US012578159B2

(12) **United States Patent**
Blakley

(10) **Patent No.: US 12,578,159 B2**
(45) **Date of Patent: *Mar. 17, 2026**

(54) **FIREARM TRIGGER MECHANISM**

(71) Applicant: **ABC IP, LLC**, Dover, DE (US)

(72) Inventor: **Brian A Blakley**, Pinellas Park, FL (US)

(73) Assignee: **ABC IP, LLC**, Dover, DE (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 160 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **18/761,606**

(22) Filed: **Jul. 2, 2024**

(65) **Prior Publication Data**

US 2026/0055983 A1 Feb. 26, 2026

Related U.S. Application Data

(63) Continuation of application No. 18/325,225, filed on May 30, 2023, now Pat. No. 12,038,247.
(Continued)

(51) **Int. Cl.**
F41A 19/45 (2006.01)
F41A 17/46 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***F41A 19/45*** (2013.01); ***F41A 17/46*** (2013.01); ***F41A 19/10*** (2013.01); ***F41A 19/16*** (2013.01); *F41A 19/15* (2013.01)

(58) **Field of Classification Search**
CPC F41A 19/45; F41A 19/10; F41A 19/15; F41A 19/64; F41A 17/46
(Continued)

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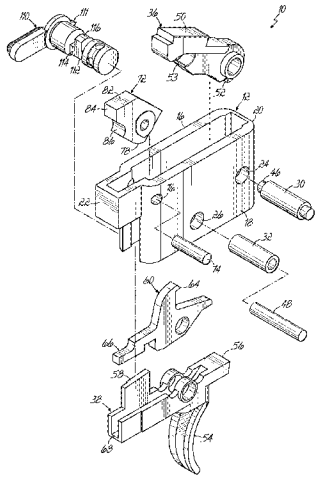
(Continued)

Primary Examiner — Reginald S Tillman, Jr.
(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP

(57) **ABSTRACT**

A trigger mechanism that can be used in AR-pattern firearms has a hammer, a trigger member, a disconnector, a cam, and a "three position" safety selector having safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from a first position to a second position such that a cam lobe forces the trigger member towards the set position, but prior to reaching the set position the disconnector hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to their set positions so that the user can pull the trigger member to fire the firearm. In the forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member to the set position, the safety selector
(Continued)



preventing the disconnector hook from catching the hammer hook, at which time the user can pull the trigger member to fire the firearm without manually releasing the trigger member.

18 Claims, 18 Drawing Sheets

Related U.S. Application Data

(60) Provisional application No. 63/374,941, filed on Sep. 8, 2022.

(51) **Int. Cl.**
F41A 19/10 (2006.01)
F41A 19/15 (2006.01)
F41A 19/16 (2006.01)

(58) **Field of Classification Search**
USPC 42/69.01, 69.03; 89/146, 148, 129.01, 89/129.02, 132
See application file for complete search history.

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Exhibit 1005 from IPR Petition No. 2025-01473 (photo of Radian Mod for Tommy Triggers upgrade kit).

Exhibit 1006 from IPR Petition No. 2025-01473 (photo of Tommy Triggers Alamo-15 And Rare Breed Frt E3 safety selector guide).

Exhibit 1007 from IPR Petition No. 2025-01473 (photo of Tommy Triggers 3 Selector install for Alamo-15).

Exhibit 1008 from IPR Petition No. 2025-01473 (*Rare Breed, et al.* v. *Strbac, d/b/s Tommy Triggers* Complaint, U.S. District Court for the N.D. Ohio, filed Feb. 21, 2022).

Statutory Invention Registration No. H107, Inventor: Bauer, Published Aug. 5, 1986 (8 pages).

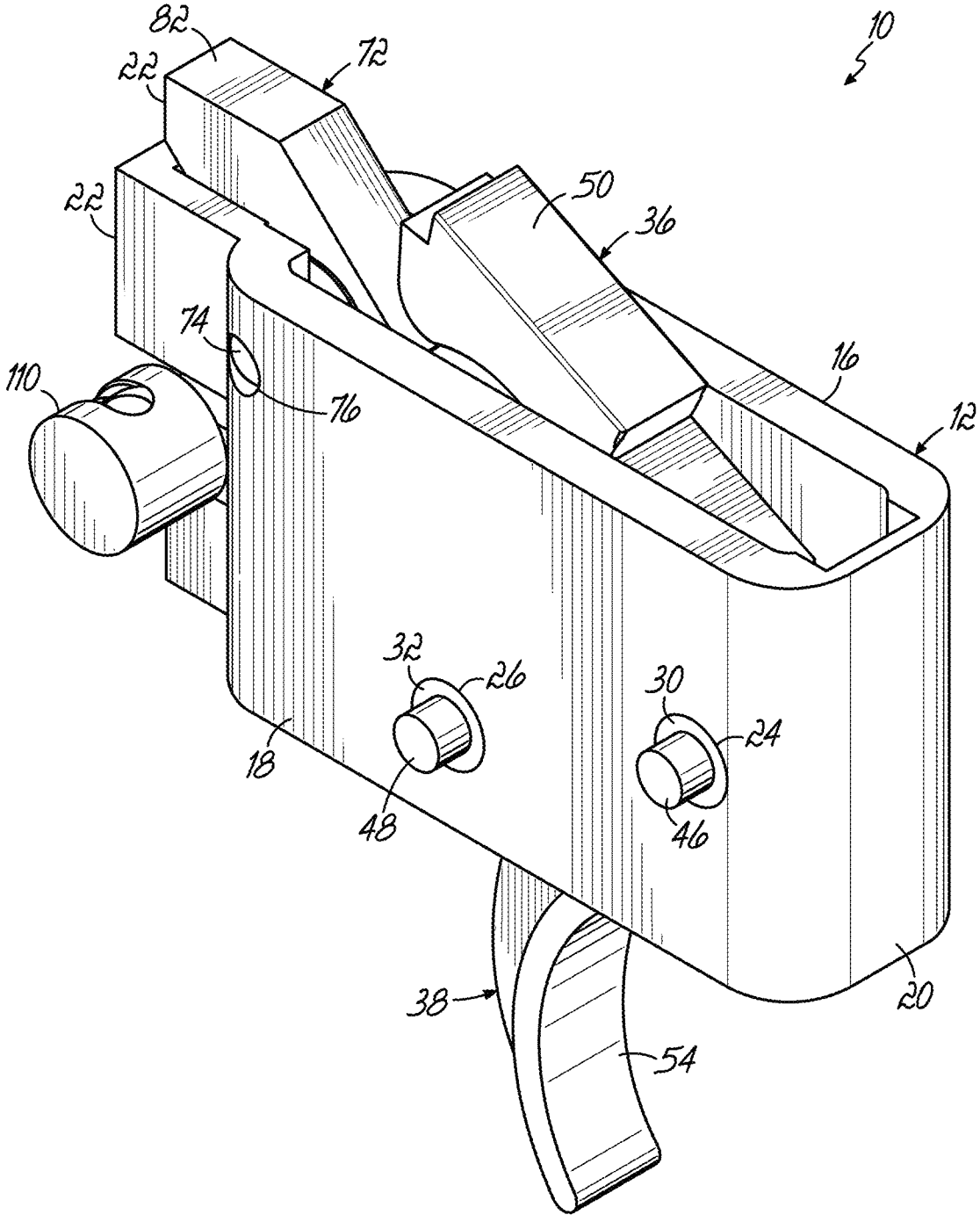
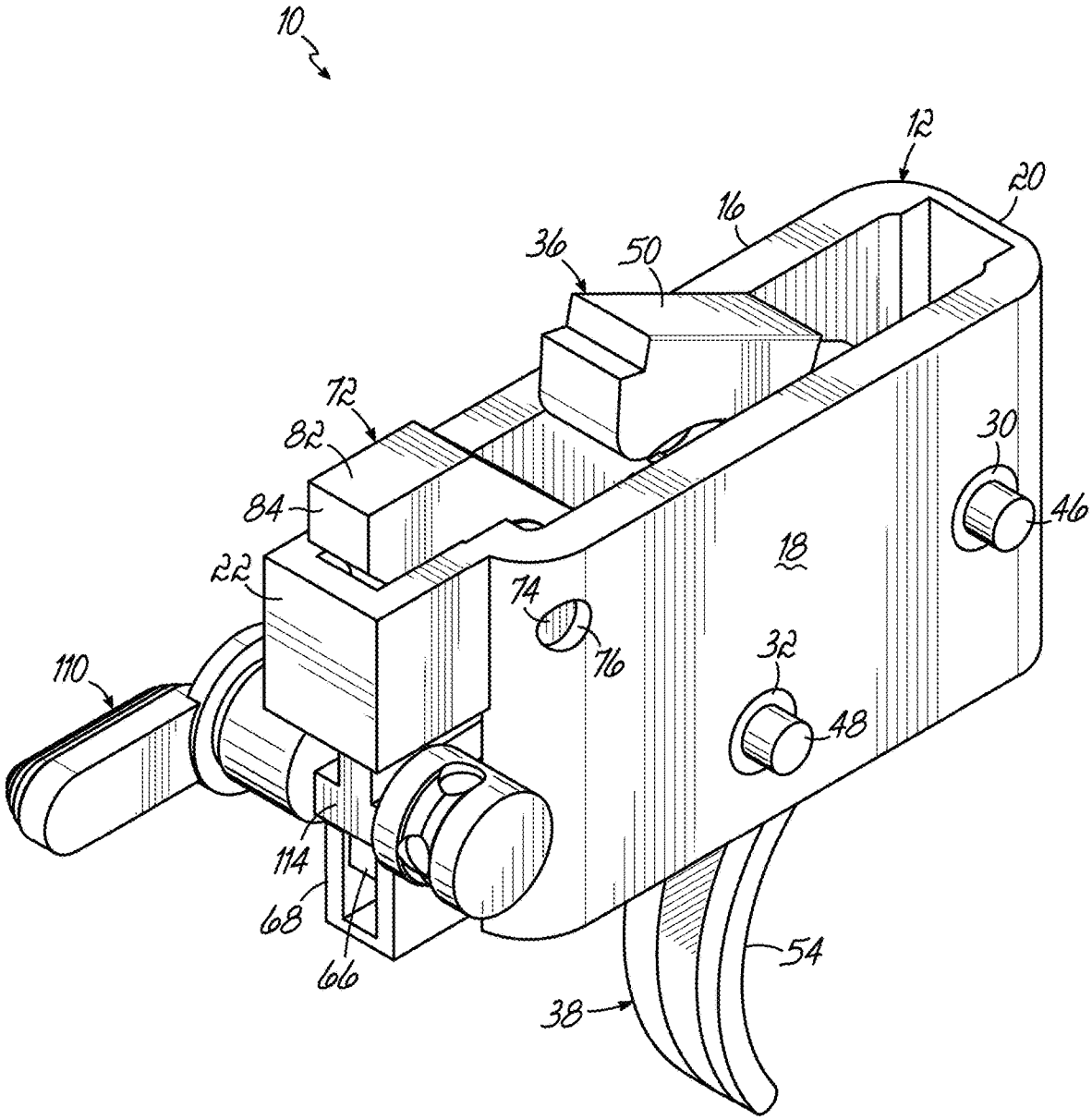


FIG. 1



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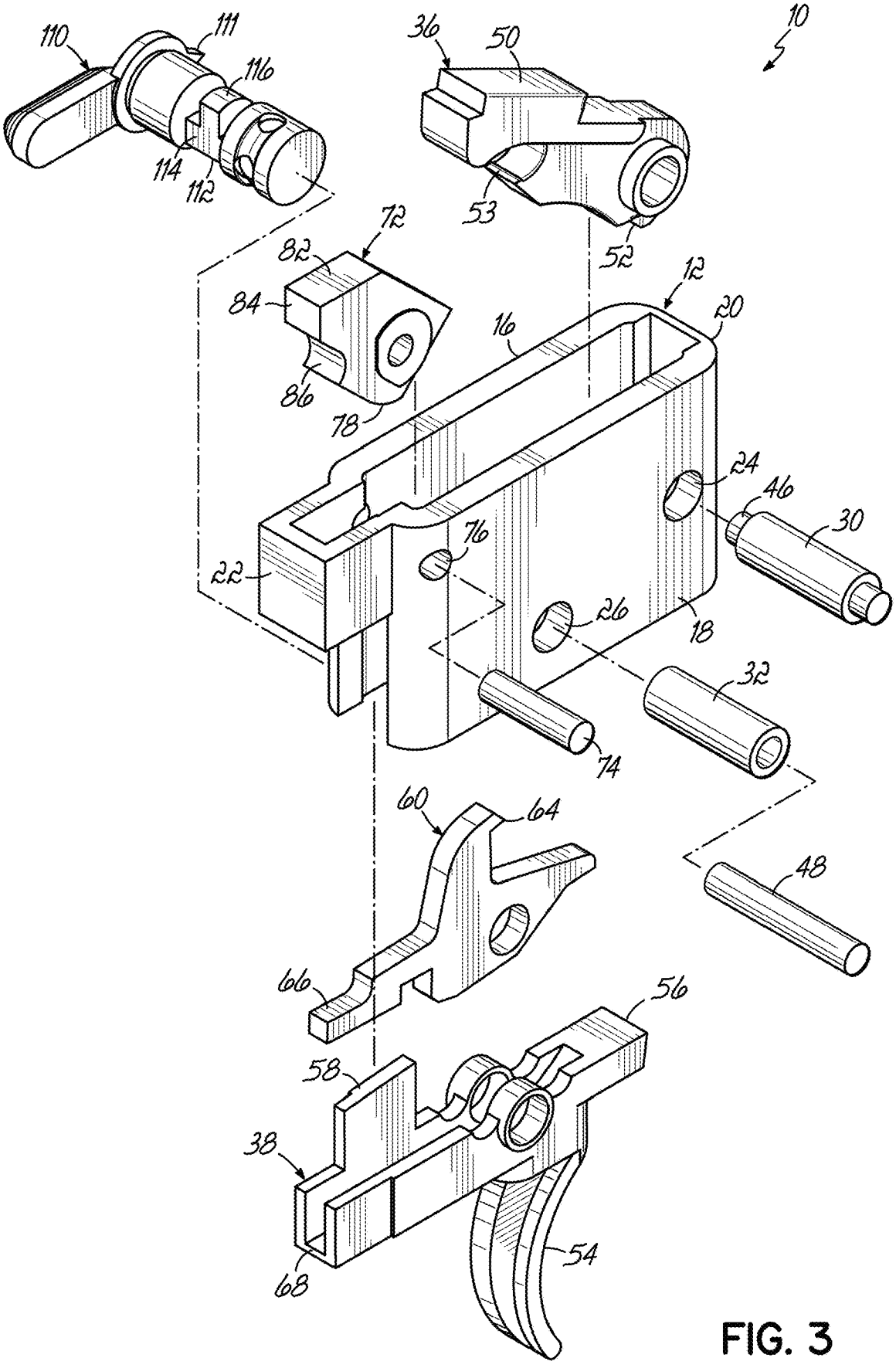
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FIG. 3

