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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

5D TACTICAL, LLC, Plaintiff, vs. 80 PERCENT ARMS INC. and TILDEN SMITH Defendants.	Case No.: CV 18-1759 **COMPLAINT AND JURY DEMAND** Judge: Complaint Filed: September 27, 2018 Trial Date: None

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NATURE OF THE ACTION

1. This is an action to stop (1) the Defendants' infringement of Plaintiff 5D Tactical LLC's ("5D Tactical's") United States Patent No. 9,982,958 entitled "IMPROVED JIG FOR MANUFACTURING OF FIREARM LOWER RECEIVER," (2) the Defendants' infringement of the distinctive trade dress of 5D Tactical's Router Jig Pro; and (3) the Defendants' infringement of 5D Tactical's copyrighted marketing materials. A copy of the '958 patent is attached hereto as Exhibit A. 5D Tactical seeks injunctive relief and monetary damages.

2. 5D Tactical filed a related action before this Court against Defendant 80 Percent Arms Inc. on May 29, 2018 regarding a different line of products (the "Easy Jig Gen 2" Products), which is docketed as Case No. 18-cv-00917.

THE PARTIES

3. 5D Tactical is a limited liability company organized and existing under the laws of Massachusetts with its principal place of business at 125 Flanders Rd, Ste. 2, Westborough, MA 01581.

4. Upon information and belief, Defendant 80 Percent Arms Inc. ("80 Percent Arms"), is a corporation organized and existing under the laws of the State of California, with its principal place of business located at 12282 Monarch St., Garden Grove, CA 92841.

5. Upon information and belief, Defendant Tilden Smith ("Smith") is the President and co-owner of 80 Percent Arms and is an individual doing business in California and residing in California.

JURISDICTION AND VENUE

6. This action arises under the Patent Laws of the United States, 35 U.S.C. § 1 et seq., including 35 U.S.C. §§ 271, 281, 283, 284, and 285, under the Lanham Act, 15 U.S.C. §§ 1051-1129, and under the Copyright Act of the United States, 17 U.S.C. § 101 et seq.

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7. This Court has subject matter jurisdiction over this case under 28 U.S.C. §§ 1331, 1367, and 1338(a).

8. The Court has personal jurisdiction over 80 Percent Arms because 80 Percent Arms has minimum contacts within the State of California and the Central District of California ("this Jurisdiction"). 80 Percent Arms is a California company, and 80 Percent Arms has purposefully availed itself of the privilege of conducting business in this Jurisdiction. Upon information and belief, 80 Percent Arms regularly conducts business within this Jurisdiction. Plaintiff's cause of action arises directly from 80 Percent Arms' business contacts and other activities in this Jurisdiction.

9. The Court has personal jurisdiction over Smith because Smith has minimum contacts within the State of California and the Central District of California (the "Jurisdiction"). Smith has purposefully availed himself of the privilege of conducting business in this Jurisdiction. Upon information and belief, Smith regularly conducts business within this Jurisdiction. Plaintiff's cause of action arises directly from Smith's business contacts and other activities in this Jurisdiction.

10. More specifically, the Defendants, directly and/or through intermediaries, ship, distribute, offer for sale, sell, and/or advertise their products in the United States and in this Jurisdiction.

11. The Defendants have committed patent infringement in this Jurisdiction, have contributed to patent infringement in this Jurisdiction and/or have induced others to commit patent infringement in this Jurisdiction.

12. Venue is proper pursuant to 28 U.S.C. § 1400(b) and 28 U.S.C. 1391(b) because a substantial part of the events or omissions giving rise to 5D Tactical's causes of action against Defendants occurred in this judicial district.

FACTS

13. A market exists for incompletely/partially manufactured firearm lower receivers. A firearm lower receiver is unregulated until a minimum level of

manufacturing is completed. This level is typically known as "80%." Firearm lower receivers completed to this level are typically referred to as "80% lower receivers."

14. These 80% lower receivers must then be completed by the end user to be operable. In a typical configuration the lower receiver is cast and/or forged and is partially machined, with certain aspects of an inner slot, in which a trigger mechanism resides, remaining uncut. The finishing task cuts this remaining slot with appropriate dimensions and accuracy.

15. 5D Tactical is a leading innovator and manufacturer in the field of 80% lower receivers.

16. Wayne Partington of 5D Tactical invented a jig that can be used in the manufacturing process by an end user to achieve significantly superior results. Prior to this new jig, the completion of an 80% lower receiver was time consuming and difficult, with uneven quality results.

17. On October 5, 2016, Mr. Partington, based on his innovative work, applied for a provisional patent from the United States Patent and Trademark Office ("USPTO"). That application was assigned serial no. 62/404,710.

18. After a full and fair examination of non-provisional patent application serial no. 15/726,351, the USPTO duly and legally issued United States Patent No. 9,982,958 (the "'958 Patent"), entitled "IMPROVED JIG FOR MANUFACTURING OF FIREARM LOWER RECEIVER" on May 29, 2018.

19. The inventor of the '958 Patent, Mr. Partington, has assigned all right, title, and interest in and to the '958 Patent, including all rights of recovery under the '958 Patent and the right to sue for infringement and recover past damages, to 5D Tactical.

20. 5D Tactical makes and sells a jig incorporating the invention of the '958 Patent called the Router Jig Pro.

21. 80 Percent Arms is also in the business of making and selling 80% lower receivers.

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22. Prior to working at 5D Tactical, Mr. Partington worked for 80 Percent Arms as an independent contractor. Mr. Partington was hired by Smith, the President and co-owner of 80 Percent Arms, because Smith was impressed with Mr. Partington's ideas. Through numerous interactions before, while working with, and after working with 80 Percent Arms, Mr. Partington has been able to observe Smith's role at 80 Percent Arms. 80 Percent arms is run and controlled by Smith. Smith controls the day-to-day activities of 80 Percent Arms and Smith directs or otherwise oversees all activities of the 80 Percent Arms, including the manufacture and sale of products. 80 Percent and Tilden Smith are largely interchangeable in terms of their roles in infringing 5D Tactical's intellectual property.

23. On or around November 3, 2017, Modulus Designs, Inc., another company in the business of making and selling 80% lower receivers, purportedly sold substantially all of its assets to 80 Percent Arms, including the rights to the Modulus Arms name.

24. The sale of substantially all of Modulus' assets to 80 Percent Arms is currently the subject of a shareholder lawsuit filed in the District of Nevada (Clark County Case No. A-17-764340-B) alleging that the sale was improper.

25. Pending the result of the shareholder lawsuit, upon information and belief, Modulus is acting as a wholly owned subsidiary of 80 Percent Arms.

26. On or around September 19, 2018, 80 Percent Arms began selling a copy of 5D Tactical's Router Jig Pro under the name "Modulus Arms" on the website ModulusArms.com, called the "Router Jig Extreme."

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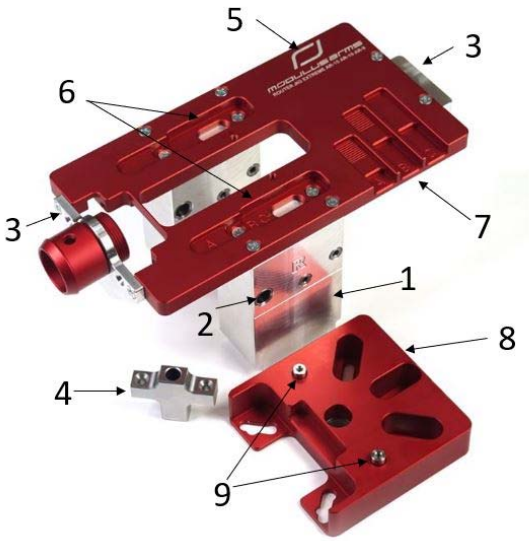
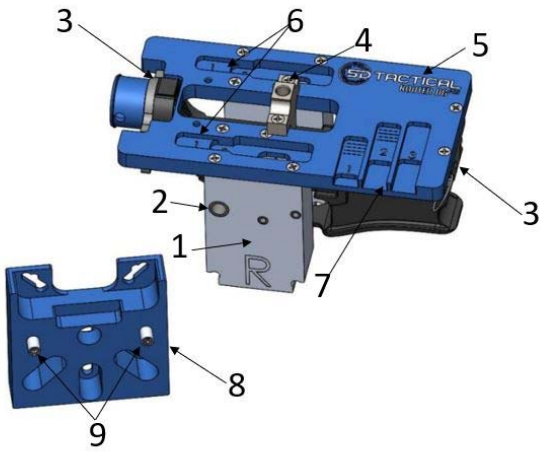
27. An annotated image comparing the Defendants' Router Jig Extreme (left) with 5D Tactical's Router Jig Pro (right) is shown below.



Modulus Jig, Released 9/2018



Pro Jig, Released 11/2017

28. There is only one noticeable difference between the appearance of 5D Tactical's Router Jig Pro ("Router Jig Pro Trade Dress") and the Defendants' Router Jig Extreme: one is blue and the other is red.

29. End-users have commented on Facebook.com that the Router Jig Extreme very closely resembles the Router Jig Pro and looks like a knock-off with a different color.

30. Other than this minor difference, Defendants copied the overall appearance of the Router Jig Pro in its entirety. The overall appearance of the two jigs is the same, including but not limited to the following nonfunctional visual features:

a. both jigs have a colorful guide plate;

b. both jigs have adapters shaped the same and sharing a color with the guide plate;

c. both jigs have metallic side plates shaped the same way;

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d. both jigs have a rectangular shaped guide plate with rounded edges;

e. both jigs have metallic, visible screwheads;

f. both jigs have a logo in the same location, and the logo is roughly the same size; and

g. both jigs have a depth gauge in the same location, at the top right side of the guide plate.

31. The 5D Tactical website, at https://www.5dtactical.com/end-mill-80-lower-jig-p/5d-rm.htm, lists a tool, called an end mill, for milling lower receivers. 5D Tactical's tool is called the Router Jig Pro ReadyMILL. Along with this tool, 5D Tactical has published a product description on the product's web page. 5D Tactical has applied to register this copyright with the Copyright Office. A copy of the copyright application is attached as Exhibit B.

32. On or around when the Defendants began selling the Router Jig Extreme, the Defendants also began selling an end mill called the Router Jig Extreme SpeedMILL on their website at http://www.modulusarms.com/router-jig-extreme-speedmill/, also available at https://perma.cc/PP6B-4BRL. A screenshot of this website taken at 5:19 PM on September 27, 2018 is attached as Exhibit C. Many portions of the product description for the Defendants' Router Jig Extreme SpeedMILL use the same text and descriptions as the product description for 5D Tactical's Router Jig Pro ReadyMILL.

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33. Upon information and belief, the Defendants' accessed 5D Tactical's product description of the Router Jig Pro ReadyMILL from https://www.5dtactical.com/end-mill-80-lower-jig-p/5d-rm.htm and copied substantial portions of that product description when writing their product description for the Defendants' Router Jig Extreme SpeedMILL. A screenshot of the Router Jig Pro ReadyMILL website taken at 5:19 PM on September 27, 2018 is attached as Exhibit D. The images below show the similarities between the product description for 5D Tactical's ReadyMILL (top) and the Defendants' SpeedMILL (bottom).

Our Patent Pending ReadyMILL™ is the strongest and most rigid 80% lower jig tool available for router-based milling, period. This advanced technology utilizes the latest in CNC manufacturing, through the use of a thermal fit tool holder which threads directly to the router. Threading directly to the router eliminates the possibility of the end mill pulling out from the collet while milling, a common fail point that exists with ***all*** other jigs.

The tool holder portion of the 80% lower jig tool is super-heated to accept our custom 5/16" diameter end mill, which has been optimized in every facet for 80% lower milling. The end mill being thermal fit into the tool holder means it will never slip out during use. However, the end mill portion of the ReadyMILL™ ***is*** replaceable by the end user at a much reduced cost to previous end mill designs.

The length of the end mill portion of the ReadyMILL™ by 5D Tactical has been reduced to only 1.5 inches! This is less than half the length of any other end mill available for router based 80% lower milling. All of this adds up to a strong and super-rigid milling tool that virtually eliminates tool chatter and produces mirror-like finished results in less time than ever before.

⚠ The 5D Tactical Router Jig PRO requires the use of our ReadyMILL™. This tool is custom designed and manufactured for the 5D Tactical Router Jig PRO, and is not available for sale elsewhere by any tooling supplier or manufacturer. The ReadyMILL™ is for use with the Router Jig PRO only, NOT the Original Router Jig.

Modulus Arms SpeedMILL™

Please Note: The Modulus Arms Router Jig Extreme™ requires the use of one of our SpeedMill™ end-mills.
The Modulus Arms SpeedMILL™ is the strongest and most rigid 80% lower jig tool available for router-based milling. The SpeedMILL™ utilizes a thermal fit tool coupler which threads directly to your router. Threading directly to the router eliminates the possibility of the end mill pulling out from the collet while milling, which is a common point of failure on other types of jigs.

The steel coupler portion of the 80% lower jig tool is super-heated to accept a custom 5/16" diameter solid carbide end mill, which is optimized in every facet for router based 80% lower milling. The end mill is thermal fit into the tool holder, meaning it can't slip out during use. The end mill portion of the SpeedMILL™ can be replaced by the customer at a reduced cost by heating the steel coupler with a torch.

The length of the carbide end mill portion of the SpeedMILL™ has been reduced to only 1.5 inches. This is less than half the length of any other end mill available for router based 80% lower milling. This results in an ultra-rigid milling tool that produces a mirror finish in record setting time.

34. Specifically, the Defendants' copied the phrases "is the strongest and most rigid 80% lower jig tool available for router-based milling," "Threading directly to the router eliminates the possibility of the end mill pulling out from the collet while milling," "portion of the 80% lower jig tool is super-heated to accept a custom 5/16" diameter solid carbide end mill, which is optimized in every facet for router

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based 80% lower milling," and "has been reduced to only 1.5 inches! This is less than half the length of any other end mill available for router based 80% lower milling."

35. 80 Percent Arms is a defendant in the related action docketed as *5D Tactical LLC v. 80 Percent Arms, Inc.*, Case No. 8:18-cv-00917-RSWL-JC, filed in the Central District of California on May 29, 2018. Smith is familiar with the facts and circumstances of that action, including the claims of the '958 Patent and 5D Tactical's Router Jig Pro.

36. Smith willfully directed 80 Percent Arms to copy 5D Tactical's Router Jig Pro by manufacturing and selling the Router Jig Extreme even though Smith knew that the Router Jig Extreme infringes the claims of 5D Tactical's '958 Patent.

37. Upon information and belief, 80 Percent Arms will be unable to support a judgment against it if it is found to be infringing the '958 Patent.

COUNT I – PATENT INFRINGEMENT

38. 5D Tactical repeats and realleges Paragraphs 1-37 of this Complaint as and for this Paragraph 38.

39. A claim chart attached to this Complaint as Exhibit E explains how Defendants' Router Jig Extreme infringes the '958 Patent. The claims in the claim chart are exemplary and additional claims may be added.

40. The Defendants have infringed, either literally or under the doctrine of equivalents, and continue to infringe all of the elements of at least the independent claims of the '958 Patent by making, using, providing, offering to sell, and selling (directly or through intermediaries), and in the case of Smith, the President and co-owner of 80 Percent Arms, also directing 80 Percent Arms to make, use, provide, offer to sell, and sell in this district and elsewhere in the United States, a device such as its Router Jig Extreme.

41. Upon information and belief, the Defendants have also induced the infringement of all of the elements of at least the independent claims of the '958

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Patent and/or actively induced others to infringe one or more claims of the '958 Patent, in this district and elsewhere in the United States.

42. The Defendants' aforementioned activities have been without authority and/or license from Plaintiff 5D Tactical.

43. Plaintiff 5D Tactical is entitled to recover from the Defendants the damages sustained by 5D Tactical as a result of the Defendant's wrongful acts in an amount which, by law, cannot be less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

44. The Defendants' continued infringement of 5D Tactical's exclusive rights under the '958 Patent will continue to damage 5D Tactical, causing irreparable harm for which there is no adequate remedy at law, unless enjoined by this Court.

COUNT II – TRADE DRESS INFRINGEMENT

45. 5D Tactical repeats and realleges Paragraphs 1-44 of this Complaint as and for this Paragraph 45.

46. 5D Tactical uses the Router Jig Pro Trade Dress in interstate commerce to identify itself as the source of its products.

47. The Router Jig Pro Trade Dress is entitled to protection under the Lanham Act, 15 U.S.C. § 1125(a). The Router Jig Pro Trade Dress, as described in Paragraph 30, has a highly distinctive appearance that is non-functional.

48. The Router Jig Pro Trade Dress is inherently highly distinctive and/or has also acquired substantial widespread recognition and acquired distinctiveness or secondary meaning in the marketplace through 5D Tactical's continuous advertising, promotion, and sale of the Router Jig Pro. The Router Jig Pro Trade Dress has become a well-known indicator of the origin and/or quality of the Router Jig Pro before the Defendants' unauthorized use of the Router Jig Pro Trade Dress.

49. Upon information and belief, the Defendants copied 5D Tactical's distinctive nonfunctional stylistic choices when it designed the Router Jig Extreme to look substantially similar to the Router Jig Pro Trade Dress.

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50. Upon information and belief, the Defendants' use of the Router Jig Pro Trade Dress has been intentional and willful, as evidenced by the almost identical appearances of the Router Jig Pro and Router Jig Extreme.

51. Upon information and belief, the Defendants had actual knowledge of the Router Jig Pro Trade Dress before it began selling the Router Jig Extreme.

52. Defendants' use in commerce of the Router Jig Pro Trade Dress is likely to cause confusion or mistake, or to deceive as to the origin of Defendants' Router Jig Extreme in violation of 15 U.S.C. § 1125(a).

53. Upon information and belief, customers have actually been or will be confused or deceived by the use of the Router Jig Pro Trade Dress by the Defendants.

54. Defendant's use described above constitutes infringement of 5D Tactical's Router Jig Pro Trade Dress in violation of 15 U.S.C. § 1125(a). The foregoing acts of infringement have been and continue to be deliberate, making this an exceptional case within the meaning of 15 U.S.C. § 1117.

55. As a direct and proximate result of Defendants' infringement of the Router Jig Pro Trade Dress, 5D Tactical has suffered and continues to suffer damages to its profits, sales, and business. 5D Tactical and Defendants compete in identical channels of trade for identical goods and services. 5D Tactical and Defendants are direct competitors. The trade dress infringement complained of herein has caused and, unless restrained and enjoined, will cause irreparable harm, damage, and injury to 5D Tactical, for which 5D Tactical has no adequate remedy at law. The injury to 5D Tactical is and continues to be ongoing and irreparable.

56. As a direct and proximate result of Defendants' conduct, 5D Tactical is entitled to injunctive relief under 15 U.S.C. § 1115, and 5D Tactical is also entitled to recover Defendants' profits, 5D Tactical's non-duplicative actual damages, and 5D Tactical's costs and reasonable attorneys' fees.

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COUNT III – COPYRIGHT INFRINGEMENT

57. 5D Tactical repeats and realleges Paragraphs 1-56 of this Complaint as and for this Paragraph 57.

58. Through their conduct averred herein, the Defendants' have infringed 5D Tactical's copyrighted work in the product description of the Router Jig Pro ReadyMILL in violation of Sections 106 and 501 of the Copyright Act, 17 U.S.C. §§ 106 and 501.

59. The Defendants' acts of infringement are willful, intentional and purposeful, in disregard of and with indifference to 5D Tactical's rights.

60. Plaintiffs further are entitled to their attorneys' fees and full costs pursuant to 17 U.S.C. § 505 and otherwise according to law.

61. As a direct and proximate result of the Defendants' conduct, 5D Tactical is entitled to injunctive relief to restrain and enjoin the Defendants' continuing infringing conduct.

PRAYER FOR RELIEF

5D Tactical respectfully requests that the Court find in its favor and against the Defendants, and that the Court grant 5D Tactical the following relief:

A. An adjudication that the Defendants have: (1) infringed, either literally and/or under the doctrine of equivalents, one or more claims of the '958 Patent; (2) violated 15 U.S.C. § 1125(a); and infringed 5D Tactical's copyrighted work;

B. An award to 5D Tactical of damages adequate to compensate 5D Tactical for the Defendants' acts of infringement together with pre-judgment and post-judgment interest;

C. That one or more of the Defendants' acts of infringement be found to be willful from the time that the Defendants became aware of the infringing nature of their actions, which is the time of service of this Complaint at the latest, and that the Court award treble damages for the period of such willful infringement pursuant to 35 U.S.C. § 284;

D. A grant of permanent injunction pursuant to 35 U.S.C. § 283, enjoining the Defendants from further acts of (1) infringement, (2) contributory infringement, and (3) actively inducing infringement with respect to the claims of the '958 Patent.

E. A grant of permanent injunction enjoining the Defendants from infringing the Router Jig Pro Trade Dress or 5D Tactical's copyrighted work.

F. That all of the Defendants' misleading and deceptive materials be removed and destroyed pursuant to 15 U.S.C. § 1118;

G. That this Court declare this to be an exceptional case and award Plaintiff reasonable attorneys' fees and costs in accordance with 35 U.S.C. § 285, 15 U.S.C. § 1117, and 17 U.S.C. § 505; and

H. Any further relief that this Court deems just and proper.

Dated: September 27, 2018

HOLLAND & KNIGHT LLP

By: /s/ Vito A. Costanzo
Vito A. Costanzo

Attorney for Plaintiff,
5D Tactical, LLC

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EXHIBIT A

US009982958B1

(12) **United States Patent**
Partington

(10) **Patent No.: US 9,982,958 B1**
(45) **Date of Patent: May 29, 2018**

(54) **JIG FOR MANUFACTURING OF FIREARM LOWER RECEIVER**

(71) Applicant: **5d Tactical, LLC**, Westborough, MA (US)

(72) Inventor: **Wayne R. Partington**, Sterling, MA (US)

(73) Assignee: **5d Tactical, LLC**, Westborough, MA (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. days.

(21) Appl. No.: **15/726,351**

(22) Filed: **Oct. 5, 2017**

Related U.S. Application Data

(60) Provisional application No. 62/404,710, filed on Oct. 5, 2016.

(51) **Int. Cl.**
F41A 3/66 (2006.01)
B23Q 17/22 (2006.01)

(52) **U.S. Cl.**
CPC ***F41A 3/66*** (2013.01); ***B23Q 17/2233*** (2013.01)

(58) **Field of Classification Search**
CPC B23Q 17/2233; F41A 3/66
USPC 33/638, 566
See application file for complete search history.

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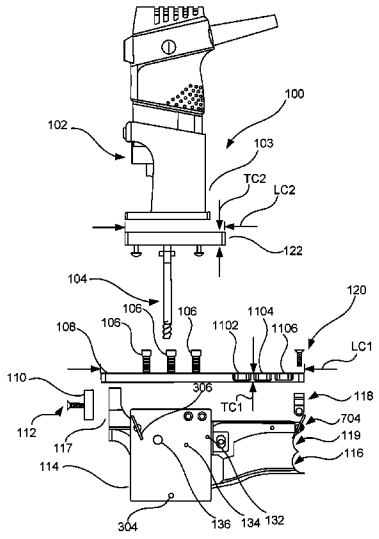
* cited by examiner

Primary Examiner — Christopher Fulton
(74) *Attorney, Agent, or Firm* — Loginov & Associates; William A. Loginov

(57) **ABSTRACT**

An improved jig for manufacturing a firearm lower receiver is comprised of a power tool mount; an adapter; a guide plate with plate screws; a rear support with mounting screws; a front support; and at least one of a carriages with at least one locating pin. A guide plate is disposed below the top surface of a lower receiver in conjunction with an adapter. The jig is a universal fitment and includes a bearing to support a rotary tool and at least one guiding feature can be used to facilitate in the guidance of the rotary tool without placing the rotary tool in direct contact with any of the guidance features. A removable locating pin is situated a long the front and rear takedown pin holes of a firearm receiver that is not threaded and is provided with at least one of a pull, string or other handle.

13 Claims, 83 Drawing Sheets



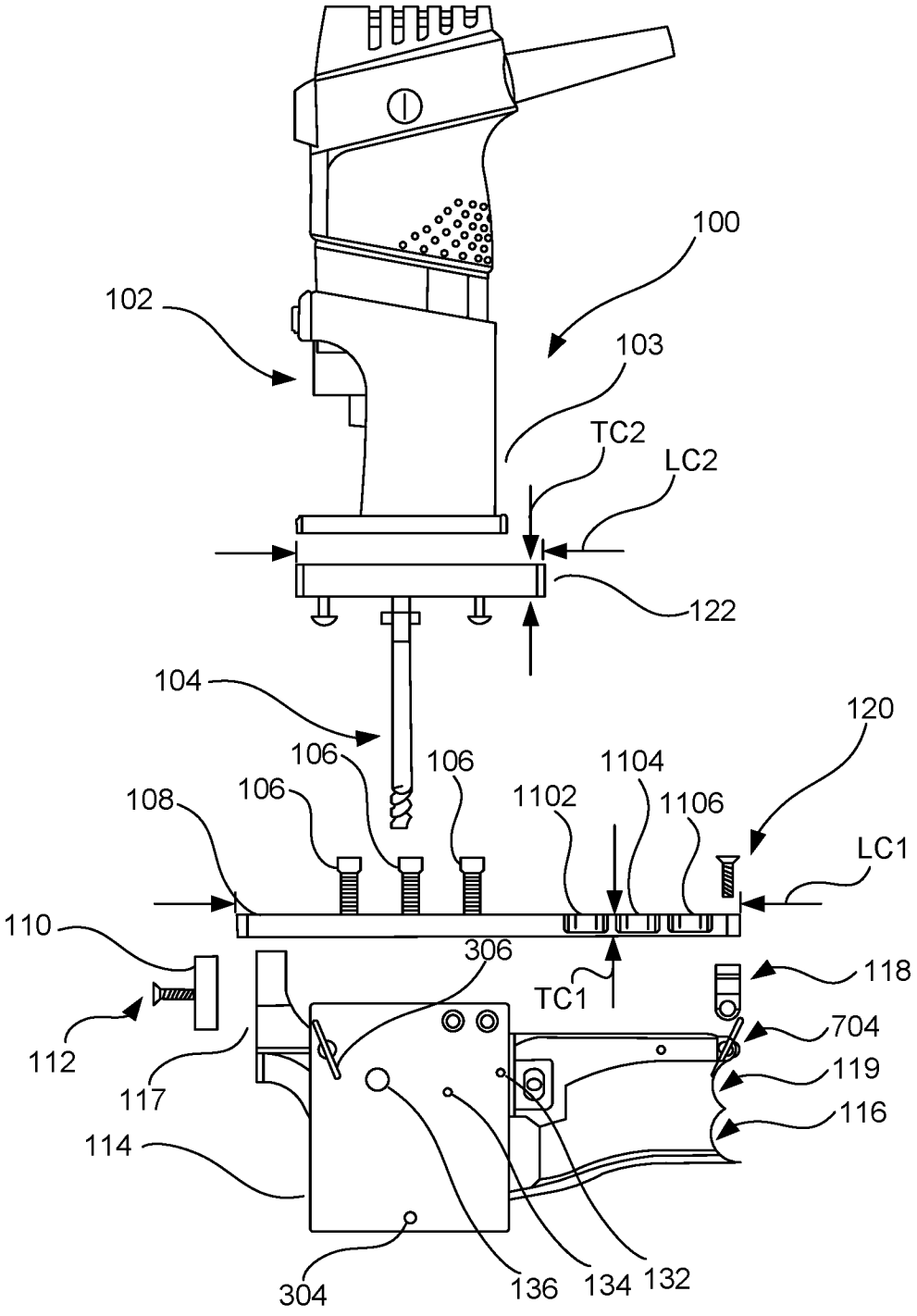

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FIG. 1

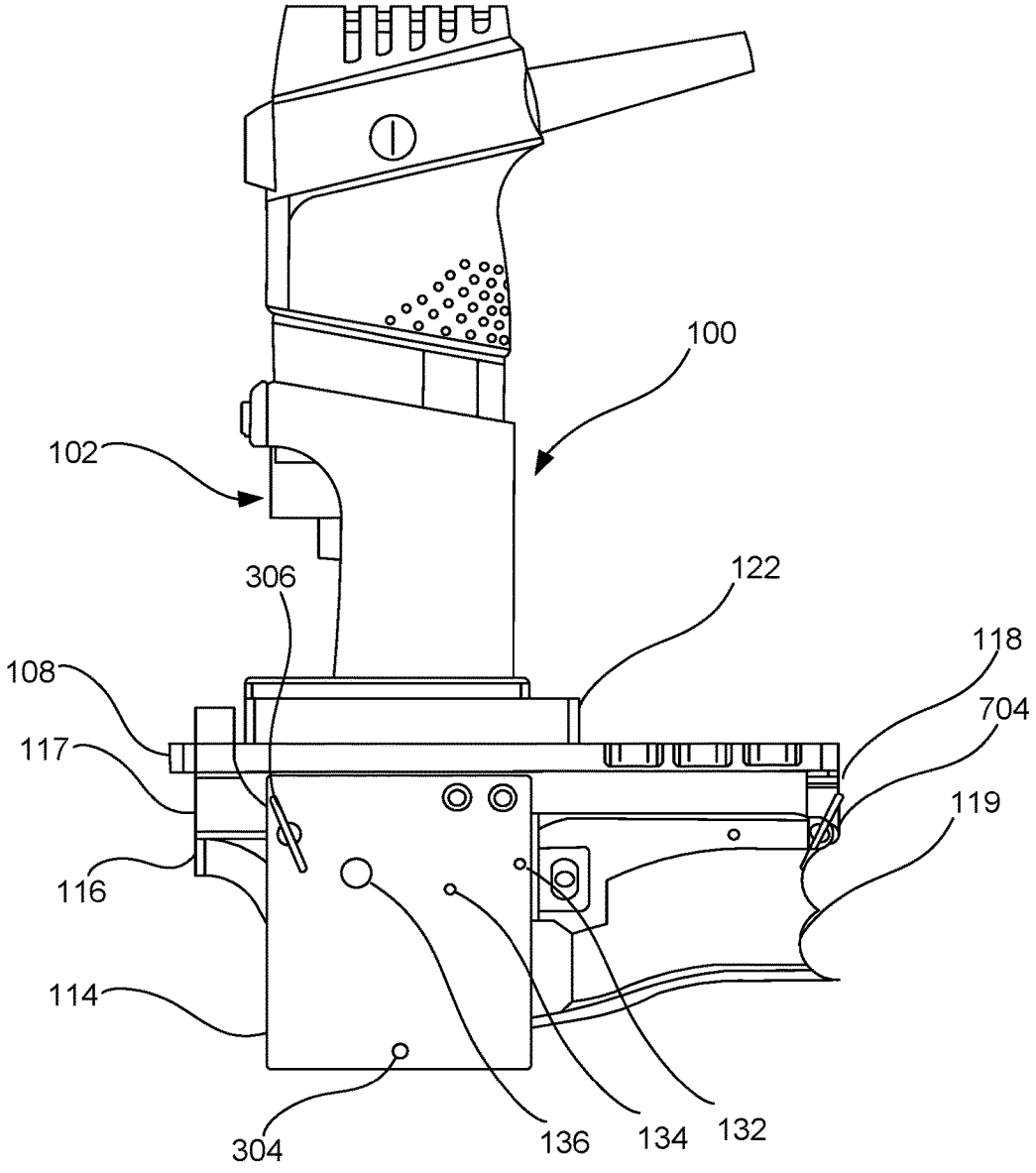

FIG. 2

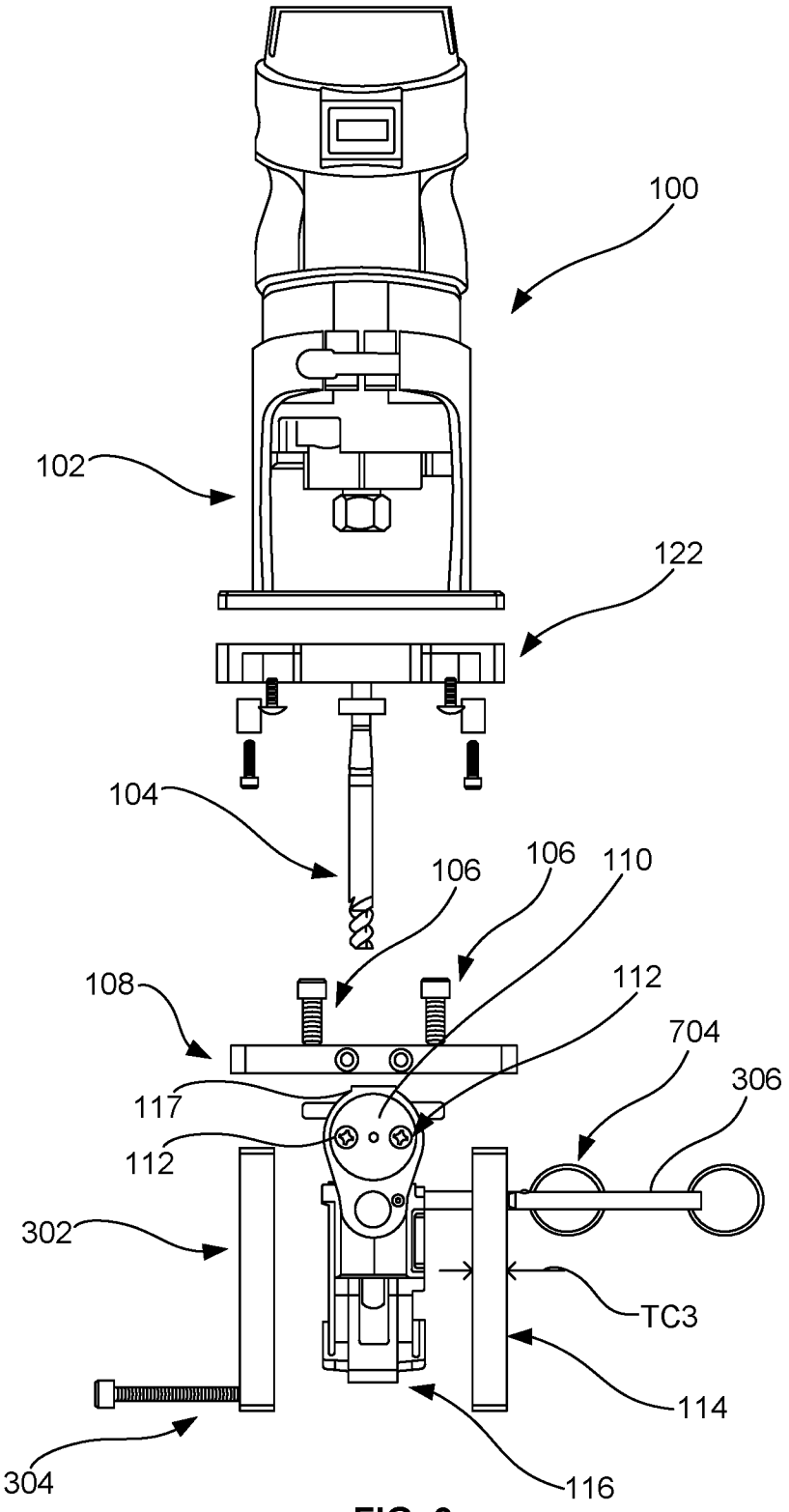
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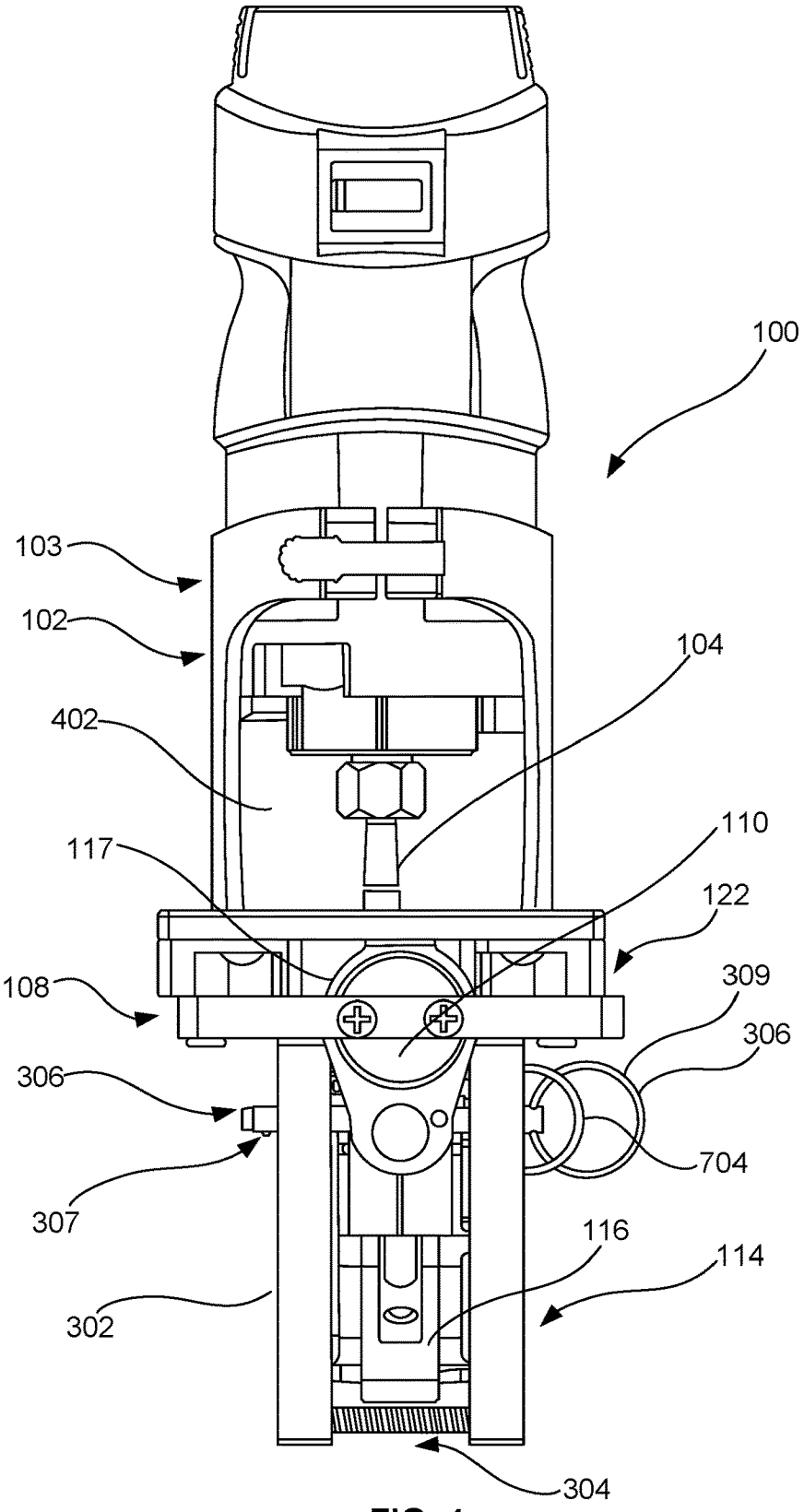
FIG. 3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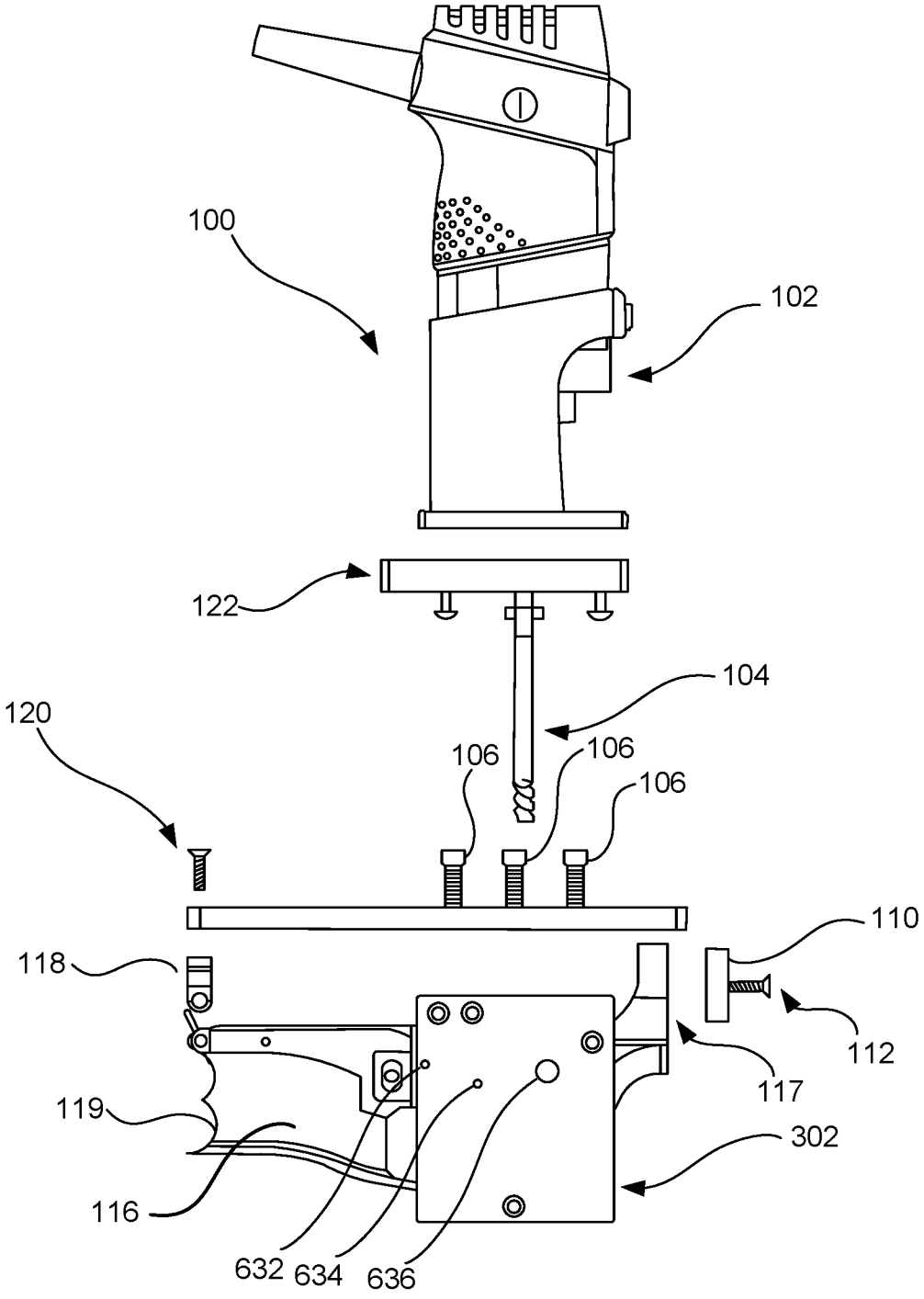
307
116
114
302
304

FIG. 4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102
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104
120
106
106
106
110
118
112
117
119
302
116
632
634
636

