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(54) **BARREL ASSEMBLY AND ATTACHMENT SYSTEM**

**Related U.S. Application Data**

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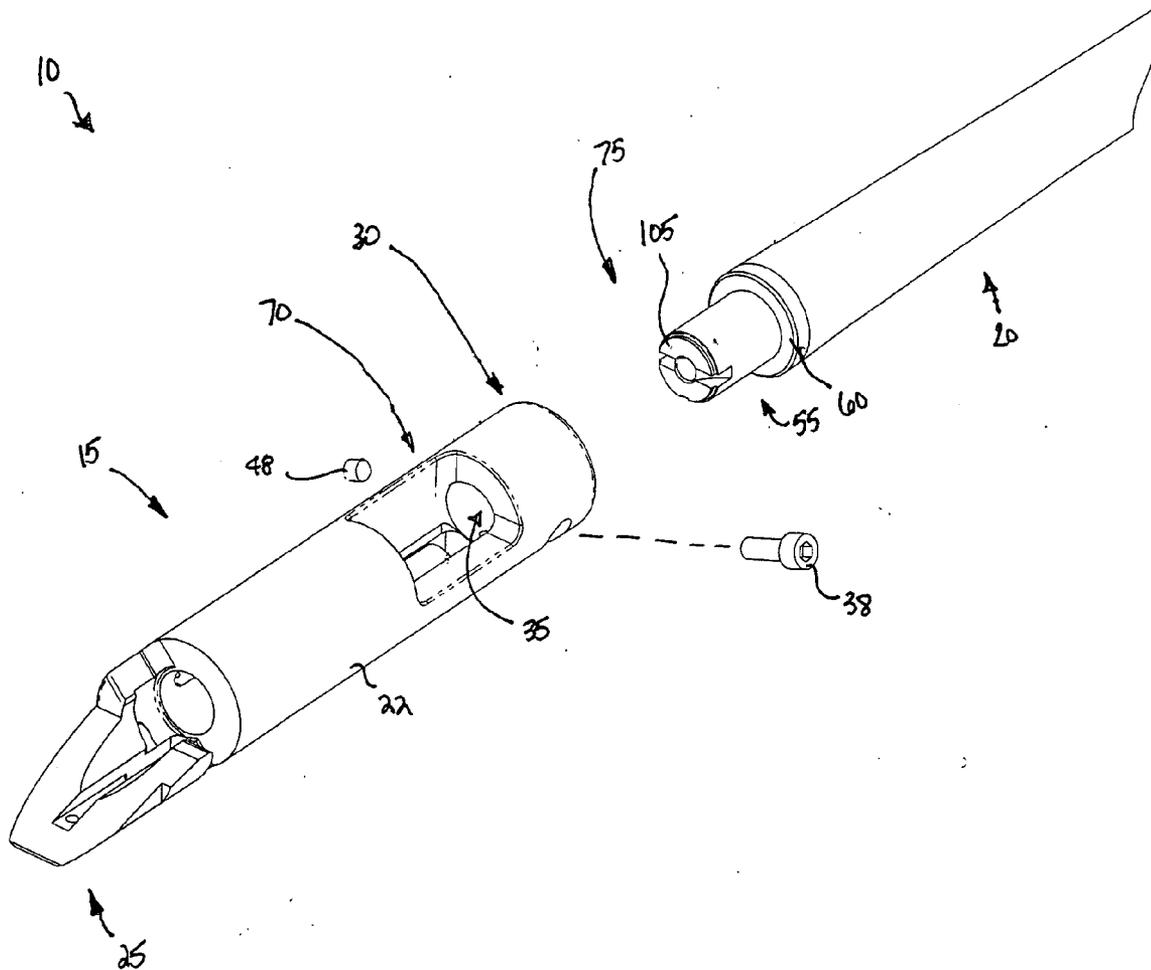
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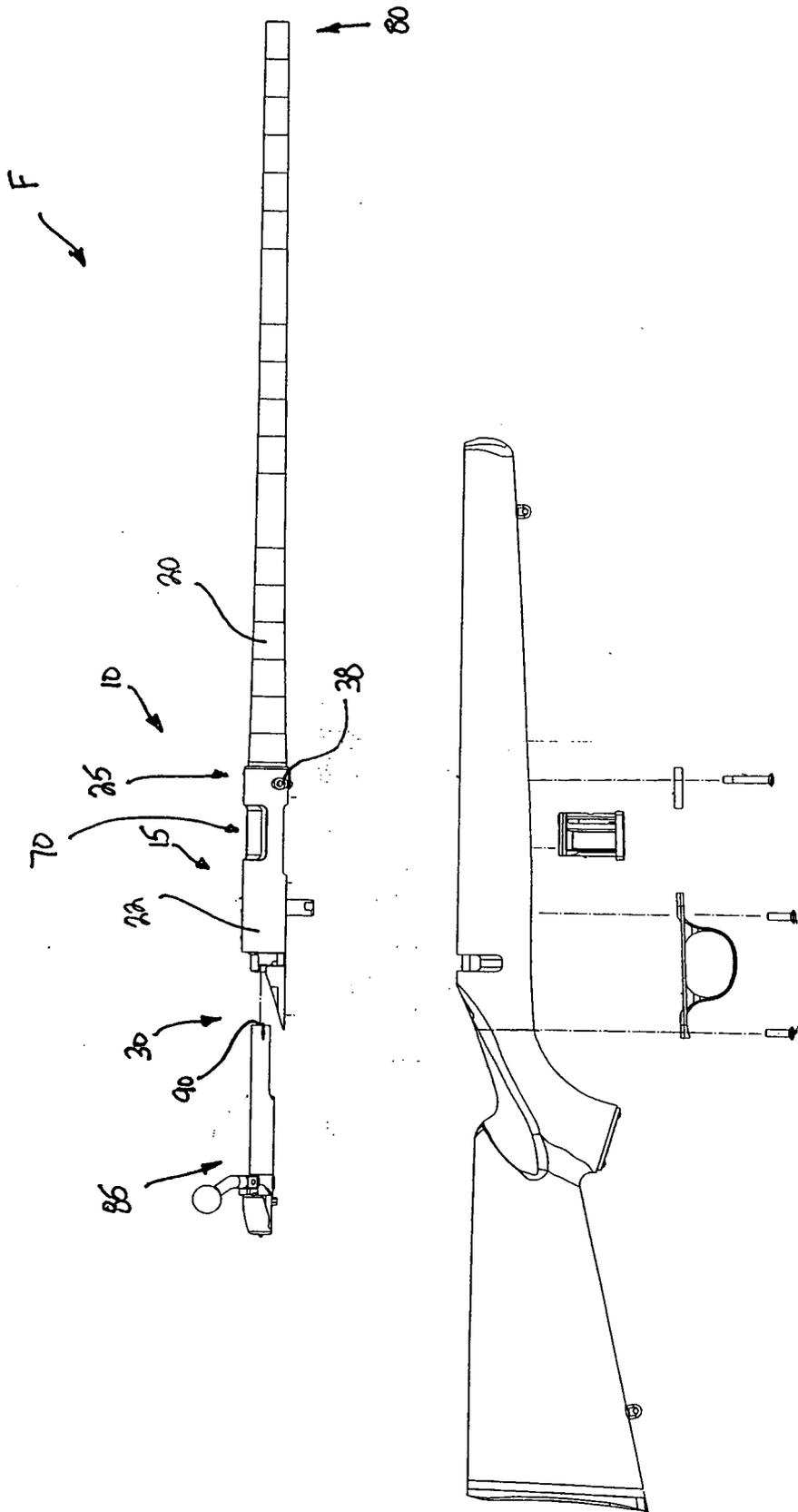
(57) **ABSTRACT**