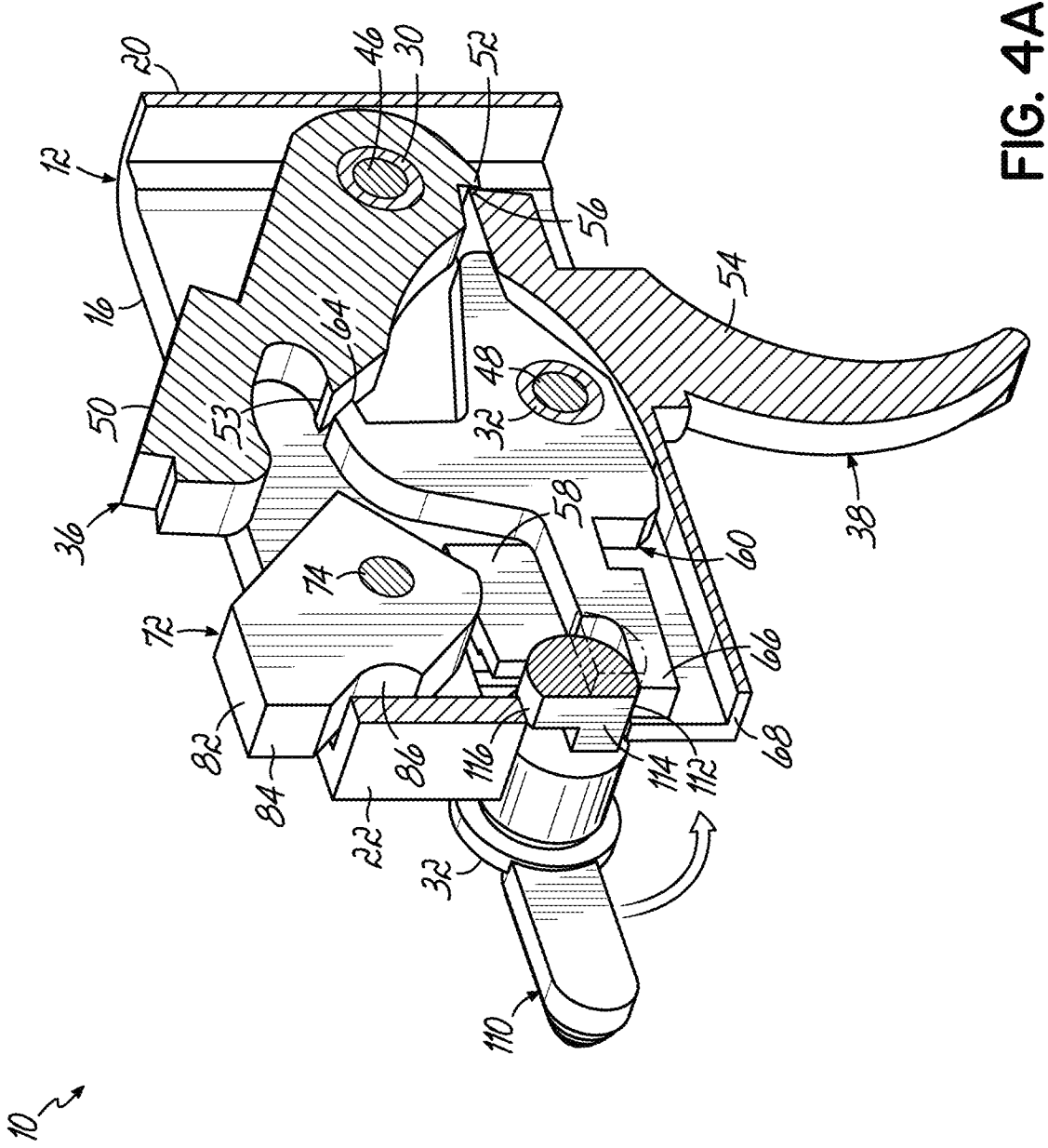
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FIG. 4A

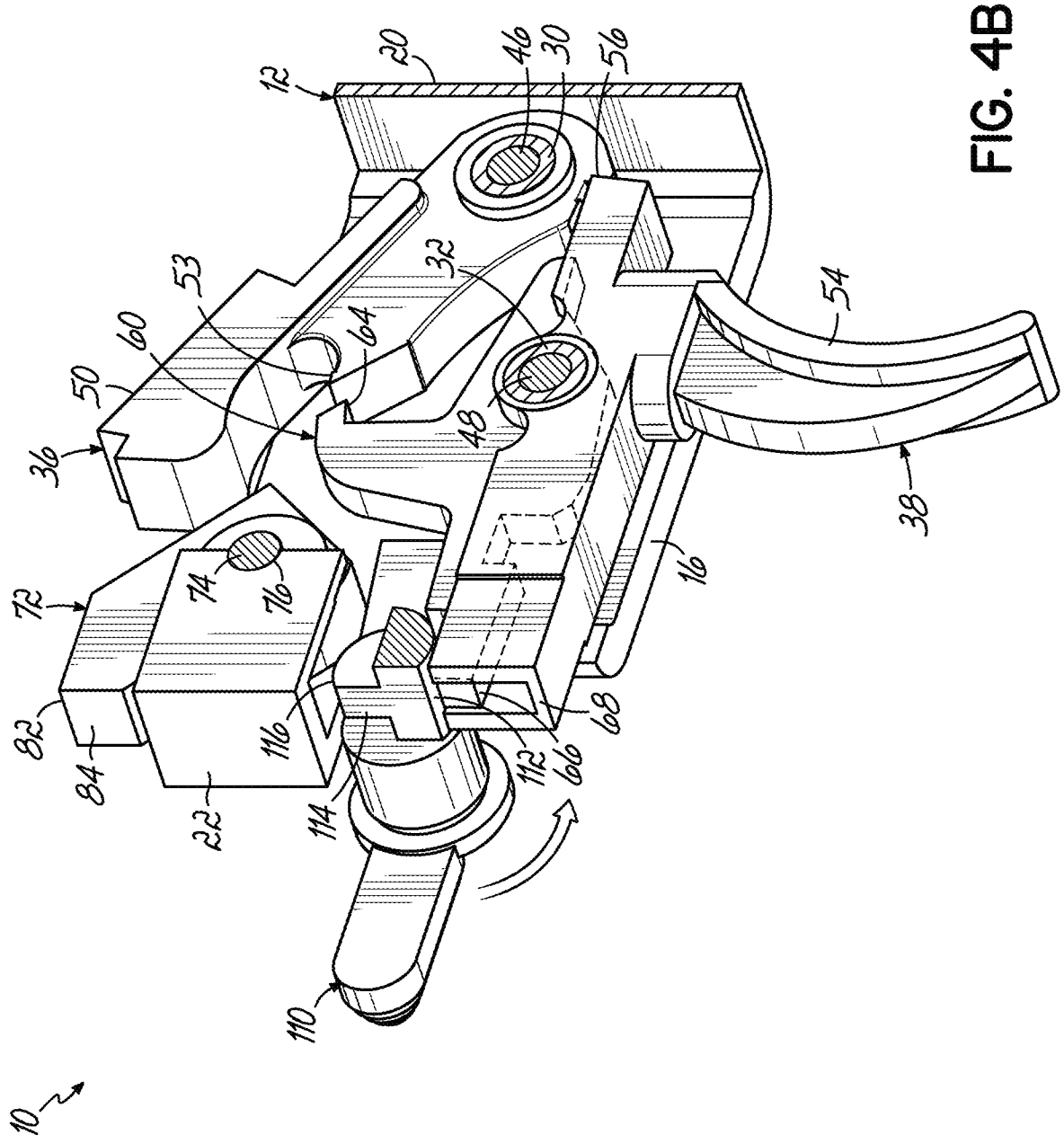
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FIG. 4B

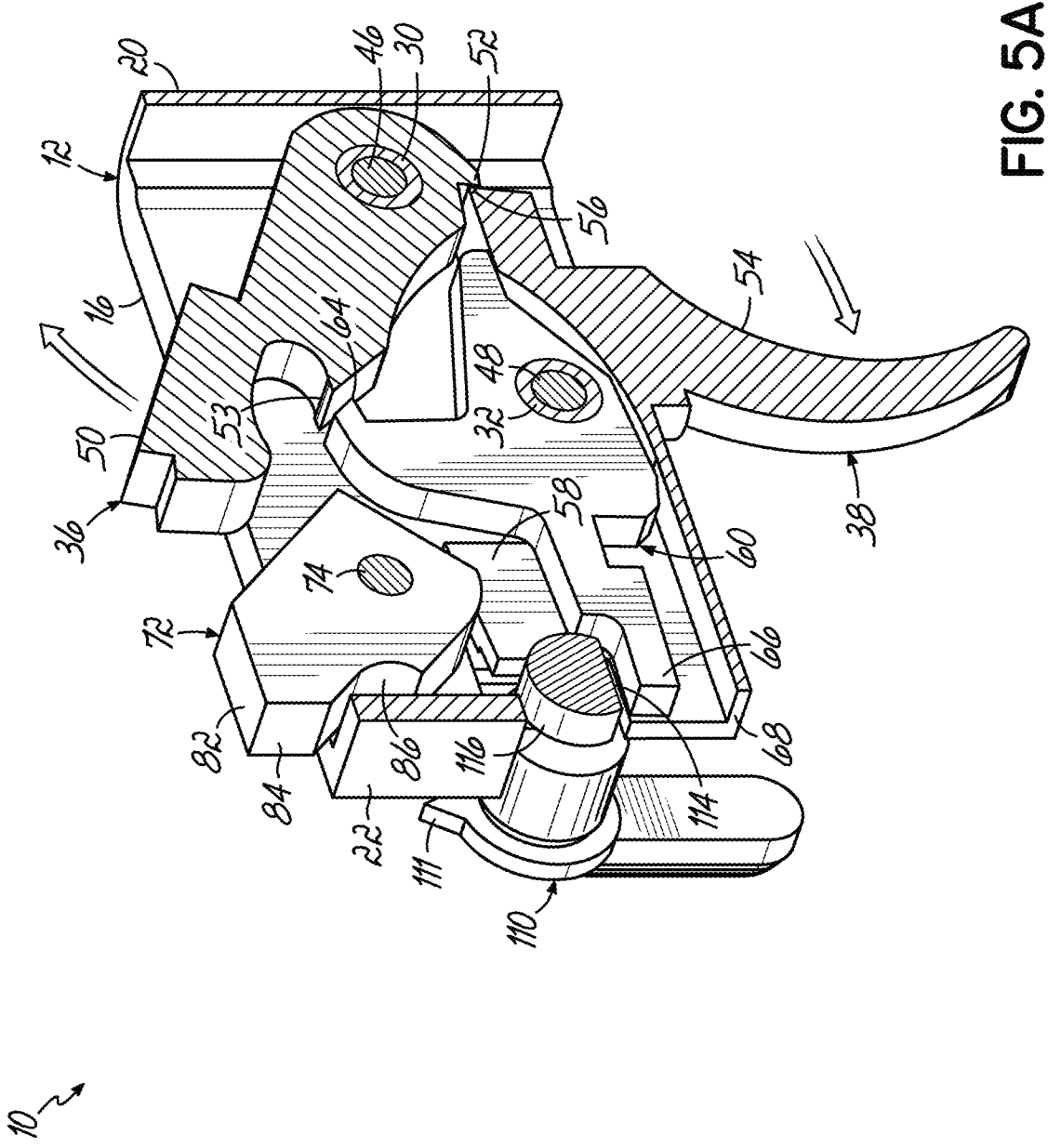
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FIG. 5A

