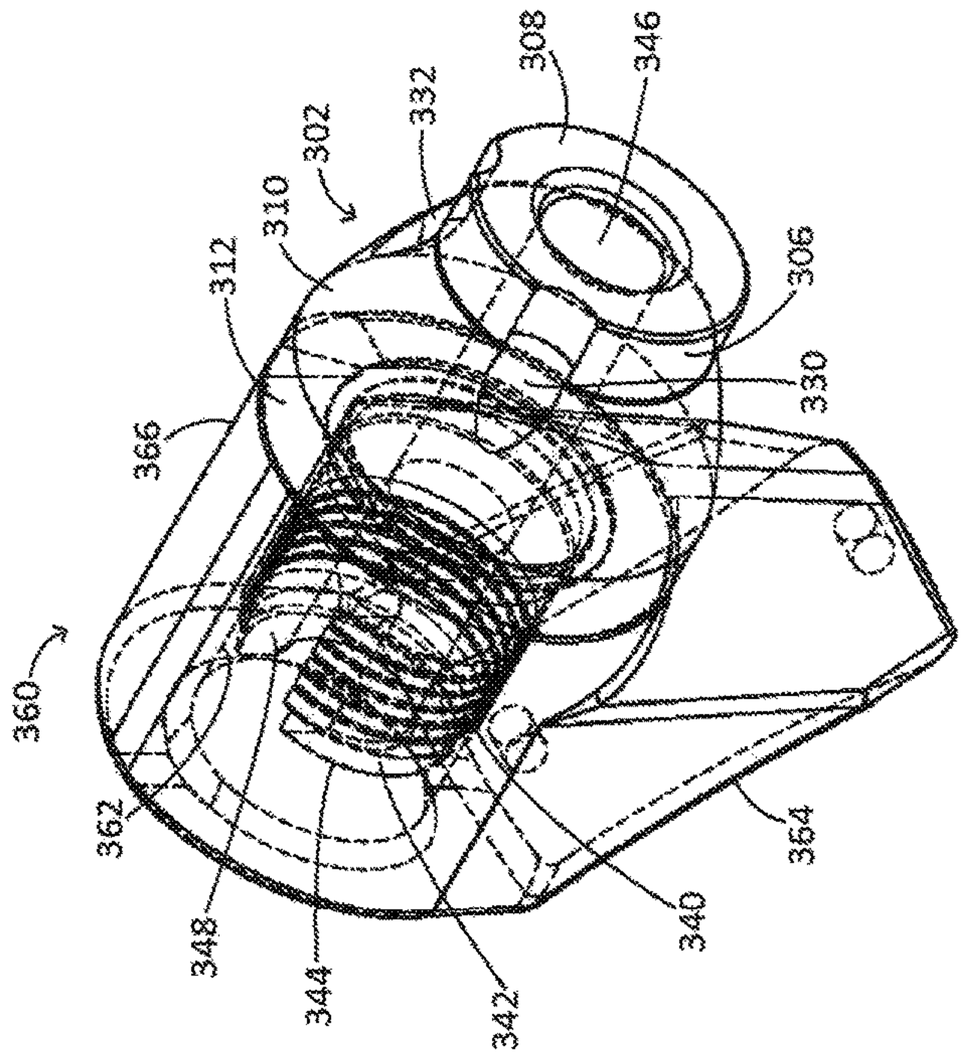

FIG. 44

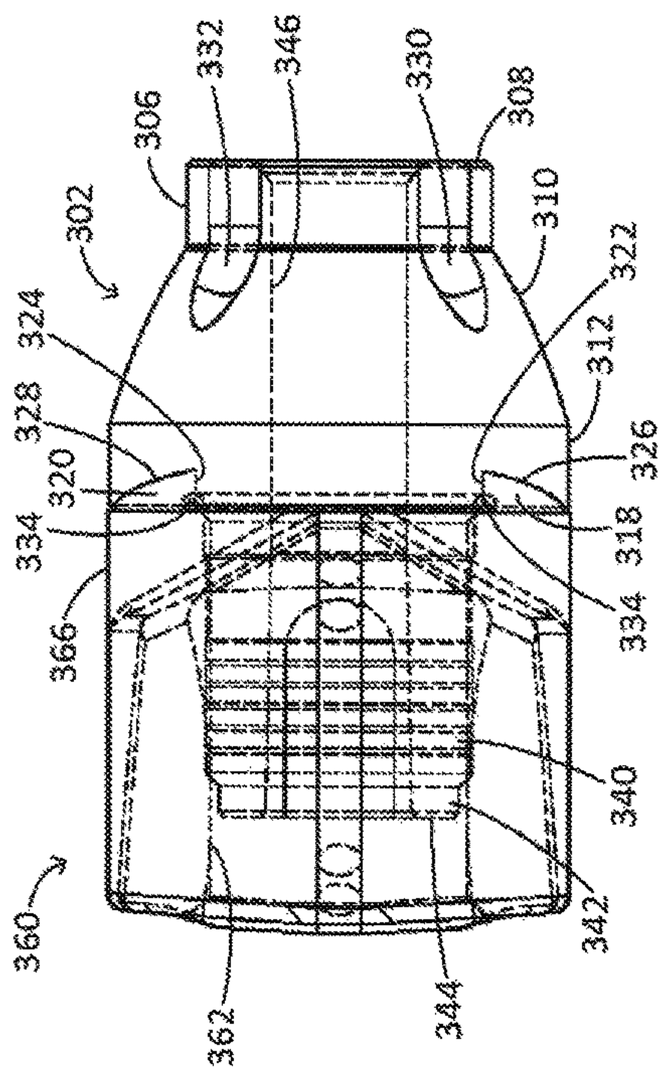

FIG. 42

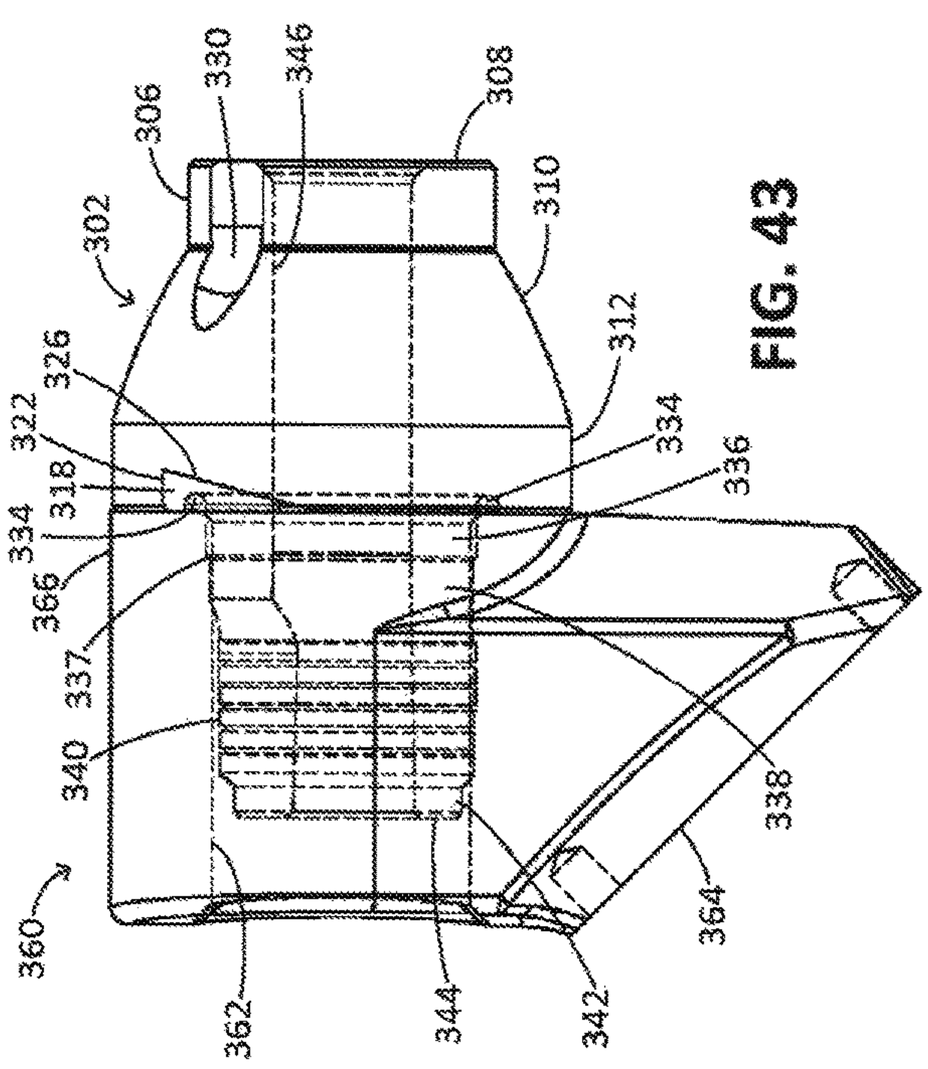

FIG. 43

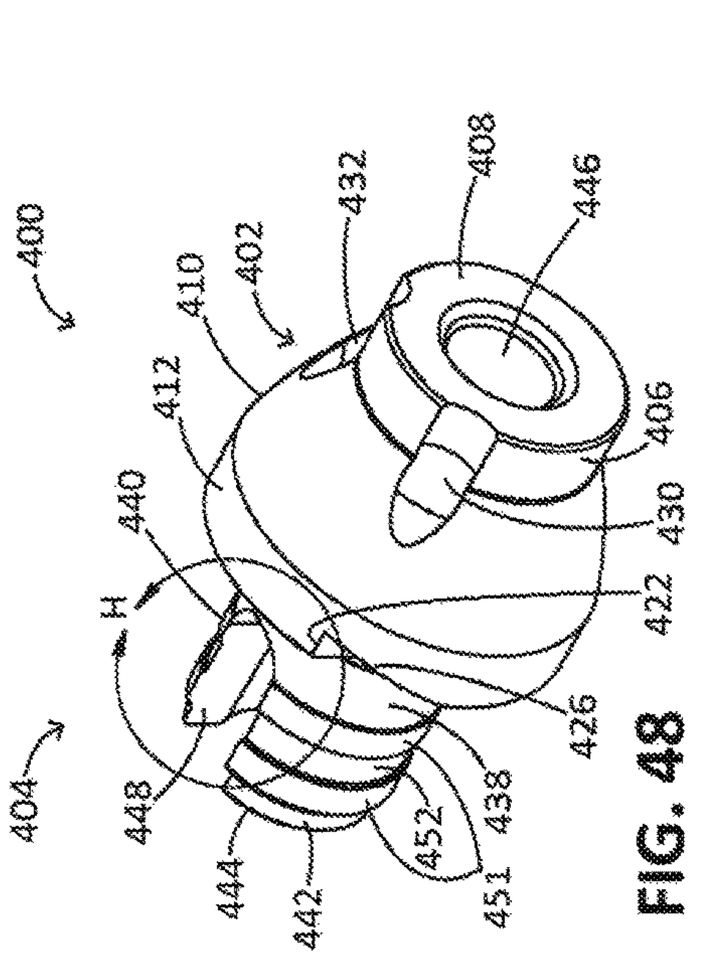

FIG. 48

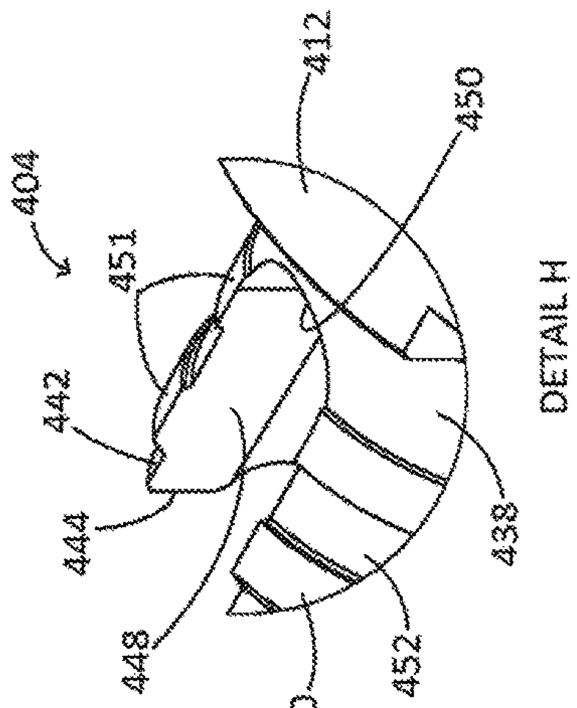

FIG. 49

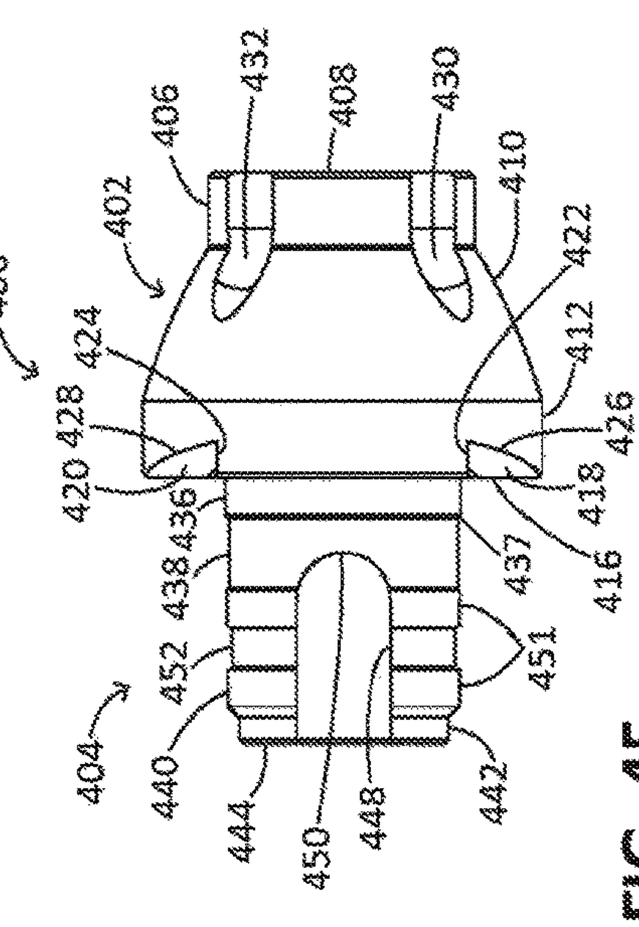

FIG. 45

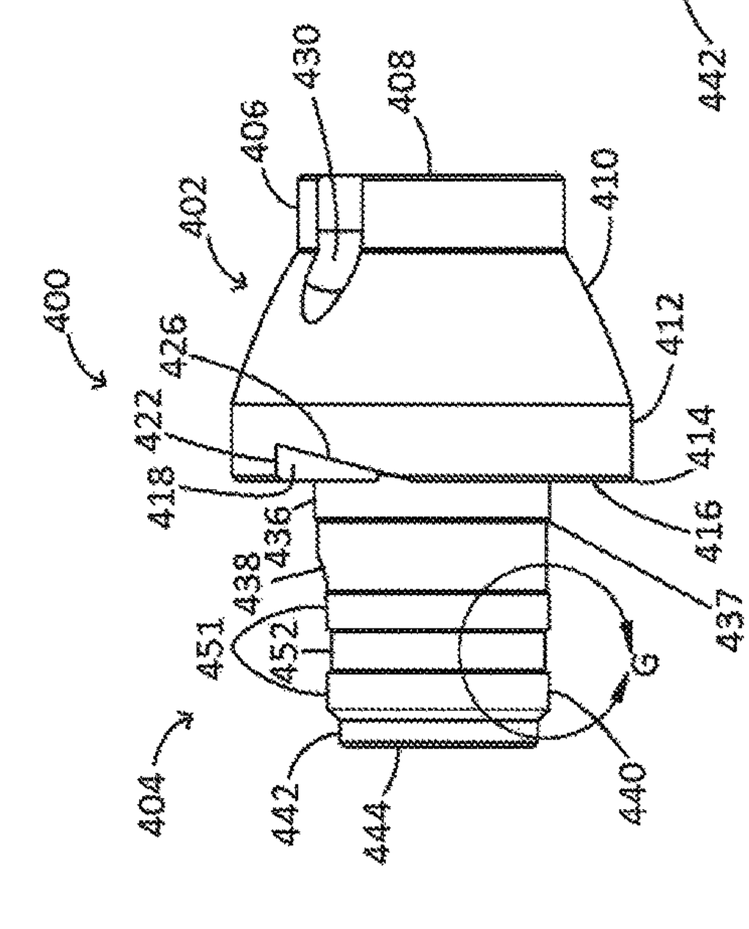

FIG. 46

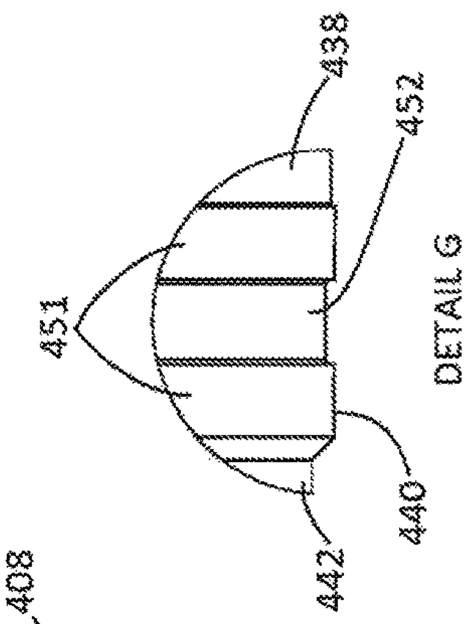

FIG. 47

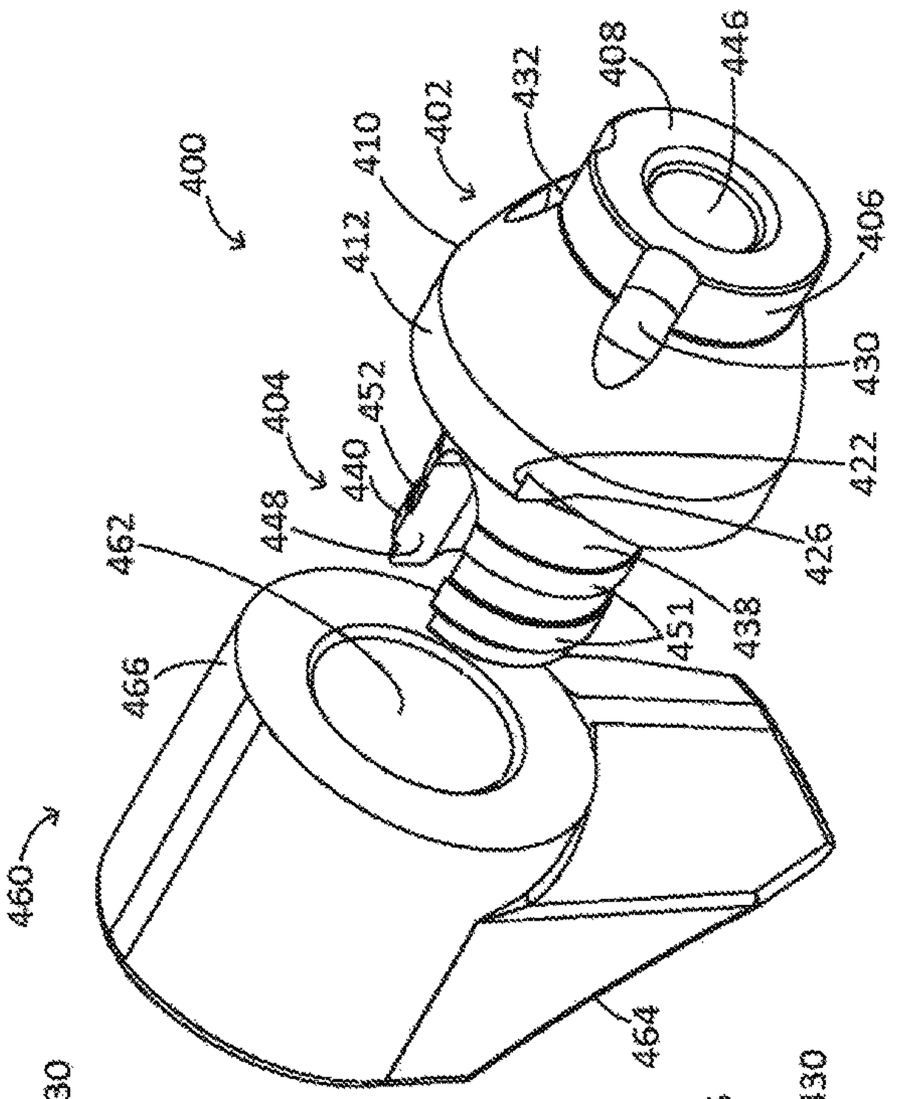

FIG. 50

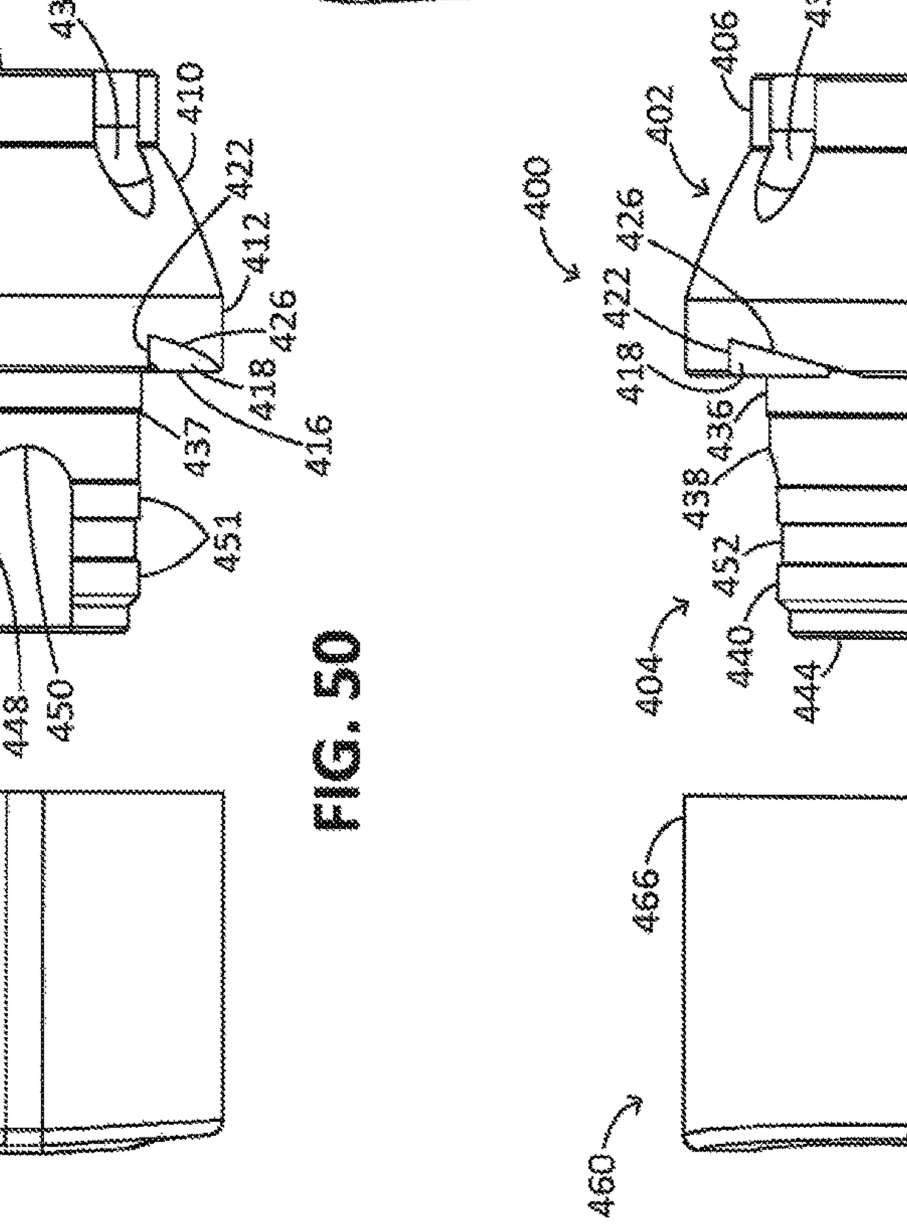

FIG. 51

FIG. 52

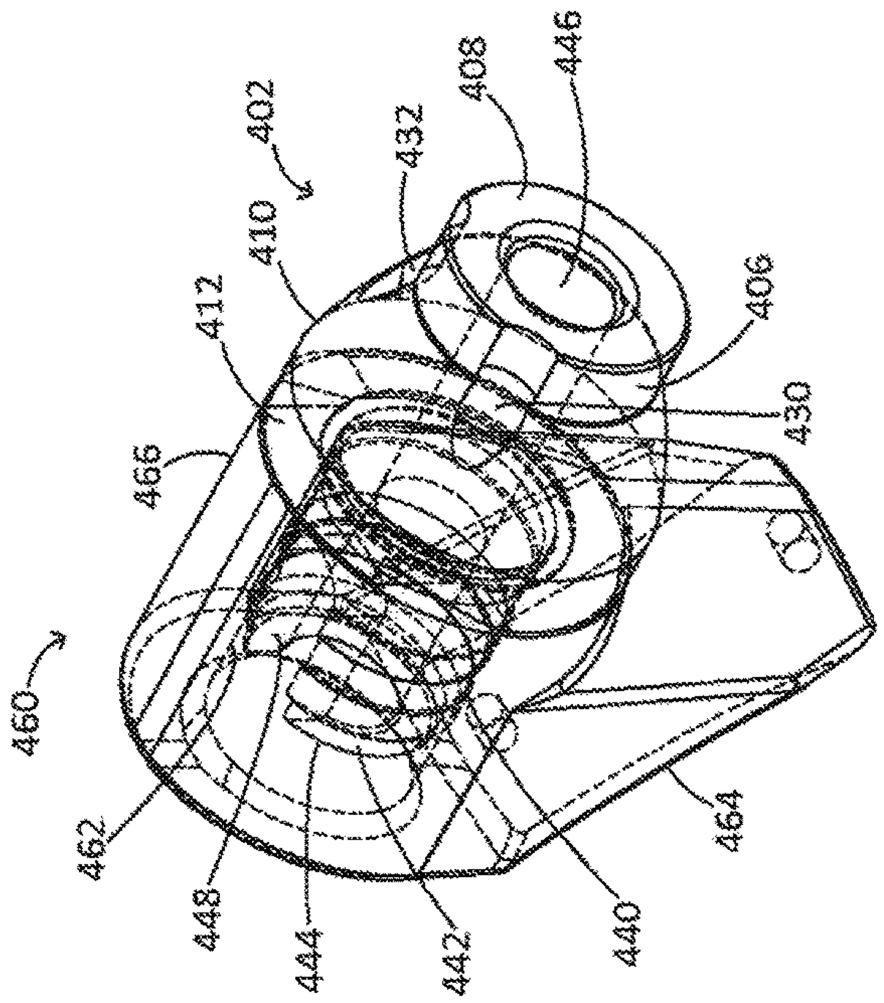

FIG. 55