A receiver and barrel assembly is provided. The barrel is readily removed from the receiver. Additionally, the head space of the assembly is readily adjusted. These features provide improved manufacturability and customized use of the rifle.

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**FIG. 1**

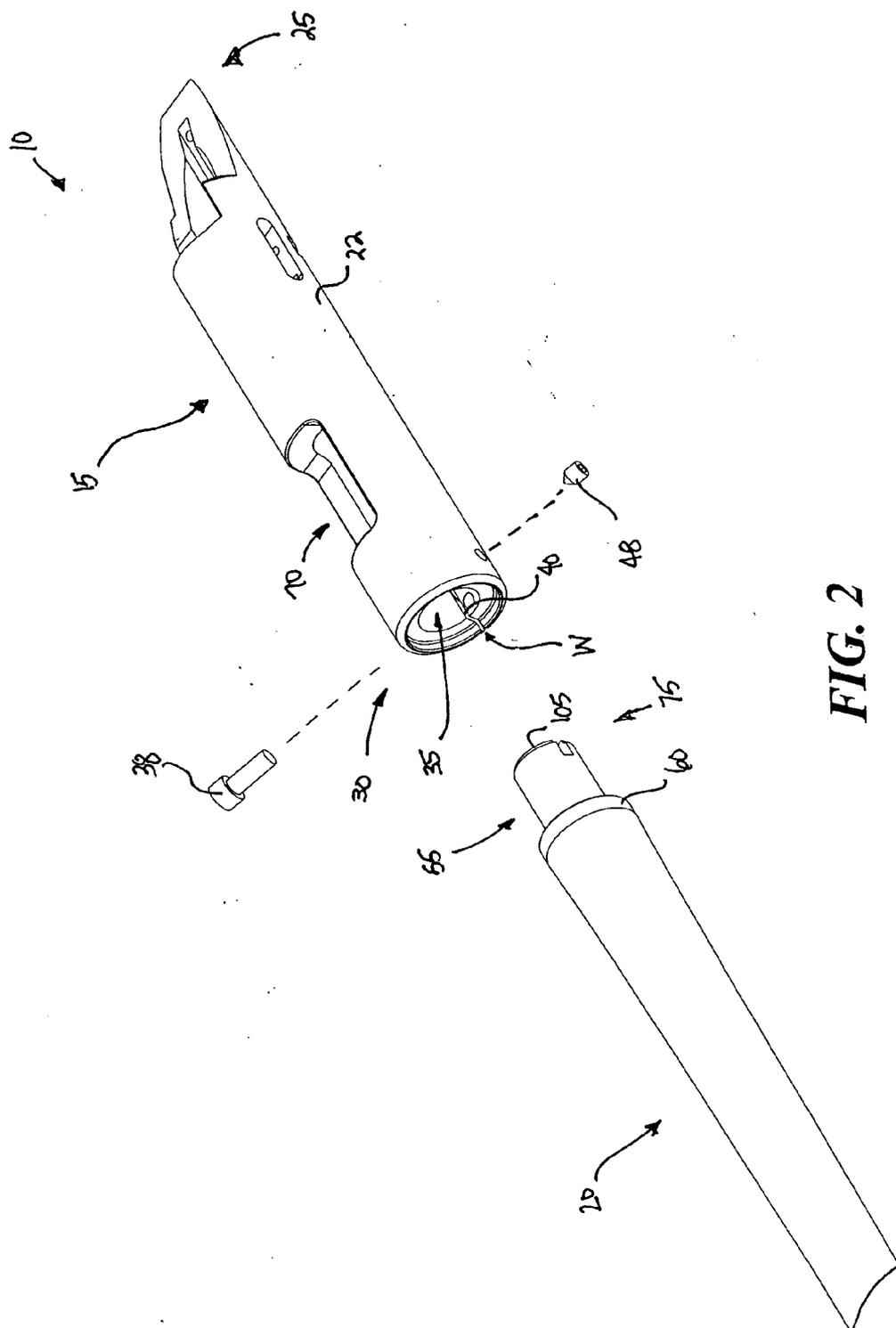


FIG. 2

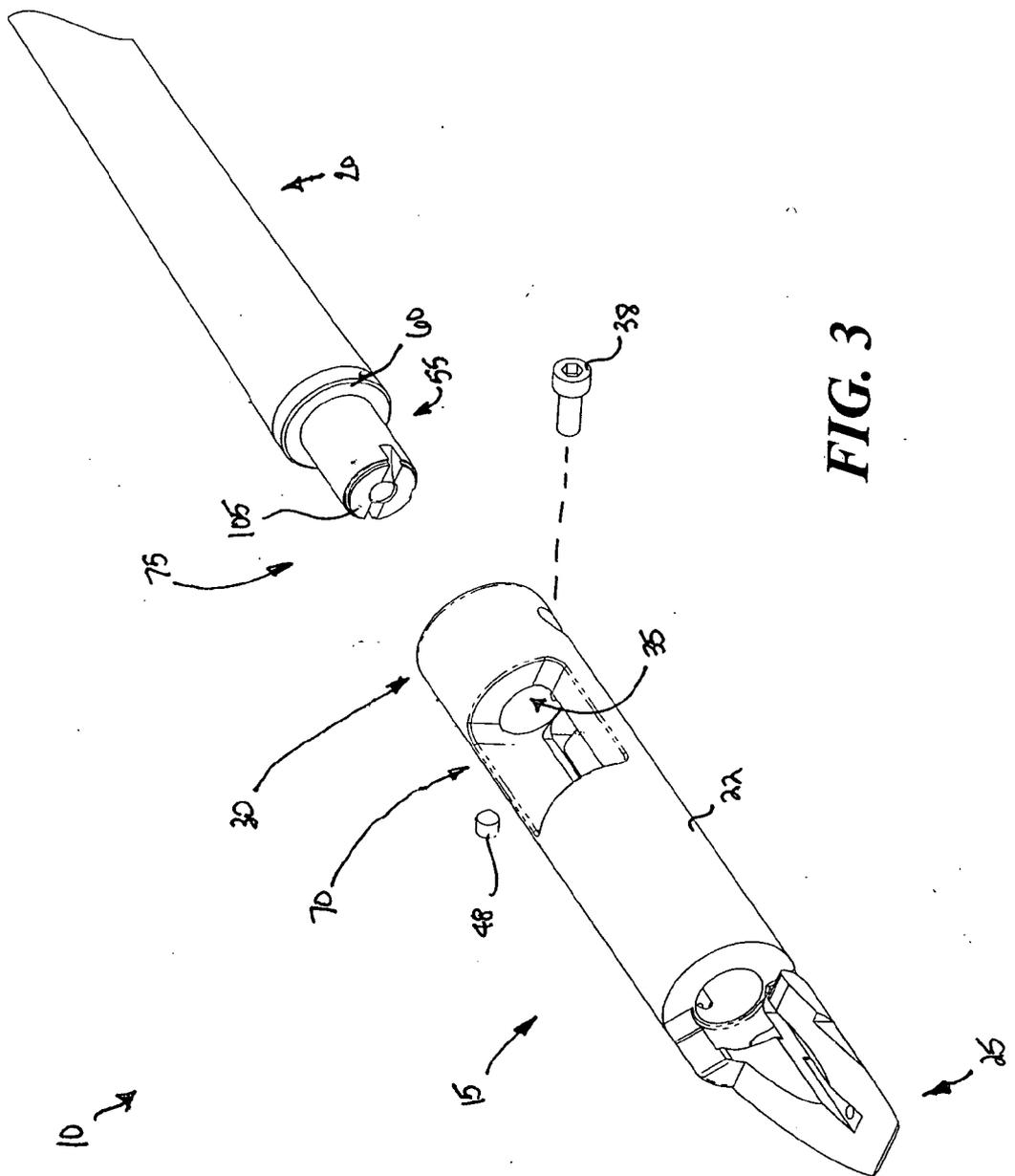
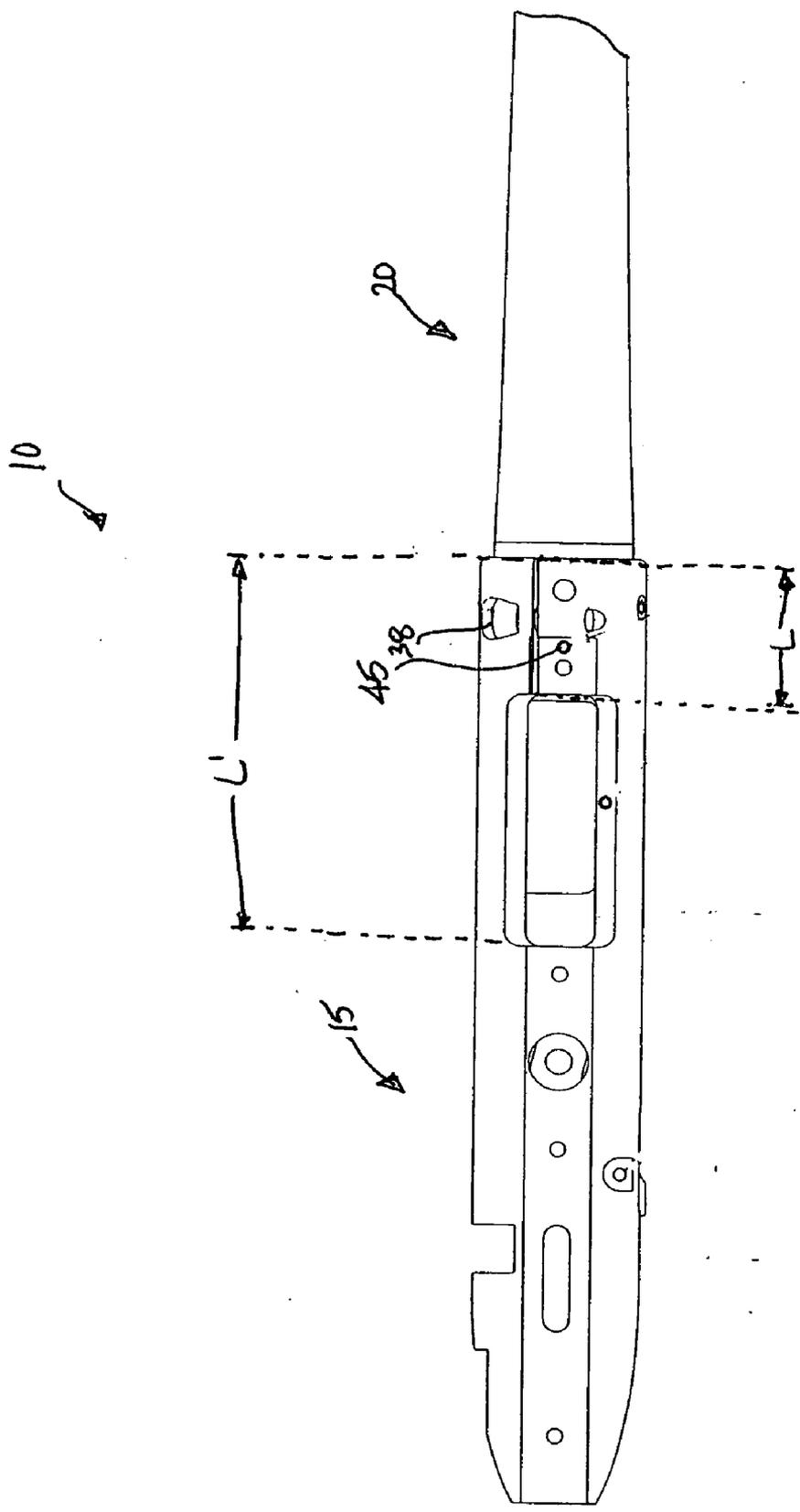
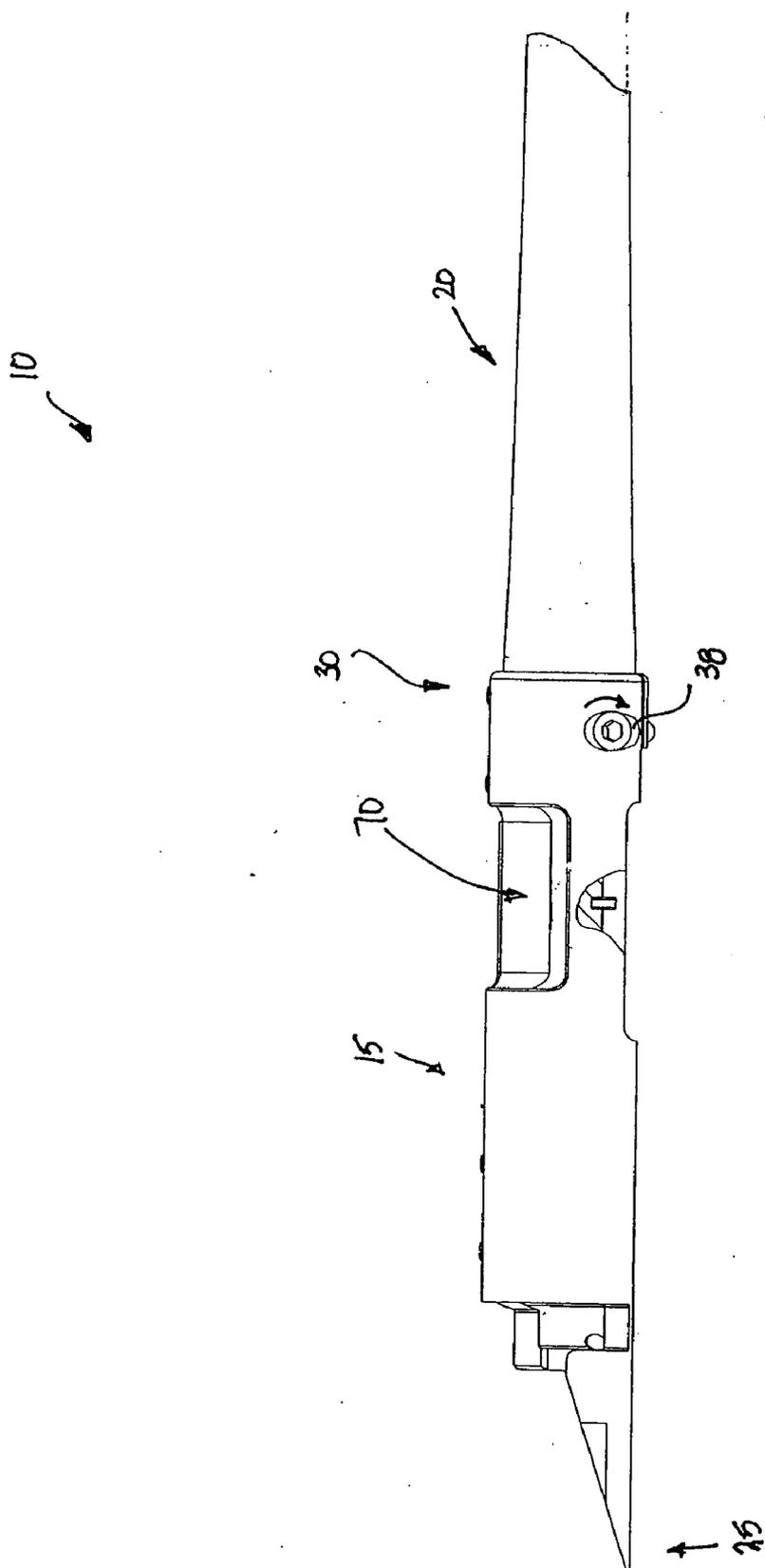