FIG. 5

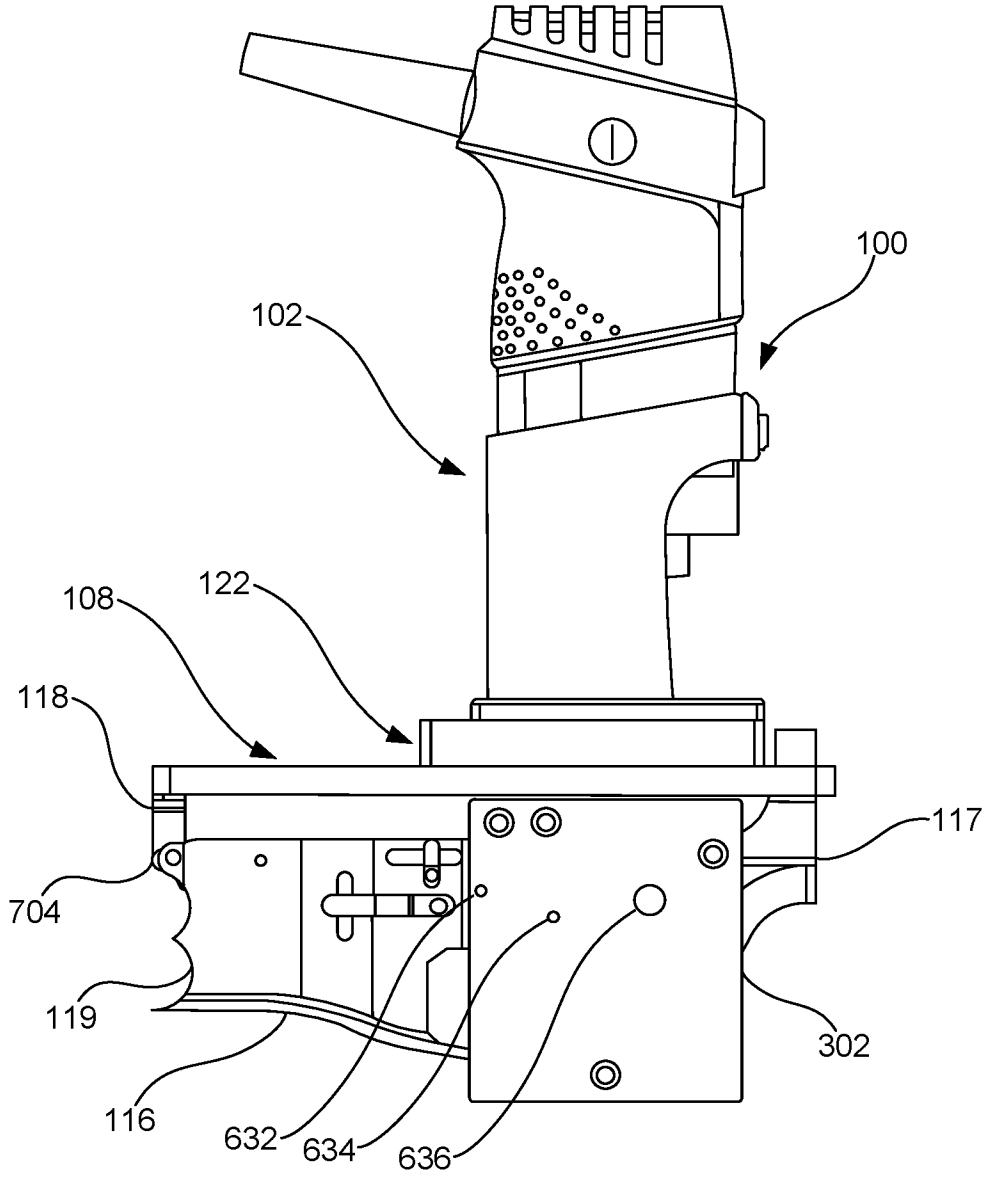


FIG. 6

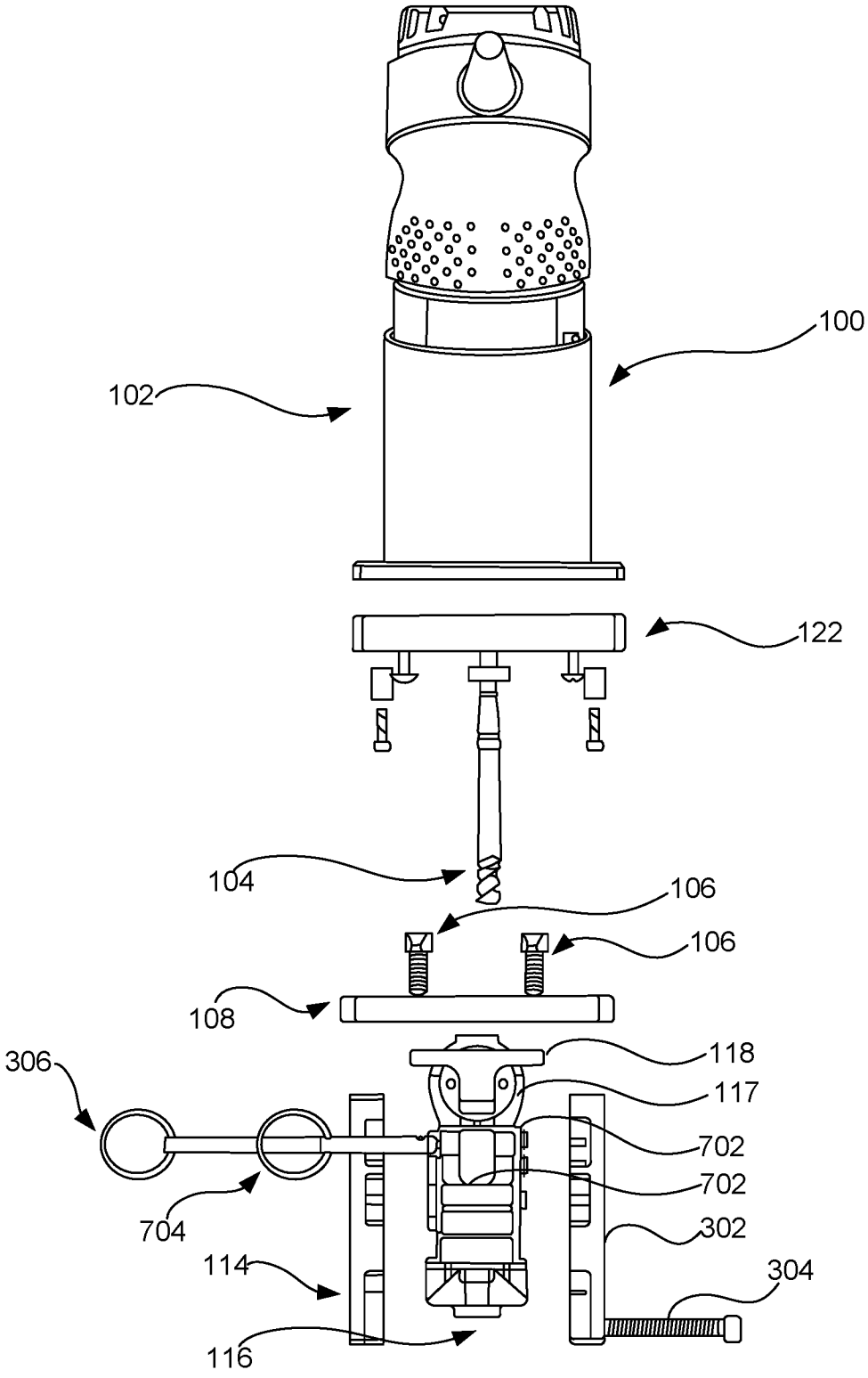

100
102
122
104
106
106
108
306
118
117
702
702
704
302
114
304
116

FIG.7

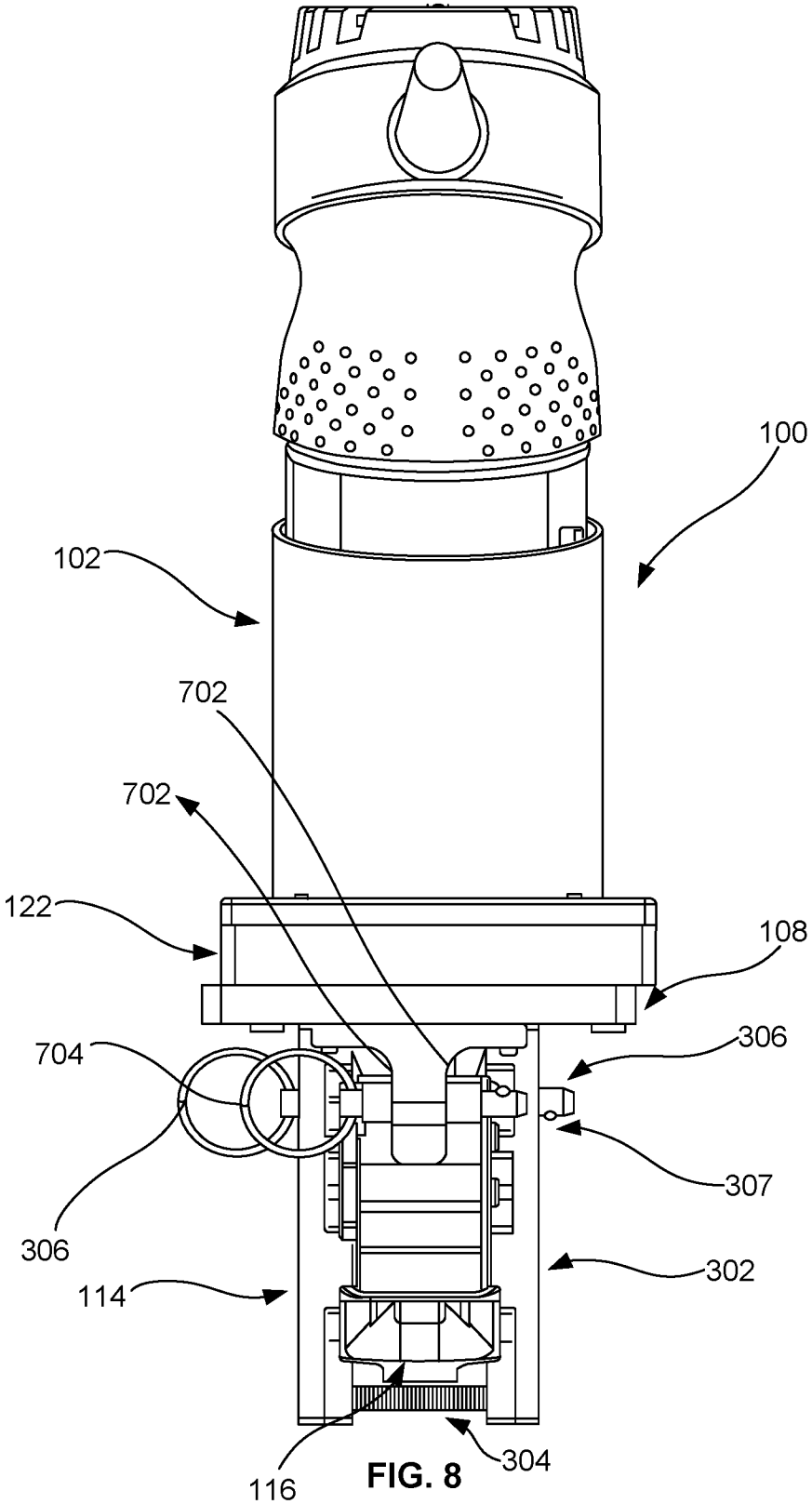
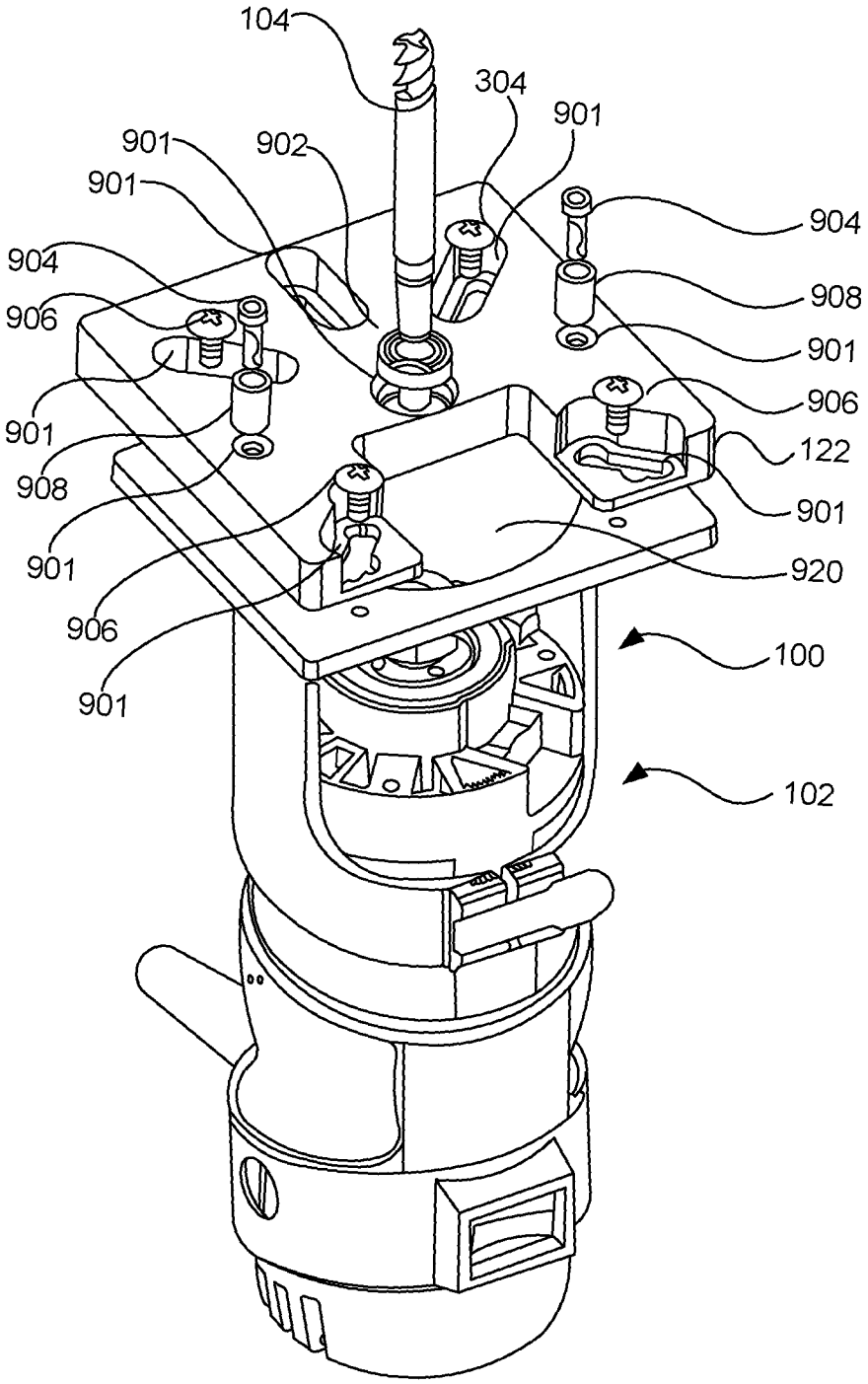


FIG. 8


104
304
901
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902
901
904
904
908
906
901
906
122
901
908
901
920
906
100
901
102

FIG. 9

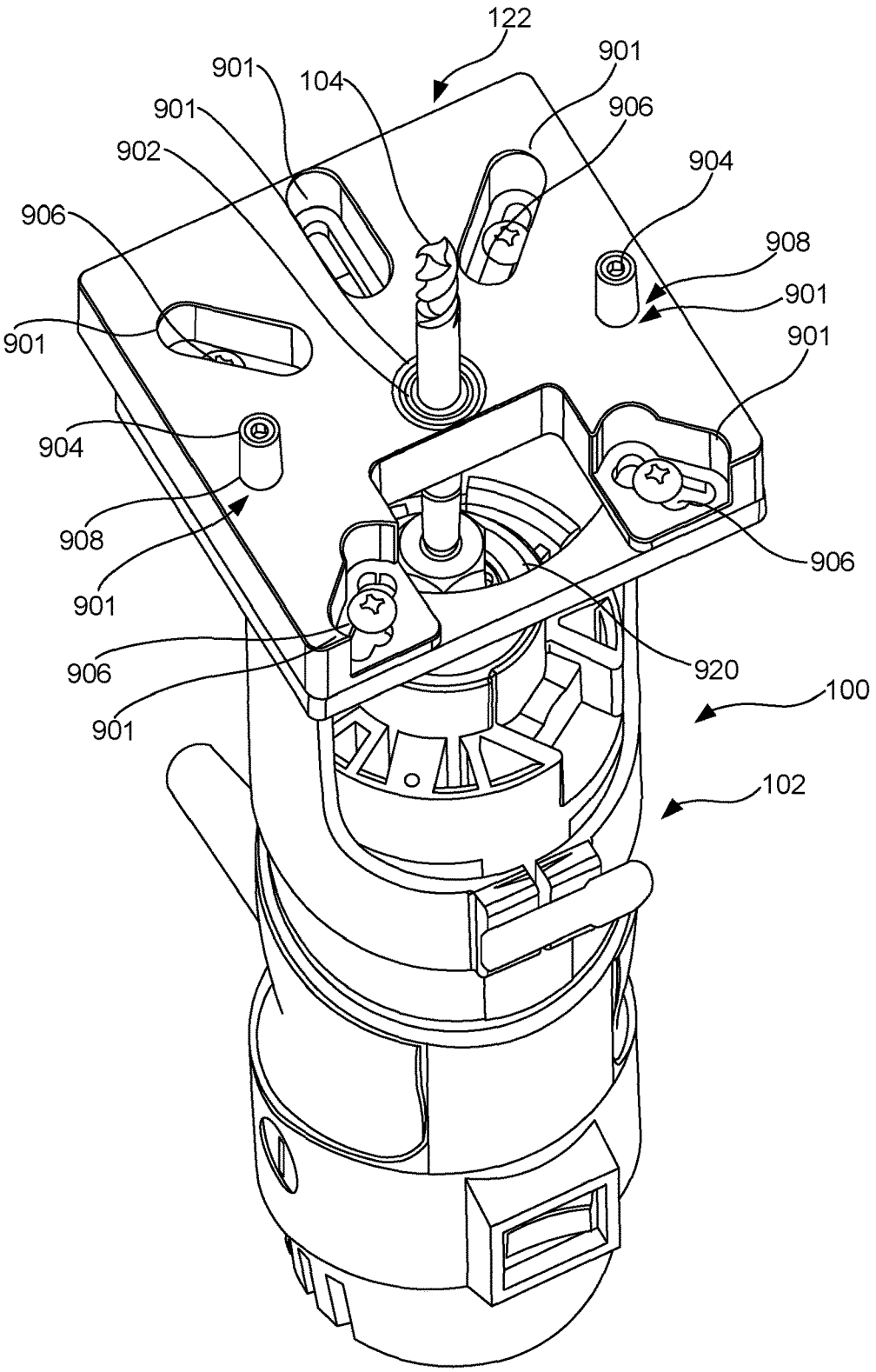

122
901
104
901
902
906
901
904
906
908
901
901
901
904
908
901
906
906
920
100
901
102

FIG. 10

REPLACEMENT SHEET

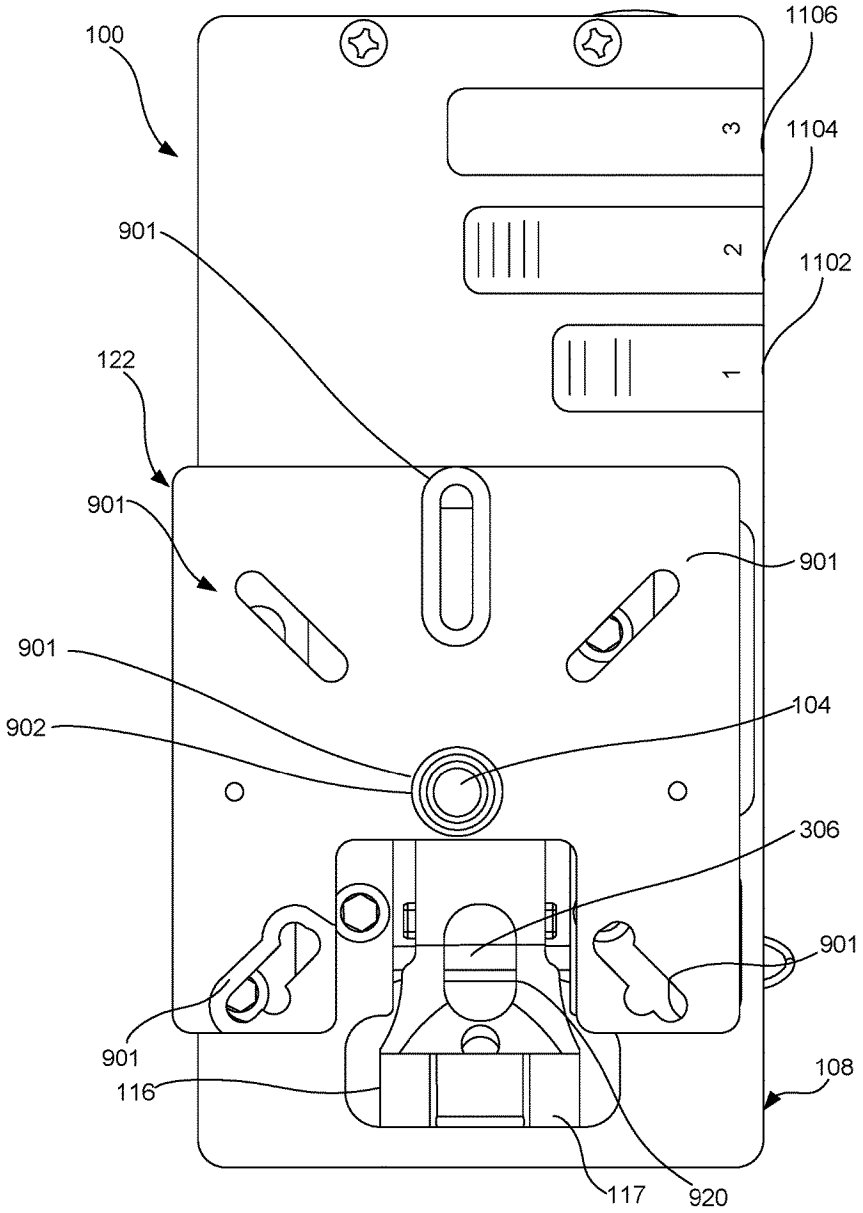


FIG. 11

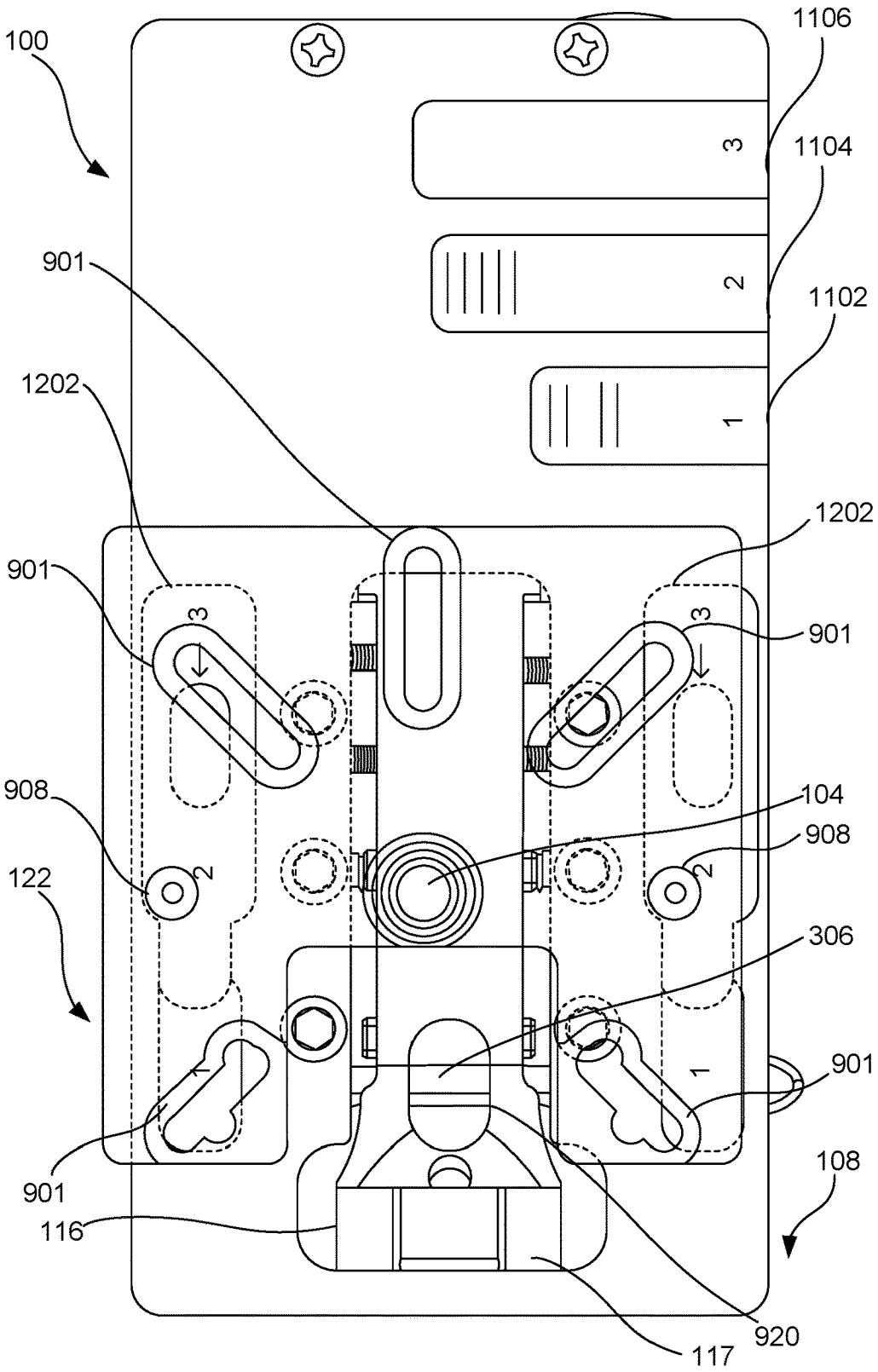

100
1106
1104
1102
901
1202
3
2
1
1202
901
901
908
104
908
122
306
901
108
901
116
920
117

FIG. 12

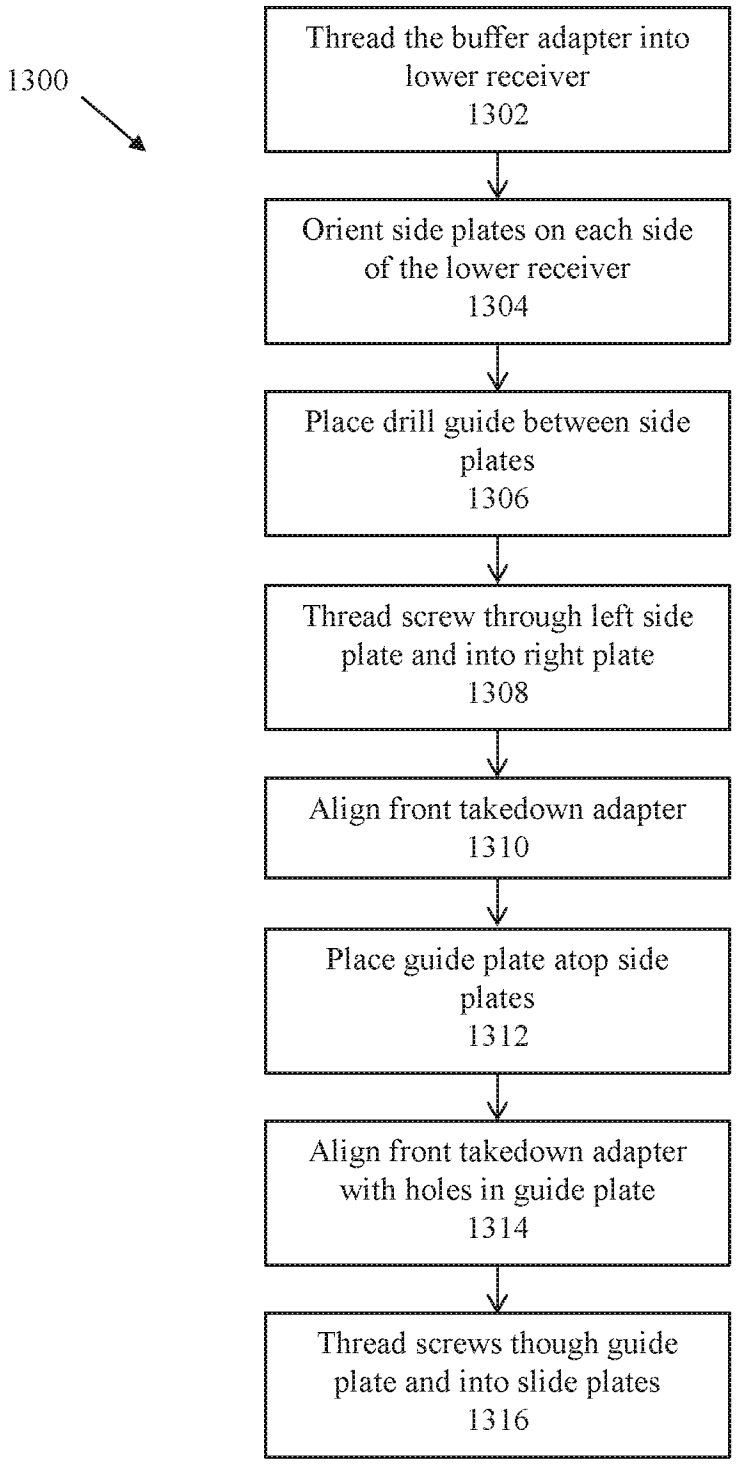

1300
Thread the buffer adapter into lower receiver
1302
Orient side plates on each side of the lower receiver
1304
Place drill guide between side plates
1306
Thread screw through left side plate and into right plate
1308
Align front takedown adapter
1310
Place guide plate atop side plates
1312
Align front takedown adapter with holes in guide plate
1314
Thread screws though guide plate and into slide plates
1316

FIG. 13

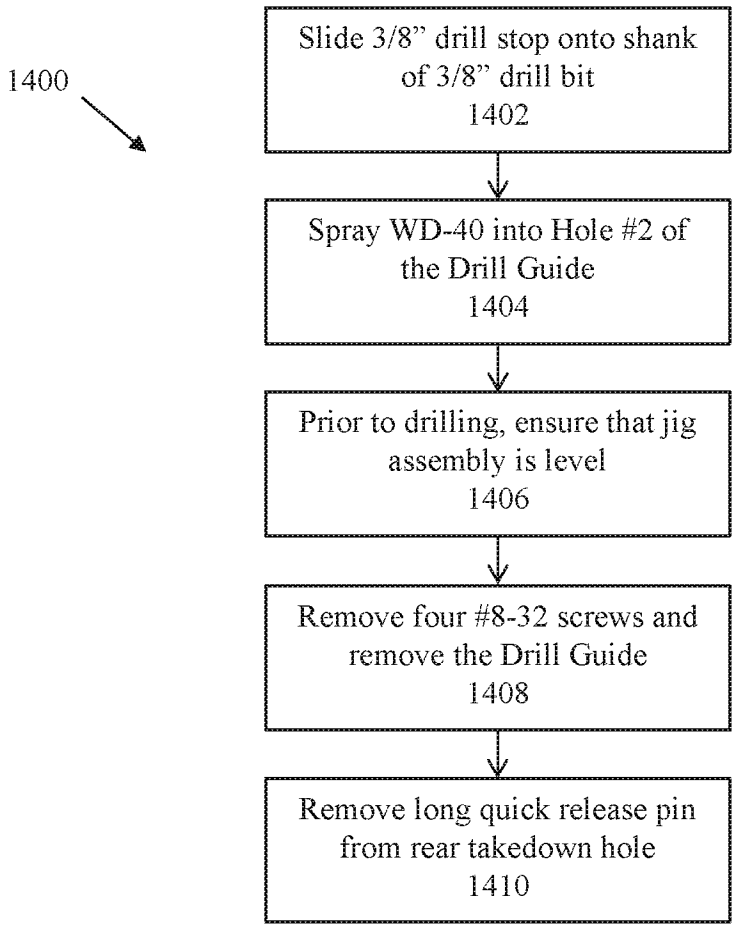

1400
Slide 3/8" drill stop onto shank of 3/8" drill bit
1402
Spray WD-40 into Hole #2 of the Drill Guide
1404
Prior to drilling, ensure that jig assembly is level
1406
Remove four #8-32 screws and remove the Drill Guide
1408
Remove long quick release pin from rear takedown hole
1410

FIG. 14

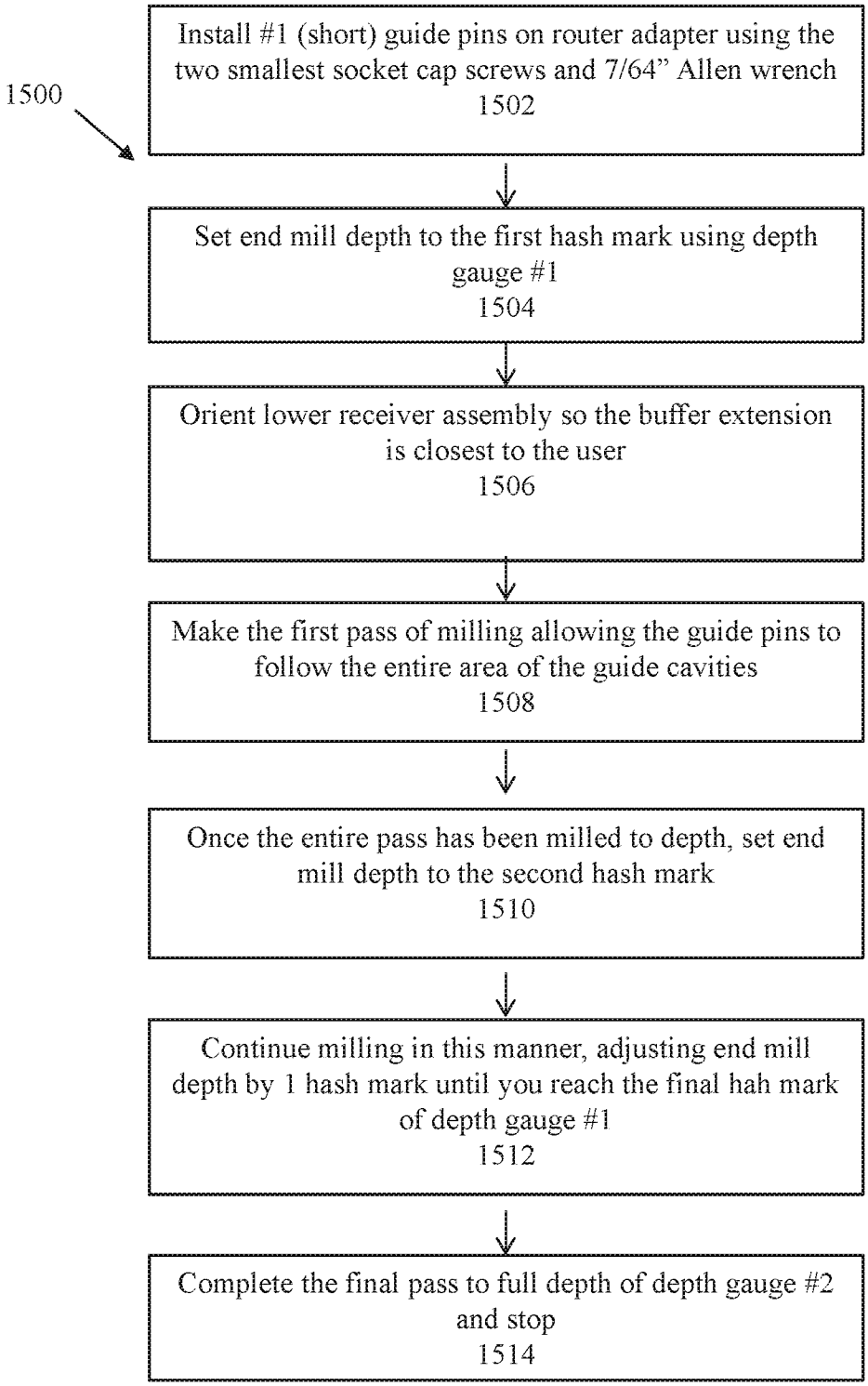

1500
Install #1 (short) guide pins on router adapter using the two smallest socket cap screws and 7/64" Allen wrench
1502
Set end mill depth to the first hash mark using depth gauge #1
1504
Orient lower receiver assembly so the buffer extension is closest to the user
1506
Make the first pass of milling allowing the guide pins to follow the entire area of the guide cavities
1508
Once the entire pass has been milled to depth, set end mill depth to the second hash mark
1510
Continue milling in this manner, adjusting end mill depth by 1 hash mark until you reach the final hah mark of depth gauge #1
1512
Complete the final pass to full depth of depth gauge #2 and stop
1514

FIG. 15

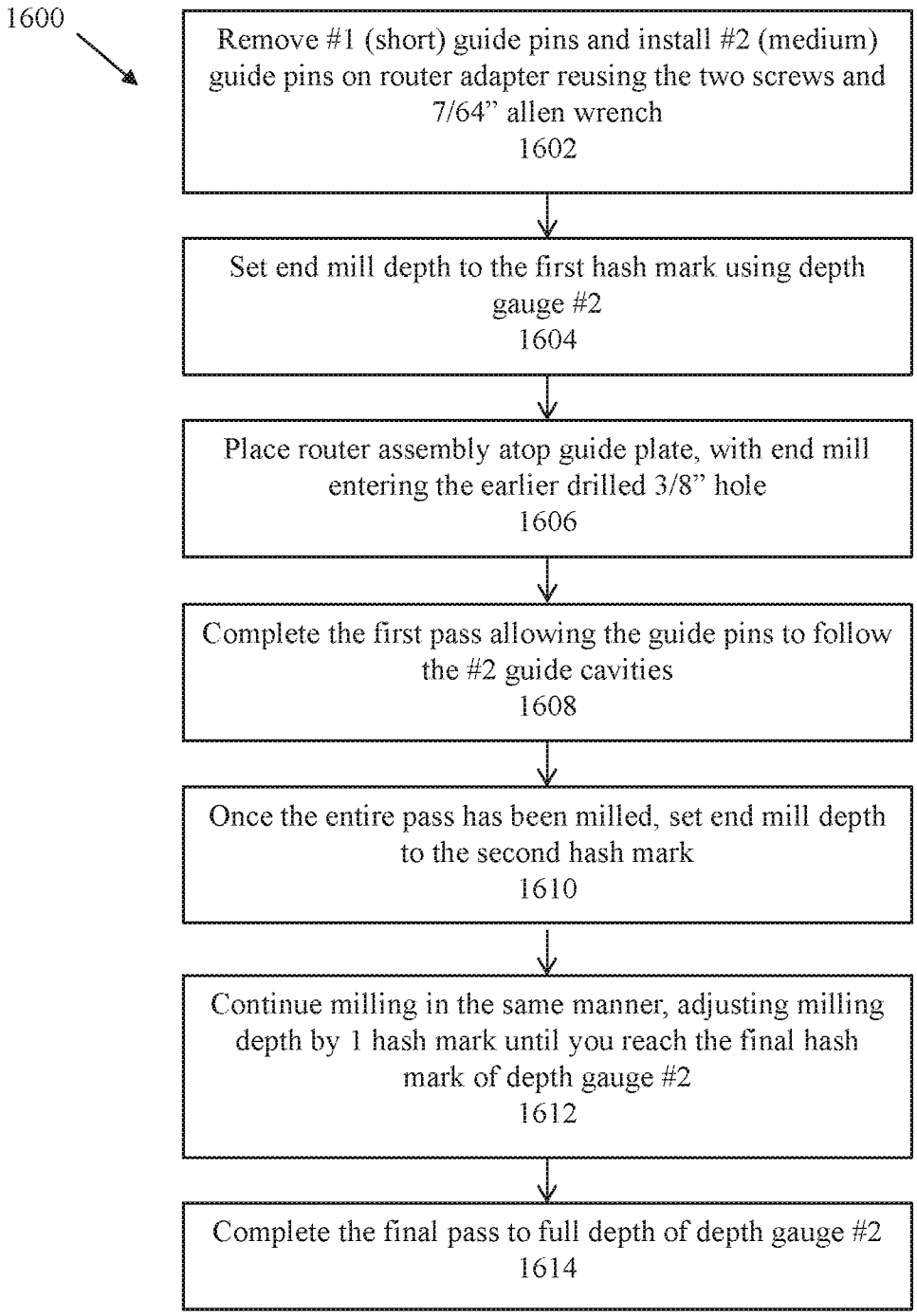

1600
Remove #1 (short) guide pins and install #2 (medium) guide pins on router adapter reusing the two screws and 7/64" allen wrench
1602
Set end mill depth to the first hash mark using depth gauge #2
1604
Place router assembly atop guide plate, with end mill entering the earlier drilled 3/8" hole
1606
Complete the first pass allowing the guide pins to follow the #2 guide cavities
1608
Once the entire pass has been milled, set end mill depth to the second hash mark
1610
Continue milling in the same manner, adjusting milling depth by 1 hash mark until you reach the final hash mark of depth gauge #2
1612
Complete the final pass to full depth of depth gauge #2
1614

FIG. 16

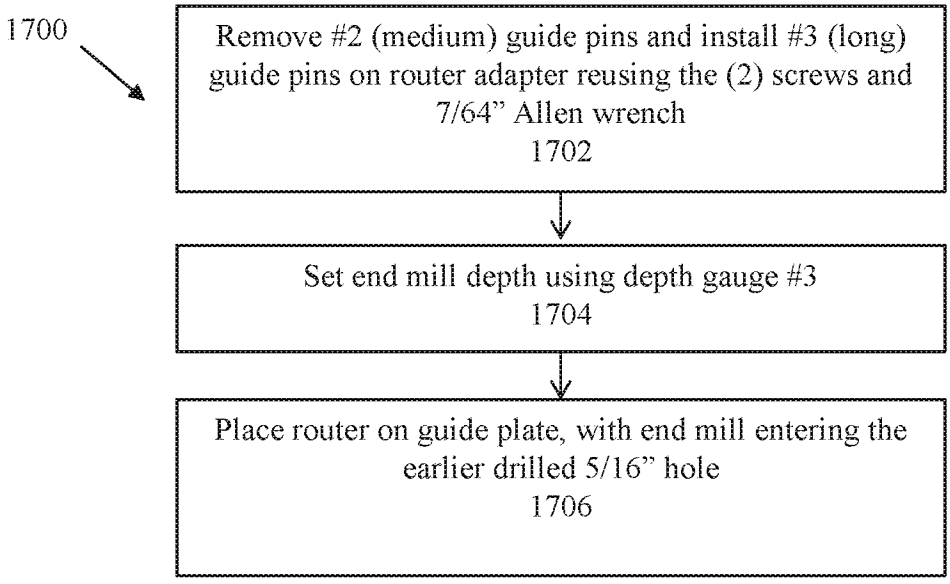

1700
Remove #2 (medium) guide pins and install #3 (long) guide pins on router adapter reusing the (2) screws and 7/64" Allen wrench
1702
Set end mill depth using depth gauge #3
1704
Place router on guide plate, with end mill entering the earlier drilled 5/16" hole
1706

FIG. 17

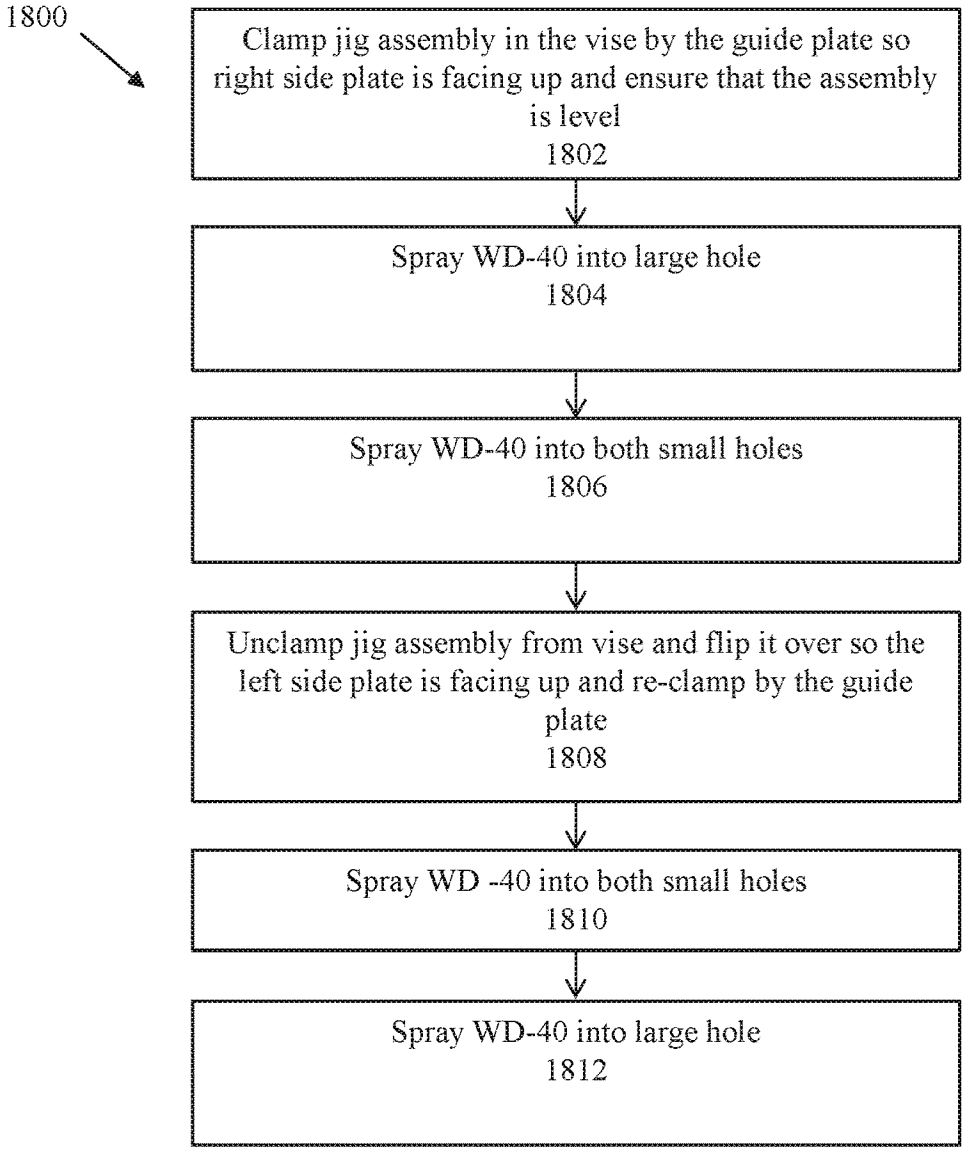

1800
Clamp jig assembly in the vise by the guide plate so right side plate is facing up and ensure that the assembly is level
1802
Spray WD-40 into large hole
1804
Spray WD-40 into both small holes
1806
Unclamp jig assembly from vise and flip it over so the left side plate is facing up and re-clamp by the guide plate
1808
Spray WD -40 into both small holes
1810
Spray WD-40 into large hole
1812

FIG. 18

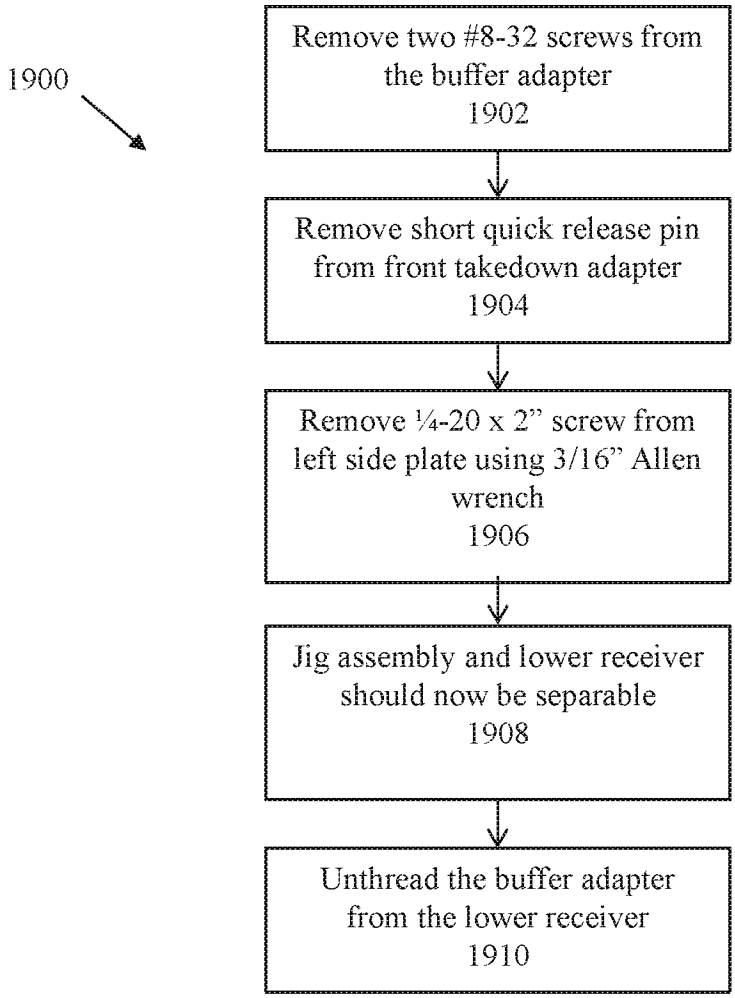

1900
Remove two #8-32 screws from the buffer adapter
1902
Remove short quick release pin from front takedown adapter
1904
Remove ¼-20 x 2" screw from left side plate using 3/16" Allen wrench
1906
Jig assembly and lower receiver should now be separable
1908
Unthread the buffer adapter from the lower receiver
1910