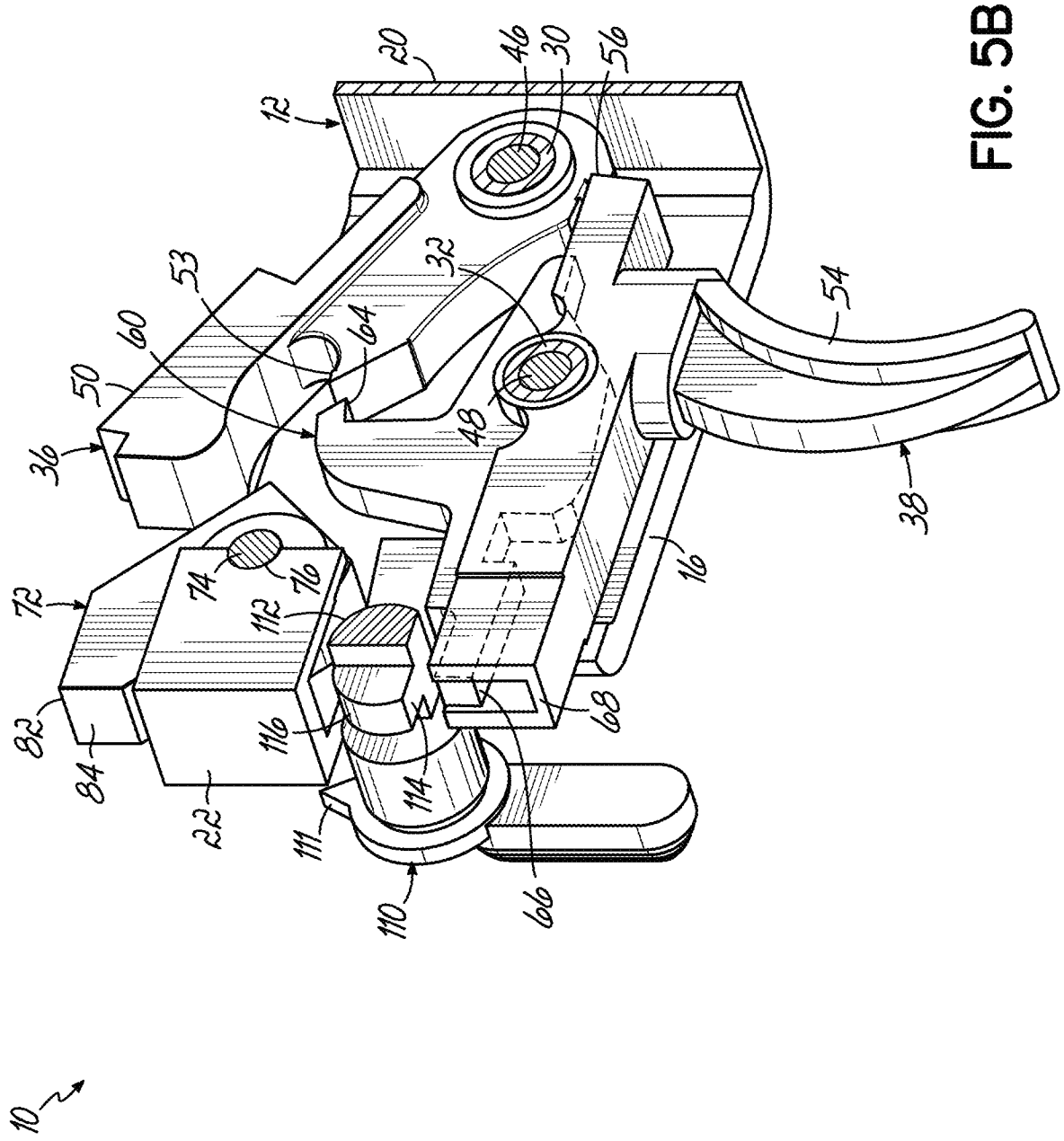
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FIG. 5B

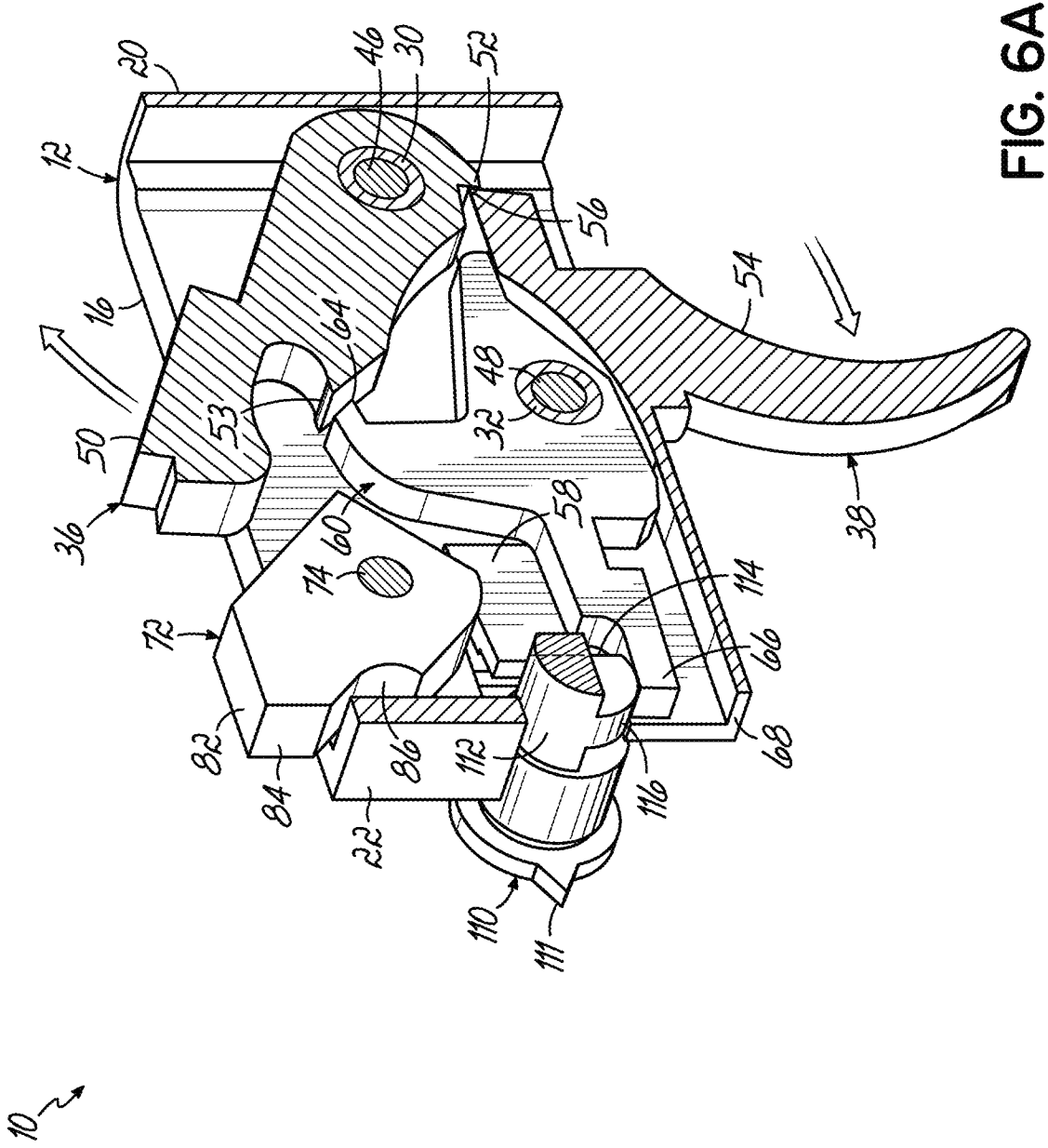
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FIG. 6A

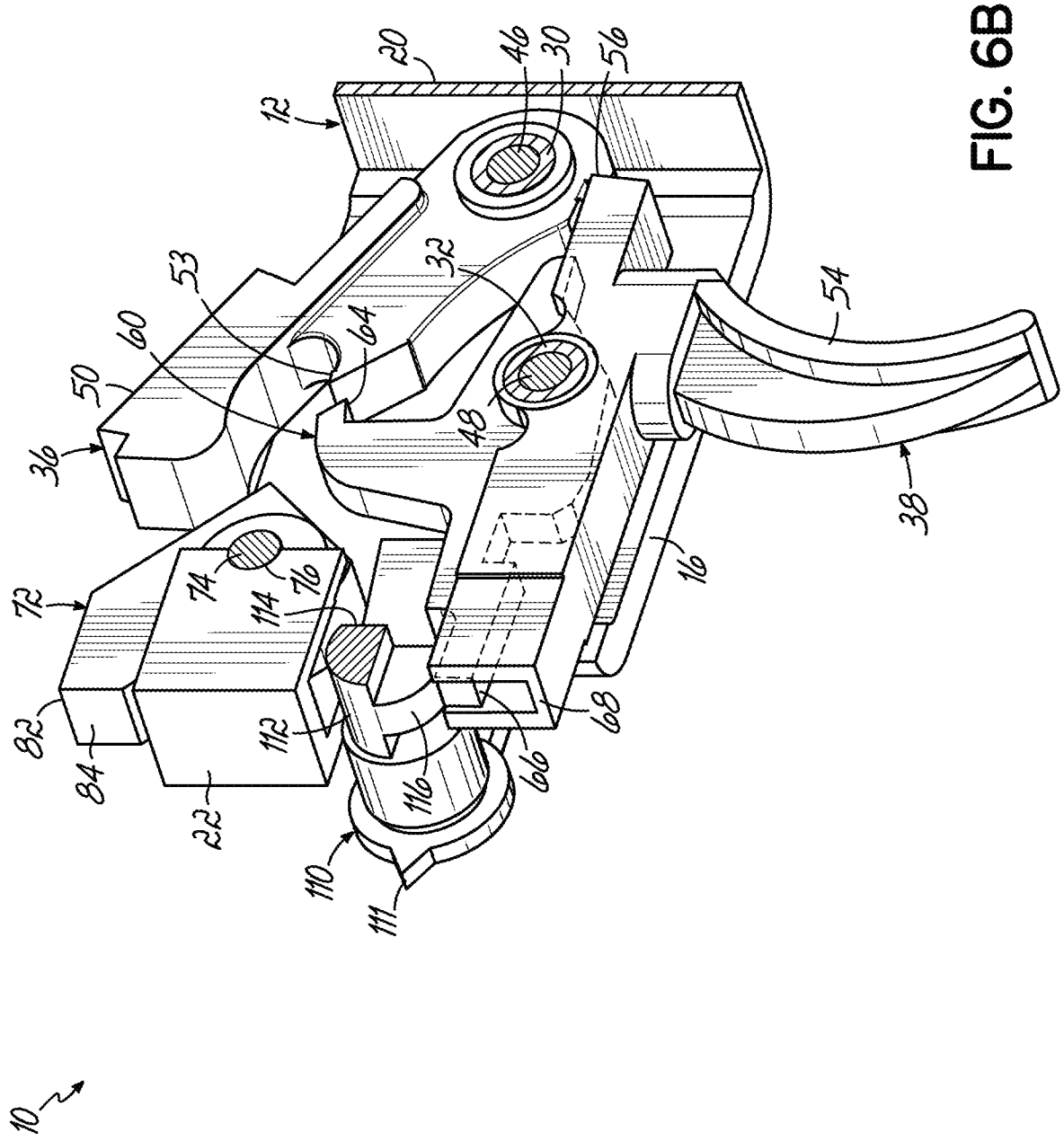
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FIG. 6B