FIG. 3



**FIG. 4**



**BARREL ASSEMBLY AND ATTACHMENT SYSTEM**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This application claims priority to U.S. Provisional Application Ser. No. 60/540,360, filed Jan. 30, 2004, which is incorporated by reference herein in its entirety.

**FIELD OF THE INVENTION**

[0002] The present invention relates generally to firearms, and in particular, to the assembly of a barrel and receiver and a method to set and maintain the head space of a bolt and barrel breach interface.

**BACKGROUND OF THE INVENTION**

[0003] Manufacturers of firearms constantly seek improvements in the way firearms are manufactured. Specifically, manufacturers seek enhanced manufacturability and process control to optimize quality and production quality. At the same time, the end-user seeks customization and ease of repair and replacement of parts of the firearm. Thus, there is a need for a firearm design that enhances manufacturability and process control, while simplifying customization and repair.

**SUMMARY OF THE INVENTION**

[0004] The present invention generally is directed to a receiver and barrel assembly for a firearm, such as a rifle or other long gun or other types of firearms, and a method for assembling and attaching the barrel and receiver and setting the head space between the bolt and the barrel. According to the present invention, the firearm readily is assembled at the time of manufacture, and readily disassembled as needed or desired to meet the needs of the individual shooter, without the need for special tooling or equipment.

[0005] According to one aspect of the present invention, a split receiver for use in the barrel assembly of the present invention comprises a substantially cylindrical body having an aft end and a fore end. The body of the receiver has an axial bore extending therethrough from the aft end to the fore end, and a slot extending from the fore end toward the aft end of the body.

[0006] The receiver also comprises a set screw or clamping screw aligned radially with the slot. The clamping screw may be positioned to tighten in a direction substantially perpendicular to the slot. The receiver also may include a barrel set screw proximate the fore end of the receiver. The barrel set screw may be positioned to tighten in a direction substantially perpendicular to the axial bore of the receiver. The barrel set screw may have a cone point that marks the barrel upon tightening.

[0007] A barrel comprising a mating portion dimensioned to be received in the axial bore engages the open fore end of the receiver. In this position, the receiver can engage and secure the barrel into the receiver by tightening the clamping screw and the barrel set screw at a desired head space. Upon tightening the clamping screw and barrel set screw, a taper is formed in the receiver at the fore end, thereby securing the barrel and the receiver.

[0008] According to another aspect of the present invention, a method of assembling a receiver and barrel is provided. The method includes providing a receiver having an axial bore therethrough and a slot having an open width, inserting a mating portion of a barrel into the axial bore, and tightening a securing means substantially radially aligned with the slot. The mating portion of the barrel is inserted into the axial bore to an extent needed to achieve a desired head space. Tightening the securing means then decreases the open width of the slot and deforms the receiver toward and against the barrel.

[0009] Various features, objects, and advantages of the present invention are discussed in, or are apparent from, the detailed description and accompanying drawings set forth below.

**BRIEF DESCRIPTION OF THE DRAWINGS**

[0010] FIG. 1 is a partially exploded side plan view of an exemplary firearm that may include a receiver and barrel assembly according to the present invention.

[0011] FIG. 2 is an exploded perspective view of an exemplary receiver and barrel assembly according to the present invention.

[0012] FIG. 3 is an alternate exploded perspective view of an exemplary receiver and barrel assembly according to the present invention.

[0013] FIG. 4 is a bottom plan view of an exemplary assembled receiver and barrel according to the present invention.

[0014] FIG. 5 is a side plan view of an exemplary assembled receiver and barrel according to the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

[0015] In contrast to presently available barrel assemblies, the present invention includes features that improve manufacturability and customization of a firearm. In particular, the features simplify manufacturing and permit rapid barrel replacement and head space adjustment without the need for special tooling or equipment. The present invention as described herein typically is used for rimfire rifle barrel attachment systems, but may be used with other long guns or other types of firearms.

