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Attorneys for Plaintiffs

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF IDAHO

ABC IP, LLC, a Delaware limited liability company, RARE BREED TRIGGERS, INC., a Texas corporation, and RBTM LLC, a Wyoming limited liability company, Plaintiffs, vs. AREA 43 LLC, an Idaho limited liability company, and ALEX KEELY, an individual, Defendants.	Case No.: COMPLAINT FOR PATENT AND TRADEMARK INFRINGEMENT AND JURY DEMAND

This is an action for patent and trademark infringement in which ABC IP LLC ("ABC"), Rare Breed Triggers, Inc. ("Rare Breed"), and RBTM LLC ("RBTM") (collectively, "Plaintiffs") accuse Area 43 LLC and Alex Keely (collectively, "Defendants") of infringing U.S. Patent Nos. 12,038,247, 12,031,784, 12,529,538, 12,578,159, and 12,636,403; infringing Plaintiffs' trademark rights; and engaging in unfair competition as follows:

PARTIES

1. ABC is a limited liability company organized under the laws of the State of Delaware with an address at 8 The Green, Suite A, Dover, Delaware 19901.

2. Rare Breed is a Texas corporation having a place of business at 2710 Central Freeway, Suite 150-151, Wichita Falls, TX 76306.

3. RBTM is a limited liability company organized under the laws of the State of Wyoming with an address at 1309 Coffeen Avenue, STE 1200, Sheridan, Wyoming 82801.

4. Upon information and belief, Area 43 LLC is a limited liability company organized under the laws of Idaho with an address of 1920 N Todd Way, Meridian, ID 83646.

5. Upon information and belief, Alex Keely is an individual residing at 1920 N Todd Way, Meridian, ID 83646, who is the owner or an owner of Area 43 LLC and directs its operations, including directing Area 43 LLC to sell products in violation of the Asserted Patents.

JURISDICTION AND VENUE

6. This is an action for patent infringement arising under 35 U.S.C. §§ 271(a)–(c), 281, and 284–85; trademark infringement; false designation of origin; and unfair competition under 15 U.S.C. §§ 1114 and 1125(a).

7. This Court has subject matter jurisdiction over this action under 28 U.S.C. § 1338, which directs that United States District Courts shall have original jurisdiction of any civil action

arising under any Act of Congress relating to patents and pursuant to 28 U.S.C. § 1331, which pertains to civil actions arising under the laws of the United States.

8. Personal jurisdiction over Defendants is proper in this District because the Defendants reside in and have a regular and established place of business in this District.

9. Venue is proper in this district pursuant to 28 U.S.C. § 1400(b). Defendants reside in or have committed acts of infringement and have a regular and established place of business in this District.

BACKGROUND

10. This lawsuit asserts (i) direct, contributory, and induced infringement of U.S. Patent Nos. 12,038,247 ("the '247 Patent"), 12,031,784 ("the '784 Patent"), 12,529,538 ("the '538 Patent"), 12,578,159 ("the '159 Patent"), and 12,636,403 ("the '403 Patent) (together, "the Asserted Patents"); and (ii) trademark infringement, false designation of origin, and unfair competition with regard to Plaintiffs' well-known FRT trademark.

11. The '247 Patent was lawfully and properly issued by the United States Patent and Trademark Office on July 16, 2024. Each and every claim of the '247 Patent is valid and enforceable. A true and correct copy of the '247 Patent is attached as Exhibit A.

12. The '784 Patent was lawfully and properly issued by the United States Patent and Trademark Office on July 9, 2024. Each and every claim of the '784 Patent is valid and enforceable. A true and correct copy of the '784 Patent is attached as Exhibit B.

13. The '538 Patent was lawfully and properly issued by the United States Patent and Trademark Office on January 20, 2026. Each and every claim of the '538 Patent is valid and enforceable. A true and correct copy of the '538 Patent is attached as Exhibit C.

14. The ’159 Patent was lawfully and properly issued by the United States Patent and Trademark Office on March 17, 2026. Each and every claim of the ’159 Patent is valid and enforceable. A true and correct copy of the ’159 Patent is attached as Exhibit D.

15. The ’403 Patent was lawfully and properly issued by the United States Patent and Trademark Office on May 26. 2026. Each and every claim of the ’403 Patent is valid and enforceable. A true and correct copy of the ’403 Patent is attached as Exhibit E.

16. ABC is the current owner by assignment of all right, title and interest in and to the Asserted Patents. These assignments have been recorded at the United States Patent and Trademark Office (“USPTO”).

17. RBTM is the owner, and Rare Breed has the exclusive right to enforce the trademark FRT® and variations thereon (“the FRT Marks”), including the right to enforce the marks against infringers. Since at least 2020, the FRT® mark has been used by Plaintiff Rare Breed to identify a unique trigger for firearms, which has been a remarkably successful offering. As a result of the long-term and high-profile use, the FRT® trademark has come to be uniquely identified with Rare Breed and a valuable identifier of Rare Breed’s products. In addition to strong common law rights in the FRT® trademark, RBTM also owns the following federally registered trademarks and pending applications, including the right to enforce the marks against infringers:

Mark	Goods	App. No.	Reg. No.	App. Date	Reg. Date
FRT	triggers for firearms	97248519	8187914	2022-02-01	2026-03-24
FRT-15	triggers for firearms	97245949	7004418	2022-01-31	2023-03-21
FRT-22	triggers for firearms	97248530	8232406	2022-02-01	2026-04-28
FRT-47	triggers for firearms	97248528	8232405	2022-02-01	2026-04-28
FRT-MR3	triggers for firearms	99714625		2026-03-20	

FRT-RD3	triggers for firearms	99714703		2026-03-20	
FRT-15L3	triggers for firearms	98715335	8225451	2024-08-24	2026-04-21

Together, Plaintiffs' common law rights in and federal trademark registrations and pending applications are referred to as the "FRT Marks."

18. Rare Breed is the exclusive licensee of the Asserted Patents and the FRT Marks.

19. Plaintiffs have complied with the requirements of 35 U.S.C. § 287 either because the Asserted Patents are not practiced by ABC or any licensee and/or because any licensee has been required to mark its product.

20. Upon information and belief, Defendants have committed acts of direct, contributory, and induced patent infringement, which will be described in more detail below. These acts are in violation of 35 U.S.C. § 271 and should be considered willful.

THE INVENTIONS

21. A typical AR15-pattern firearm, for example, is considered a semiautomatic firearm. The operation of a *standard disconnector* AR-pattern trigger mechanism is commenced by the trigger member being pulled by the user. The trigger member releases the hammer from the trigger sear and allows the hammer to strike the firing pin. A portion of the propellant gas is used to begin the process of sending the bolt carrier to the rear of the firearm. The rearward movement of bolt carrier cocks the hammer on the disconnector and then the bolt is allowed to return forward into battery with a new round inserted into the chamber. While this is happening, in the standard AR-pattern semiautomatic trigger, the user can either continue to hold the trigger member in a pulled (i.e., fired) state or allow the trigger to return to its reset state, in which the sear, rather than the disconnector, engages and holds the hammer in a cocked position. When the user reduces

pressure on the trigger member to allow the trigger spring to reset the trigger member, the disconnector releases the hammer to engage the trigger sear.

22. In the standard AR-pattern trigger assembly, the purpose of the disconnector is to hold the hammer in a cocked position until the trigger member is reset by a trigger spring when the user lets the trigger reset. The disconnector 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 manually reset the trigger rapidly enough so that the sear engages before the bolt carrier or bolt 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 to simply "follow" the bolt carrier as it returns to battery without firing a second round, leaving the hammer uncocked.

23. In contrast, in what Plaintiffs have coined a "forced reset" trigger mechanism, cycling of the bolt carrier or bolt causes the trigger member to be mechanically moved to the reset position and hold the trigger member there until the bolt or bolt carrier is back in battery, when it is safe for the user to pull the trigger again, without the need for a disconnector.

24. The '247 and '159 Patents provide a novel device for accelerating the firing sequence of any semiautomatic firearm, in contrast to a standard semiautomatic trigger or other prior art devices that allow an accelerated rate of semiautomatic firing. The device can be selected to operate in either a standard semiautomatic mode or a "forced reset" semiautomatic mode and uses a cam, rotated by cycling of the action, to cause the trigger member to reset and prevent the trigger member from being pulled again until the action has returned to the in-battery position.

25. The '784 Patent provides a device that works in a trigger system as an extended trigger member locking mechanism for use with a semi-automatic firearm that employs, in some embodiments, a "deflectable extension of the locking member that is actuated by forward

movement of the bolt carrier," among other innovations as explicitly claimed. Certain inventions of the '784 Patent overcome the geometric limitations of prior art designs for use in multiple and varied semi-automatic firearm designs by allowing a locking member to deflect or fold separately from the body portion of the locking member when contacted by the forward portion of the bolt carrier as it cycles to the rear.

26. The '538 Patent provides a safety mechanism for a firearm that employs a cam selector, a lever, and a trigger. The cam selector contains multiple recesses and is configured to operate between a first mode, a second mode, and a third mode. In the first mode, a portion of the trigger referred to as a first trigger tail portion is movable within the first recess. In the second mode, the first trigger tail portion is allowed to engage the second recess and be moved down by a cam portion of the second recess when the cam selector rotates. In the third mode, the cam selector is configured to prevent the trigger from being pulled.

27. The claims of the patents define the scope of the patented inventions.

THE INFRINGING DEVICES

28. On information and belief, Defendants previously or are currently making, using, selling, and/or offering for sale products that embody the technology claimed in the Asserted Patents, including the following (collectively, the "Infringing Devices"):

I. The Super Safety

29. On information and belief, Defendants previously or are currently making, using, selling, and/or offering for sale a (3-Position) Super Safety ("the Super Safety"), which embodies the technology claimed in at least the '247, '784, '538, '159, and '403 Patents.

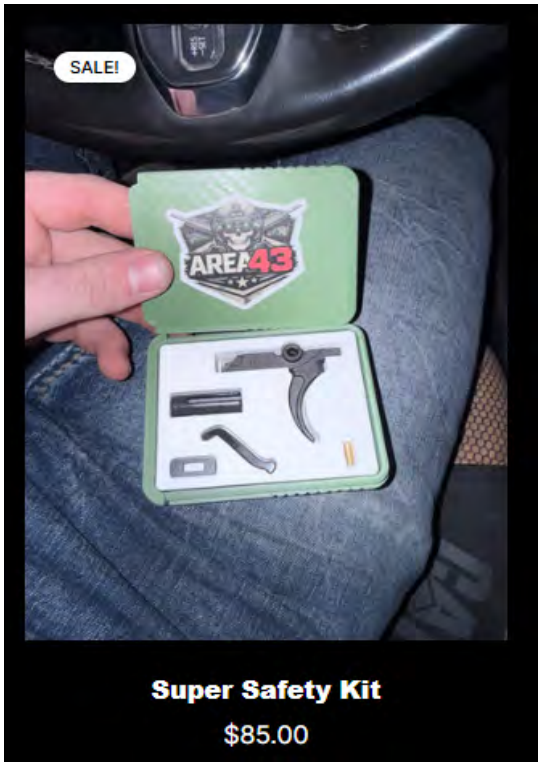
30. On information and belief, Defendants previously or are currently making, using, selling, and/or offering for sale the Super Safety via the website https://area43.co/collections/ar15-ar9, in multiple variants, including at least:

a. A partial kit, which includes at minimum the cam and cam lever components, and may further include one or more additional components—when these components are installed in combination with a standard AR-pattern hammer and disconnector, with standard springs, the combination creates the invention of the '247, '784, '538, '159, and '403 Patents—and/or;

b. A complete kit, which includes at minimum the cam and cam lever components and additional components (e.g., a standard AR-pattern hammer, disconnector, standard springs, and a modified trigger); and/or

c. A complete kit preinstalled in a receiver and/or complete firearm, which includes cam and cam lever components and additional components (e.g., a standard AR-pattern hammer, disconnector, standard springs, and a modified trigger) preinstalled in an AR-pattern receiver.

31. An exemplary image is shown below:



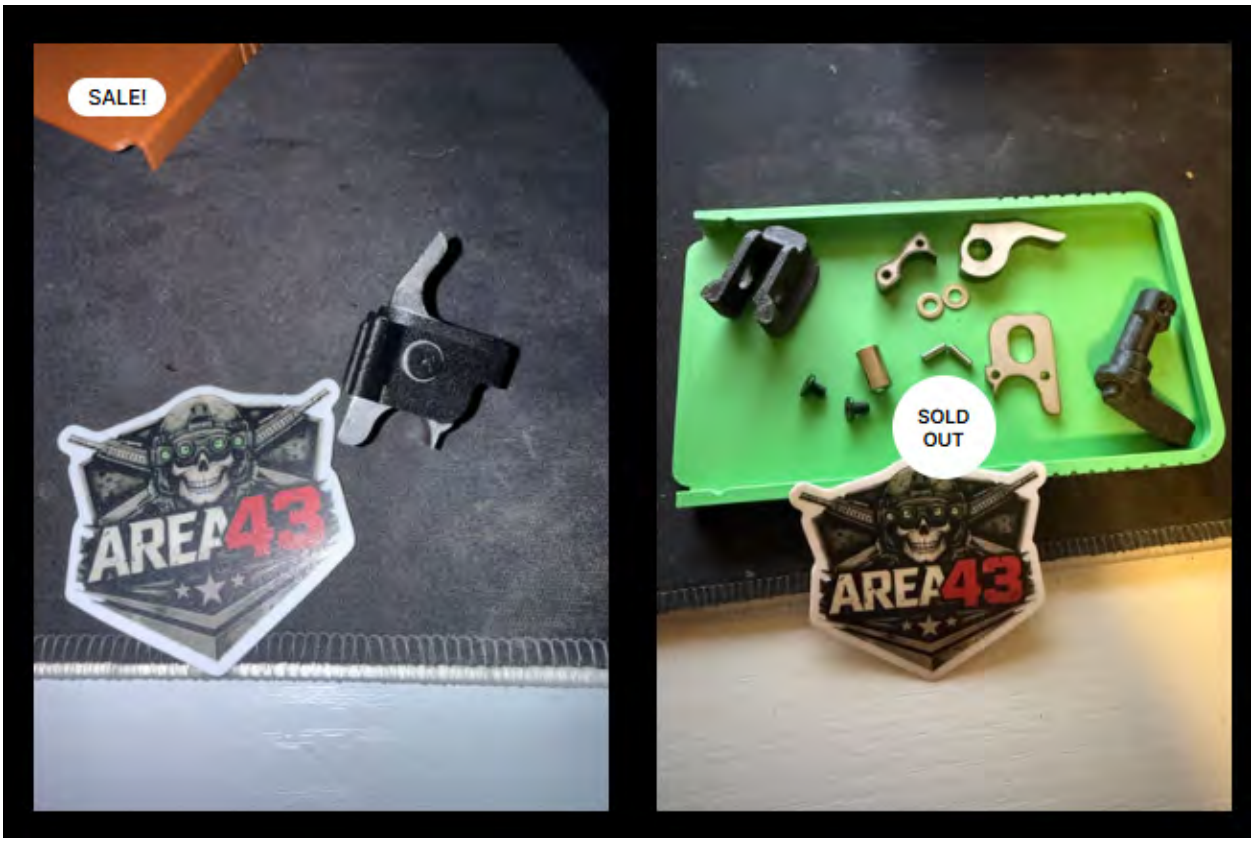
32. The Super Safety can operate in a "disconnector mode," which is much like that of a standard AR-15 trigger. The user can switch between safe, standard semiautomatic with disconnector, and "forced reset" semiautomatic with cam modes by moving the safety selector laterally between positions.

II. The Kabuto

33. On information and belief, Defendants have previously or are currently making, using, selling, and/or offering for sale a Kabuto device ("the Kabuto"), which embodies the technology claimed in at least the '247, '784, '159, and '403 Patents.

34. On information and belief, Defendants previously or are currently making, using, selling, and/or offering for sale the Kabuto via the website https://area43.co/collections/ar15-ar9.

35. Exemplary images are shown below:



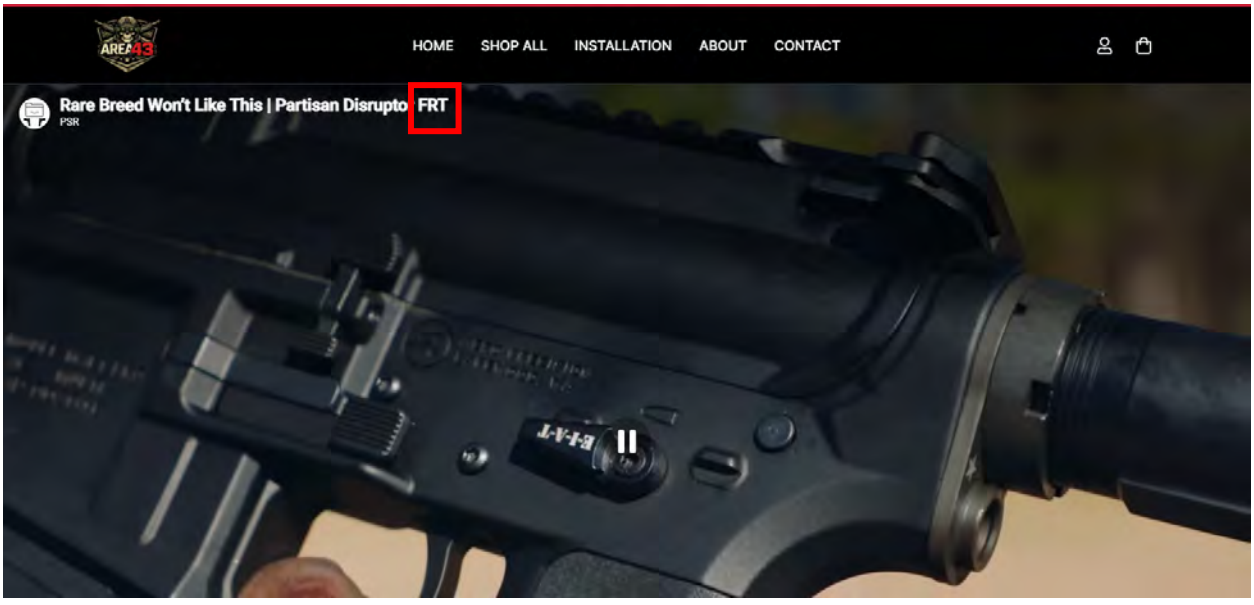
36. The Kabuto can operate in at least a "disconnector mode," which is much like that of a standard AR-15 trigger. The user can switch between standard semiautomatic with disconnector and "forced reset" semiautomatic with cam modes by rotating the safety selector between positions.

INFRINGEMENT OF THE FRT MARKS

37. On information and belief, Defendants are distributing, advertising, and/or selling products that do not originate with Plaintiffs but that nonetheless bear or are promoted in association with the FRT Marks.

38. Defendants are falsely associating their products with Plaintiffs' well-known FRT Marks.

39. Defendants are advertising their products as "FRT" as shown at: https://area43.co/. Exemplary highlighted images are shown below:



40. Despite Defendants' marketing, Defendants' products are **not** one of Plaintiffs' FRT products.

41. Defendants' unauthorized use of the FRT Marks to identify and promote their products is likely to mislead consumers into falsely believing that Defendants' products are in fact Plaintiffs' products, or are endorsed by or associated with Plaintiffs.

42. The only reason Defendants would use the FRT Marks in connection with their products is to trade on the goodwill Plaintiffs have developed in the FRT Marks, and thus Defendants' conduct is willful.

COUNT I — INFRINGEMENT OF THE '247 PATENT

43. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

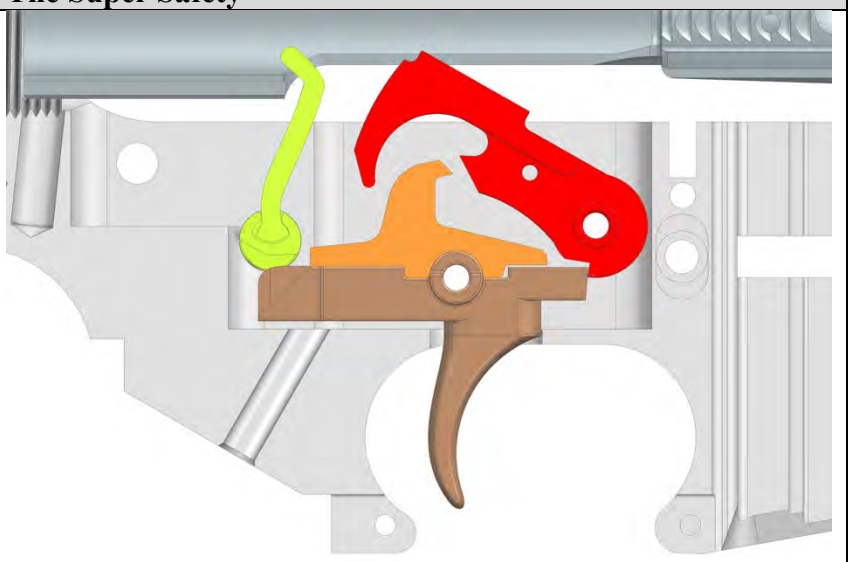
44. In violation of 35 U.S.C. § 271, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the '247 Patent, including but not limited to claim 15, literally and/or under the doctrine of equivalents, by among other things, making, using, offering for sale, selling, and/or importing into the United States unlicensed products in a manner that infringes the '247 Patent. Such unlicensed products include the Super Safety and Kabuto.

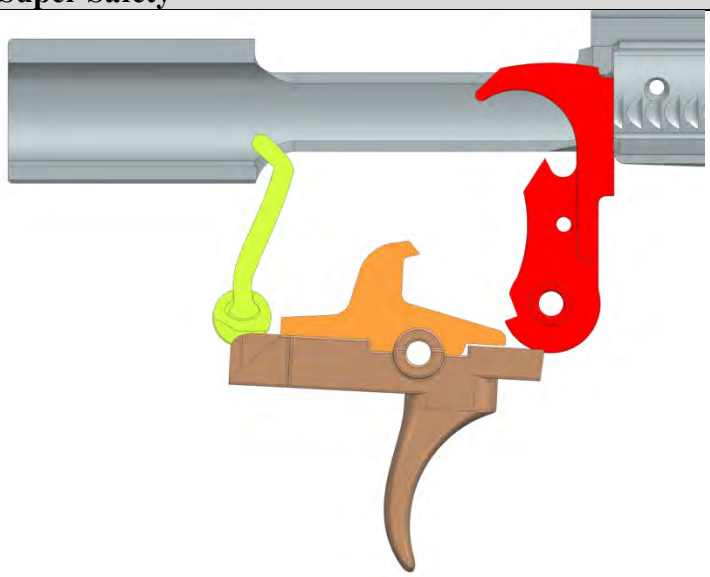
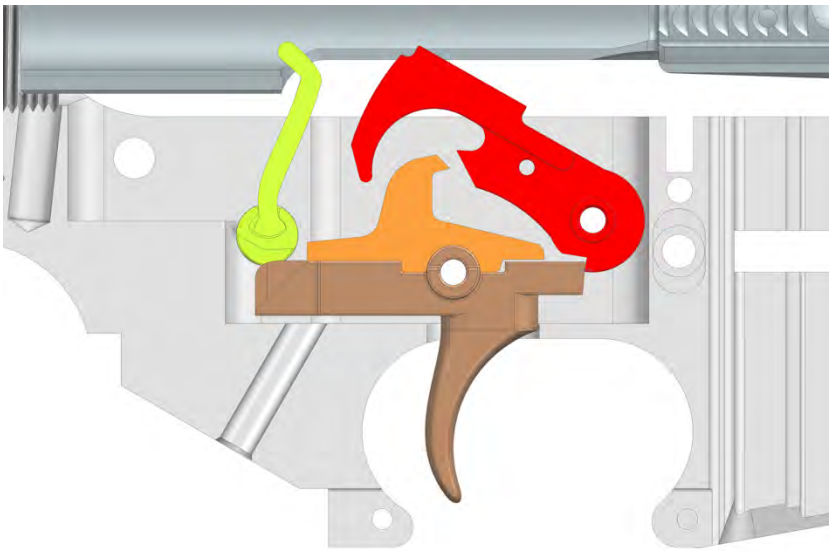
45. On information and belief, Defendants have and continue to willfully infringe, induce others to infringe, and/or contribute to the infringement of one or more claims of the '247 Patent, including but not limited to claim 15, literally and/or under the doctrine of equivalents.

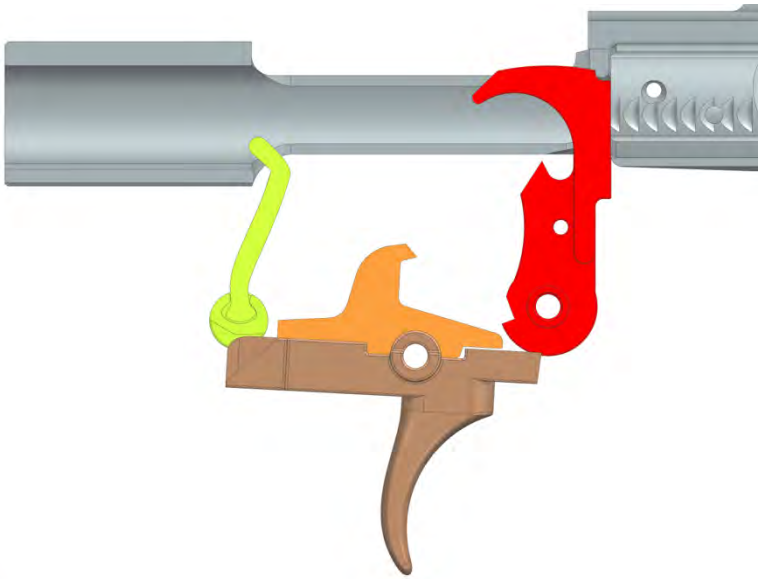
46. An exemplary comparison of the Super Safety, when assembled and used as intended, with claim 15 of the '247 Patent, is illustrated in the chart below:

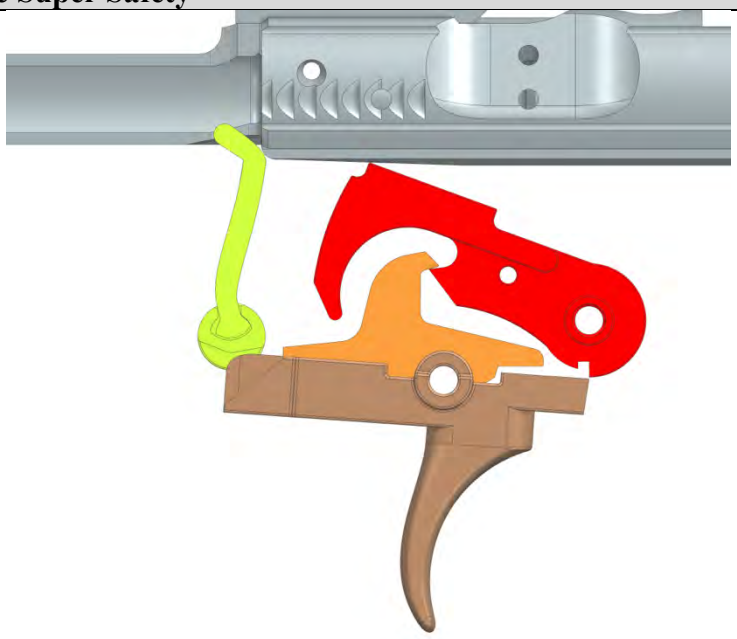
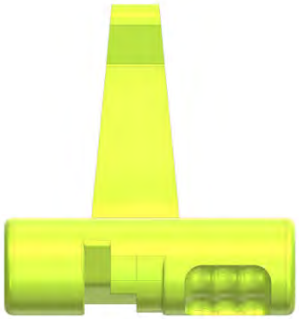
'247 Patent, Claim 15	**The Super Safety**
15. A firearm trigger mechanism comprising:	When installed and used as directed, the Super Safety is part of a trigger mechanism and functions as a cam that in at least one mode, both causes the reset of the trigger and locks the trigger during the cycle of operation.