FIG. 19

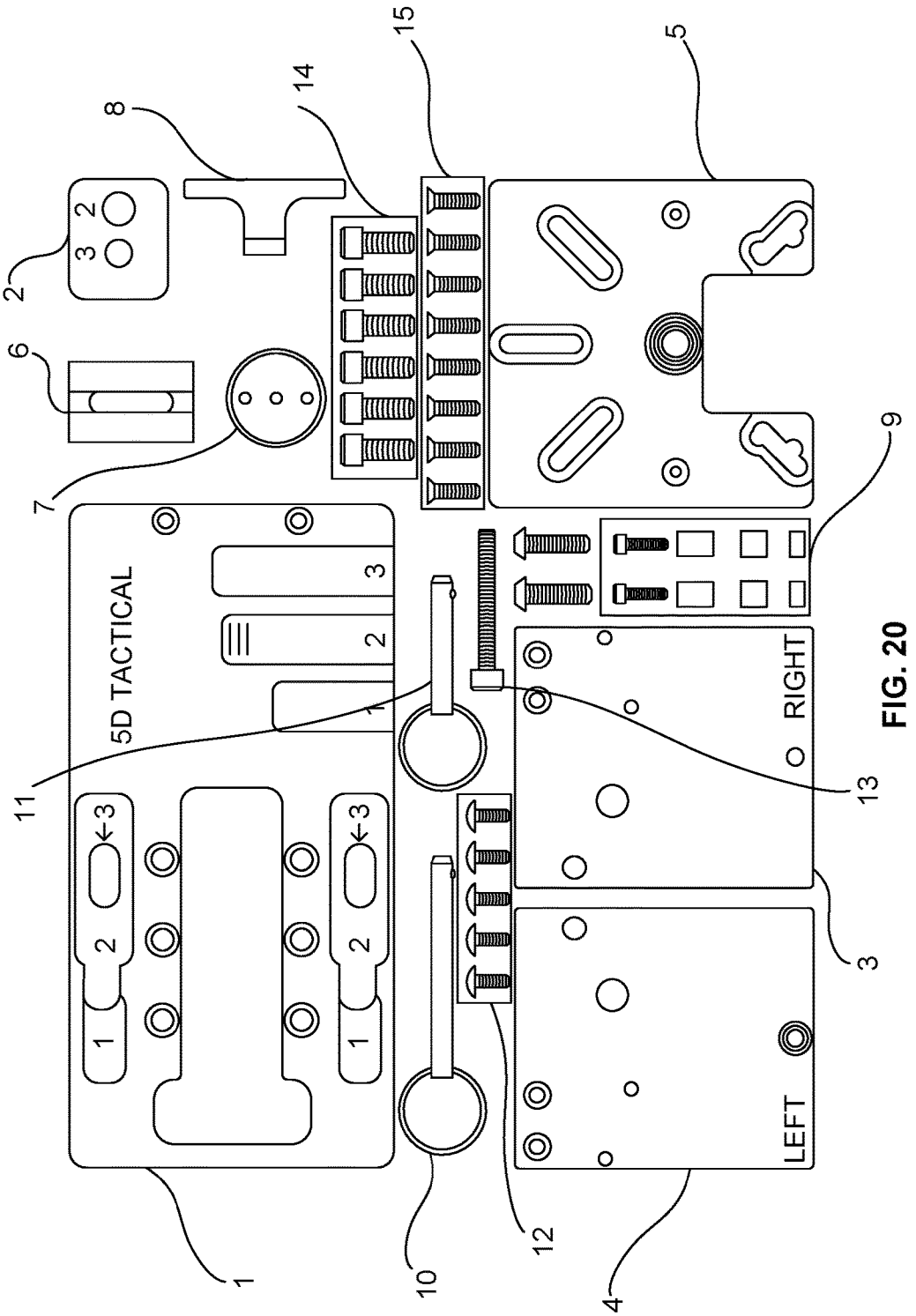


FIG. 20

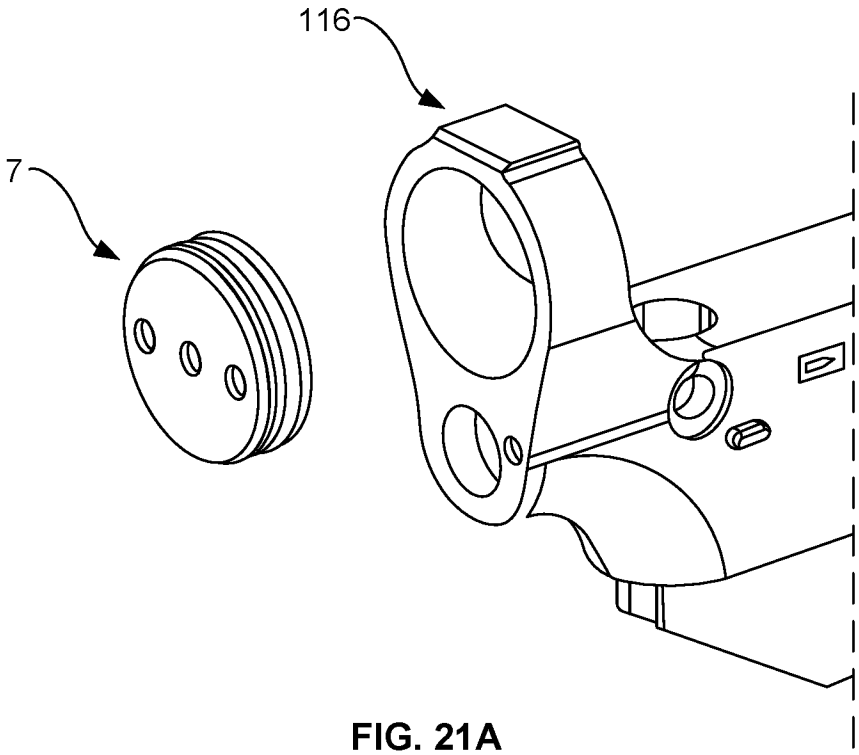


FIG. 21A

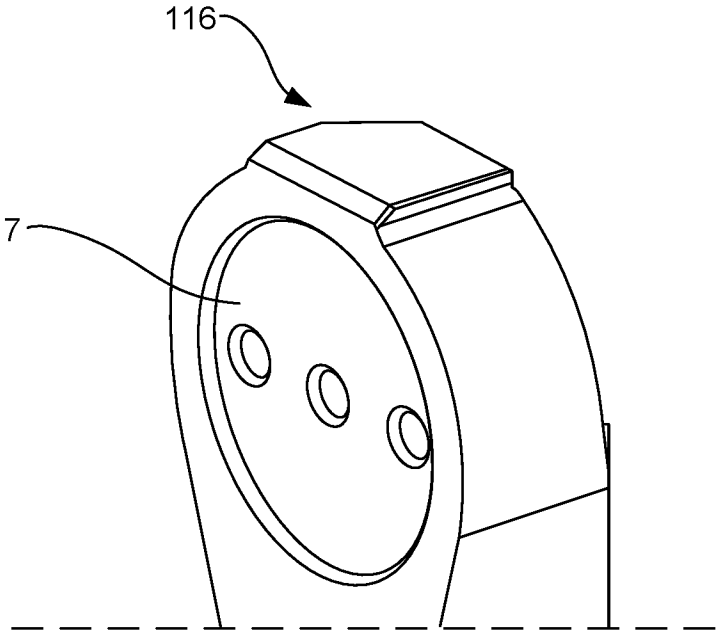


FIG. 21B

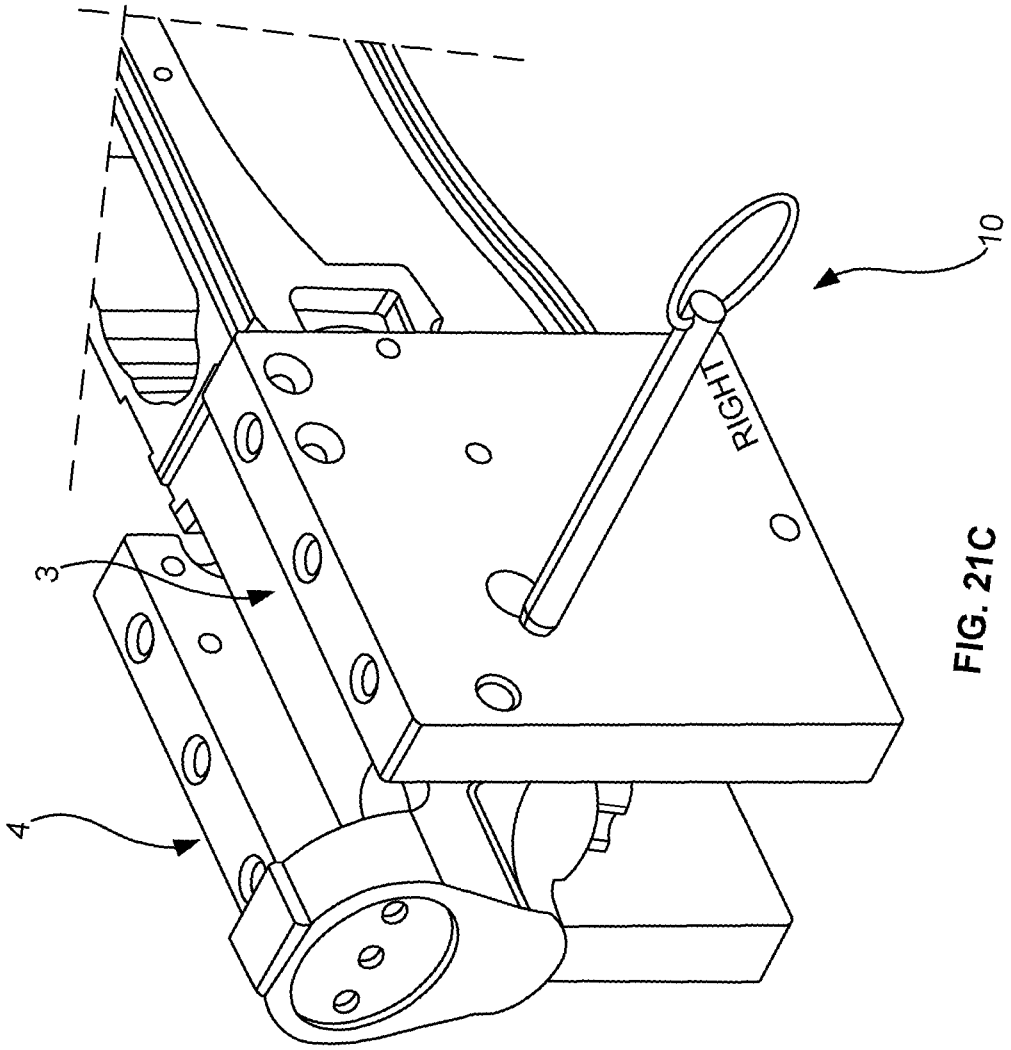


FIG. 21C

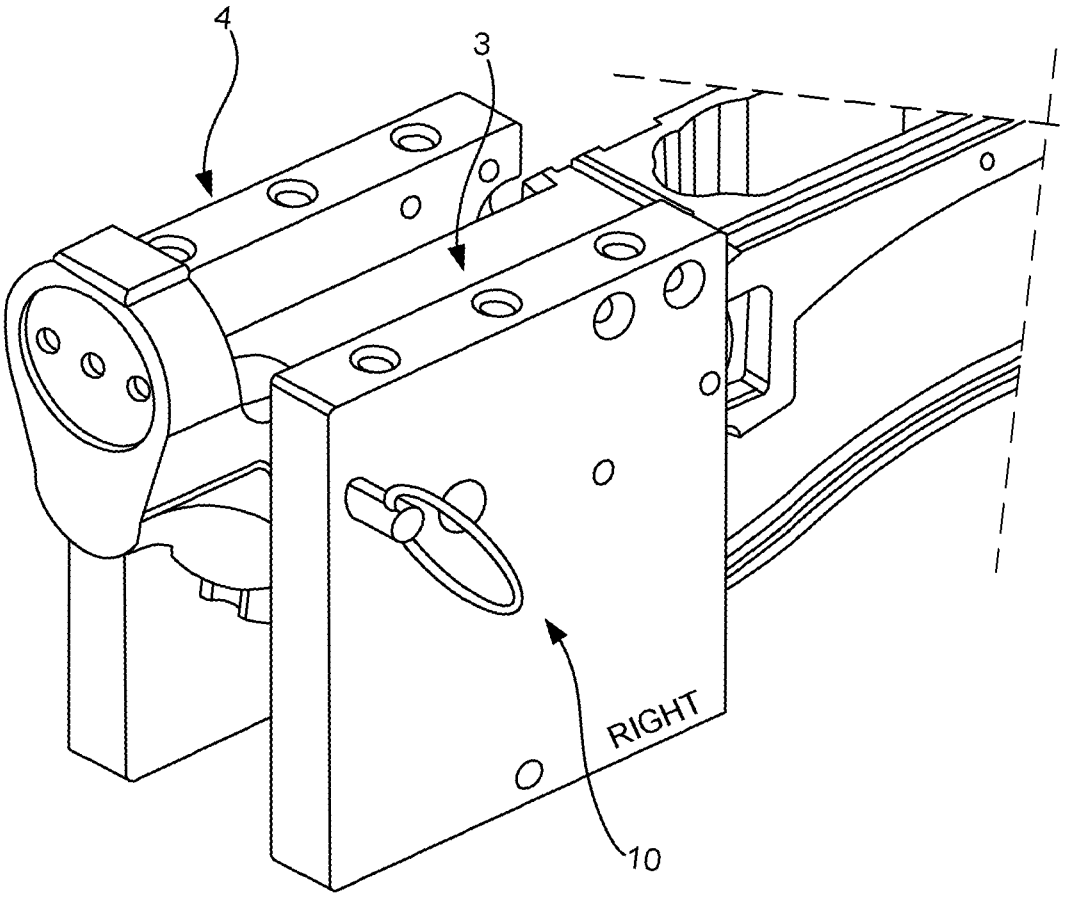


FIG. 21D

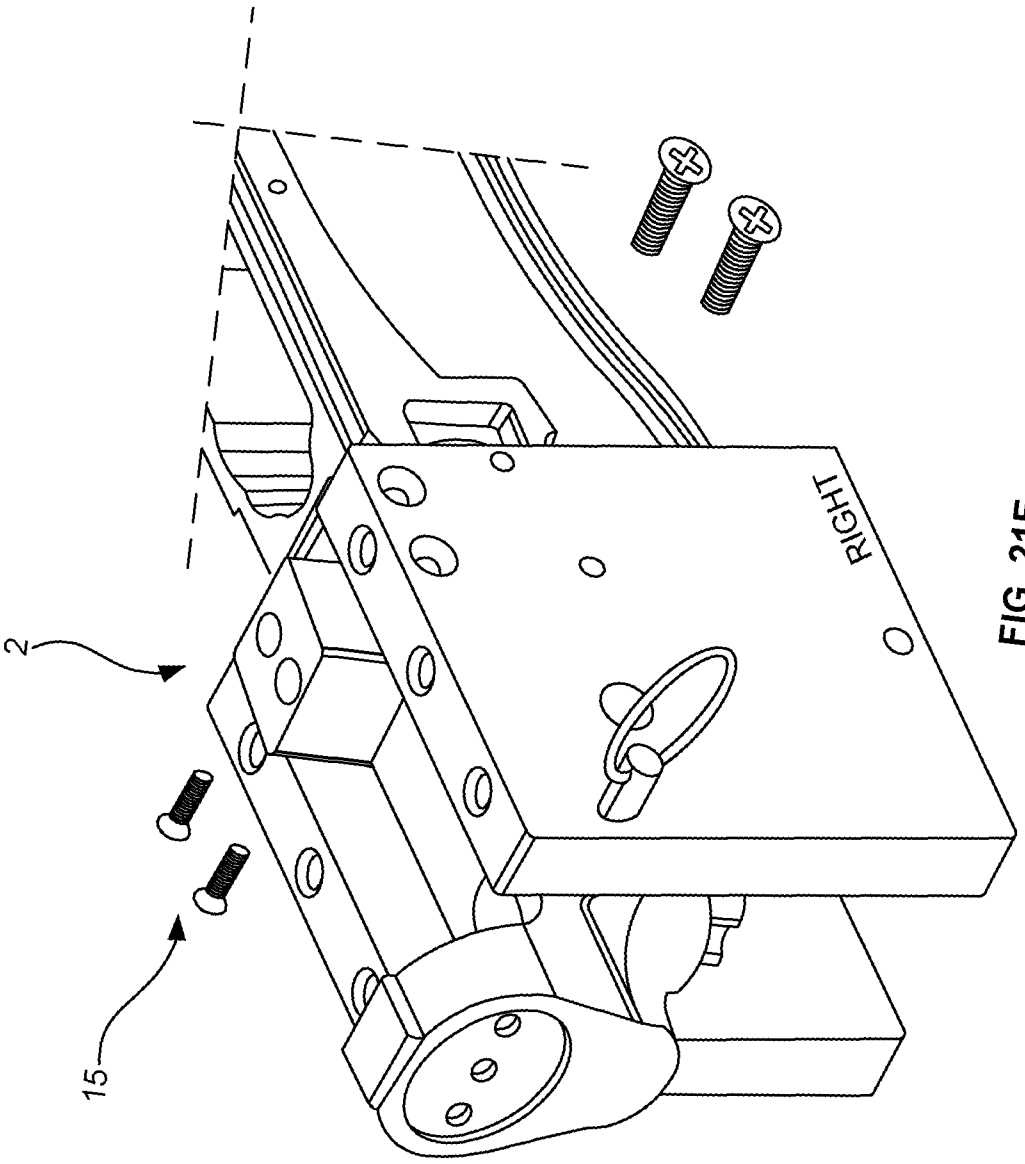


FIG. 21E

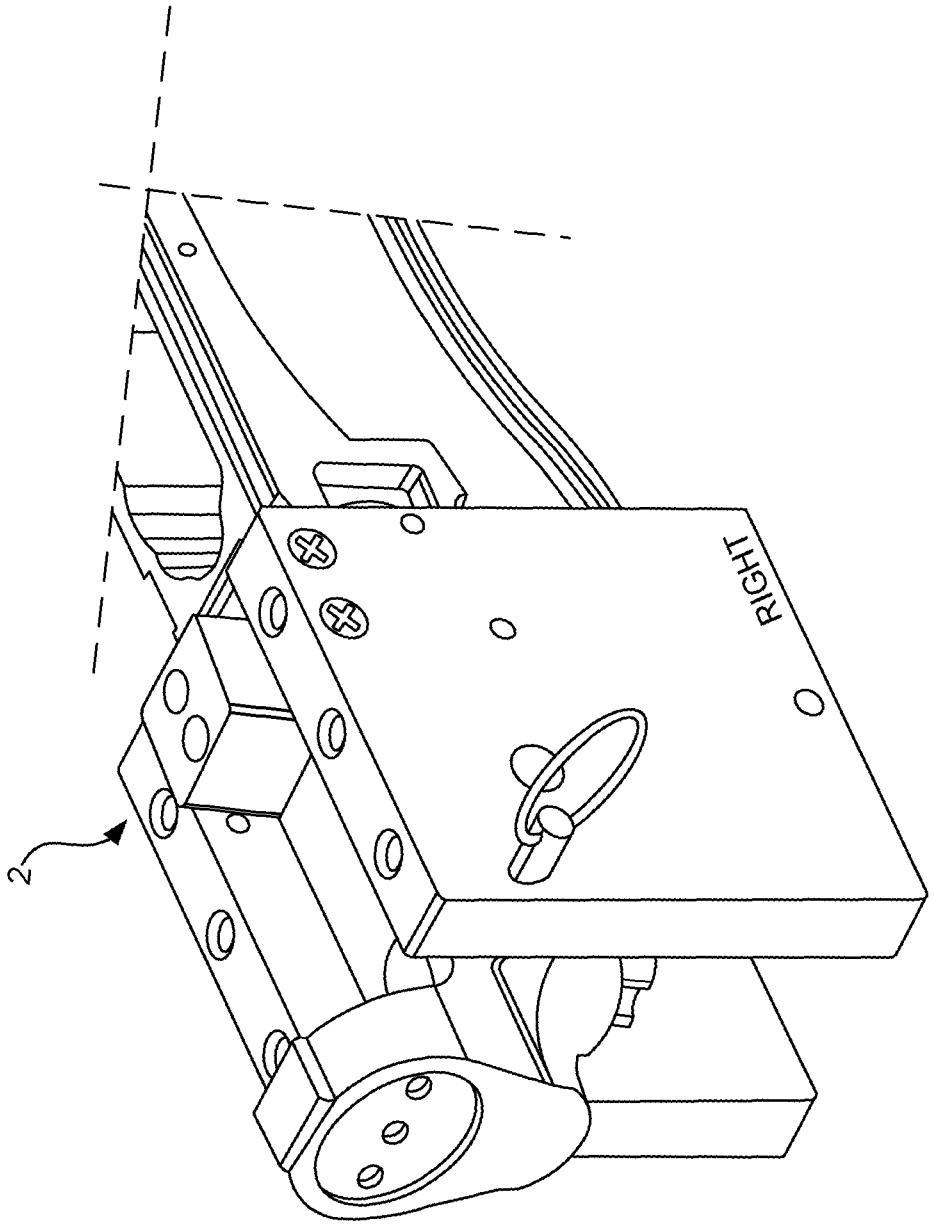


FIG. 21F

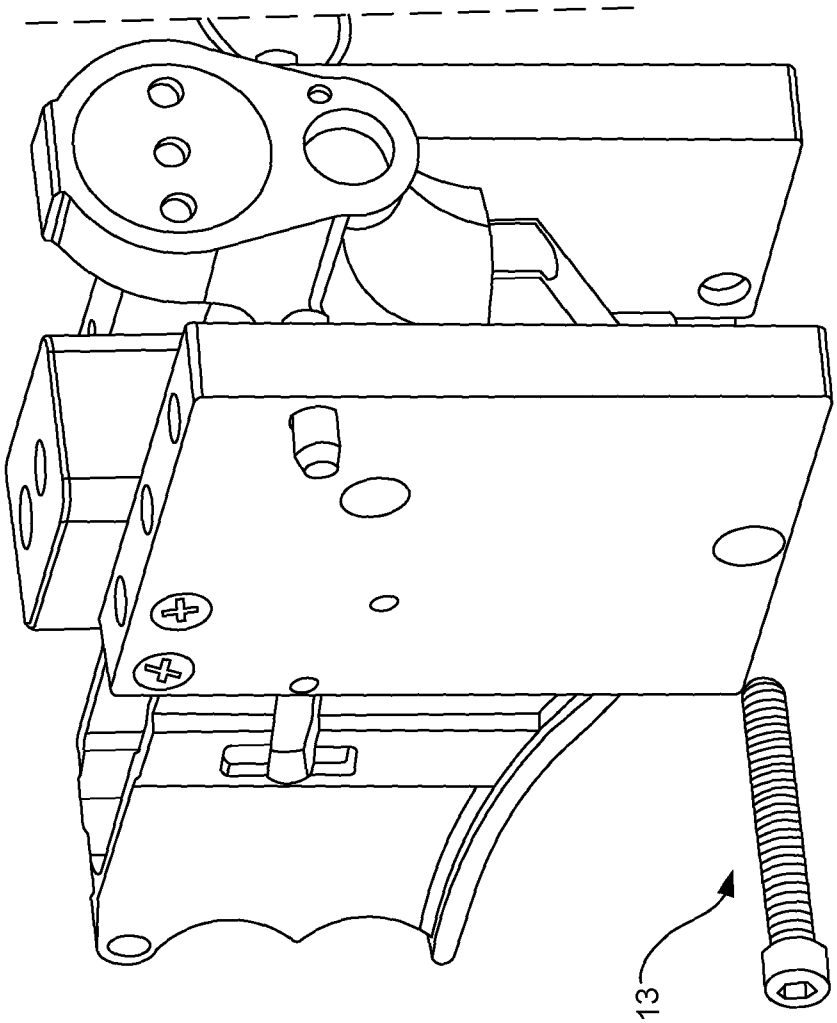


FIG. 21G

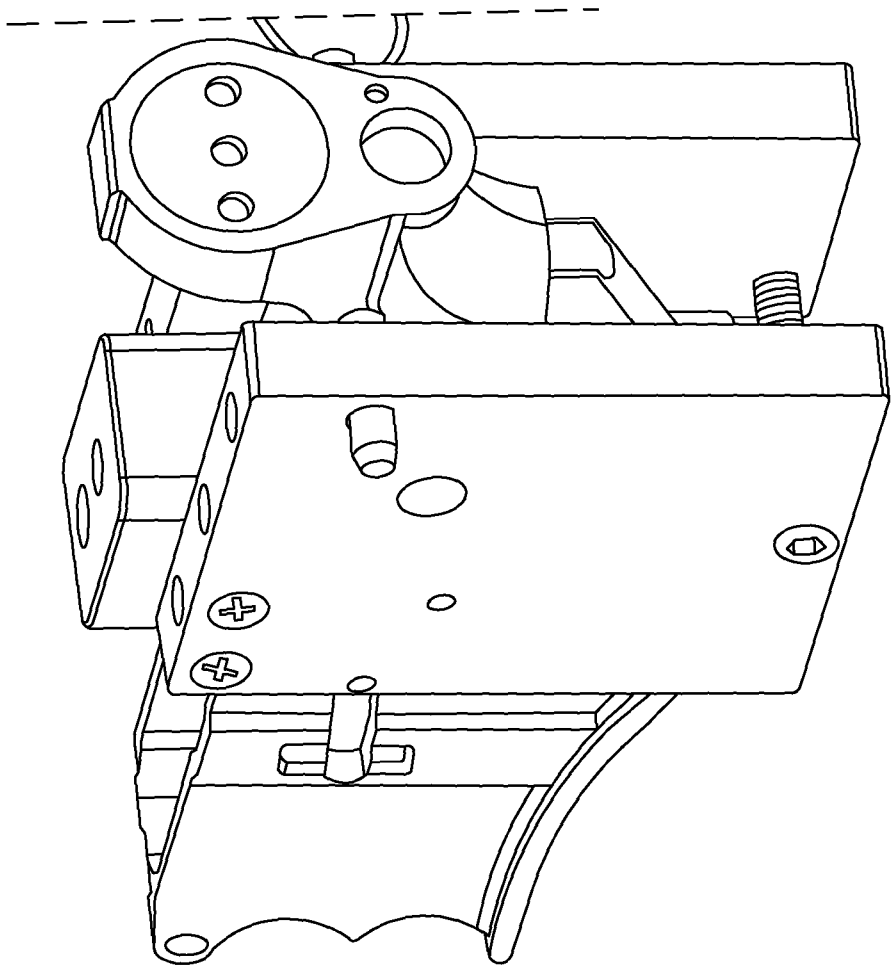


FIG. 21H

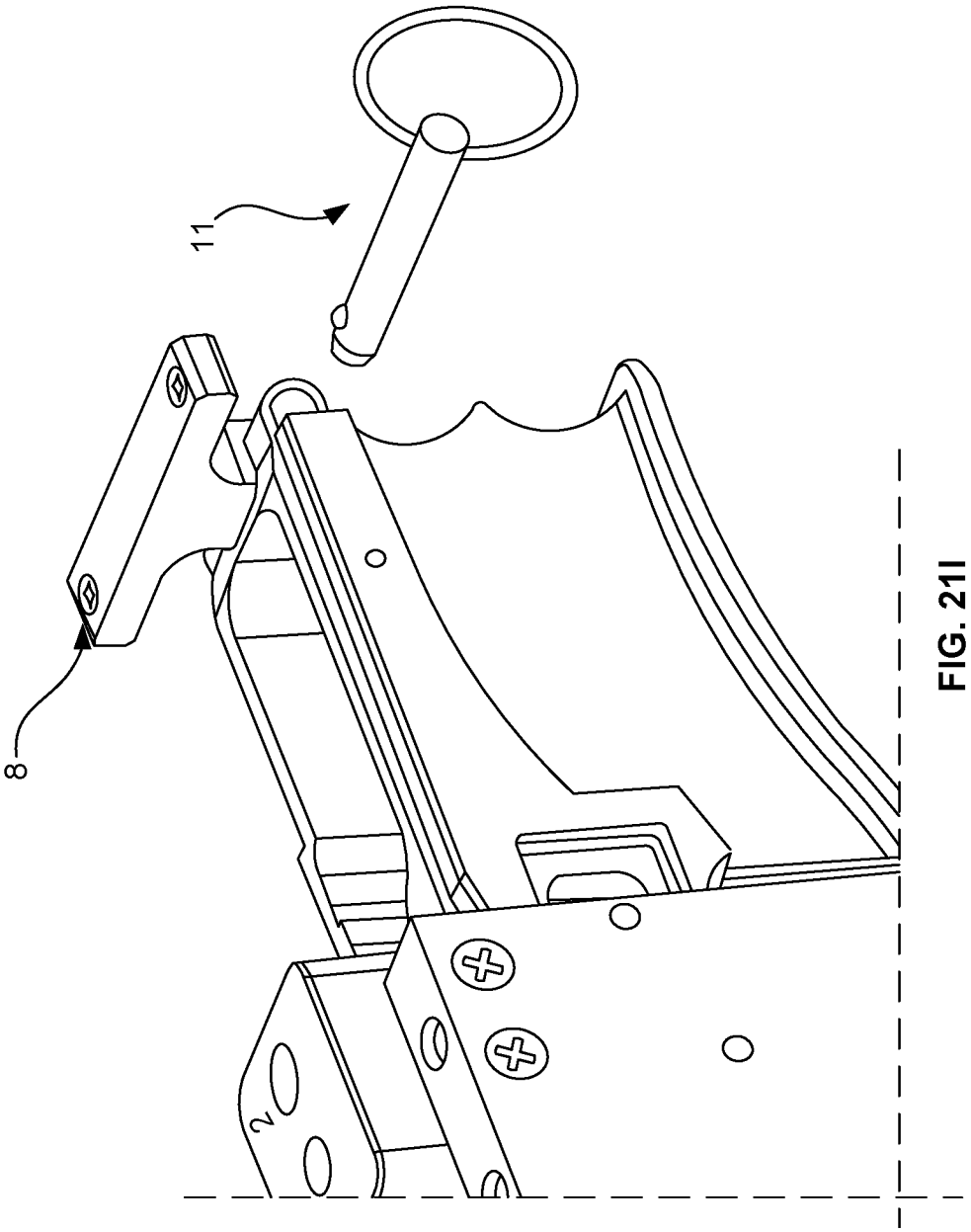


FIG. 21I

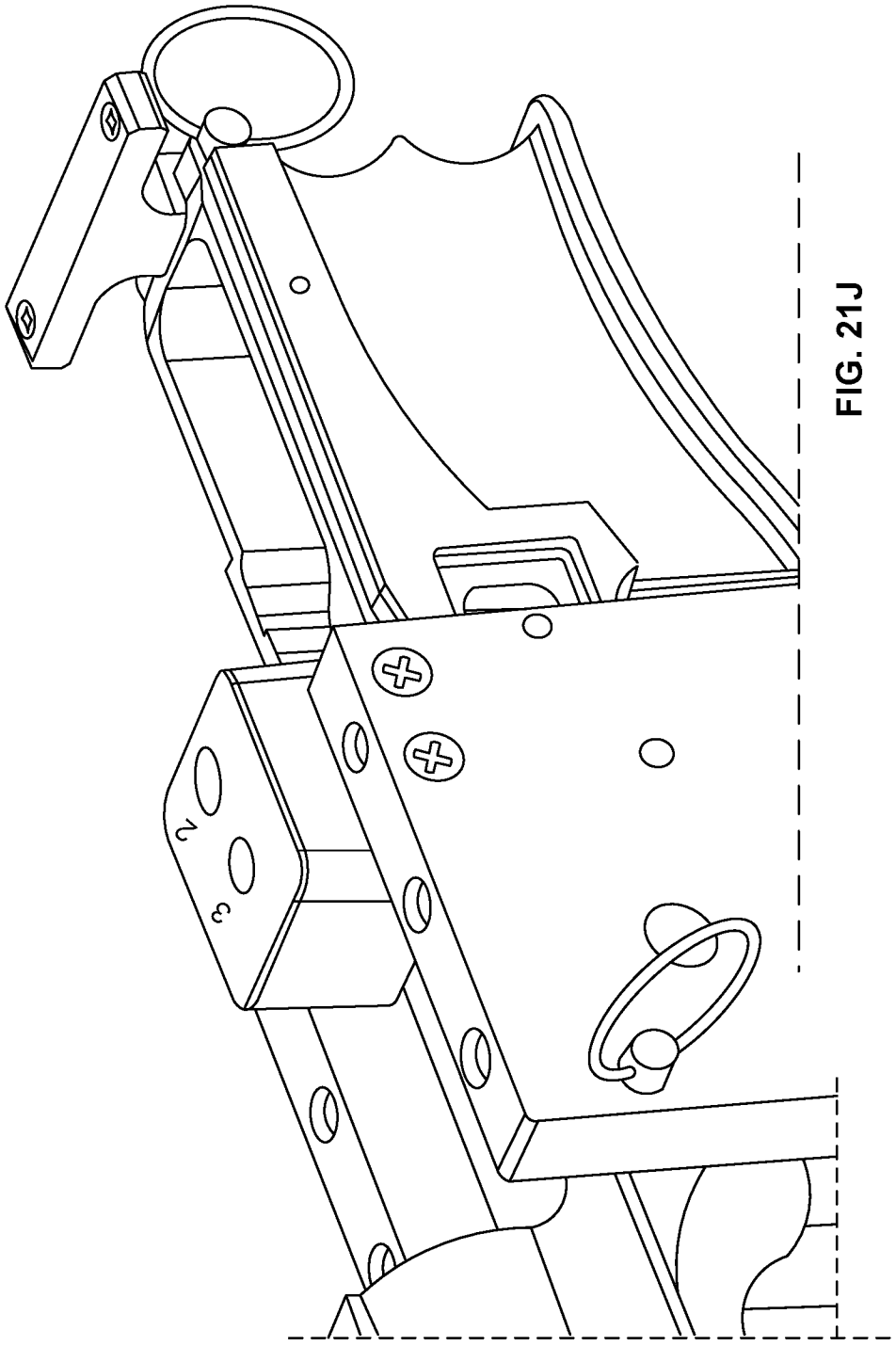


FIG. 21J

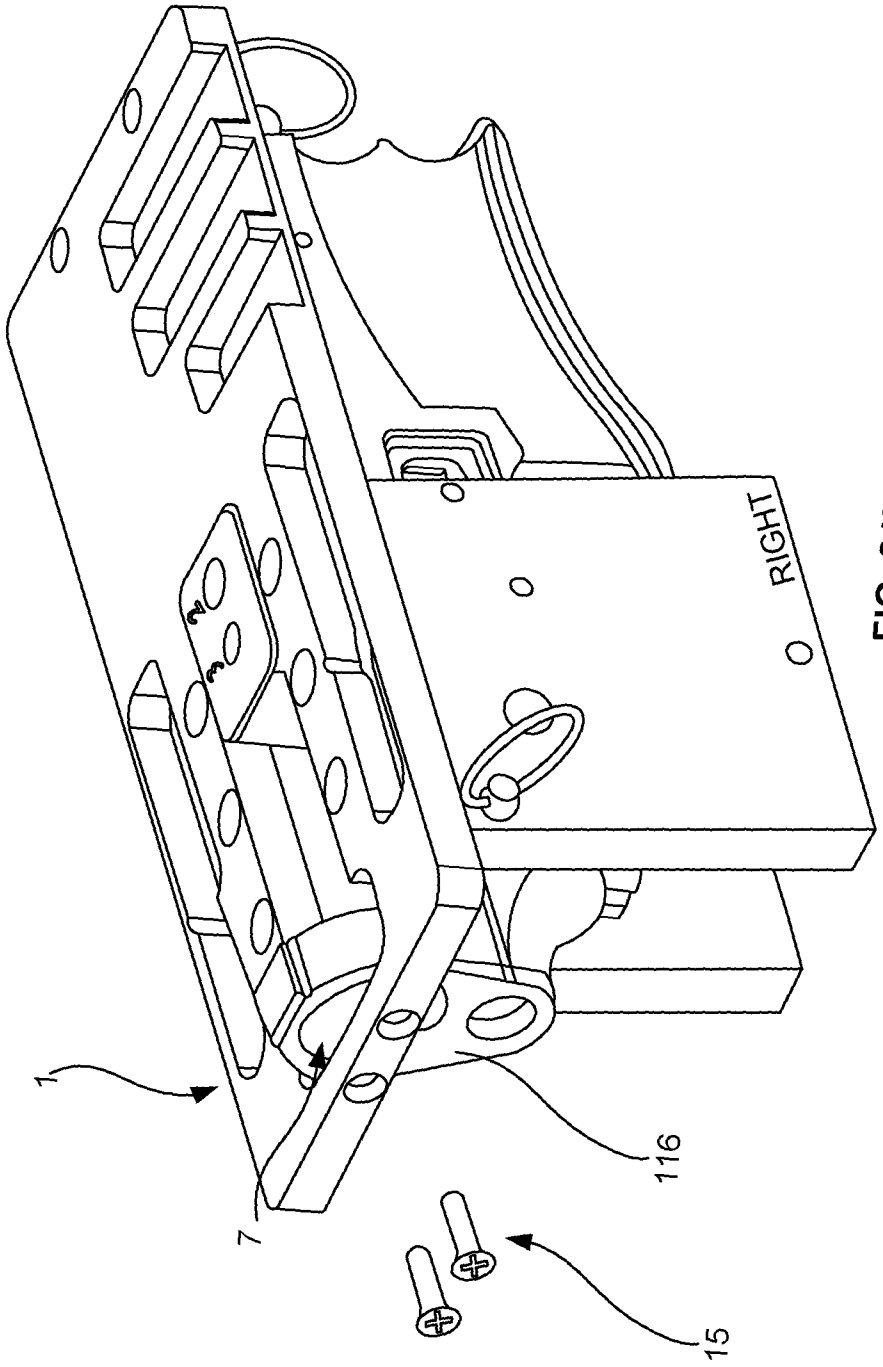


FIG. 21K

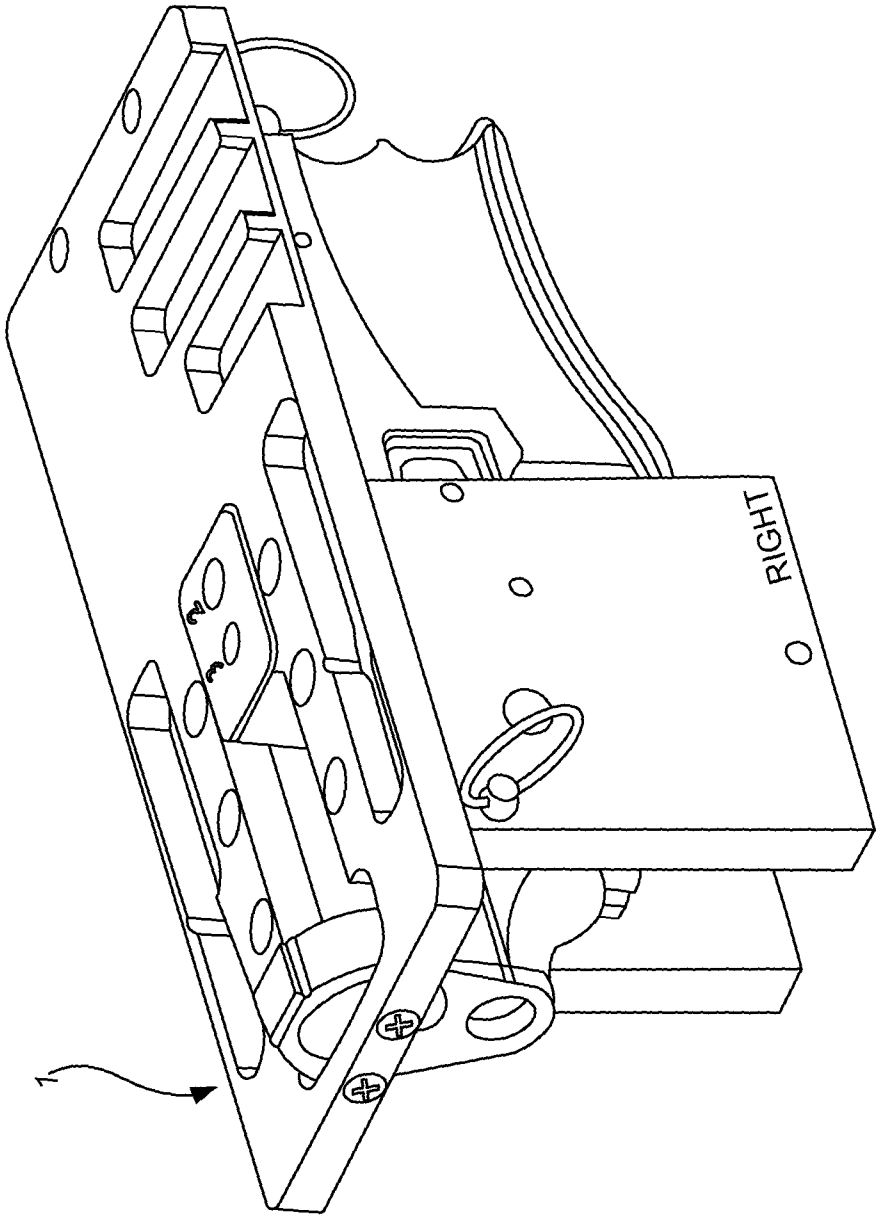


FIG. 21L

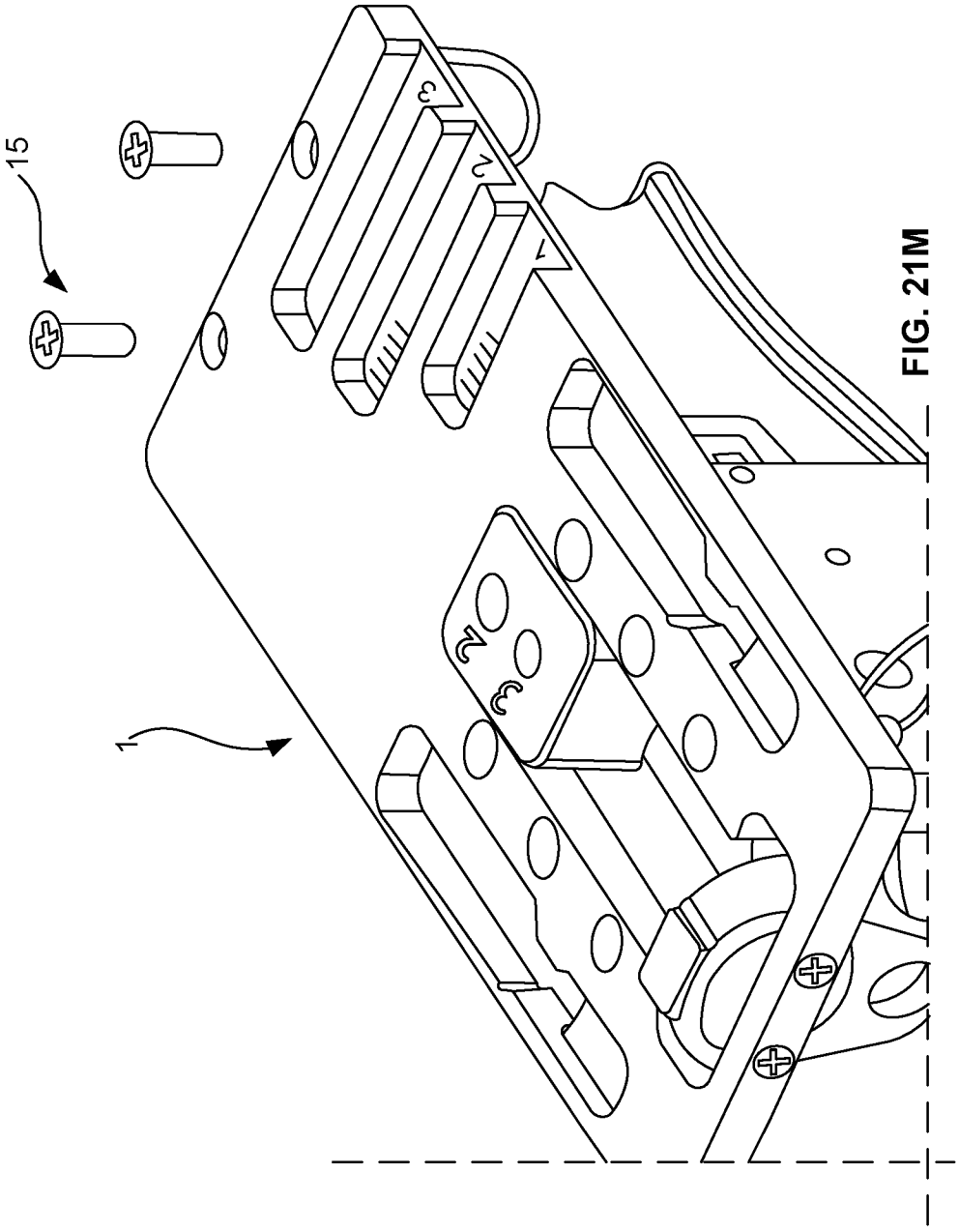


FIG. 21M

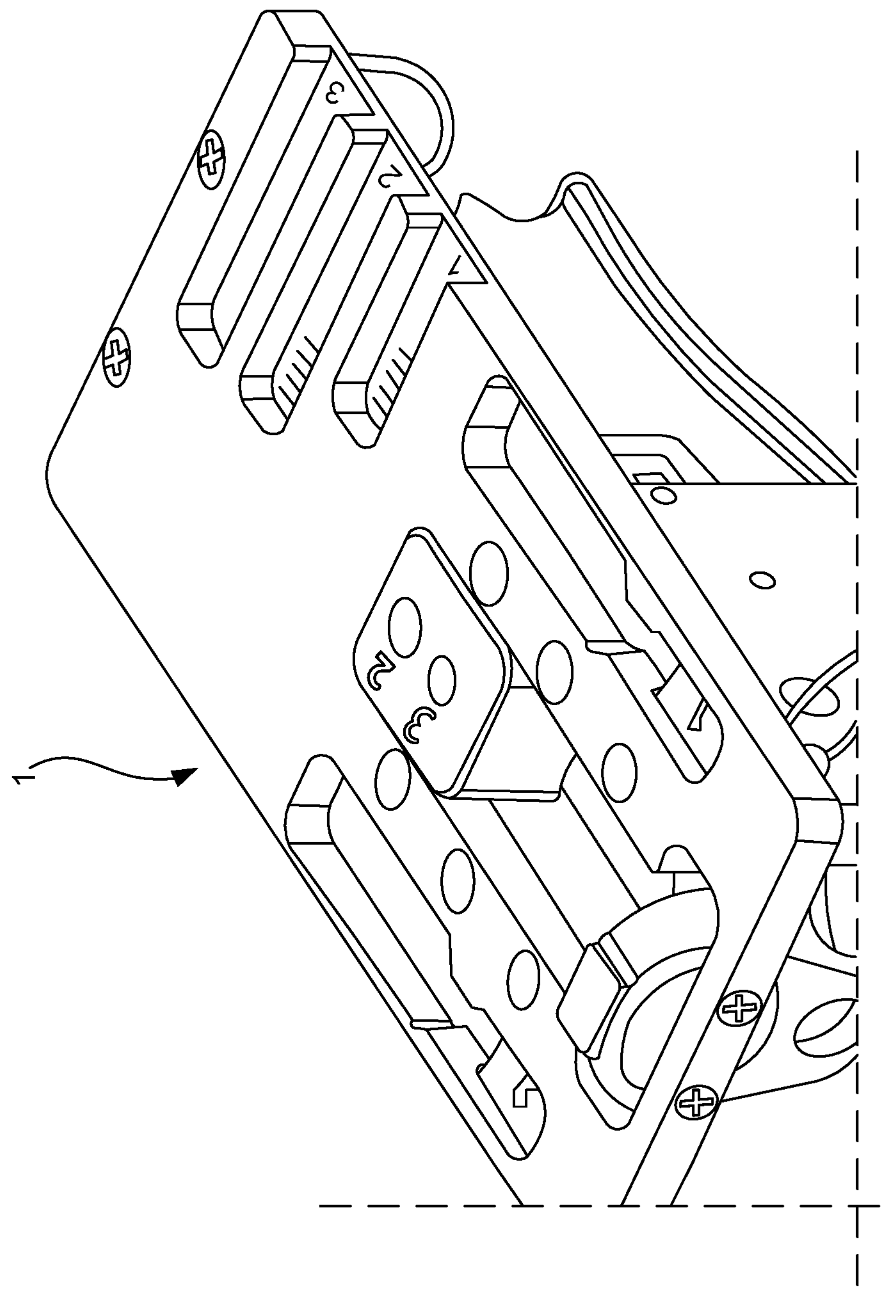
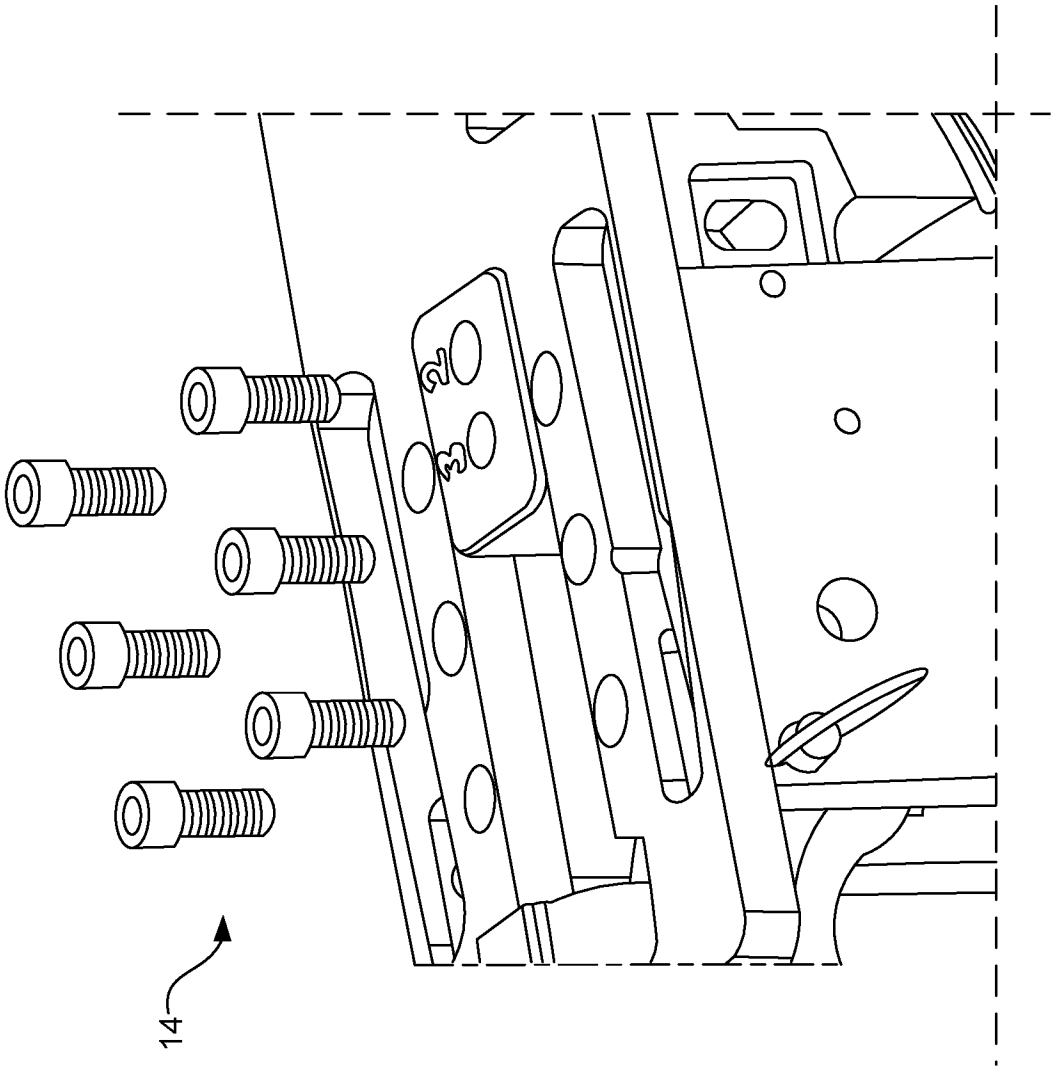