[0016] As shown in FIGS. 1-3, the barrel assembly 10 of the present invention generally includes a receiver 15 and a barrel 20 used in connection with a firearm, for example, a rifle F, shown in exploded view in FIG. 1. The receiver 15 has a substantially cylindrical body 22 having a first or aft end 25, a second or fore end 30, and an axial bore 35 extending therethrough from the aft end 25 to the fore end 30. The receiver 15 also includes a slot 40 having an open width W extending a length L from the fore end 30 toward the aft end 25 of the body 22. The open width W and length L vary for a given receiver design. In one aspect, the open width W is from about 0.025 in. to about 0.060 in., for example 0.040 in. In another aspect, the slot 40 has a length from about 0.5 in. to about 1.5 in. for example, 1 inch.

[0017] The receiver also includes a clamping screw 38, set screw, locking pin, or other securing means proximate the

fore end **30** of the receiver **15** for releasably securing the barrel **20** within the receiver **15**. The clamping screw **38** is substantially aligned radially with the slot **40** and tightens in a direction substantially perpendicular to the axial bore **35**. In one aspect, the clamping screw **38** is aligned in a substantially perpendicular relation to the slot **40**.

[0018] The receiver further includes a barrel set screw **48**, typically tightened at the time of manufacture. The barrel set screw **48** is positioned so that it tightens in a radial direction, substantially perpendicular to the axial bore **35**. In one aspect, the barrel set screw **48** is a cone point screw, so that upon tightening against the barrel **20**, the mating portion **55** of the barrel **20** is marked or scored permanently. The marking then can be used to determine whether the barrel **20** has been tampered with after assembly. According to one aspect of the present invention, the slot **40** is extended to a magazine chamber **70**, thereby providing an overall clamping length *L'* (**FIG. 4**) of from about 2 inches to about 4 inches, for example, about 3 inches. By doing so, the body **22** of the receiver **15** more readily deforms during assembly, thereby requiring less torque to tighten the barrel set screw **48**.

[0019] The receiver **15** also may include a guide pin **45** (best seen in **FIG. 4**) that extends inward from the exterior of the receiver **15** into the axial bore **35**. The guide pin **45** may be mounted flush to the exterior of the receiver **15** and may extend into the bore **35** about 0.05 in. to about 0.10 in., although greater or lesser amounts of extension of the guide pin also can be used as needed or desired.

[0020] Still viewing **FIGS. 1-3**, the barrel **20** includes a first end **75** defining a mating portion **55** with a mating shoulder **60** formed thereabout, and a second, distal end **80**. The mating portion **55** is dimensioned to be slidably received in the axial bore **35** of the receiver **15**. The barrel **20** also may include a guide groove (not shown) or similar directional feature dimensioned to slidably receive the guide pin **45** of the receiver **15**. It should be noted that different barrels having different length mating portions also can be provided or used.

[0021] To assemble the receiver **15** and barrel **20**, the mating portion **55** of the barrel **20** is rotated as needed to align the guide groove **65** and the guide pin **45** of the receiver **15**. The mating portion **55** then is slidably inserted into the axial bore **35** of the receiver **15**. A bolt assembly **85** is inserted into the receiver **15** and closed. The bolt assembly **85** includes a bolt face **90** having a counterbore (not shown) therein.

[0022] According to the present invention, the barrel **20** is slidably adjusted within the axial bore **35** of the receiver **15** along the length thereof until a desired head space is attained. The minimum possible head space is attained by bringing the barrel breach face **105** into contact with the counterbore of the bolt face **90** within the receiver **15**. Hard gauging techniques known to those of skill in the art can be used to attain a greater head space if desired.

[0023] The ability to adjust the head space in this manner provides significant advantages over presently available receiver and barrel assemblies. Notably, the receiver and assembly of the present invention readily accommodate normal tolerance variations in the barrel and receiver, thereby simplifying the manufacturing process. Addition-

ally, secondary machining typically required to provide a proper engagement of the receiver and barrel is not required.

[0024] Turning to **FIGS. 4 and 5**, when the barrel **20** is positioned relative to the receiver **15** at the desired head space, the clamping screw **38** is tightened. The tightening action causes the open width *W* of the slot to decrease. Further, the tightening action causes the fore end **30** of the receiver **15** to deform toward and against the mating portion **55** of the barrel **20**, thereby forming a taper in the receiver **15**. The taper in the receiver decreases the diameter of the receiver **15** at the fore end **30** relative to the original diameter. Depending on the particular firearm, a required torque may be specified. In one aspect, the required torque on the clamping screw is from about 100 in-lbf to about 125 in-lbf. The resulting taper helps to substantially securely clamp the receiver **15** to the barrel **20** seated therein. Additionally, tightening of the clamping screw **38** maintains the desired head space dimension.