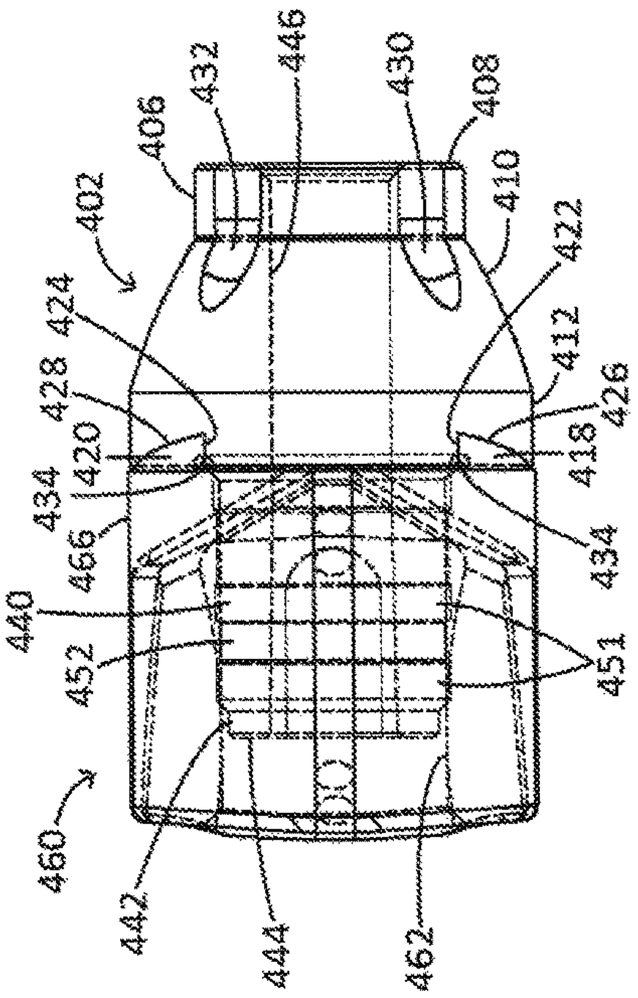

FIG. 53

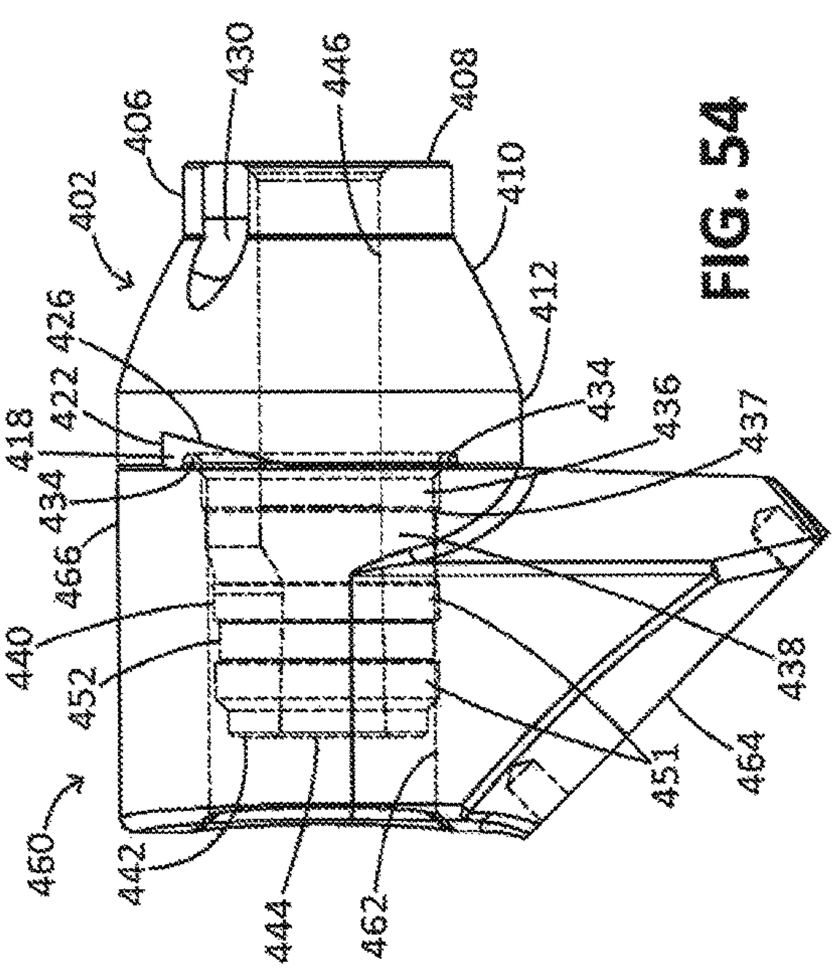

FIG. 54

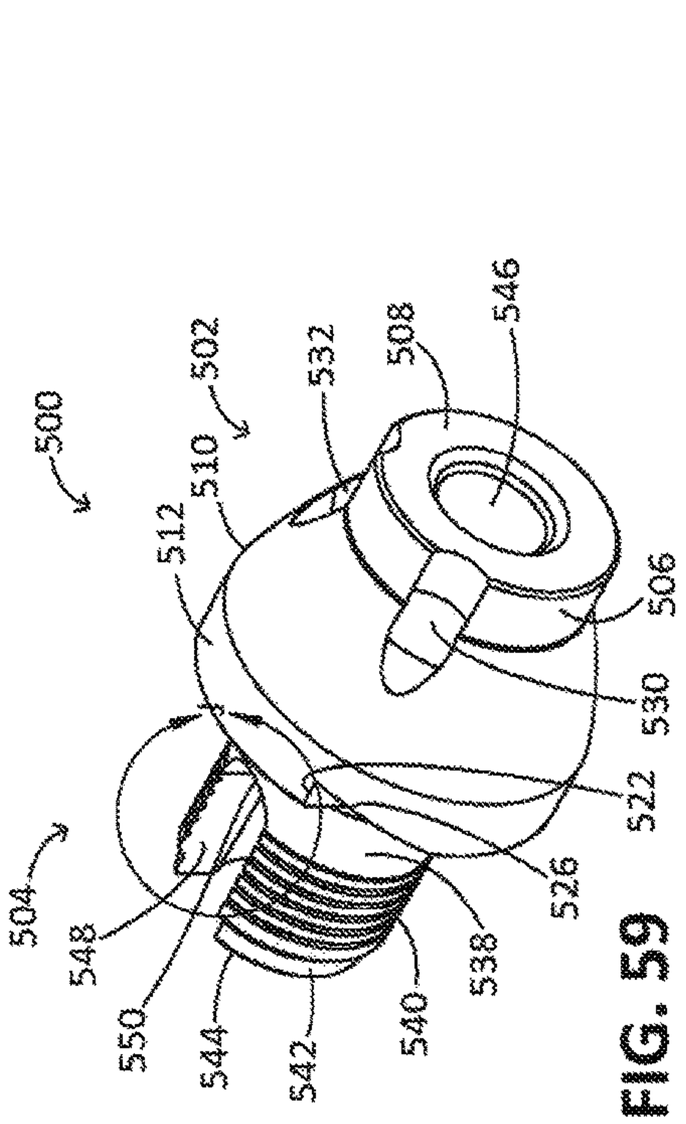

FIG. 59

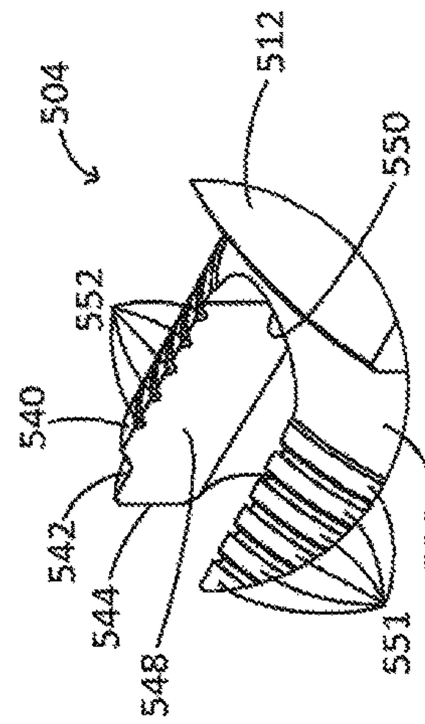

FIG. 60

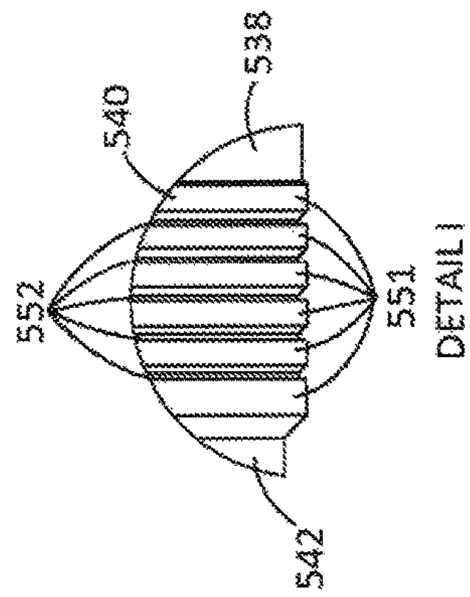

FIG. 58

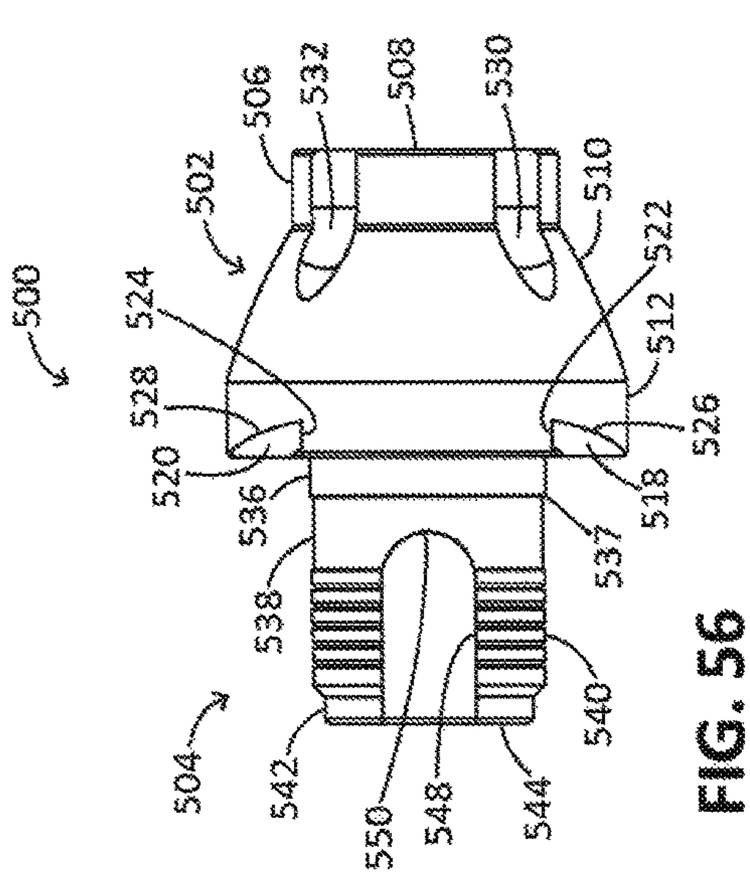

FIG. 56

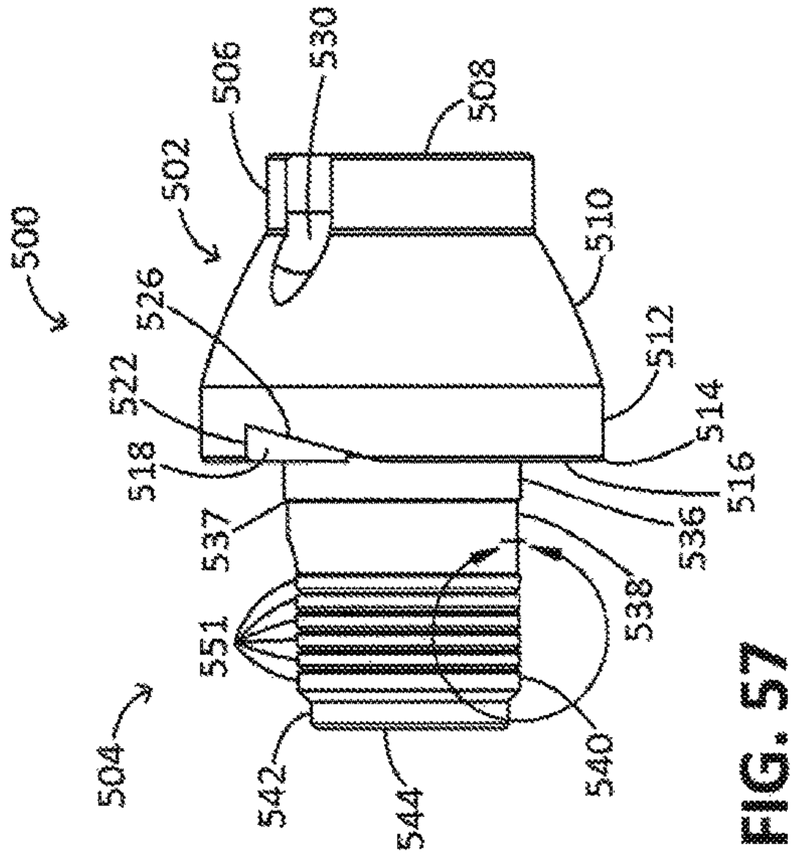

FIG. 57

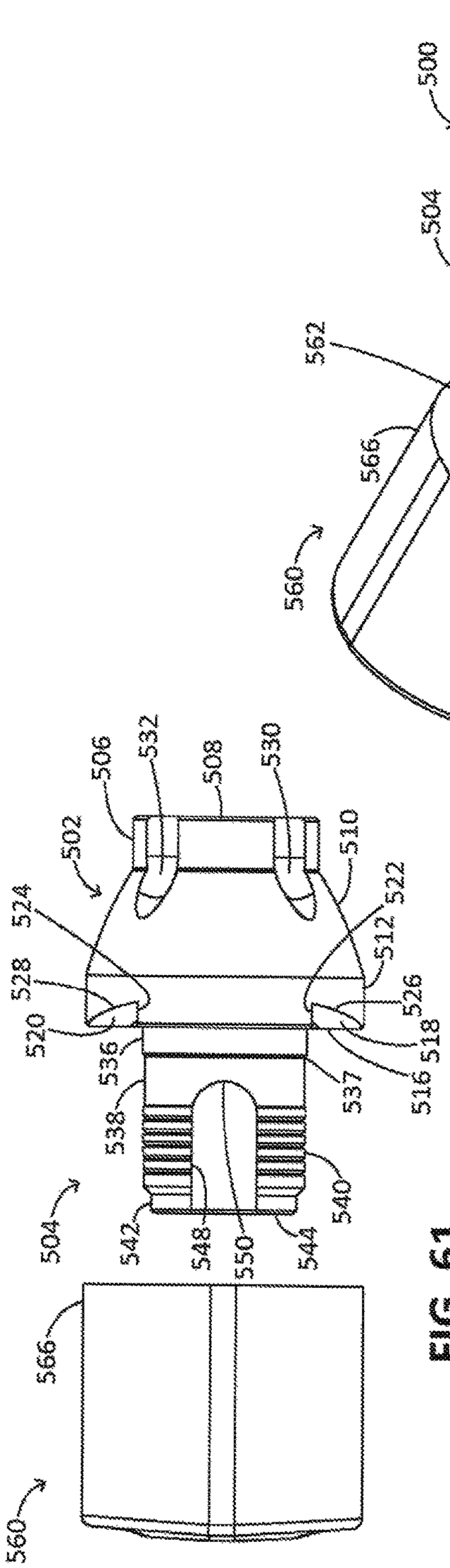

FIG. 61

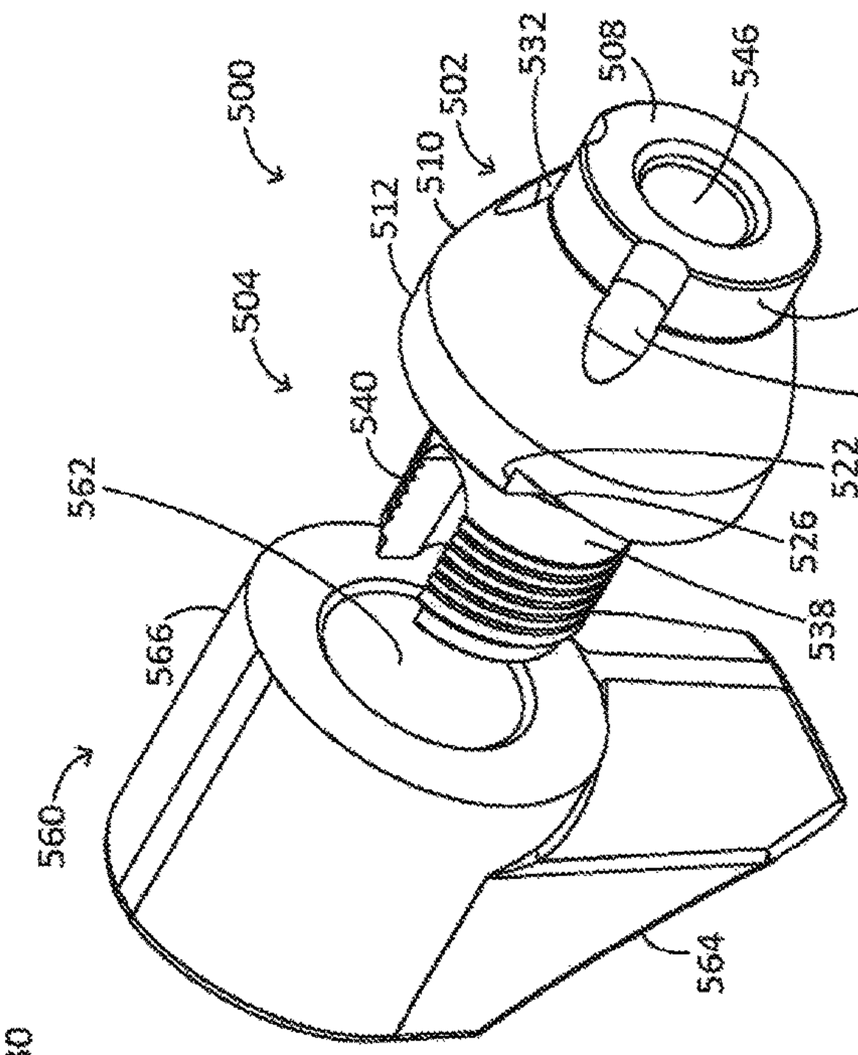

FIG. 63

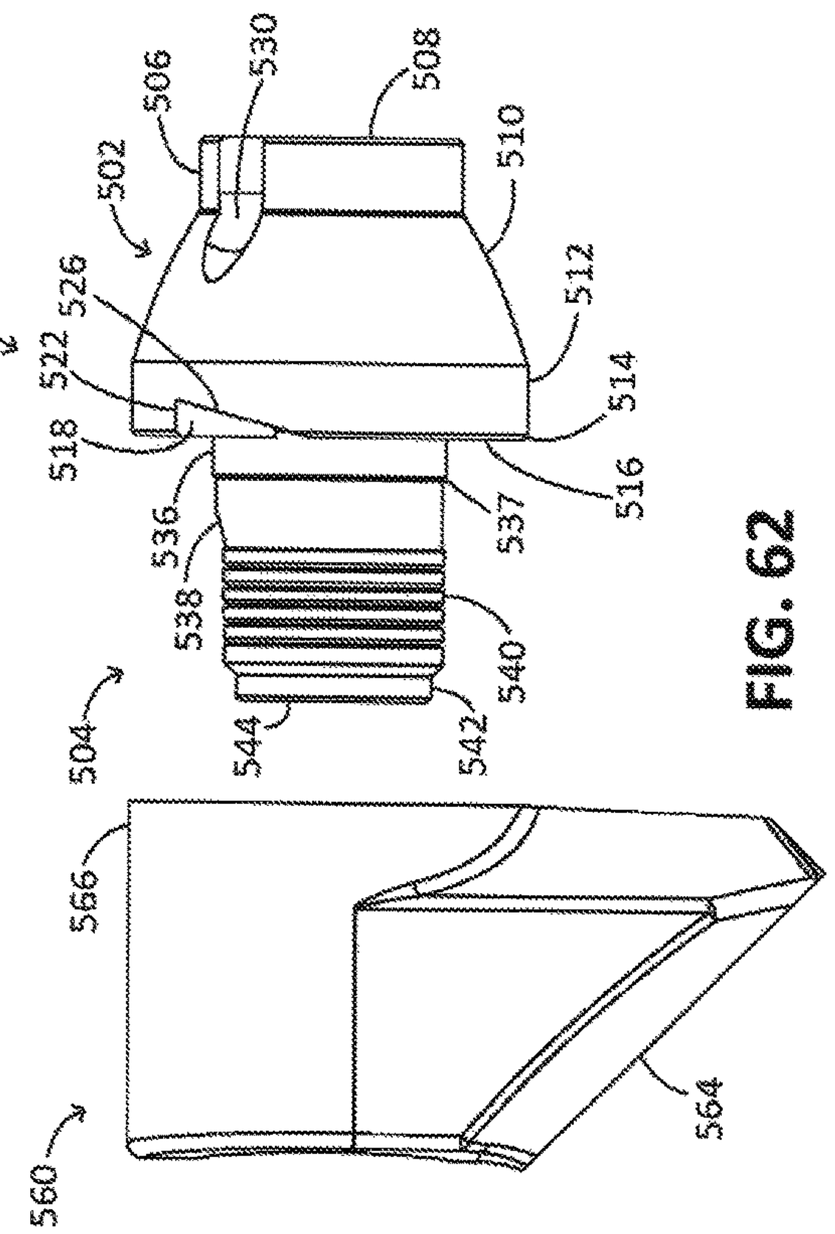

FIG. 62

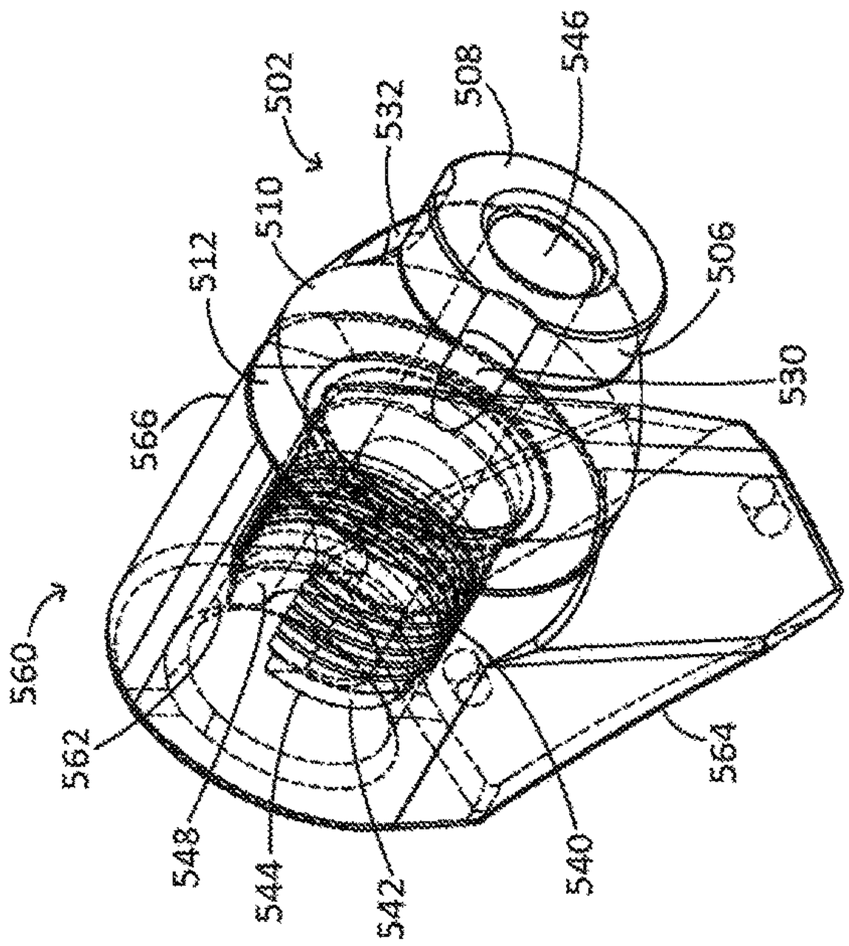

FIG. 66

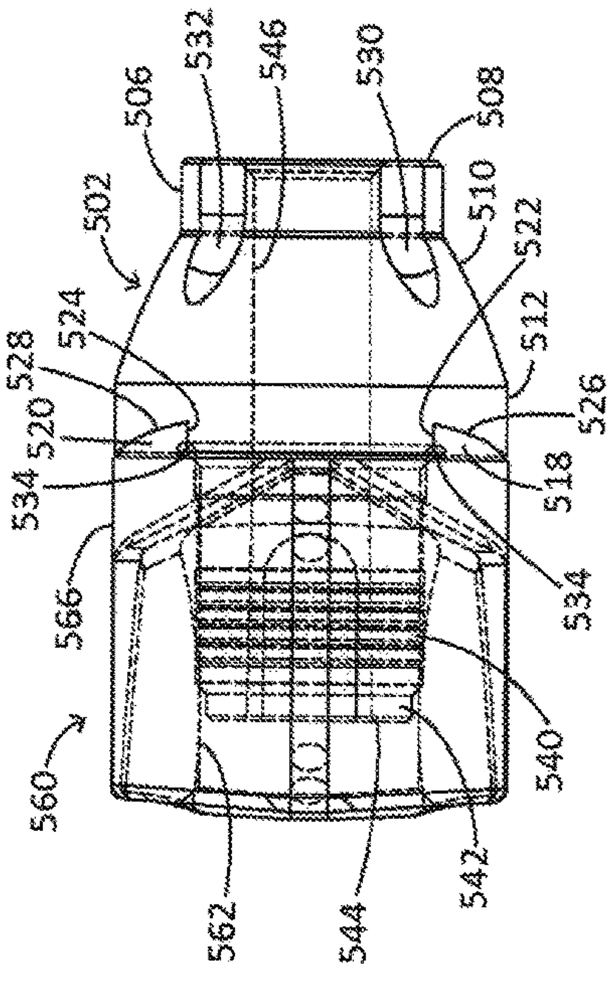