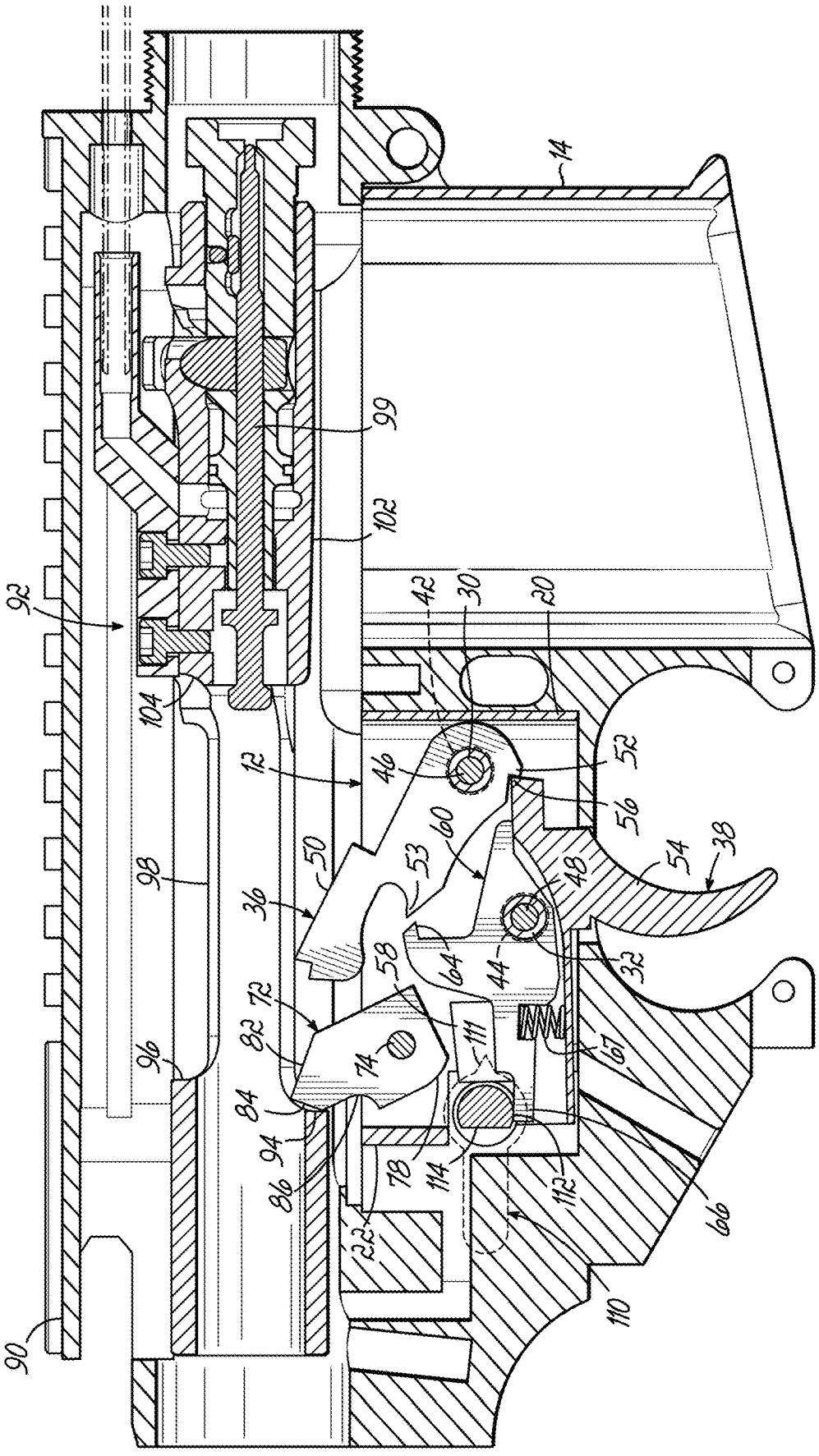
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FIG. 7

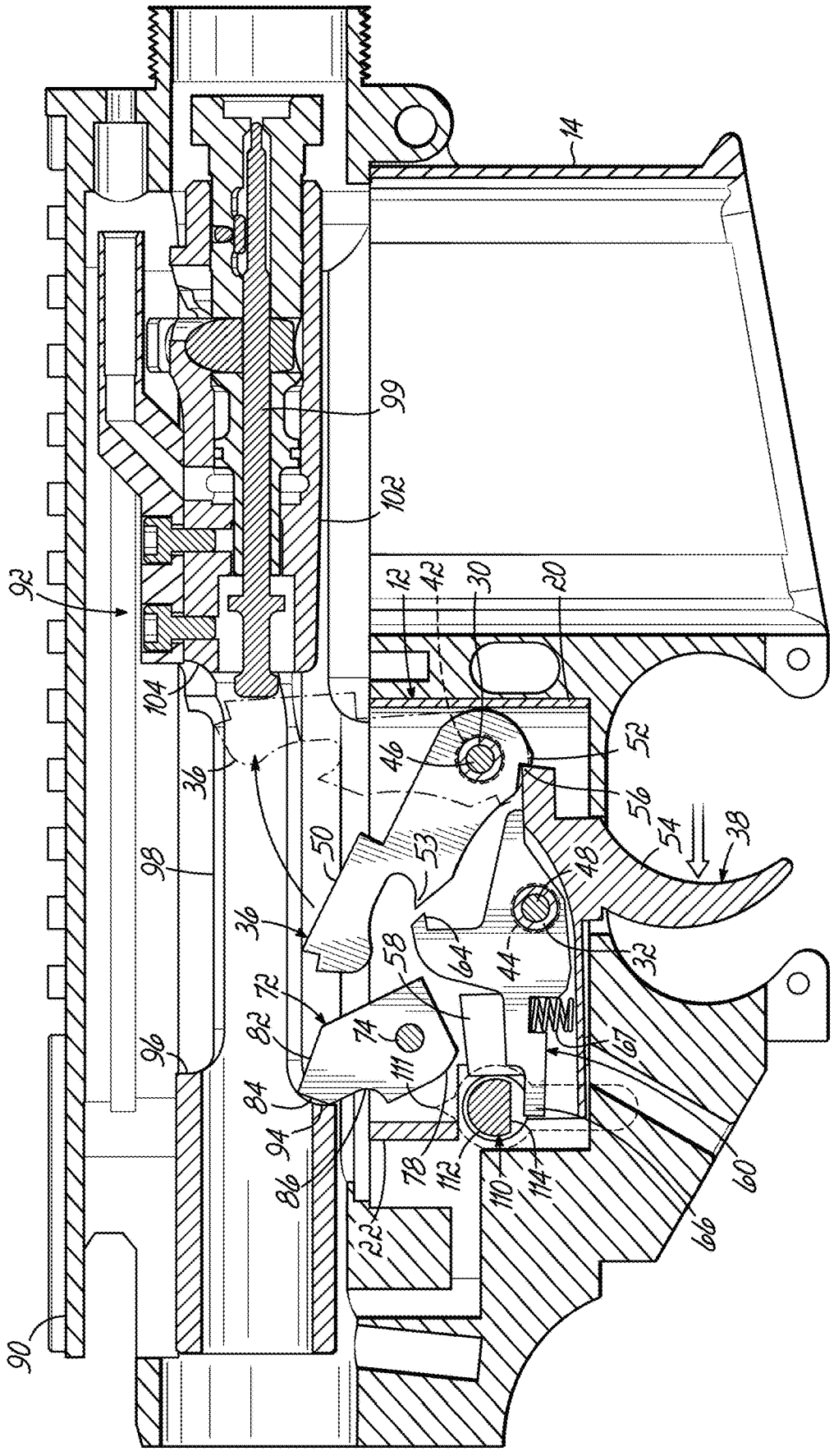
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FIG. 8A

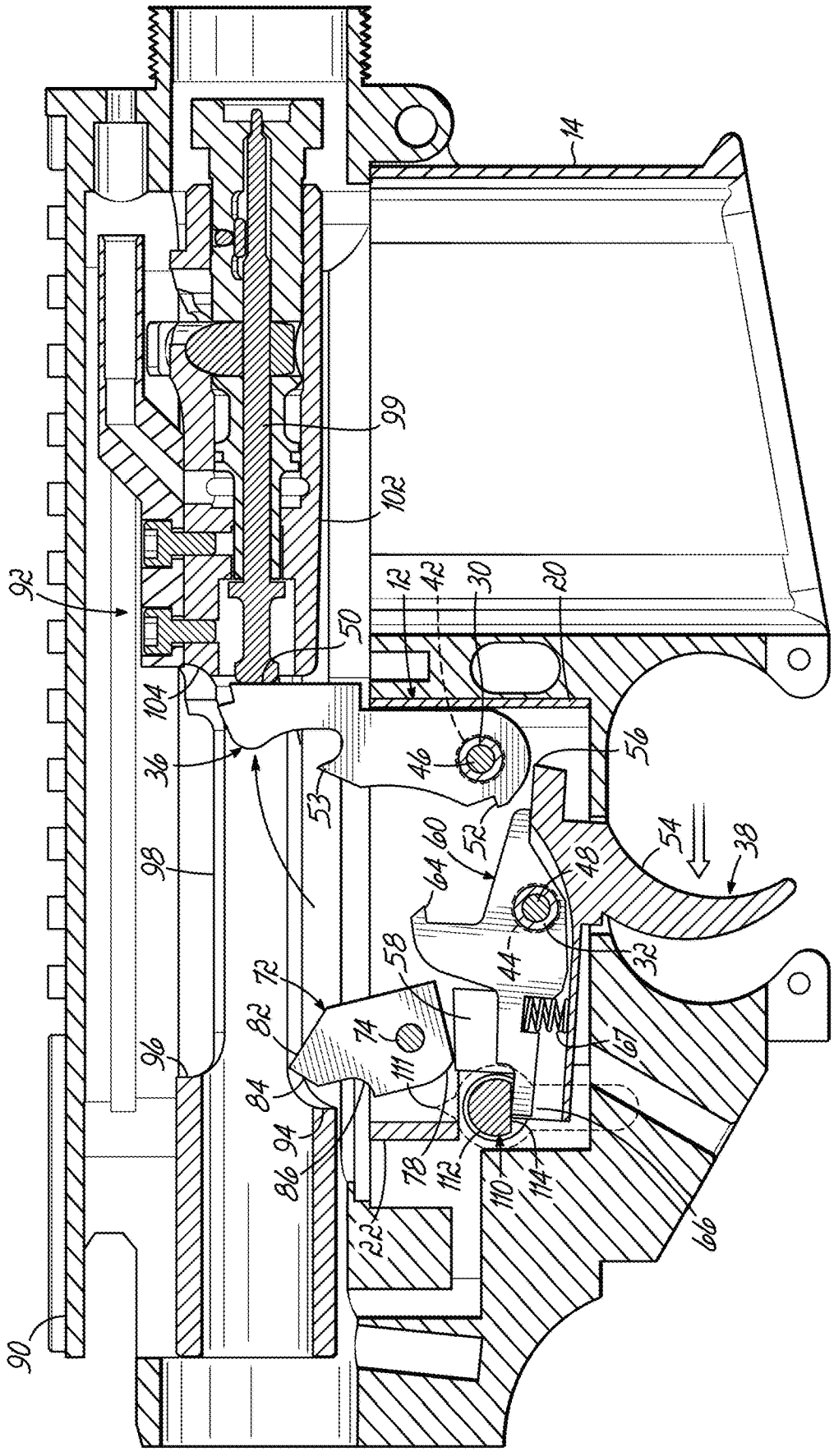
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FIG. 8B

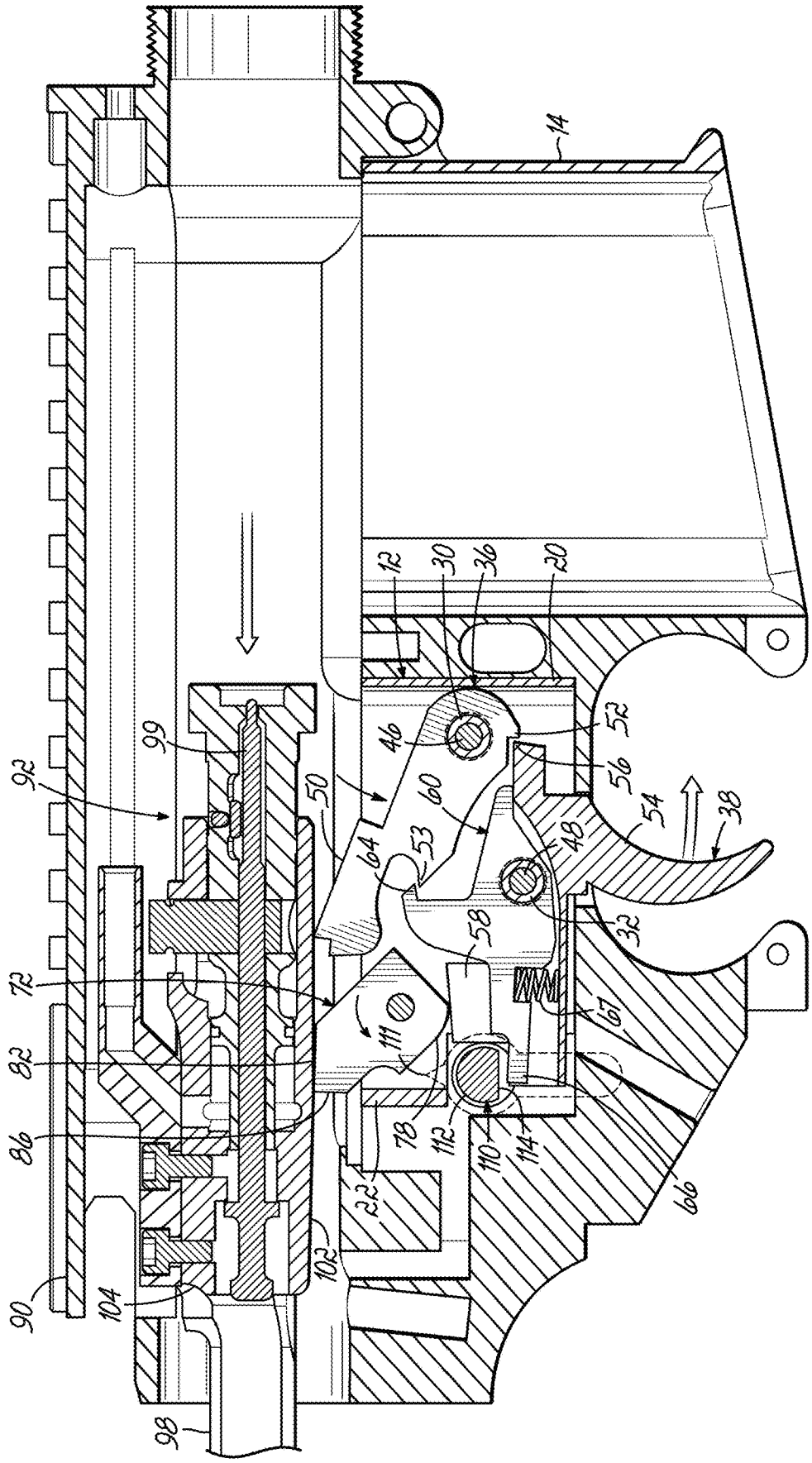
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FIG. 8C