FIG. 21N

FIG. 21O



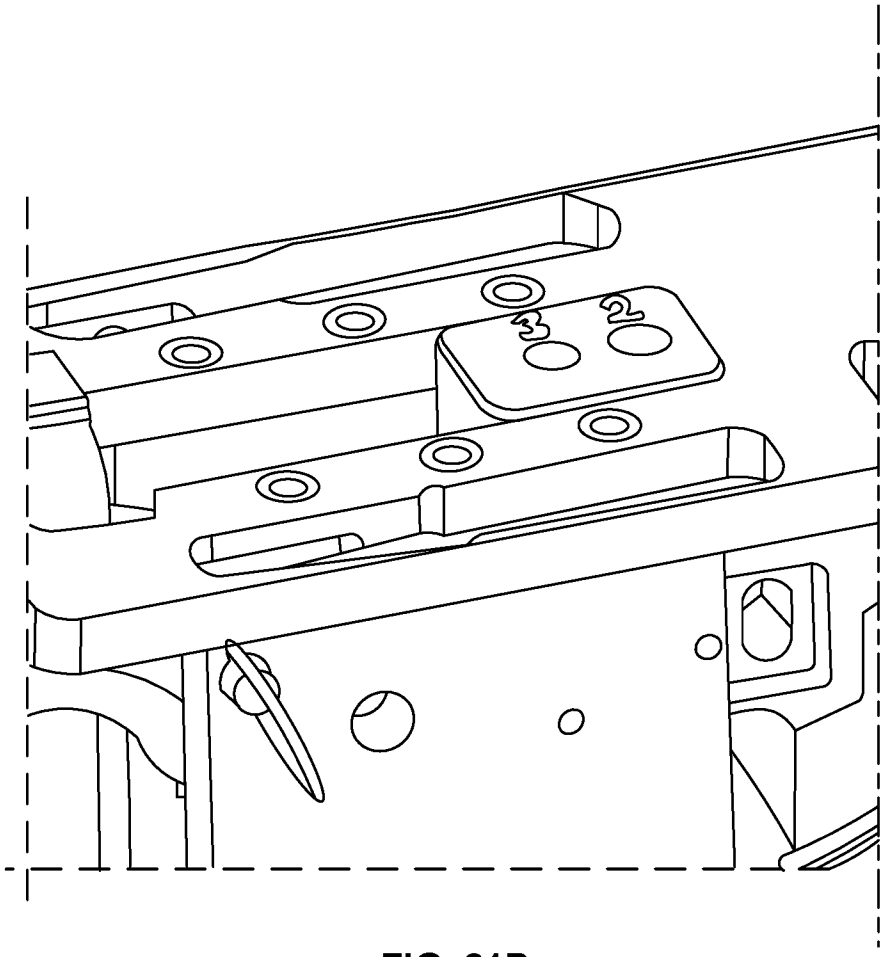


FIG. 21P

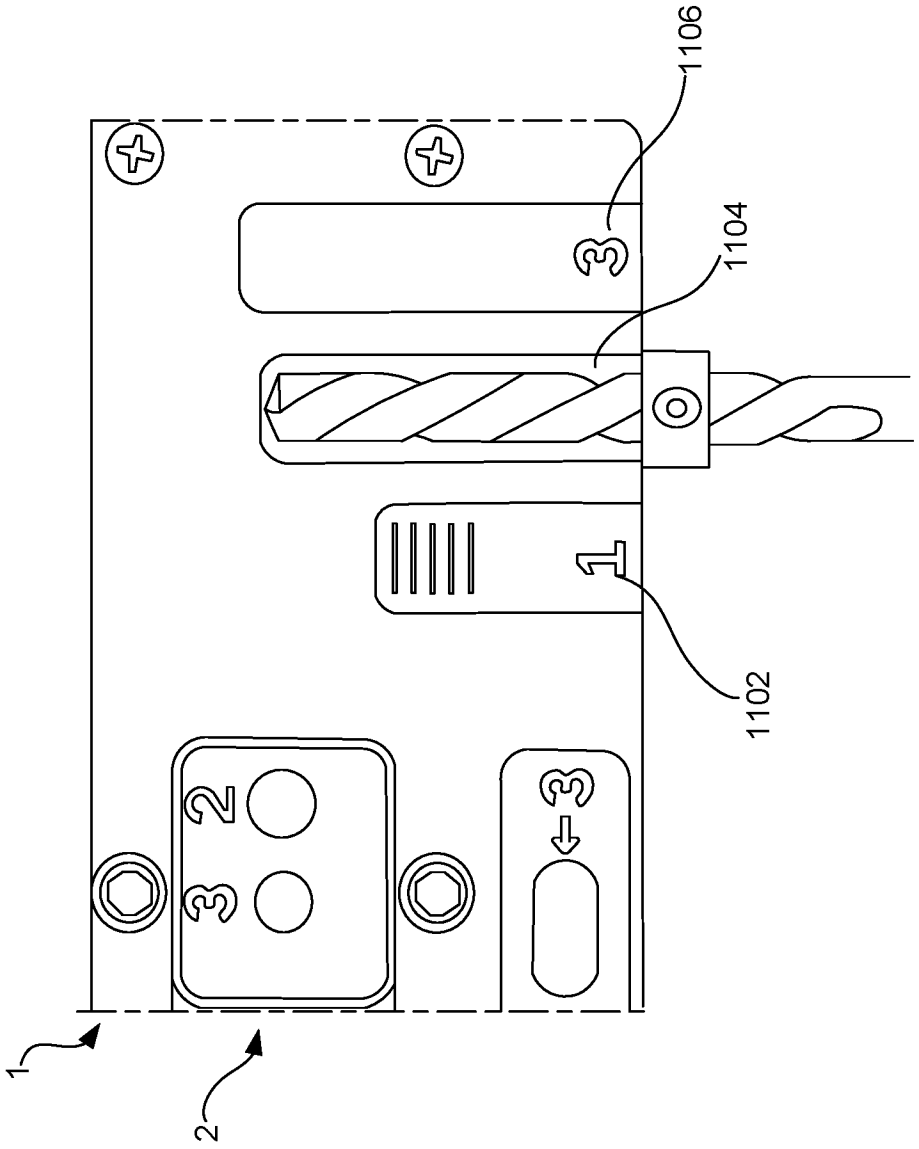


FIG. 22A

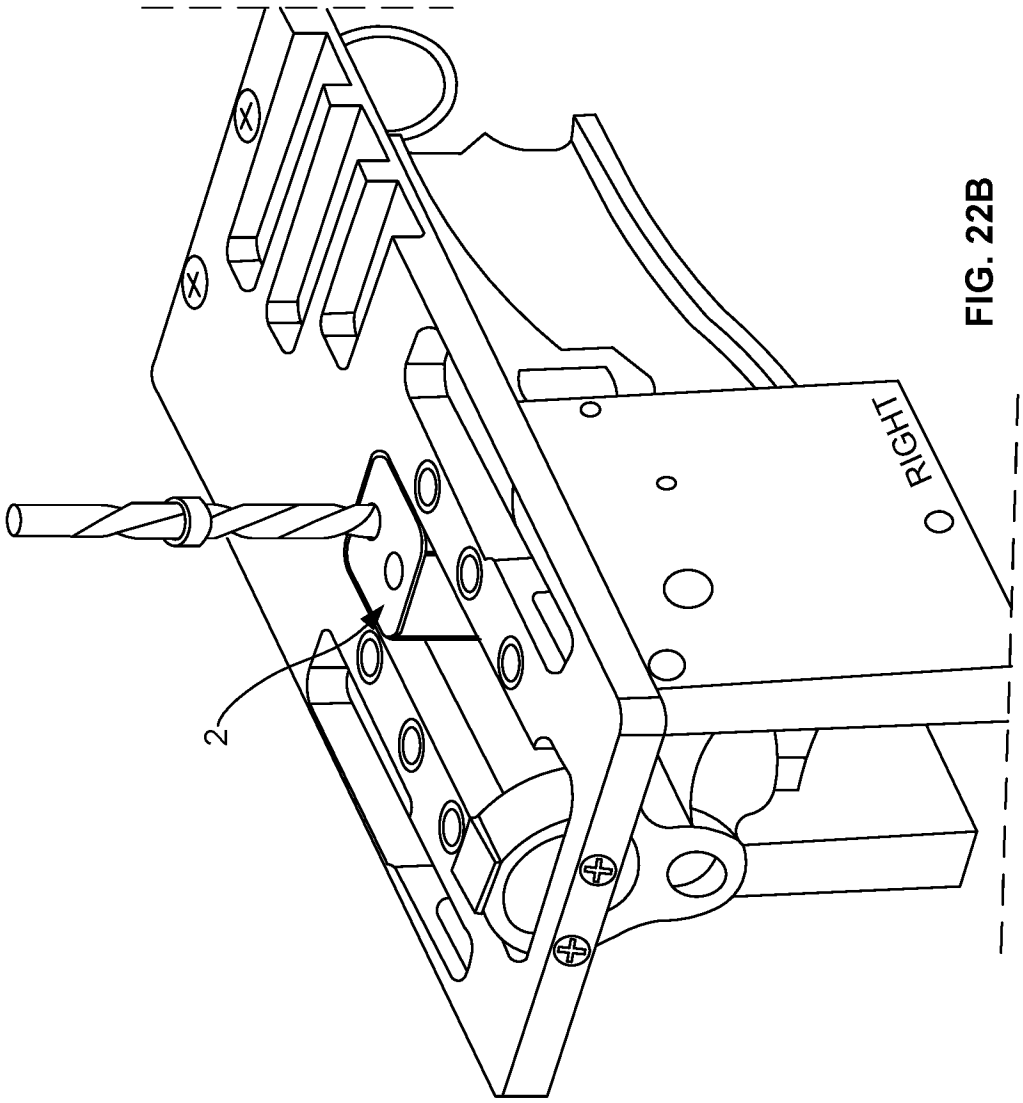


FIG. 22B

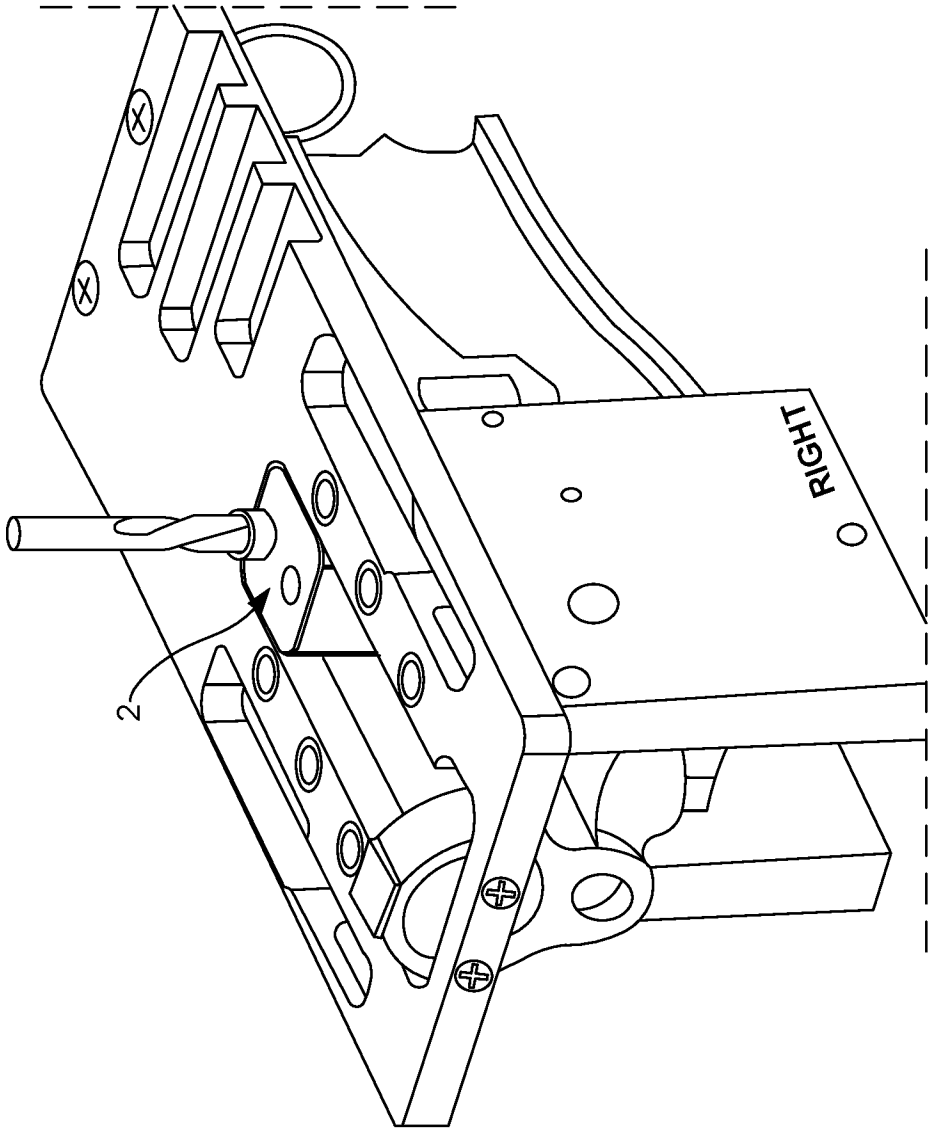


FIG. 22C

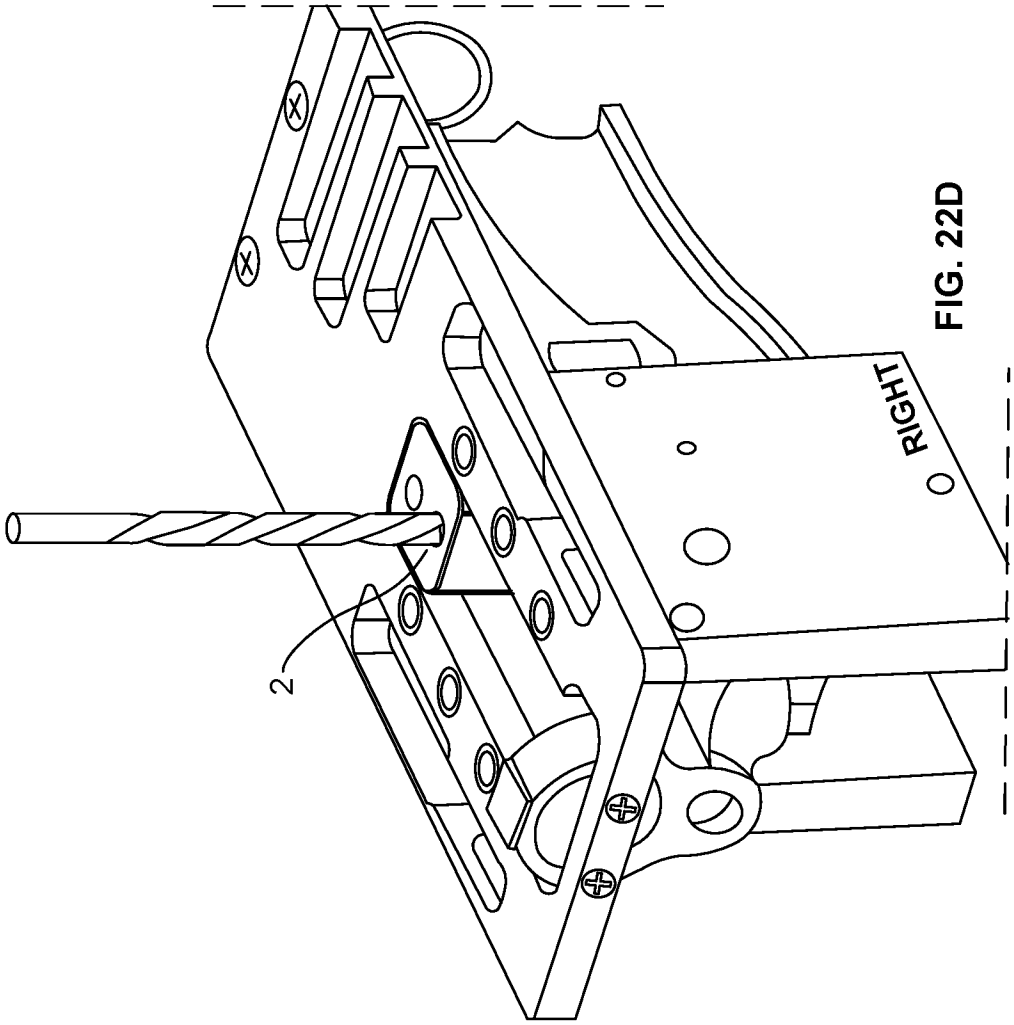


FIG. 22D

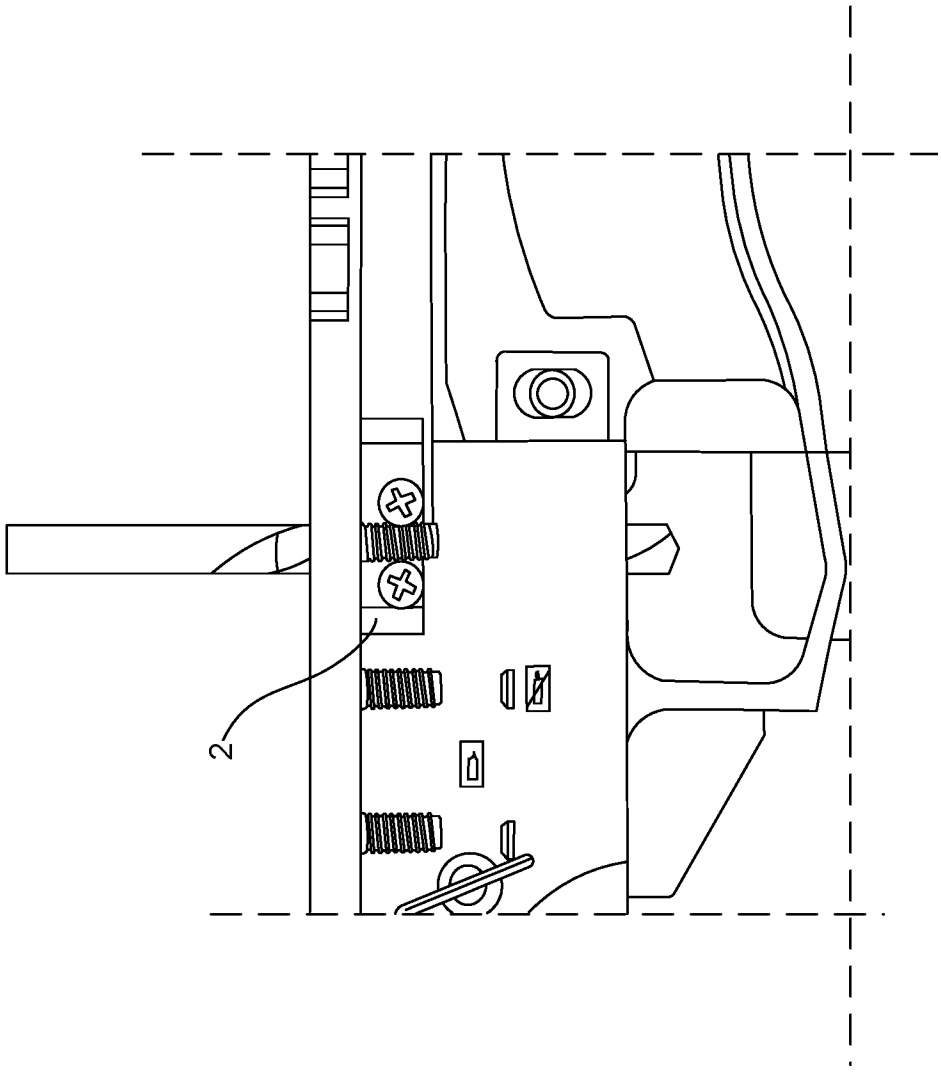


FIG. 22E

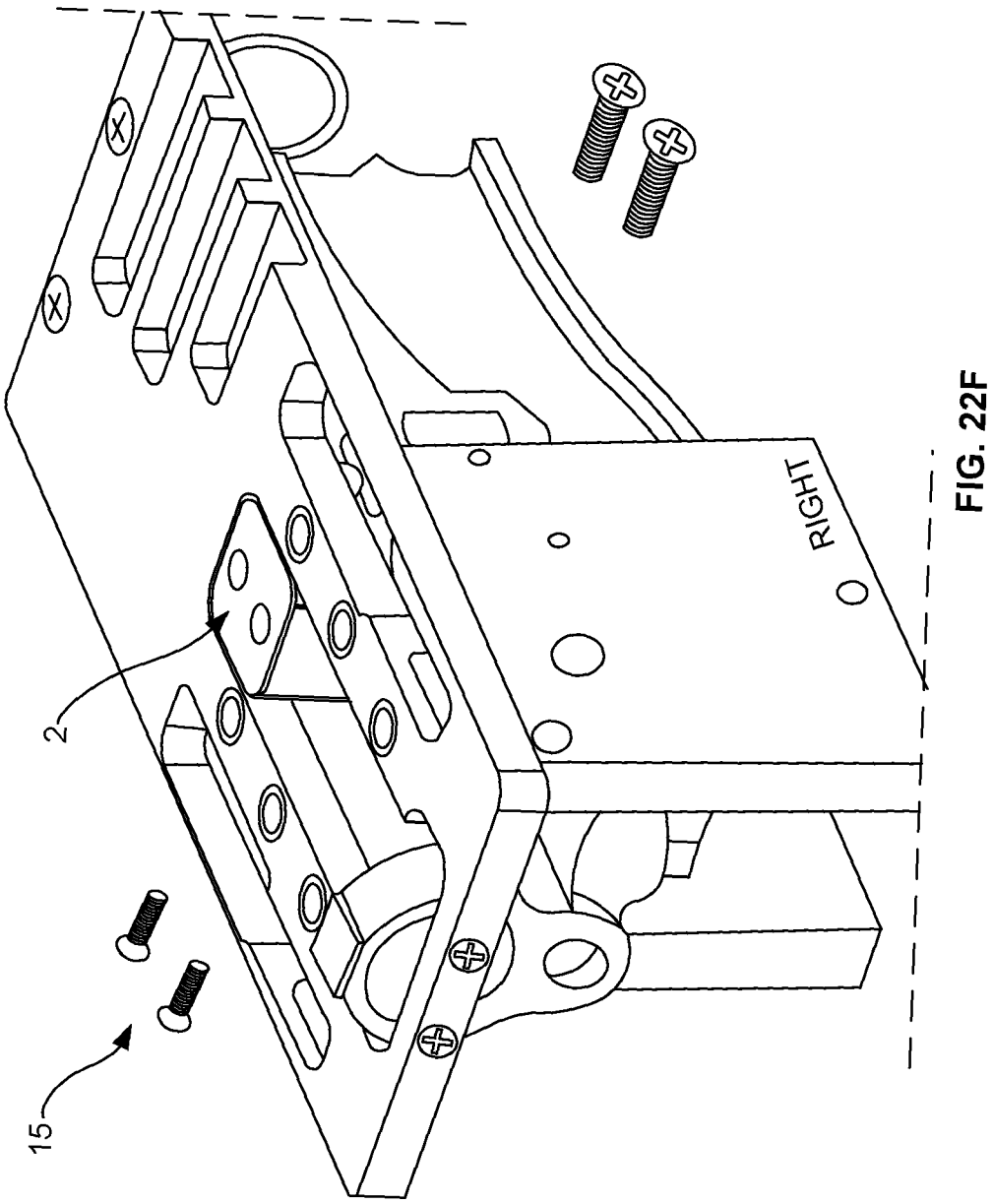


FIG. 22F

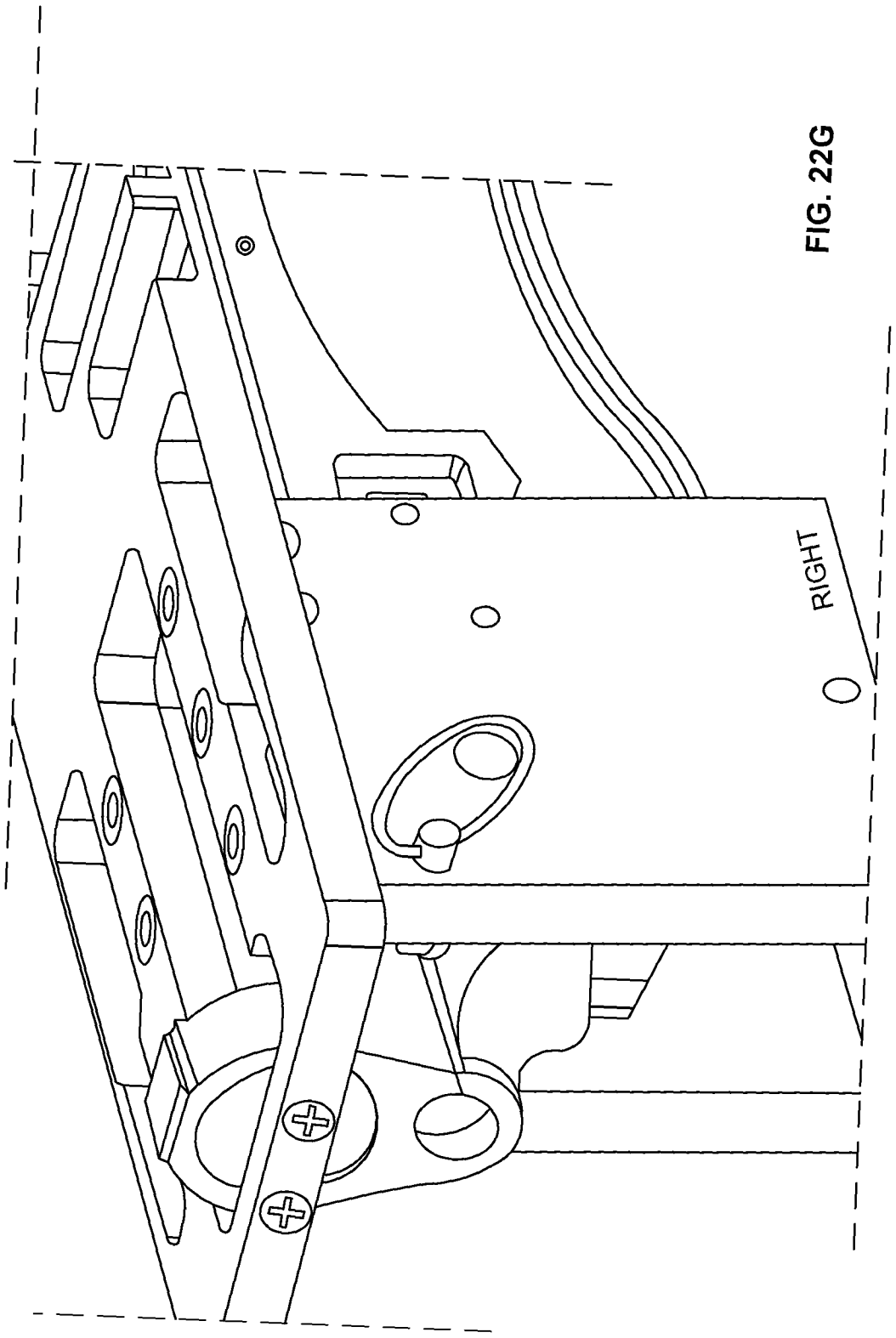


FIG. 22G

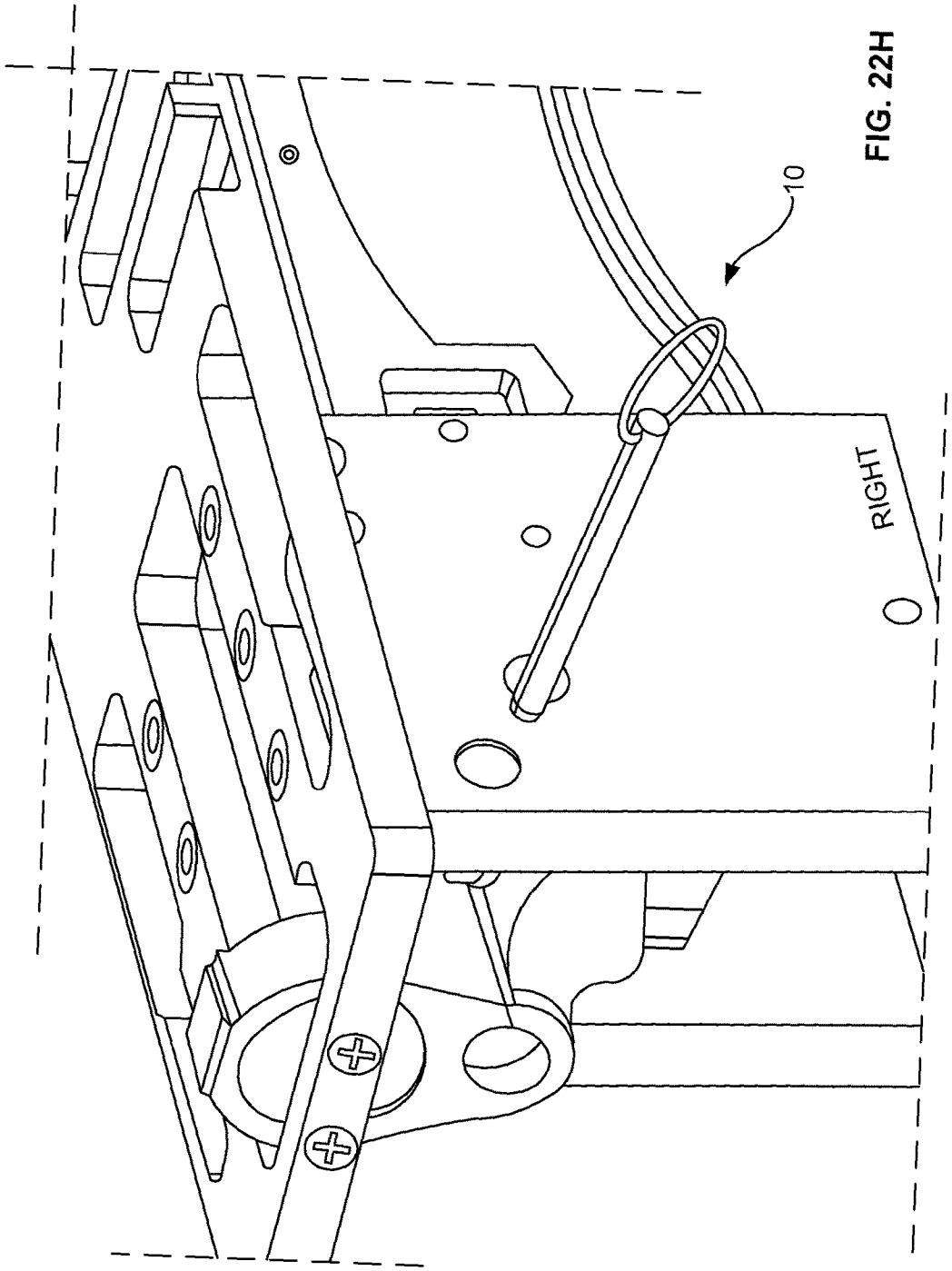


FIG. 22H

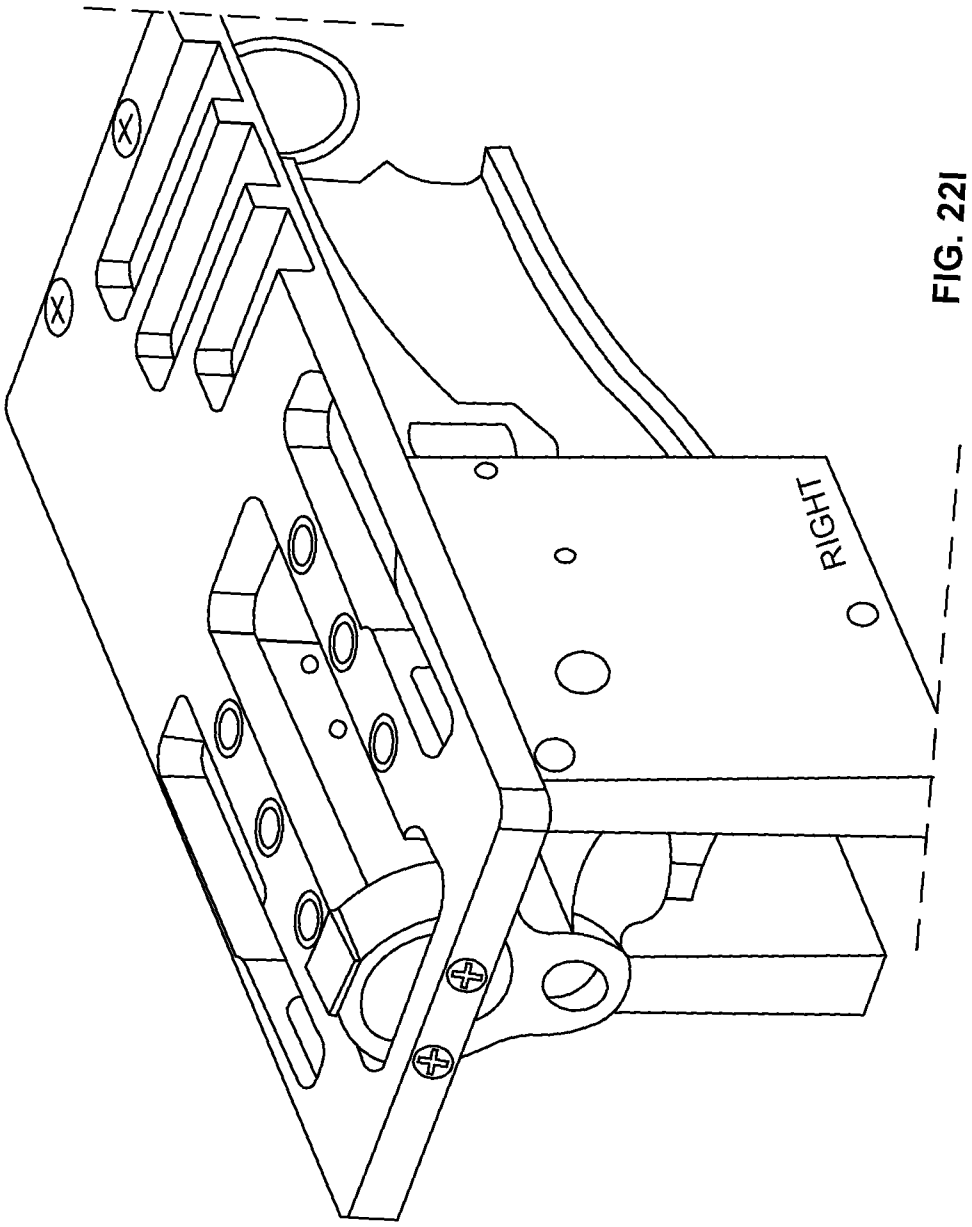


FIG. 22I

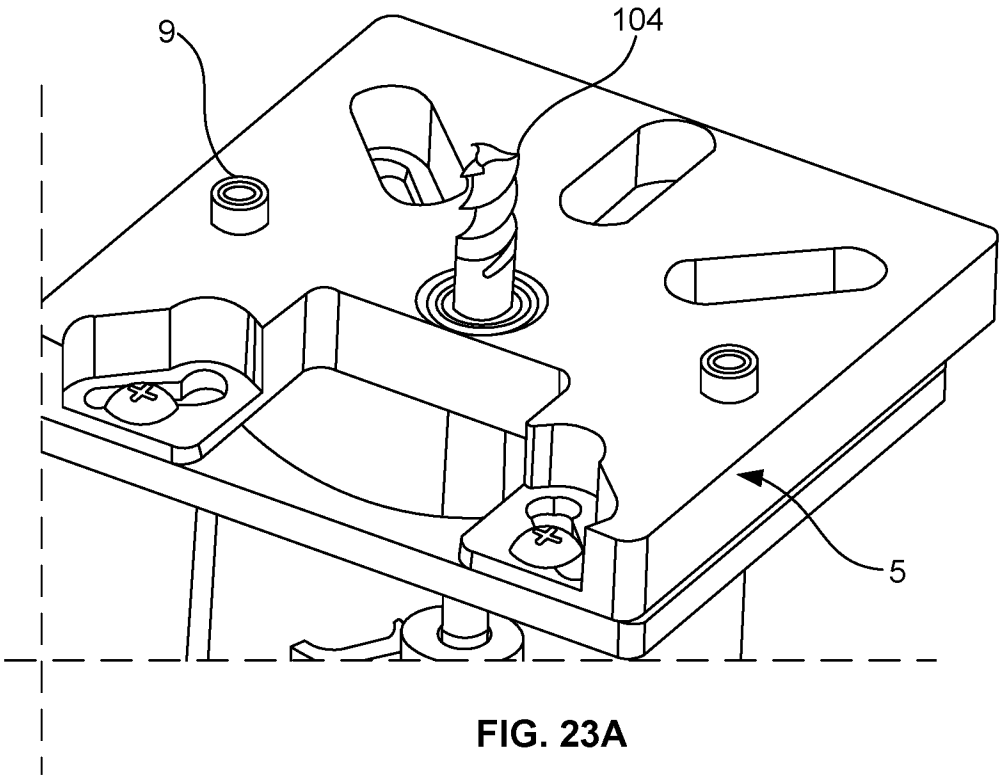


FIG. 23A

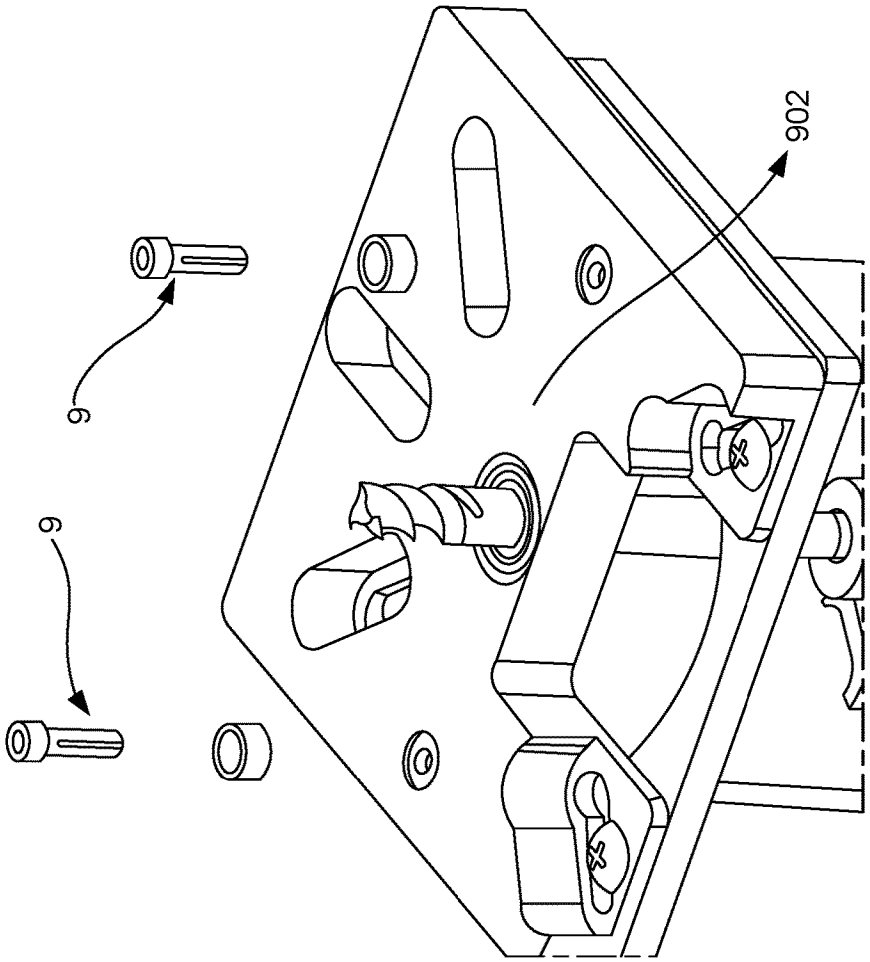


FIG. 23B

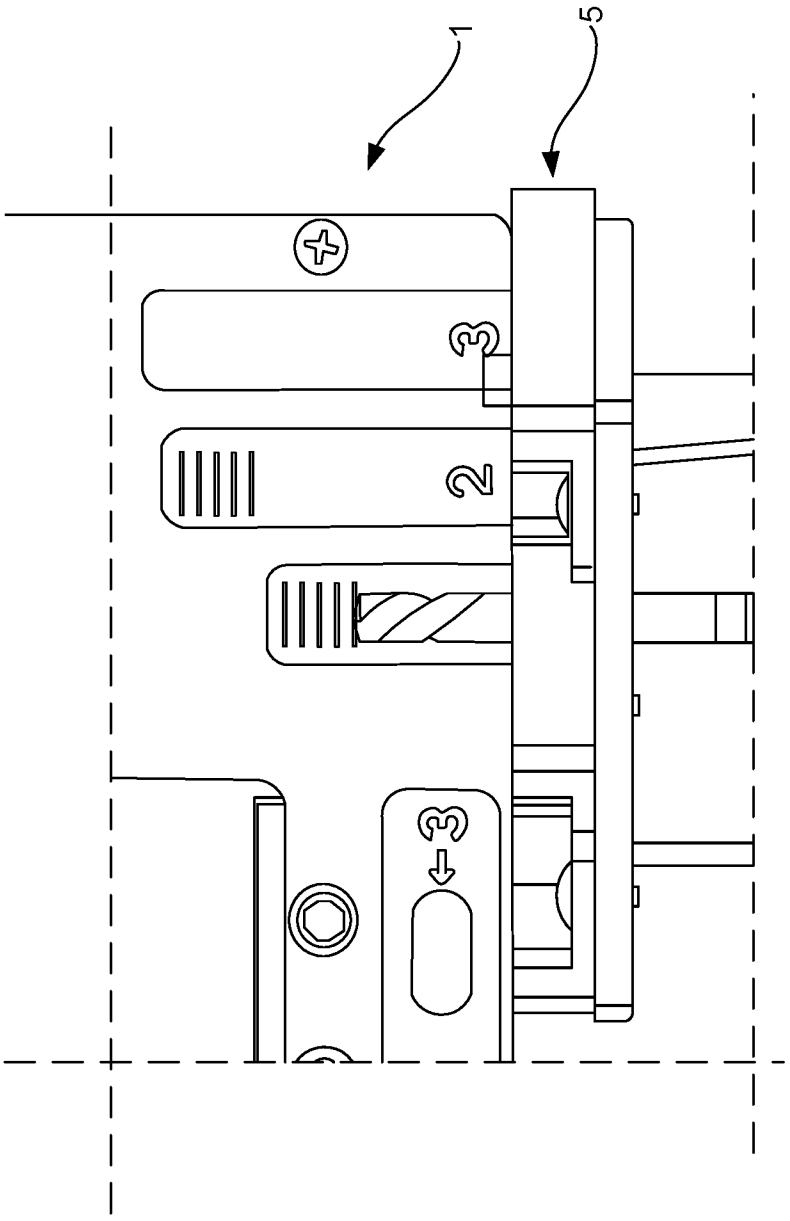


FIG. 23C

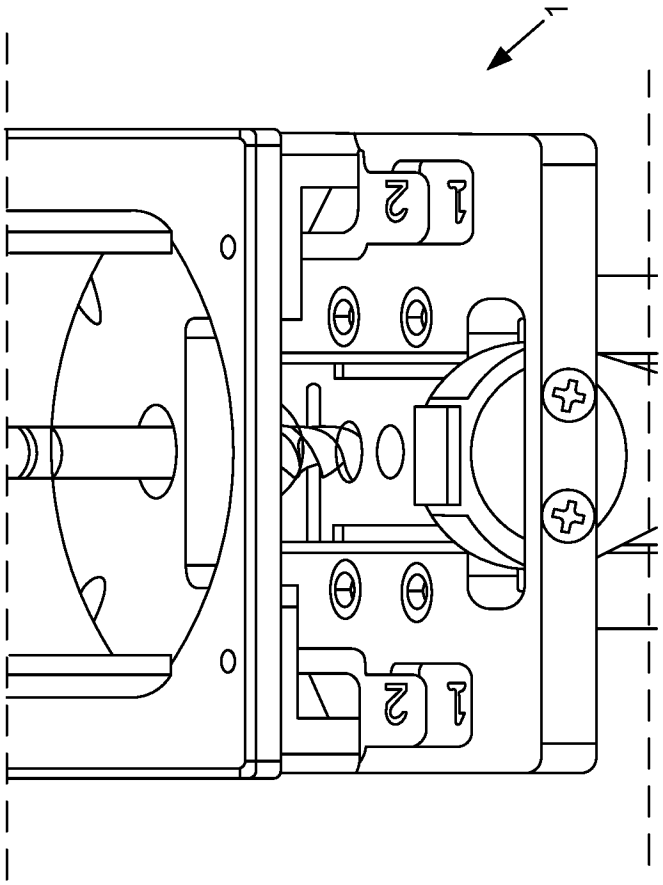


FIG. 23D

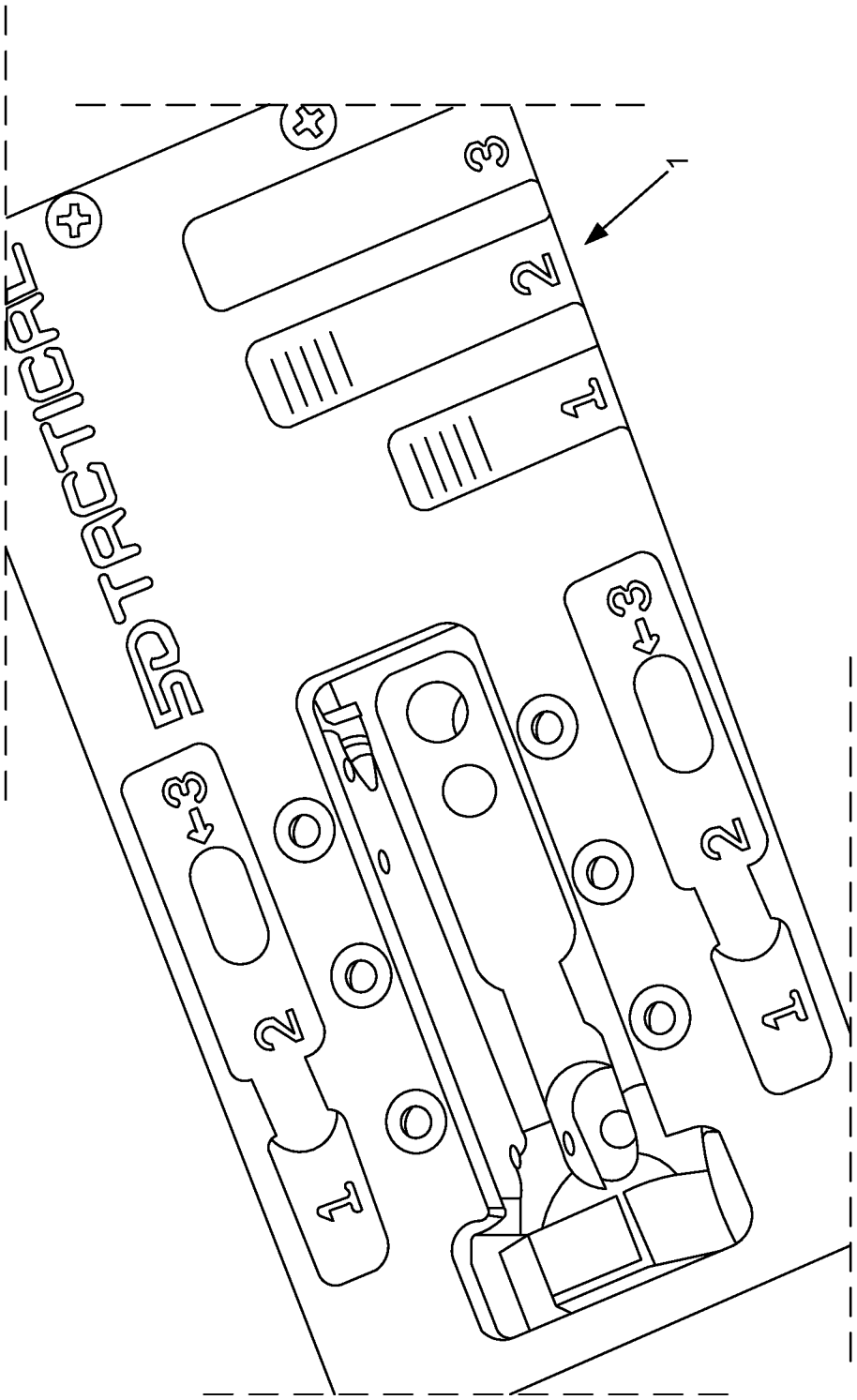


FIG. 23E

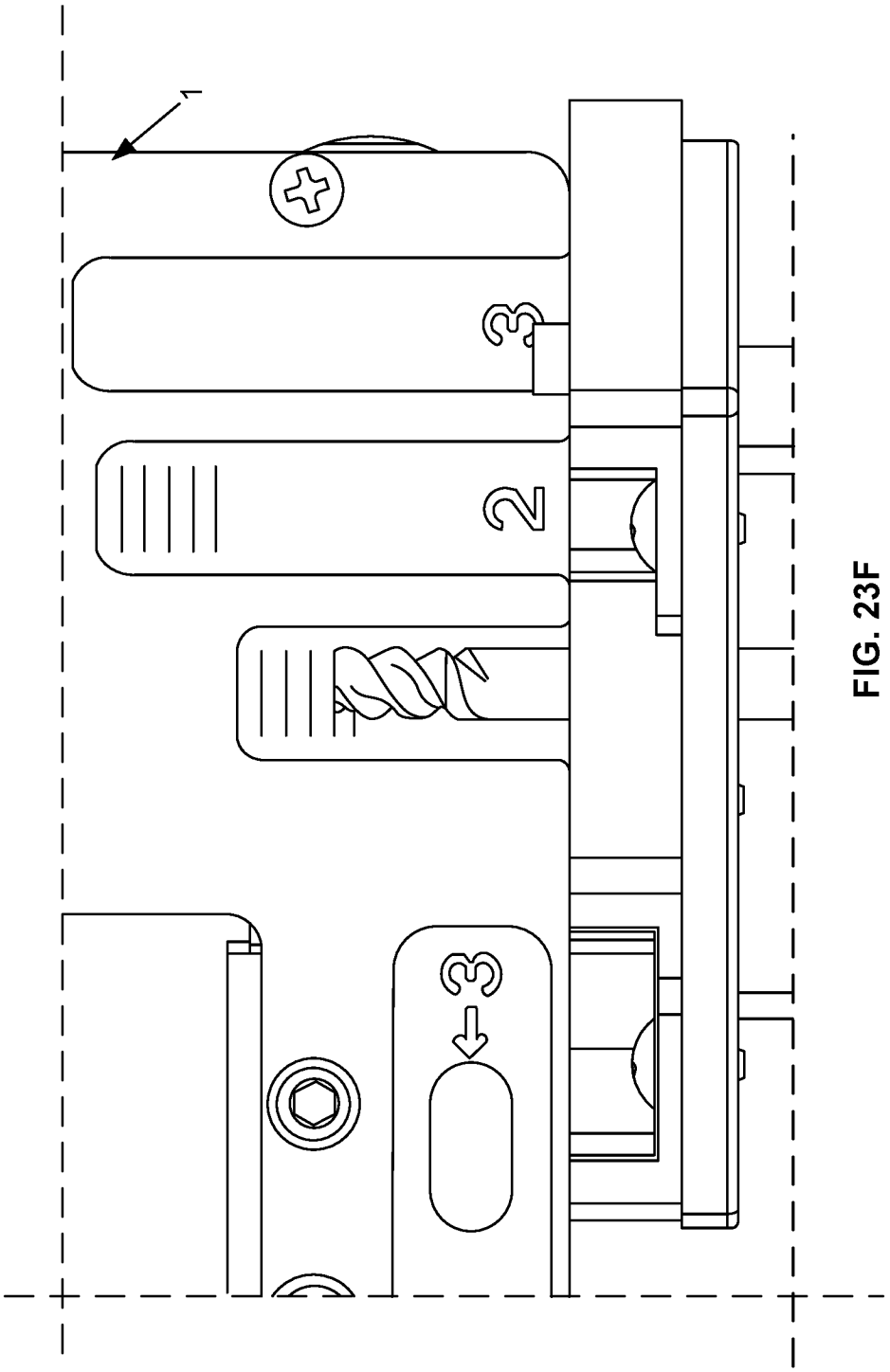


FIG. 23F

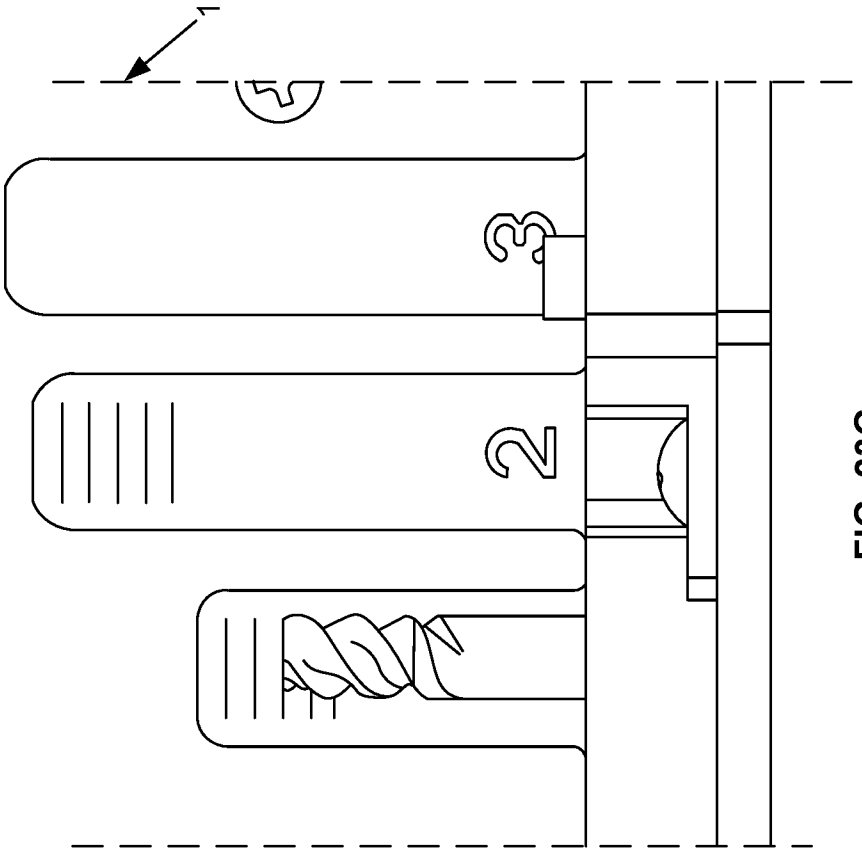


FIG. 23G

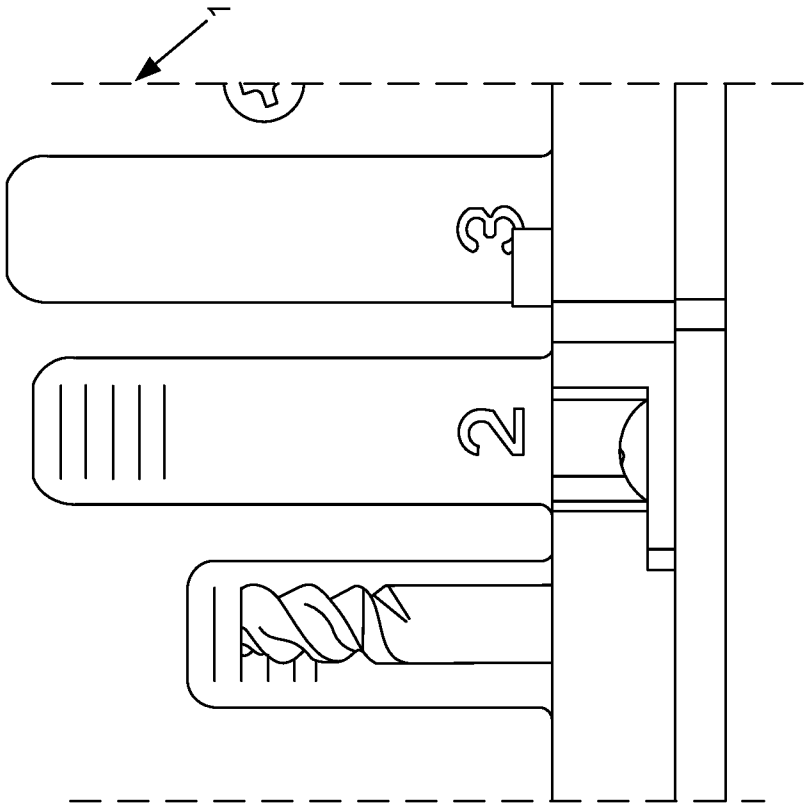


FIG. 23H

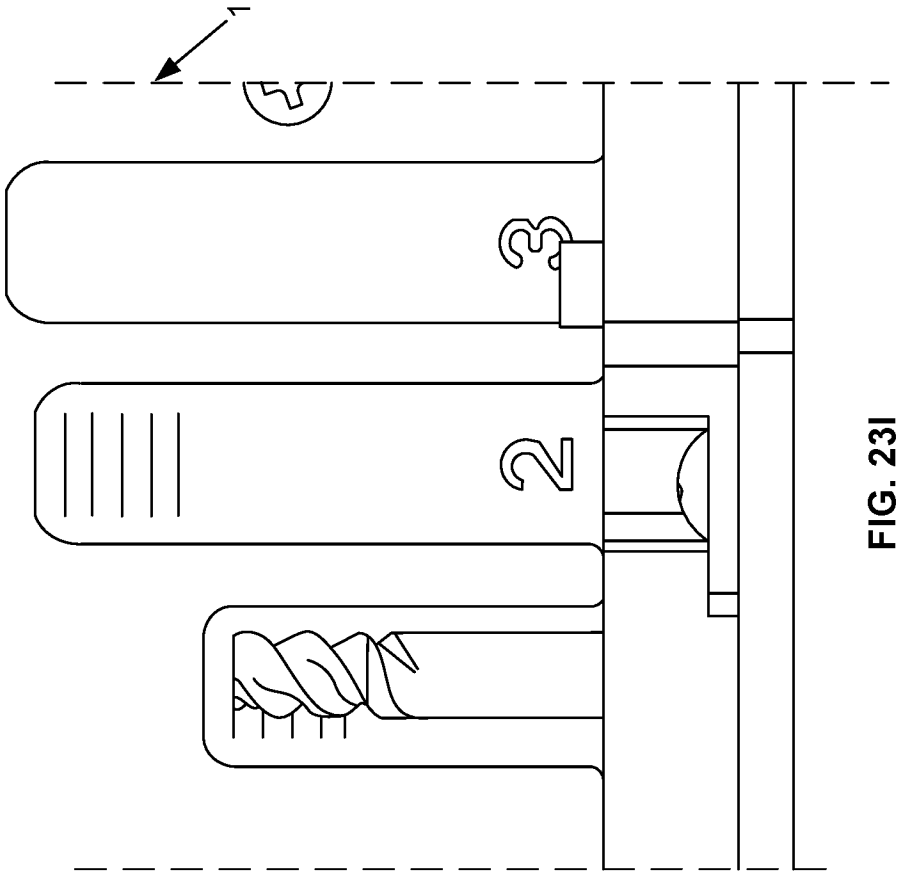


FIG. 23I

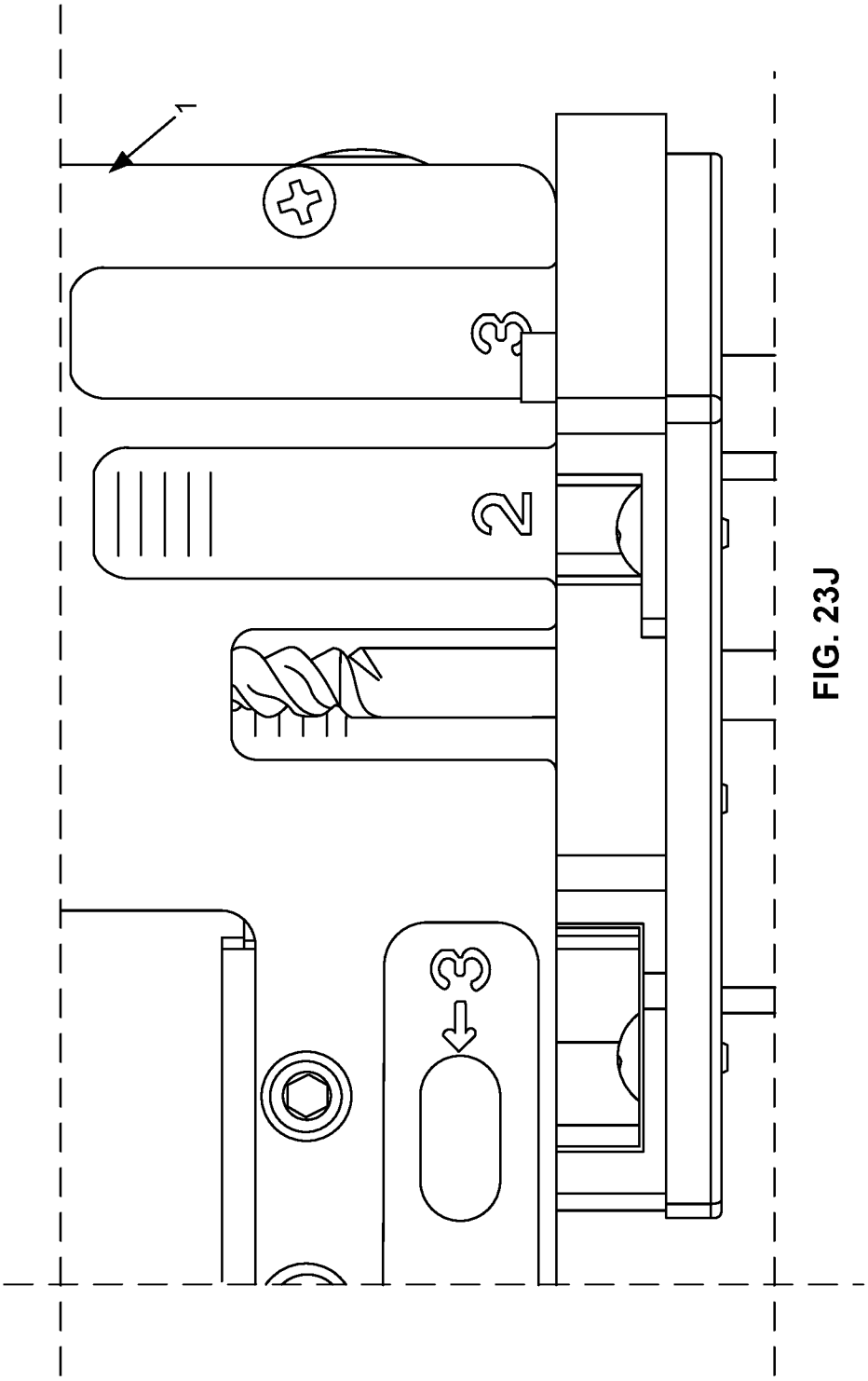


FIG. 23J

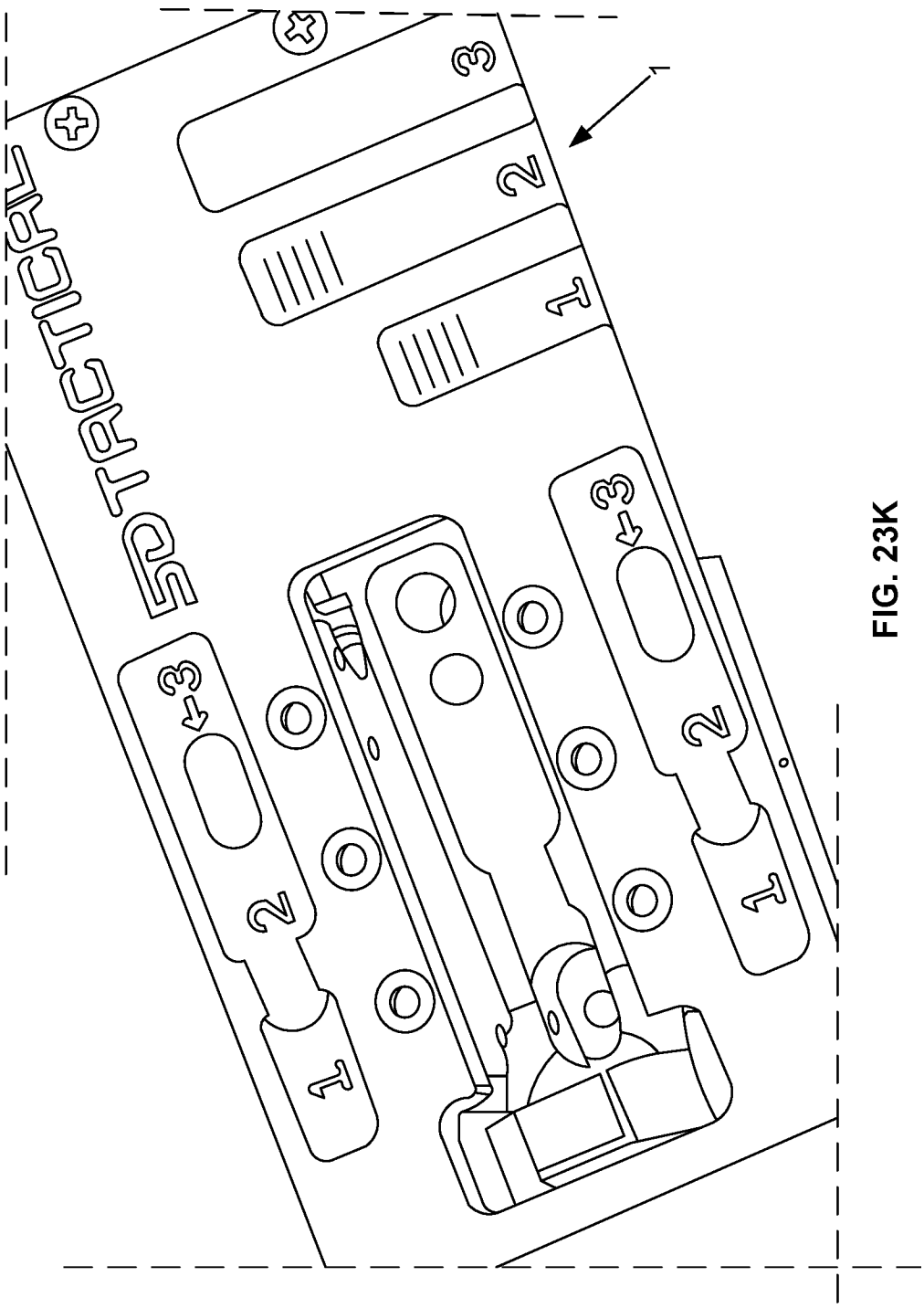


FIG. 23K

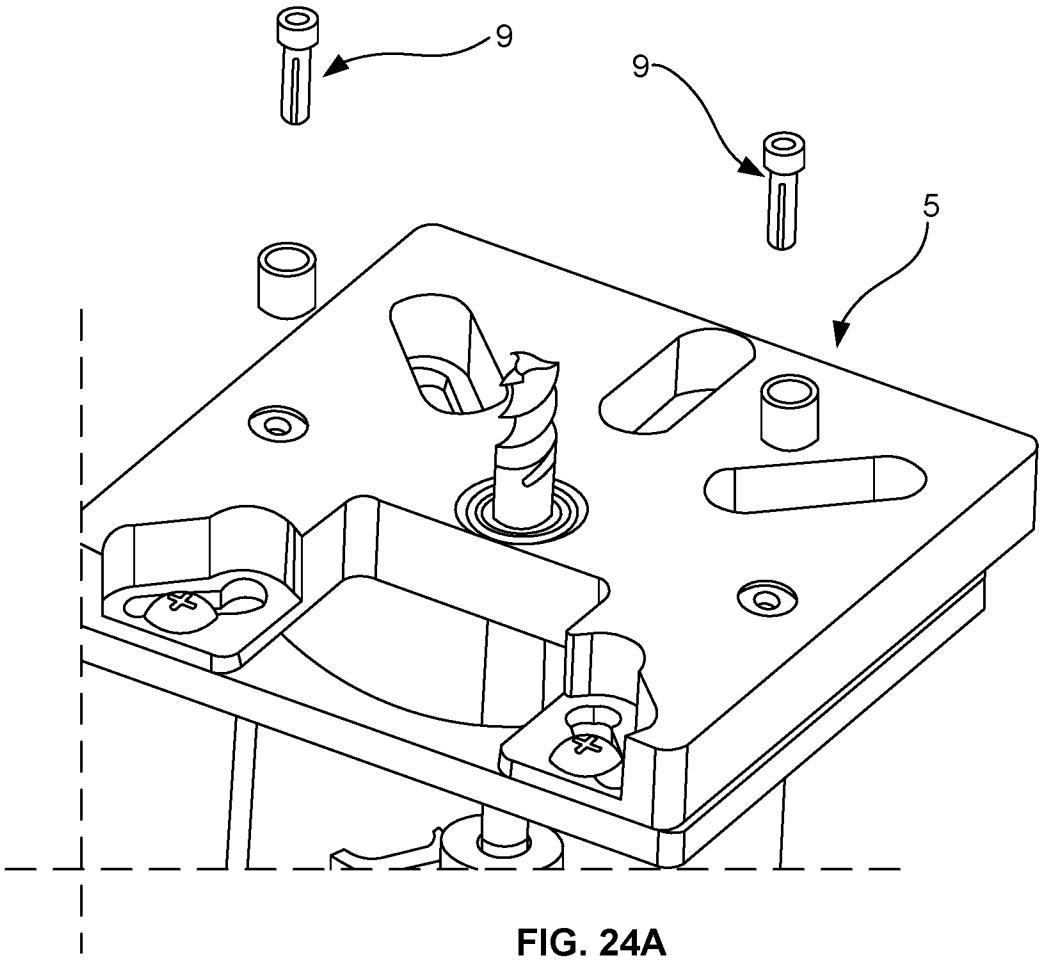


FIG. 24A

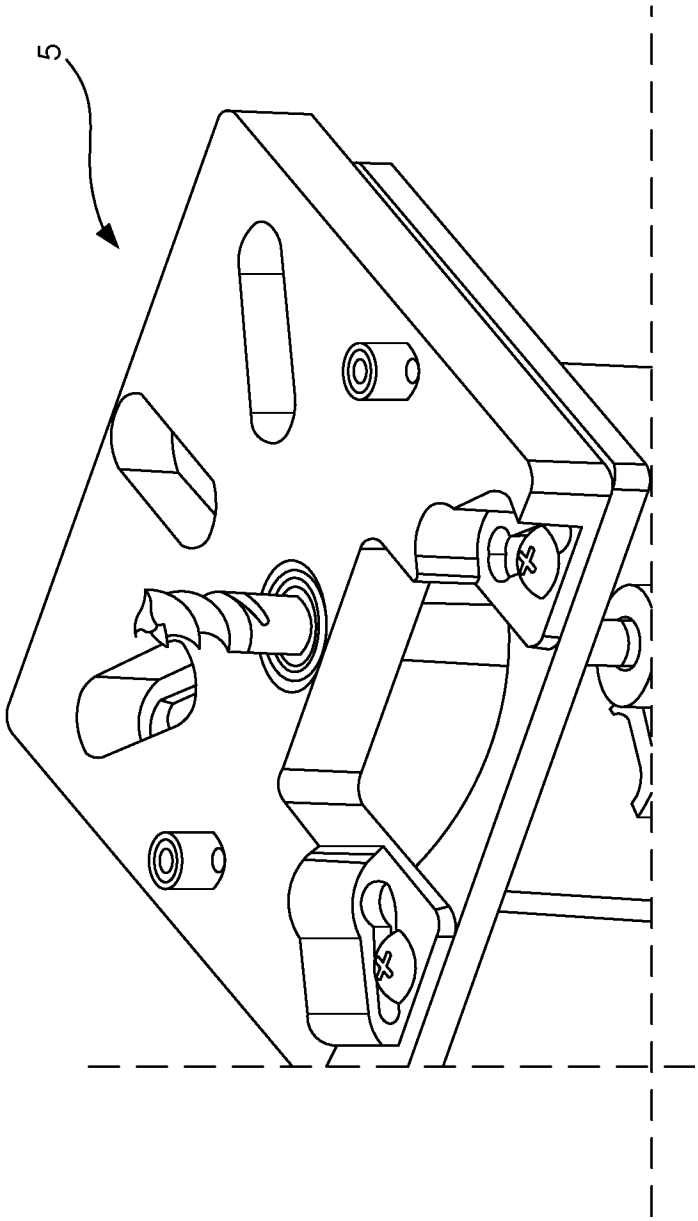


FIG. 24B

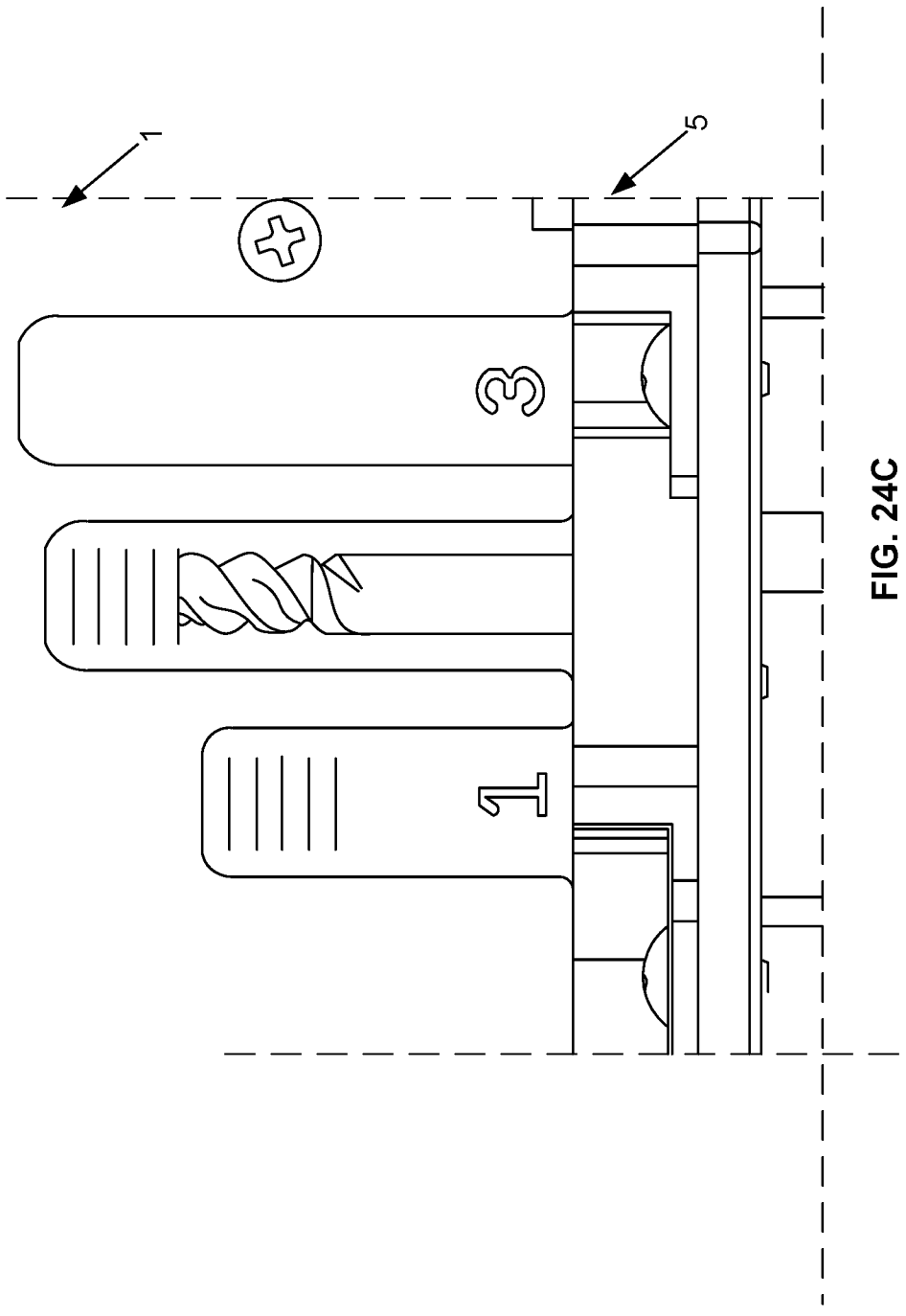


FIG. 24C

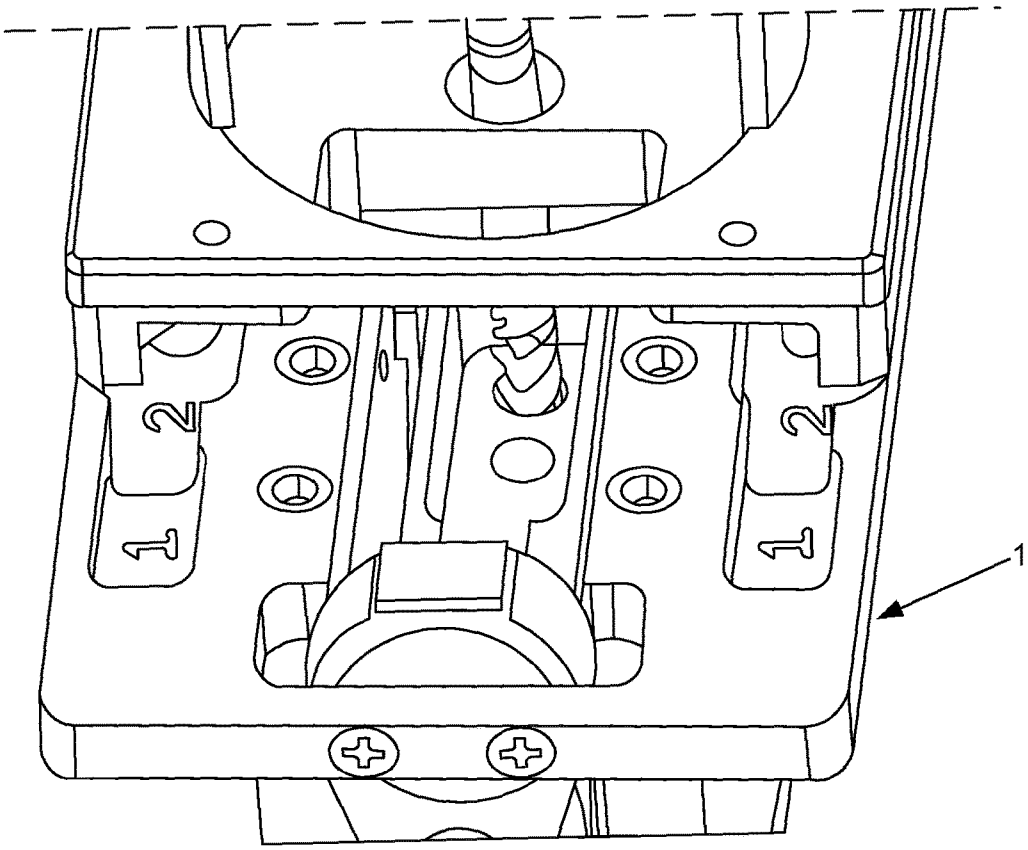


FIG. 24D

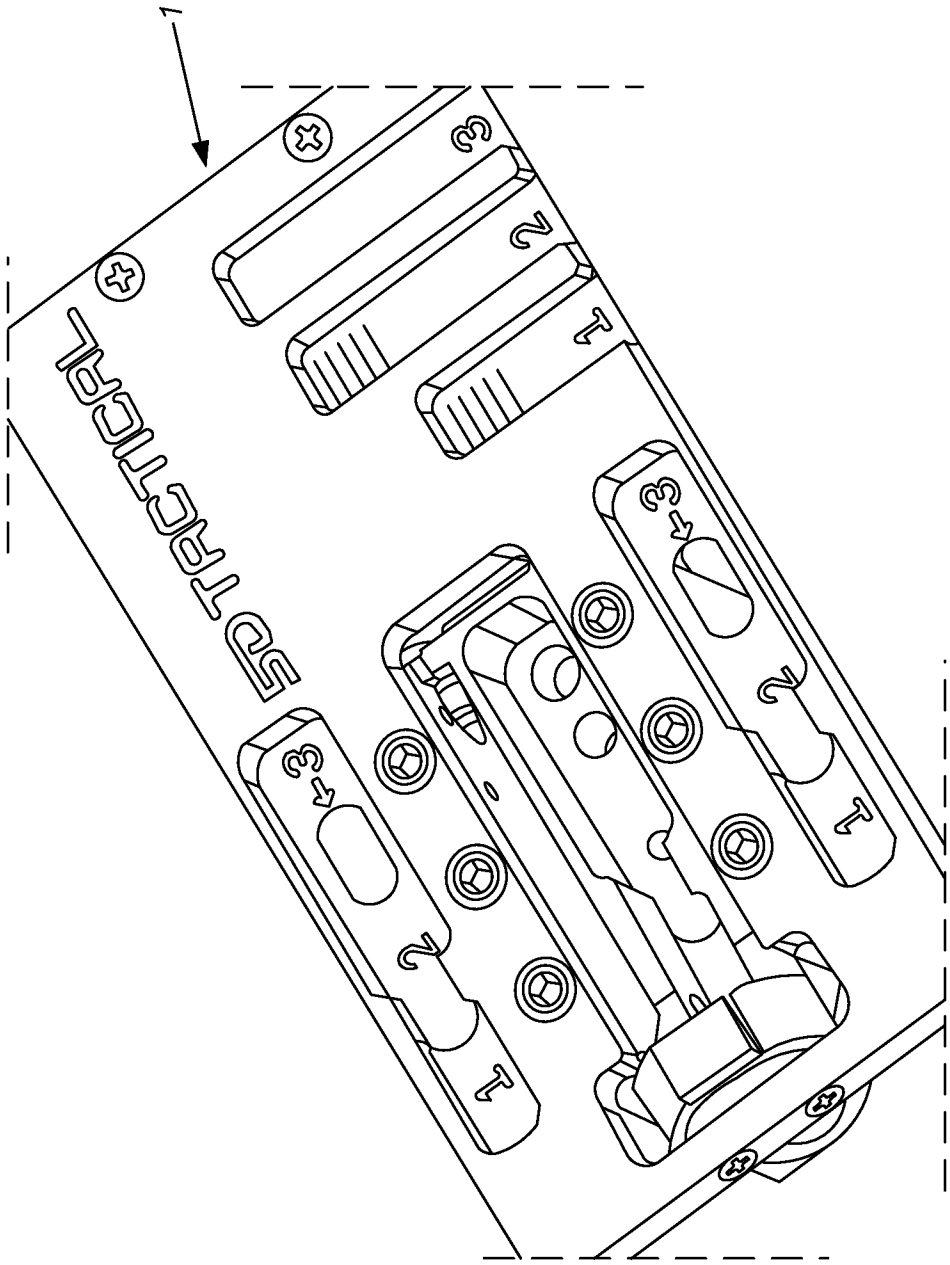


FIG. 24E

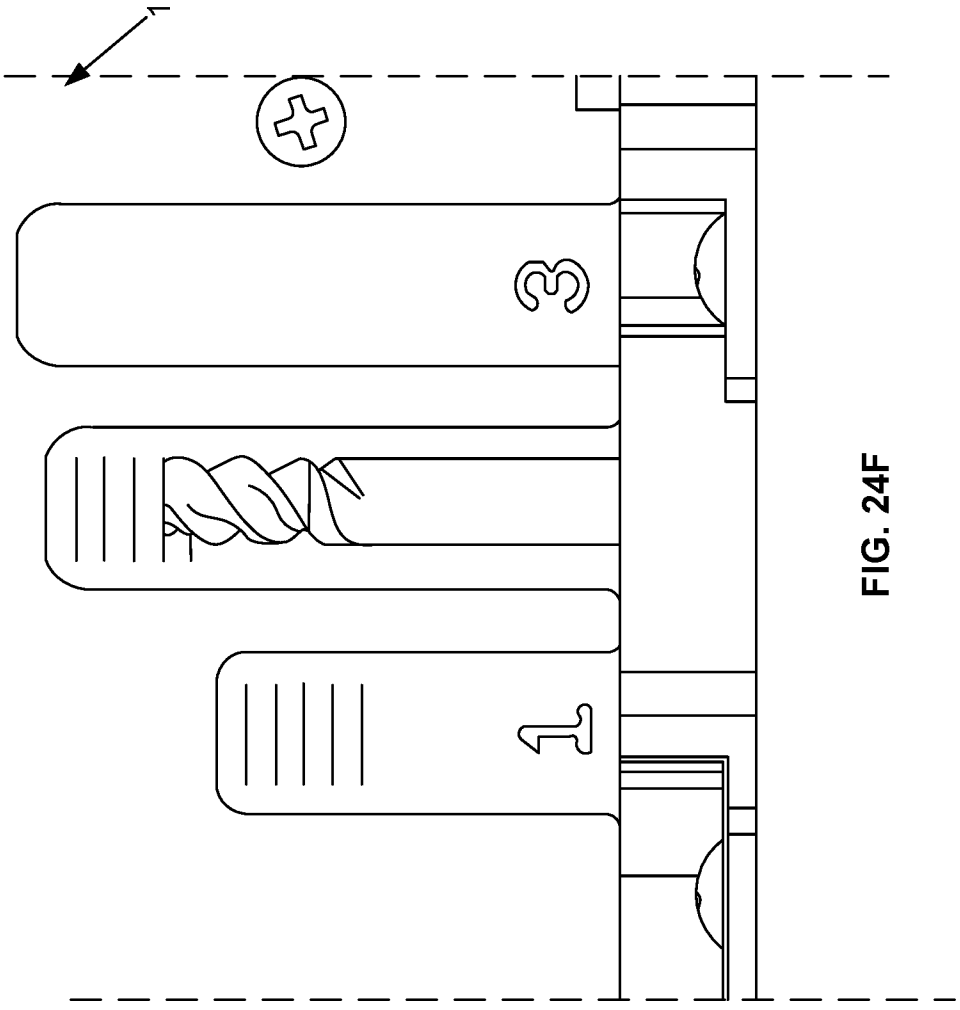


FIG. 24F

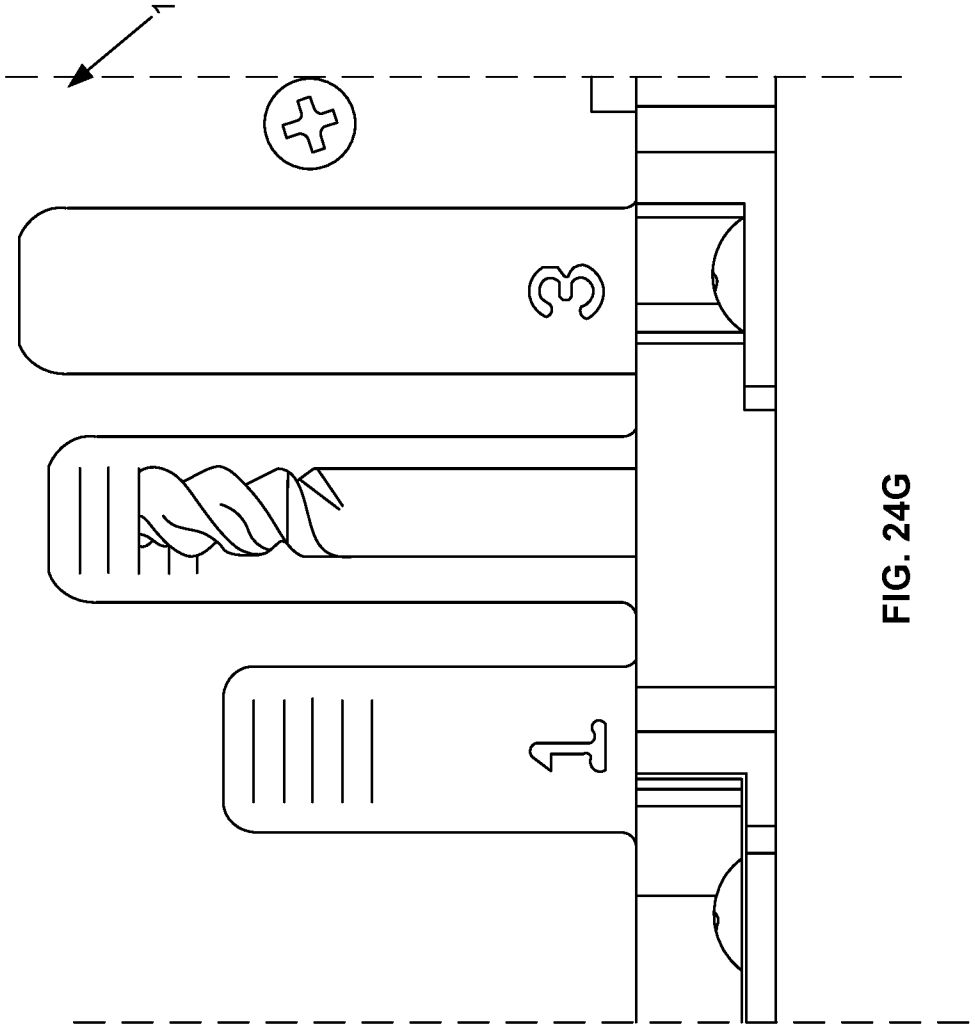


FIG. 24G

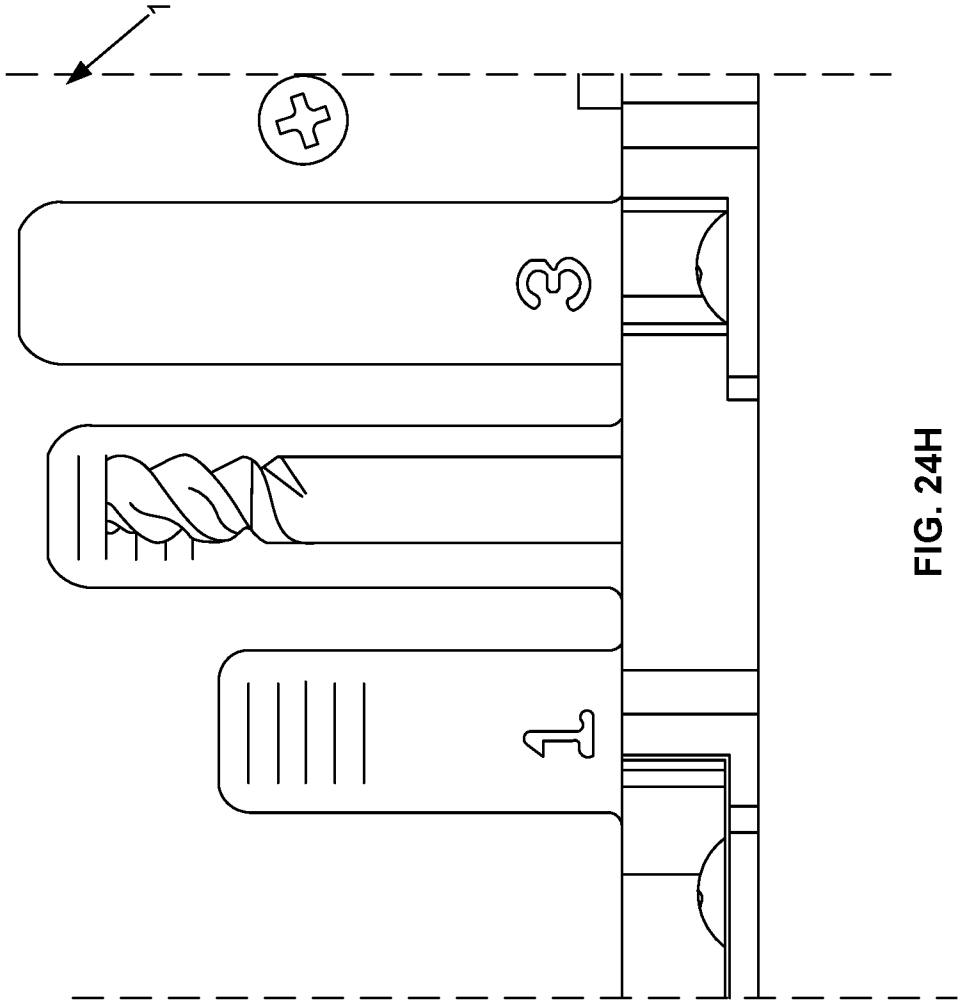


FIG. 24H

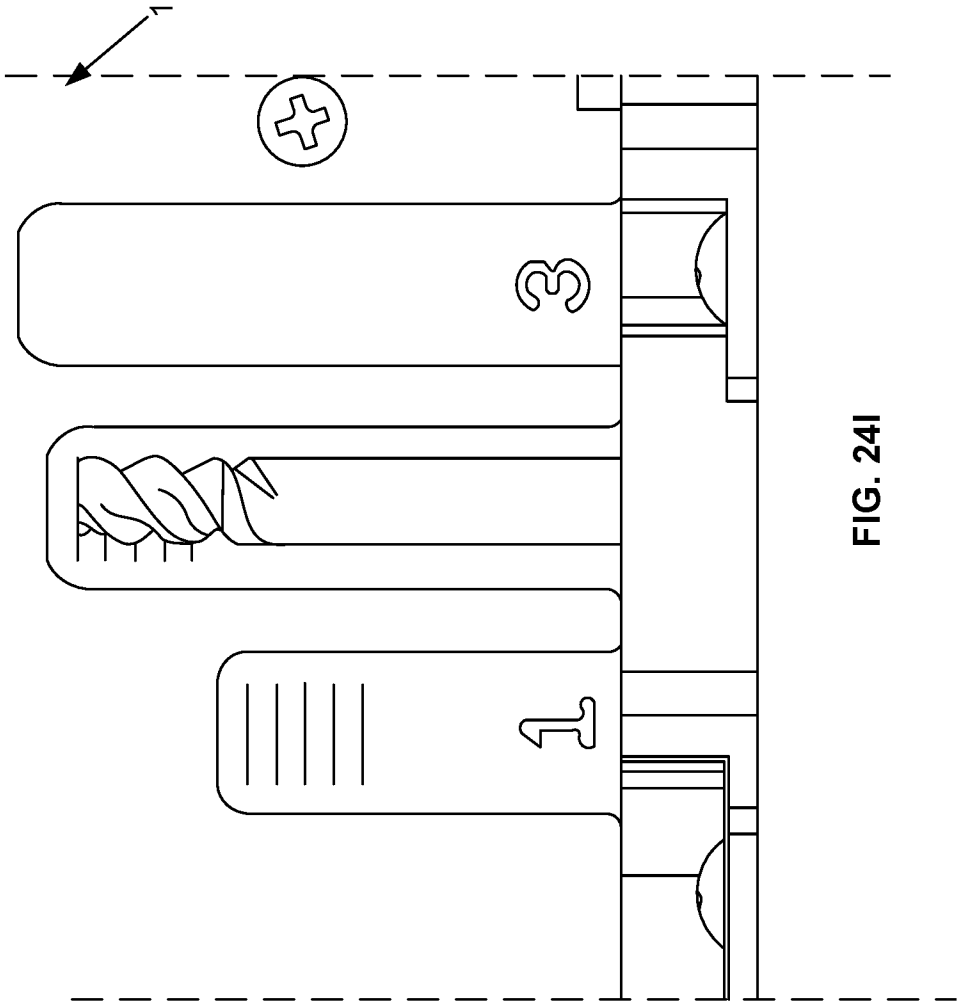


FIG. 24I

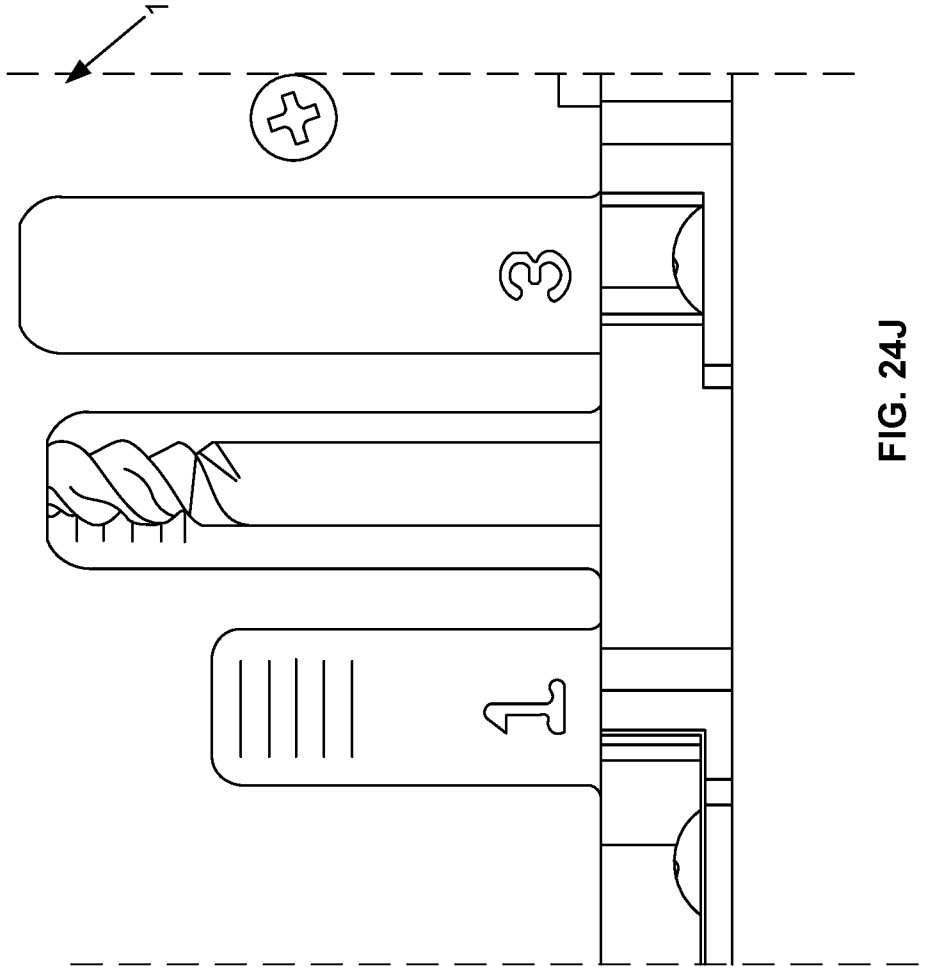


FIG. 24J

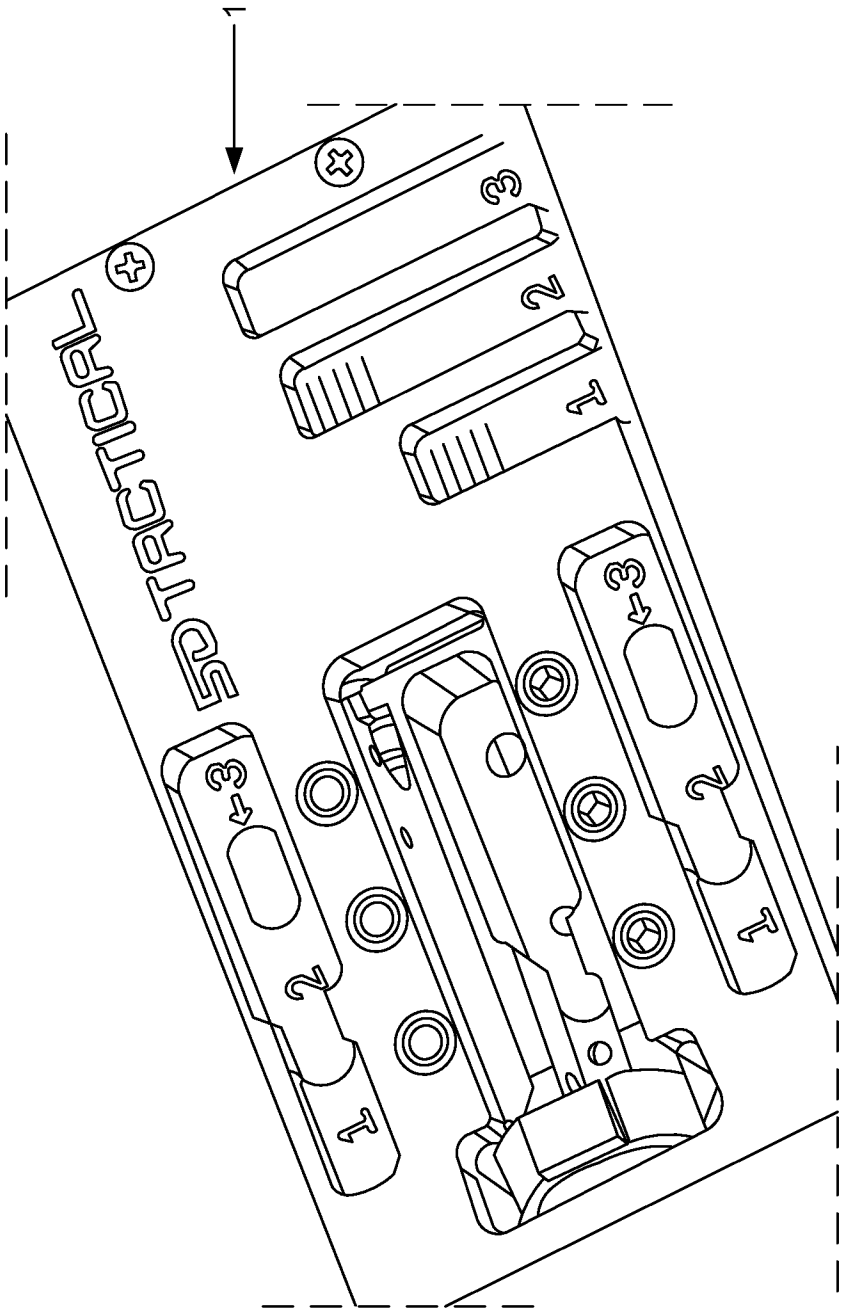


FIG. 24K

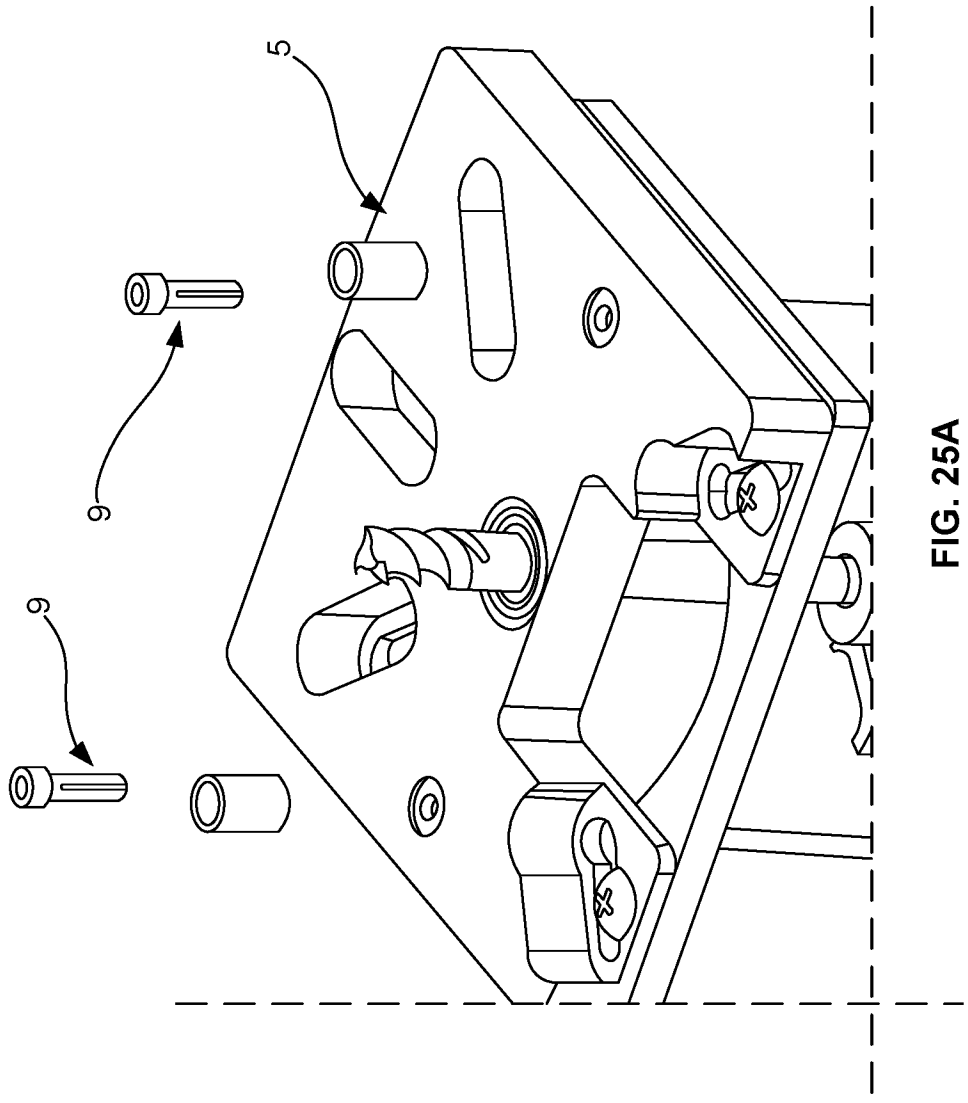


FIG. 25A

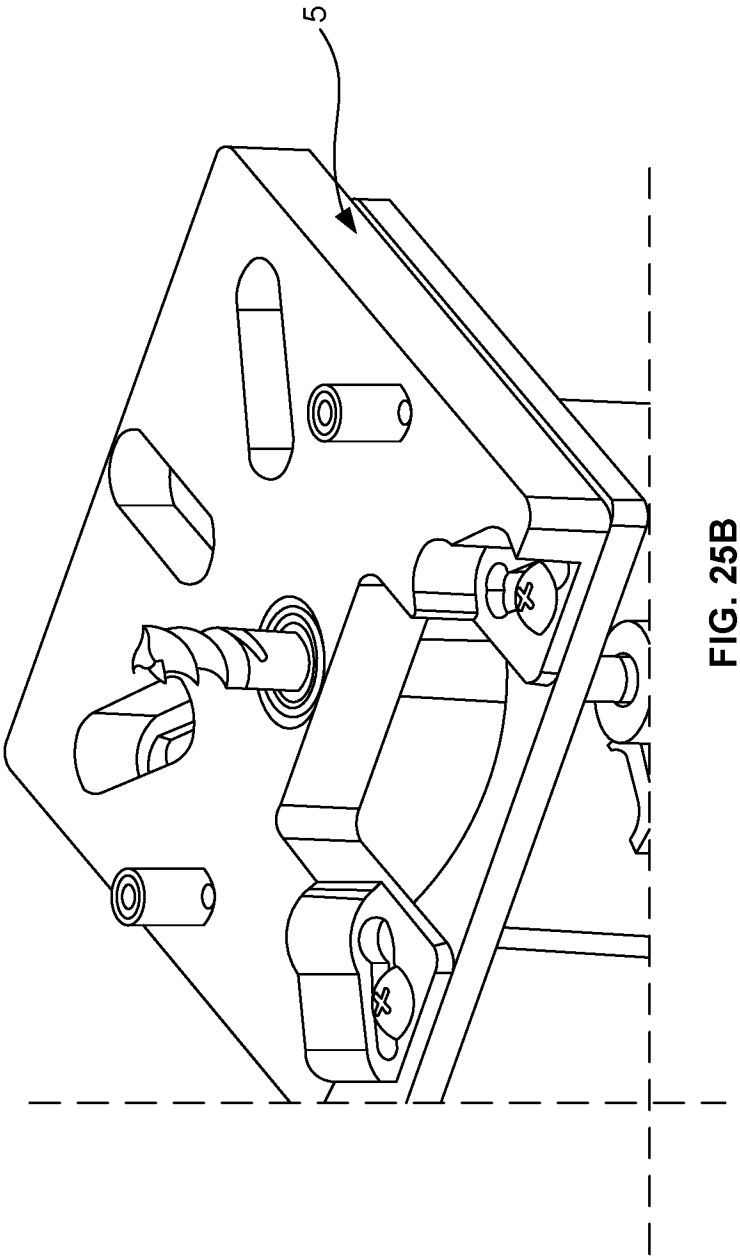


FIG. 25B

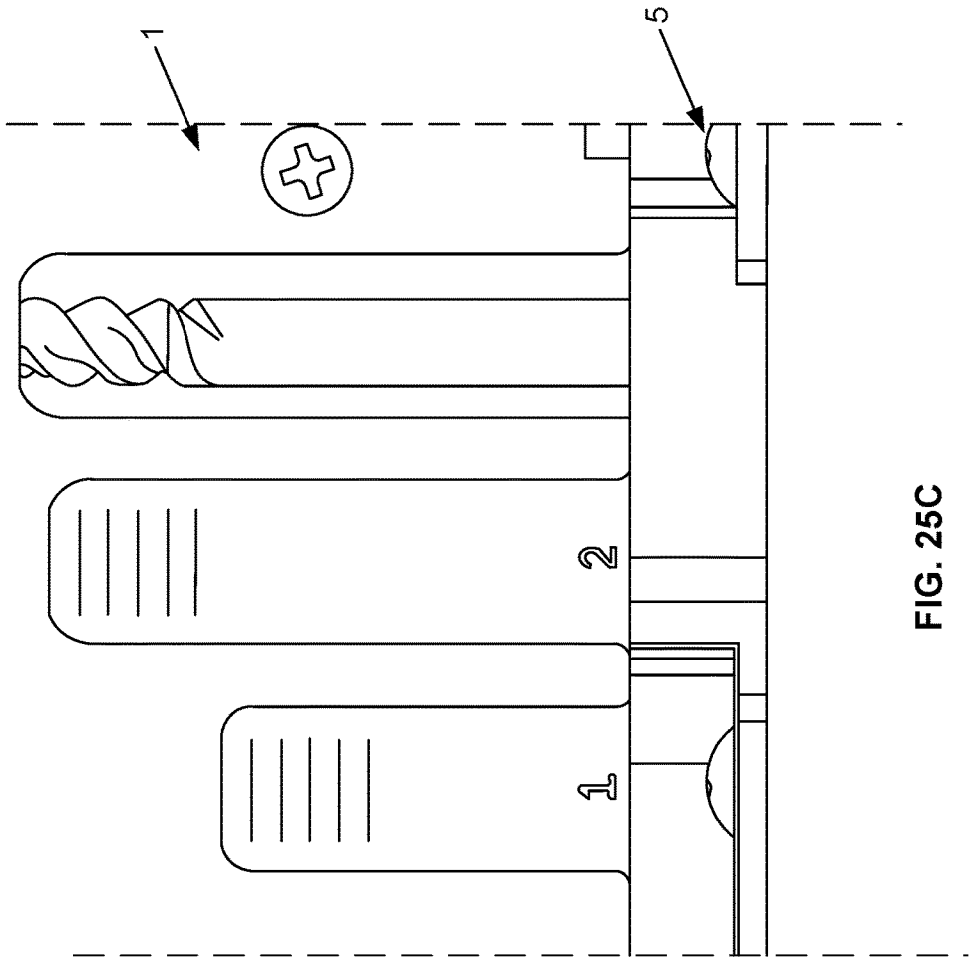


FIG. 25C

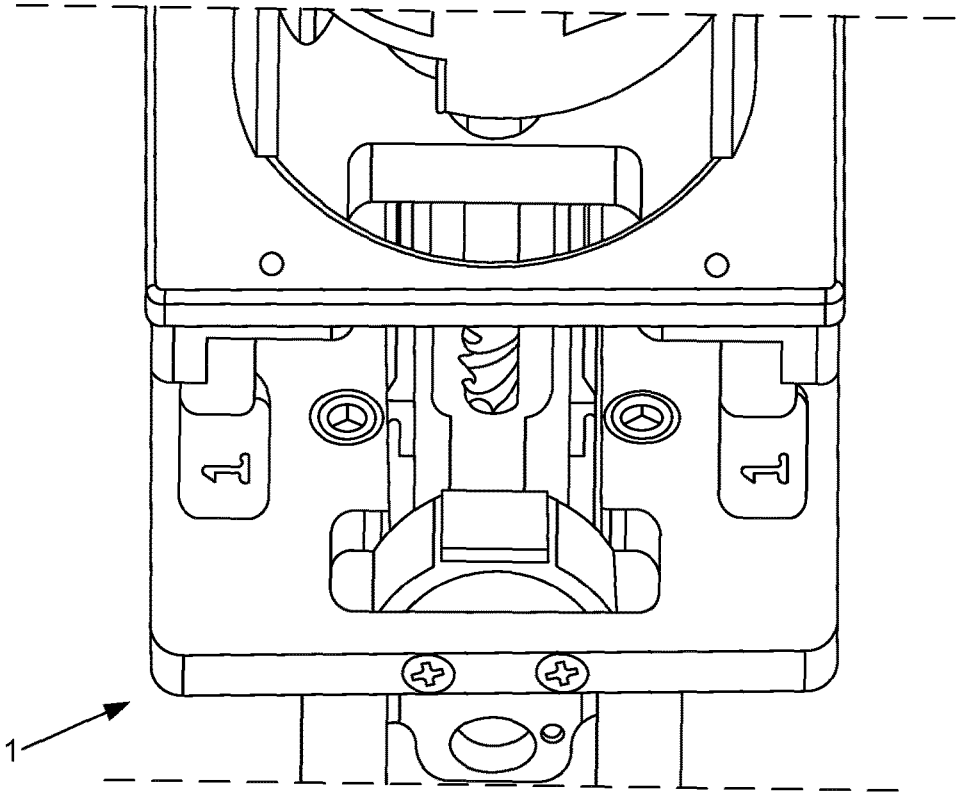


FIG. 25D

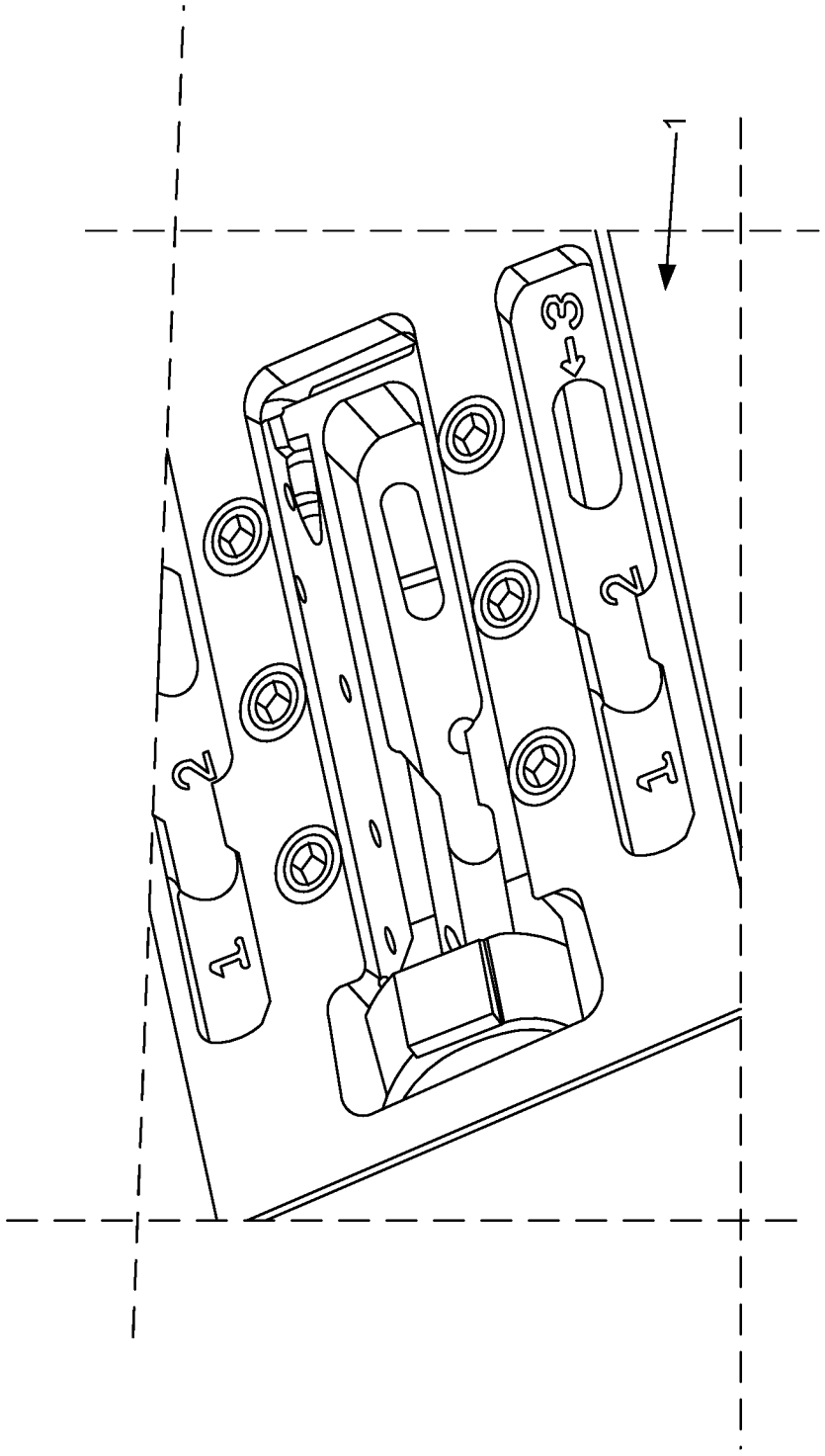


FIG. 25E

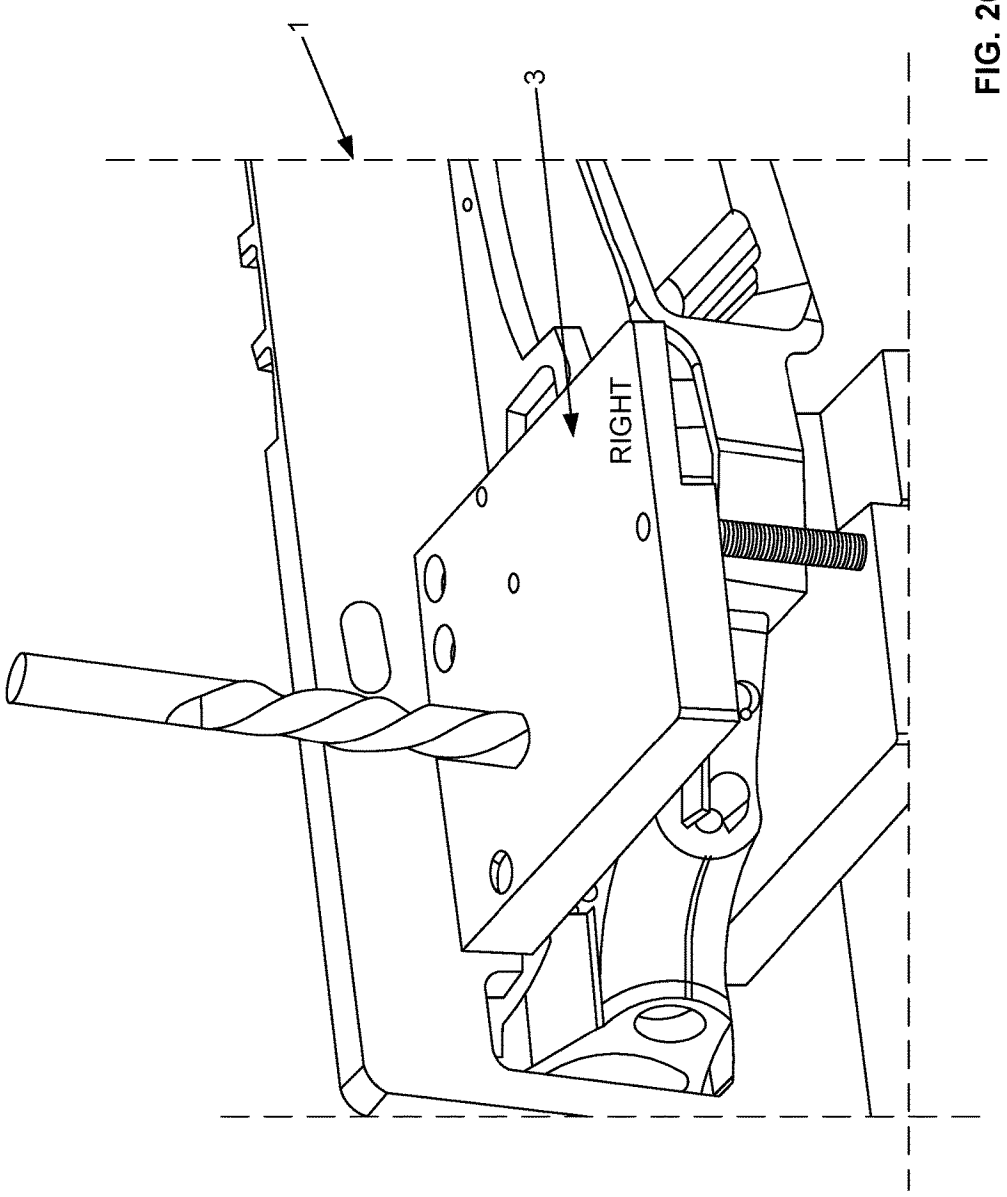


FIG. 26A

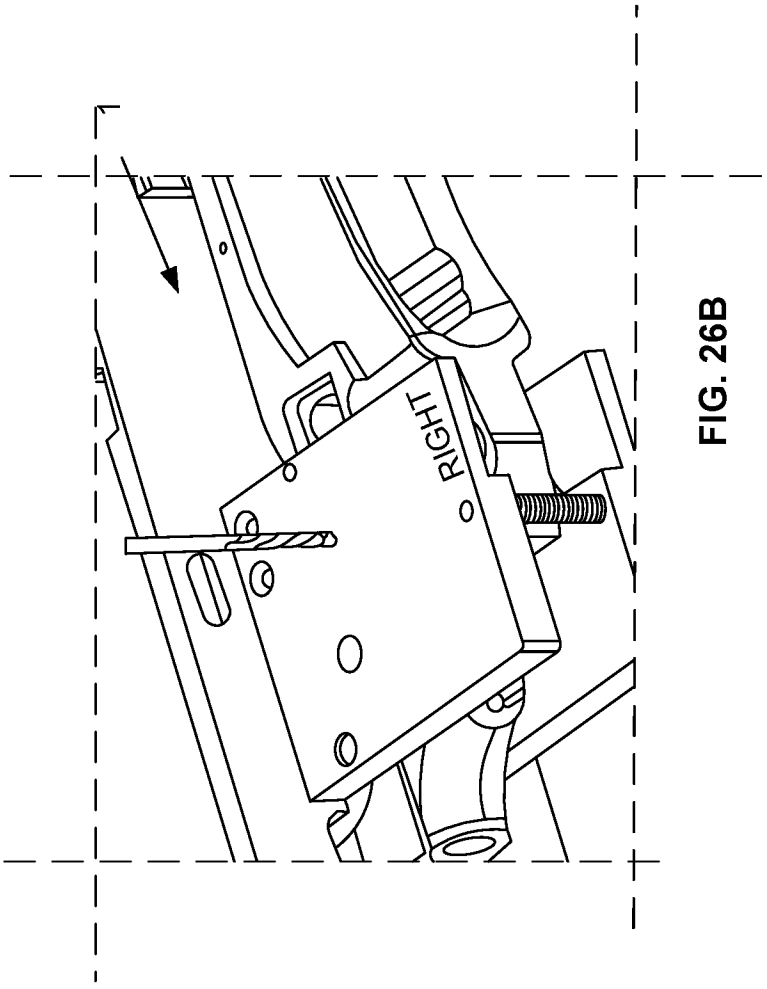


FIG. 26B

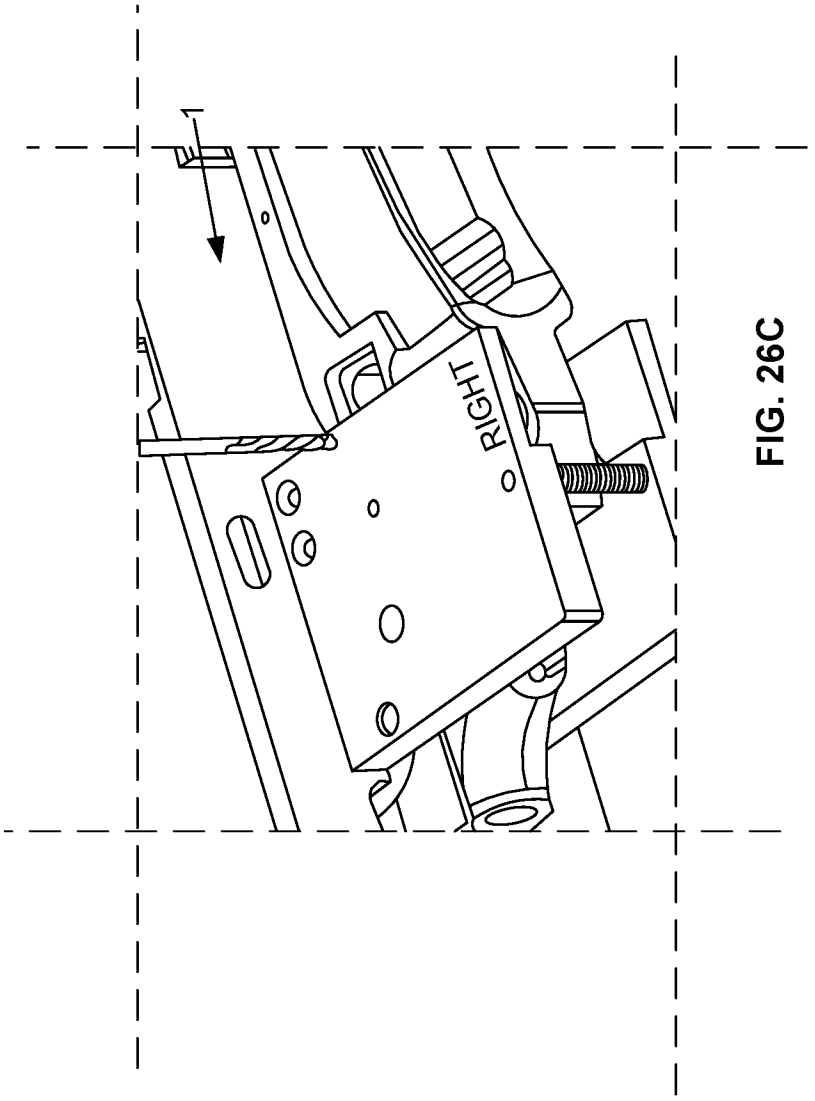


FIG. 26C

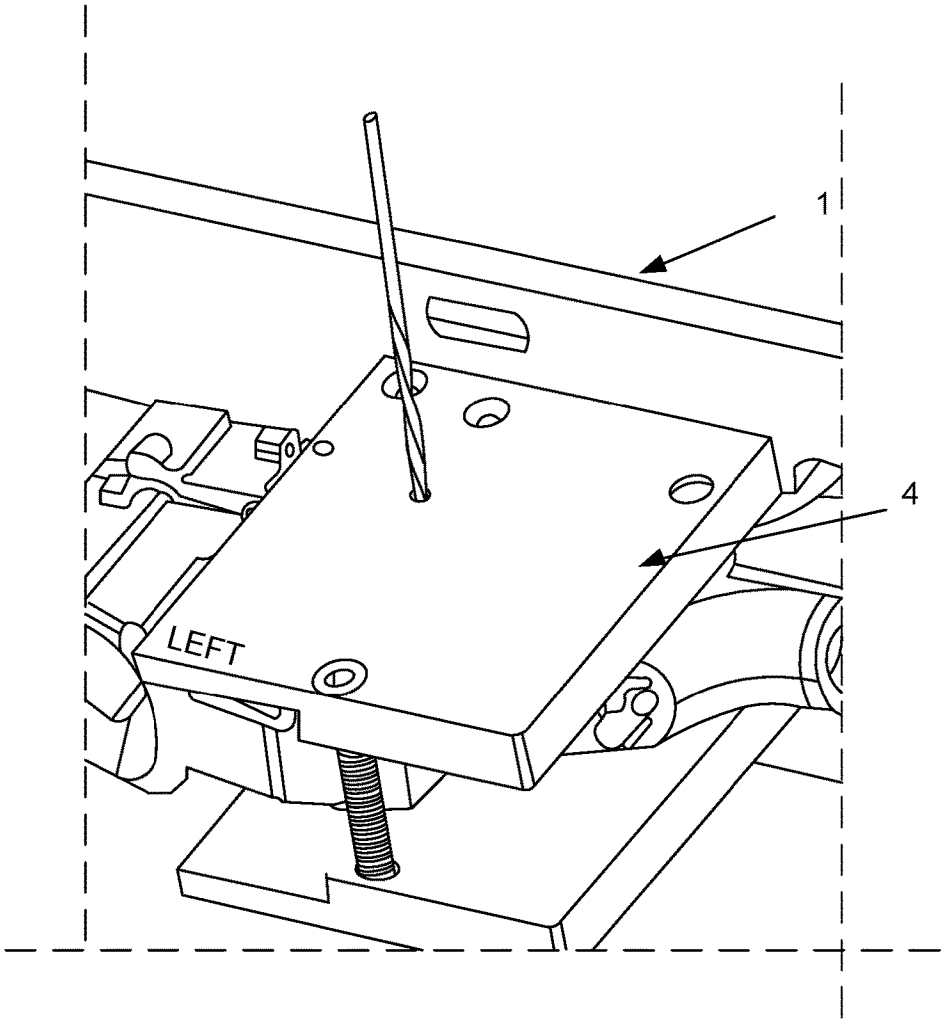


FIG. 26D

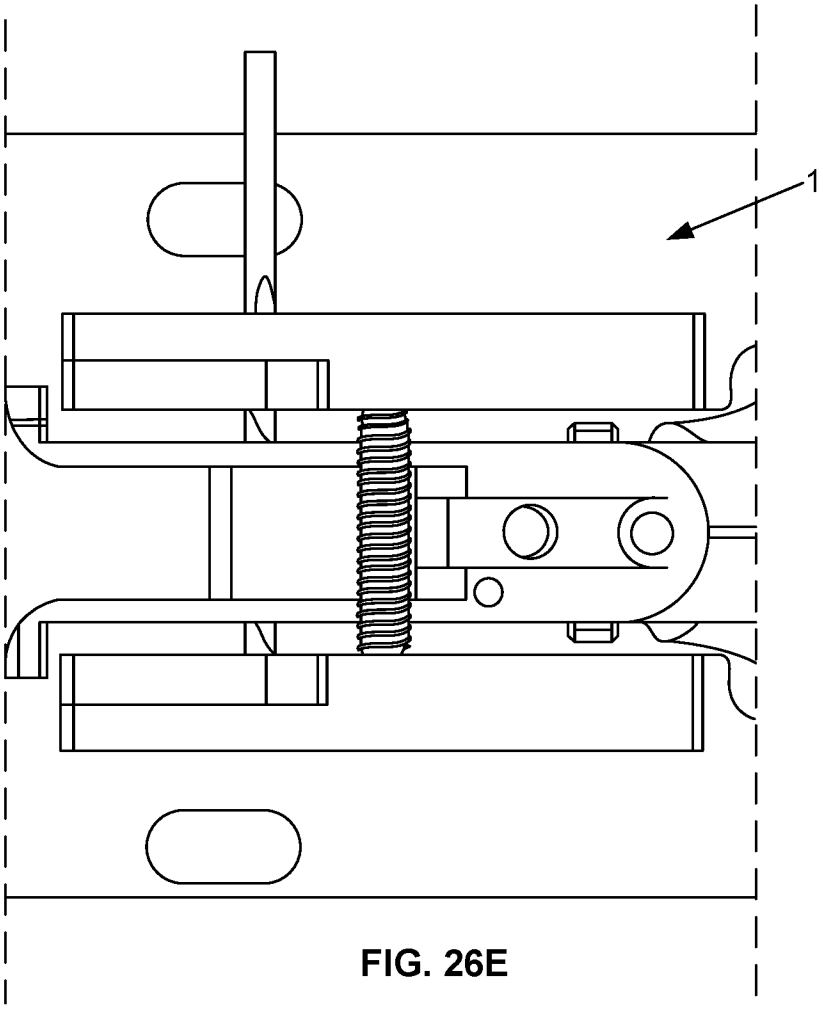


FIG. 26E

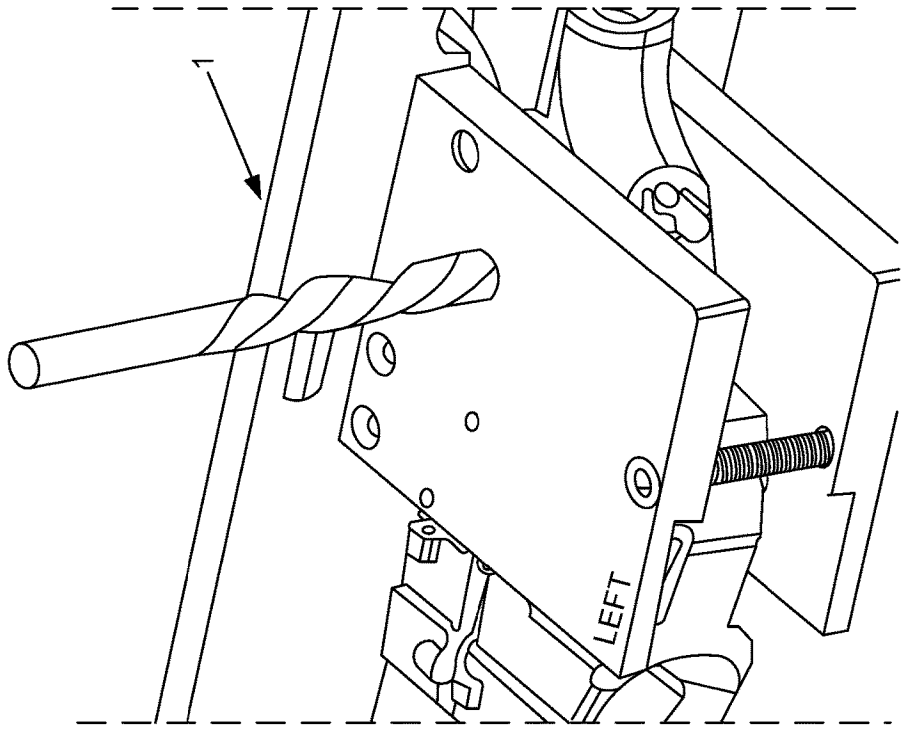


FIG. 26F

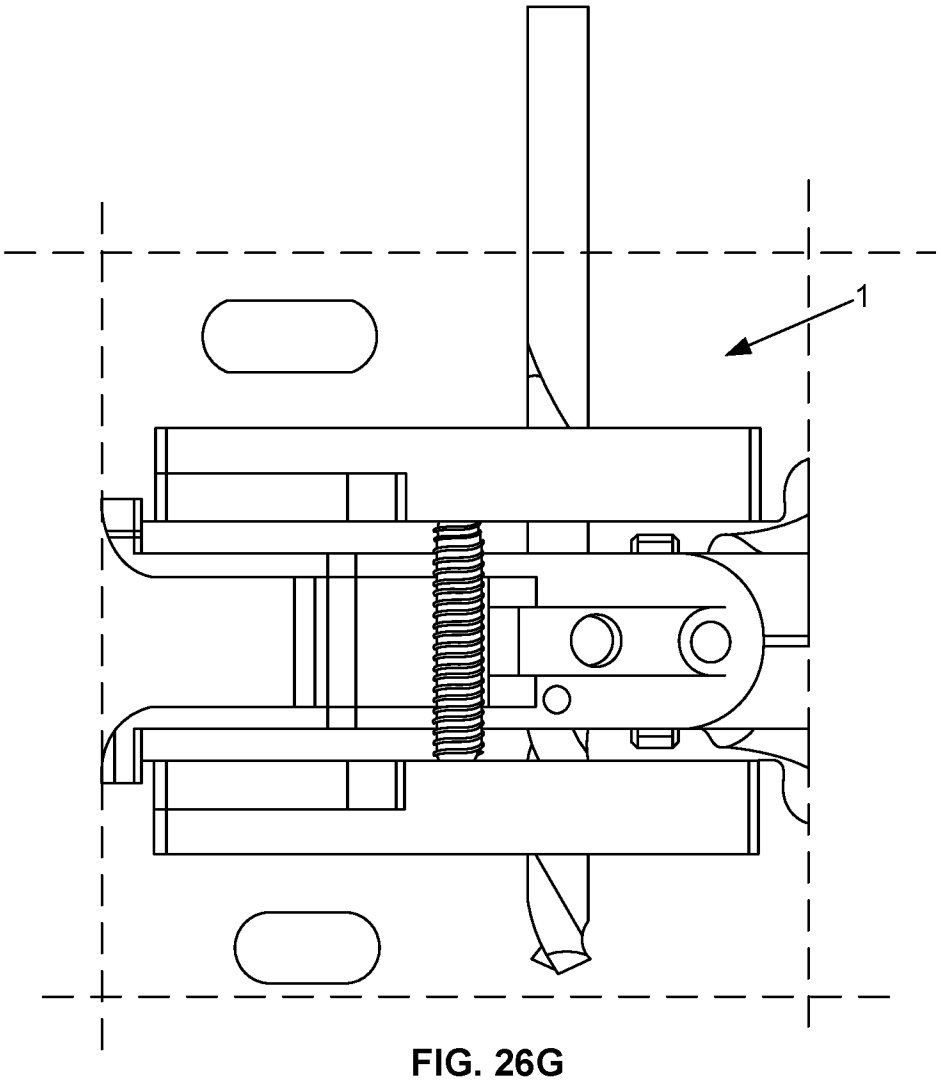


FIG. 26G

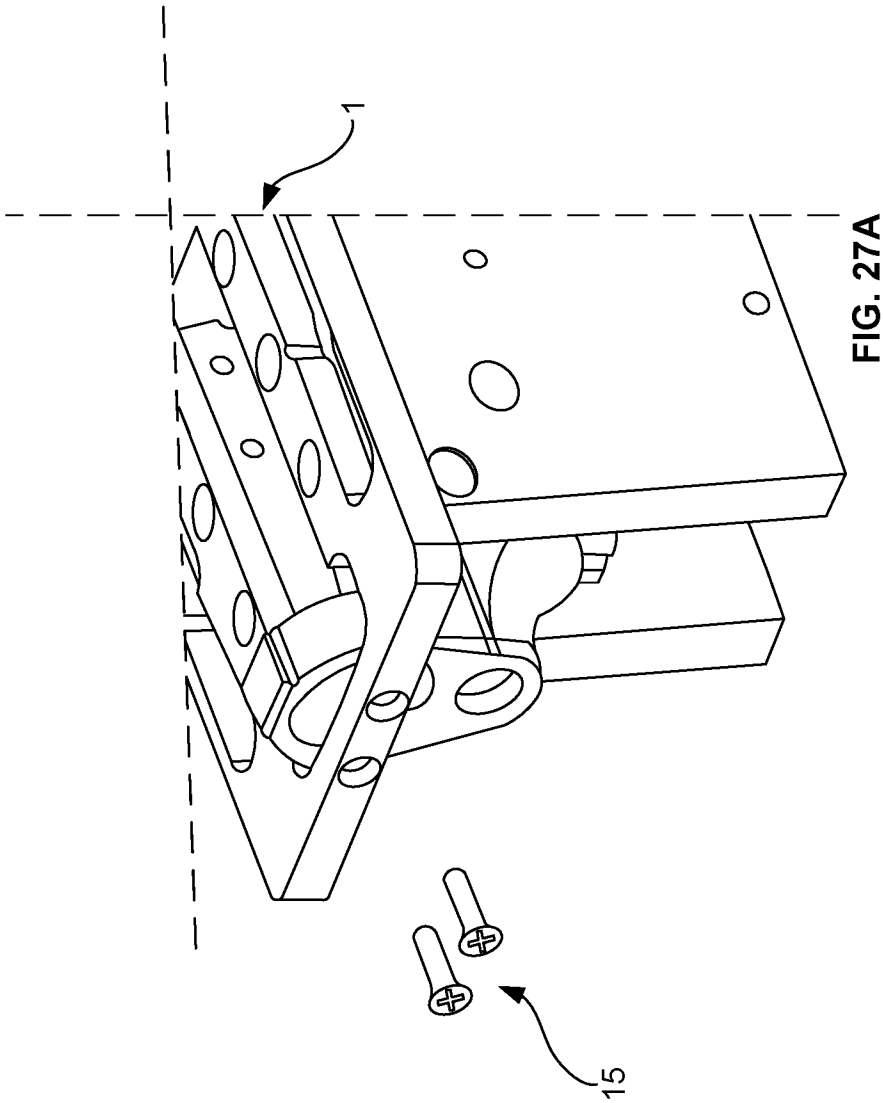


FIG. 27A

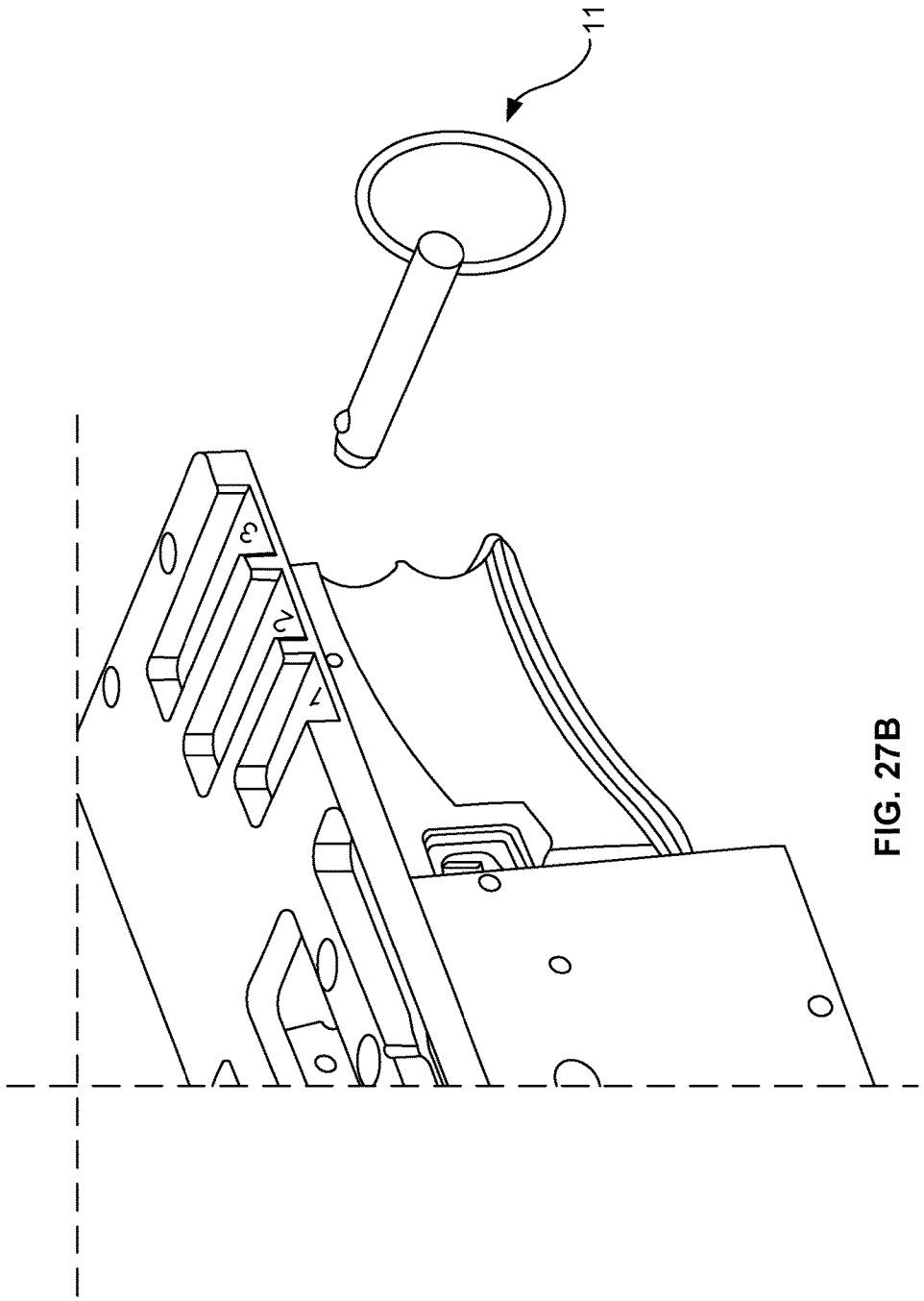


FIG. 27B

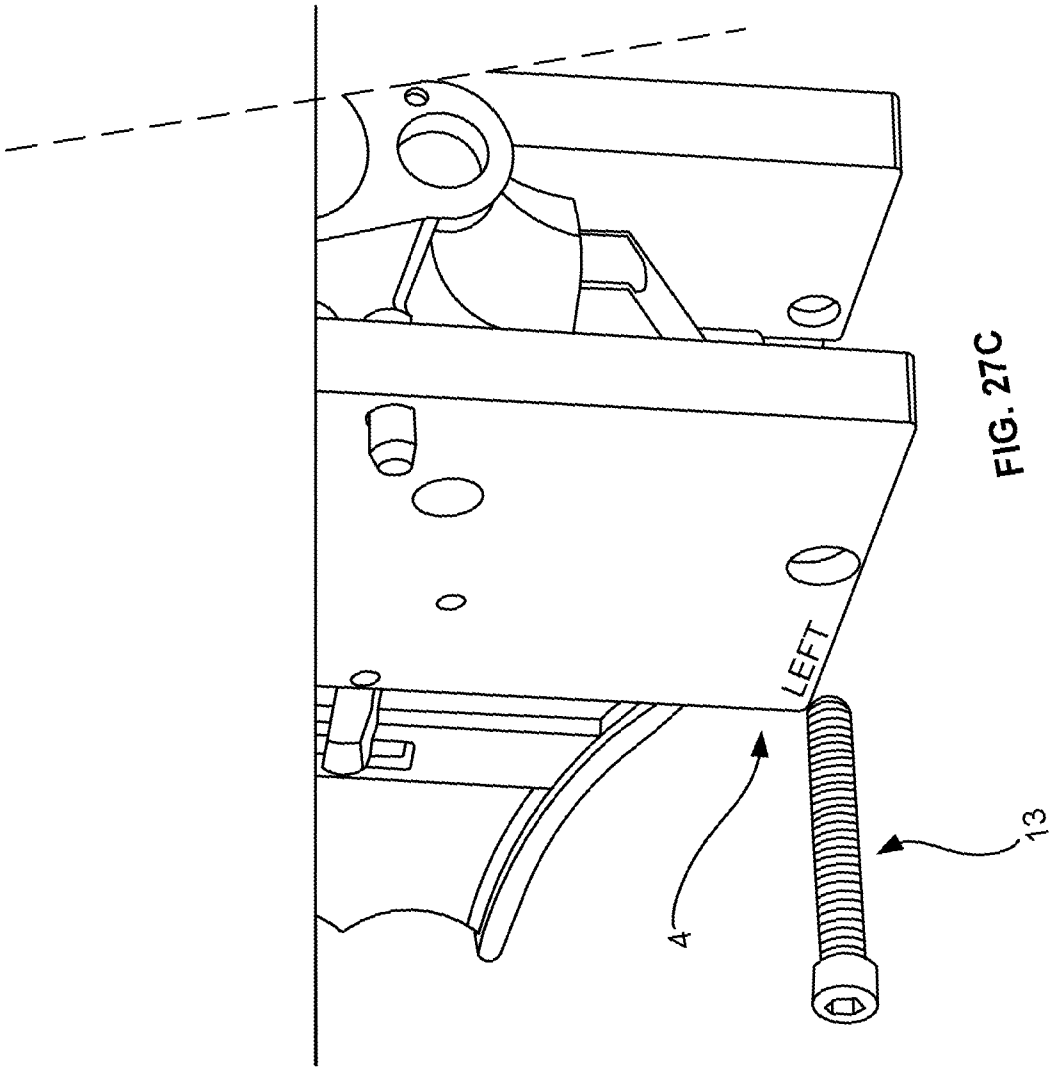


FIG. 27C

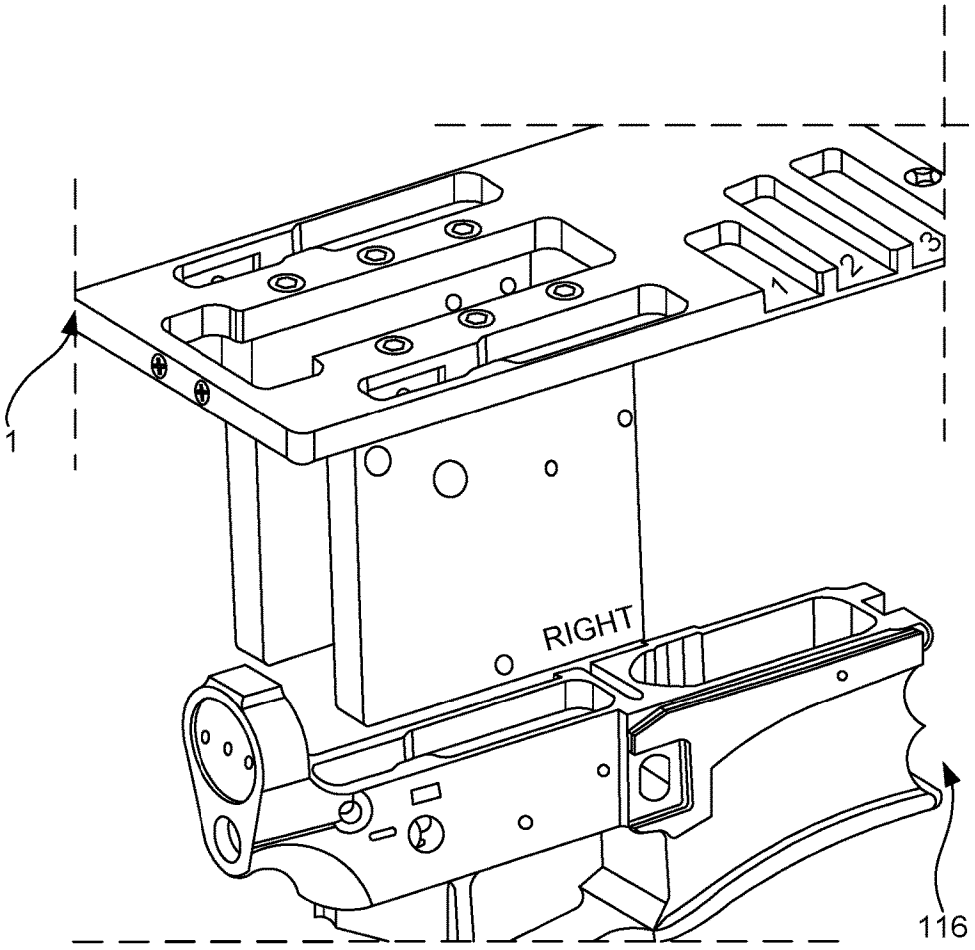


FIG. 27D

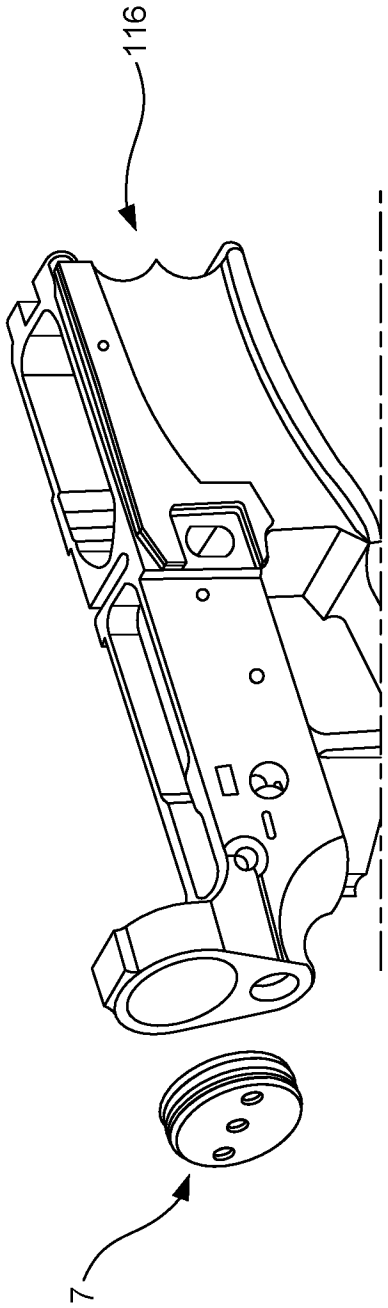


FIG. 27E

JIG FOR MANUFACTURING OF FIREARM LOWER RECEIVER

RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application Ser. No. 62/404,710, filed Oct. 5, 2016, entitled IMPROVED JIG FOR MANUFACTURING OF FIREARM LOWER RECEIVER, the entire disclosure of which is herein incorporated by reference.

FIELD OF THE INVENTION

This invention relates to systems and methods for manufacturing an 80% (partially unfinished) firearm receiver, with a high rate of success with improved quality, by an unskilled user.

BACKGROUND OF THE INVENTION

A market exists for incompletely/partially manufactured firearm lower receivers. A firearm lower receiver is unregulated until a minimum level of manufacturing is completed. This level is typically known as "80%". Firearm lower receivers completed to this level are typically referred to as "80%" lower receivers. These firearms must then be completed by the end user to be operable. In a typical configuration the lower receiver is cast and/or forged and is partially machined, with certain aspects of the inner slot (in which the trigger mechanism resides) remaining uncut. The finishing task cuts this remaining slot with appropriate dimensions and accuracy.

The completion of these lower receivers can be time consuming and quality results may be difficult to achieve with prior art. In accordance with the prior art, the technique for finishing the receiver can place a rotary power tool in a position that is effectively too far away from the lower receiver. As such this prior art technique can produce poor results and broken tooling. Additionally, the prior art technique can involve placement of a rotating tool in direct contact with guiding areas of a jig, which can result in premature wear.

It would be desirable to provide a jig assembly that effectively reduces the unsupported distance between the rotary power tool and the 80% lower receiver and that avoids direct contact between the rotating tool and its guiding features.

SUMMARY OF THE INVENTION

This invention overcomes the disadvantages of the prior art by providing a device that reduces the distance between the lower receiver and the rotary power tool and by using additional features to guide the rotary tool instead of placing it in direct contact with any of the plurality of guiding features. An improved jig for manufacturing a firearm lower receiver is comprised of a power tool mount; an adapter; a guide plate with plate screws; a rear support with mounting screws; a front support; and at least one carriage with at least one locating pin. A guide plate is disposed around and below the top surface of a lower receiver and is mounted to the carriage(s) in conjunction with a rotary power tool adapter. The jig is a universal fitment. The jig includes a bearing to support a rotary tool and is constructed and arranged to provide for use of at least one guiding feature to facilitate in the guidance of the rotary tool without placing the rotary tool in direct contact with any of a plurality of guidance features for firearm lower receiver manufacturing. A removable locating pin is situated in a location along the front and rear takedown pin holes of a firearm receiver that is not threaded and is provided with at least one of a pull, a string or other handle for firearm lower receiver manufacturing.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention description below refers to the accompanying drawings, of which:

FIG. **1** is an exploded right side view of an improved jig, according to an illustrative embodiment;

FIG. **2** is a right side view of the improved jig, according to the illustrative embodiment;

FIG. **3** is an exploded rear view of the improved jig, according to the illustrative embodiment;

FIG. **4** is a rear view of the improved jig, according to the illustrative embodiment;

FIG. **5** is an exploded left side view of the improved jig, according to the illustrative embodiment;

FIG. **6** is a left side view of the improved jig, according to the illustrative embodiment;

FIG. **7** is an exploded front view of the improved jig, according to the illustrative embodiment;

FIG. **8** is a front view of the improved jig, according to the illustrative embodiment;

FIG. **9** is a exploded perspective view of the improved jig, according to the illustrative embodiment;

FIG. **10** is a perspective view of the improved jig, according to the illustrative embodiment;

FIG. **11** is a top view of the improved jig, according to the illustrative embodiment;

FIG. **12** is a top view of the improved jig, according to the illustrative embodiment;

FIG. **13** depicts a method of jig assembly according to one or more aspects of the disclosure;

FIG. **14** depicts a method of drilling with a jig assembly according to one or more aspects of the disclosure;

FIG. **15** depicts a method of milling with a jig assembly according to one or more aspects of the disclosure;

FIG. **16** depicts a method of milling with a jig assembly according to one or more aspects of the disclosure;

FIG. **17** depicts a method of milling with a jig assembly according to one or more aspects of the disclosure;

FIG. **18** depicts a method of drilling with a jig assembly according to one or more aspects of the disclosure;

FIG. **19** depicts a method of lower receiver removal using a jig assembly according to one or more aspects of the disclosure;

FIG. **20** depicts various components of a jig assembly with reference to FIGS. **13-19** and **21-27**;

FIGS. **21**A-P depict various stages of the method of FIG. **13**;

FIGS. **22**A-I depict various stages of the method of FIG. **14**;

FIGS. **23**A-K depict various stages of the method of FIG. **15**;

FIGS. **24**A-K depict various stages of the method of FIG. **16**;

FIGS. **25**A-E depict various stages of the method of FIG. **17**;

FIGS. **26**A-G depict various stages of the method of FIG. **18**; and

FIGS. **27**A-E depict various stages of the method of FIG. **19**.

DETAILED DESCRIPTION

The primary function of a jig is to provide repeatability, accuracy, and interchangeability in the manufacturing of