FIG. 64

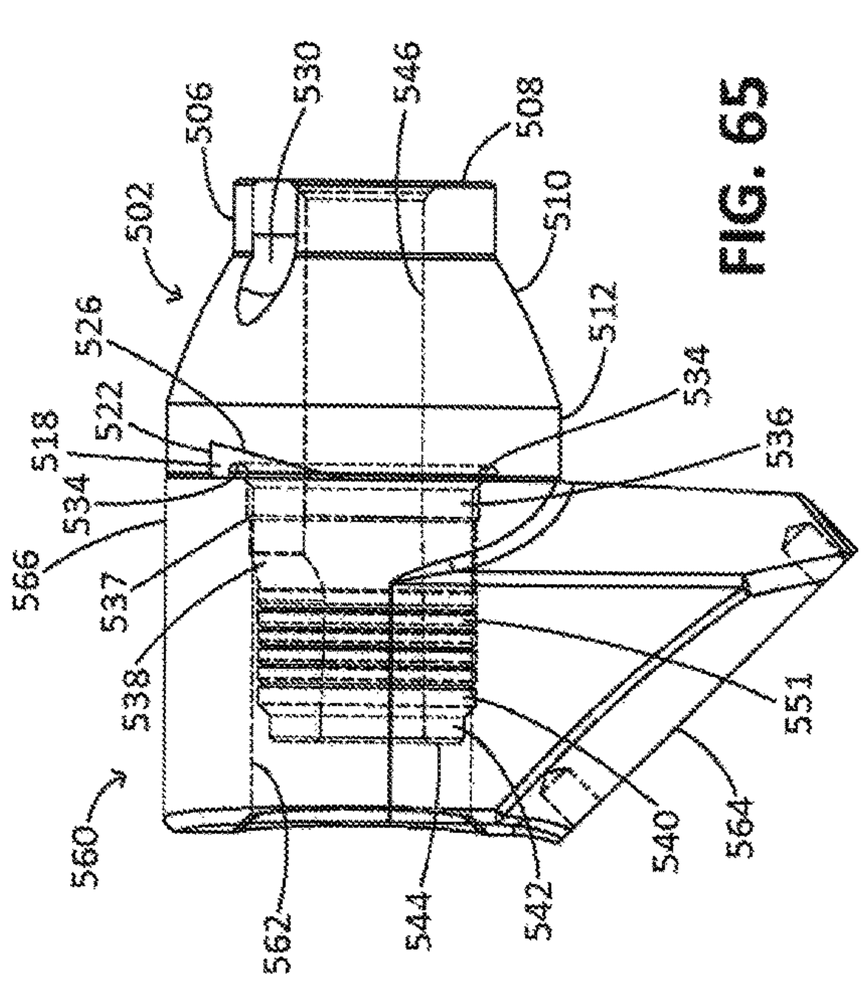

FIG. 65

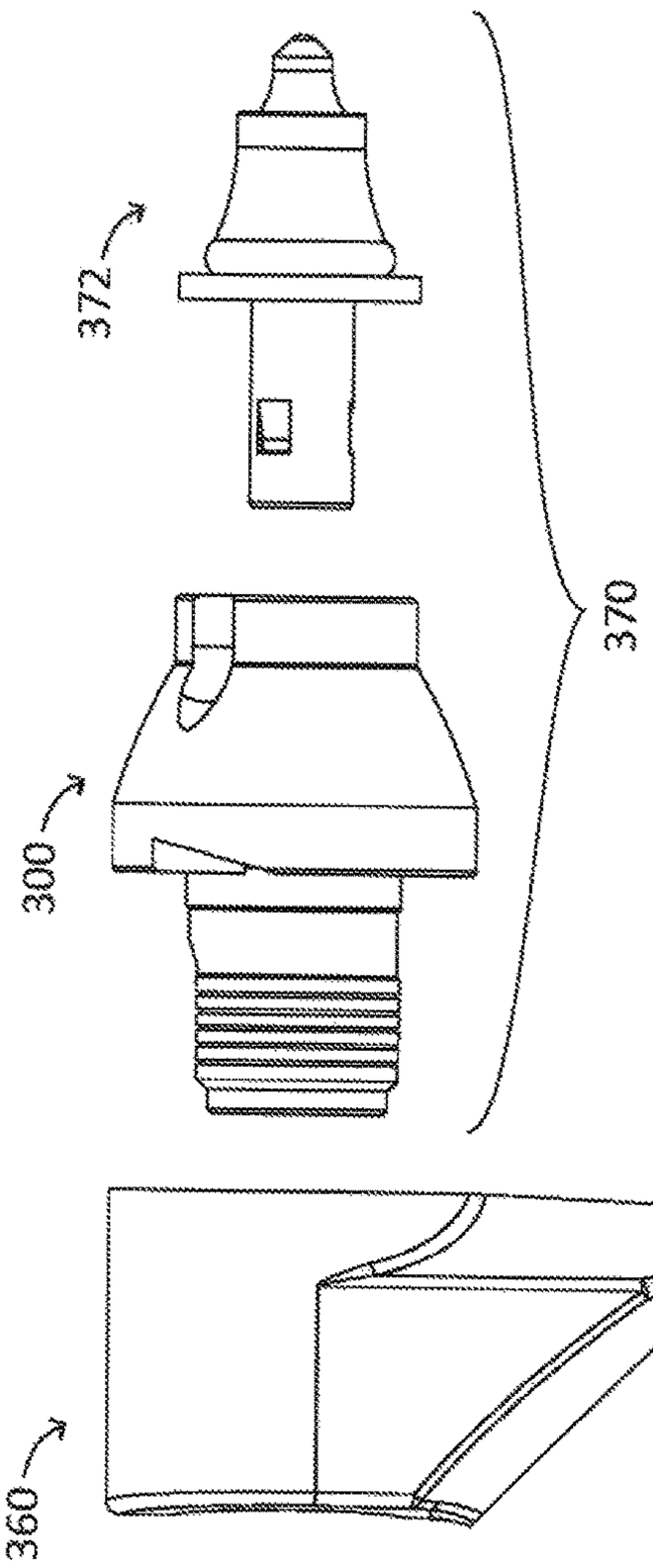

FIG. 67

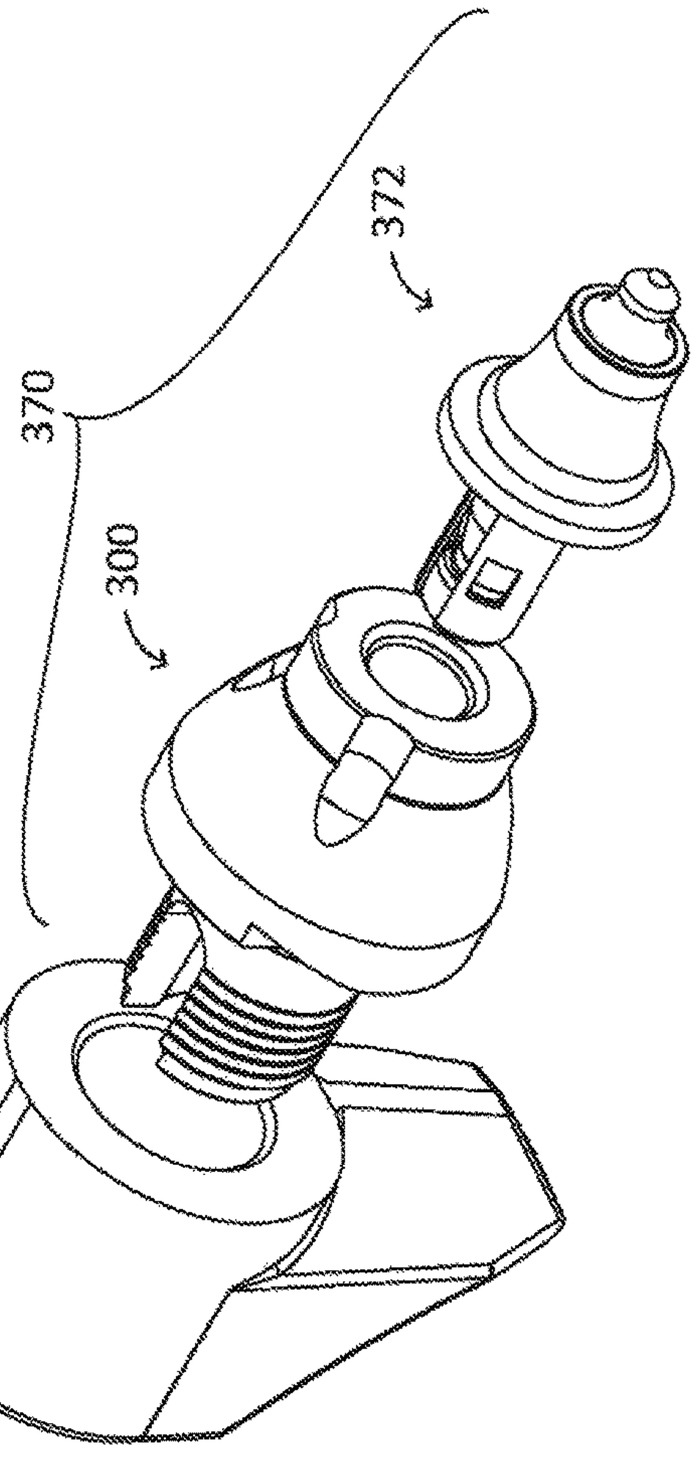

FIG. 68

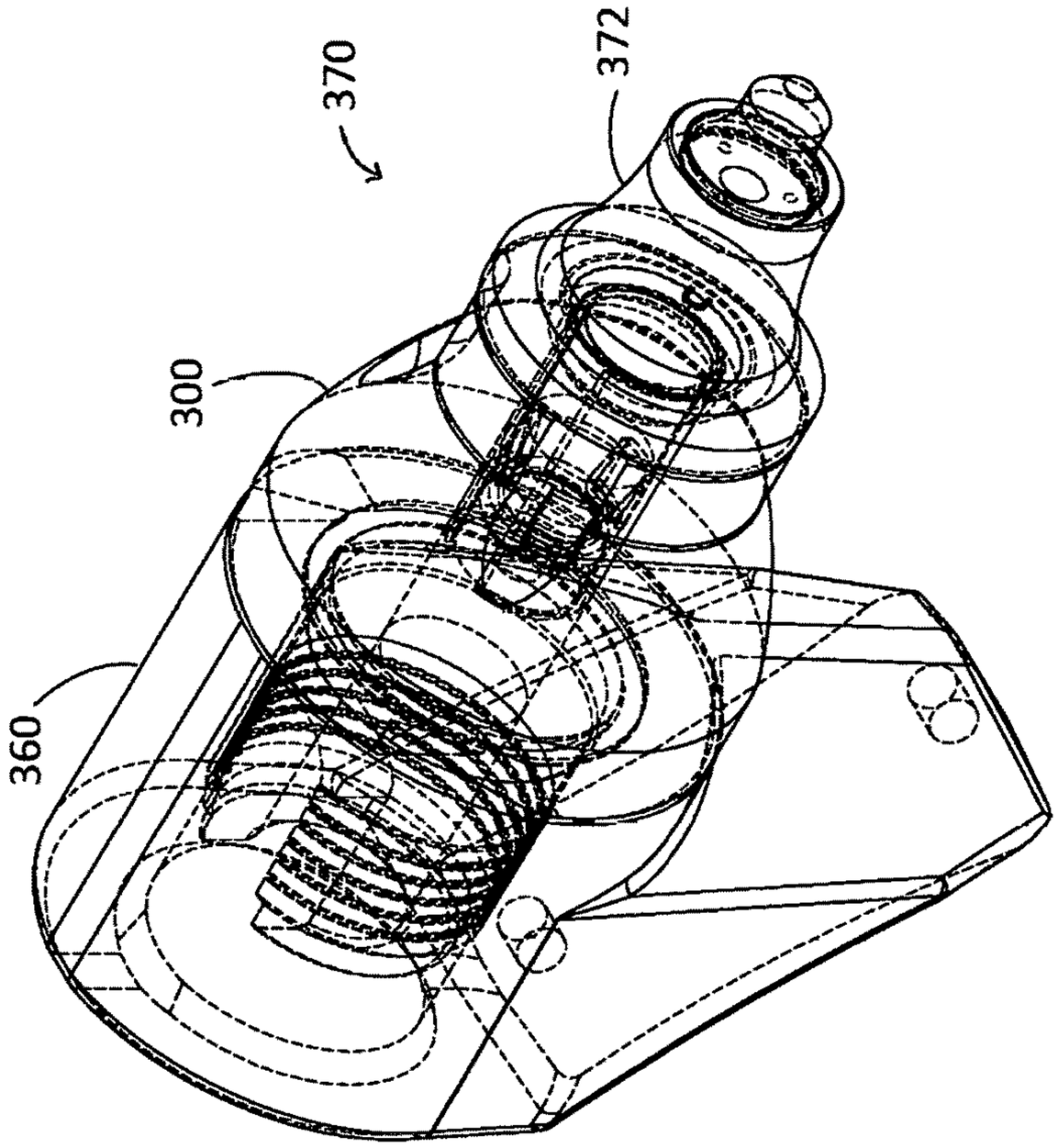

FIG. 69

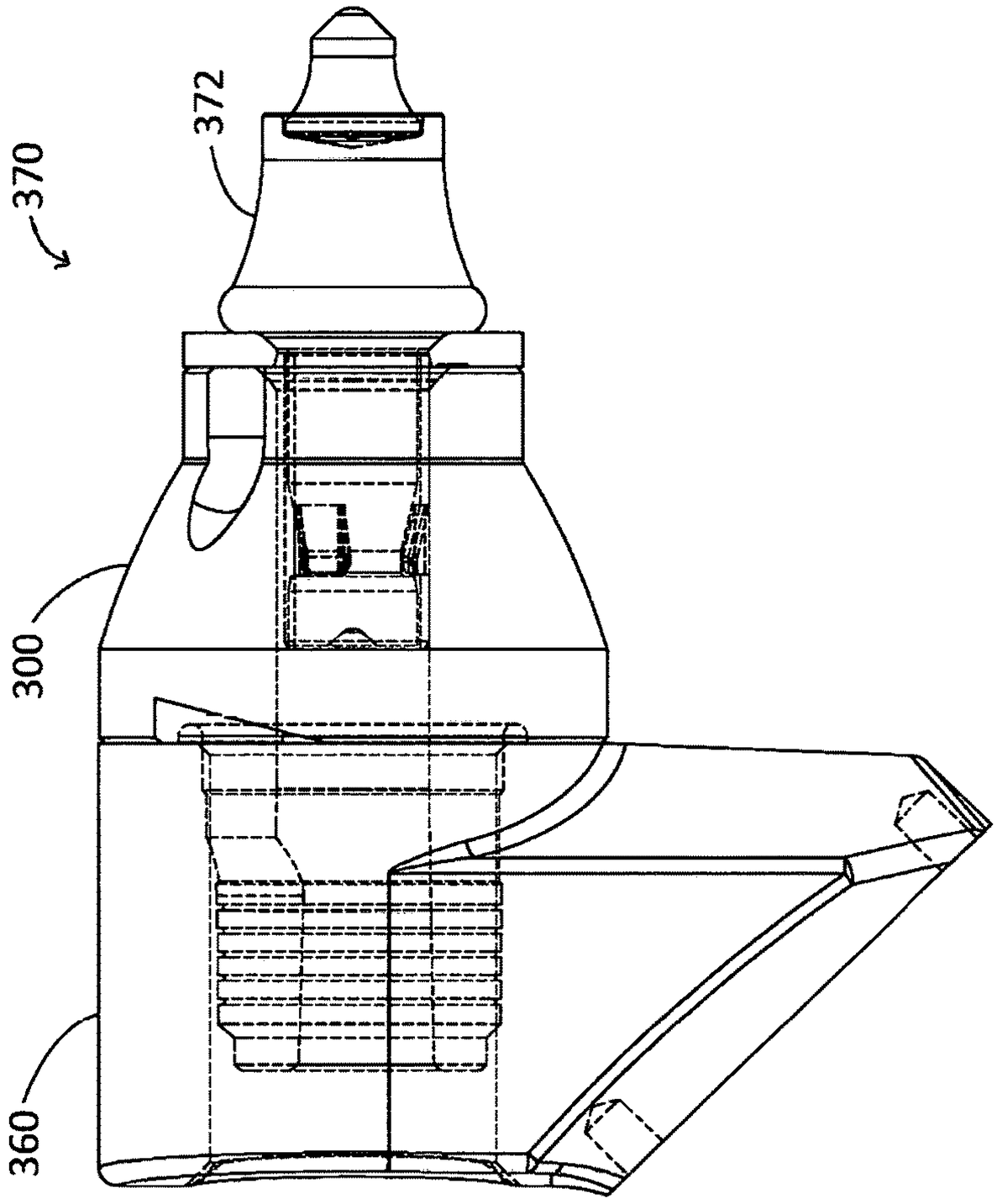

FIG. 70

BIT HOLDER

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application claims priority to and is a continuation-in-part of U.S. Provisional Application No. 61/891,683, filed Oct. 16, 2013, claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 12/870,289, filed Aug. 27, 2010, now U.S. Pat. No. 8,622,482, issued Jan. 7, 2014, claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 14/512,581, filed Oct. 13, 2014, claims priority to and is a continuation-in-part of U.S. Provisional Application No. 61/944,646, filed Feb. 26, 2014, claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 14/628,482, filed Feb. 23, 2015, now U.S. Pat. No. 9,879,531, issued Jan. 30, 2018, claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 15/708,292, filed Sep. 19, 2017, claims priority to and is a continuation-in-part of U.S. Provisional Application No. 62/100,764, filed Jan. 7, 2015, claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 14/959,551, filed Dec. 4, 2015, claims priority and is a continuation-in-part to U.S. Provisional Application No. 61/983,291, filed Apr. 23, 2014, claims priority to and is a continuation-in-part to U.S. Non-Provisional application Ser. No. 14/690,679, filed Apr. 20, 2015, and claims priority to and is a continuation-in-part of U.S. Non-provisional application Ser. No. 15/699,504, filed Sep. 8, 2017, to the extent allowed by law and the contents of which are incorporated herein by reference in their entireties.