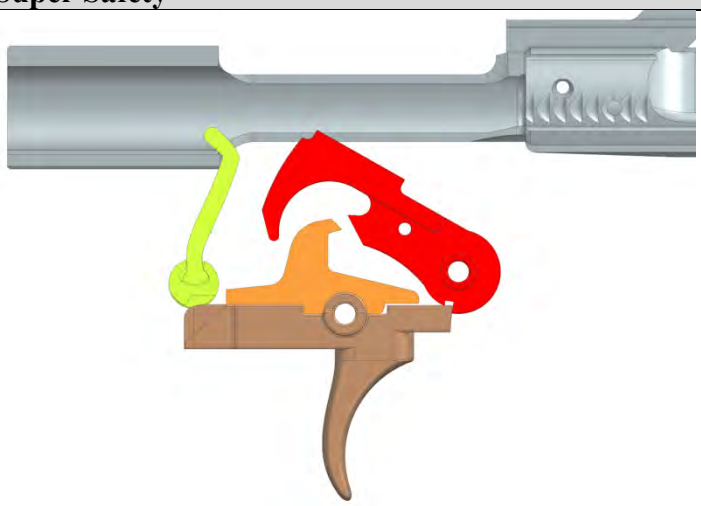
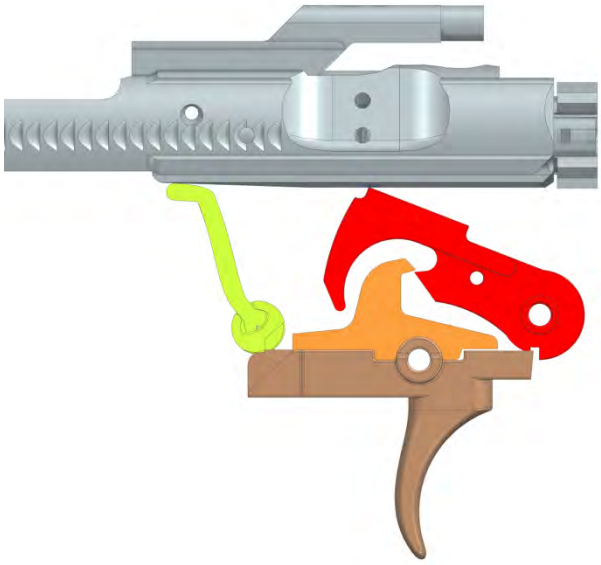
'247 Patent, Claim 15	**The Super Safety**
	 https://area43.co/collections/ar15-ar9  **The Super Safety** *See also*, Ex. J, Super Safety 3D Printed Active Trigger System v4.4, ("Super Safety Guide") at 12.
a hammer having a sear catch and a hook for engaging a disconnector and adapted to be mounted in a fire control mechanism pocket of a receiver	The Super Safety (yellow) is installed in a fire control mechanism pocket of a receiver along with a hammer (red) that has a sear catch and a hook for engaging a disconnector (orange).

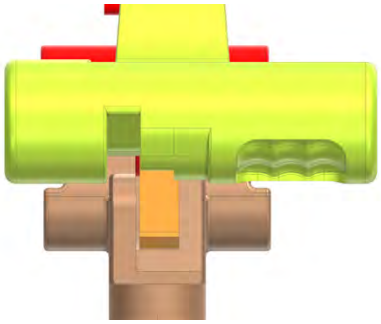
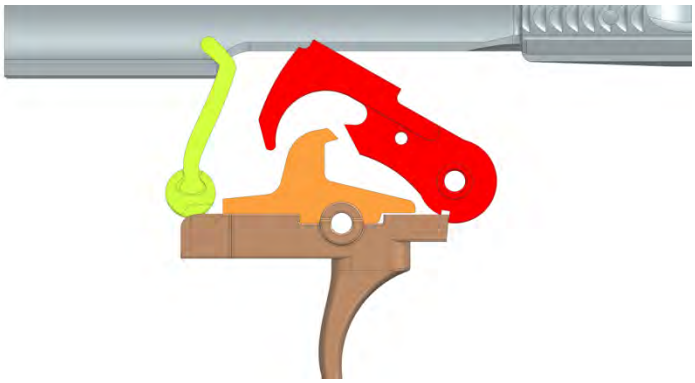
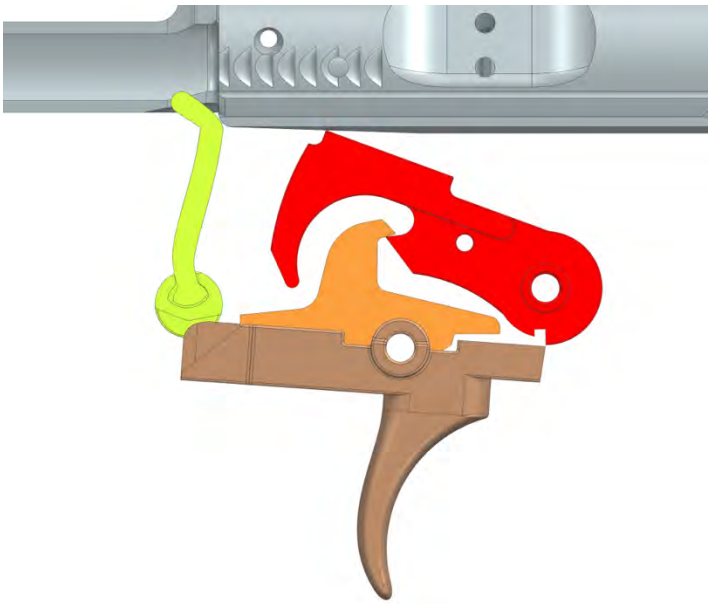
’247 Patent, Claim 15	The Super Safety
	 (Plaintiff-generated renderings of the Super Safety here and below)
to pivot on a transverse hammer pivot axis between set and released positions, said hammer adapted to be pivoted rearward by rearward movement of a bolt carrier,	The hammer (red) pivots on a transverse hammer pivot axis between set and released positions, depicted below. The hammer is adapted to be pivoted rearward by rearward movement of a bolt carrier.  **Hammer Set Position**

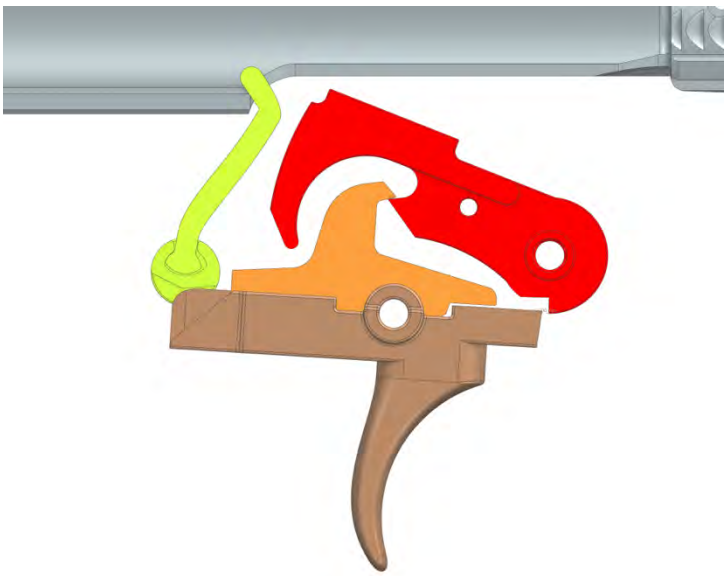
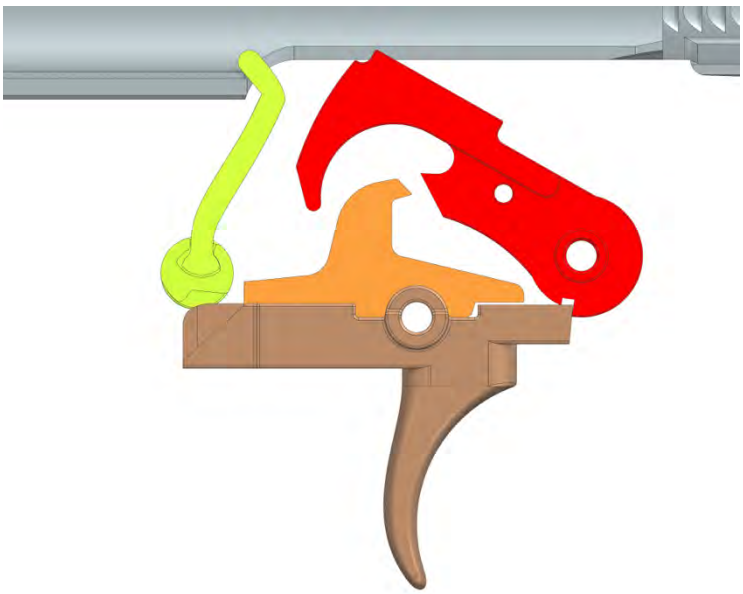
'247 Patent, Claim 15	**The Super Safety**
	 **Hammer Released Position**
a trigger member having a sear and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions,	The Super Safety (yellow) is installed with a trigger member (brown) in the fire control mechanism pocket and the trigger member pivots on a transverse trigger member pivot axis between set and released positions. The trigger member (brown) has a sear. 
wherein said sear and sear catch are in engagement in said set positions of said hammer and trigger member	The sear of the trigger member (brown) and sear catch of the hammer (red) are in engagement when the hammer and trigger member are in their set positions.

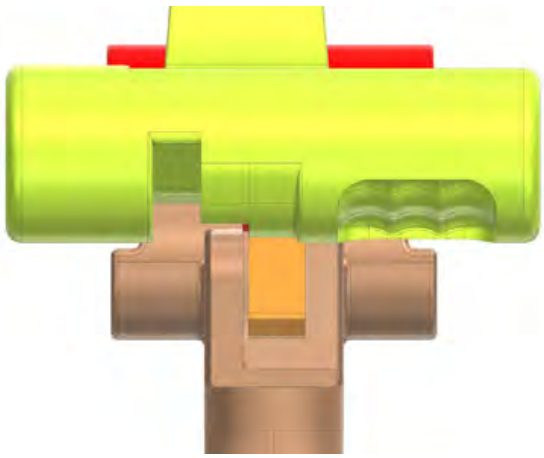
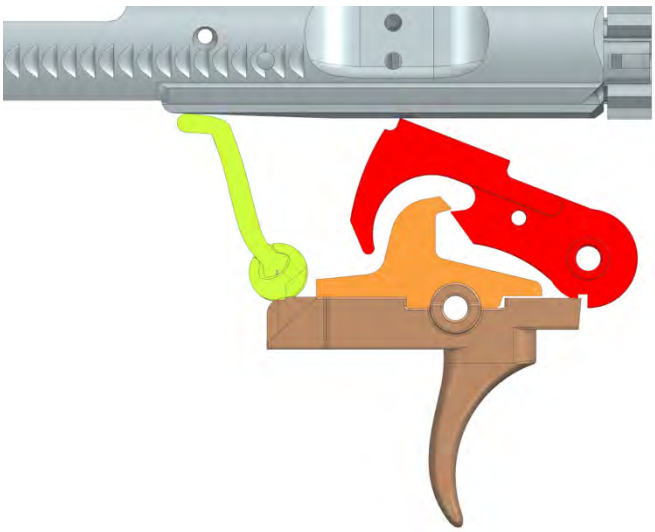
’247 Patent, Claim 15	The Super Safety
	 **Trigger Member Set Position**
and are out of engagement in said released positions of said hammer and trigger member,	The sear of the trigger member (brown) and sear catch of the hammer (red) are out of engagement in the released position.  **Trigger Member Released Position**
said disconnector having a hook for engaging said hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis,	The disconnector (orange) is adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis. The disconnector has a hook for engaging the hammer (red).

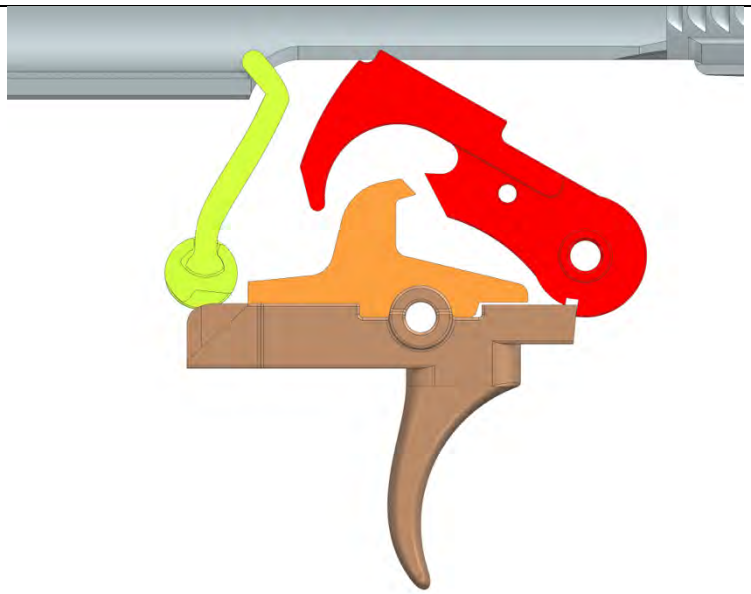
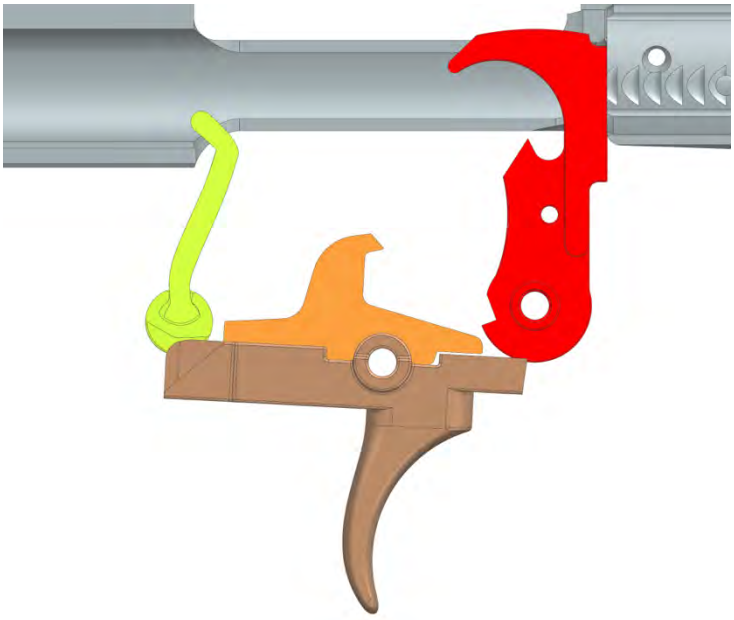
’247 Patent, Claim 15	The Super Safety
	 **Disconnector Hook Engaged**
and a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket,	The Super Safety has a cam with a cam lobe and lever that is adapted to be movably mounted in the fire control mechanism pocket. (*See* image above depicting Super Safety, shown in yellow, in fire control mechanism pocket)  **Super Safety Cam with Lobe and Lever**
said cam being movable between a first position and a second position, in said second position said cam lobe forces said trigger member towards said set position,	The cam is movable between a first position and a second position.

’247 Patent, Claim 15	The Super Safety
	 **Cam and Lobe First Position** In the second position, the cam lobe mechanically moves the trigger member (brown) toward the set position when the cam is in the “forced reset” semi-automatic mode.  **Cam and Lobe Second Position**

whereupon in a standard semi-automatic mode,	During at least part of the cycle in the standard semi-automatic mode, 
said cam is in said first position,	. . . the cam is in the first position. 
rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook catches said hammer hook,	Rearward movement of the bolt carrier causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook catches the hammer hook. 

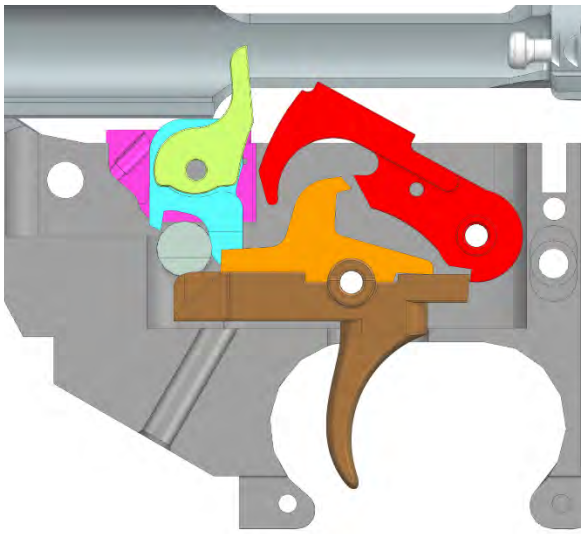
and thereafter the bolt carrier moves forward into battery,	Thereafter, the bolt carrier moves forward into battery, 
at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and	. . . at which time a user must manually release the trigger member (brown) to free said hammer (red) from the disconnector (orange) 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. 

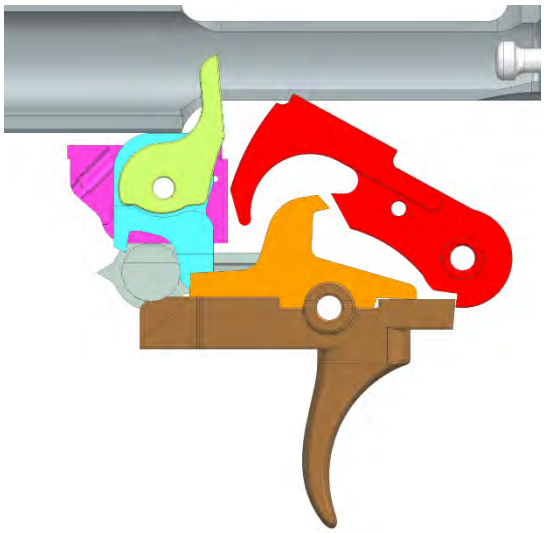
whereupon in a forced reset semi-automatic mode,	When in the “forced reset” semi-automatic mode, 
said cam is in said second position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook is prevented from catching said hammer hook,	. . . the cam is in the second position during at least part of the cycle and mechanically moves the trigger member toward the set position. Rearward movement of the bolt carrier causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook is prevented from catching the hammer hook. 
and thereafter the bolt carrier moves forward into battery,	Thereafter, the bolt carrier moves forward into battery,

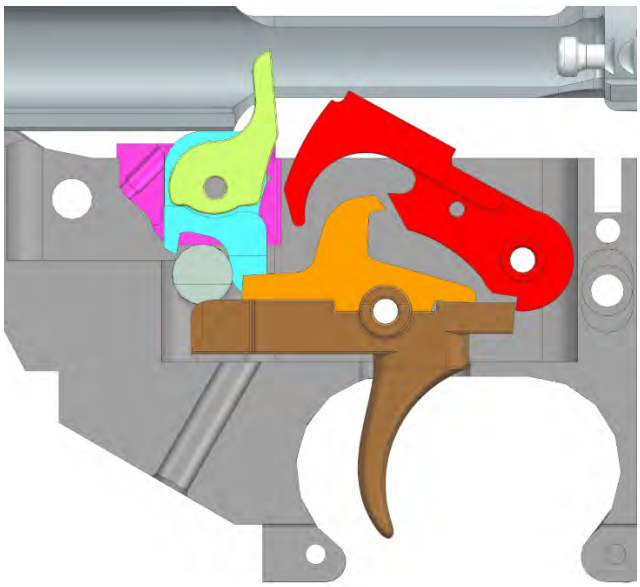
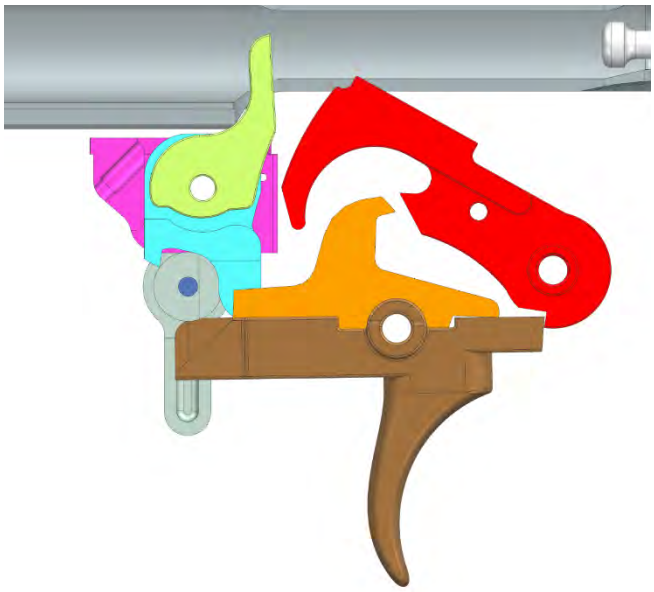
	
at which time the user can pull said trigger member to fire the firearm.	. . . at which time the user can pull the trigger member (brown) to fire the firearm. 

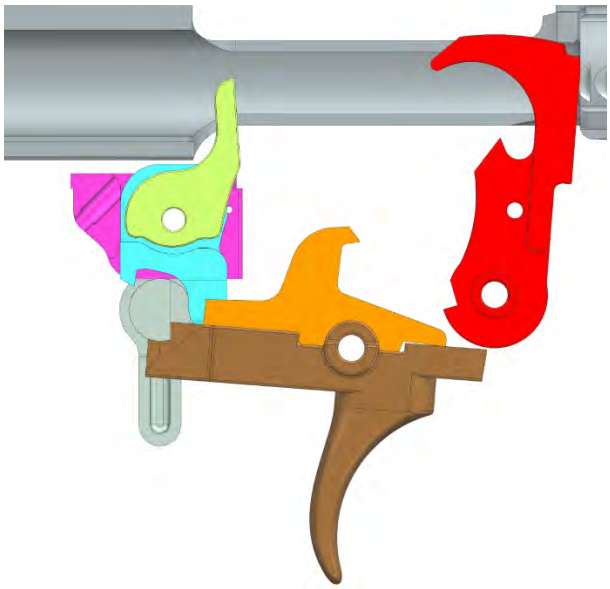
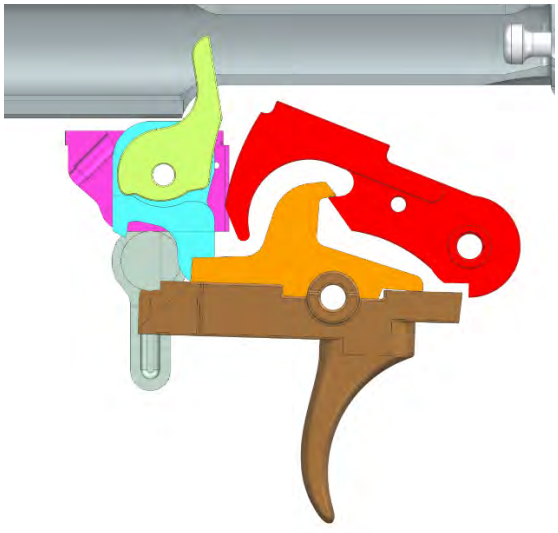
47. An exemplary comparison of the Kabuto, when assembled and used as intended, with claim 15 of the ’247 Patent, is illustrated in the chart below:

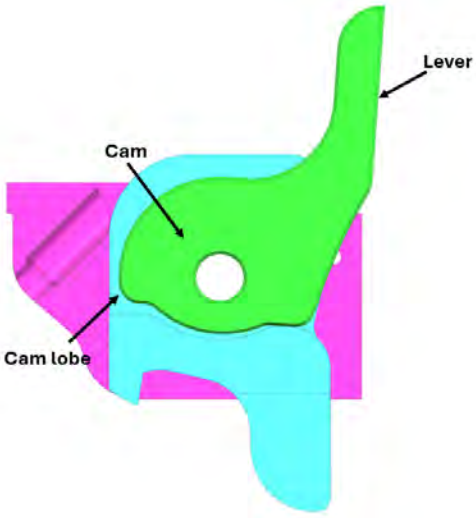
'247 Patent, Claim 15	**The Kabuto**
15. A firearm trigger mechanism comprising:	When installed and used as directed, the Kabuto is part of a reset trigger mechanism and functions as a cam that in at least one mode, both causes the reset of the trigger and locks the trigger during the cycle of operation.  https://area43.co/collections/ar15-ar9  **Kabuto**

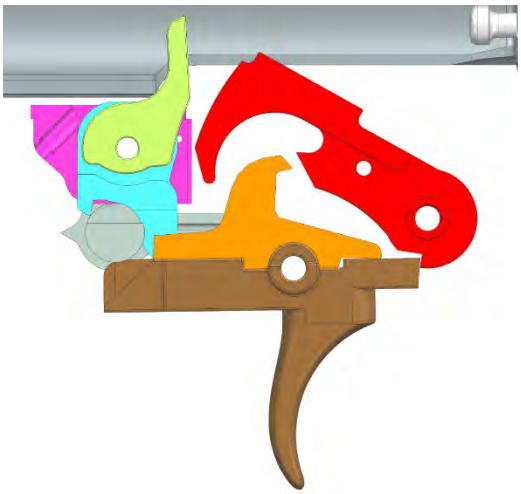
'247 Patent, Claim 15	**The Kabuto**
a hammer having a sear catch and a hook for engaging a disconnector and adapted to be mounted in a fire control mechanism pocket of a receiver	The Kabuto (green, blue, and purple) is installed in a fire control mechanism pocket of a receiver along with a hammer (red) that has a sear catch and a hook for engaging a disconnector (orange).  (Plaintiff-generated renderings of Kabuto here and below)

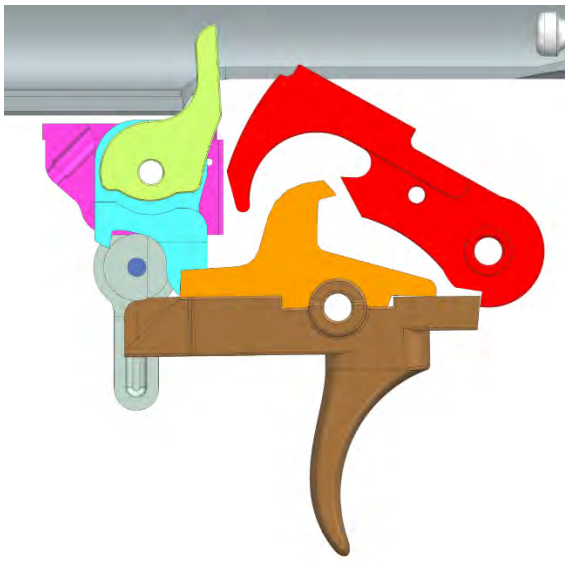
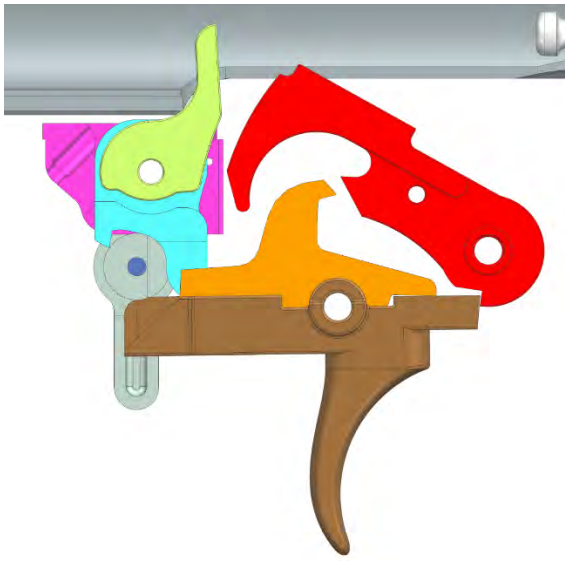
’247 Patent, Claim 15	The Kabuto
to pivot on a transverse hammer pivot axis between set and released positions, said hammer adapted to be pivoted rearward by rearward movement of a bolt carrier,	The hammer (red) pivots on a transverse hammer pivot axis between set and released positions, depicted below. The hammer is adapted to be pivoted rearward by rearward movement of a bolt carrier.  **Hammer Set Position**  **Hammer Released Position**