products. In FIG. **1**, an improved jig **100** is assembled by placing left carriage **302** (see FIG. **3**, not shown in FIG. **1**) on the left side of a lower receiver **116** and by placing right carriage **114**, on the right side of the lower receiver **116**. The lower receiver in this example is a form of popular AR-style receiver (for example the semi-automatic version of the AR-15, M-16, M-4 carbine, and variants thereof). The lower receiver is the portion of the firearm that includes a shoulder stock, pistol grip, trigger mechanism and magazine well. The upper receiver includes the barrel, chamber and bolt assembly. The lower receiver is attached to the upper receiver by two takedown pins. The firearm is available in fully automatic and semi-automatic versions. Note that the jig is adapted to finish the receiver with holes and cuts appropriate to the semi-automatic version. However, the jig can be adapted for the use by licensed manufacturers to finish other versions (e.g. fully automatic) of the firearm. The jig **100** is an assembly that is comprised of a rotary power tool mount **103**, an adapter **122**, a guide plate **108** with plate screws **106**, **120**, a threaded rear support **110** with mounting screws **112**, a front support **118**, and at least one carriage **114** with at least one locating pin **306**. As described below, the plate screws **106** are machine screws with an appropriate diameter, thread size and length, and the screw **120** can also be a machine screw (for example, a #8-32 flat head machine screw), sheet metal screw, or another form of self-tapping screw. The receiving hole of the front support **118** is drilled and/or tapped to accommodate the screw **120**. The illustrative jig defines a universal fitment. A removable locating pin **306** (See FIG. **3**) is readily inserted through all three parts **302**, **116** and **114** to hold them in alignment relative to each other. This renders assembly highly straightforward for use by even an inexperienced user. In an embodiment, the jig assembly can be provided as a kit with appropriate instructions (printed, on electronic media and/or available via the Internet). See for example, the instructions in attached Appendix A, which describe setup and use of the jig assembly. The kit can include a rotary power tool having and appropriate size, shape, torque and power supply.

As described herein, the lower receiver **116** includes a buffer mount**117** for receiving a buffer assembly within the shoulder stock at one end, and the front surface of the magazine well **119** at the other. As defined herein, the buffer mount **117** is at the "rear" end of the lower receiver, while the magazine well **119** is at the "front" end of the lower receiver. As presented in FIG. **1**, the rear end of the lower receiver **116** is on the left side and the front end of the lower receiver **116** is on the right side and the visible face of the lower receiver is the "right" side. The right carriage **114** is resting on the right side of the lower receiver **116**. Thus, the relative orientation of the jig assembly **100** (i.e. left, right, front, rear, top and bottom) is described with respect to the corresponding, confronting sides of the lower receiver **116**.

Note that the carriage plate **114** is provided with three drill guide holes, **132**, **134**, **136**, along its side for the location of and drilling of appropriate diameter pin holes into the lower receiver **116**. These guide holes are used to guide and align a drill bit to bore desired holes into the lower receiver side. By way of non-limiting example drill guide hole **132** is a guide hole for a hammer pivot/pin hole, for the subsequent mounting of an assembly that retains the hammer mechanism within the lower receiver. Drill guide hole **134** is a guide hole for a trigger pivot/pin hole, for the later mounting of a trigger pivot/pin to retain the trigger mechanism. Drill guide hole **136** is a guide hole for a selector/safety pivot hole, for the subsequent mounting of a selector/safety lever. These carriage guide holes provide for the accurate and precise placement of the pin holes and are constructed so that an unskilled user can properly place the pivot/pin holes for completion of the assembly of a functioning lower receiver. Holes can be provided on each of opposing carriage plates to drill each side of the receiver in an embodiment. In alternate embodiments holes are provided on one side and the drill passes through both sides of the receiver. The thickness of the carriage plate(s) and close tolerance of the hole to the drill shaft is sufficient to ensure minimal skew or wobble as the drill passes into the receiver side.

The rotary power tool mount **103** is adapted to receive an appropriately sized and shaped rotary power tool **102**, as described further below. The rotary power tool retains an appropriate rotary tool **104** in accordance with various embodiments. The term "rotary tool" shall be taken broadly herein to mean any one of a variety of rotating cutting elements that can be mounted removably (or permanently) within a chuck or arbor of the rotary power tool **102**. For example a two-flute or four-flute end mill of appropriate diameter (for example, a ¼ inch diameter, or another appropriate diameter between (e.g.) ⅛ inch and ½ inch) can be mounted within the rotary power tool. The mill can include a cutting end and a shaft that is free of cutting surfaces. The shaft is adapted to confront the jig so as to avoid cutting its sides while the cutting end is adapted to reside within the receiver so as to cut the appropriate slot(s) in conjunction with the jig's outline(s). The rotary tool **104** can be constructed from a variety of high-strength materials, such as high-speed steel, tungsten carbide, etc.

As shown, the rear support **110** is threaded into lower receiver **116** via the receiver's rear buffer mount (a large round hole at the rear of the receiver in which a buffer assembly normally resides when assembled into a firearm). Front support **118** is placed between two mounting ears on the lower receiver **116** before an easily removable locating pin **704** inserted through the mounting ears of the lower receiver **116** and through the hole in the front support **118**. Illustratively, the front support **118** resides where the front pivot/takedown pin between the upper and lower receiver on a complete firearm normally resides. The pivot hole in this arrangement has been drilled by the supplier of the 80% receiver, and is, thus available for use in mounting the front support via pin **306**. As with other receiver holes and structures relied upon to engage the jig assembly, they are reliably located by the manufacturer using sophisticated tooling so that the jig accurately and repeatable mounted to the lower receiver **116**, and the corresponding cutting performed by the user is equally reliable and accurate.

After mounting the front support **118**, a guide plate **108** is then placed atop the assembly by aligning the holes in the guide plate **108** with the threaded holes in the front support **118**, the threaded holes in the rear support **110**, and the threaded holes in both the left and right carriages **302** and **114** respectively. The guide plate **108** has a thickness TC**1** of between ⅜ and up to ½ inch and a length LC**1** of approximately 8 inches (±0.5 inches). The adapter plate **122** has a thickness TC**2** of approximately ½ inch and a length LC**2** of approximately 4 inches (±0.5 inches). In other embodiments, these thicknesses and widths can vary greater or lesser, depending on the materials used. Once aligned, carriage-to-guide plate screws **106** are inserted through the guide plate **108** and tightened to connect the carriages **114** and **302** to the guide plate **108**. The rear support-to-guide plate screws are inserted through the holes in the guide plate **108** and tightened into the rear support **110**. The front support-to-guide plate screws **120** are inserted through the guide plate **108** and tightened into the front support **118**.

These screws **120** can be sheet-metal screws or flat head screws (for example, a #8-32 flat head screw) and the hole(s) in the front support **118** can be sized to receive such screws. The carriage screw **304** is threaded to a corresponding female thread in the left carriage **302** and continued through a threaded hole in the right carriage **114**. Illustratively, both the left carriage **302** and right carriages **114** are threaded so if the assembly is placed into the jaws of an external vice or other clamp, it will tend to resist deformation that could damage the lower receiver **116** sandwiched therebetween. The screw **304** can have a recessed drive head (e.g. hex, star, etc.) so that it avoids interference with a clamping jaw (if any). The above thus defines the full set of components of the jig assembly, which are connected either directly or indirectly to the lower receiver **116**.

The illustrative jig assembly is depicted as retaining a rotary power tool **102** in the power tool mount **103**, but it is contemplated that the power tool can be a non-rotary tool. The jig provides for the use of at least one of the various guiding features (for example, left carriage **302**) to be utilized to aid in the guidance of a power tool **102** without placing the tool in direct contact with any guiding feature.