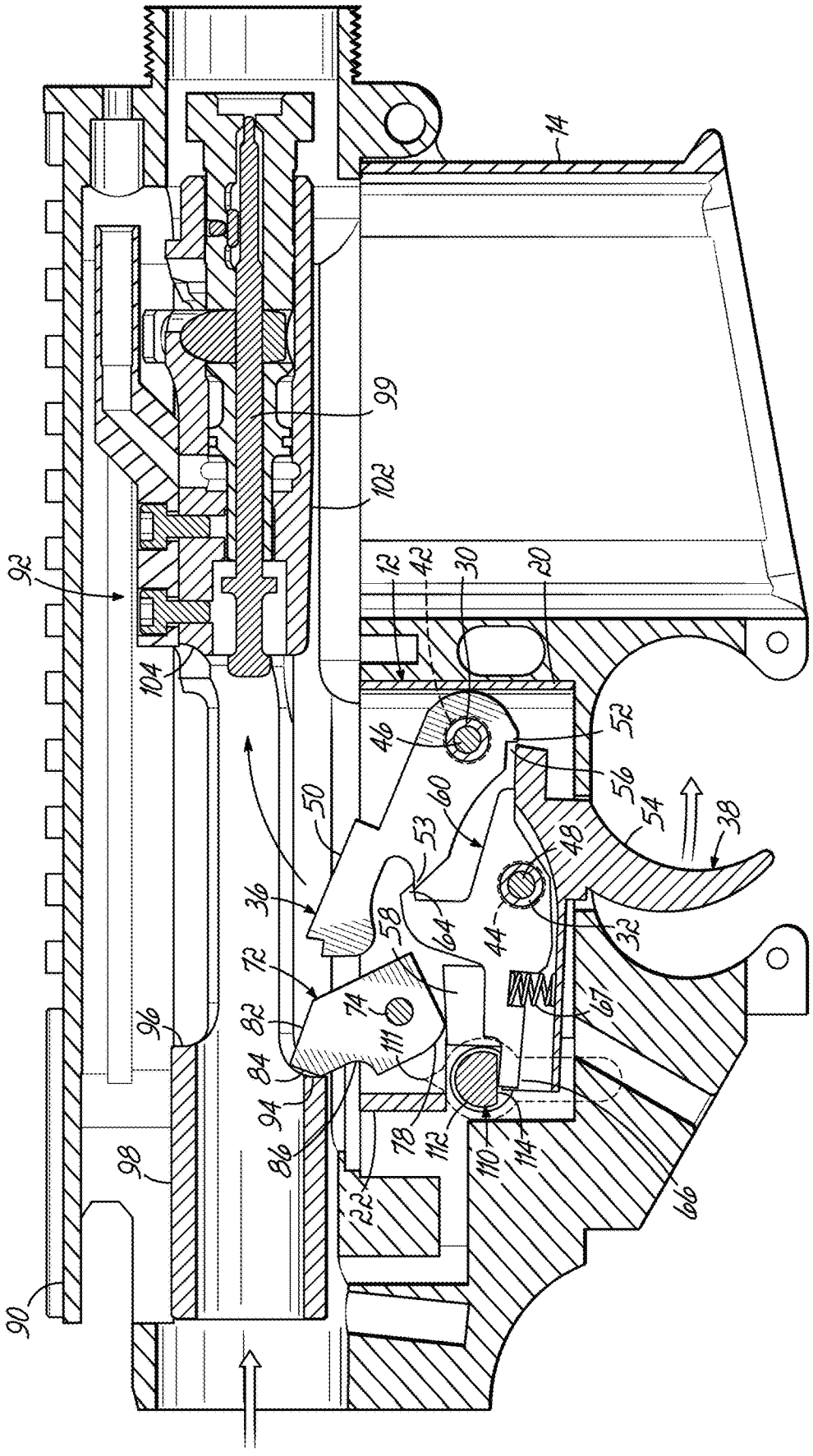
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FIG. 8D

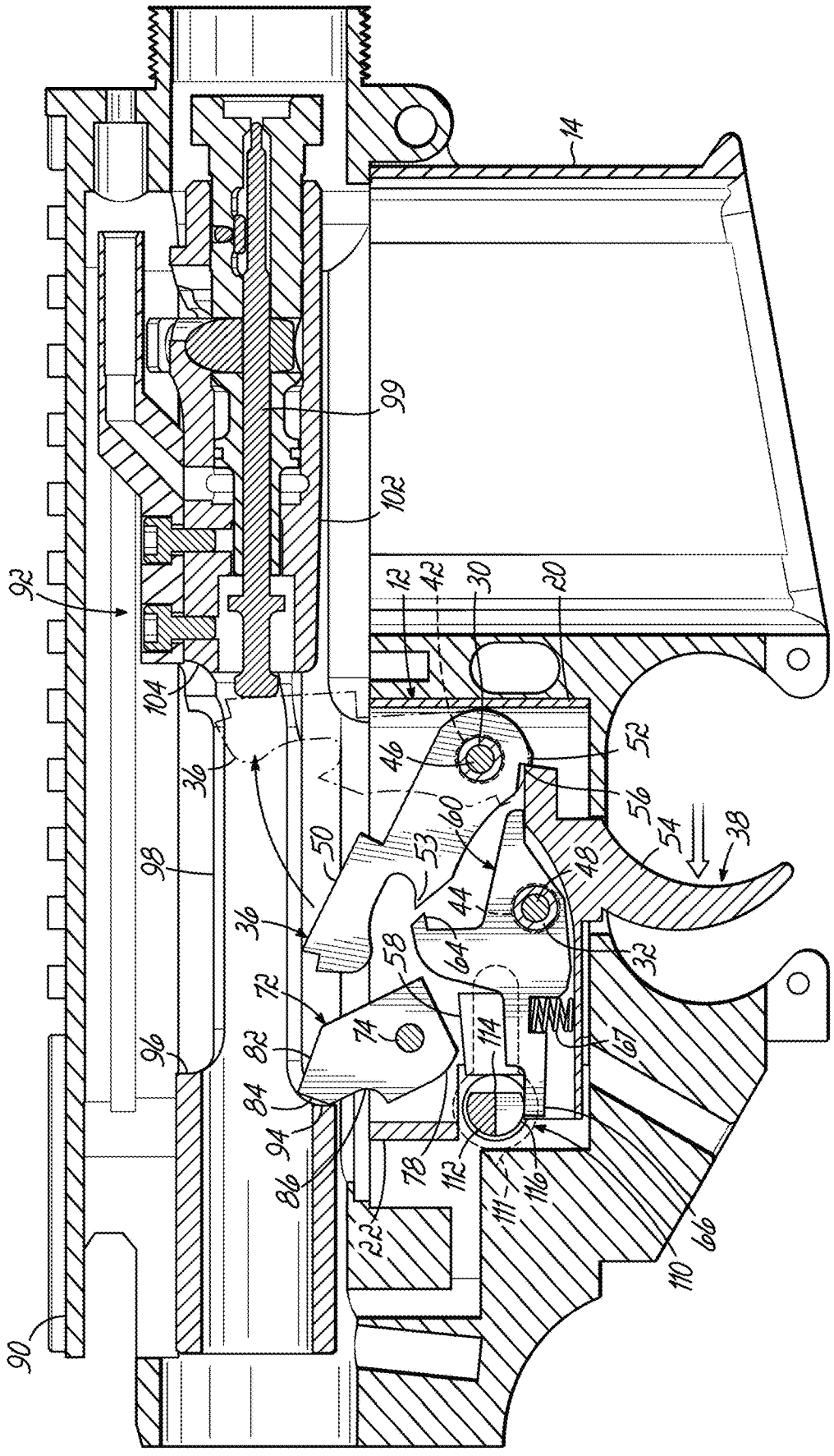
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FIG. 9A

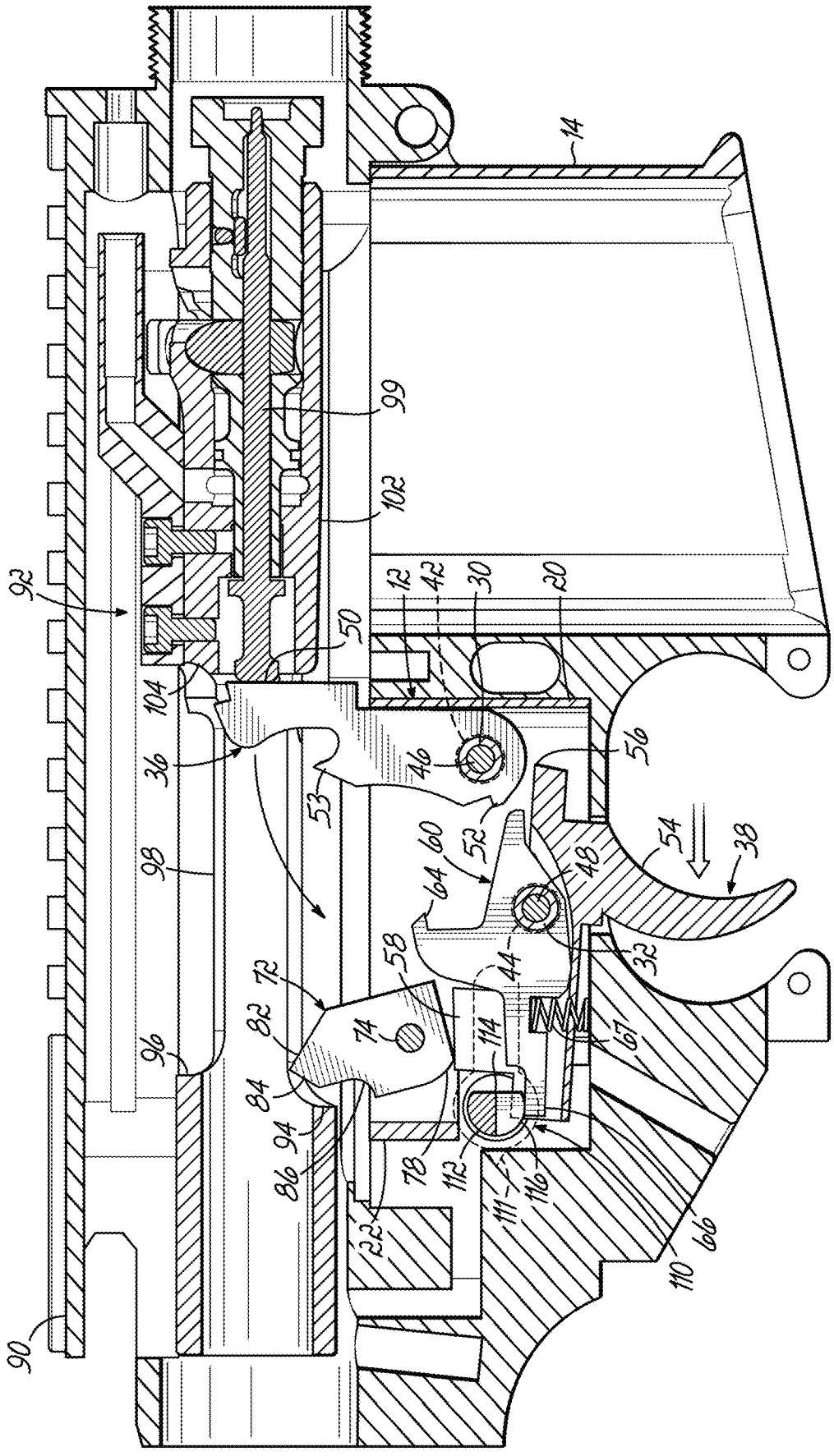
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FIG. 9B