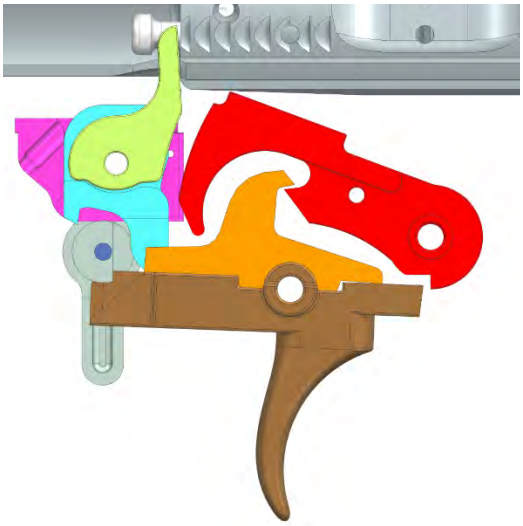
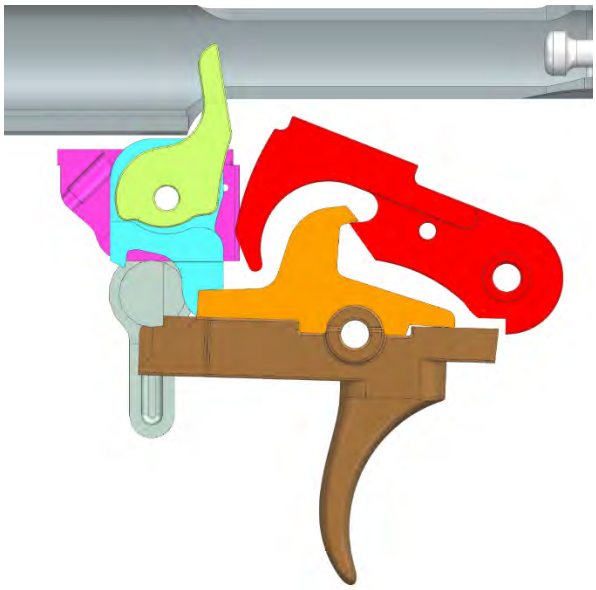
'247 Patent, Claim 15	**The Kabuto**
a trigger member having a sear and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions,	The Kabuto (green, blue, and purple) is installed with a trigger member (brown) in the fire control mechanism pocket and the trigger member pivots on a transverse trigger member pivot axis between set and released positions. The trigger member (brown) has a sear. 
wherein said sear and sear catch are in engagement in said set positions of said hammer and trigger member	The sear of the trigger member (brown) and sear catch of the hammer (red) are in engagement when the hammer and trigger member are in their set positions.  **Trigger Member Set Position**

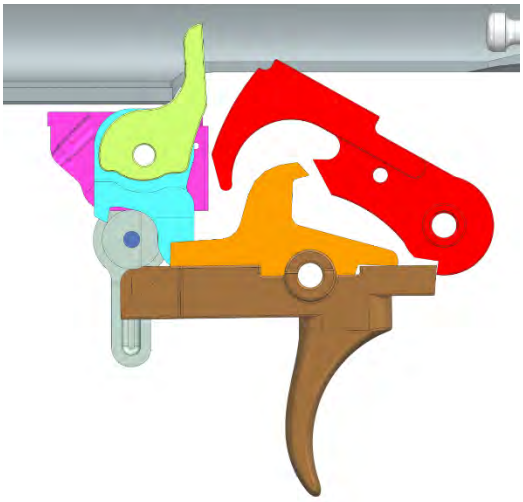
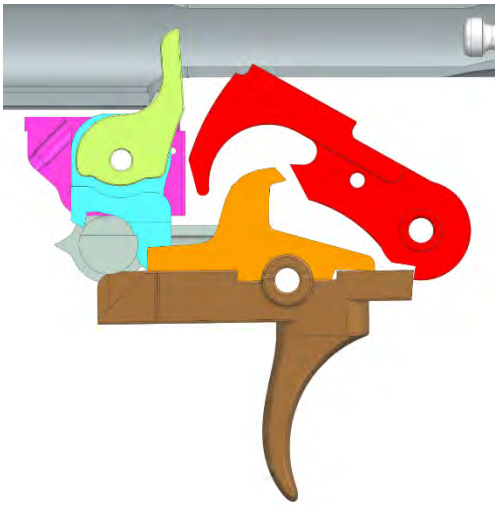
’247 Patent, Claim 15	The Kabuto
and are out of engagement in said released positions of said hammer and trigger member,	The sear of the trigger member (brown) and sear catch of the hammer (red) are out of engagement in the released position.  **Trigger Member Released Position**
said disconnector having a hook for engaging said hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis,	The disconnector (orange) is adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis. The disconnector has a hook for engaging the hammer (red).  **Disconnector Hook Engaged**

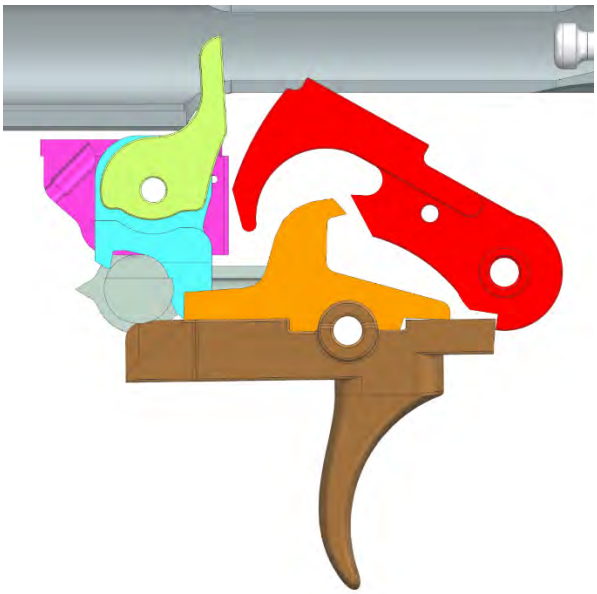
'247 Patent, Claim 15	**The Kabuto**
and a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket,	The Kabuto has a cam with a cam lobe and lever that is adapted to be movably mounted in the fire control mechanism pocket. (*See* Image above depicting Kabuto, shown in green, blue, and purple, in fire control mechanism pocket)  **Kabuto Cam with Lobe and Lever**

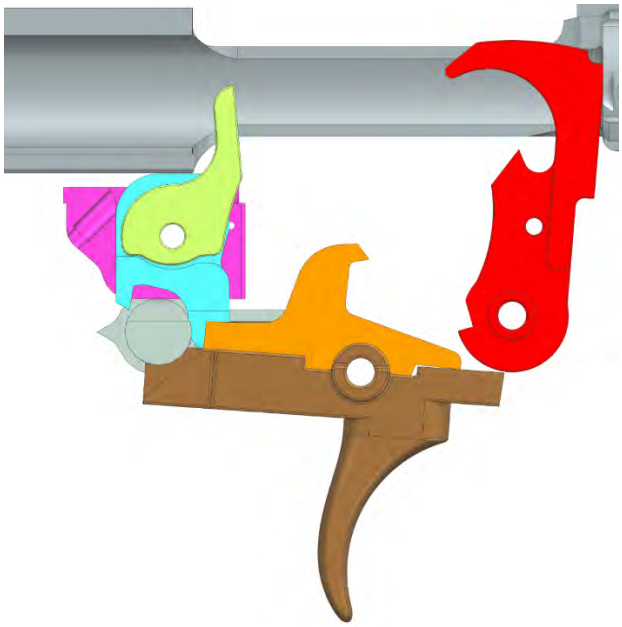
’247 Patent, Claim 15	The Kabuto
said cam being movable between a first position and a second position, in said second position said cam lobe forces said trigger member towards said set position,	The cam is movable between a first position and a second position.  **Cam and Lobe First Position** In the second position, the cam (green) lobe moves the trigger member (brown), via a link (blue), toward the set position when the cam is in the “forced reset” semi-automatic mode.  **Cam and Lobe Second Position**

'247 Patent, Claim 15	**The Kabuto**
whereupon in a standard semi-automatic mode,	During at least part of the cycle in the standard semi-automatic mode, 
said cam is in said first position,	. . . the cam (green) is in the first position. 

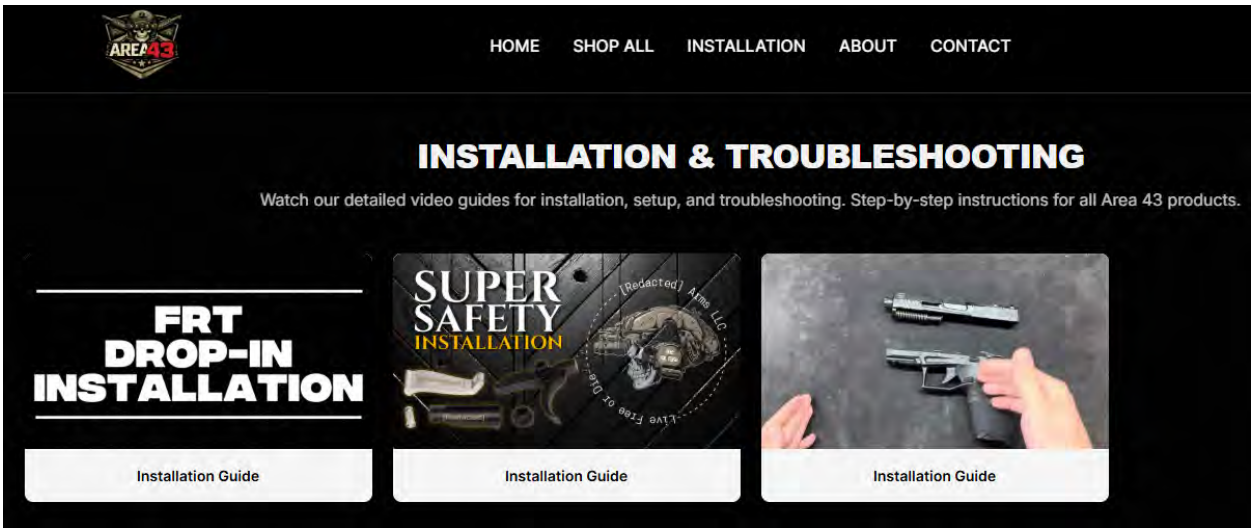
'247 Patent, Claim 15	**The Kabuto**
rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook catches said hammer hook,	Rearward movement of the bolt carrier causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook catches the hammer hook. 
and thereafter the bolt carrier moves forward into battery,	Thereafter, the bolt carrier moves forward into battery, 

'247 Patent, Claim 15	**The Kabuto**
at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and	. . . at which time a user must manually release the trigger member (brown) to free said hammer (red) from the disconnector (orange) 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. 
whereupon in a forced reset semi-automatic mode,	When in the "forced reset" semi-automatic mode, 

'247 Patent, Claim 15	**The Kabuto**
said cam is in said second position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook is prevented from catching said hammer hook,	. . . the cam is in the second position during at least part of the cycle and moves the trigger member toward the set position. Rearward movement of the bolt carrier causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook is prevented from catching the hammer hook. 
and thereafter the bolt carrier moves forward into battery,	Thereafter, the bolt carrier moves forward into battery, 

'247 Patent, Claim 15	**The Kabuto**
at which time the user can pull said trigger member to fire the firearm.	. . . at which time the user can pull the trigger member (brown) to fire the firearm. 

48. On information and belief, in addition to direct infringement, Defendants take active steps to induce others, including their customers, to directly infringe the '247 patent. Defendants take such active steps knowing that those steps will induce, encourage, and facilitate direct infringement by others. Such active steps include, but are not limited to, installation of, encouraging, advertising, promoting, and instructing others to use and/or how to use the Super Safety and Kabuto. One example of this is the promotional material found on Defendants' website (https://area43.co/pages/installation) that informs customers to install the Infringing Devices into an AR15:



49. On information and belief, Defendants know or should know that such activities induce others to directly infringe at least claim 15 of the ’247 Patent.

50. On information and belief, Defendants also contribute to the infringement of the ’247 Patent by others, including their customers. Acts by Defendants that contribute to the infringement of others include, but are not limited to, the sale, offer for sale, and/or importation by Defendants of the components of the Super Safety and Kabuto, such as the cam or cam lever arm. The components are not suitable for substantial noninfringing use as they are specially designed and adapted to be used in a fire control unit to mechanically reset a trigger mechanism and infringe the ’247 Patent.

51. Defendants have engaged in egregious infringement behavior with knowledge of the ’247 Patent, which has been duly issued by the USPTO, and is presumed valid. On information and belief, Defendants have known or should have known that their actions constituted and continue to constitute infringement of the ’247 Patent and that the ’247 Patent is valid at least through the service of this complaint. Defendants could not reasonably or subjectively believe that their actions do not constitute infringement of the ’247 Patent, nor could they reasonably or subjectively believe that the patent is invalid. Despite that knowledge and subjective belief, and

the objectively high likelihood that their actions constitute infringement, Defendants have continued their infringing activities. As such, Defendants willfully infringe the ’247 Patent.

52. By their actions, Defendants have injured Plaintiffs and are liable to Plaintiffs for infringement of the ’247 Patent pursuant to 35 U.S.C. § 271.

53. By their actions, Defendants’ infringement of the ’247 Patent has irreparably injured Plaintiffs. Unless such infringing acts are enjoined by this Court, Plaintiffs will continue to suffer additional irreparable injury.

54. By their actions, Defendants’ infringement of the ’247 Patent has damaged and continues to damage, Plaintiffs in an amount yet to be determined.

55. Defendants’ infringement of the ’247 patent is exceptional and entitles Plaintiffs to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

56. Defendants’ acts of infringement are willful and for no other purpose than to deliberately and irreparably harm Plaintiffs’ business, sales, reputation, and good-will.

57. Plaintiffs have been substantially harmed by Defendants’ infringing activities and are entitled to relief including but not limited to a preliminary injunction, a permanent injunction, damages adequate to compensate for the infringement, being lost profits or no less than a reasonable royalty, treble damages, and attorneys’ fees.

COUNT II — INFRINGEMENT OF THE ’784 PATENT

58. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

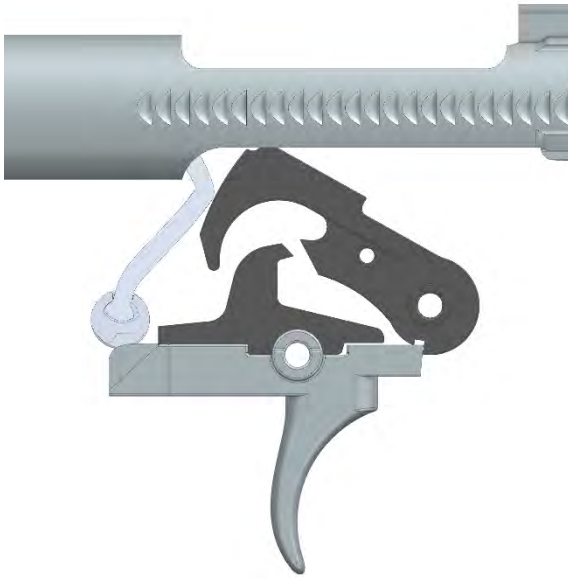
59. In violation of 35 U.S.C. § 271, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the ’784 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents, by among other things, making, using, offering for sale, selling, and/or importing into the United States unlicensed

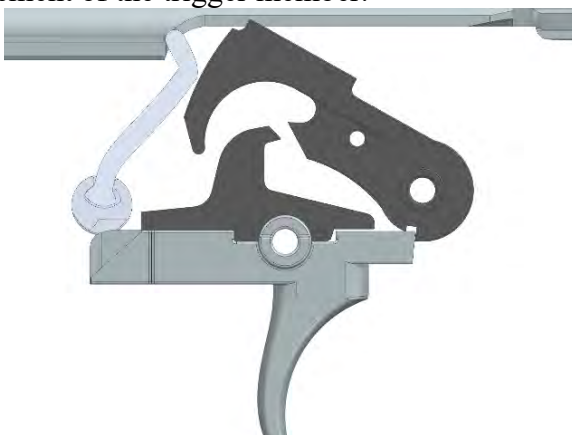
products in a manner that infringes the ’784 patent. Such unlicensed products include the Super Safety and Kabuto.

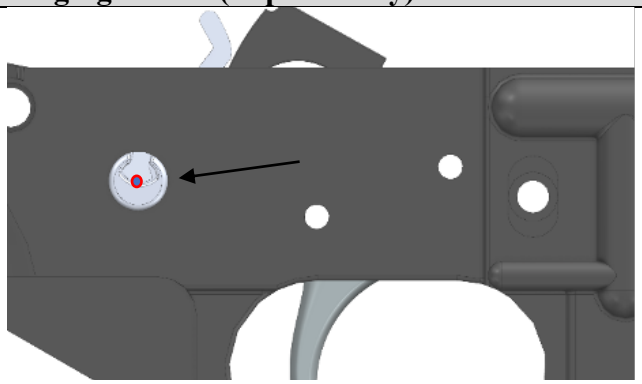
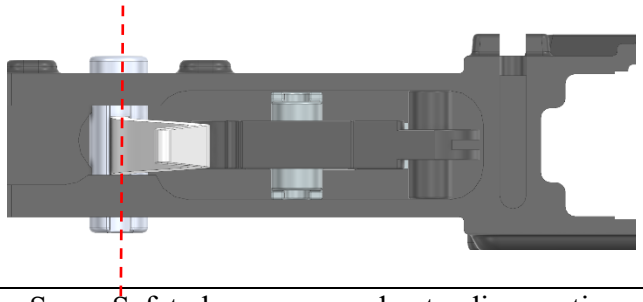
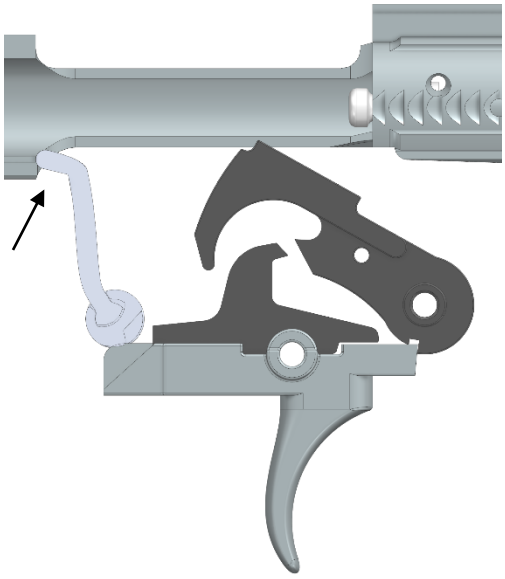
60. On information and belief, Defendants have and continue to willfully infringe, induce others to infringe, and/or contribute to the infringement of one or more claims of the ’784 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents.

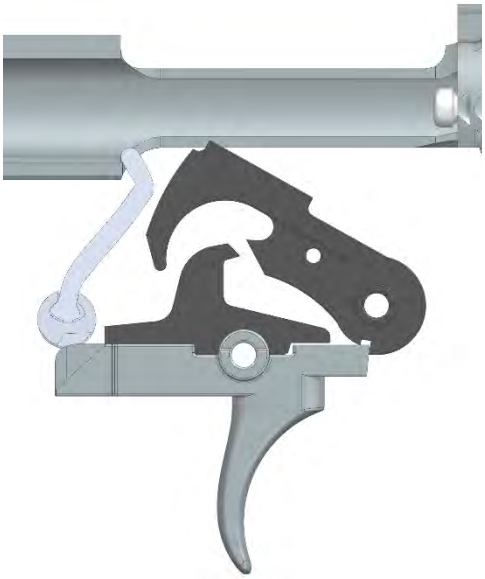
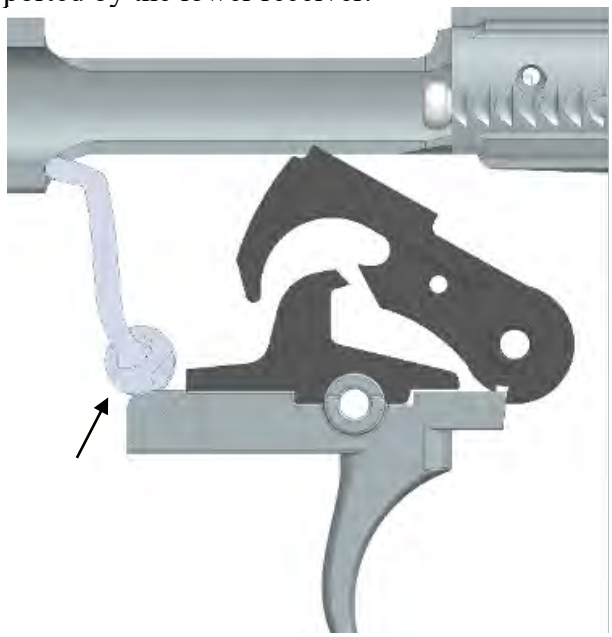
61. An exemplary comparison of the Super Safety, when assembled and used as intended, with claim 1 of the ’784 Patent is illustrated in the chart below:

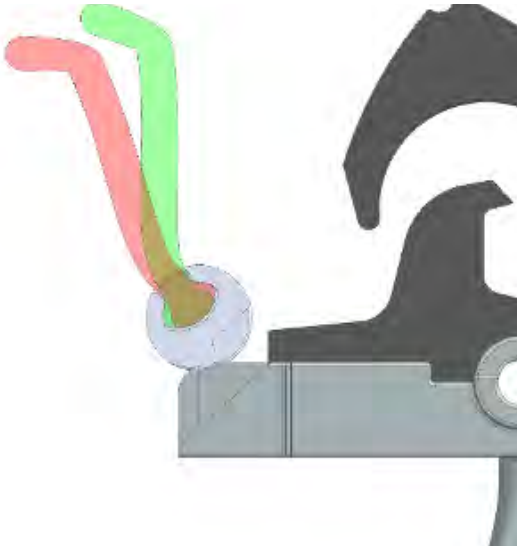
’784 Patent, Claim 1	**Infringing Device (Super Safety)**
1. In a forced reset trigger mechanism, an extended trigger member locking device, comprising:	When installed and used as directed, the Super Safety is part of a forced reset trigger mechanism and functions as an extended trigger member locking device.  https://area43.co/collections/ar15-ar9  **Super Safety** Ex. J, Super Safety 3D Printed Active Trigger System v4.4, Hoffman Tactical (July 19, 2023) (“Super Safety Guide”) at 12.

'784 Patent, Claim 1	**Infringing Device (Super Safety)**
	 **Super Safety Installed** (Plaintiff-generated renderings of Super Safety here and below; Locking member and bolt carrier shown here and below in section view for clarity) "The Super Safety is a mechanism that actively resets the trigger of a firearm to allow the operator to fire again, quickly, and efficiently. The Super Safety has been designed to operate with AR-15 pattern firearms that use a mil-spec bolt carrier and fire control group." Ex. J, Super Safety Guide at 1.
a locking member that is movable between a first position in which it locks a trigger against pulling movement	The Super Safety operates as a locking member and has a first position in which the Super Safety locks the trigger member against pulling movement.

'784 Patent, Claim 1	**Infringing Device (Super Safety)**
	 **Locked First Position**
and a second position where it does not restrict movement of the trigger member,	The Super Safety is moveable from the first position to a second position where it does not restrict movement of the trigger member.  **Unlocked Second Position**
the locking member configured to be movably supported by a frame	The Super Safety is movably (pivotally about the axis depicted below) supported by a frame (the lower receiver).

'784 Patent, Claim 1	**Infringing Device (Super Safety)**
	 
and including a generally upward extension portion configured to make actuating contact with a surface of the bolt carrier,	The Super Safety has an upward extending portion (lever arm) configured to make actuating contact with a surface of the bolt carrier. 
such actuating contact causing the locking member to move from the first position to the second position,	The actuating contact causes the locking member to move from the first position to the second position.

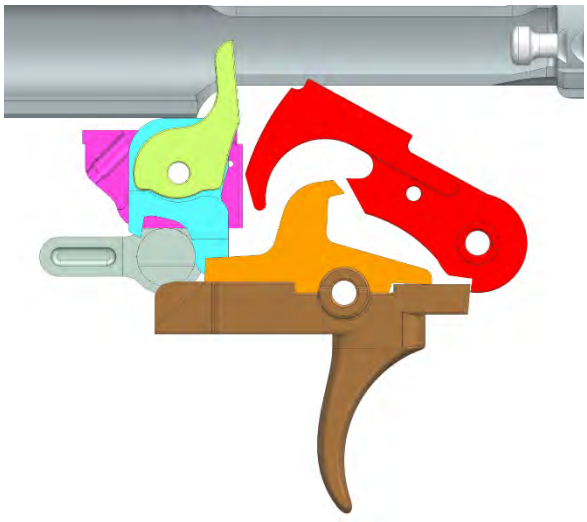
'784 Patent, Claim 1	**Infringing Device (Super Safety)**
	 **Unlocked Second Position**
the locking member having a body portion that is movably supported	The Super Safety has a body portion that is movably supported by the lower receiver. 
and an upwardly extending deflectable portion that is separately movable relative to the body portion between an extended position	The Super Safety has an upwardly extending deflectable portion (lever arm). The dovetail connection is designed to allow separate movement of the lever arm relative to the body portion between one position (depicted in red) where it is extended and

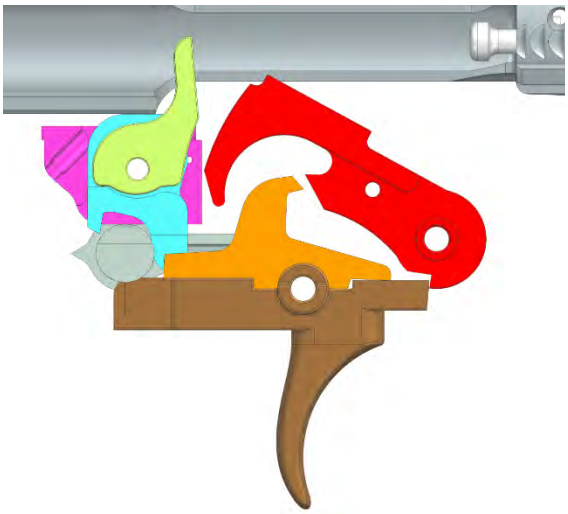
'784 Patent, Claim 1	Infringing Device (Super Safety)
	another position where it is deflected (depicted in green).  Below illustrates the upward extending deflectable portion's (lever arm) total separate travel with an overlay of the lever in both positions without the body portion moving.  "The dovetail joint does not immediately transfer torque from the lever to the cam. The lever pivots in the cam until the void is filled. Once the void is filled the hammer can transfer torque to the cam via the upper and lower contact surfaces and. Note that the void, the lower contact surface, and the upper contact surface, are shown on arbitrary sides of the dovetail,

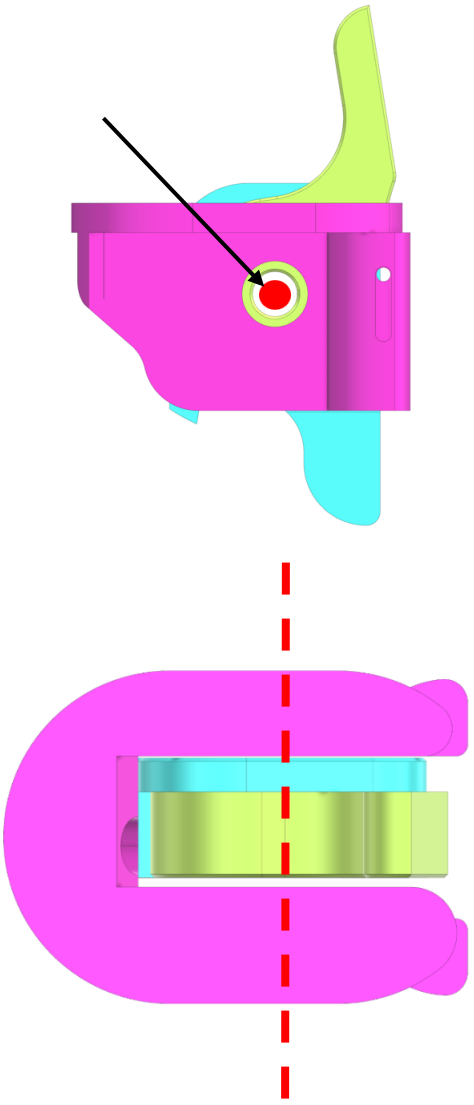
’784 Patent, Claim 1	Infringing Device (Super Safety)
	these features may be on either side of the dovetail depending on which direction the lever is moving. The amount that the lever rotates in the dovetail before transferring torque to the cam is such that as the bolt carrier completes its forward movement, the cam rotates the neutral surface away from the cam follower and to a point where the cam follower begins to slide against the cam surface.” (reference numerals removed for clarity). Ex. J, Super Safety Guide at 4. https://www.scribd.com/document/843484122/Super-Safety-Documentation
and a deflected position.	The lever is now shown deflected independent of the body. 