Note that a wide variety of rotary power tools can be employed in association with an embodiment of the jig assembly—for example a small router, drill, hand piece of a flexible-shaft unit or Dremel®-style tool. The rotary tool can be cordless or powered by (e.g.) wall current via a power cable.

FIG. **2** depicts the jig **100** holding the rotary power tool **102** in engagement with the lower receiver **116** so that finishing work can be performed on the lower receiver. The receiver **116** is situated between the carriages **114** and **302** so that it remains in place during the finishing operation. There is a narrow gap between the carriages and the walls of the lower receiver **116**. The gap prevents contact between the surfaces of the carriages with the surface of the lower receiver and thereby prevents possible scratching of the surface coating of the lower receiver. In an alternate embodiment, the carriages can have an external flexible coating (for example, a polymer) and make contact with the surface of the lower receiver or a removable foam pad can be provided during assembly to avoid inadvertent contact between the carriage plate and the receiver during assembly of the jig. The various plates of the jig assembly can be constructed from a variety of materials, or combination of materials—for example aluminum alloy, steel, polymer (e.g. Delrin® (from DuPont), polycarbonate, acrylic, etc.). The thickness of each plate **108**, **122** is also highly variable, and depends in part upon the choice of material(s). By way of non-limiting example, the thickness of the jig assembly plate(s) can be between ⅛ and ½ inch, or greater, for sufficient strength and rigidity. For example, the carriage plates **114** and **302** should define a sufficient thickness to receive the screws **106** within threaded holes formed in the top edge of each plate. Likewise, the guide plate **108** should be sufficiently thick to allow the rotary tool **104** to resist wobble. The various plates can be constructed from sheet stock and milled to shape using, e.g. CNC manufacturing techniques. Other methods of constructing the plates can be employed in alternate embodiments—for example stamping or casting with finish milling, 3D printing, molding, etc.

The following is a description further views and representations of the assembled jig assembly **100** and corresponding rotary power tool (**102**) arrangement.

With reference to FIG. **3**, a rear-oriented exploded view of the jig assembly **100** is shown, with the rear support **110** with mounting screws **112** visible within the buffer mount **117** within the lower receiver **116**. In an embodiment the carriage plates **114** and/or **302** can define a thickness TC**3** of approximately ½ inch (+⅛ inch). This dimension is highly variable in alternate embodiments an, in part, facilitates the formation or female-threaded holes for receiving screws **106**. Note that, while two carriage plates are employed in the depicted embodiment, at least one carriage plate can be used in alternate arrangements. Such a single plate can include appropriate brackets or other structures to maintain it in confronting, accurate engagement with the lower receiver side.

With reference to FIG. **4** a rear view of the assembled jig **100** is shown in operation on the lower receiver **116**. The carriage plates **114**, **302** are situated on their respective sides of the lower receiver **116** and are held in place by removable pins **306** and **704**. Each of the pins is removably locked in place by a detent **307** located at one end and a ring **309** at the other. Opening **402** in the tool mount **103** serves to provide air circulation within the area of the machining, a portal for the egress of machining debris and a visible window to allow a view of the machining in process.

FIG. **5** is an exploded left side view of the jig **100** in an assembled state, with a rotary power tool **102**, a rotary power tool adapter **122**, a rotary tool **104**, a guide plate **108**, a rear support **110**, a left carriage **302**, a lower receiver **116**, a front support **118** and related mechanisms. The buffer mount **117** protrudes through guide plate **108**. Plates **108** and **122** support the rotary power tool above the lower receiver **116** such that the rotary power tool is not resting upon the lower receiver.

As described above, the left carriage plate **302** is also provided with three drill guide holes, **632**, **634**, **636**, for the location of and drilling of pivot/pin holes into the lower receiver **116** that are aligned with the right carriage holes **132**, **134** and **136**, respectively and define the same dimensions. In embodiments in which a pin/pivot defines different diameters on each side, or is eccentric the diameter or placement of the left carriage hole can vary relative to that of the right carriage hole.

FIG. **6** is a collapsed view of FIG. **5** illustrating; a rotary power tool **102**, a rotary power tool adapter **122**, a guide plate **108**, a left carriage **302**, a lower receiver **116** and a front support **118**.

FIG. **7** is an exploded front view of the illustrative jig **100**. Pin **704** is positioned to be inserted through takedown pin mounts **702**, such that the pin **704** passes through the front support **118** and the pin mounts **702**, thereby locking the front support **118** to the lower receiver **116**. The pin mounts are through holes in the lower receiver **116**. In another embodiment, pins **306** and **704** can define a bolt with a removable nut for locking the bolt in place.

FIG. **8** is a collapsed view of the jig **100** with particular attention called to the placement of the locating pins **306**, **704** in the pin mounts **702** and are held in place by detents **307**. The locating pin **306** is removable and is situated in a location along the front and rear takedown pin holes of a firearm receiver that is not threaded and is provided with at least one of a pull, a string or other handle for firearm lower receiver manufacturing.

FIG. **9** is a bottom view of the jig **100**. The bottom surface of adapter **122** includes a plurality of wells **901** of various sizes, angles and shapes disposed across the surface of the adapter **122**. A rotary power tool support bearing **902** is inserted into the rotary power tool adapter **122** (for example—using a press or other biasing device) in a circular well **901** located near the center point of the adapter **122**. Bearing **902** allows movement of a rotary power tool which

further supports the rotary tool, thereby increasing rigidity, user control, and thus, quality. The rotary tool **104** is then inserted into the rotary tool support bearing **902** and the rotary power tool adapter **122** is connected to the rotary power tool **102** by inserting adapter screws **906** into their respective wells **901** in the adapter **122** and tightened into adapter **103**. The guide pins **908** are connected to the adapter **122** by inserting an adapter screw **904** through the guide pins **908** and tightened into the adapter plate. The above thus defines the components of the tooling assembly.

In use, the rotary power tool **102** and mount **103** and adapter **122** are placed on top of the guide plate **108** and assembled, as described above, to form the jig. The guide pins **908** are placed into the guide cavities **1202** located within the guide plate **108**. The rotary tool **104** protrudes by a predetermined length from adapter **122** so as to interface with the lower receiver **116** situated below guide plate **108**. The geometry of the walls of the lower receiver are generally vertical, with the walls of each side parallel to each other up and down and front to back. This geometry provides an opportunity for the unskilled user to complete the machining of the receiver and the performance of the machining tools is optimized by the stability of the jig. The rotary power tool **102**, adapter **122**, rotary tool **104**, guide pins **908**, and connecting screws **904** and **906**, are then guided within the guide cavities **1202**. The location of the guide pins **908** and guide cavities **1202** are placed as to locate the rotary tool **104** in a predetermined location within the lower receiver **116** to achieve the desired results without placing the rotary tool **104** in direct contact with any components other than the lower receiver **116**, thus reducing premature wear. Window **920** is a cutout slot at the rear of adapter **122** and provides visual and physical access to the lower receiver during machining operations, as well as preventing contact with the buffer mount **117**.

FIG. **10** is a collapsed view of FIG. **9** showing the protrusion of the rotary tool **104**. Window **920** is aligned to the rear of the jig.