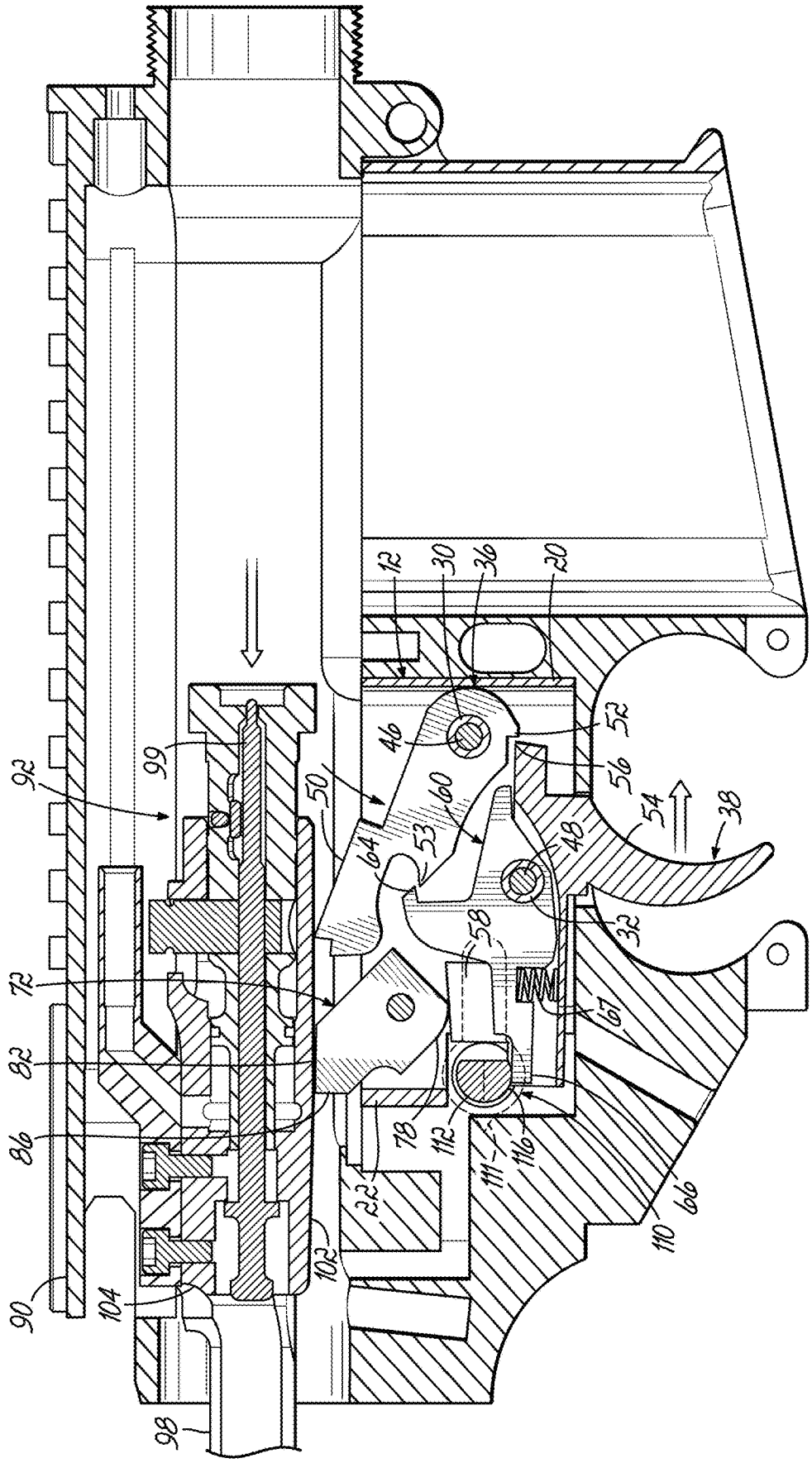
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FIG. 9C

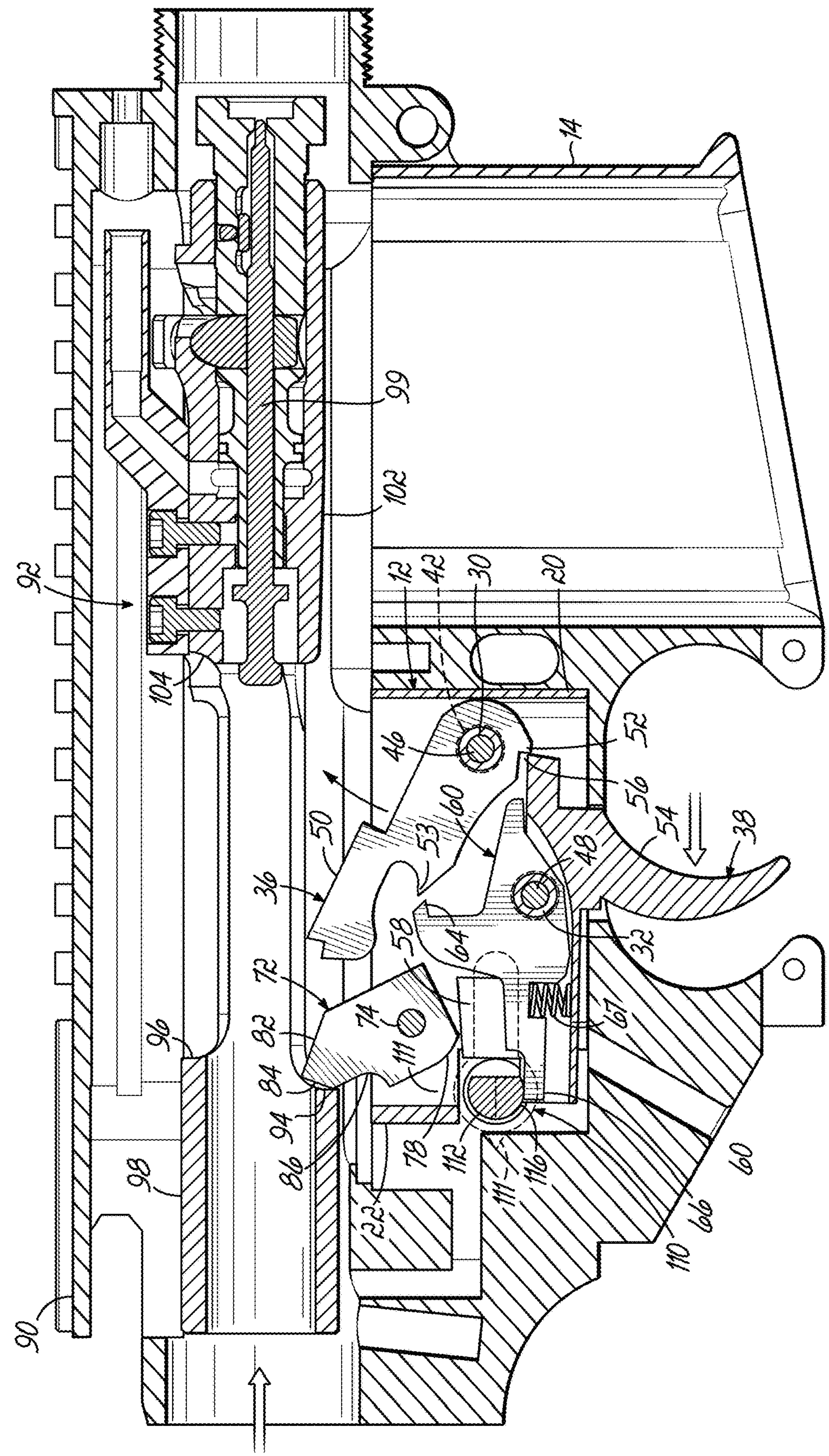
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FIG. 9D

FIREARM TRIGGER MECHANISM

RELATED APPLICATIONS

This application is a continuation application of U.S. patent application Ser. No. 18/325,225, filed May 30, 2023, and claims the priority benefit of US Provisional Ser. No. 63/374,941 filed Sep. 8, 2022, which are hereby incorporated by reference herein as if fully set forth in their entirety.

FIELD OF THE INVENTION

The present invention relates generally to a firearm trigger mechanism, and more particularly to a semiautomatic trigger that is selectively mechanically reset by movement of the bolt carrier.

BACKGROUND OF THE INVENTION

In a standard semiautomatic firearm, actuation of the trigger releases a sear, allowing a hammer or striker to fire a chambered ammunition cartridge. Part of the ammunition's propellant force is used to cycle the action, extracting and ejecting a spent cartridge and replacing it with a loaded cartridge. The cycle includes longitudinal reciprocation of a bolt and/or carrier, which also resets the hammer or striker.

A standard semiautomatic trigger mechanism includes a disconnector, which holds the hammer or striker in a cocked position until the trigger member is reset to engage the sear. This allows the firearm to be fired only a single time when the trigger is pulled and held, because the user is not typically able to release the trigger rapidly enough so that the sear engages before the bolt or bolt carrier returns to its in-battery position. The disconnector prevents the firearm from either firing multiple rounds on a single pull of the trigger, or from allowing the hammer or striker to simply "follow" the bolt as it returns to battery without firing a second round, but leaving the hammer or striker uncocked.

For various reasons, shooters desire to increase the rate of semiautomatic fire. Sometimes this is simply for entertainment and the feeling of shooting a machine gun. In the past, users have been known to employ "bump firing" to achieve rapid semiautomatic fire. Bump firing uses the recoil of the semiautomatic firearm to fire shots in rapid succession. The process involves bracing the rifle with the non-trigger hand, loosening the grip of the trigger hand (but leaving the trigger finger in its normal position in front of the trigger), and pushing the rifle forward in order to apply pressure on the trigger from the finger while keeping the trigger finger stationary. When fired with the trigger finger held stationary, the firearm will recoil to the rear and allow the trigger to reset as it normally does. When the non-trigger hand pulls the firearm away from the body and back forward toward the original position, it causes the trigger to be pressed against the stationary finger again, firing another round as the trigger is pushed back.

Devices for increasing the rate of semiautomatic fire are shown in U.S. Pat. Nos. 9,568,264, 9,816,772, and 9,939,221, issued to Thomas Allen Graves. The devices shown in these patents forcefully reset the trigger with rigid mechanical contact between the trigger member and the bolt as the action cycles. To adapt this invention to an AR-pattern firearm, for example, would require not only a modified fire control mechanism, but also a modified bolt carrier.

Other devices for increasing the rate of semiautomatic fire are shown in the assignee's U.S. Pat. Nos. 10,514,223 and 11,346,627 and U.S. patent application Ser. No. 18/048,572 filed Oct. 21, 2022, all of which are hereby incorporated by reference as if fully set forth in their entirety. In these devices the hammer forces the trigger to the set position, and a locking bar prevents early hammer release.

Another device for increasing the rate of semiautomatic fire is shown in U.S. Pat. No. 7,398,723, issued on Jul. 15, 2008, to Brian A. Blakley, and is hereby incorporated by reference herein as if fully set forth in its entirety. The device shown in this patent has a pivoting cam which is contacted by the rearwardly traveling bolt carrier, pivoting the cam rearwardly such that the bottom surface of the cam presses downward on the trigger-extension, forcing the rear of the trigger down, and thereby moving forward the surface of the trigger that an operator's finger engages.

Further improvement in forced reset triggers is desired.

SUMMARY OF INVENTION

The present invention provides a semiautomatic trigger mechanism for increasing rate of fire that can be retrofitted into popular existing firearm platforms. In particular, this invention provides a trigger mechanism that can be used in AR-pattern firearms with an otherwise standard M16-pattern bolt carrier assembly. Embodiments of the present invention are particularly adaptable for construction as a "drop-in" replacement trigger module that only requires insertion of two assembly pins and the safety selector. Advantageously, the present invention provides a "three position" trigger mechanism having safe, standard semi-automatic, and forced reset semi-automatic positions.

In one aspect, a firearm trigger mechanism comprises a housing adapted to be installed in a fire control mechanism pocket of a receiver and having a first pair of transversely aligned openings for receiving a hammer pin, a second pair of transversely aligned openings for receiving a trigger pin, and a third pair of transversely aligned openings for receiving a cam pin, a hammer having a sear catch and a hook for engaging a disconnector and mounted in the housing to pivot on the hammer pin between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of a bolt carrier, a trigger member having a sear and mounted in the housing to pivot on the trigger member pin between set and released positions, wherein the sear and sear catch are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member, a disconnector having a hook for engaging the hammer and mounted in the housing to pivot on the trigger member pin, a cam having a cam lobe and mounted in the housing to pivot on the cam pin, the cam being pivotable between a first position at which the cam lobe does not force the trigger member towards the set position and a second position at which the cam lobe does force the trigger member towards the set position, and a safety selector adapted to be mounted in the fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member towards the set position but prior to reaching the set position the disconnector hook catches the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time a user must manually release the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull

the trigger member to fire the firearm. In the forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time the user can pull the trigger member to fire the firearm without manually releasing the trigger member.

The safety selector can have a protuberance thereon which, when the safety selector is in the forced reset semi-automatic position, contacts the disconnector preventing the disconnector hook from catching the hammer hook. The trigger mechanism can further include a spring which biases the trigger member towards the set position.

In another aspect, a firearm trigger mechanism comprises a housing adapted to be installed in a fire control mechanism pocket of a receiver and having a first pair of transversely aligned openings for receiving a hammer pin, a second pair of transversely aligned openings for receiving a trigger pin, and a third pair of transversely aligned openings for receiving a cam pin, a hammer having a sear catch and a hook for engaging a disconnector and mounted in the housing to pivot on the hammer pin between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of a bolt carrier, a trigger member having a sear and mounted in the housing to pivot on the trigger member pin between set and released positions, wherein the sear and sear catch are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member, a disconnector having a hook for engaging the hammer and mounted in the housing to pivot on the trigger member pin, a cam having a cam lobe and mounted in the housing to pivot on the cam pin, the cam being pivotable between a first position at which the cam lobe does not force the trigger member towards the set position and a second position at which the cam lobe does force the trigger member towards the set position, and a safety selector adapted to be mounted in the fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member towards the set position but prior to reaching the set position the disconnector hook catches the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time a user must manually release the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm. In the forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time the user can pull the trigger member to fire the firearm without manually releasing the trigger member.