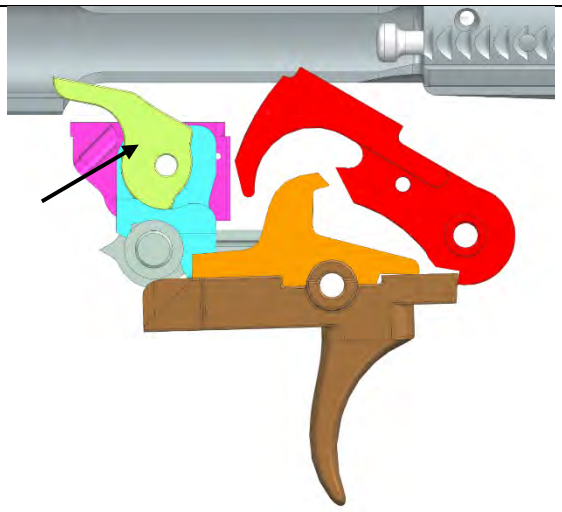
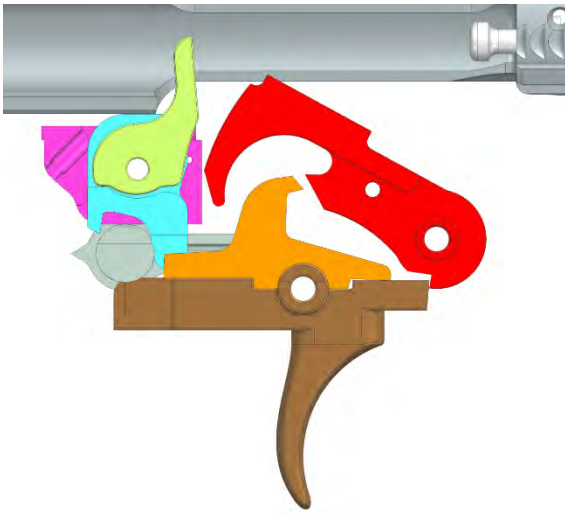
62. An exemplary comparison of the Kabuto, when assembled and used as intended, with claim 1 of the ’784 Patent is illustrated in the chart below:

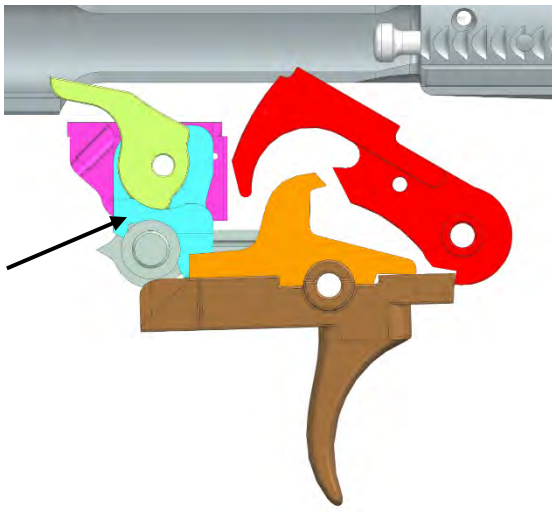
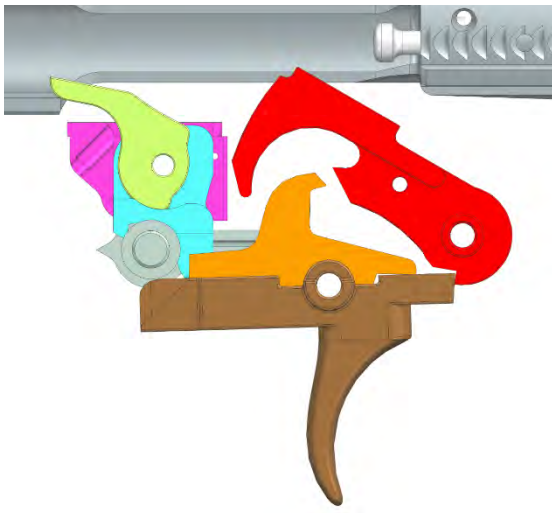
’784 Patent, Claim 1	The Kabuto
1. In a forced reset trigger mechanism, an extended trigger member locking device, comprising:	When installed and used as directed, the Kabuto is part of a reset trigger mechanism and functions as an extended trigger member locking device.

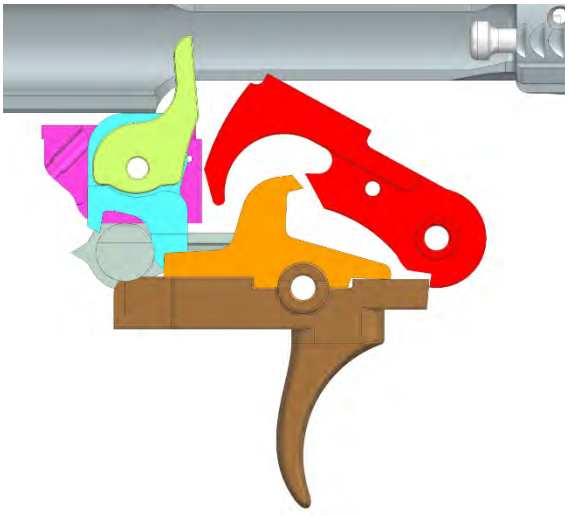
’784 Patent, Claim 1	The Kabuto
	 https://area43.co/collections/ar15-ar9  **The Kabuto**  **Kabuto Installed** (Plaintiff-generated renderings of Kabuto here and below)

'784 Patent, Claim 1	**The Kabuto**
a locking member that is movable between a first position in which it locks a trigger against pulling movement	The Kabuto (yellow, blue, and purple) operates as a locking member and has a first position in which the Kabuto locks the trigger member against pulling movement.  **Locked First Position**
and a second position where it does not restrict movement of the trigger member,	The Kabuto (yellow, blue, and purple) is moveable from the first position to a second position where it does not restrict movement of the trigger member.  **Unlocked Second Position**

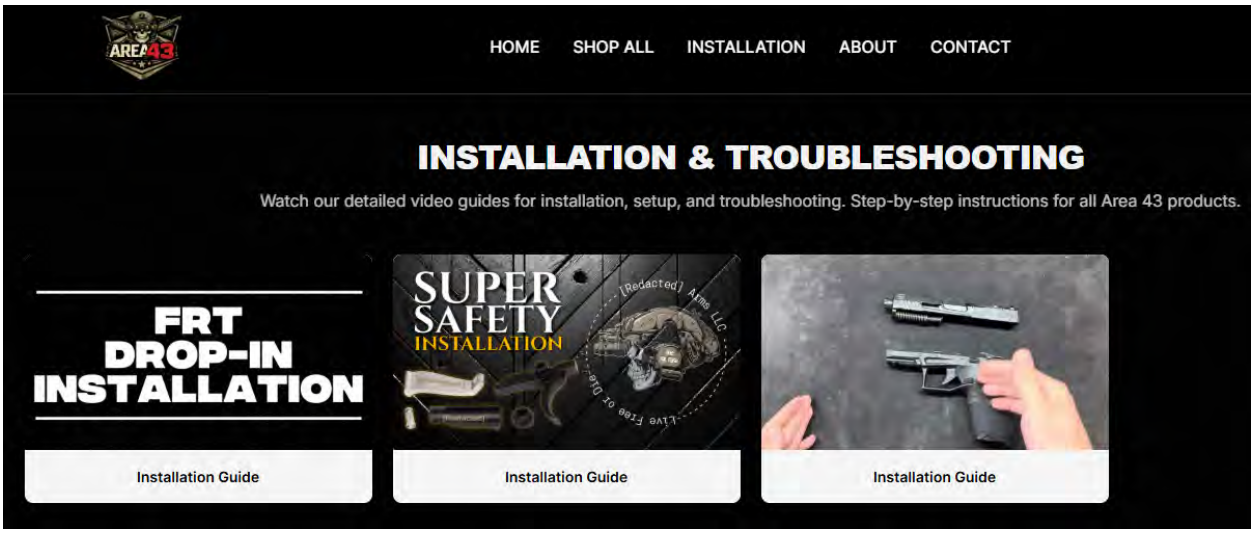
the locking member is configured to be movably supported by a frame	The Kabuto (yellow, blue, and purple) is movably (pivotally about the axis depicted below) supported by a frame (purple). 
and including a generally upward extension portion configured to make actuating contact with a surface of the bolt carrier,	The Kabuto (yellow, blue, and purple) has an upward extending portion (the "lever arm," yellow) configured to make actuating contact with a surface of the bolt carrier.

	
such actuating contact causing the locking member to move from the first position to the second position,	The actuating contact causes the locking member to move from the first position to the second position.  **Unlocked Second Position**

the locking member having a body portion that is movably supported	The Kabuto (yellow, blue, and purple) has a body portion (blue) that is movably supported by a housing (purple). 
and an upwardly extending deflectable portion that is separately movable relative to the body portion between an extended position	The Kabuto (yellow, blue, and purple) has an upwardly extending deflectable portion (lever arm).  The below illustrates the lever arm's (upward extending deflectable portion) total separate travel with an overlay of the lever in both positions without the body portion moving.

	
and a deflected position.	The lever is now shown deflected independent of the body. 

63. On information and belief, in addition to direct infringement, Defendants take active steps to induce others, including their customers, to directly infringe the '784 patent. Defendants take such active steps knowing that those steps will induce, encourage, and facilitate direct infringement by others. Such active steps include, but are not limited to, installation of, encouraging, advertising, promoting, and instructing others to use and/or how to use the Super Safety and Kabuto while selling products. One example of this is the promotional material found on Defendants' website (https://area43.co/pages/installation) that informs customers to install the Infringing Devices into an AR15:



64. On information and belief, Defendants know or should know that such activities induce others to directly infringe at least claim 1 of the '784 Patent.

65. On information and belief, Defendants also contribute to the infringement of the '784 Patent by others, including their customers. Acts by Defendants that contribute to the infringement of others include, but are not limited to, the sale, offer for sale, and/or importation by Defendants of the components of the Super Safety and Kabuto, such as the cam or cam lever arm. The components are not suitable for substantial noninfringing use as they are specially designed

and adapted to be used in a fire control unit to mechanically reset a trigger mechanism and infringe the ’784 Patent.

66. Defendants have engaged in egregious infringement behavior with knowledge of the ’784 Patent, which has been duly issued by the USPTO, and is presumed valid. On information and belief, Defendants have known or should have known that their actions constituted and continue to constitute infringement of the ’784 Patent and that the ’784 Patent is valid at least through the service of this complaint. Defendants could not reasonably or subjectively believe that their actions do not constitute infringement of the ’784 Patent, nor could they reasonably or subjectively believe that the patent is invalid. Despite that knowledge and subjective belief, and the objectively high likelihood that their actions constitute infringement, Defendants have continued their infringing activities. As such, Defendants willfully infringe the ’784 Patent.

67. By their actions, Defendants have injured Plaintiffs and are liable to Plaintiffs for infringement of the ’784 Patent pursuant to 35 U.S.C. § 271.

68. By their actions, Defendants’ infringement of the ’784 Patent has irreparably injured Plaintiffs. Unless such infringing acts are enjoined by this Court, Plaintiffs will continue to suffer additional irreparable injury.

69. By their actions, Defendants’ infringement of the ’784 Patent has damaged and continues to damage, Plaintiffs in an amount yet to be determined.

70. Defendants’ infringement of the ’784 patent is exceptional and entitles Plaintiffs to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

71. Defendants’ acts of infringement are willful and for no other purpose than to deliberately and irreparably harm Plaintiffs’ business, sales, reputation, and good-will.

72. Plaintiffs have been substantially harmed by Defendants' infringing activities and are entitled to relief including but not limited to a preliminary injunction, a permanent injunction, damages adequate to compensate for the infringement, being lost profits or no less than a reasonable royalty, treble damages, and attorneys' fees.

COUNT III — INFRINGEMENT OF THE '538 PATENT

73. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

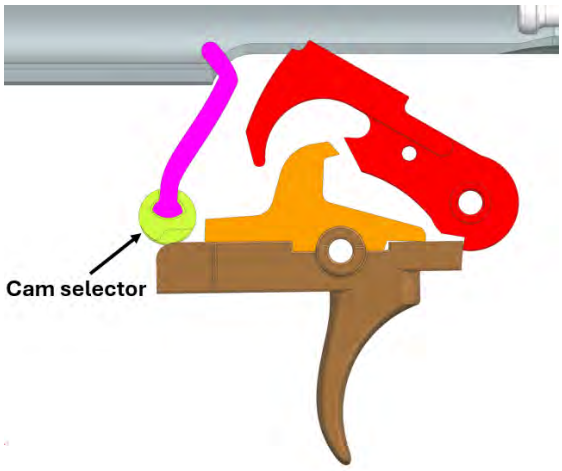
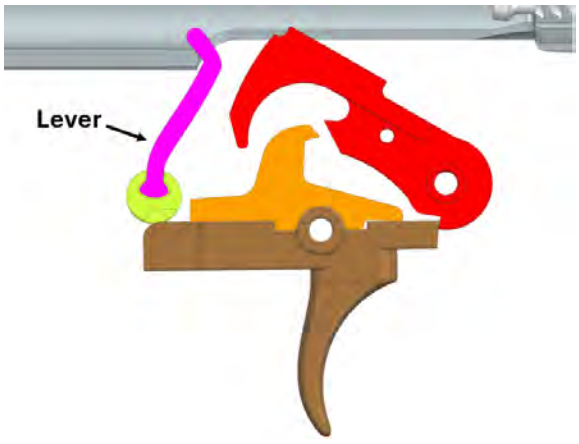
74. In violation of 35 U.S.C. § 271, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the '538 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents, by among other things, making, using, offering for sale, selling, and/or importing into the United States unlicensed products in a manner that infringes the '538 patent. Such unlicensed products include the Super Safety.

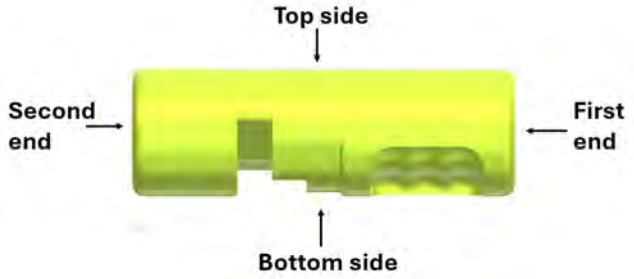
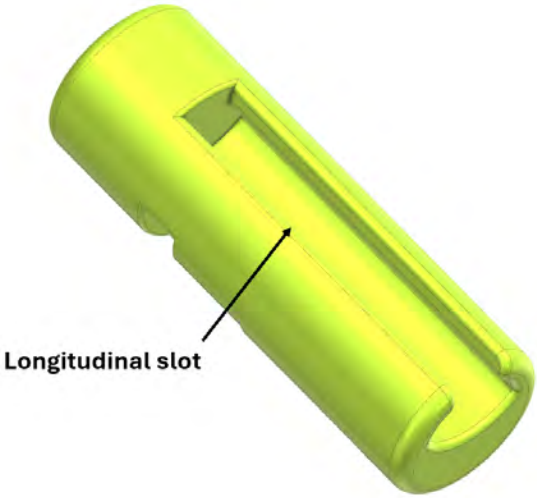
75. On information and belief, Defendants have and continue to willfully infringe, induce others to infringe, and/or contribute to the infringement of one or more claims of the '538 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents.

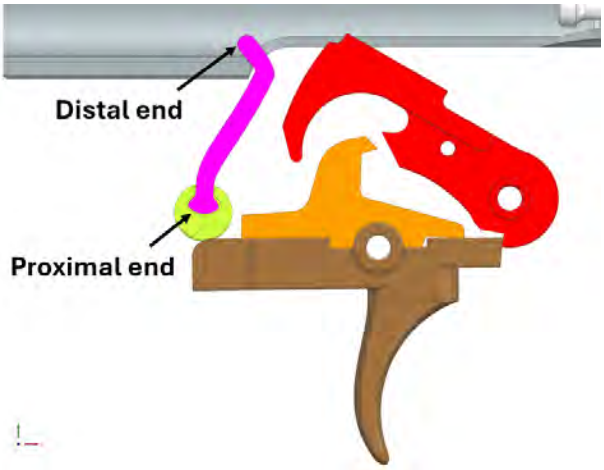
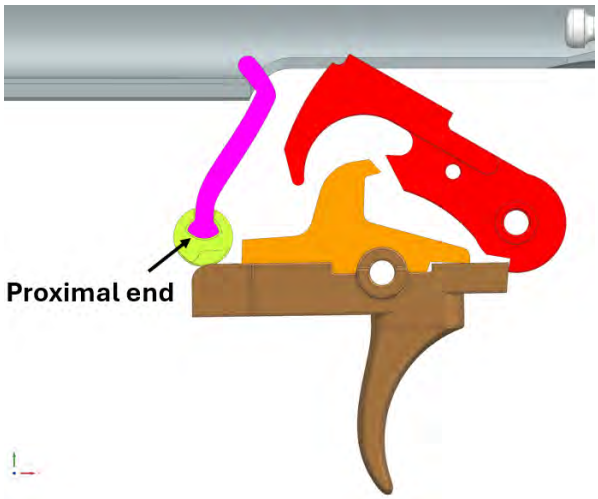
76. An exemplary comparison of the Super Safety, when assembled and used as intended, with claim 1 of the '538 Patent is illustrated in the chart below:

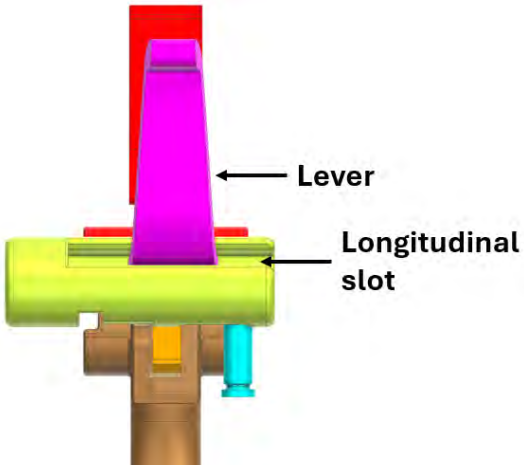
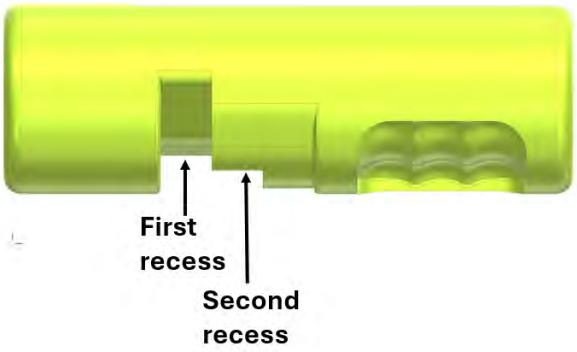
'538 Patent, Claim 1	**The Super Safety**
1. A safety mechanism for a firearm comprising:	The Super Safety is part of a trigger mechanism installed into a firearm receiver in place of a standard safety.

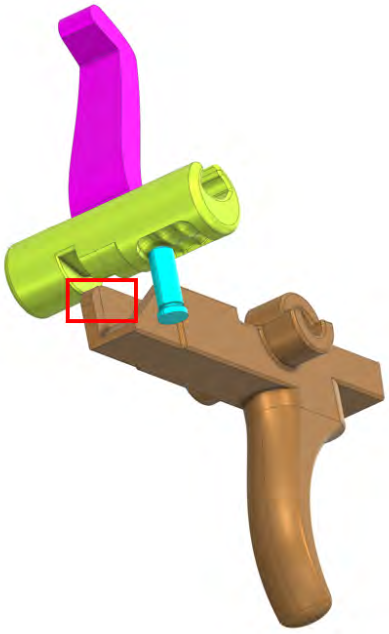
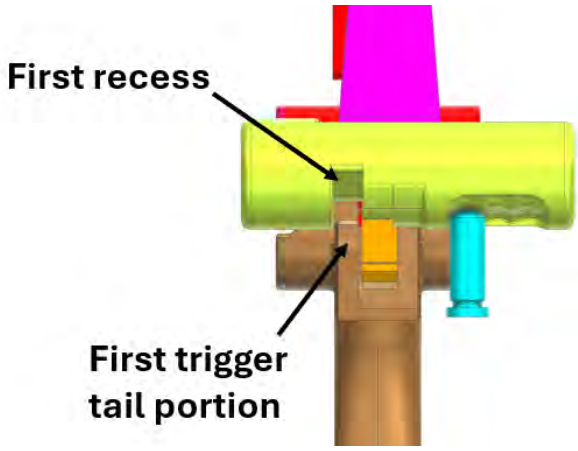
’538 Patent, Claim 1	The Super Safety
	 https://area43.co/collections/ar15-ar9  **Super Safety** Ex. J, Super Safety 3D Printed Active Trigger System v4.4, Hoffman Tactical (July 19, 2023) (“Super Safety Guide”) at 12.  **Super Safety Installed** (Plaintiff-generated renderings of Super Safety here and below; cam selector and bolt carrier shown in section view for clarity)

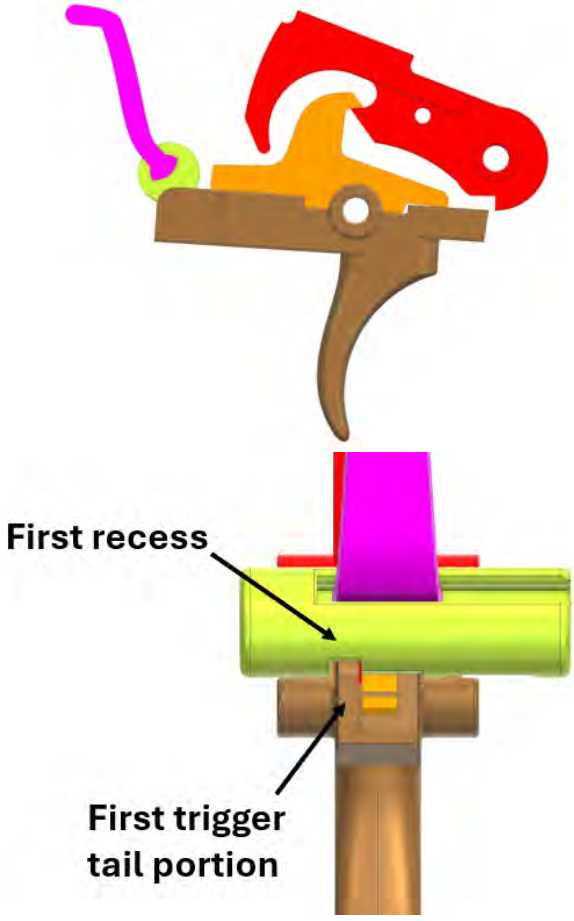
'538 Patent, Claim 1	**The Super Safety**
a cam selector;	The Super Safety includes a dual mode cam selector that allows for selection of safe, active reset, and passive reset modes.  **Dual Mode Cam Selector** Ex. J, Super Safety Guide at 1. 
a lever;	The Super Safety has a lever (pink) extending upward from the cam selector. 

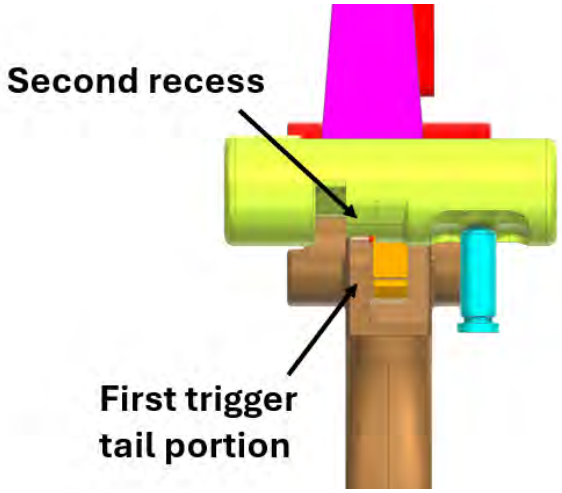
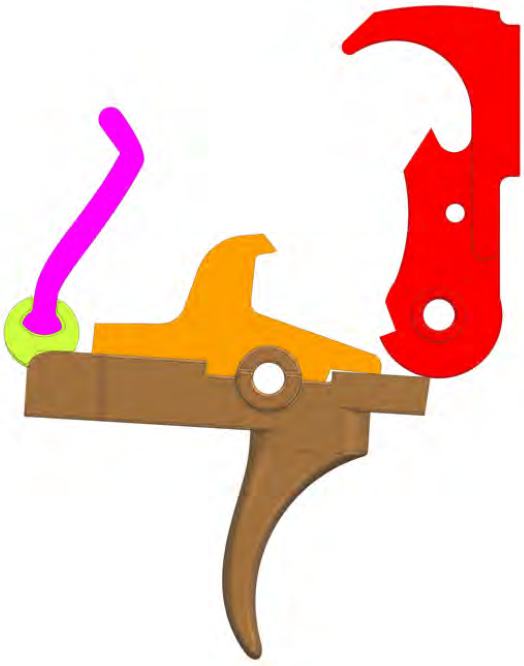
'538 Patent, Claim 1	**The Super Safety**
a trigger;	The cam selector operates on a trigger. (brown) 
the cam selector comprising a first end, a second end, a top side, and a bottom side;	The Super Safety dual mode cam selector has two ends, a top side, and a bottom side as illustrated below. 
the cam selector comprising a longitudinal slot positioned on the top side of the cam selector;	The Super Safety dual mode cam selector comprises a longitudinal slot that is positioned on the top side and extends along the cam selector. 