FIG. **11** is a top view of the jig **100** without the rotary power tool. Indices **1102**, **1104**, **1106** are located along a surface of guide plate **108** and are depth references for the end milling process. Each of the indices is a cavity, as shown in FIG. **1**. Indices **1102**, **1104** and **1106** relate to three different lengths for guide pins and the guide cavities are stepped at three different heights so that as the pins get longer, the guide describes a smaller area. The alignment of the view of FIG. **11** is that the top of the view is the front of the jig and the bottom of the view corresponds to the rear of the jig. Buffer mount **117** is depicted as protruding through guide plate **108**.

FIG. **12** is the same view as FIG. **11** with the rotary power tool adapter viewed as semi-transparent, allowing a better view of a rotary tool **104**, a guide plate **108** incorporating guide cavities **1202**; a lower receiver **116** and guide pins **908** residing within their respective wells **901**. The shape of the guide cavities **1202** corresponds to the shape of the internal walls of the lower receiver **116** such that when the rotary tool **104** is inserted into the lower receiver **116**, the operator maneuvers the guide pins **908** against the walls of the guide cavities **1202** and can accurately machine the internal surfaces of the lower receiver **116**.

In operation, the user places carriages **114** and **302** in a vise or other clamping device to hold steady. The protrusion depth of the rotary tool **104** is set using indices **1102**, **1104**, **1106**. In practice, this is done by placing rotary tool **104** within the indices and aligning to the appropriate hash mark for the required milling step and moving the rotary power tool adapter **122** into contact with the edge of guide plate **108** therefore setting the protrusion depth to the appropriate hash mark relative to the bottom surface of adapter **122**

The assembled rotary power tool **102**, mount **103**, rotary tool **104**, adapter **122** and guide pins **908** are engaged with the guide plate **108** and guide cavities **1202**. When the assemblies are placed atop each other with guide pins **908** within guide cavities **1202** the rotary power tool is switched on and rotary tool **104** begins to rotate at a high rate of angular velocity. The user grasps either the rotary power tool **102**, mount **103** or adapter **122** and slide the adapter **122** along the guide plate **108**. The protruding guide pins **908** contact the walls of the guide **1202** preventing rotary tool **104** from milling into the incorrect locations. This task is continued until guide pins **908** have been translated through the entire guide cavities **1202** removing all the material that rotary tool **104** has contacted within the lower receiver **116**. The rotary power tool **102** is then switched off and the rotary tool **104** is allowed to come to rest. The assembled rotary power tool **102**, mount **103**, rotary tool **104**, adapter **122** and guide pins **908** are then lifted off of the guide plate **108**. The rotary tool **104** is then placed back into indices **1102**, **1104**, **1106** to adjust the protrusion depth to the next hash mark of the respective index. When the depth is properly set, the assembled rotary power tool **102**, mount **103**, rotary tool **104**, adapter **122** and guide pins **908** are re-engaged with guide plate **108** and guide cavities **1202**. The same procedure is followed to remove this material with rotary tool **104** from lower receiver **116**. This procedure is similarly followed until all material is removed from lower receiver **116**. Chips can be removed periodically during each cutting task using a vacuum or by rotating the receiver and jig assembly upside down.

In order to guide rotary **104** properly in lower receiver **116** to allow for proper function, guide cavities **1202** have additional cavities contained within them. For example, the entire guide cavity **1202** is milled to a depth greater than 1/16 inch but less than 1/8 inch. A further reduced area within guide cavity **1202** is milled to a depth greater than 1/8 but less than 3/16 inch. Yet another area within the reduced area is milled to a depth greater than 3/16 inch. This allows for two reduced area cavities within the larger guide cavity **1202**. Guide pins **908** can be interchanged with varying lengths to allow for the assembled rotary power tool **102**, mount **103**, rotary tool **104**, adapter **122** and guide pin **908** unit to be engaged in either the full guide cavities **1202** or within the reduced area cavities within guide cavities **1202**. If a guide pin **908** has a length greater than zero but less than 1/8 of an inch, it would guide within the entire guide cavities **1202**. If a guide pin **908** has a length greater than 1/8 but less than 3/16 of an inch, similarly it would guide within the reduced area within the guide cavities **1202**. Finally, if a guide pin **908** has a length greater than 3/16 of an inch it would be guided within the cavity within the reduced area cavity which is within the guide cavities **1202**. With this arrangement, the assembled rotary power tool **102**, mount **103**, rotary tool **104**, adapter **122** and guide pins **908** can guide the rotary tool **104** to various shapes within the lower receiver by interchanging the guide pins **908** length.

FIGS. **13-19** depict various methods with reference to FIGS. **20-27**.

FIG. **13** depicts a method **1300** of jig assembly according to one or more aspects of the disclosure.

At block **1302**, and with reference to FIGS. **21**A-B, thread the buffer adapter **7** into lower receiver. The buffer adapter **7** should sit just below surface of the lower receiver with

threaded holes sitting horizontal. If the buffer adapter **7** is difficult to thread, #8-32 screws **15** can be installed for leverage.

At block **1304**, and with reference to FIGS. **21**C-D, orient side plates **3**, **4** on each side of the lower receiver, taking note of right and left as it would be oriented in a shooting position. Insert long quick release pin **10** through right side plate, through receiver rear takedown, and out left side.

At block **1306**, and with reference to FIGS. **21**E-F, place the drill guide **2** between side plates as shown and align screw holes. It should align only one way. Pinch side plates against drill guide and tighten four #8-32 screws **15**.

At block **1308**, and with reference to FIGS. **21**G-H, use 3/16" Allen wrench to thread 1/4-20×2" screw **13** through left side plate **4** and into right plate **3** using care not to cross-thread.

At block **1310**, and with reference to FIGS. **21**I-J, align the front takedown adapter **8** between front takedown holes. Push the short quick release pin **11** through receiver and adapter as shown.

At block **1312**, and with reference to FIGS. **21**K-L, place the guide plate **1** atop side plates **3**, **4** as shown. Align screw holes on guide plate **1** with buffer adapter **7** screw holes. Thread two #8-32 screws **15** and leave loose.

At block **1314**, and with reference to FIGS. **21**M-N, align front takedown adapter **8** (not shown) with holes in guide plate **1**. Insert and tighten two #8-32 screws **15**, tightening each screw a little at time. Now, tighten two #8-32 screws **15** from blocks **1302-1312**. The buffer adapter **7** will self-center in buffer mount. Guide plate **1** may move as these are tightened. Allow guide plate to move freely during tightening.

At block **1316**, and with reference to FIGS. **21**O-P, loosely thread six 1/4-20×1/2" screws **14** through guide plate **1** and into side plates **3**, **4**. Tighten screws using 3/16" Allen wrench. The jig assembly is now complete.

FIG. **14** depicts a method **1400** of drilling with a jig assembly according to one or more aspects of the disclosure.

At block **1402**, and with reference to FIG. **22**A, slide 3/8" drill stop onto shank of 3/8" drill bit. Insert drill bit to full depth of depth gauge #2 **1104**. Place the drill stop against the edge of the guide plate **1**. Secure drill stop onto drill bit.

At block **1404**, and with reference to FIGS. **22**B-C, spray WD-40 into hole #2 of the drill guide **2**. Insert 3/8" drill bit into hole. Do not start drill until bit is fully inserted. Start drill and apply firm pressure. Periodically, lift drill to assist in chip removal. Reapply WD-40 as necessary. Stop drilling just before the drill stop touches the drill guide **2**.

At block **1406**, and with reference to FIGS. **22**D-E, prior to drilling, ensure that jig assembly is level. Spray WD-40 into hole #3 of drill guide **2**. Insert 5/16" drill bit into hole. Do not start drill until bit is fully inserted. Start drill and apply firm pressure. Periodically, lift drill to assist in chip removal. Reapply WD-40 as necessary. Stop drilling when the drill bit exits the bottom of the fire control pocket. Take care not to drill into the trigger guard. In this example, keep the drill bit perpendicular to the lower receiver. Drilling at a large angle can result in an oblong trigger slot.