The safety selector can have a protuberance thereon which, when the safety selector is in the forced reset semi-automatic position, contacts the disconnector preventing the disconnector hook from catching the hammer hook. The first and second pairs of transversely aligned openings in the housing can be adapted to be aligned with first and second pairs of transversely aligned assembly pin openings in the fire control mechanism pocket. The trigger mechanism can include a spring which biases the trigger member towards the set position. The spring can be a torsion spring.

In another aspect, a firearm comprises a receiver having a fire control mechanism pocket therein, a reciprocating bolt carrier, a hammer having a sear catch and a hook for engaging a disconnector and mounted in the fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of the bolt carrier, a trigger member having a sear and mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions, wherein the sear and sear catch are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member, a disconnector having a hook for engaging the hammer and mounted in the fire control mechanism pocket to pivot on the transverse trigger member pivot axis, a cam having a cam lobe and mounted in the fire control mechanism pocket to pivot on a transverse cam pivot axis, the cam being pivotable between a first position at which the cam lobe does not force the trigger member towards the set position and a second position at which the cam lobe does force the trigger member towards the set position, and a safety selector mounted in the fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member towards the set position but prior to reaching the set position the disconnector hook catches the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time a user must manually release the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm. In the forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and pivoting of the cam from the first position to the second position such that the cam lobe forces the trigger member to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to pivot to the first position, at which time the user can pull the trigger member to fire the firearm without manually releasing the trigger member.

The firearm can further comprise a housing having a first pair of transversely aligned openings with a hammer pin therethrough and a second pair of transversely aligned openings with a trigger member pin therethrough, the hammer mounted on the hammer pin, the trigger member and disconnector mounted on the trigger member pin. The receiver can have a first pair of transversely aligned assembly pin openings and a second pair of transversely aligned assembly pin openings, the housing first pair of openings coaxial with the receiver first pair of openings and the housing second pair of openings coaxial with the receiver second pair of openings, a first assembly pin passing through the receiver first pair of openings and through the housing

first pair of openings, and a second assembly pin passing through the receiver second pair of openings and through the housing second pair of openings. The firearm can further comprise a spring which biases the trigger member towards the set position. The spring can be a torsion spring.

In another aspect, a firearm trigger mechanism comprises a hammer having a sear catch and a hook for engaging a disconnector and adapted to be mounted in a fire control mechanism pocket of a receiver to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of a bolt carrier, a trigger member having a sear and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions, wherein the sear and sear catch are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member, a disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on the transverse trigger member pivot axis, a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, the cam being movable between a first position at which the cam lobe does not force the trigger member towards the set position and a second position at which the cam lobe does force the trigger member towards the set position, and a safety selector adapted to be mounted in the fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and movement of the cam from the first position to the second position such that the cam lobe forces the trigger member towards the set position but prior to reaching the set position the disconnector hook catches the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to move to the first position, at which time a user must manually release the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm. In the forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer and movement of the cam from the first position to the second position such that the cam lobe forces the trigger member to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter forward movement of the bolt carrier causes the cam to move to the first position, at which time the user can pull the trigger member to fire the firearm without manually releasing the trigger member.

Other aspects, features, benefits, and advantages of the present invention will become apparent to a person of skill in the art from the detailed description of various embodiments with reference to the accompanying drawing figures, all of which comprise part of the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

Like reference numerals are used to indicate like parts throughout the various drawing figures, wherein:

FIG. **1** is a top front right perspective view of a drop-in trigger module for an AR-pattern firearm according to one embodiment of the invention.

FIG. **2** is a top rear right perspective view thereof.

FIG. **3** is a top rear right exploded perspective view thereof.

FIG. **4**A is a top rear right cross-sectional view thereof with the safety selector in the safe position and with the hammer and trigger member in their set postions.

FIG. **4**B is a bottom rear right cross-sectional view thereof with the safety selector in the safe position and with the hammer and trigger member in their set positions.

FIG. **5**A is a top rear right cross-sectional view thereof with the safety selector in the standard semi-automatic position and with the hammer and trigger member in their set positions.

FIG. **5**B is a bottom rear right cross-sectional view thereof with the safety selector in the standard semi-automatic position and with the hammer and trigger member in their set positions.

FIG. **6**A is a top rear right cross-sectional view thereof with the safety selector in the forced reset semi-automatic position and with the hammer and trigger member in their set positions.

FIG. **6**B is a bottom rear right cross-sectional view thereof with the safety selector in the forced reset semi-automatic position and with the hammer and trigger member in their set positions.

FIG. **7** is a cross-sectional view showing the trigger module installed in a typical AR15-pattern lower receiver, with the hammer and trigger member in their set positions and with the bolt carrier in an in-battery position, and with the safety selector in the safe position.

FIG. **8**A is a view similar to FIG. **7** but with the safety selector in the standard semi-automatic position.

FIG. **8**B is a view similar to FIG. **8**A but after the trigger has been pulled to drop the hammer.

FIG. **8**C is a view similar to FIG. **8**B but with the bolt carrier cycling to the rear to pivot the hammer and cam.

FIG. **8**D is a view similar to FIG. **8**C but with the bolt carrier having returned to battery and the disconnector having caught the hammer.

FIG. **9**A is a view similar to FIG. **7** but with the safety selector in the forced reset semi-automatic position.

FIG. **9**B is a view similar to FIG. **9**A but after the trigger has been pulled to drop the hammer.

FIG. **9**C is a view similar to FIG. **9**B but with the bolt carrier cycling to the rear to pivot the hammer and cam.

FIG. **9**D is a view similar to FIG. **9**C but with the bolt carrier having returned to battery and the hammer and trigger having returned to their set positions.

DETAILED DESCRIPTION OF THE DRAWINGS

With reference to the drawing figures, this section describes particular embodiments and their detailed construction and operation. Throughout the specification, reference to "one embodiment," "an embodiment," or "some embodiments" means that a particular described feature, structure, or characteristic may be included in at least one embodiment. Thus, appearances of the phrases "in one embodiment," "in an embodiment," or "in some embodiments" in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the described features, structures, and characteristics may be combined in any suitable manner in one or more embodiments. In view of the disclosure herein, those skilled in the art will recognize that the various embodiments can be practiced without one or more of the specific details or with other methods, components, materials, or the like. In some instances, well-known structures, materials, or operations are not shown or not described in detail to avoid obscuring aspects of the embodiments. "Forward" will indi-

cate the direction of the muzzle and the direction in which projectiles are fired, while "rearward" will indicate the opposite direction. "Lateral" or "transverse" indicates a side-to-side direction generally perpendicular to the axis of the barrel. Although firearms may be used in any orientation, "left" and "right" will generally indicate the sides according to the user's orientation, "top" or "up" will be the upward direction when the firearm is gripped in the ordinary manner. QAs used herein, "transverse" means a side-to-side direction generally perpendicular to the longitudinal axis of the barrel.

Referring first to FIGS. **1**-**6**B, there is illustrated a "drop-in" trigger module **10** adapted for use in an AR-pattern firearm according to a first embodiment of the present invention. As used herein, "AR-pattern" firearm includes the semiautomatic versions of the AR10 and AR15 firearms and variants thereof of any caliber, including pistol caliber carbines or pistols using a blow-back bolt. While select fire (fully automatic capable) versions of this platform, such as the M16 and M4, are also AR-pattern firearms, this invention only relates to semiautomatic firearm actions. The concepts of this invention may be adaptable to other popular semiautomatic firearm platforms, such as the Ruger 10/22™, AK-pattern firearms, and HK-pattern firearms.

The module **10** includes a frame or housing **12** sized and shaped to fit within the internal fire control pocket of an AR-pattern lower receiver **14**. Lower receiver parts not important to the present invention are well-known in the art and are omitted from the figures for clarity. The housing **12** includes left and right sidewalls **16**, **18** which extend substantially vertically and parallel to one another in a laterally spaced-apart relationship. The sidewalls **16**, **18** may be interconnected by front and rear sidewalls **20**, **22**. The sidewalls **16**, **18** include first and second pairs of aligned openings **24**, **26** for receiving hollow transverse pins **30**, **32** upon which a hammer **36** and trigger member **38** pivot. The openings **24**, **26** are located coaxially with openings **42**, **44** in the lower receiver **14**. Standard AR-pattern hammer and trigger pins **46**, **48** pass through the openings **42**, **44** in the lower receiver **14** and through the hollow transverse pins **30**, **32** to assemble the housing **12** into the lower receiver **14**. Thus, the pins **30**, **32** retain the hammer **36** and trigger member **38** in the housing **12** in modular fashion, whereas the pins **46**, **48** retain the trigger module **10** in the lower receiver **14**.

The hammer **36** has a hammer head **50**, a sear catch **52**, and a hammer hook **53**. The hammer **36** is spring biased towards a forward position by a standard AR-pattern hammer torsion spring (not shown).

The trigger member **38** has a trigger blade **54** that extends downwardly. The trigger blade **54** is the part of the trigger member **38** contacted by a user's finger to actuate the trigger mechanism. The trigger blade **54** may be curved (as shown) or straight, as desired. The trigger member **38** has a sear **56**. When the sear **56** and the sear catch **52** are engaged, the hammer **36** and trigger member **38** are in their set positions. When the sear **56** and sear catch **52** are not engaged, the hammer **36** and trigger member **38** are in their released positions. The trigger member **38** also has a cam follower **58**. The trigger member **38** is spring biased by a standard AR-pattern trigger member torsion spring (not shown) so that the trigger blade **54** is spring biased towards a forward position.

A disconnector **60** is pivoted on the hollow transverse pin **32** upon which the trigger member **38** pivots. The disconnector **60** has a disconnector hook **64** and a tail **66**. The tail **66** of the disconnector **60** is spring biased upwardly away from a tail **68** of the trigger member **38** by a standard AR-pattern disconnector compression spring **67**.

A cam **72** is movably mounted to the housing **12**. For example, the cam **72** can be pivoted on a cam pin **74** that is installed in aligned openings **76** in the sidewalls **16**, **18** of the housing **12**. The cam **72** has a cam lobe **78** that interacts with the cam follower **58**, in a manner to be described below. The cam **72** has a first contact surface **82** on an upper forward portion thereof and a second contact surface **84** on an upper rearward portion thereof. The cam **72** has a notch **86** below the second contact surface **84** to provide clearance for the rear wall **22** of the housing **12**. Alternatively, the cam **72** can be slidably mounted to the housing **12** with or without spring bias.

An upper receiver **90** houses a bolt carrier assembly **92**. As is well-known in the art, the bolt carrier assembly **92** (or blow-back bolt) slidably reciprocates in the upper receiver **90** and engages the breach of a barrel or barrel extension. As used herein, "bolt carrier" and "bolt carrier assembly" may be used interchangeably and include a blow-back type bolt used in pistol caliber carbine configurations of the AR-platform. The bolt carrier assembly **92** used with the embodiments of this invention can have either a standard mil-spec M16-pattern bolt carrier, a standard AR15-pattern bolt carrier, or some variation of the two, depending on the design of the cam **72**, and whether operated by a gas direct impingement system or a gas piston system. The bolt carrier assembly **92** has an engagement surface **94** in a rear portion **96** of the bolt carrier body **98**. As in an ordinary AR15-pattern configuration, during rearward travel of the bolt carrier assembly **92** a lower surface **102** in a forward portion **104** of the bolt carrier body **98** contacts the face of the hammer head **50** causing the hammer **36** to pivot rearward. During further rearward travel of bolt carrier assembly **92** the lower surface **102** of the bolt carrier body **98** contacts the surface **82** of the cam **72** to the pivot cam **72** in a first direction from a first position to a second position. During forward travel of the bolt carrier assembly **92** the engagement surface **94** of the bolt carrier body **98** contacts the surface **84** of the cam **72** to pivot the cam **72** in a second opposite direction from the second position to the first position.

A three position safety selector **110** has safe, standard semi-automatic, and forced reset semi-automatic positions. When in the safe position (safety selector indicator **111** pointing forward), a wide semi-circular portion **112** of the safety selector **110** prevents the trigger blade **54** from being pulled (FIGS. **4**A, **4**B, and **7**). When in the standard semi-automatic position (safety selector indicator **111** pointing upward), a flat portion **114** of the safety selector **110** permits the trigger blade **54** to be pulled. The disconnector **60** can pivot with the trigger member **38** and the disconnector hook **64** can catch the hammer hook **53** during rearward pivoting travel of the hammer head **50**. (FIGS. **5**A and **5**B). When in the forced reset semi-automatic position (safety selector indicator **111** pointing rearward), a narrow semi-circular portion **116** permits the trigger blade **54** to be pulled but prevents the disconnector **60** from pivoting with the trigger member **38** thus preventing the disconnector hook **64** from catching the hammer hook **53** during rearward pivoting travel of the hammer head **50**. (FIGS. **6**A and **6**B). In other words, in the forced reset semi-automatic position, the disconnector **60** is "disabled" in that the disconnector hook **64** is unable to catch the hammer hook **53** during cycling of the bolt carrier assembly **92**.