[0025] Assembly of the barrel **20** and receiver **15** of the firearm *F* is completed by tightening the barrel set screw **110**, which further helps to secure the barrel **20** in the receiver **15**. In one aspect, the barrel set screw **110** requires a minimum torque setting of at least about 25 in-lbf. Tightening the barrel set screw **110** in this manner may provide from about 500 lb to about 1000 lb of additional force in securing the barrel **20** in the receiver **15**.

[0026] In contrast to presently known, more complicated assemblies, only two screws or other securing means are needed to secure the receiver to the barrel. Thus, the simple, easy to use design of the present invention permits the assembly to be customized according to the preferences of the user. Additionally, the present invention allows a damaged or worn barrel and/or receiver to be replaced with little effort or cost.

[0027] Accordingly, it will be readily understood by those persons skilled in the art that, in view of the above detailed description of the invention, the present invention is susceptible of broad utility and application. Many adaptations of the present invention other than those herein described, as well as many variations, modifications, and equivalent arrangements will be apparent from or reasonably suggested by the present invention and the above detailed description thereof, without departing from the substance or scope of the present invention.

[0028] While the present invention is described herein in detail in relation to specific aspects, it is to be understood that this detailed description is only illustrative and exemplary of the present invention and is made merely for purposes of providing a full and enabling disclosure of the present invention. The detailed description set forth herein is not intended nor is to be construed to limit the present invention or otherwise to exclude any such other embodiments, adaptations, variations, modifications, and equivalent arrangements of the present invention, the present invention being limited solely by the claims appended hereto and the equivalents thereof.

What is claimed is:

1. A split receiver for use in a barrel assembly, comprising:

a substantially cylindrical body having an aft end and a fore end, the body having an axial bore extending from

the aft end to the fore end, and a slot extending from the fore end toward the aft end of the body; and

a clamping screw aligned radially with the slot.

2. The receiver of claim 1, wherein the clamping screw is positioned to tighten in a direction substantially perpendicular to the slot.

3. The receiver of claim 1, further comprising a barrel set screw proximate the fore end of the receiver, the barrel set screw being positioned to tighten in a direction substantially perpendicular to the axial bore of the receiver.

4. The receiver of claim 3, wherein the barrel set screw has a cone point.

5. The receiver of claim 1, wherein the slot has an open width of from about 0.025 to about 0.060 in.

6. The receiver of claim 1, wherein the slot has a length of from about 0.50 to about 1.5 in.

7. The receiver of claim 1, wherein the slot extends to a magazine chamber formed in the receiver, thereby forming an overall clamping length of from about 2 to about 4 inches.

8. A barrel attachment system for a firearm comprising:

a receiver having a fore end and an axial bore therethrough;

a barrel including a mating portion dimensioned to be received in the axial bore; and

a clamping screw positioned proximate the fore end of the receiver.

9. The barrel attachment system of claim 8, wherein the receiver includes a slot substantially aligned radially with the clamping screw.

10. The barrel attachment system of claim 9, wherein the slot extends from the fore end toward the aft end.

11. The barrel attachment system of claim 9, wherein the clamping screw is positioned so that it tightens in a direction substantially perpendicular to the slot.

12. A firearm comprising:

a receiver having a fore end, an aft end, an axial bore therethrough, and a slot extending from the fore end towards the aft end;

a barrel including a mating portion having a breach face, the mating portion slidably received within the axial bore; and

a securing means positioned at the fore end of the receiver and substantially aligned radially with the slot,

wherein the securing means permits the barrel to be secured at a desired position within the receiver to achieve a desired head space.

13. The firearm of claim 12, wherein the securing means comprises a clamping screw that tightens in a direction substantially perpendicular to the axial bore.

14. The firearm of claim 12, wherein the securing means comprises a clamping screw positioned proximate the fore end of the receiver and substantially perpendicularly aligned with the slot, whereby the clamping screw tightened against the barrel forms a taper in the receiver against the mating portion of the barrel.

15. The firearm of claim 12, further comprising a bolt assembly dimensioned to be received in the axial bore at the aft end of the receiver, the bolt assembly including a bolt face, wherein a minimum head space is defined by engaging the breach face of the barrel with the bolt face.

16. A method of assembling a receiver and barrel, comprising:

providing a receiver having an axial bore therethrough and a slot having an open width;

inserting a mating portion of a barrel into the axial bore; and

tightening a securing means substantially radially aligned with the slot,

wherein tightening the securing means decreases the open width of the slot and deforms the receiver toward and against the barrel.

17. The method of claim 16, wherein the mating portion of the barrel is inserted into the axial bore to an extent needed to achieve a desired head space.

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