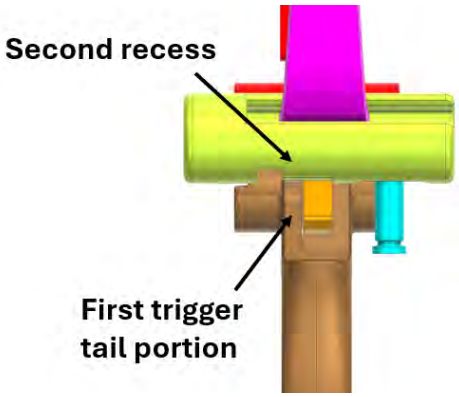
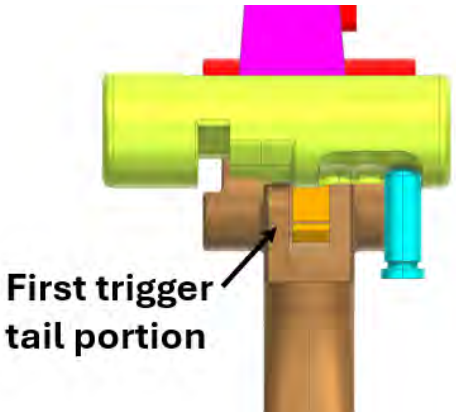
'538 Patent, Claim 1	**The Super Safety**
the lever comprising a proximal end and a distal end;	The Super Safety lever (pink) has a proximal end and a distal end, as illustrated below. 
the longitudinal slot being configured to receive the proximal end of the lever;	The longitudinal slot on the top side of the cam selector (yellow) is configured to receive the proximal end of the lever (pink).  Ex. J, Super Safety Guide at 12 

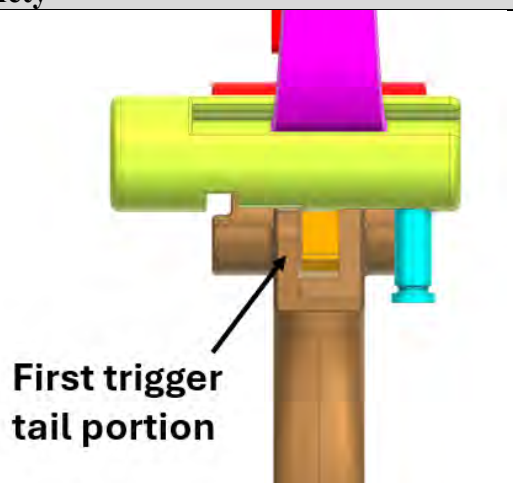
’538 Patent, Claim 1	The Super Safety
	 **Super Safety Installed**
the cam selector further comprising a first recess and a second recess on the bottom side of the cam selector;	The Super Safety dual mode cam selector has a first recess and a second recess on the bottom side of the cam. 
the trigger comprising a first trigger tail portion;	The Super Safety dual mode trigger has a first trigger tail portion, shown in the red box below.  Ex. J, Super Safety Guide at 10.

'538 Patent, Claim 1	**The Super Safety**
	
the cam selector being configured to operate between a first mode, a second mode, and a third mode;	The Super Safety dual mode cam is operable in three modes: (1) passive reset (standard semi-automatic) (2) active reset, and (3) safe. Ex. J, Super Safety Guide at 1.
wherein the first mode of the cam selector is configured to allow the first trigger tail portion to be movable within the first recess,	The Super Safety dual mode cam selector is operable in standard semi-automatic mode, in which the first trigger tail aligns with the first recess of the cam.  **Standard Semi-Automatic Mode** When the cam selector is in the first mode, the first trigger tail portion is movable within the first recess of the cam.

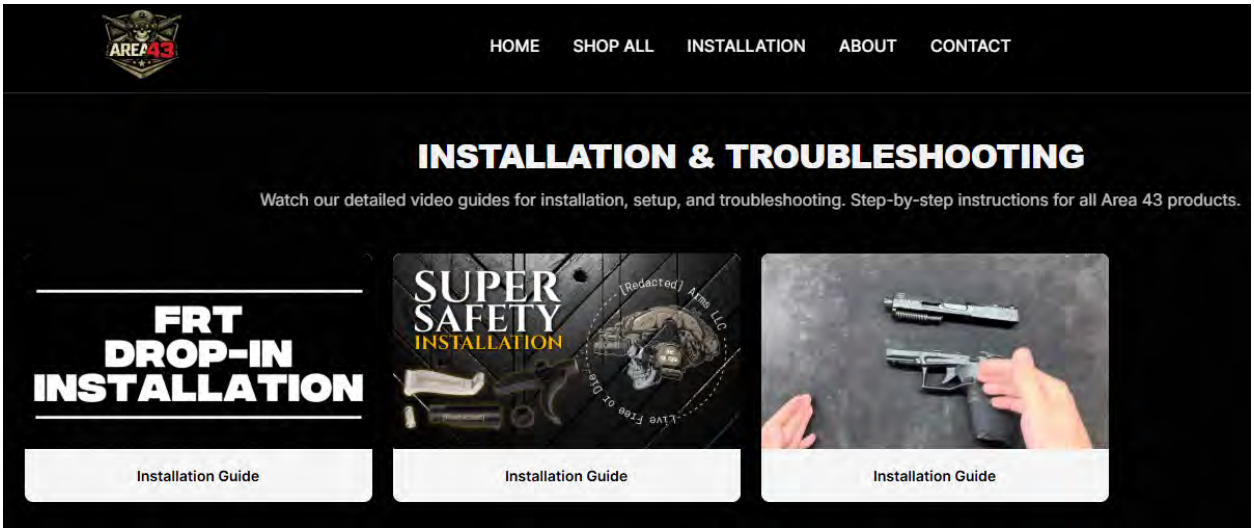
’538 Patent, Claim 1	The Super Safety
	 **Super Safety Installed**  **Super Safety Installed, Trigger Pulled, Lever and Cam Rotated**

’538 Patent, Claim 1	The Super Safety
wherein the second mode of the cam selector is configured to allow the first trigger tail portion to engage the second recess	The Super Safety dual mode cam selector is operable in active reset mode, in which the first trigger tail aligns with the second recess of the cam.  **Active Reset Mode**
and be moved down by a cam portion of the second recess when the cam selector rotates,	In the second mode, when the cam is rotated by the lever, the cam selector portion of the second recess moves the first trigger tail portion down.  **Super Safety Installed, Trigger Pulled**

’538 Patent, Claim 1	The Super Safety
	 **Super Safety Installed, Lever and Cam Rotated** 
and wherein the third mode of the cam selector is configured to prevent the trigger from being pulled.	The Super Safety dual mode cam is operable in safe mode, in which the first trigger tail portion does not align with a recess in the cam. The trigger is not movable within a recess of the cam, and the cam therefore prevents the trigger from being pulled. 

’538 Patent, Claim 1	The Super Safety
	

77. On information and belief, in addition to direct infringement, Defendants take active steps to induce others, including their customers, to directly infringe the ’538 patent. Defendants take such active steps knowing that those steps will induce, encourage, and facilitate direct infringement by others. Such active steps include, but are not limited to, installation of, encouraging, advertising, promoting, and instructing others to use and/or how to use the Super Safety while selling products. One example of this is the promotional material found on Defendants’ website (https://area43.co/pages/installation) that informs customers to install the Super Safety into an AR15:



78. On information and belief, Defendants know or should know that such activities induce others to directly infringe at least claim 1 of the ’538 Patent.

79. On information and belief, Defendants also contribute to the infringement of the ’538 Patent by others, including their customers. Acts by Defendants that contribute to the infringement of others include, but are not limited to, the sale, offer for sale, and/or importation by Defendants of the components of the Super Safety, such as the cam or cam lever arm. The components are not suitable for substantial noninfringing use as they are specially designed and adapted to be used in a fire control unit to mechanically reset a trigger mechanism and infringe the ’538 Patent.

80. Defendants have engaged in egregious infringement behavior with knowledge of the ’538 Patent, which has been duly issued by the USPTO, and is presumed valid. On information and belief, Defendants have known or should have known that their actions constituted and continue to constitute infringement of the ’538 Patent and that the ’538 Patent is valid at least through the service of this complaint. Defendants could not reasonably or subjectively believe that their actions do not constitute infringement of the ’538 Patent, nor could they reasonably or subjectively believe that the patent is invalid. Despite that knowledge and subjective belief, and the objectively high likelihood that their actions constitute infringement, Defendants have continued their infringing activities. As such, Defendants willfully infringe the ’538 Patent.

81. By their actions, Defendants have injured Plaintiffs and are liable to Plaintiffs for infringement of the ’538 Patent pursuant to 35 U.S.C. § 271.

82. By their actions, Defendants’ infringement of the ’538 Patent has irreparably injured Plaintiffs. Unless such infringing acts are enjoined by this Court, Plaintiffs will continue to suffer additional irreparable injury.

83. By their actions, Defendants' infringement of the '538 Patent has damaged and continues to damage, Plaintiffs in an amount yet to be determined.

84. Defendants' infringement of the '538 patent is exceptional and entitles Plaintiffs to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

85. Defendants' acts of infringement are willful and for no other purpose than to deliberately and irreparably harm Plaintiffs' business, sales, reputation, and good-will.

86. Plaintiffs have been substantially harmed by Defendants' infringing activities and are entitled to relief including but not limited to a preliminary injunction, a permanent injunction, damages adequate to compensate for the infringement, being lost profits or no less than a reasonable royalty, treble damages, and attorneys' fees.

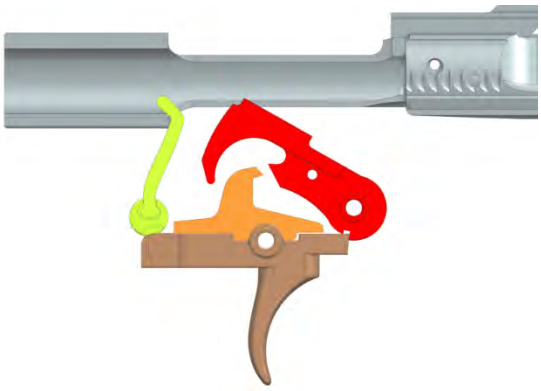
COUNT IV — INFRINGEMENT OF THE '159 PATENT

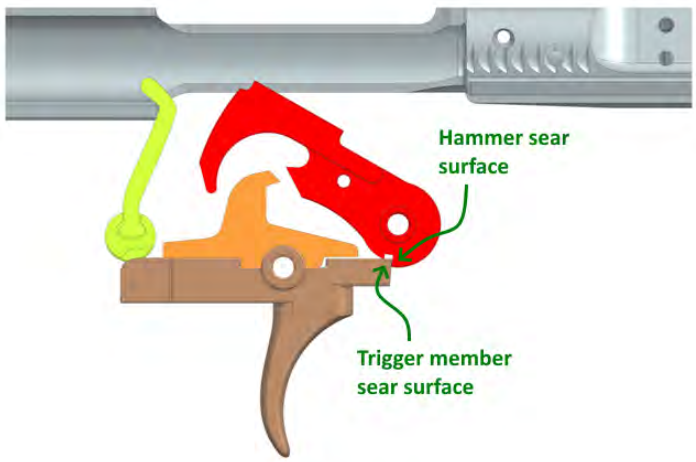
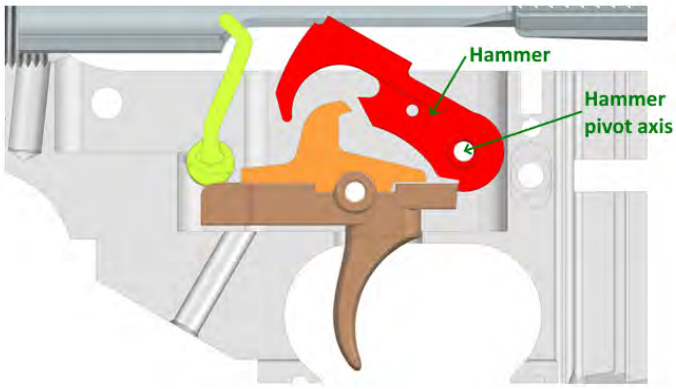
87. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

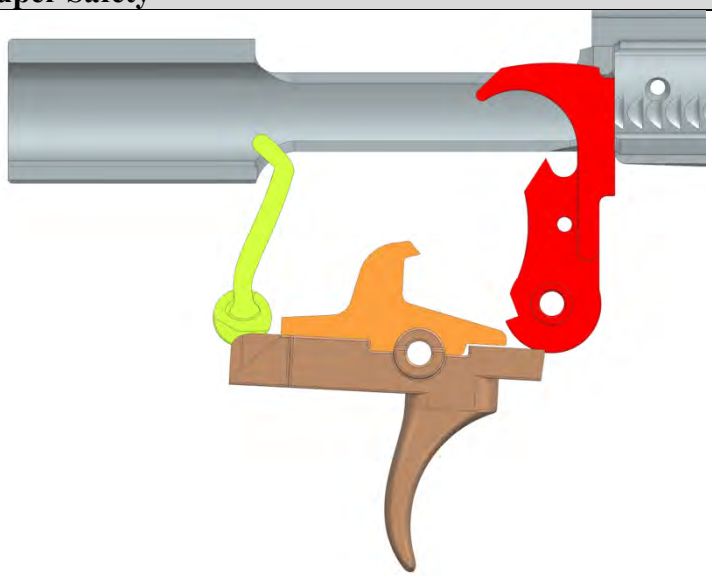
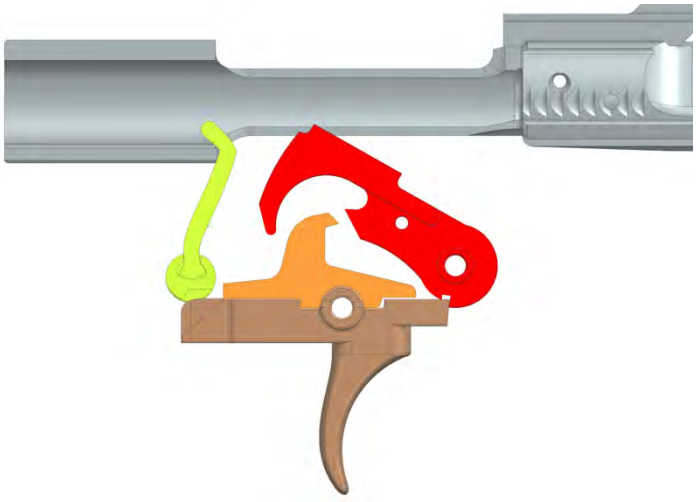
88. In violation of 35 U.S.C. § 271, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the '159 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents, by among other things, making, using, offering for sale, selling, and/or importing into the United States unlicensed products in a manner that infringes the '159 patent. Such unlicensed products include the Super Safety and Kabuto.

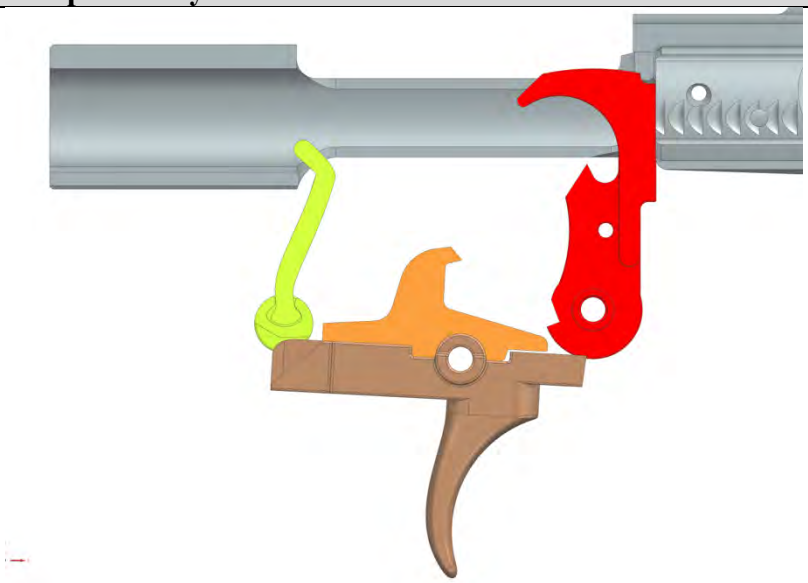
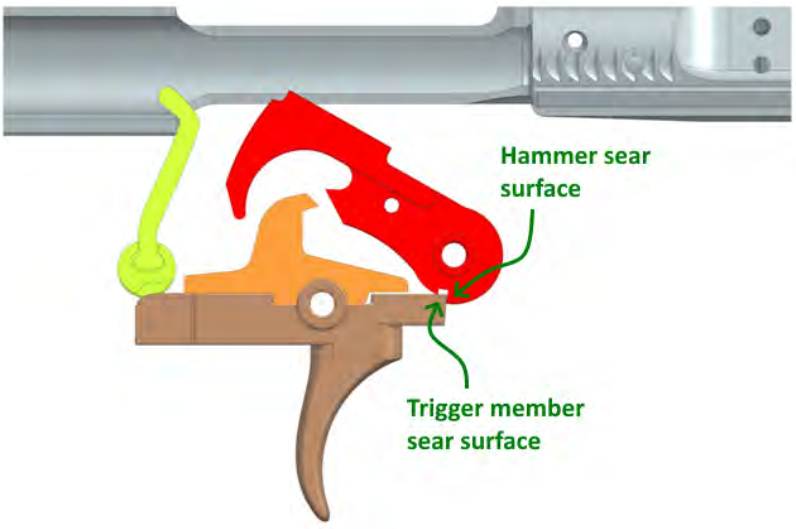
89. On information and belief, Defendants have and continue to willfully infringe, induce others to infringe, and/or contribute to the infringement of one or more claims of the '159 patent, including but not limited to claim 1, literally and/or under the doctrine of equivalents.

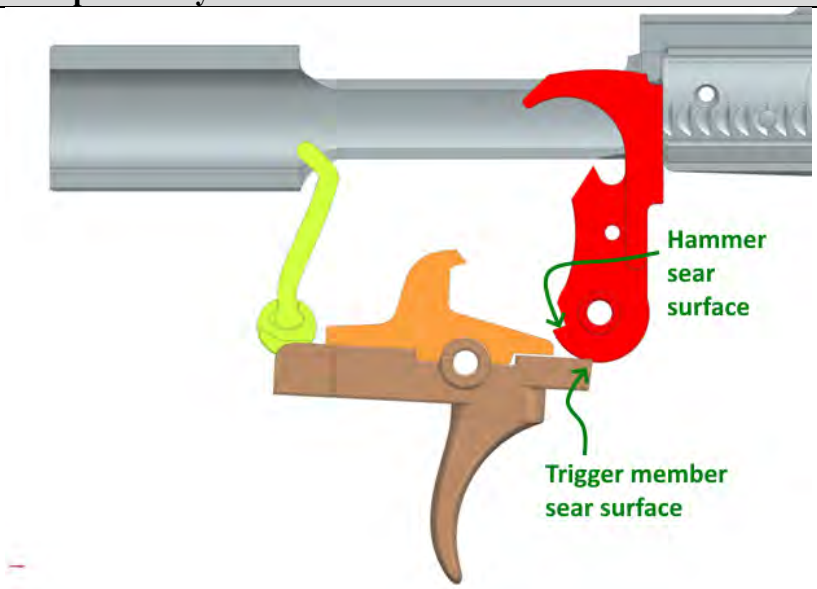
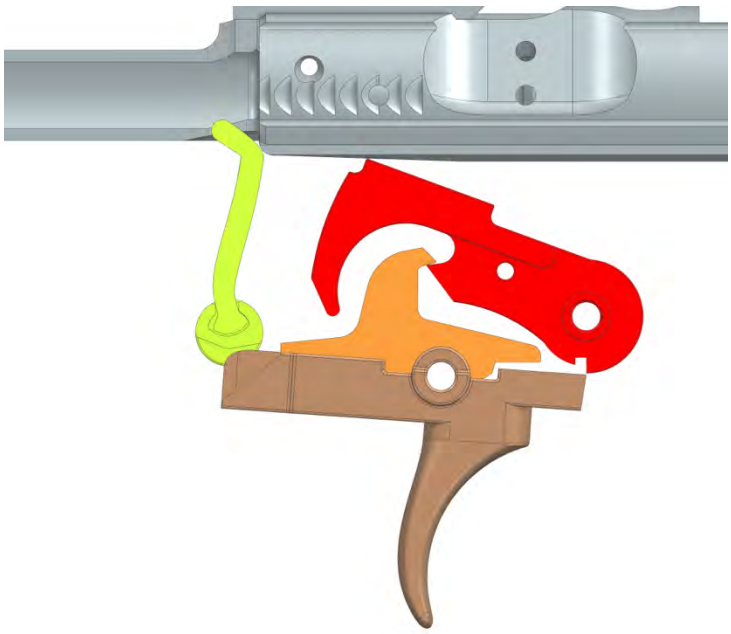
90. An exemplary comparison of the Super Safety, when assembled and used as intended, with claim 1 of the '159 Patent is illustrated in the chart below:

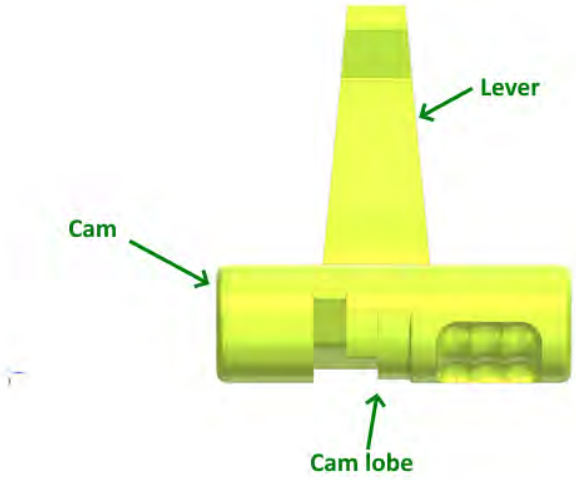
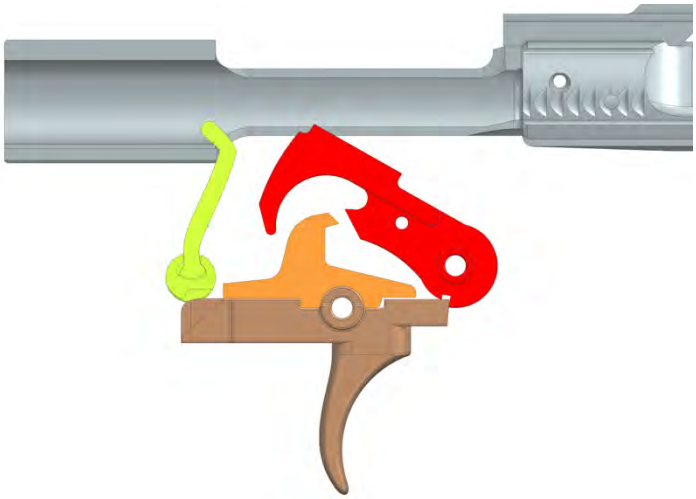
'159 Patent, Claim 1	**The Super Safety**
1. A firearm trigger mechanism for a firearm having a fire control mechanism pocket and a reciprocating bolt means, the trigger mechanism operable in a first, standard semi-automatic mode and in a second, forced reset semi-automatic mode, the mechanism comprising:	When installed and used as directed, the Super Safety is part of a reset trigger mechanism that uses a bolt means. With the Super Safety installed, the trigger mechanism operates in a standard semi-automatic mode and a semi-automatic mode  https://area43.co/collections/ar15-ar9  **Super Safety** Ex. J, Super Safety 3D Printed Active Trigger System v4.4, Hoffman Tactical (July 19, 2023) ("Super Safety Guide") at 12  **Super Safety (Installed)** (Plaintiff-generated renderings of the Super Safety here and below)

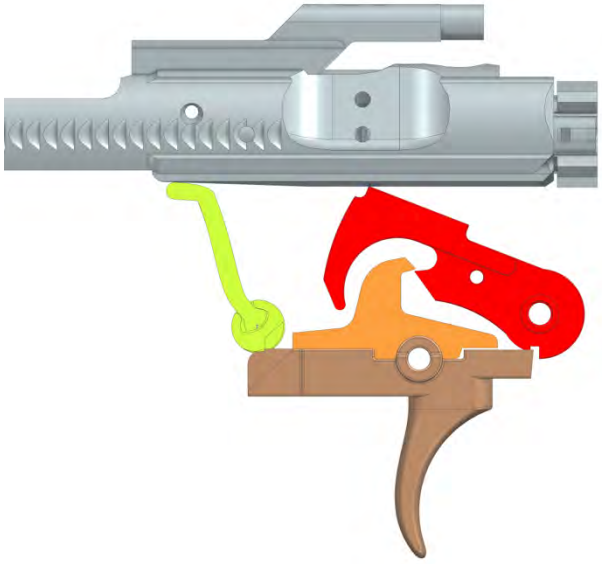
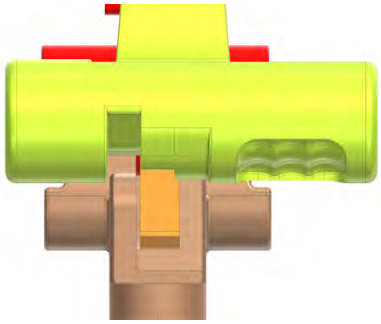
’159 Patent, Claim 1	The Super Safety
a hammer having a sear surface and a hook for engaging a disconnector and adapted to be mounted in a fire control mechanism pocket of a receiver	The Super Safety (yellow) is installed in a fire control mechanism pocket of a receiver along with a hammer (red) that has a sear surface and a hook for engaging a disconnector (orange).  **Super Safety (Installed)**
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 means,	The hammer (red) pivots on a transverse hammer pivot axis between set and released positions, depicted below. The hammer is adapted to be pivoted rearward by rearward movement of a bolt means.  **Hammer Set Position**