TECHNICAL FIELD

This disclosure relates to bit assemblies for road milling, mining, and trenching equipment, and more particularly, to a bit holder for use road milling, mining, and trenching machines.

BACKGROUND

Road milling, mining, and trenching equipment utilizes bits traditionally set in a bit assembly having a bit holder and/or a bit holder block. In one embodiment, the bit is retained by the bit holder and the bit holder is retained in the bit holder block. In another embodiment a unitary bit/holder is retained in the bit holder block. A plurality of the bit assemblies are mounted on the outside of a rotatable drum in staggered positions, typically in a V-shaped or spiral configuration, in an effort to create the smoothest road milling. The combinations of bit assemblies have been utilized to remove material from the terra firma, such as degrading the surface of the earth, minerals, cement, concrete, macadam or asphalt pavement. Individual bits, bit holders, and bit holder blocks may wear down or break over time due to the harsh road degrading environment. Additionally, the bit holder or the unitary bit/holder may be ejected out of the bit holder block bore due to the harsh road degrading environment. A need has developed to provide a bit holder and/or a unitary bit/holder that makes a sufficient radial connection with the bit holder block bore to prevent the bit holder and/or unitary bit/holder from being ejected out of the bit holder block bore during harsh operations. Additionally, to provide greater radial force, a shank of the bit holder and/or unitary bit/holder comprises notches and/or

relief zones adapted to reduce surface contact between the shank of the bit holder, and/or unitary bit/holder, and the bit holder block bore.

SUMMARY

This disclosure relates generally to bit assemblies for road milling, mining, and trenching equipment. One implementation of the teachings herein is a bit holder that includes a body having a bottom; and a generally cylindrical shank depending axially from the bottom of the body, the shank including a segment adjacent a distal end of the shank, the segment including a plurality of ribs.

In another implementation of the teachings herein is a combination for a bit assembly that includes one of a unitary bit/holder and a bit holder comprising: a forward body portion having a bottom; and a generally cylindrical hollow shank depending axially from the bottom of the forward body portion, the shank comprising: a segment adjacent a distal end of the shank, the segment comprising a plurality of ribs; and a base block comprising a bore adapted to make an interference contact with at least the segment of the shank, the plurality of ribs adapted to reduce a surface contact between the segment and a complementary portion of the bore of the base block and to provide a more evenly distributed and more highly concentrated force per segment.

These and other aspects of the present disclosure are disclosed in the following detailed description of the embodiments, the appended claims and the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

The various features, advantages, and other uses of the apparatus will become more apparent by referring to the following detailed description and drawings, wherein like reference numerals refer to like parts throughout the several views. It is emphasized that, according to common practice, the various features of the drawings are not to-scale. On the contrary, the dimensions of the various features are arbitrarily expanded or reduced for clarity.

FIG. **1** is a top elevation view of a first embodiment of a bit holder in accordance with implementations of this disclosure;

FIG. **2** is a side perspective view of the first embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **3** is a side elevation view of the first embodiment of the holder in accordance with implementations of this disclosure;

FIG. **4** is a detail perspective view of Detail A of the first illustrated embodiment of the bit holder of FIG. **2** in accordance with implementations of this disclosure;

FIG. **5** is an exploded top elevation view of the first embodiment of the bit holder and a bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **6** is an exploded side elevation view of the first embodiment of the bit holder and the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **7** is an exploded side perspective view of the first embodiment of the bit holder and the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **8** is a top elevation view of the first embodiment of the bit holder assembled with the bit holder block, showing

invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **9** is a side elevation view of the first embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **10** is a side perspective view of the first embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **11** is a side perspective view of the first embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **12** is an cross-sectional view of the first embodiment of the bit holder assembled with the bit holder block, taken along Line B-B of FIG. **11**, in accordance with implementations of this disclosure;

FIG. **13** is a top elevation view of a second embodiment of a bit holder, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **14** is a side elevation view of the second embodiment of the bit holder, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **15** is a side perspective view of the second embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **16** is a detail perspective view of Detail B of the second illustrated embodiment of the bit holder of FIG. **15** in accordance with implementations of this disclosure;

FIG. **17** an exploded top elevation view of the second illustrated embodiment of the bit holder and a bit holder block in accordance with implementations of this disclosure;

FIG. **18** is an exploded side elevation view of the second illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **19** is an exploded side perspective view of the second illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **20** is a top elevation view of the second illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **21** is a side elevation view of the second illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **22** is a side perspective view of the second illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **23** is a top elevation view of a third illustrated embodiment of a bit holder in accordance with implementations of this disclosure;

FIG. **24** is a side elevation view of the third illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **25** is a detail elevation view of Detail C of the third illustrated embodiment of the bit holder of FIG. **24** in accordance with implementations of this disclosure;

FIG. **26** is a side perspective view of the third illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **27** is a detail perspective view of Detail D of the third illustrated embodiment of the bit holder of FIG. **26** in accordance with implementations of this disclosure;

FIG. **28** is an exploded top elevation view of the third illustrated embodiment of the bit holder and a bit holder block in accordance with implementations of this disclosure;

FIG. **29** is an exploded side elevation view of the third illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **30** is an exploded side perspective view of the third illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **31** is a top elevation view of the third illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **32** is a side elevation view of the third illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **33** is a side perspective view of the third illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **34** is a top elevation view of a fourth illustrated embodiment of a bit holder in accordance with implementations of this disclosure;

FIG. **35** is a side elevation view of the fourth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **36** is a detail elevation view of Detail E of the fourth illustrated embodiment of the bit holder of FIG. **35** in accordance with implementations of this disclosure;

FIG. **37** is a side perspective view of the fourth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **38** is a detail perspective view of Detail F of the fourth illustrated embodiment of the bit holder of FIG. **37** in accordance with implementations of this disclosure;

FIG. **39** is an exploded top elevation view of the fourth illustrated embodiment of the bit holder and a bit holder block in accordance with implementations of this disclosure;

FIG. **40** is an exploded side elevation view of the fourth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **41** is an exploded side perspective view of the fourth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **42** is a top elevation view of the fourth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **43** is a side elevation view of the fourth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **44** is a side perspective view of the fourth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **45** is a top elevation view of a fifth illustrated embodiment of a bit holder in accordance with implementations of this disclosure;

FIG. **46** is a side elevation view of the fifth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **47** is a detail elevation view of Detail G of the fifth illustrated embodiment of the bit holder of FIG. **46** in accordance with implementations of this disclosure;

FIG. **48** is a side perspective view of the fifth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **49** is a detail perspective view of Detail H of the fifth illustrated embodiment of the bit holder of FIG. **48** in accordance with implementations of this disclosure;

FIG. **50** is an exploded top elevation view of the fifth illustrated embodiment of the bit holder and a bit holder block in accordance with implementations of this disclosure;

FIG. **51** is an exploded side elevation view of the fifth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **52** is an exploded side perspective view of the fifth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **53** is a top elevation view of the fifth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **54** is a side elevation view of the fifth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **55** is a side perspective view of the fifth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **56** is a top elevation view of a sixth illustrated embodiment of a bit holder in accordance with implementations of this disclosure;

FIG. **57** is a side elevation view of the sixth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **58** is a detail elevation view of Detail I of the sixth illustrated embodiment of the bit holder of FIG. **57** in accordance with implementations of this disclosure;

FIG. **59** is a side perspective view of the sixth illustrated embodiment of the bit holder in accordance with implementations of this disclosure;

FIG. **60** is a detail perspective view of Detail J of the sixth illustrated embodiment of the bit holder of FIG. **59** in accordance with implementations of this disclosure;

FIG. **61** is an exploded top elevation view of the sixth illustrated embodiment of the bit holder and a bit holder block in accordance with implementations of this disclosure;

FIG. **62** is an exploded side elevation view of the sixth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **63** is an exploded side perspective view of the sixth illustrated embodiment of the bit holder and the bit holder block in accordance with implementations of this disclosure;

FIG. **64** is a top elevation view of the sixth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **65** is a side elevation view of the sixth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **66** is a side perspective view of the sixth illustrated embodiment of the bit holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure;

FIG. **67** is an exploded side elevation view of the fourth illustrated embodiment of the bit holder and a first illustrated embodiment of the unitary bit/holder, shown with a bit holder block and a bit, in accordance with implementations of this disclosure;

FIG. **68** is an exploded perspective view of the fourth illustrated embodiment of the bit holder and the first illustrated embodiment of the unitary bit/holder, shown with the bit holder block and the bit, in accordance with implementations of this disclosure;

FIG. **69** is a side perspective view of the fourth illustrated embodiment of the bit holder assembled with the bit into the first illustrated embodiment of the unitary bit/holder and the first illustrated embodiment of the unitary bit/holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure; and

FIG. **70** is a side elevation view of the fourth illustrated embodiment of the bit holder assembled with the bit into the first illustrated embodiment of the unitary bit/holder and the first illustrated embodiment of the unitary bit/holder assembled with the bit holder block, showing invisible internal elements in dotted lines, in accordance with implementations of this disclosure.

DETAILED DESCRIPTION

Road milling, mining, and trenching equipment utilizes bits traditionally set in a bit assembly having a bit holder and/or a bit holder block. In one embodiment, the bit is retained by the bit holder and the bit holder is retained in the bit holder block. In another embodiment a unitary bit/holder is retained in the bit holder block, hereinafter referred to as a base block. A plurality of the bit assemblies are mounted on the outside of a rotatable drum in staggered positions, typically in a V-shaped or spiral configuration, in an effort to create the smoothest road milling. The combinations of bit assemblies have been utilized to remove material from the terra firma, such as degrading the surface of the earth, minerals, cement, concrete, macadam or asphalt pavement. Individual bits, unitary bit/holders, bit holders, and base blocks may wear down or break over time due to the harsh road degrading environment. Additionally, the bit holder or the unitary bit/holder may be ejected out of the base block bore due to the harsh road degrading environment. A need has developed to provide a bit holder and/or a unitary bit/holder that makes a sufficient radial connection with the base block bore to prevent the bit holder and/or unitary bit/holder from being ejected out of the base block bore during harsh operations. Additionally, to provide greater radial force, a shank of the bit holder and/or unitary bit/holder comprises ribs, notches and/or relief zones adapted to reduce surface contact between the shank of the bit holder, and/or unitary bit/holder, and the base block bore.

Referring to FIGS. **1-12**, a first embodiment of a bit holder **10** comprises a bit holder body **12** and a shank **14** axially depending from the bottom of the bit holder body **12**. The bit holder body **12** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **16** axially extending from a top surface **18**, such as a flat annular top surface in this first illustrated embodiment. Subjacent the upper body portion **16** is a middle portion **20** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **22**. The middle portion **20**, in this illustrated embodiment, has an arcuate

shape. In other embodiments, the middle portion **20** can have a frustoconical shape, a convex shape, a concave shape, or an arcuate shape.

Adjacent the tire portion **22** is a tapered portion **24** (FIG. **3**) that ends in a flange **26** (FIGS. **3**, **5**, and **6**), such as a flat annular flange, of the bit holder body **12**. The tire portion **22** includes at least a pair of tapered cutouts **28**, **30** (FIGS. **1**, **5**, and **8**), or wedge-shaped undercuts to provide access and leverage for a tool to extract the bit holder **10** from a base block **70** (FIGS. **5-12**). The tapered cutouts **28**, **30** are formed into the tire portion **22** and extend from the flange **26** subjacent to the tire portion **22**. The tapered cutouts **28**, **30** include a pair of parallel flat vertical inner surfaces **32**, **34** (FIGS. **1** and **8**), respectively, and a pair of flat tapered top surfaces **36**, **38** (FIGS. **1** and **8**), respectively. The outer edge of the flat tapered top surfaces **36**, **38** is each arcuate in shape to follow the periphery of the tire portion **22**. An interior border of each tapered cutout **28**, **30** does not extend to a plane through the centerline of the bit holder **10** in this illustrated embodiment. A pair of notches **40**, **42** (FIGS. **1**, **2**, **5**, and **8**) are formed into the bit holder body **12** and extend from the flat annular top surface **18** through the upper body portion **16** and the middle portion **20**, terminating at a point within the middle portion **20**. The notches **40**, **42** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **12**.

A generally rounded annular or generally cylindrical undercut **44** (FIGS. **5**, **6**, **8**, **9**, **11**, and **12**) extends from the tire portion **22** to a generally cylindrical or annular first segment **46** of the shank **14**. The shank **14** axially depends from the flange **26** of the bit holder body **12**. The bit holder body **12** and the shank **14** are axially aligned about a bit holder bore **56** (FIGS. **2**, **7**, and **10-12**) that extends from the flat annular top surface **18** of the bit holder body **12** to a distal end **54** of the shank **14**. The first segment **46** of the shank **14** axially extends from the flange **26** to a second segment **48** that is subjacent to the first segment **46**. The second segment **48** can have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **46** or towards the distal end **54** of the shank **14**. A slot **58** extends from an upper termination **60** to the distal end **54** of the shank **14**. Subjacent the second segment **48** is a third segment **50** that axially extends to a decreased diameter fourth segment **52** adjacent the distal end **54** of the shank **14**. The fourth segment **52** is generally C-shaped when viewed from the distal end **54**.