At block **1408**, and with reference to FIGS. **22**F-G, remove four #8-32 screws **15** and remove the drill guide **2**. It may be necessary to loosen the vise and/or use a screwdriver to gently pry the drill guide from between the side plates. Insert the screw driver shank into hole #2 and gently pry upward.

At block **1410**, and with reference to FIGS. **22**H-I, remove long quick release pin **10** from rear takedown hole.

FIG. **15** depicts a method **1500** of milling with a jig assembly according to one or more aspects of the disclosure.

Initially, prepare your router for milling by installing the universal router adapter **5**. If using a variable speed router, start router on slowest speed and gradually increase speed until optimal milling results are achieved. Generally speaking, this will equate to speed "2" to speed "4" on most variable models with "1" to "10" speed adjustments. Do not insert or remove router while it is spinning. Move router smoothly in a clockwise manner, do not mill in straight lines for extended periods. Avoid abruptly pulling the end mill or exerting excessive force to move the end mill. Apply WD-40 liberally while milling to reduce excess heat. Remove chips whenever necessary.

At block **1502**, and with reference to FIGS. **23**A-B, install #1 (short) guide pins **9** on router adapter **5** using the two smallest socket cap screws and 7/64" Allen wrench. Open end of pins should be facing up. Make sure pin seats are clear of debris prior to installing. Check that guide pins are properly seated.

At block **1504**, and with reference to FIG. **23**C, set end mill depth to the first hash mark using depth gauge #1 **1102**. Set depth by holding base of router adapter **5** against the edge of the guide plate **1**. Be sure guide pins **9** are not between adapter and guide plate. Make sure router depth adjustment is locked when complete.

At block **1506**, and with reference to FIG. **23**D, orient lower receiver assembly so the buffer extension is closest to the user. Place router assembly atop guide plate **1**, with end mill entering the earlier drilled 3/8" hole. The notched side of the router adapter should be facing the buffer extension as shown. The guide pins should be positioned inside the guide cavities on both sides. Turn router on slowest speed and increase to operating speed once ready to mill. Mill using consistent pressure and speed, moving in a clockwise manner.

At block **1508**, and with reference to FIG. **23**E, make the first pass of milling allowing the guide pins to follow the entire area of the guide cavities. When milling corners, gently twist the router side to side to assist to complete the entire corner radius.

At block **1510**, and with reference to FIG. **23**F, once the entire pass has been milled to depth, set end mill depth to the second hash mark. Mill second pass following the same method and process as shown in blocks **1506-1508**.

At block **1512**, and with reference to FIGS. **23**G-I, continue milling in this manner, adjusting end mill depth by 1 hash mark until you reach the final hash mark of depth gauge #1. Do not attempt to mill more than 1 hash mark, as it may result in poor quality, longer time and broken end mills.

At block **1514**, and with reference to FIGS. **23**J-K, complete the final pass to full depth of depth gauge #1 and stop. Before continuing to depth gauge #2, the #2 (medium) guide pins **9** should be installed.

FIG. **16** depicts a method **1600** of milling with a jig assembly according to one or more aspects of the disclosure.

At block **1602**, and with reference to FIGS. **24**A-B, remove #1 (short) guide pins **9** and install #2 (medium) guide pins **9** on router adapter **5** reusing the (2) screws and 7/64" allen wrench. Make sure pin seats are clear of debris prior to installing. Check that guide pins are properly seated.

At block **1604**, and with reference to FIG. **24**C, set end mill depth to the first hash mark using depth gauge #2. Set depth by holding base of router adapter **5** against the edge of

the guide plate **1**. Be sure guide pins are not between adapter and guide plate. Make sure router depth adjustment is locked when complete.

At block **1606**, and with reference to FIG. **24**D, place router assembly atop guide plate **1**, with end mill entering the earlier drilled ⅜" hole. The guide pins **9** should be positioned inside the #2 guide cavities on both sides. Turn router on slowest speed and increase to operating speed once ready to mill. Mill using consistent pressure and speed, moving in a clockwise manner.

At block **1608**, and with reference to FIG. **24**E, complete the first pass allowing the guide pins **9** to follow the #2 guide cavities. When milling corners, gently twist the router side to side to assist to complete the entire corner radius.

At block **1610**, and with reference to FIG. **24**F, once the entire pass has been milled, set end mill depth to the second hash mark. Mill second pass following the same method and process as outlined in blocks **1606** and **1608**.

At block **1612**, and with reference to FIGS. **24**G-I, continue milling in the same manner, adjusting milling depth by 1 hash mark until you reach the final hash mark of depth gauge #2. Do not attempt to mill more than 1 hash mark, as it may result in poor quality, longer time and broken end mills.

At block **1614**, and with reference to FIGS. **24**J-K, complete the final pass to full depth of depth gauge #2. Start the end mill in the 5/16" pilot hole. Start the router at slowest speed setting and mill the hole larger before increasing the router speed. Once complete, stop. Before continuing to depth gauge #3 **1106**, the #3 (long) guide pins **9** should be installed on the router adapter.

FIG. **17** depicts a method **1700** of milling with a jig assembly according to one or more aspects of the disclosure.

At block **1702**, and with reference to FIGS. **25**A-B, remove #2 (medium) guide pins **9** and install #3 (long) guide pins **9** on router adapter **5** reusing the (2) screws and 7/64" Allen wrench. Open end of pins should be facing up. Make sure pin seats are clear of debris prior to installing. Check that guide pins are properly seated.

At block **1704**, and with reference to FIG. **25**C, set end mill depth using depth gauge #3. Set depth by holding base of router adapter **5** against the edge of the guide plate **1**. Be sure guide pins are not between adapter and guide plate. Make sure router depth adjustment is locked before when complete.

At block **1706**, and with reference to FIGS. **25**D-E, place router on guide plate **1**, with end mill entering the earlier drilled 5/16" hole. The guide pins **9** should be positioned inside the #3 guide cavities on both sides. Start the router at slowest speed setting and mill the hole larger before increasing the router speed. Gently mill in a clockwise manner until the trigger slot is formed.

FIG. **18** depicts a method **1800** of drilling with a jig assembly according to one or more aspects of the disclosure.

At block **1802**, clamp jig assembly in the vise by the guide plate **1** so right side plate is facing up and ensure that the assembly is level. Use a rag or cardboard between the vise and guide plate to prevent damage to the top surface of the guide plate.

At block **1804**, and with reference to FIG. **26**A, spray WD-40 into large hole. Insert ⅜" drill bit into large guide hole (large left hole as shown). Do not start drill until bit is fully inserted in the guide hole. Apply moderate pressure and drill until the bit penetrates the right side wall. Do not drill through both sides.

At block **1806**, and with reference to FIGS. **26**B-C, spray WD-40 into both small holes. Insert 19/64" drill bit into either remaining guide holes. Do not start drill until bit is fully inserted in the guide hole. Apply moderate pressure and drill until the bit penetrates the right side wall. Do not drill through both sides. Repeat in last remaining hole.

At block **1808**, unclamp jig assembly from vise and flip it over so the left side plate is facing up and re-clamp by the guide plate **1**. Ensure that assembly is level. Use a rag or cardboard between the vise and guide plate to prevent damage to the top surface of the guide plate.

At block **1810**, and with reference to FIGS. **26**D-E, spray WD-40 into both small holes. Insert 19/64" drill bit into either small guide hole. Do not start drill until bit is fully inserted in the guide hole. Apply moderate pressure and drill until the bit penetrates the left side wall. Continue drilling so the bit passes through the opposite side wall connecting the holes from either side. Repeat on remaining small hole.

At block **1812**, and with reference to FIGS. **26**F-G, spray WD-40 into large hole. Insert ⅜" drill bit into large guide hole. Do not start drill until bit is fully inserted in the guide hole. Apply moderate pressure and drill until the bit penetrates the right side wall. Continue drilling so the bit passes through the opposite side wall connecting the holes from either side.

FIG. **19** depicts a method **1900** of lower receiver removal using a jig assembly according to one or more aspects of the disclosure.

One advantage of the presently described jig assembly or assemblies is they do not require the user to completely disassemble the jig assembly to remove or mount an 80% lower receiver.

At block **1902**, and with reference to FIG. **27**A, remove two #8-32 screws **15** from the buffer adapter **7**.

At block **1904**, and with reference to FIG. **27**B, remove short quick release pin **11** from front takedown adapter.

At block **1906**, and with reference to FIG. **27**C, remove ¼-20×2" screw from left side plate **4** using 3/16" Allen wrench.

At block **1908**, and with reference to FIG. **27**D, the jig assembly and lower receiver should now be separable. For the AR-308 router jig, loosening or removing one of the side plates **3**, **4** may be employed to extract the lower receiver.

At block **1910**, and with reference to FIG. **27**E, unthread the buffer adapter **7** from the lower receiver.

FIG. **20** depicts various components of a jig assembly with reference to FIGS. **13-19** and **21-27**, as described below:

1. Guide Plate (e.g. guide plate **108** described above); 2. Drill Guide; 3. Right Side Plate (e.g., carriage **114** as described above); 4. Left Side Plate (e.g., carriage **302** as described above); 5. Router Adapter (e.g., power tool adapter **122**); 6. Router Adapter Side Block; 7. Buffer Adapter (e.g., rear support **110** as described above); 8. Front Takedown Adapter (e.g., front support **118**); 9. Guide Pin Set (e.g., **908** as described above); 10. Long Quick Release Pin (e.g., corresponding to locating pin **306**); 11. Short Quick Release Pin (e.g., corresponding to pin **704**); 12. (5) M4×10 Phillips Truss Screw (e.g., adapter screw **906** as described above); 13. (1) ¼"-20×2" Socket Screw (e.g., carriage screw **304** as described above); 14. (6) ¼"-20×⅝" Socket Screws (e.g., plate screws **106** as described above); 15. (8) #8-32×⅝" Phillips Screws (e.g., plate screws **120** as described above).

It should be clear that the above-described jig for manufacturing a firearm lower receiver is a universal fitment and facilitates in the guidance of the rotary tool without placing the rotary tool in direct contact with any of a plurality of guidance features for firearm lower receiver manufacturing.

It is straightforward to use, resists wear and produces accurate and repeatable results in the hands of both skilled and unskilled users.

The foregoing has been a detailed description of illustrative embodiments of the invention. Various modifications and additions can be made without departing from the spirit and scope if this invention. Each of the various embodiments described above may be combined with other described embodiments in order to provide multiple features. As used herein the directional terms, such as, but not limited to, "up" and "down", "upward" and "downward", "rear", "rearward" and "forward", "top" and "bottom", "inside" and "outer", "front" and "back", "inner" and "outer", "interior" and "exterior", "downward" and "upward", "horizontal" and "vertical" should be taken as relative conventions only, rather than absolute indications of orientation or direction with respect to a direction of the force of gravity. Furthermore, while the foregoing describes a number of separate embodiments of the apparatus and method of the present invention, what has been described herein is merely illustrative of the application of the principles of the present invention. For example, the foregoing jig can be adapted to machining and finishing other parts for a firearm, such as portions of an upper receiver that is being repaired, modified or fabricated. Moreover, the jig can be sold as part of a kit with additional right and left carriages and guide pins that are adapted for machining other firearms (for example, polishing the internal surfaces or repairing a restored firearm). This jig can be adapted for firearms of various sizes and shapes by interchanging the carriages, thereby providing a jig that can be useful to a person finishing a firearm, and repairing and/or restoring a firearm. Also, it is expressly contemplated that the size and shape of the plates of the jig can vary. In general, they are sized in an embodiment proportionally to the depiction herein relative to the size of the lower receiver. Accordingly, this description is meant to be taken only by way of example, and not to otherwise limit the scope of this invention.

What is claimed is:

1. A jig for manufacturing a lower receiver comprising:
an adapter configured to support a rotary power tool above the lower receiver, the adapter defining a through-hole for a rotary tool to pass therethrough, the adapter having a bearing configured to support the rotary tool;
a guide plate disposed relative to the adapter such that the guide plate is configured to be disposed below a top surface of the lower receiver.

2. The jig of claim **1**, wherein the guide plate engages with the adapter.

3. The jig of claim **1**, further comprising:
at least one support feature configured to engage with the guide plate.

4. The jig of claim **3**, wherein the at least one support feature comprises at least one of:
a rear support configured to engage with the guide plate;
a front support configured to engage with the guide plate; or
at least one carriage.

5. The jig of claim **1**, wherein the adapter is configured to receive a guide pin, the guide pin being configured to engage with the adapter and align the adapter with respect to the guide plate.

6. The jig of claim **1**, further comprising:
a power tool mount configured to engage with the adapter and configured to receive the rotary power tool.

7. A jig for manufacturing a lower receiver comprising:
an adapter configured to support a rotary power tool above the lower receiver, the adapter defining a through-hole for a rotary tool to pass therethrough, the adapter having a bearing configured to support the rotary tool;
a guide plate disposed relative to the adapter such that the guide plate is configured to be disposed below a top surface of the lower receiver;
one or more guide pins configured to be received by the adapter, the one or more guide pins being configured to engage with the adapter and align the adapter with respect to the guide plate.

8. The jig of claim **7**, wherein the guide plate engages with the adapter.

9. The jig of claim **8**, further comprising:
at least one support feature configured to engage with the guide plate.

10. The jig of claim **9**, wherein the at least one support feature comprises at least one of:
a rear support configured to engage with the guide plate;
a front support configured to engage with the guide plate; or
at least one carriage.

11. The jig of claim **7**, wherein the guide plate engages with the adapter.

12. A jig for manufacturing a lower receiver comprising:
an adapter, comprising:
a top surface configured to engage with a rotary power tool,
a lower surface defining a plurality of wells, the wells being configured to align the adapter with respect to the rotary power tool,
a bearing configured to support a rotary tool; and
a guide plate disposed relative to the adapter.

13. The adapter of claim **12**, wherein the adapter is configured to support the rotary power tool above a lower receiver.

* * * * *

EXHIBIT B

Registration #: *-APPLICATION-*
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Mail Certificate

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EXHIBIT C

DESCRIPTION WARRANTY INFORMATION

Modulus Arms SpeedMILL™

Please Note: The Modulus Arms Router Jig Extreme™ requires the use of one of our SpeedMill™ end-mills.
The Modulus Arms SpeedMILL™ is the strongest and most rigid 80% lower jig tool available for router-based milling. The SpeedMILL™ utilizes a thermal fit tool coupler which threads directly to your router. Threading directly to the router eliminates the possibility of the end mill pulling out from the collet while milling, which is a common point of failure on other types of jigs.

The steel coupler portion of the 80% lower jig tool is super-heated to accept a custom 5/16" diameter solid carbide end mill, which is optimized in every facet for router based 80% lower milling. The end mill is thermal fit into the tool holder, meaning it can't slip out during use. The end mill portion of the SpeedMILL™ can be replaced by the customer at a reduced cost by heating the steel coupler with a torch.

The length of the carbide end mill portion of the SpeedMILL™ has been reduced to only 1.5 inches. This is less than half the length of any other end mill available for router based 80% lower milling. This results in an ultra-rigid milling tool that produces a mirror finish in record setting time.

Check this table to find the correct SpeedMill™ version to fit your router.

ROUTER	SpeedMill™ SELECTION
BOSCH PR10E	SpeedMill #V1
BOSCH PR20EV	SpeedMill #V1
DEWALT DWE6000	SpeedMill #V1
PORTER CABLE 6430	SpeedMill #V1

EXHIBIT D

ROUTER JIG PRO READYMILL

Larger Photo

Our Patent Pending ReadyMILL™ is the strongest and most rigid 80% lower jig tool available for router-based milling, period. This advanced technology utilizes the latest in CNC manufacturing, through the use of a thermal fit tool holder which threads directly to the router. Threading directly to the router eliminates the possibility of the end mill pulling out from the collet while milling, a common fail point that exists with ***all*** other jigs.

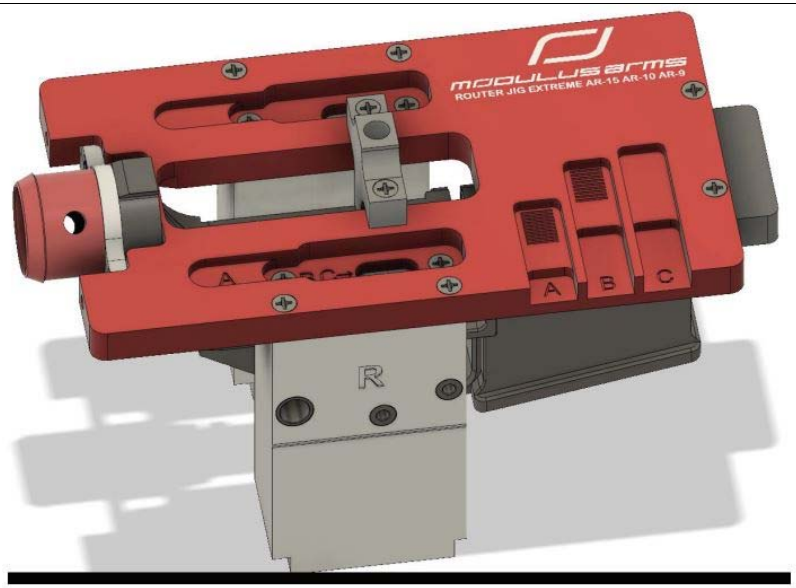
The tool holder portion of the 80% lower jig tool is super-heated to accept our custom 5/16" diameter end mill, which has been optimized in every facet for 80% lower milling. The end mill being thermal fit into the tool holder means it will never slip out during use. However, the end mill portion of the ReadyMILL™ ***is*** replaceable by the end user at a much reduced cost to previous end mill designs.

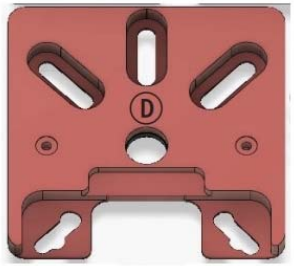
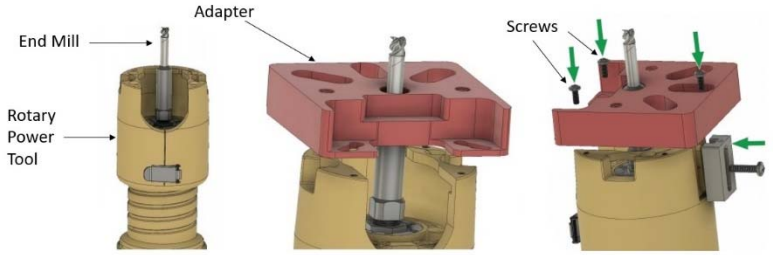
The length of the end mill portion of the ReadyMILL™ by 5D Tactical has been reduced to only 1.5 inches! This is less than half the length of any other end mill available for router based 80% lower milling. All of this adds up to a strong and super-rigid milling tool that virtually eliminates tool chatter and produces mirror-like finished results in less time than ever before.

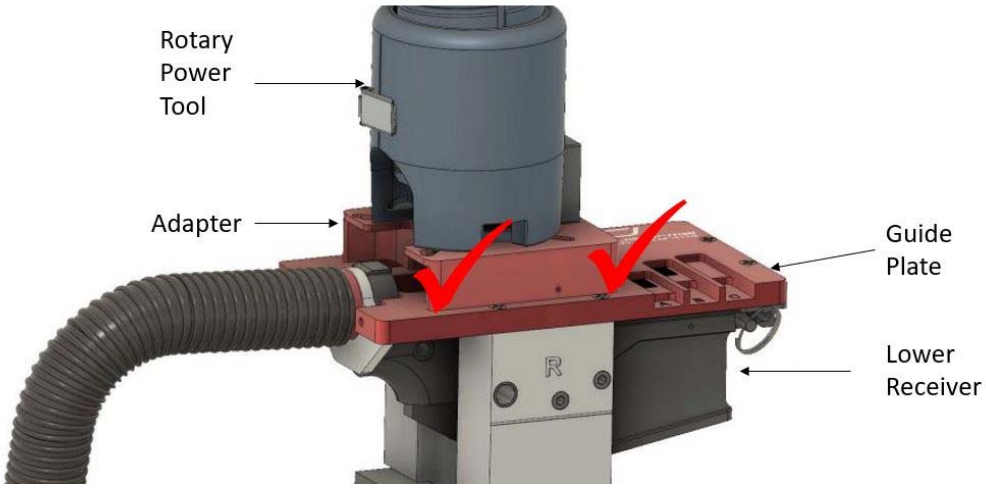
⚠ The 5D Tactical Router Jig PRO requires the use of our ReadyMILL™. This tool is custom designed and manufactured for the 5D Tactical Router Jig PRO, and is not available for sale elsewhere by any tooling supplier or manufacturer. The ReadyMILL™ is for use with the Router Jig PRO only, NOT the Original Router Jig.

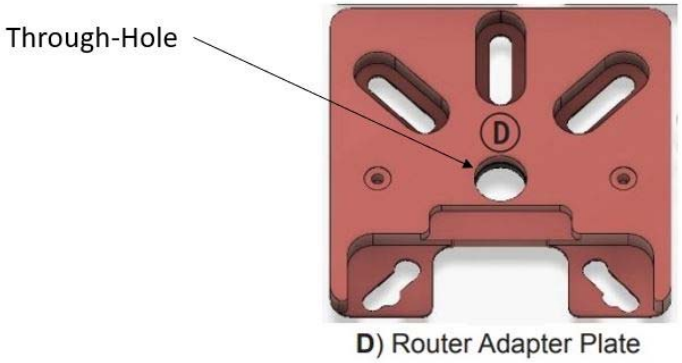
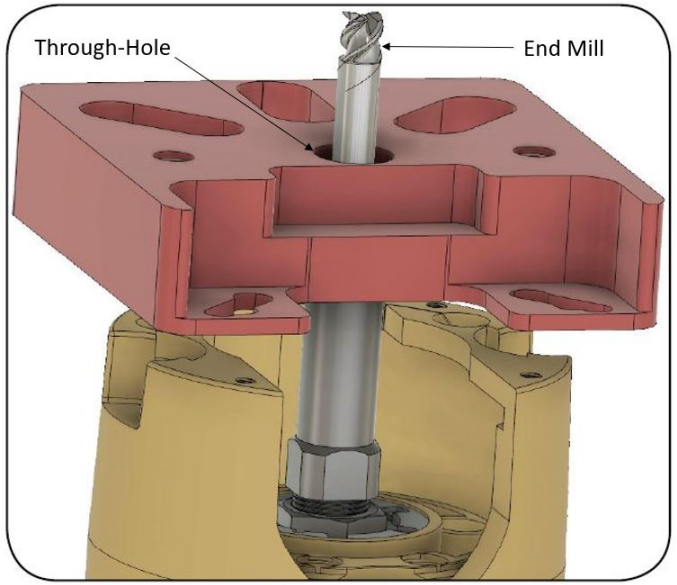
Use the guide below to determine the correct ReadyMILL™ size for your router.

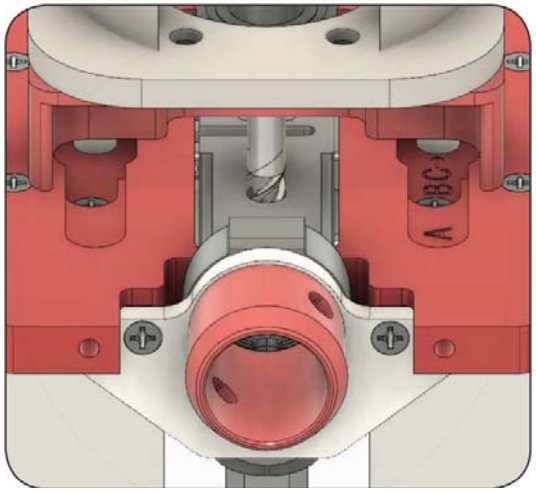
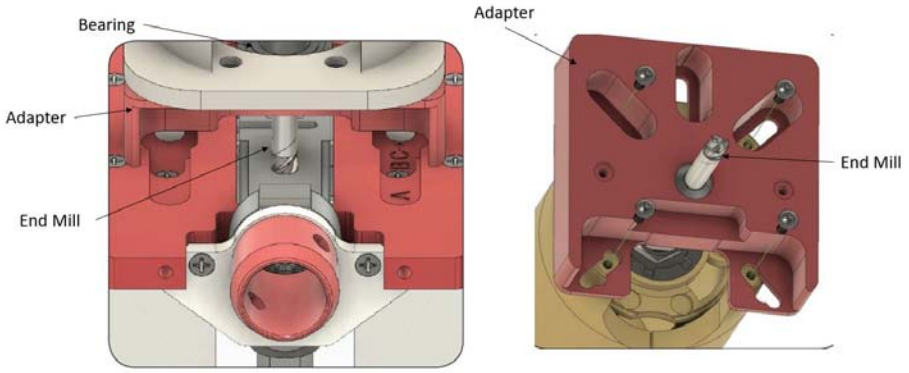
EXHIBIT E

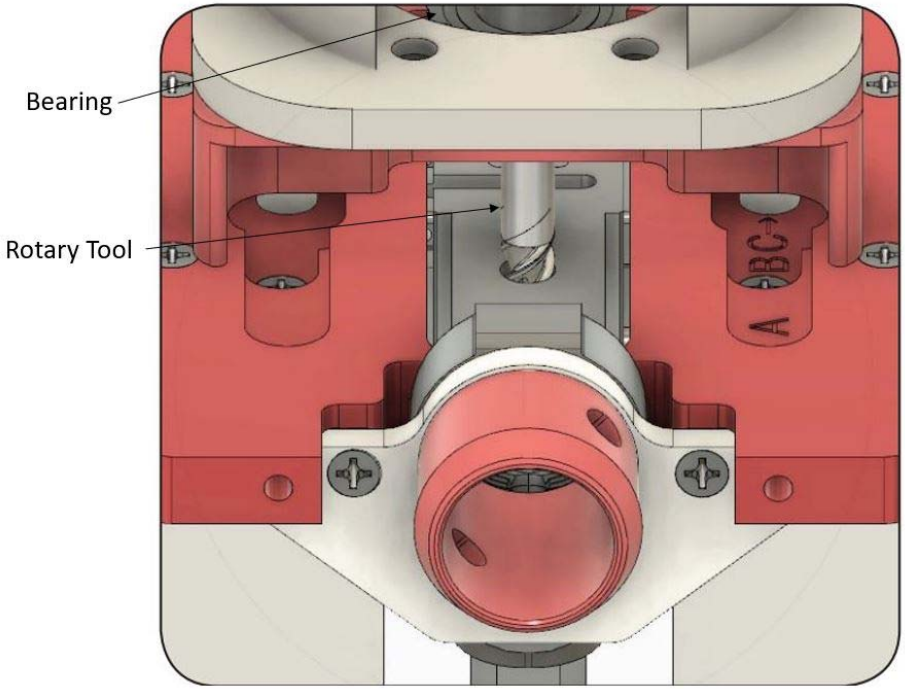
INFRINGEMENT OF CLAIM 7 OF THE '958 PATENT	
Claim Elements	**Router Jig Extreme AR-15/AR-10/AR-9 80% Jig made, used, and/or sold by 80 Percent Arms and Tilden Smith**
7. A jig for manufacturing a lower receiver comprising:	 **ROUTER JIG EXTREME™ AR-15 AR-10 AR-9** Cover Page, ROUTER JIG EXTREME™ AR-15 AR-10 AR-9 Milling System User Manual Ver. 1.31 (the "Manual") A jig is a device used to control the location and guide the motion of other parts or tools. The name of the product, "Router Jig Extreme," and the Manual confirm that the accused product is a jig: "The Modulus Arms Router Jig Extreme™ is the most durable, cost effective, easy to use, and fastest jig on the market to effortlessly finish your 80% lowers." Page 02, Manual. Conclusion: the Router Jig Extreme is a jig for manufacturing a lower receiver.

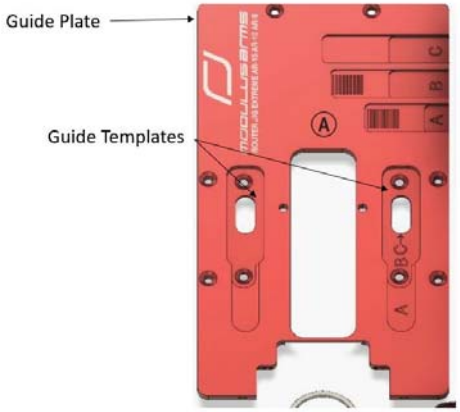
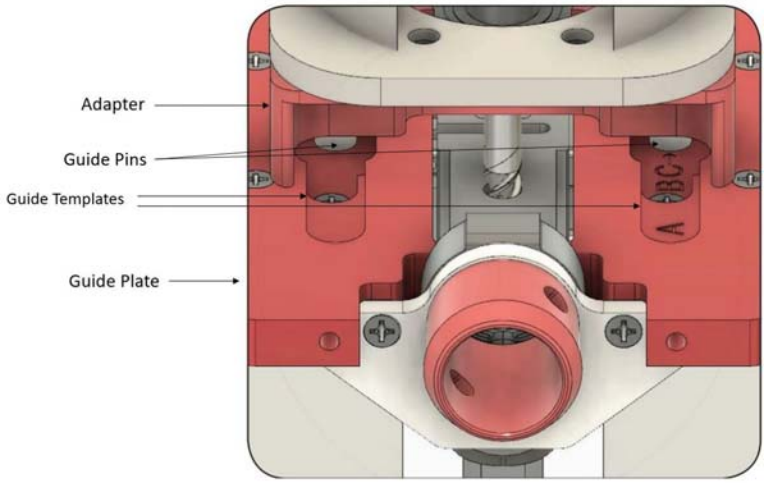
an adapter configured to support a rotary power tool above the lower receiver,	 D) Router Adapter Plate "D" Router Adapter Plate, Page 01, Manual (annotated) An adapter is a device for connecting pieces of equipment that cannot be connected directly. In the context of the invention, an adapter is a device for connecting a rotary power tool to the guide plate of the jig. The "D" Router Adapter Plate corresponds to the claimed adapter.  Steps H2, H3, H5, Manual (annotated) The rotary power tool is placed on top of the "D" Router Adapter Plate. The end mill from the rotary power tool passes through a hole in the "D" Router Adapter Plate. The Manual confirms that the end mill is secured onto the "D" Router Adapter Plate: "Slide the Router Adapter Plate over the end mill with the exposed side of the bearing facing the router. (Step H3). Pass the thicker SpeedMill portion of the end mill holder through the bearing. This will align the router adapter plate with the spindle and end mill. Thread 4 Router Adapter Screws through the Router Adapter Plate to secure the plate to the router base (Step H4). Tighten the screws being careful not to misalign

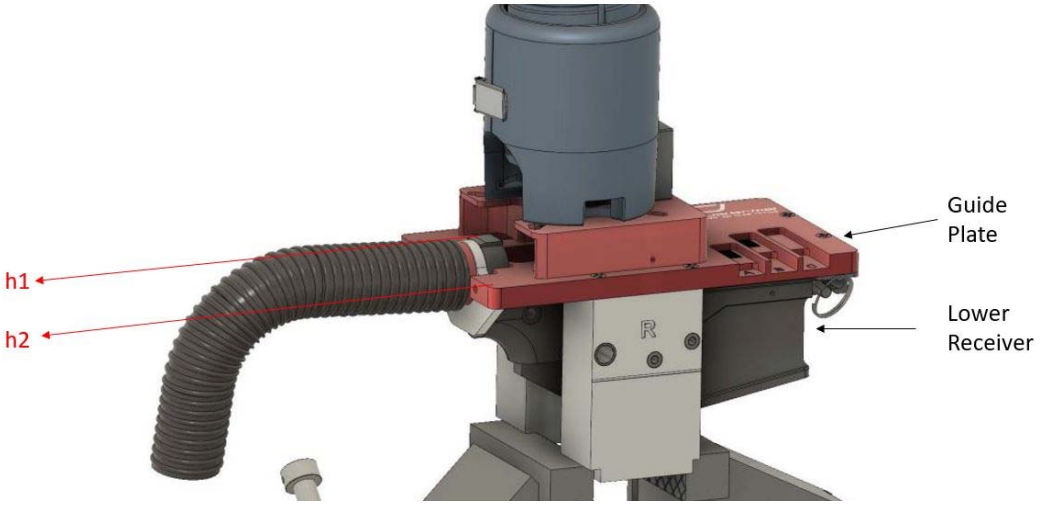
	the router adapter plate" Page 10, Manual. The end mill corresponds to the bit of the rotary power tool and the router corresponds to the rotary power tool.  Page 13, Manual (annotated) The "D" Router Adapter Plate supports the rotary power tool during operation because the rotary power tool sits on top of the "D" Router Adapter Plate. The rotary power tool is placed on top of the on the "D" Router Adapter Plate, which is placed on top of the lower receiver. Conclusion: The Router Jig Extreme has an adapter configured to support a rotary power tool above the lower receiver.

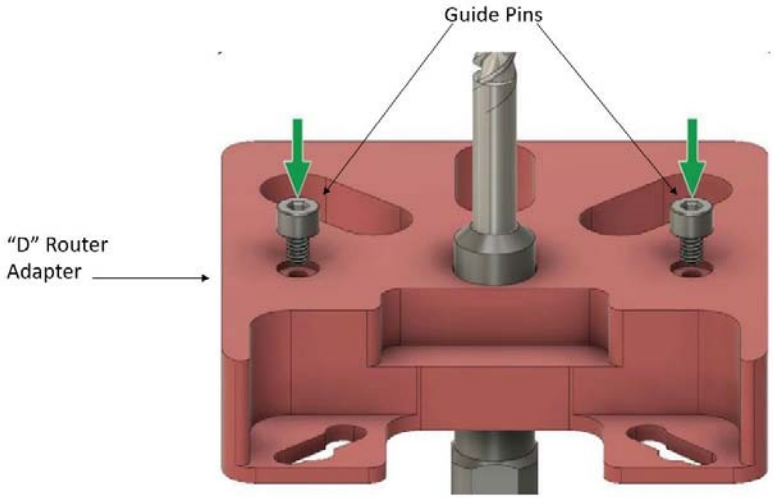
the adapter defining a through-hole for a rotary tool to pass therethrough	 "D" Router Adapter Plate, Page 01, Manual (annotated) There is a through-hole, labeled "Through-Hole" for the end mill of the rotary power tool to pass through.  Step H3, Manual

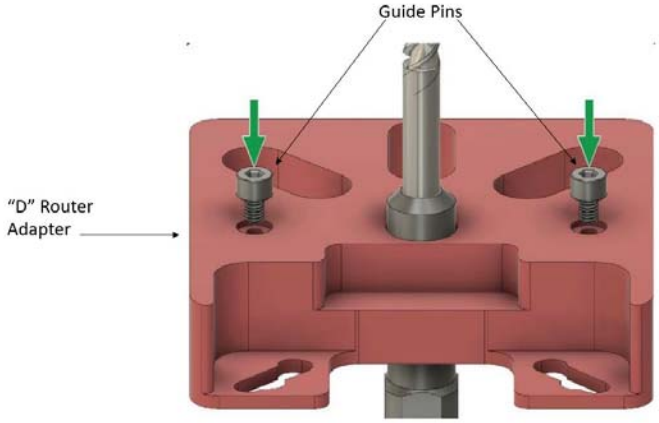
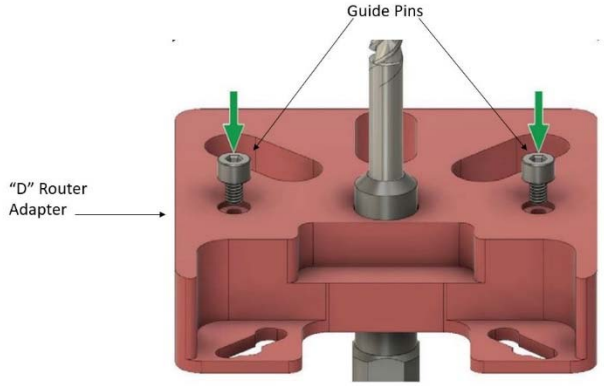
	 Step C3, Manual The images above show the end mill passing through the through-hole of the "D" Router Adapter Plate. Conclusion: the Router Jig Extreme has a through-hole for a rotary tool to pass therethrough.
the adapter having a bearing configured to support the rotary tool;	 Step C3, H4, Manual (annotated)

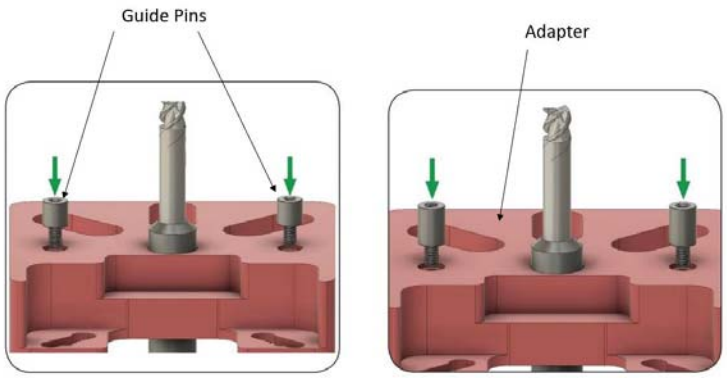
	A bearing is a machine element that constrains the motion of another element and reduces friction between moving parts. As shown in the images above, the "D" Router Adapter Plate has a bearing, and the bearing fits inside the through-hole in the "D" Router Adapter Plate. The product manual confirms that the bearing is part of the "D" Router Adapter Plate: "Pass the thicker SpeedMill portion of the end mill holder through the bearing. This will align the router adapter plate with the spindle and end mill." Page 10, Manual.  Step C3, Manual (annotated) The end mill of the rotary power tool passes through the bearing located inside the through-hole of the "D" Router Adapter Plate. The bearing supports the end mill by stabilizing the end mill while it is spinning and preventing the end mill from coming in direct contact with the walls of the through-hole. Conclusion: the "D" Router Adapter Plate of the Router Jig Extreme has a bearing configured to support a rotary power tool.

a guide plate disposed relative to the adapter such that the guide plate is configured to be disposed below a top surface of the lower receiver;	 "A" Top Plate, Page 01, Manual (annotated) A guide plate is a plate with one or more guidance features for aligning or orienting another object. The image below shows the Guide Templates of the "A" Top Plate serving as guidance features for aligning the Adapter with respect to the "A" Top Plate. The "A" Top Plate thus corresponds to the guide plate  Step C3, Manual (annotated)

	When operating the jig, the guide plate is between the adapter and the lower receiver. The guide plate is disposed relative to the adapter such that the top surface of the lower receiver is above the top surface of the guide plate.  Page 13, Manual (annotated) The top surface of the lower receiver is labeled h_1, while the top surface of the guide plate is labeled h_2. As seen in the image above, the top surface of the lower receiver is clearly above the top surface of the guide plate. Conclusion: the Router Jig Extreme has a guide plate disposed relative to the adapter such that the guide plate is configured to be disposed below a top surface of the lower receiver.

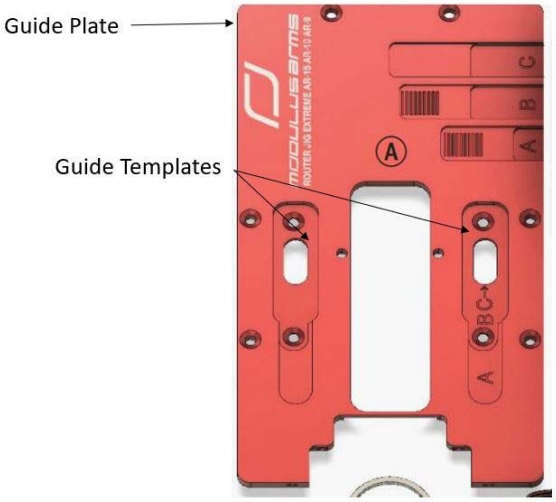
one or more guide pins configured to be received by the adapter,	 Page 05, Manual (annotated) A guide pin is a pin or peg that helps align or orient another object. The guide pin is receivable by the adapter if it can be inserted in the adapter. The parts labeled Guide Pins, referred to in the Manual as the "Guide Pins," are screwed into the "D" Router Adapter Plate: "Screw two Short Guide Pins into the Router Adapter Plate using the provided 7/64" Allen wrench. Do not over tighten the Guide Pins." Page 05, Manual. The product manual confirms that the Guide Pins can be removed from the adapter: "Remove the two Short Guide Pins and replace them with two Medium Guide Pins." Page 06, Manual. "Remove the two Medium Guide Pins from the Router Adapter plate and screw in the two Long Guide Pins." Page 07, Manual.

	 Step C3, Manual (annotated) The image above shows the "D" Router Adapter Plate with the guide pins, being installed to the "D" Router Adapter Plate (adapter). Once removed from the adapter, the Guide Pins can be changed to guide pins of different lengths. Thus the guide pins are receivable by the "D" Router Adapter Plate. Conclusion: the Router Jig Extreme has two guide pins protruding from the "D" Router Adapter Plate, which are configured to be received by the Router Adapter Plate.
the one or more guide pins being configured to engage with the adapter and align the adapter with respect to the guide plate.	 Guide pins shown being inserted in adapter. Step C3, Manual (annotated)



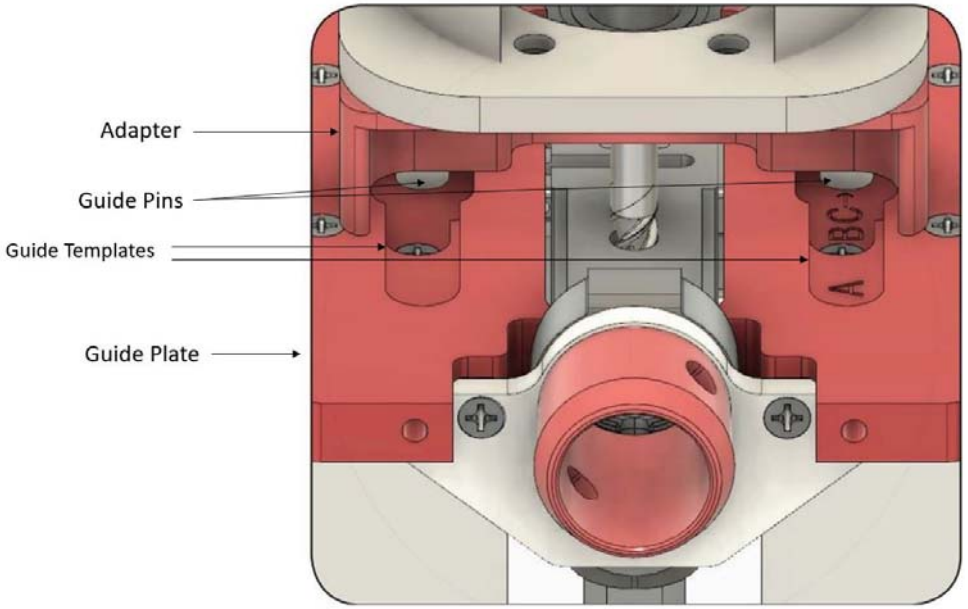
Different length Guide Pins installed to adapter. Step D1, E1, Manual (annotated)

To engage with means to connect, unite, fit together, or join with. The guide pins can be received by or removed from the "D" Router Adapter Plate. The guide pin is thus configured to engage with the adapter.



Page 01, Manual (annotated)

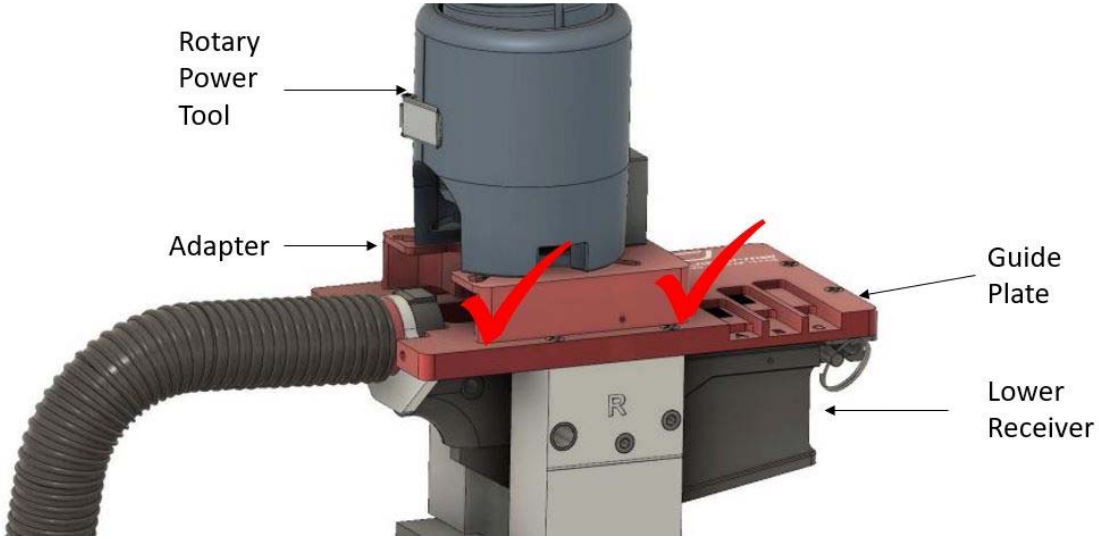
The image above shows the top surface of the guide plate. There are openings, labeled "Guide Templates"



Step C4, Manual (annotated)

To operate the jig, the Manual instructs the user that "[t]he small Guide Pins should be inside the recessed area of both templates." Step C3, Manual. The "templates" corresponds to the Guide Templates of the "A" Top Plate. When the "D" Router Adapter Plate is placed on the top surface of the "A" Top Plate, the guide pins are placed inside the Guide Templates so that the pins can only move within the walls of the Guide Templates. Because the guide pins are attached to the "D" Router Adapter Plate, it also limits the side-to-side movement of the "D" Router Adapter Plate with respect to the "A" Top Plate. Thus, the guide pins are "configured to engage the adapter and align the adapter with respect to the guide plate."

Conclusion: The Router Jig Extreme has two guide pins protruding from the "D" Router Adapter Plate, and the guide pins align the "D" Router Adapter Plate with respect to the "A" Top Plate. Therefore, there are guide pins "configured to engage the adapter and align the adapter with respect to the guide plate."

INFRINGEMENT OF CLAIM 8 OF THE '958 PATENT	
Claim Elements	**Router Jig Extreme 80% Jig made, used, and/or sold by 80 Percent Arms**
8. The jig of claim 7	For the reasons stated above, the Router Jig Extreme contains every element of Claim 7.
wherein the guide plate engages with the adapter.	 To engage with means to connect, unite, fit together, or join with. The adapter engages the guide plate when the user places the adapter on the guide plate during operation. Conclusion: the guide plate engages with the adapter.