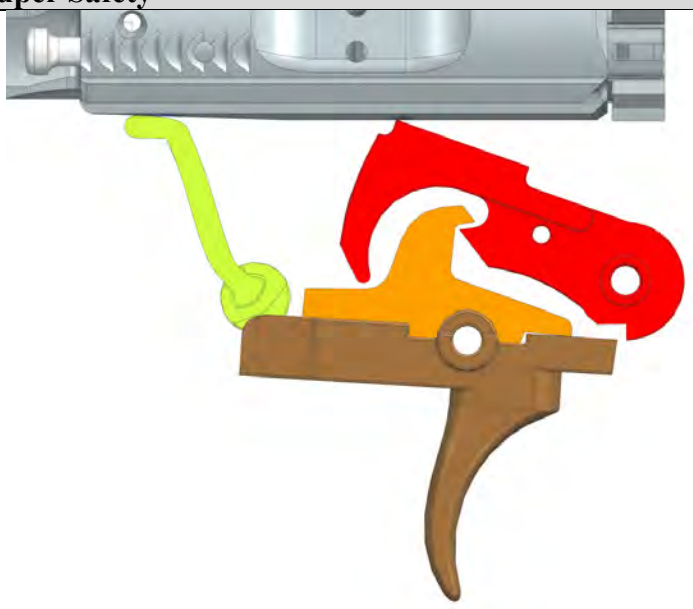
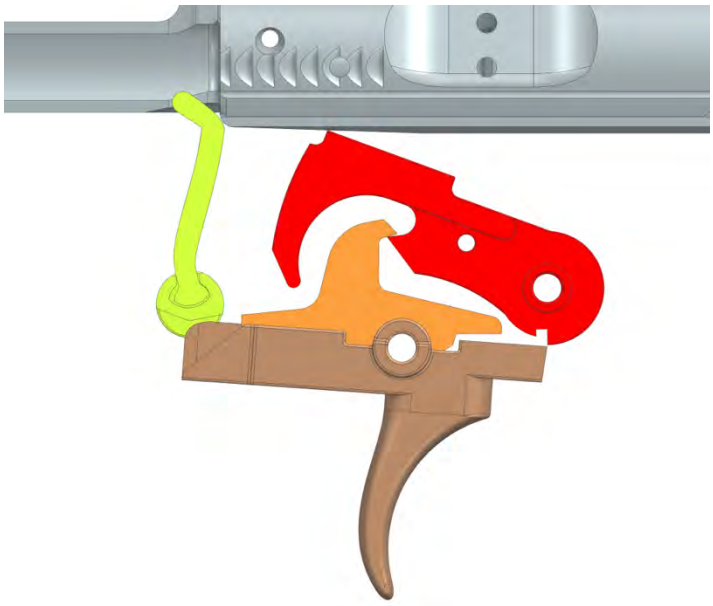
’159 Patent, Claim 1	The Super Safety
	 **Hammer Released Position**
a trigger member having a trigger sear surface and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and	The Super Safety (yellow) is installed with a trigger member (brown) in the fire control mechanism pocket and the trigger member pivots on a transverse trigger member pivot axis between set and released positions. The trigger member has a sear surface.  **Trigger Member Set Position**

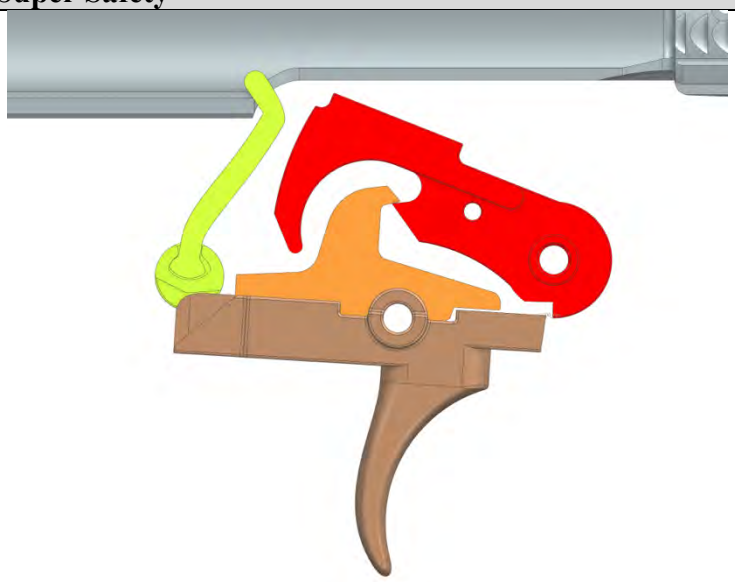
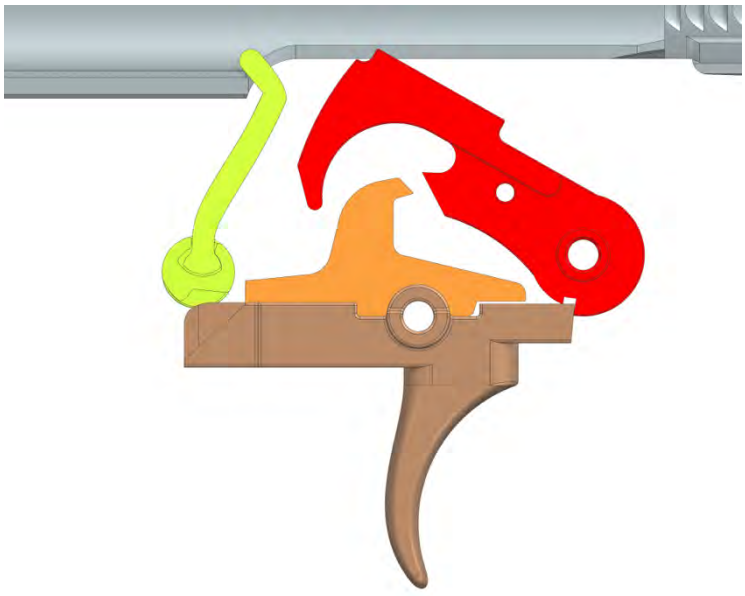
'159 Patent, Claim 1	The Super Safety
released positions,	 **Trigger Member Released Position**
wherein the trigger member sear surface and hammer sear surface are in engagement in the set positions of the hammer and trigger member	The sear surface of the trigger member (brown) and sear surface of the hammer (red) are in engagement when the hammer and trigger member are in their set positions.  **Trigger Member and Hammer Member Set Position**
and are out of engagement in the released positions of the hammer and trigger member,	The sear surface of the trigger member (brown) and sear catch surface of the hammer (red) are out of engagement in the released position.

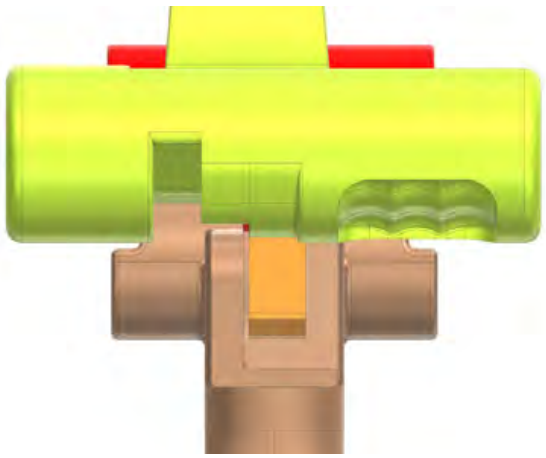
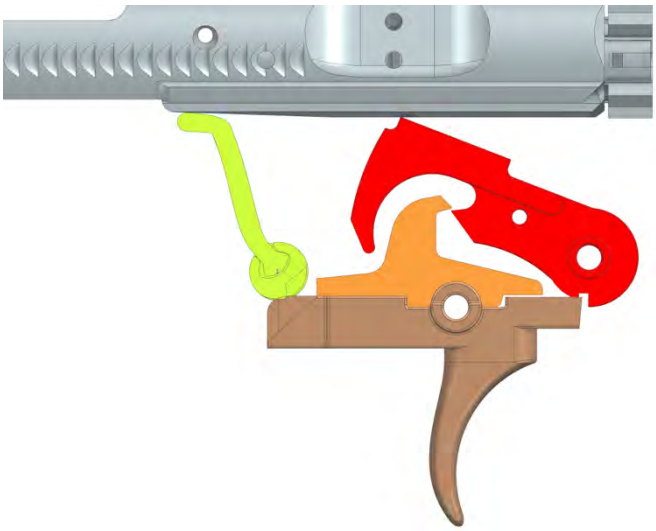
’159 Patent, Claim 1	The Super Safety
	 **Trigger Member and Hammer Member Released Positions**
the disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis, and	The disconnector (orange) is adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis. The disconnector has a hook for engaging the hammer (red).  **Disconnector Hook Engaged**
a cam having a cam lobe and adapted to be movably mounted in the	The Super Safety has a cam with a cam lobe and lever that is adapted to be movably mounted in the fire control mechanism pocket. (*See* image above depicting Super Safety, shown in yellow, in fire control mechanism pocket)

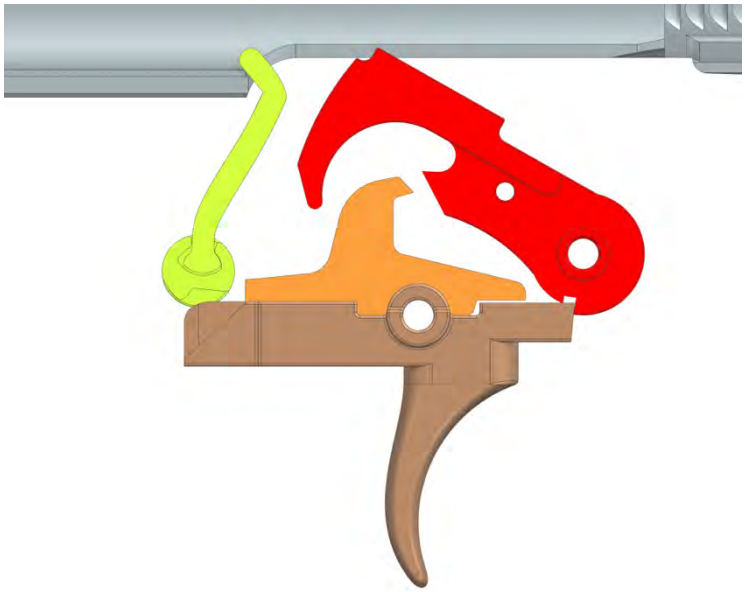
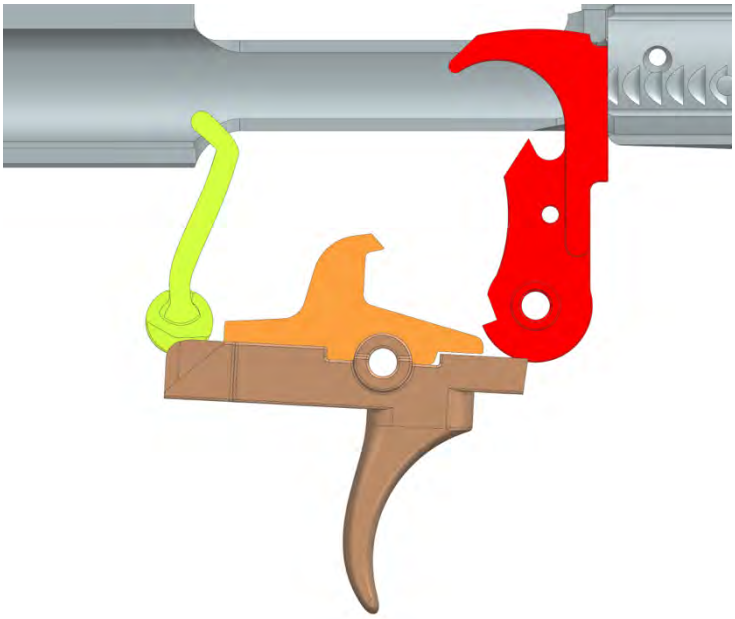
’159 Patent, Claim 1	The Super Safety
fire control mechanism pocket,	 **Super Safety Cam with Lobe and Lever**
the cam being movable between a first position and a second position, in the second position the cam lobe forces the trigger member toward the set position,	The cam is movable between a first position and a second position.  **Cam and Lobe First Position** In the second position, the cam lobe mechanically moves the trigger member (brown) toward the set position when the cam is in the “forced reset” semi-automatic mode.

’159 Patent, Claim 1	The Super Safety
	 **Cam and Lobe Second Position**
whereupon in the first mode,	While in the first (standard semi-automatic) mode, 
rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook,	. . . rearward movement of the bolt means causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook catches the hammer hook.

’159 Patent, Claim 1	The Super Safety
	 **Disconnector Hook Catches the Hammer**
and thereafter the bolt means moves forward into battery,	Thereafter, the bolt means moves forward into battery, 

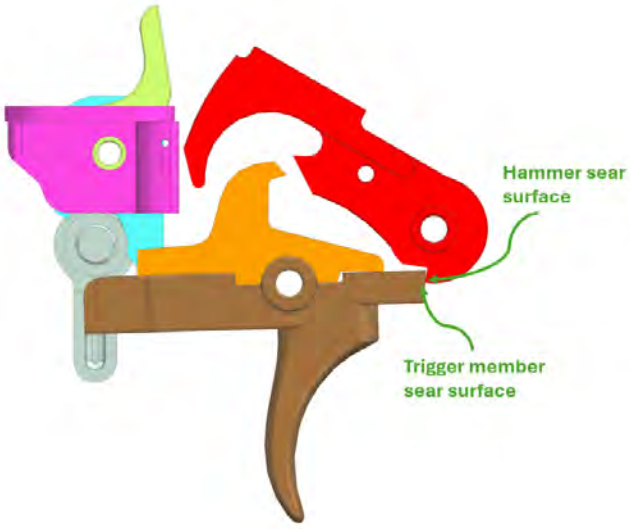
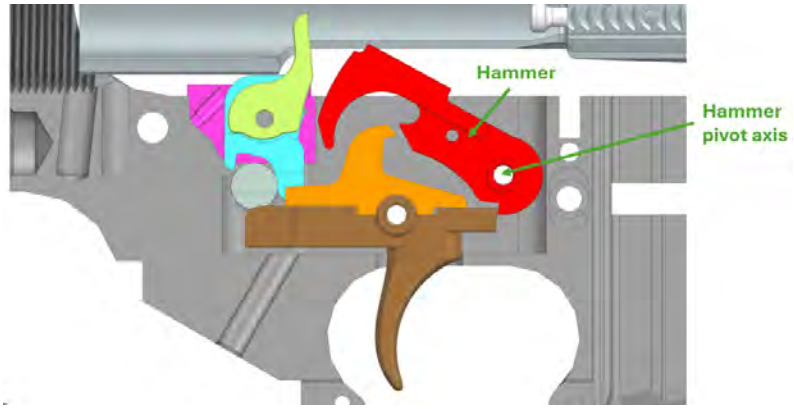
’159 Patent, Claim 1	The Super Safety
	 **Pressure on Trigger Member Prevents Reset**
at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm, and	. . . at which time a user must manually reduce pressure on the trigger member (brown) to free the hammer (red) from the disconnector (orange) 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.  **Reduced Pressure on Trigger Member Allows Reset**

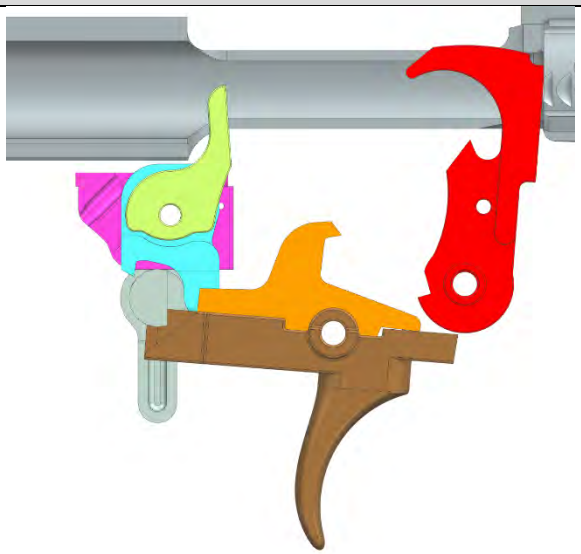
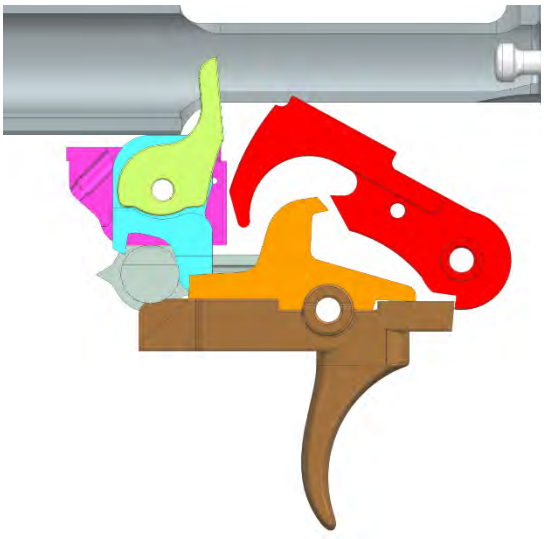
whereupon in a second mode,	When in the second ("forced reset" semi-automatic) mode, 
rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook is prevented from holding the hammer,	. . . rearward movement of the bolt means causes rearward pivoting of the hammer (red) and the cam to mechanically move the trigger member toward the reset position such that the disconnector (orange) hook is prevented from holding the hammer hook. 

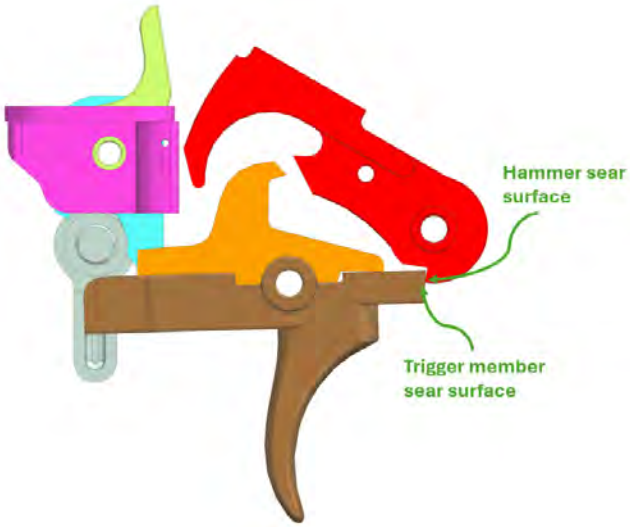
and thereafter the bolt means moves forward into battery,	Thereafter, the bolt means moves forward into battery and the hammer moves to its reset position, 
at which time the user can pull the trigger member to fire the firearm.	. . . at which time the user can pull the trigger member (brown) to fire the firearm without having to first release pressure on the trigger member. 

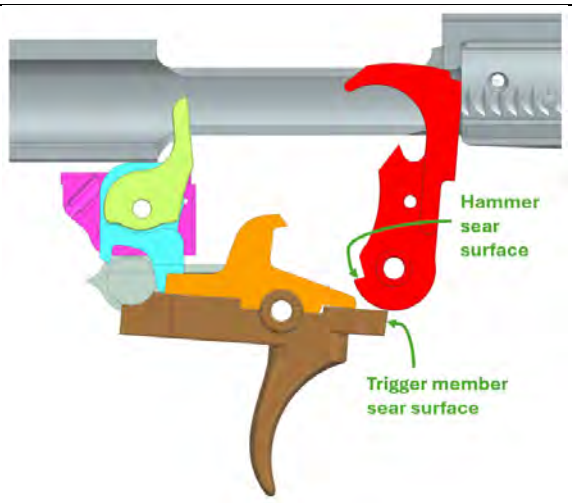
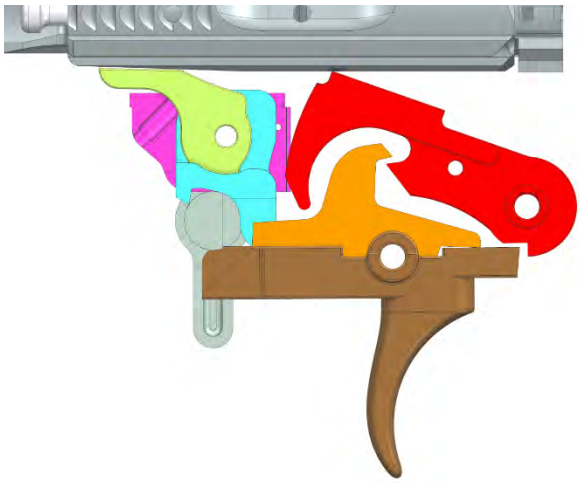
91. An exemplary comparison of the Kabuto, when assembled and used as intended, with claim 1 of the ’159 Patent is illustrated in the chart below:

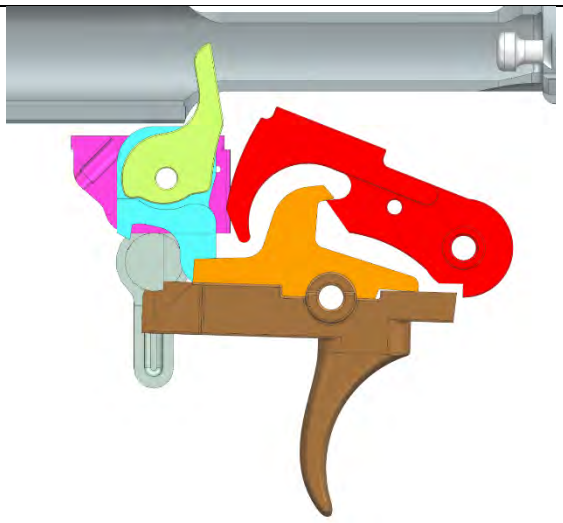
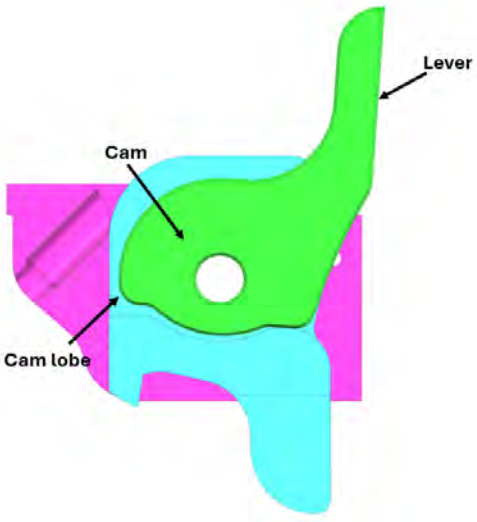
'159 Patent, Claim 1	**The Kabuto**
1. A firearm trigger mechanism for a firearm having a fire control mechanism pocket and a reciprocating bolt means, the trigger mechanism operable in a first, standard semi-automatic mode and in a second, forced reset semi-automatic mode, the mechanism comprising:	When installed and used as directed, the Kabuto is part of a trigger mechanism that uses a bolt means, for example, a bolt carrier assembly or a blow-back bolt. With the Kabuto installed, the trigger mechanism operates in a standard semi-automatic mode and a "forced reset" semi-automatic mode  https://area43.co/collections/ar15-ar9  **Kabuto**
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	The Kabuto (yellow, blue, and purple) is installed in a fire control mechanism pocket of a receiver along with a hammer (red) that has a sear surface and a hook for engaging a disconnector (orange).

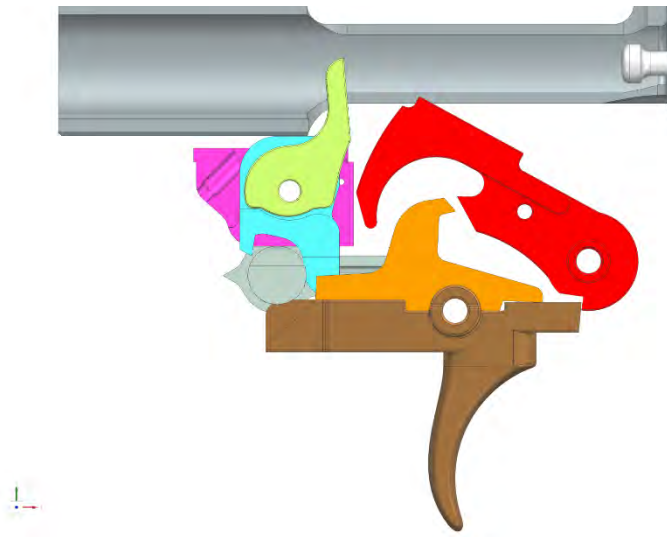
’159 Patent, Claim 1	The Kabuto
	 (Plaintiff-generated renderings of Kabuto here and below)
to pivot on a transverse hammer pivot axis between set and released positions, the hammer adapted to be pivoted rearward by rearward movement of a bolt means,	The hammer (red) pivots on a transverse hammer pivot axis between set and released positions, depicted below. The hammer is adapted to be pivoted rearward by rearward movement of a bolt means.  **Hammer Set Position**

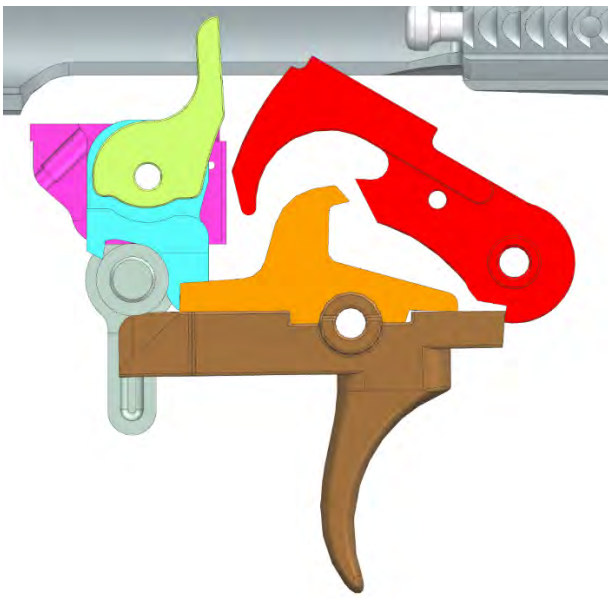
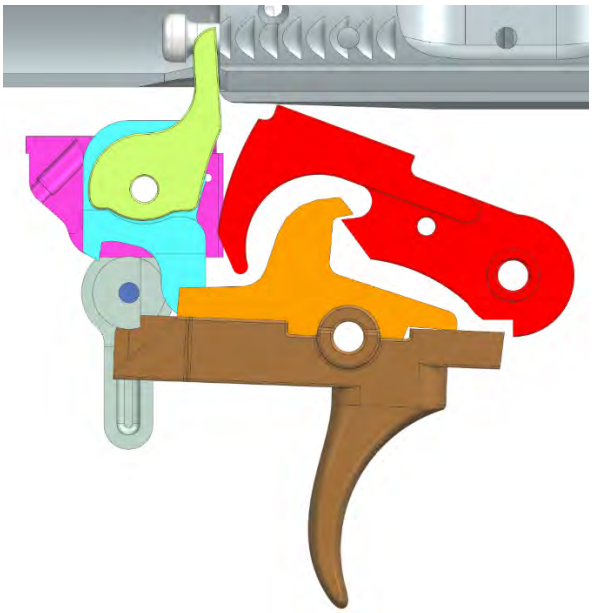
’159 Patent, Claim 1	The Kabuto
	 **Hammer Released Position**
a trigger member having a trigger sear surface and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and	The Kabuto (yellow, blue, and purple) is installed with a trigger member (brown) in the fire control mechanism pocket and the trigger member pivots on a transverse trigger member pivot axis between set and released positions. The trigger member has a sear surface.  **Trigger Member Set Position**

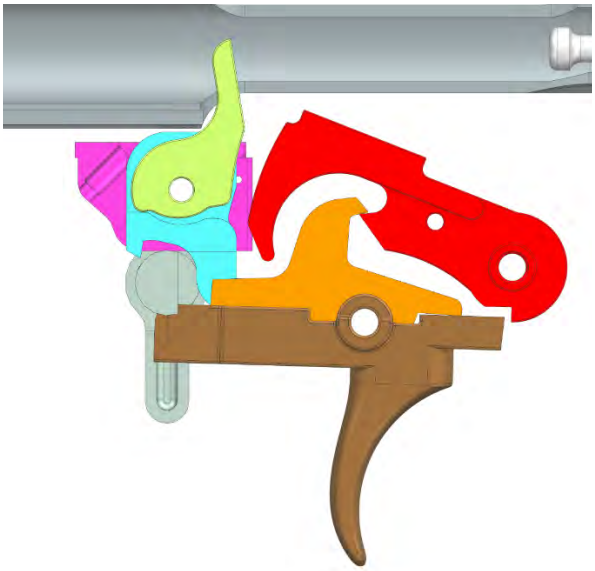
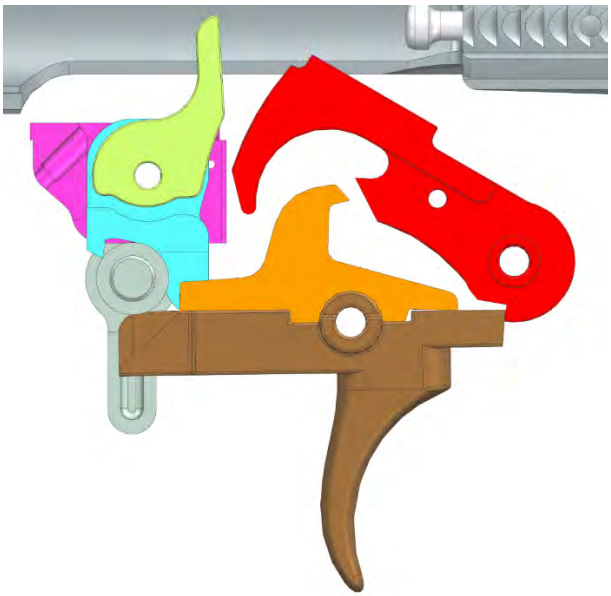
released positions,	 **Trigger Member Released Position**
wherein the trigger member sear surface and hammer sear surface are in engagement in the set positions of the hammer and trigger member	The sear surface of the trigger member (brown) and sear surface of the hammer (red) are in engagement when the hammer and trigger member are in their set positions.  **Trigger Member and Hammer Member Set Position**
and are out of engagement in the released positions of the hammer and trigger member,	The sear surface of the trigger member (brown) and sear catch surface of the hammer (red) are out of engagement in the released position.