In this first illustrated embodiment, the third segment **50** of the shank **14** includes a plurality of ribs **61** and a plurality of notches or relief zones **62**, shown in detail in FIG. **4**, which are U-shaped in this first illustrated embodiment, located between each rib in the plurality of ribs **61**. The plurality of ribs **61** and the plurality of notches or relief zones **62**, in this exemplary implementation, are disposed solely on an outer surface of the third segment **50** of the shank **14**. The plurality of notches **62** provide reduced surface contact between the third segment **50** and a complementary portion of a bore **72** (FIG. **7**) of the base block **70**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without a plurality of notches or relief zones. The base block **70** comprises a base **74** and receiving portion **76**, as shown in FIGS. **6** and **7**. The base **74** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **76** includes the base block bore **72** that is symmetrical with the shank **14** along a centerline. When assembled, after insertion of the shank **14** into the bore **72**, the shank **14** of the bit holder **10** forms an interference fit with the bore **72** of the base block **70**.

Referring to FIGS. **13-22**, a second embodiment of a bit holder **100** comprises a bit holder body **102** and a shank **104** substantially the same as the bit holder **10** of the first embodiment. The bit holder body **102** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **106** axially extending from a top surface **108**, such as a flat annular top surface in this second illustrated embodiment. Subjacent the upper body portion **106** is a middle portion **110** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **112**. The middle portion **110**, in this illustrated embodiment, has an arcuate shape. In other embodiments, the middle portion **110** can have a frustoconical shape, a convex shape, a concave shape, or an arcuate shape.

Adjacent the tire portion **112** is a tapered portion **114** (FIGS. **14** and **18**) that ends in a flange **116** (FIGS. **13**, **14**, **17**, and **18**), such as a flat annular flange, of the bit holder body **102**. The tire portion **112** includes at least a pair of tapered cutouts **118**, **120** (FIGS. **13**, **17**, and **20**), or wedge-shaped undercuts, to provide access and leverage for a tool to extract the bit holder **100** from a base block **160** (FIGS. **17-22**). The tapered cutouts **118**, **120** are formed into the tire portion **112** and extend from the flange **116** subjacent to the tire portion **112**. The tapered cutouts **118**, **120** include a pair of parallel flat vertical inner surfaces **122**, **124** (FIGS. **13**, **17**, and **20**), respectively, and a pair of flat tapered top surfaces **126**, **128** (FIGS. **13**, **17**, and **20**), respectively. The outer edge of the flat tapered top surfaces **126**, **128** is each arcuate in shape to follow the periphery of the tire portion **112**. An interior border of each tapered cutout **118**, **120** does not extend to a plane through the centerline of the bit holder **100** in this illustrated embodiment. A pair of notches **130**, **132** (FIGS. **13**, **15**, **17**, **19**, and **20**) are formed into the bit holder body **102** and extend from the flat annular top surface **108** through the upper body portion **106** and the middle portion **110**, terminating at a point within the middle portion **110**. The notches **130**, **132** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **102**.

A generally rounded annular or generally cylindrical undercut **134** (FIGS. **14** and **20**) extends from the tire portion **112** to a generally cylindrical or annular first segment **136** of the shank **104**. The shank **104** axially depends from the flange **116** of the bit holder body **102**. The bit holder body **102** and the shank **104** are axially aligned about a bit holder bore **146** (FIGS. **13-15** and **19-22**) that extends from the flat annular top surface **108** of the bit holder body **102** to a distal end **144** of the shank **104**. The first segment **136** of the shank **104** axially extends from the flange **116** to a second segment **138** that is subjacent to the first segment **136**. The second segment **138** can have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **136** or towards the distal end **144** of the shank **104**. A slot **148** extends from an upper termination **150** to the distal end **144** of the shank **104**. Subjacent the second segment **138** is a third segment **140** that axially extends to a decreased diameter fourth segment **142** adjacent the distal end **144** of the shank **104**. The fourth segment **142** is generally C-shaped when viewed from the distal end **144**.

In this second illustrated embodiment, the third segment **140** of the shank **104** includes a plurality of ribs **151** and at least one notch or relief zone **152**, shown in detail in FIG. **16**, between each rib in the plurality of ribs **151**. The plurality of ribs **151** and the at least one notches or relief zone **152**, in this exemplary implementation, are disposed solely on an

outer surface of the third segment **140** of the shank **104**. The at least one notch or relief zone **152** provides reduced surface contact between the third segment **140** and a complementary portion of a bore **162** (FIG. **19**) of the base block **160**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without at least one notch or relief zone. The base block **160** comprises a base **164** and receiving portion **166**, as shown in FIGS. **18** and **19**. The base **164** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **166** includes the base block bore **162** that is symmetrical with the shank **104** along a centerline. When assembled, after insertion of the shank **104** into the bore **162**, the shank **104** of the bit holder **100** forms an interference fit with the bore **162** of the base block **160**.

Referring to FIGS. **23-33**, a third embodiment of a bit holder **200** comprises a bit holder body **202** and a shank **204** substantially the same as the bit holder **10** of the first embodiment. The bit holder body **202** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **206** axially extending from a top surface **208**, such as a flat annular top surface in this third illustrated embodiment. Subjacent the upper body portion **206** is a middle portion **210** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **212**. The middle portion **210**, in this illustrated embodiment, has an arcuate shape. In other embodiments, the middle portion **210** can have a frustoconical shape, a convex shape, a concave shape, or an arcuate shape.

Adjacent the tire portion **212** is a tapered portion **214** (FIGS. **24** and **29**) that ends in a flange **216** (FIGS. **24** and **29**), such as a flat annular flange, of the bit holder body **202**. The tire portion **212** includes at least a pair of tapered cutouts **218**, **220** (FIGS. **23**, **28**, and **31**), or wedge-shaped undercuts, to provide access and leverage for a tool to extract the bit holder **200** from a base block **260** (FIGS. **28-33**). The tapered cutouts **218**, **220** are formed into the tire portion **212** and extend from the flange **216** subjacent to the tire portion **212**. The tapered cutouts **218**, **220** include a pair of parallel flat vertical inner surfaces **222**, **224** (FIGS. **23**, **28**, and **31**), respectively, and a pair of flat tapered top surfaces **226**, **228** (FIGS. **23**, **28**, and **31**), respectively. The outer edge of the flat tapered top surfaces **226**, **228** is each arcuate in shape to follow the periphery of the tire portion **212**. An interior border of each tapered cutout **218**, **220** does not extend to a plane through the centerline of the bit holder **200** in this illustrated embodiment. A pair of notches **230**, **232** (FIGS. **23**, **26**, **28**, **30**, and **31**) are formed into the bit holder body **202** and extend from the flat annular top surface **208** through the upper body portion **206** and the middle portion **210**, terminating at a point within the middle portion **210**. The notches **230**, **232** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **202**.

A generally rounded annular or generally cylindrical undercut **234** (FIGS. **31** and **32**) extends from the tire portion **212** to a generally cylindrical or annular first segment **236** of the shank **204**. The shank **204** axially depends from the flange **216** of the bit holder body **202**. The bit holder body **202** and the shank **204** are axially aligned about a bit holder bore **246** (FIGS. **26** and **30-33**) that extends from the flat annular top surface **208** of the bit holder body **202** to a distal end **244** of the shank **204**. The first segment **236** of the shank **204** axially extends from the flange **216** to a second segment **238** that is subjacent to the first segment **236**. The second segment **238** can have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **236** or towards the distal end **244** of the shank **204**. A slot **248** extends from an upper termination **250** to the distal end **244** of the shank **204**. Subjacent the second segment **238** is a third segment **240** that axially extends to a decreased diameter fourth segment **242** adjacent the distal end **244** of the shank **204**. The fourth segment **242** is generally C-shaped when viewed from the distal end **244**.

In this third illustrated embodiment, the third segment **240** of the shank **204** includes a plurality of ribs **251** and a plurality of notches or relief zones **252**, shown in detail in FIGS. **25** and **27**, between each rib in the plurality of ribs **251**. The plurality of ribs **251** and the plurality of notches or relief zones **252**, in this exemplary implementation, are disposed solely on an outer surface of the third segment **240** of the shank **204**. The edges or sides of each rib in the plurality of ribs **251** are disposed at an acute angle, in this embodiment, to a plane through the centerline of the bit holder **200**. In other embodiments the edges or sides of each rib in the plurality of ribs **251** can be disposed at an obtuse angle to or perpendicular to a plane through the centerline of the bit holder **200**. The plurality of notches **252** provide reduced surface contact between the third segment **240** and a complementary portion of a bore **262** (FIG. **30**) of the base block **260**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without at least one notch or relief zone. The base block **260** comprises a base **264** and receiving portion **266**, as shown in FIGS. **29** and **30**. The base **264** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **266** includes the base block bore **262** that is symmetrical with the shank **204** along a centerline. When assembled, after insertion of the shank **204** into the bore **262**, the shank **204** of the bit holder **200** forms an interference fit with the bore **262** of the base block **260**.

Referring to FIGS. **34-44**, a fourth embodiment of a bit holder **300** comprises a bit holder body **302** and a shank **304** axially depending from the bottom of the bit holder body **302**. The bit holder body **302** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **306** axially extending from a top surface **308**, such as a flat annular top surface in this fourth illustrated embodiment. Subjacent the upper body portion **306** is a middle portion **310** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **312**. The middle portion **310**, in this illustrated embodiment, has an arcuate shape. In other embodiments, the middle portion **310** can have a frustoconical shape, a convex shape, or an arcuate shape.

Adjacent the tire portion **312** is a tapered portion **314** (FIGS. **35** and **40**) that ends in a flange **316** (FIGS. **35**, **39**, and **40**), such as a flat annular flange, of the bit holder body **302**. The tire portion **312** includes at least a pair of tapered cutouts **318**, **320** (FIGS. **34**, **39**, and **42**), or wedge-shaped undercuts to provide access and leverage for a tool to extract the bit holder **300** from a base block **360** (FIGS. **39-44**). The tapered cutouts **318**, **320** are formed into the tire portion **312** and extend from the flange **316** subjacent to the tire portion **312**. The tapered cutouts **318**, **320** include a pair of parallel flat vertical inner surfaces **322**, **324** (FIGS. **34**, **39**, and **42**), respectively, and a pair of flat tapered top surfaces **326**, **328** (FIGS. **34**, **39**, and **42**), respectively. The outer edge of the flat tapered top surfaces **326**, **328** is each arcuate in shape to

follow the periphery of the tire portion **312**. An interior border of each tapered cutout **318**, **320** does not extend to a plane through the centerline of the bit holder **300** in this illustrated embodiment. A pair of notches **330**, **332** (FIGS. **34**, **39**, **41**, and **42**) are formed into the bit holder body **302** and extend from the flat annular top surface **308** through the upper body portion **306** and the middle portion **310**, terminating at a point within the middle portion **310**. The notches **330**, **332** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **302**.

A generally rounded annular or generally cylindrical undercut **334** (FIGS. **42** and **43**) extends from the tire portion **312** to a generally cylindrical or annular increased diameter first segment **336** of the shank **304**. The shank **304** axially depends from the flange **316** of the bit holder body **302**. The bit holder body **302** and the shank **304** are axially aligned about a bit holder bore **346** (FIGS. **37** and **41-44**) that extends from the flat annular top surface **308** of the bit holder body **302** to a distal end **344** of the shank **304**. The first segment **336** of the shank **304** axially extends from the flange **316** to a shoulder **337** that is subjacent to the first segment **336**. A decreased diameter second segment **338**, subjacent the shoulder **337**, axially extends to an increased diameter third segment **340**. The second segment **338** can have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **336** or towards the distal end **344** of the shank **304**. A slot **348** extends from an upper termination **350** to the distal end **344** of the shank **304**. A decreased diameter fourth segment **342** axially extends from the third segment **340** to a location adjacent the distal end **344** of the shank **304**. The fourth segment **342** is generally C-shaped when viewed from the distal end **344**.

In this fourth illustrated embodiment, the third segment **340** of the shank **304** includes a plurality of ribs **351** and a plurality of notches or relief zones **352**, shown in detail in FIGS. **36** and **38**, which are U-shaped in this fourth illustrated embodiment, located between each rib in the plurality of ribs **351**. The plurality of ribs **351** and the plurality of notches or relief zones **352**, in this exemplary implementation, are disposed solely on an outer surface of the third segment **340** of the shank **304**. The plurality of notches **352** provide reduced surface contact between the third segment **340** and a complementary portion of a bore **362** (FIG. **41**) of the base block **360**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without a plurality of notches or relief zones. The base block **360** comprises a base **364** and receiving portion **366**, as shown in FIGS. **40** and **41**. The base **364** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **366** includes the base block bore **362** that is symmetrical with the shank **304** along a centerline. When assembled, after insertion of the shank **304** into the bore **362**, the shank **304** of the bit holder **300** forms an interference fit with the bore **362** of the base block **360**.

Bits and their respective bit holders may be combined into a unitary structure. A first illustrated embodiment of a unitary bit/holder **370**, shown in FIGS. **67-70**, comprises the fourth illustrated embodiment of the bit holder **300** and a bit **372** which are assembled together into a unitary structure to form the unitary bit/holder **370**. In other embodiments, the unitary bit/holder **370** may comprise the first illustrated embodiment of the bit holder **10**, the second illustrated embodiment of the bit holder **100**, the third illustrated embodiment of the bit holder **200**, the fifth illustrated embodiment of the bit holder **400**, or the sixth illustrated embodiment of the bit holder **500** assembled together with the bit **372** to form the unitary structure of the into a unitary bit/holder. All these members are brazed in their respective recesses to form a generally unitary bit/holder that fits in a bit holder block bore. The unitary bit/holder **370** of this first illustrated embodiment is then assembled into the base block **360**, which comprises insertion of the shank **304** into the bore **362** of the base block **360**, forming an interference fit between the shank **304** of the bit holder **300** and the bore **362** of the base block **360**. In other embodiments, the unitary bit/holder may be assembled into the base block **70**, base block **160**, base block **260**, base block **460**, or base block **560**.