Referring now to FIGS. **8**A-**8**D, with the safety selector **110** set in the standard semi-automatic position, rearward

finger pressure on the trigger blade **54** causes the trigger member **38** to rotate clockwise. Depending on the position of the cam **72**, the cam follower **58** may or may not act upon the cam lobe **78** to pivot the cam **72** clockwise. Rotation of the trigger member **38** causes the sear **56** to disengage from the sear catch **52** of the hammer **36**. This allows the hammer **36** to drop by spring force onto the firing pin **99** of the bolt carrier assembly **92**, discharging an ammunition cartridge (not shown), and causing the action to cycle by moving the bolt carrier assembly **92** rearward. Rearward travel of the bolt carrier assembly **92** causes the lower surface **102** to contact the face of the hammer head **50** and pivot the hammer **36** counter-clockwise. During pivoting travel of the hammer **36** the disconnector hook **64** catches the hammer hook **53**. During further rearward travel of the bolt carrier assembly **92** the lower surface **102** contacts the surface **82** of the cam **72** to pivot the cam **72** counter-clockwise. As the cam **72** pivots counter-clockwise, the cam lobe **78** may acts upon the cam follower **58** to pivot the trigger member **38** counter-clockwise. Forward travel of the bolt carrier assembly **92** returning to battery causes the surface **94** to contact the surface **84** of the cam **72** to pivot the cam **72** clockwise. At this point rearward finger pressure on the trigger blade **54** must be released to allow the sear **56** to engage the sear catch **52**, returning the hammer **36** and trigger member **38** to their set positions. Thereafter the user can reapply rearward finger pressure on the trigger blade **54** to fire another round.

Referring now to FIGS. **9**A-**9**D, with the safety selector **110** set in the forced reset semi-automatic position, rearward finger pressure on the trigger blade **54** causes the trigger member **38** to rotate clockwise. The narrow semi-circular portion **116** of the safety selector **110** prevents the disconnector **60** from rotating with the trigger member **38**, thus "disabling" the disconnector **60**, preventing the disconnector hook **64** from catching the hammer hook **53**. Depending on the position of the cam **72**, the cam follower **58** may or may not act upon the cam lobe **78** to pivot the cam **72** clockwise. Rotation of the trigger member **38** causes the sear **56** to disengage from the sear catch **52** of the hammer **36**. This allows the hammer **36** to drop by spring force onto the firing pin **99** of the bolt carrier assembly **92**, discharging an ammunition cartridge, and causing the action to cycle by moving the bolt carrier assembly **92** rearward. Rearward travel of the bolt carrier assembly **92** causes the lower surface **102** to contact the face of the hammer head **50** and pivot the hammer **36** counter-clockwise. During further rearward travel of the bolt carrier assembly **92** the lower surface **102** contacts the surface **82** of the cam **72** to pivot the cam **72** counter-clockwise. As the cam **72** pivots counter-clockwise, the cam lobe **78** acts upon the cam follower **58** to the pivot trigger member **38** counter-clockwise. The bolt carrier assembly **92** thereby forces the hammer **36** and trigger member **38** to their set positions wherein the sear **56** engages the sear catch **52**. Forward travel of the bolt carrier assembly **92** returning to battery causes the surface **94** to contact the surface **84** of the cam **72** to pivot the cam **72** clockwise. At this point the user can reapply rearward finger pressure on the trigger blade **54** to fire another round, without first manually releasing rear finger pressure on the trigger blade **54**.

Thus, as the bolt carrier assembly **92** returns forward, the trigger member **38** is held in its set position by cam **72**. The trigger member **38** cannot be pulled to release the sear/sear catch engagement, thus precluding early hammer release or "hammer follow" against the bolt carrier assembly **92** and firing pin **99** as the bolt carrier assembly **92** is returning to battery. When the bolt carrier assembly **92** has reached (or nearly reached) its closed, in-battery position, the engagement surface **94** contacts and forwardly displaces the contact surface **84** of cam **72**, disengaging the cam lobe **78** from the cam follower **58**, allowing the trigger blade **54** to be pulled. Again, this prevents early hammer release and contact of the hammer against the firing pin before the bolt is completely locked and in-battery.

While various embodiments of the present invention have been described in detail, it should be apparent that modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention. Therefore, the foregoing is intended only to be illustrative of the principles of the invention. The invention resides in each individual feature described herein, alone, and in any and all combinations and subcombinations of any and all of those features. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not intended to limit the invention to the exact construction and operation shown and described. Accordingly, all suitable modifications and equivalents may be included and considered to fall within the scope of the invention, defined by the following claim or claims.

What is claimed is:

1. A firearm trigger mechanism for a firearm having a fire control mechanism pocket and a reciprocating bolt means, the trigger mechanism operable in a first, standard semi-automatic mode and in a second, forced reset semi-automatic mode, the mechanism comprising:

a hammer having a hammer sear surface and a hook for engaging a disconnector and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of the bolt means,

a trigger member having a trigger sear surface and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions,

wherein the trigger member sear surface and hammer sear catch surface are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member,

the disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis, and

a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, the cam being movable between a first position and a second position, in the second position the cam lobe forces the trigger member toward the set position,

whereupon in the first mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm, and

whereupon in the second mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the user can pull the trigger member to fire the firearm.

2. The trigger mechanism of claim 1, further comprising:

a housing having a first pair of transversely aligned openings with a hammer pin therethrough and a second pair of transversely aligned openings with a trigger member pin therethrough,

the hammer mounted on the hammer pin, the trigger member and disconnector mounted on the trigger member pin.

3. The trigger mechanism of claim 1, further comprising a spring which biases the trigger member toward the set position.

4. The trigger mechanism of claim 3, wherein the spring is a torsion spring.

5. The trigger mechanism of claim 1, wherein the trigger member pivot axis and disconnector pivot axis are coaxial.

6. A firearm trigger mechanism for a firearm having a fire control mechanism pocket and a reciprocating bolt means, the trigger mechanism operable in a first, standard semi-automatic mode and in a second, forced reset semi-automatic mode, the mechanism comprising:

a hammer having a sear surface and a hook for engaging a disconnector and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of the bolt means,

a trigger member having a sear surface and adapted to be mounted in the fire control mechanism pocket to move between set and released positions,

wherein the hammer sear surface and trigger member sear surface are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member,

the disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis, and

a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, the cam being movable between a first position and a second position, in the second position the cam prevents the trigger member from moving from the set position to the released position,

whereupon in the first mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to move to the set positions so that the user can pull the trigger member to fire the firearm again, and

whereupon in the second mode, rearward movement of the bolt means causes rearward pivoting of the hammer, movement of the trigger member to the set position, and the disconnector hook is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the cam is moved to the first position, allowing the user to pull the trigger member to fire the firearm.

7. The trigger mechanism of claim 6, further comprising a spring which biases the trigger member toward the set position.

8. The trigger mechanism of claim 7, wherein the spring is a torsion spring.

9. The trigger mechanism of claim 6, wherein the trigger member pivots on a transverse trigger axis between set and released positions.

10. A firearm trigger mechanism for a firearm having a fire control mechanism pocket and a reciprocating bolt means, the trigger mechanism operable in a first, standard semi-automatic mode and in a second, forced reset semi-automatic mode, the mechanism comprising:

a hammer having a sear surface and a hook for engaging a disconnector and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of the bolt means,

a trigger member having a sear surface and adapted to be mounted in the fire control mechanism pocket to move between set and released positions,

wherein the hammer sear surface and trigger member sear surface are in engagement in the set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member,

the disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis, and

a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, the cam being movable between a first position and a second position, movement of the cam to the second position causing the trigger member to move from the released position toward the set position,

whereupon in the first mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to move to the set positions so that the user can pull the trigger member to fire the firearm again, and

whereupon in the second mode, rearward movement of the bolt means causes rearward pivoting of the hammer and causes movement of the trigger member to the set position, and wherein the disconnector hook is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the cam is moved to the first position and the user can pull the trigger member to fire the firearm again.

11. The trigger mechanism of claim 10, further comprising a spring which biases the trigger member toward the set position.

12. The trigger mechanism of claim 11, wherein the spring is a torsion spring.

13. The trigger mechanism of claim 10, wherein the trigger member pivots on a transverse trigger axis between set and released positions.

14. A firearm trigger mechanism comprising: a hammer having a sear surface and a hook for engaging a disconnector and adapted to be mounted in a fire control mechanism pocket of a receiver to move between set and released positions, the hammer adapted to be moved to the set position by rearward movement of a bolt means, a trigger member having a sear surface and adapted to be mounted in the fire control mechanism pocket to move between set and released positions, wherein the hammer sear surface and trigger member sear surface are in position to engage in the

set positions of the hammer and trigger member and are out of engagement in the released positions of the hammer and trigger member, the disconnector having a hook for engaging the hammer, and a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, the cam being movable between a first position and a second position, in the second position the cam lobe forces the trigger member toward the set position, when in a standard semi-automatic mode, rearward movement of the bolt carrier causes movement of the hammer such that the disconnector hook catches the hammer hook, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer sear surface and trigger member sear surface to move into engagement so that the user can pull the trigger member to fire the firearm, and when in a forced reset semi-automatic mode, rearward movement of the bolt means causes movement of the hammer and the disconnector hook is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the user can pull the trigger member to fire the firearm.

15. A firearm trigger mechanism comprising:

a hammer having a sear surface and a hook means for engaging a disconnector and adapted to move between set and released positions, the hammer adapted to be moved to the set position by rearward movement of a bolt means,

a trigger means having a sear surface and adapted to move between set and released positions,

wherein the hammer sear surface and trigger means sear surface are positioned to engage when the hammer and trigger means are in their set positions and are out of engagement in the hammer and trigger means are in their released positions,

the disconnector having a disconnector hook means for engaging the hammer hook means,

a cam adapted to be movable between a first position at which the cam does not force the trigger member into the set position and a second position at which the cam does force the trigger member toward the set position, and

a means for selecting between at least standard semi-automatic and forced reset semi-automatic modes,

when in the standard semi-automatic position, rearward movement of the bolt means causes movement of the hammer such that the disconnector hook means catches the hammer hook means, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger means to free the hammer from the disconnector to permit the hammer and trigger means to move to the set positions so that the user can pull the trigger means to fire the firearm, and

when in the forced reset semi-automatic position, rearward movement of the bolt means causes movement of the hammer, the disconnector is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the user can pull the trigger means to fire the firearm.

16. A firearm trigger mechanism comprising:

a hammer having a sear engagement surface and a hook means for engaging a disconnector and adapted to move between set and released positions, the hammer adapted to be moved to the set position by rearward movement of a bolt means,

a trigger means having a sear engagement surface and adapted to move between set and released positions,

wherein the trigger means and hammer sear engagement surfaces are in position to engage in the set positions of the hammer and trigger means and will not engage in the released positions of the hammer and trigger means,

the disconnector having a hook means for engaging the hammer hook means, and

a cam movable between a first position and a second position, in the second position the cam forces the trigger member toward the set position,

when in a standard semi-automatic mode, rearward movement of the bolt means causes movement of the hammer and the disconnector hook means catches the hammer hook means, and thereafter the bolt means moves forward into battery, at which time a user must manually reduce pressure on the trigger means to free the hammer from the disconnector to permit the hammer and trigger means to move to their set positions so that the user can pull the trigger means to fire the firearm, and

when in a forced reset semi-automatic mode, upon rearward movement of the bolt means, the disconnector is prevented from holding the hammer, and thereafter the bolt means moves forward into battery, at which time the user can pull the trigger means to fire the firearm.

17. A firearm trigger mechanism comprising:

a hammer movable between a set position and a released position, and having a sear engagement surface;

a trigger member having a sear engagement surface, the trigger member being movable between a set position and a released position;

a cam configured to move during cycling of the firearm's action and to contact the trigger member to bias it toward the set position;

a movable blocking means configured to selectively prevent the hammer sear catch surface from engaging with the sear in the set position;

a mode selector operable by the user to select between at least two modes of operation of the trigger mechanism, including:

a semi-automatic mode, in which the hammer and trigger member sear engagement surfaces are not able engage in the set position during cycling of the firearm's action until the user manually reduces pressure from the trigger member to disengage the blocking means before firing again, regardless of whether the cam moves the trigger member to the set position; and

a forced reset mode, in which the cam moves during cycling and forcibly biases the trigger member into the set position with the hammer and trigger member sear engagement surfaces engaged, permitting the user to immediately fire again without the user manually releasing pressure on the trigger member;

wherein if the cam moves in both modes, the difference in operation between modes is determined by movable selection of the blocking means, thereby selectively either permitting or preventing the hammer and trigger member sear engagement surfaces from engaging when the trigger member is biased by the cam.

18. For use in a firearm having a semiautomatic action, a firearm trigger mechanism comprising:

a trigger member movable between a set condition in which the trigger member is ready to fire and a released condition; and

a cam movable between a first position and a second position, in the second position, the cam contacting and biasing the trigger member toward the set condition;

wherein cycling of the firearm's action causes the cam to move from the first position toward the second position;

wherein the trigger mechanism is selectable between at least standard semi-automatic and forced reset semiautomatic operating modes, in the standard semi-automatic mode, after firing, cycling of the action causes the cam to move the trigger member without reaching the set condition, such that manually releasing pressure on the trigger member by the user is required to fully reset the trigger mechanism and enable subsequent firing, and in the forced reset semi-automatic mode, after firing, cycling of the action causes the cam to force the trigger member to the set condition, thereby enabling subsequent firing without requiring further manual reduction of pressure on the trigger member; and

wherein a selector means is provided to selectively prevent the trigger member from being fully reset by the cam without the user manually reducing pressure on the trigger member, thereby enabling operation in the standard semi-automatic mode.

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