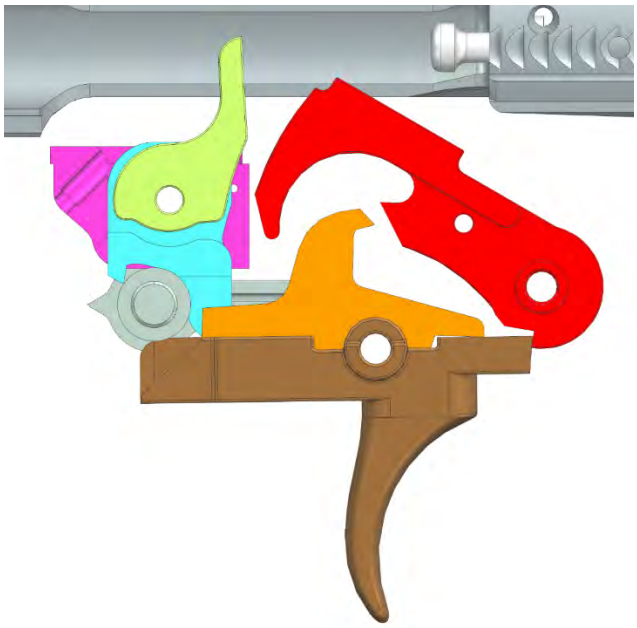
	 **Trigger Member and Hammer Member Released Positions**
the disconnector having a hook for engaging the hammer and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis, and	The disconnector (orange) is adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnector pivot axis. The disconnector has a hook for engaging the hammer (red). 

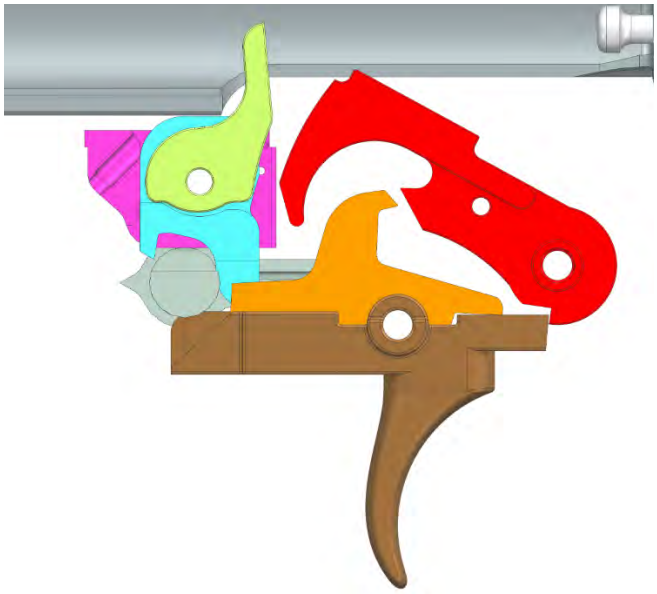
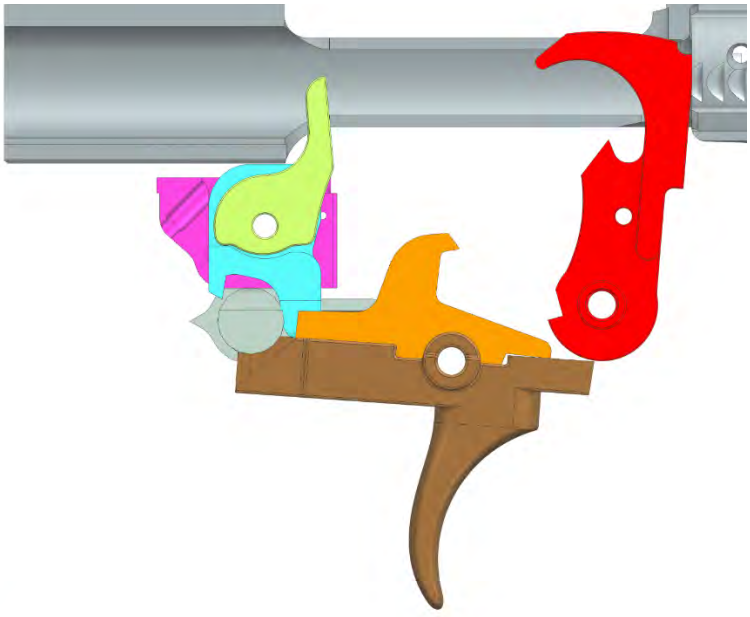
	 **Disconnector Hook Engaged**
a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket,	The Kabuto has a cam with a cam lobe and lever that is adapted to be movably mounted in the fire control mechanism pocket. (*See* Image above depicting Kabuto, shown in green, blue, and purple, in fire control mechanism pocket)  **Kabuto Cam with Lobe and Lever**

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,	The cam is movable between a first position and a second position.  **Cam and Lobe First Position** In the second position, the cam lobe moves the trigger member (brown) toward the set position when the cam is in the "forced reset" semi-automatic mode.  **Cam and Lobe Second Position**

whereupon in the first mode,	While in the first (standard semi-automatic) mode, 
rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook,	. . . rearward movement of the bolt means causes rearward pivoting of the hammer (red) such that the disconnector (orange) hook catches the hammer hook.  **Disconnector Hook Catches the Hammer**

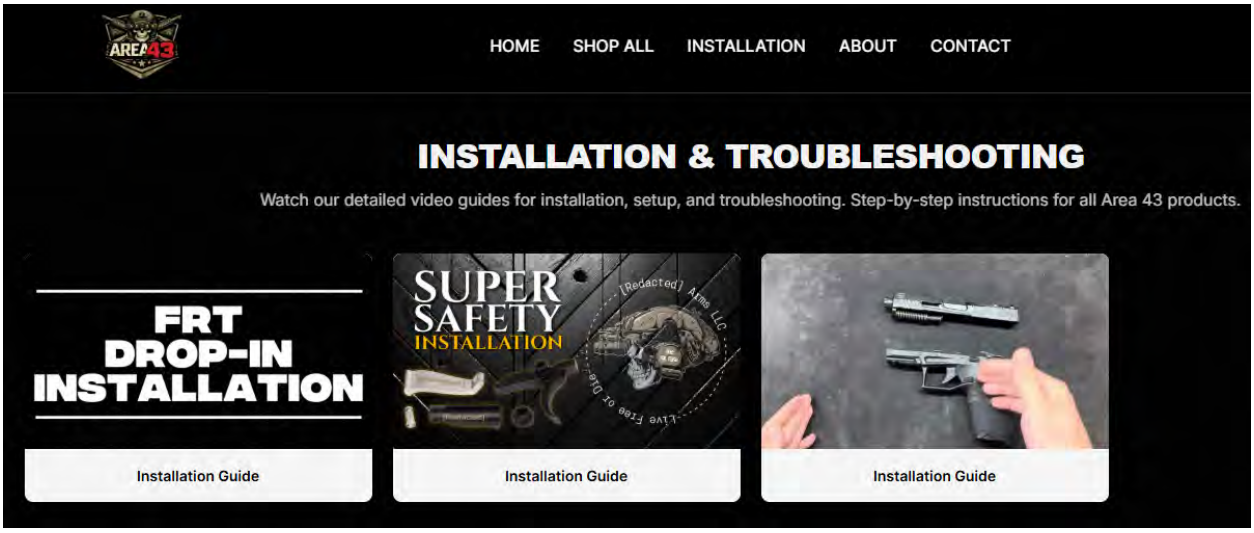
and thereafter the bolt means moves forward into battery,	Thereafter, the bolt means moves forward into battery,  **Pressure on Trigger Member Prevents Reset**
at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnector to permit the hammer and trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm, and	. . . at which time a user must manually reduce pressure on the trigger member (brown) to free the hammer (red) from the disconnector (orange) 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.  **Reduced Pressure on Trigger Member Allows Reset**

whereupon in a second mode,	When in the second (“forced reset” semi-automatic) mode, 
rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook is prevented from holding the hammer,	. . . rearward movement of the bolt means causes rearward pivoting of the hammer (red) and the cam (yellow) acting on the link (blue) to move the trigger member toward the reset position such that the disconnector (orange) hook is prevented from holding the hammer hook. 

and thereafter the bolt means moves forward into battery,	Thereafter, the bolt means moves forward into battery and the hammer moves to its reset position, 
at which time the user can pull the trigger member to fire the firearm.	. . . at which time the user can pull the trigger member (brown) to fire the firearm without having to first release pressure on the trigger member. 

92. On information and belief, in addition to direct infringement, Defendants take active steps to induce others, including their customers, to directly infringe the '159 patent.

Defendants take such active steps knowing that those steps will induce, encourage, and facilitate direct infringement by others. Such active steps include, but are not limited to, installation of, encouraging, advertising, promoting, and instructing others to use and/or how to use the Super Safety and Kabuto while selling products. One example of this is the promotional material found on Defendants' website (https://area43.co/pages/installation) that informs customers to install the Infringing Devices into an AR15:



93. On information and belief, Defendants know or should know that such activities induce others to directly infringe at least claim 1 of the '159 Patent.

94. On information and belief, Defendants also contribute to the infringement of the '159 Patent by others, including their customers. Acts by Defendants that contribute to the infringement of others include, but are not limited to, the sale, offer for sale, and/or importation by Defendants of the components of the Super Safety and Kabuto, such as the cam or cam lever arm. The components are not suitable for substantial noninfringing use as they are specially designed and adapted to be used in a fire control unit to mechanically reset a trigger mechanism and infringe the '159 Patent.

95. Defendants have engaged in egregious infringement behavior with knowledge of the ’159 Patent, which has been duly issued by the USPTO, and is presumed valid. On information and belief, Defendants have known or should have known that their actions constituted and continue to constitute infringement of the ’159 Patent and that the ’159 Patent is valid at least through the service of this complaint. Defendants could not reasonably or subjectively believe that their actions do not constitute infringement of the ’159 Patent, nor could they reasonably or subjectively believe that the patent is invalid. Despite that knowledge and subjective belief, and the objectively high likelihood that their actions constitute infringement, Defendants have continued their infringing activities. As such, Defendants willfully infringe the ’159 Patent.

96. By their actions, Defendants have injured Plaintiffs and are liable to Plaintiffs for infringement of the ’159 Patent pursuant to 35 U.S.C. § 271.

97. By their actions, Defendants’ infringement of the ’159 Patent has irreparably injured Plaintiffs. Unless such infringing acts are enjoined by this Court, Plaintiffs will continue to suffer additional irreparable injury.

98. By their actions, Defendants’ infringement of the ’159 Patent has damaged and continues to damage, Plaintiffs in an amount yet to be determined.

99. Defendants’ infringement of the ’159 patent is exceptional and entitles Plaintiffs to attorneys’ fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

100. Defendants’ acts of infringement are willful and for no other purpose than to deliberately and irreparably harm Plaintiffs’ business, sales, reputation, and good-will.

101. Plaintiffs have been substantially harmed by Defendants’ infringing activities and are entitled to relief including but not limited to a preliminary injunction, a permanent injunction,

damages adequate to compensate for the infringement, being lost profits or no less than a reasonable royalty, treble damages, and attorneys' fees.

COUNT V — INFRINGEMENT OF THE '403 PATENT

102. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

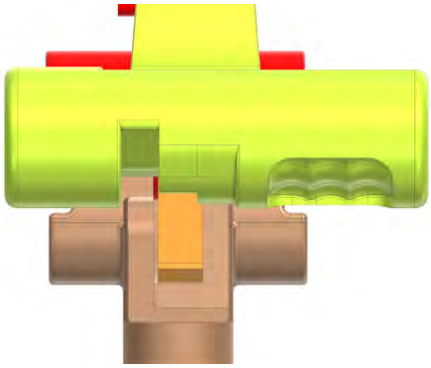
103. In violation of 35 U.S.C. § 271, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the '403 patent, including but not limited to claims 38 and 54, literally and/or under the doctrine of equivalents, by among other things, making, using, offering for sale, selling, and/or importing into the United States unlicensed products in a manner that infringes the '403 patent. Such unlicensed products include the Infringing Devices.

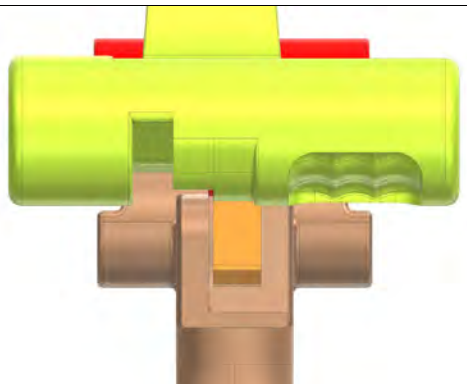
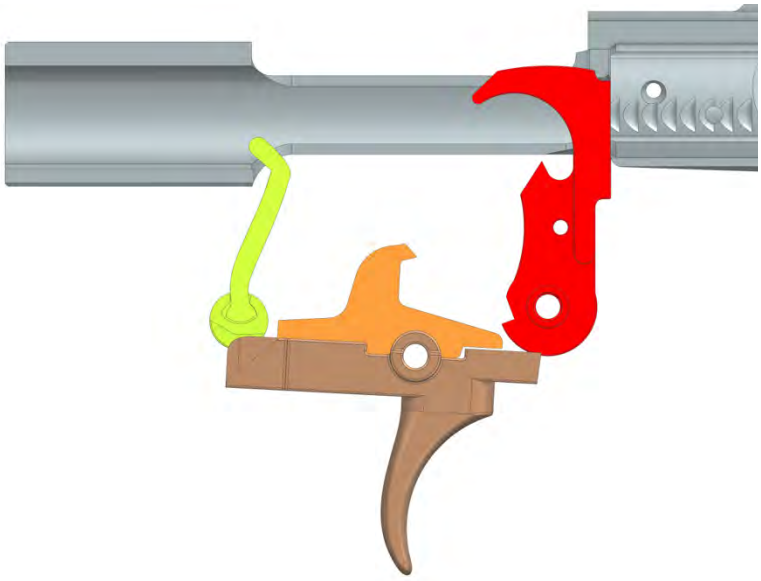
104. On information and belief, Defendants have and continue to willfully infringe, induce others to infringe, and/or contribute to the infringement of one or more claims of the '403 patent, including but not limited to claims 38 and 54, literally and/or under the doctrine of equivalents.

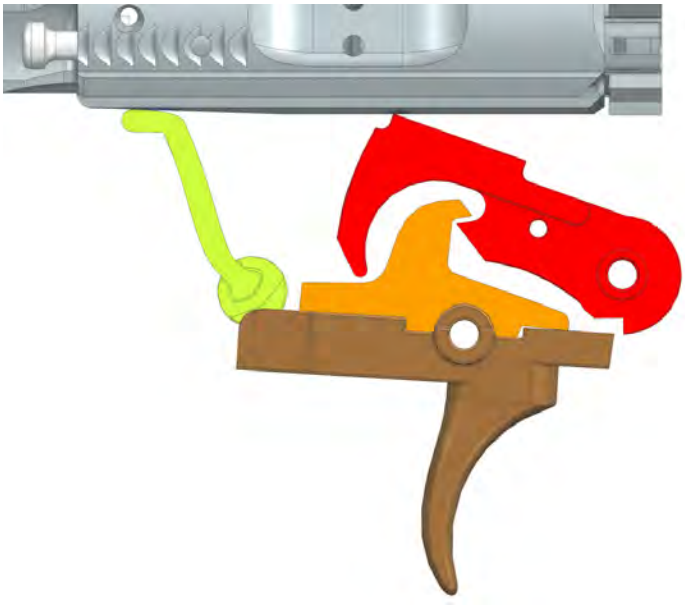
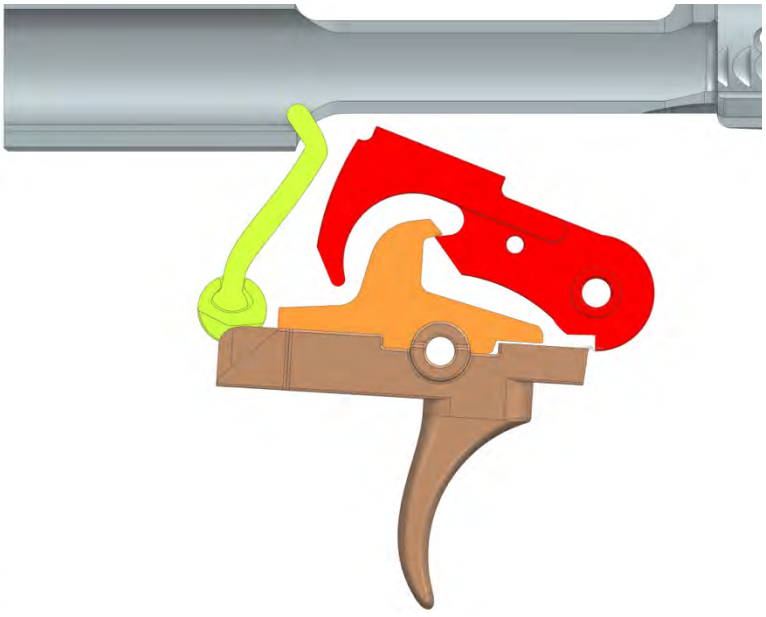
105. An exemplary comparison of the Super Safety, when assembled and used as intended, with claim 38 of the '403 patent is illustrated in the chart below:

'403 Patent, Claim 38	**The Super Safety**
38. A forced reset trigger mechanism, comprising:	When installed and used as directed, the Super Safety is part of a trigger mechanism. 

'403 Patent, Claim 38	**The Super Safety**
	https://area43.co/collections/ar15-ar9  **Super Safety** Ex. J, Super Safety 3D Printed Active Trigger System v4.4, Hoffman Tactical (July 19, 2023) ("Super Safety Guide") at 12.
a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;	The Super Safety (yellow) is installed in a fire control mechanism pocket along with a hammer (red) that has a hammer hook and pivots on a transverse axis.  **Super Safety (Installed)** (Plaintiff-generated renderings of Super Safety here and below)

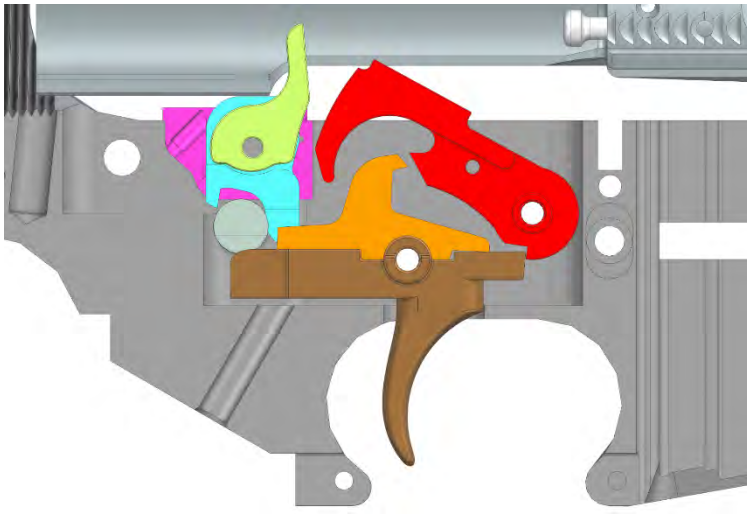
a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis; a trigger member; and	The Super Safety is installed along with a disconnector (orange) which has a disconnector hook and pivots on a transverse disconnector pivot axis, and a trigger member (brown)  **Disconnector and Trigger Member**
a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position,	The Super Safety is a safety selector adapted to be movable between a standard semi-automatic position,  **Super Safety (installed) in Standard Semi-Automatic Position** . . . and a “forced reset” semi-automatic position,

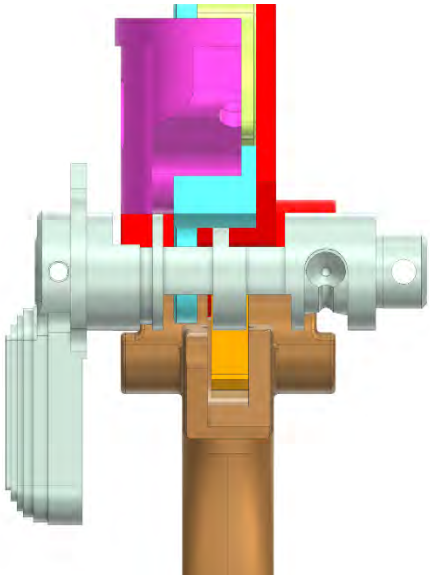
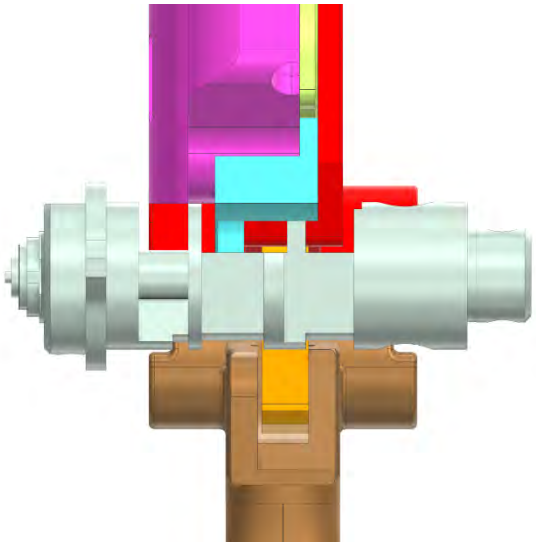
	 **Super Safety (installed) in "Forced Reset" Semi-Automatic Position**
wherein when the safety selector is in the standard semi-automatic position and the trigger member is rearwardly actuated,	When safety selector is in the standard semi-automatic position the trigger member (brown) is rearwardly actuated. 

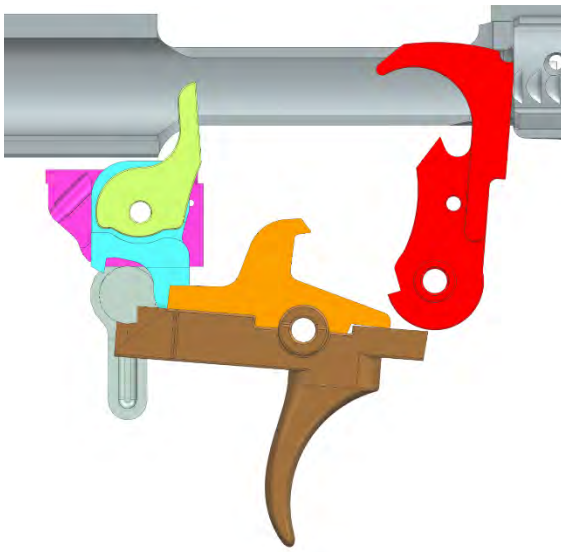
and after the hammer pivots rearward to a position where the hammer hook is past the disconnector hook,	The hammer (red) pivots rearward to a position where the hammer hook is past the disconnector hook (orange).  **Hammer Hook is Past Disconnector Hook**
rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm.	Rearward pressure on the trigger member (brown) must be reduced to permit the trigger member to then be actuated to fire a firearm.  **Pressure Must be Reduced**

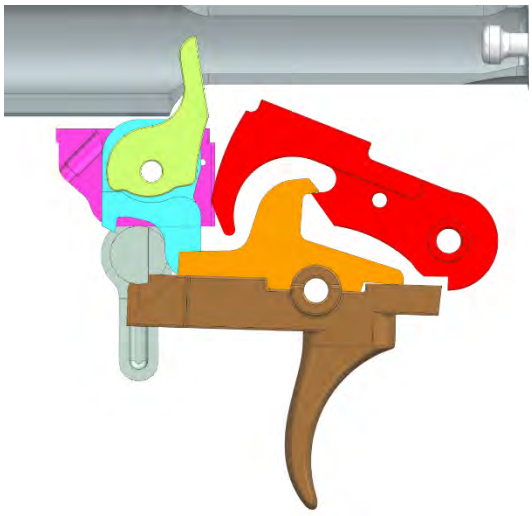
106. An exemplary comparison of the Kabuto, when assembled and used as intended, with claim 38 of the ’403 patent is illustrated in the chart below:

'403 Patent, Claim 38	**The Kabuto**
38. A forced reset trigger mechanism, comprising:	When installed and used as directed, the Kabuto is part of a reset trigger mechanism.  https://area43.co/collections/ar15-ar9  **Kabuto**

'403 Patent, Claim 38	**The Kabuto**
a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;	The Kabuto (yellow, blue, and purple) is installed in a fire control mechanism pocket along with a hammer (red) that has a hammer hook and is adapted to pivot on a transverse hammer pivot axis.  **Kabuto (Installed)** (Plaintiff-generated renderings of Kabuto here and below)
a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis; a trigger member; and	The Kabuto is installed along with a disconnector **(orange)** which has a disconnector hook and is adapted to pivot on a transverse disconnector pivot axis, and a trigger member **(brown)**.  **Disconnector and Trigger Member**

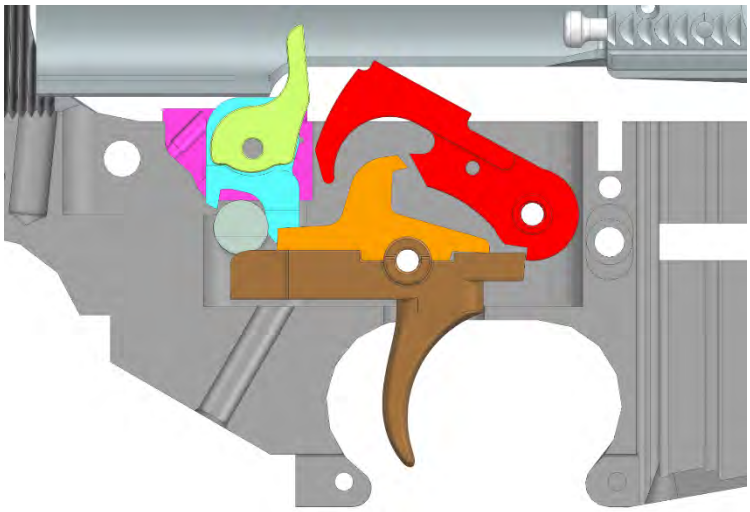
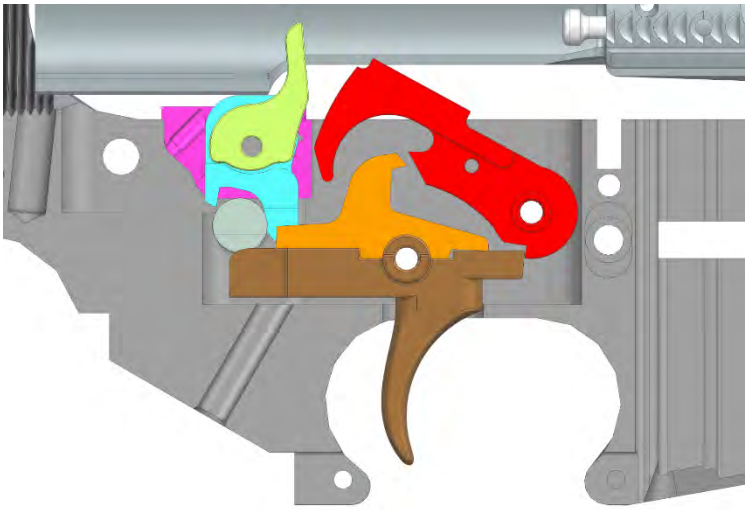
'403 Patent, Claim 38	**The Kabuto**
a safety selector adapted to be movable between a standard semi-automatic position	The Kabuto interacts with a safety selector adapted to be movable between a standard semi-automatic position,  **Kabuto (installed) in Standard Semi-Automatic Position**
and a forced reset semi-automatic position,	. . . and a "forced reset" semi-automatic position,  **Kabuto (installed) in "Forced Reset" Semi-Automatic Position**

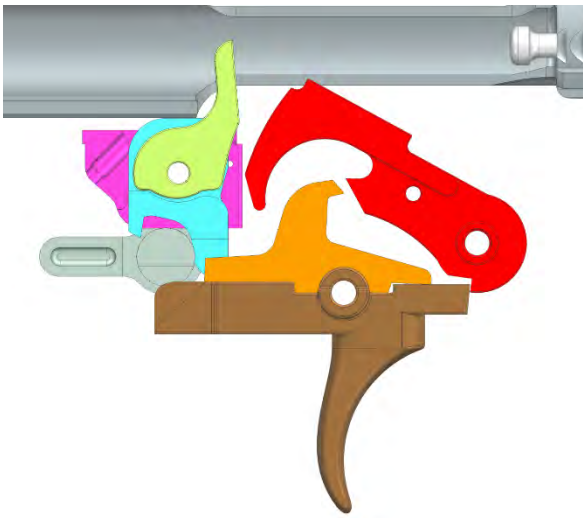
'403 Patent, Claim 38	**The Kabuto**
wherein when the safety selector is in the standard semi-automatic position and the trigger member is rearwardly actuated,	When safety selector is in the standard semi-automatic position the trigger member (brown) is rearwardly actuated. 
and after the hammer pivots rearward to a position where the hammer hook is past the disconnector hook,	The hammer (red) pivots rearward to a position where the hammer hook is past the disconnector hook (orange). 