Referring to FIGS. **45-55**, a fifth embodiment of a bit holder **400** comprises a bit holder body **402** and a shank **404** substantially the same as the bit holder **300** of the fourth embodiment. The bit holder body **402** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **406** axially extending from a top surface **408**, such as a flat annular top surface in this fifth illustrated embodiment. Subjacent the upper body portion **406** is a middle portion **410** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **412**. The middle portion **410**, in this illustrated embodiment, has an arcuate shape. In other embodiments, the middle portion **410** can have a frustoconical shape, a convex shape, a concave shape, or an arcuate shape.

Adjacent the tire portion **412** is a tapered portion **414** (FIGS. **46** and **51**) that ends in a flange **416** (FIGS. **45**, **46**, **50**, and **51**), such as a flat annular flange, of the bit holder body **402**. The tire portion **412** includes at least a pair of tapered cutouts **418**, **420** (FIGS. **45**, **50**, and **53**), or wedge-shaped undercuts to provide access and leverage for a tool to extract the bit holder **400** from a base block **460** (FIGS. **50-55**). The tapered cutouts **418**, **420** are formed into the tire portion **412** and extend from the flange **416** subjacent to the tire portion **412**. The tapered cutouts **418**, **420** include a pair of parallel flat vertical inner surfaces **422**, **424** (FIGS. **45**, **50**, and **53**), respectively, and a pair of flat tapered top surfaces **426**, **428** (FIGS. **45**, **50**, and **53**), respectively. The outer edge of the flat tapered top surfaces **426**, **428** is each arcuate in shape to follow the periphery of the tire portion **412**. An interior border of each tapered cutout **418**, **420** does not extend to a plane through the centerline of the bit holder **400** in this illustrated embodiment. A pair of notches **430**, **432** (FIGS. **45**, **48**, **50**, **52**, **53**, and **55**) are formed into the bit holder body **402** and extend from the flat annular top surface **408** through the upper body portion **406** and the middle portion **410**, terminating at a point within the middle portion **410**. The notches **430**, **432** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **402**.

A generally rounded annular or generally cylindrical undercut **434** (FIGS. **53** and **54**) extends from the tire portion **412** to a generally cylindrical or annular increased diameter first segment **436** of the shank **404**. The shank **404** axially depends from the flange **416** of the hit holder body **402**. The bit holder body **402** and the shank **404** are axially aligned about a bit holder bore **446** (FIGS. **48** and **52-55**) that extends from the flat annular top surface **408** of the bit holder body **402** to a distal end **444** of the shank **404**. The first segment **436** of the shank **404** axially extends from the flange **416** to a shoulder **437** that is subjacent to the first segment **436**. A decreased diameter second segment **438**, subjacent the shoulder **437**, axially extends to an increased diameter third segment **440**. The second segment **438** can

have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **436** or towards the distal end **444** of the shank **404**. A slot **448** extends from an upper termination **450** to the distal end **444** of the shank **404**. A decreased diameter fourth segment **442** axially extends from the third segment **440** to a location adjacent the distal end **444** of the shank **404**. The fourth segment **442** is generally C-shaped when viewed from the distal end **444**.

In this fifth illustrated embodiment, the third segment **440** of the shank **404** includes a plurality of ribs **451** and at least one notch or relief zone **452**, shown in detail in FIGS. **47** and **49**, between each rib in the plurality of ribs **451**. The plurality of ribs **451** and the at least one notches or relief zone **452**, in this exemplary implementation, are disposed solely on an outer surface of the third segment **440** of the shank **404**. The at least one notch or relief zone **452** provides reduced surface contact between the third segment **440** and a complementary portion of a bore **462** (FIG. **52**) of the base block **460**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without a plurality of notches or relief zones. The base block **460** comprises a base **464** and receiving portion **466**, as shown in FIGS. **51** and **52**. The base **464** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **466** includes the base block bore **462** that is symmetrical with the shank **404** along a centerline. When assembled, after insertion of the shank **404** into the bore **462**, the shank **404** of the bit holder **400** forms an interference fit with the bore **462** of the base block **460**.

Referring to FIGS. **56-66**, a sixth embodiment of a bit holder **500** comprises a bit holder body **502** and a shank **504** substantially the same as the bit holder **300** of the fourth embodiment. The bit holder body **502** is generally annular in shape and comprises an annular or generally cylindrical upper body portion **506** axially extending from a top surface **508**, such as a flat annular top surface in this sixth illustrated embodiment. Subjacent the upper body portion **506** is a middle portion **510** that extends axially and radially outwardly to a radially extending generally cylindrical tire portion **512**. The middle portion **510**, in this illustrated embodiment, has an arcuate shape. In other embodiments, the middle portion **510** can have a frustoconical shape, a convex shape, a concave shape, or an arcuate shape.

Adjacent the tire portion **512** is a tapered portion **514** (FIGS. **57** and **62**) that ends in a flange **516** (FIGS. **57**, **61**, and **62**), such as a flat annular flange, of the bit holder body **502**. The tire portion **512** includes at least a pair of tapered cutouts **518**, **520** (FIGS. **56**, **61**, and **64**), or wedge-shaped undercuts to provide access and leverage for a tool to extract the bit holder **500** from a base block **560** (FIGS. **61-66**). The tapered cutouts **518**, **520** are formed into the tire portion **512** and extend from the flange **516** subjacent to the tire portion **512**. The tapered cutouts **518**, **520** include a pair of parallel flat vertical inner surfaces **522**, **524** (FIGS. **56**, **61**, and **64**), respectively, and a pair of flat tapered top surfaces **526**, **528** (FIGS. **56**, **61**, and **64**), respectively. The outer edge of the flat tapered top surfaces **526**, **528** is each arcuate in shape to follow the periphery of the tire portion **512**. An interior border of each tapered cutout **518**, **520** does not extend to a plane through the centerline of the bit holder **500** in this illustrated embodiment. A pair of notches **530**, **532** (FIGS. **56**, **59**, **61**, **63**, **64**, and **66**) are formed into the bit holder body **502** and extend from the flat annular top surface **508** through the upper body portion **506** and the middle portion **510**, terminating at a point within the middle portion **510**. The notches **530**, **532** provide access and leverage for a tool to extract, or knock out, a bit from the bit holder body **502**.

A generally rounded annular or generally cylindrical undercut **534** (FIGS. **64** and **65**) extends from the tire portion **512** to a generally cylindrical or annular increased diameter first segment **536** of the shank **504**. The shank **504** axially depends from the flange **516** of the bit holder body **502**. The bit holder body **502** and the shank **504** are axially aligned about a bit holder bore **546** (FIGS. **59** and **63-66**) that extends from the flat annular top surface **508** of the bit holder body **502** to a distal end **544** of the shank **504**. The first segment **536** of the shank **504** axially extends from the flange **516** to a shoulder **537** that is subjacent to the first segment **536**. A decreased diameter second segment **538**, subjacent the shoulder **537**, axially extends to an increased diameter third segment **540**. The second segment **538** can have a generally cylindrical shape, an arcuate shape, or can be tapered towards the first segment **536** or towards the distal end **544** of the shank **504**. A slot **548** extends from an upper termination **550** to the distal end **544** of the shank **504**. A decreased diameter fourth segment **542** axially extends from the third segment **540** to a location adjacent the distal end **544** of the shank **504**. The fourth segment **542** is generally C-shaped when viewed from the distal end **544**.

In this sixth illustrated embodiment, the third segment **540** of the shank **504** includes a plurality of ribs **551** and a plurality of notches or relief zones **552**, shown in detail in FIGS. **58** and **60**, between each rib in the plurality of ribs **551**. The plurality of ribs **551** and the plurality of notches or relief zones **552**, in this exemplary implementation, are disposed solely on an outer surface of the third segment **540** of the shank **504**. The edges or sides of each rib in the plurality of ribs **551** are disposed at an acute angle, in this embodiment, to a plane through the centerline of the bit holder **500**. In other embodiments the edges or sides of each rib in the plurality of ribs **551** can be disposed at an obtuse angle to or perpendicular to a plane through the centerline of the bit holder **500**. The plurality of notches **552** provide reduced surface contact between the third segment **540** and a complementary portion of a bore **562** (FIG. **63**) of the base block **560**, which yields a more evenly distributed and more highly concentrated force per segment when compared to a bit holder having a shank with a segment with no material removed, i.e., without a plurality of notches or relief zones. The base block **560** comprises a base **564** and receiving portion **566**, as shown in FIGS. **62** and **63**. The base **564** can be flat or slightly concave to fit a drum or additional mounting plates on which a singular or a plurality of base blocks can be mounted. The receiving portion **566** includes the base block bore **562** that is symmetrical with the shank **504** along a centerline. When assembled, after insertion of the shank **504** into the bore **562**, the shank **504** of the bit holder **500** forms an interference fit with the bore **562** of the base block **560**.

As used in this application, the term "or" is intended to mean an inclusive "or" rather than an exclusive "or". That is, unless specified otherwise, or clear from context, "X includes A or B" is intended to mean any of the natural inclusive permutations. That is, if X includes A; X includes B; or X includes both A and B, then "X includes A or B" is satisfied under any of the foregoing instances. In addition, "X includes at least one of A and B" is intended to mean any of the natural inclusive permutations. That is, if X includes A; X includes B; or X includes both A and B, then "X includes at least one of A and B" is satisfied under any of the foregoing instances. The articles "a" and "an" as used in this

application and the appended claims should generally be construed to mean "one or more" unless specified otherwise or clear from context to be directed to a singular form. Moreover, use of the term "an implementation" or "one implementation" throughout is not intended to mean the same embodiment, aspect or implementation unless described as such.

While the present disclosure has been described in connection with certain embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims, which scope is to be accorded the broadest interpretation so as to encompass all such modifications and equivalent structures as is permitted under the law.

What is claimed is:

1. A bit holder comprising:
a forward body portion having a bottom;
a generally cylindrical hollow shank depending axially from the bottom of the forward body portion, the shank comprising:
a first segment adjacent a distal end of the shank, the first segment comprising a plurality of ribs solely around a first outer surface of the first segment;
a slot axially extending from the distal end of the shank to a slot termination disposed in a second segment adjacent the first segment, the second segment comprising a smooth second outer surface, a first diameter of the first segment subjacent the second segment greater than a second diameter of the second segment; and
a bore axially extending from a forward end of the forward body portion to the distal end of the shank, a portion of the bore internally adjacent the first segment, the portion including a smooth surface.

2. The bit holder of claim **1**, further comprising:
at least one notch disposed between each rib of the plurality of ribs.

3. The bit holder of claim **2**, wherein the at least one notch is U-shaped.

4. The bit holder of claim **2**, wherein the at least one notch includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right angle to a plane through a centerline of the bit holder.

5. The bit holder of claim **1**, wherein each rib in the plurality of ribs includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right angle to a plane through a centerline of the bit holder.

6. The bit holder of claim **1**, wherein the plurality of ribs is adapted to reduce a surface contact between the segment and a complementary portion of a bore of a base block and to provide a more evenly distributed and more highly concentrated force per segment.

7. A unitary bit/holder comprising:
a forward body portion having a bottom;
a generally cylindrical hollow shank depending axially from the bottom of the forward body portion, the shank comprising:
a first segment adjacent a distal end of the shank, the first segment comprising a plurality of ribs solely around a first outer surface of the first segment;
a slot axially extending from the distal end of the shank to a slot termination disposed in a second segment adjacent the first segment, the second segment comprising a smooth second outer surface, a first diameter of the first segment subjacent the second segment greater than a second diameter of the second segment; and
a bore axially extending from a forward end of the forward body portion to the distal end of the shank, a portion of the bore internally adjacent the first segment, the portion including a smooth surface.

8. The unitary bit/holder of claim **7**, further comprising:
at least one notch disposed between each rib of the plurality of ribs.

9. The unitary bit/holder of claim **8**, wherein the at least one notch is U-shaped.

10. The unitary bit/holder of claim **8**, wherein the at least one notch includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right angle to a plane through a centerline of the unitary bit/holder.

11. The unitary bit/holder of claim **7**, wherein each rib in the plurality of ribs includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right angle to a plane through a centerline of the unitary bit/holder.

12. The unitary bit/holder of claim **7**, wherein the plurality of ribs is adapted to reduce a surface contact between the segment and a complementary portion of a bore of a base block and to provide a more evenly distributed and more highly concentrated force per segment.

13. A combination for a bit assembly comprising:
one of a unitary bit/holder and a bit holder comprising:
a forward body portion having a bottom;
a generally cylindrical hollow shank depending axially from the bottom of the forward body portion, the shank comprising:
a first segment adjacent a distal end of the shank, the first segment comprising a plurality of ribs solely around a first outer surface of the first segment;
a slot axially extending from the distal end of the shank to a slot termination disposed in a second segment adjacent the first segment, the second segment comprising a smooth second outer surface, a first diameter of the first segment subjacent the second segment greater than a second diameter of the second segment;
a shank bore axially extending from a forward end of the forward body portion to the distal end of the shank, a portion of the shank bore internally adjacent the first segment, the portion including a smooth surface; and
a base block comprising a base block bore adapted to make an interference contact with at least the first segment of the shank, the plurality of ribs adapted to reduce a surface contact between the first segment and a complementary portion of the base block bore of the base block and to provide a more evenly distributed and more highly concentrated force per segment.

14. The combination of claim **13**, further comprising:
at least one notch disposed between each rib of the plurality of ribs.

15. The combination of claim **14**, wherein the at least one notch is U-shaped.

16. The combination of claim **14**, wherein the at least one notch includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right angle to a plane through a centerline of at least one of the unitary bit/holder and the bit holder.

17. The combination of claim **13**, wherein each rib in the plurality of ribs includes a pair of sides, each side disposed at at least one of an acute angle, an obtuse angle, and a right

angle to a plane through a centerline of at least one of the unitary bit/holder and the bit holder.

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