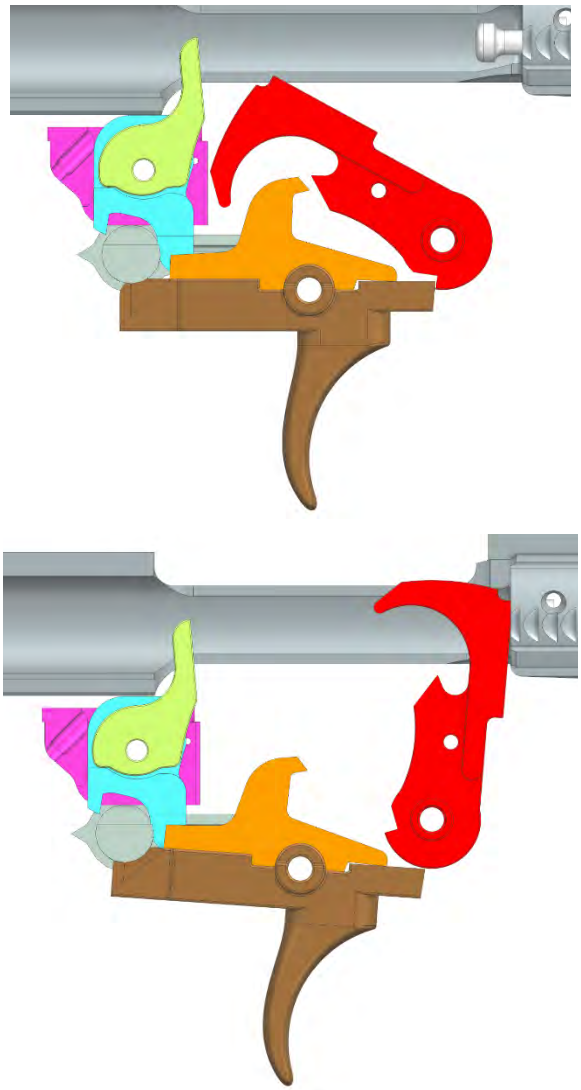
’403 Patent, Claim 38	The Kabuto
rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm.	Rearward pressure on the trigger member (brown) must be reduced to permit the trigger member to then be actuated to fire a firearm. 

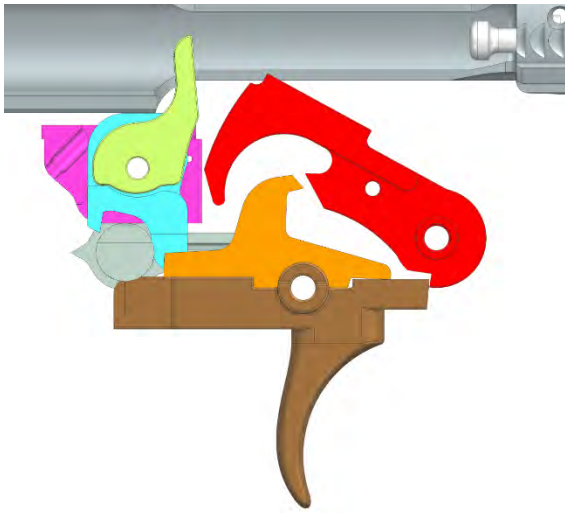
107. An exemplary comparison of the Kabuto, when assembled and used as intended, with claim 54 of the ’403 patent is illustrated in the chart below:

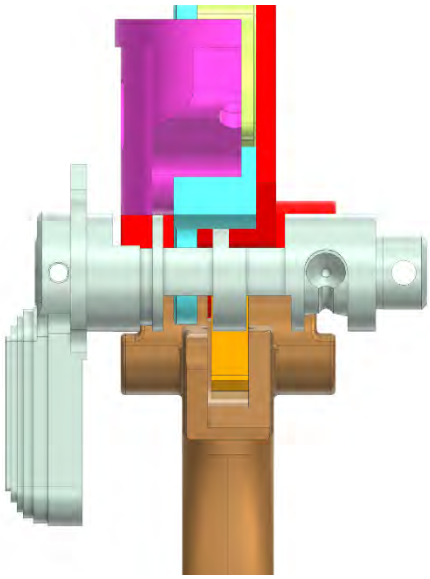
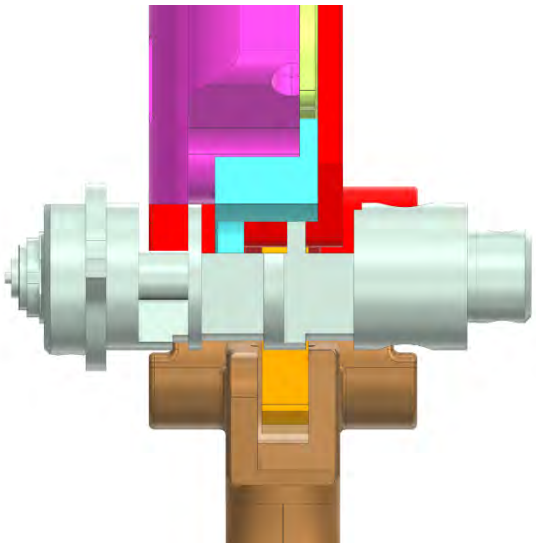
'403 Patent, Claim 54	**Kabuto**
54. A forced reset trigger mechanism, comprising:	When installed and used as directed, the Kabuto is part of a forced reset trigger mechanism.  https://area43.co/collections/ar15-ar9  **Kabuto**

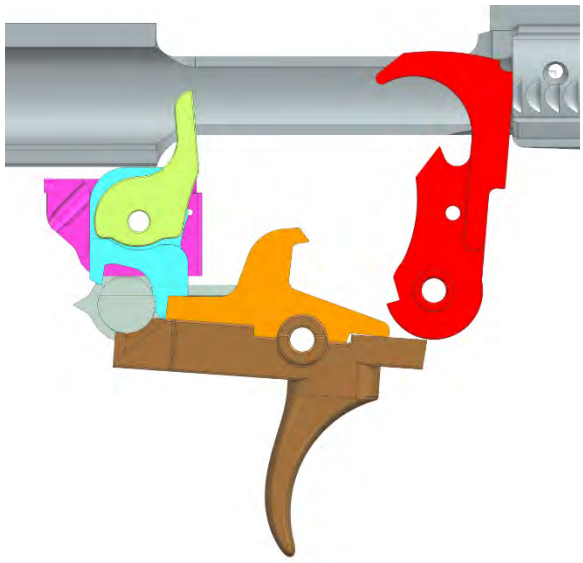
'403 Patent, Claim 54	**Kabuto**
a trigger member configured to pivot about a transverse axis;	The Kabuto is installed in a fire control mechanism pocket along with a trigger member that is configured to pivot about a transverse axis. 
a hammer	The Kabuto (Green, Blue, and Magenta) is installed in a fire control mechanism pocket along with a hammer (red).  **Kabuto (Installed)** (Plaintiff-generated renderings of Kabuto above and below)

'403 Patent, Claim 54	**Kabuto**
a disconnector operatively associated with the trigger member and the hammer;	The Kabuto is installed along with a disconnector (orange) which is operatively associated with the hammer (Red) and trigger (Brown).  **Disconnector and Trigger Member**
a locking member operatively associated with the trigger member;	The Kabuto uses the cam (Green) and link (Blue) in combination as a locking member and they are operatively associated with the trigger member. 

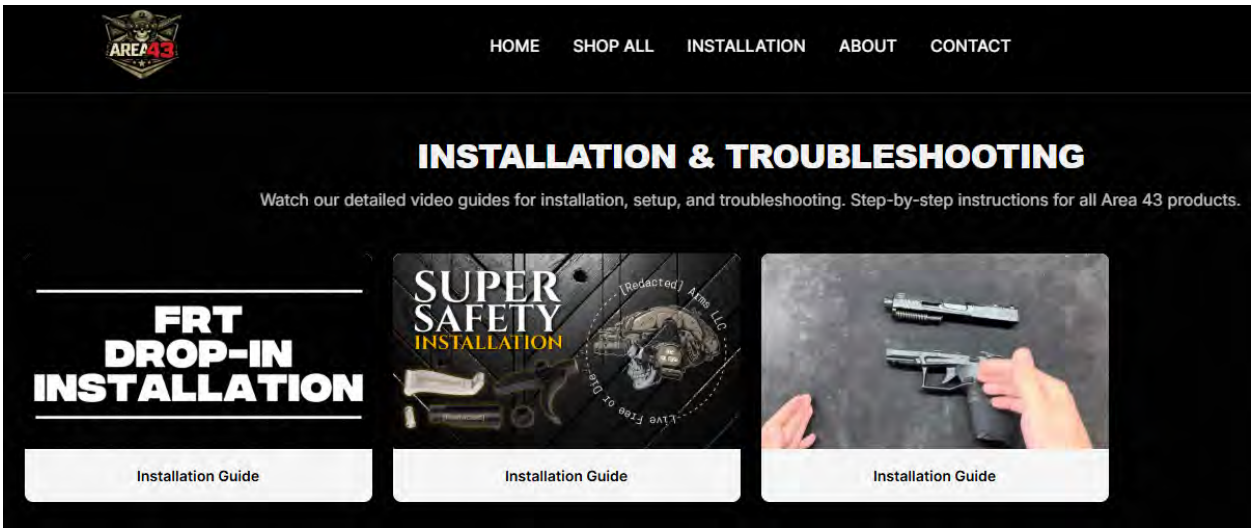
Wherein cycling of the action causes the trigger member to be forcibly returned to a set position in at least one operating mode; and	When using a Kabuto, the cycling of the action causes the trigger member to be forcibly returned to the set position in at least one operating mode. 

’403 Patent, Claim 54	Kabuto
	 **Reset is Forced** 

'403 Patent, Claim 54	**Kabuto**
wherein the trigger mechanism includes a selector inter-face structured to cooperate with a selector having at least two discrete selectable positions including:	The Kabuto interacts with a safety selector adapted to be movable between a standard semi-automatic position,
(i) a standard semi-automatic position; and	 **Kabuto (installed) in Standard Semi-Automatic Position**
(ii) a forced reset semi-automatic position,	. . . and a forced reset semi-automatic position,  **Kabuto (installed) in Forced Reset Semi-Automatic Position**

'403 Patent, Claim 54	**Kabuto**
Such that rotation of the selector to the forced reset position enables said forced reset operating mode.	When the safety selector is in the forced reset position the forced reset operating mode is enabled. 

108. On information and belief, in addition to direct infringement, Defendants take active steps to induce others, including their customers, to directly infringe the '403 patent. Defendants take such active steps knowing that those steps will induce, encourage, and facilitate direct infringement by others. Such active steps include, but are not limited to, encouraging, advertising, promoting, and instructing others to use and/or how to use the Infringing Device while selling products. One example of this is the promotional material found on Defendants' website (https://area43.co/pages/installation) that informs customers to install the Infringing Devices into an AR15:



109. On information and belief, Defendants know or should know that such activities induce others to directly infringe at least claims 38 and 54 of the ’403 Patent.

110. On information and belief, Defendants also contribute to the infringement of the ’403 Patent by others, including their customers. Acts by Defendants that contribute to the infringement of others include, but are not limited to, the sale, offer for sale, and/or importation by Defendants of the components of the Infringing Devices, such as the trigger assembly or the cam or cam lever arm. The components are not suitable for substantial noninfringing use as they are specially designed and adapted to be used in a fire control unit to mechanically reset a trigger mechanism and infringe the ’403 Patent.

111. Defendants have engaged in egregious infringement behavior with knowledge of the ’403 Patent, which has been duly issued by the USPTO, and is presumed valid. On information and belief, Defendants have known or should have known that their actions constituted and continue to constitute infringement of the ’403 Patent and that the ’403 Patent is valid at least through the service of this complaint. Defendants could not reasonably or subjectively believe that their actions do not constitute infringement of the ’403 Patent, nor could they reasonably or subjectively believe that the patent is invalid. Despite that knowledge and subjective belief, and

the objectively high likelihood that their actions constitute infringement, Defendants have continued their infringing activities. As such, Defendants willfully infringe the '403 Patent.

112. By their actions, Defendants have injured Plaintiffs and are liable to Plaintiffs for infringement of the '403 Patent pursuant to 35 U.S.C. § 271.

113. By their actions, Defendants' infringement of the '403 Patent has irreparably injured Plaintiffs. Unless such infringing acts are enjoined by this Court, Plaintiffs will continue to suffer additional irreparable injury.

114. By their actions, Defendants' infringement of the '403 Patent has damaged and continues to damage, Plaintiffs in an amount yet to be determined.

115. Defendants' infringement of the '403 patent is exceptional and entitles Plaintiffs to attorneys' fees and costs incurred in prosecuting this action under 35 U.S.C. § 285.

116. Defendants' acts of infringement are willful and for no other purpose than to deliberately and irreparably harm Plaintiffs' business, sales, reputation, and good-will.

117. Plaintiffs have been substantially harmed by Defendants' infringing activities and are entitled to relief including but not limited to a preliminary injunction, a permanent injunction, damages adequate to compensate for the infringement, being lost profits or no less than a reasonable royalty, treble damages, and attorneys' fees.

COUNT VI — FEDERAL TRADEMARK INFRINGEMENT
15 U.S.C. § 1114(1)

118. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

119. As described above, Plaintiff RBTM is the owner and Plaintiff Rare Breed is the exclusive licensee of the FRT Marks in connection with firearm triggers.

120. The federal trademark registrations for the FRT Marks as detailed above are in full force and effect. Plaintiff RBTM owns all right, title, and interest in and to these federal trademark registrations.

121. The FRT Marks are inherently distinctive and have acquired significant goodwill in the marketplace through Plaintiffs' continuous and substantially exclusive use of those marks in commerce. As a result of their widespread and continuous use, the FRT Marks have become uniquely associated in the minds of consumers and the trade with Plaintiffs.

122. The reputation Plaintiffs have built in the FRT Marks is of great value to Plaintiffs.

123. Plaintiffs' use of and rights in the FRT Marks predate any use by Defendants of FRT.

124. Defendants are wrongfully using FRT as a source identifier in U.S. commerce in connection with the distribution, advertising, and/or sale of firearm trigger products.

125. Defendants' use of the FRT Marks was and is without Plaintiffs' consent. Such unauthorized use by Defendants is likely to confuse consumers as to the origin, sponsorship, endorsement, or affiliation of Defendants' products, in violation of Section 32(1) of the Lanham Act, 15 U.S.C. § 1114(1).

126. Defendants' unlawful acts have caused and, unless enjoined by this Court pursuant to 15 U.S.C. § 1116, will continue to cause, great harm and irreparable injury to Plaintiffs for which Plaintiffs have no adequate remedy at law, including undermining consumers' association of the FRT Marks with Plaintiffs.

127. Plaintiffs are entitled to injunctive relief prohibiting Defendants from using the FRT Marks and any mark confusingly similar to the FRT Marks.

128. Upon information and belief, Defendants have realized unjust profits, gains, and advantages from their unlawful actions, including by making sales under the FRT Marks, and have caused Plaintiffs monetary damage in an amount to be determined at trial.

COUNT VII — FALSE DESIGNATION OF ORIGIN
15 U.S.C. § 1125(A)

129. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

130. As described above, Plaintiff RBTM owns and Plaintiff Rare Breed is the exclusive licensee of the distinctive FRT Marks in connection with firearm triggers through their continuous and substantially exclusive use of the FRT Marks since at least as early as 2020, which is well before any use of FRT by Defendants.

131. Plaintiffs' common law rights in the FRT Marks predate Defendants' infringing use of FRT and any other confusingly similar name or mark comprised of or containing FRT.

132. Defendants are using FRT as a source identifier in U.S. commerce in connection with the distribution, advertising, and/or sale of firearm trigger products.

133. Defendants' actions described above constitute use of a false designation of origin that wrongfully and falsely designates the origin of Defendants' goods and services and is likely to cause confusion or mistake and/or to deceive as to affiliation, connection, or association or as to the origin, sponsorship, or approval of Defendants' goods by Plaintiffs. These actions constitute a false designation of origin in interstate commerce in violation of Section 43(a)(1)(A) of the Lanham Act, 15 U.S.C. § 1125(a)(1)(A).

134. Defendants' unlawful acts, which were committed and continue to be committed with full knowledge of Plaintiffs' prior rights in the FRT Marks, are knowing, willful, and done in bad faith.

135. Defendants' acts have caused and, unless enjoined by this Court pursuant to 15 U.S.C. § 1116, will continue to cause, great harm and irreparable injury to Plaintiffs for which Plaintiffs have no adequate remedy at law, including undermining consumers' association of the FRT Marks with Plaintiffs.

136. Plaintiffs are entitled to injunctive relief prohibiting Defendants from using the FRT Marks or any other mark confusingly similar to the FRT Marks.

137. Upon information and belief, Defendants have realized unjust profits, gains, and advantages from their unlawful actions, including by making sales under the FRT Marks, and have caused Plaintiffs monetary damage in an amount to be determined at trial.

COUNT VIII — COMMON LAW TRADEMARK INFRINGEMENT AND UNFAIR COMPETITION

138. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

139. As described above, Plaintiff RBTM owns and Plaintiff Rare Breed is the exclusive licensee of the distinctive FRT Marks in connection with firearm triggers through their continuous use of the marks since at least as early 2020, prior to any use of FRT by Defendants.

140. Plaintiffs' common law rights in the FRT Marks predate Defendants' infringing use of FRT and/or other confusingly similar marks comprised of or containing FRT.

141. Defendants are using FRT as a source identifier in U.S. commerce in connection with the distribution, sale, offering for sale, and advertising of firearm triggers.

142. Defendants' use of FRT was and is without Plaintiffs' consent. Such unauthorized use by Defendants is likely to confuse consumers as to the origin, sponsorship, endorsement, or affiliation of Defendants' goods and services. As such, Defendants' acts constitute trademark infringement and unfair competition under common law.

143. Defendants' unlawful acts, which were committed and continue to be committed with full knowledge of Plaintiffs' prior common law rights in the FRT Marks are knowing, willful, and done in bad faith.

144. Defendants' acts have caused and, unless enjoined by this Court, will continue to cause great harm and irreparable injury to Plaintiffs for which it has no adequate remedy at law, including undermining consumers' association of the FRT Marks with Plaintiffs.

145. Plaintiffs are entitled to injunctive relief prohibiting Defendants from using FRT or any other mark confusingly similar to the FRT Marks.

146. Upon information and belief, Defendants have realized unjust profits, gains, and advantages from their unlawful actions, including by making sales under the FRT mark, and have caused Plaintiffs monetary damage in an amount to be determined at trial.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs respectfully request that this Court enter judgment against Defendants as follows:

a. Each of the Asserted Patents has been and continues to be infringed by Defendants;

b. Defendants' infringement of each of the Asserted Patents has been, and continues to be, willful;

c. Each of the Asserted Patents is enforceable and not invalid;

d. That Defendants willfully infringed Plaintiffs' registered FRT Marks in violation of the Lanham Act, 15 U.S.C. § 1114;

e. That Defendants committed willful acts of false designation of origin through their unauthorized use of the FRT Marks in violation of the Lanham Act, 15 U.S.C. § 1125(a);

f. That Defendants engaged in conduct constituting unfair competition under applicable law;

g. A preliminary injunction enjoining Defendants and their principals, agents, successors, assigns, attorneys, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from (1) infringement or contributing to the infringement of each of the Asserted Patents during the pendency of this case; (2) using the mark "FRT" (or any similar or derivative term, including any FRT-formative term) (i) in association with firearm triggers or any related products, (ii) in any other manner that creates confusion or is likely to create confusion with Plaintiffs or Plaintiffs' FRT Marks, (iii) that in any way constitutes unfair competition with Plaintiffs; or (3) other such equitable relief as the Court determines is warranted;

h. A permanent injunction enjoining Defendants and their principals, agents, successors, assigns, attorneys, servants, affiliates, employees, divisions, branches, subsidiaries, parents, and all others acting in active concert therewith from (1) infringement or contributing to the infringement of each of the Asserted Patents; (2) using the mark "FRT" (or any similar or derivative term, including any FRT-formative term) (i) in association with firearm triggers or any related products, (ii) in any other manner that creates confusion or is likely to create confusion with Plaintiffs or Plaintiffs' FRT Marks, (iii) that in any way constitutes unfair competition with Plaintiffs; or (3) other such equitable relief as the Court determines is warranted;

i. Consistent with the above, order Defendants to (1) remove from display any advertisements and marketing, promotional, or sales materials comprising, bearing, or displaying the FRT Marks or any similar or derivative term that infringes or is likely to be confused with the FRT Marks, including any FRT-formative term, including from all Internet webpages and social media accounts within Defendants' custody or control; and (2) deliver to the Court for destruction, or to show proof of destruction of, any and all physical advertisements and marketing, promotional

materials, and sales materials comprising, bearing, or displaying the term "FRT" or any similar or derivative term that infringes or is likely to be confused with the FRT Marks, including any FRT-formative term;

j. An award of damages adequate to compensate Plaintiffs for the infringement of each of the Asserted Patents that has occurred, together with pre-judgment interests and costs, post-judgment interests and costs, and an accounting;

k. An award of all other damages permitted by 35 U.S.C. § 284 and 15 U.S.C. § 1117(a), including increased damages up to three times the amount of compensatory damages found;

l. An award of all profits received by Defendants from sales and revenues of any kind made as a result of their trademark infringement and unfair competition;

m. An award of all damages sustained by Plaintiffs as a result of Defendants' infringement and unfair competition, including ascertainable damages, the costs incurred by Plaintiffs for corrective advertising, the costs for this action, and Plaintiffs' reasonable attorneys' fees;

n. A finding that this action is an exceptional case under 35 U.S.C. § 285 and 15 U.S.C. § 1117, and an award to Plaintiffs of their costs and attorneys' fees incurred in this action; and

o. Any and all other relief, at law or equity, to which Plaintiffs may show themselves to be entitled or which this Court deems just and proper.

DEMAND FOR JURY TRIAL

Plaintiffs, under Rule 38 of the Federal Rules of Civil Procedure, request a trial by jury of any issues so triable by right.

DATED: July 17, 2026.

Respectfully submitted,

/s/ Jared W. Allen
Jared W. Allen
Beard St. Clair Gaffney PA

Glenn D. Bellamy (Pro Hac Vice forthcoming)
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Attorneys for Plaintiffs

EXHIBIT A

US012038247B2

(12) **United States Patent**
Blakley

(10) **Patent No.: US 12,038,247 B2**
(45) **Date of Patent: Jul. 16, 2024**

(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 0 days.

(21) Appl. No.: **18/325,225**

(22) Filed: **May 30, 2023**

(65) **Prior Publication Data**

US 2024/0085136 A1 Mar. 14, 2024

Related U.S. Application Data

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

(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 19/10; F41A 19/45; F41A 19/15; F41A 17/46
(Continued)

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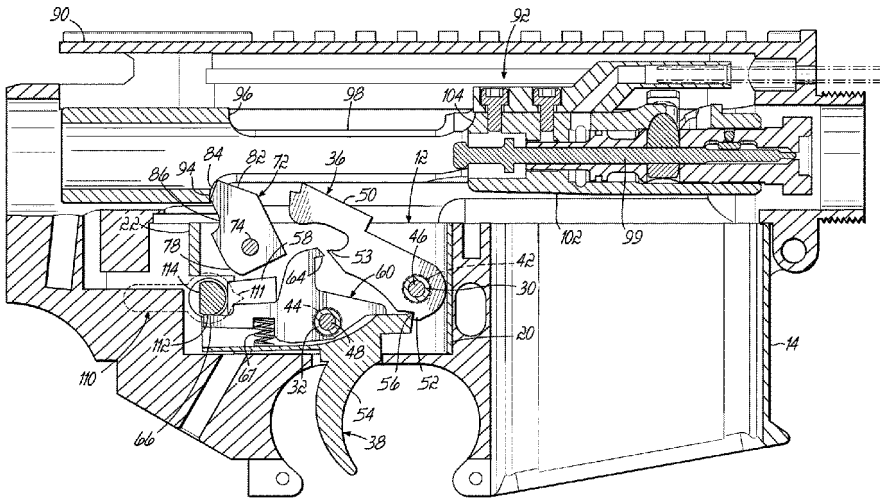
Primary Examiner — Reginald S Tillman, Jr.
(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP

(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 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.

23 Claims, 18 Drawing Sheets



(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
See application file for complete search history.

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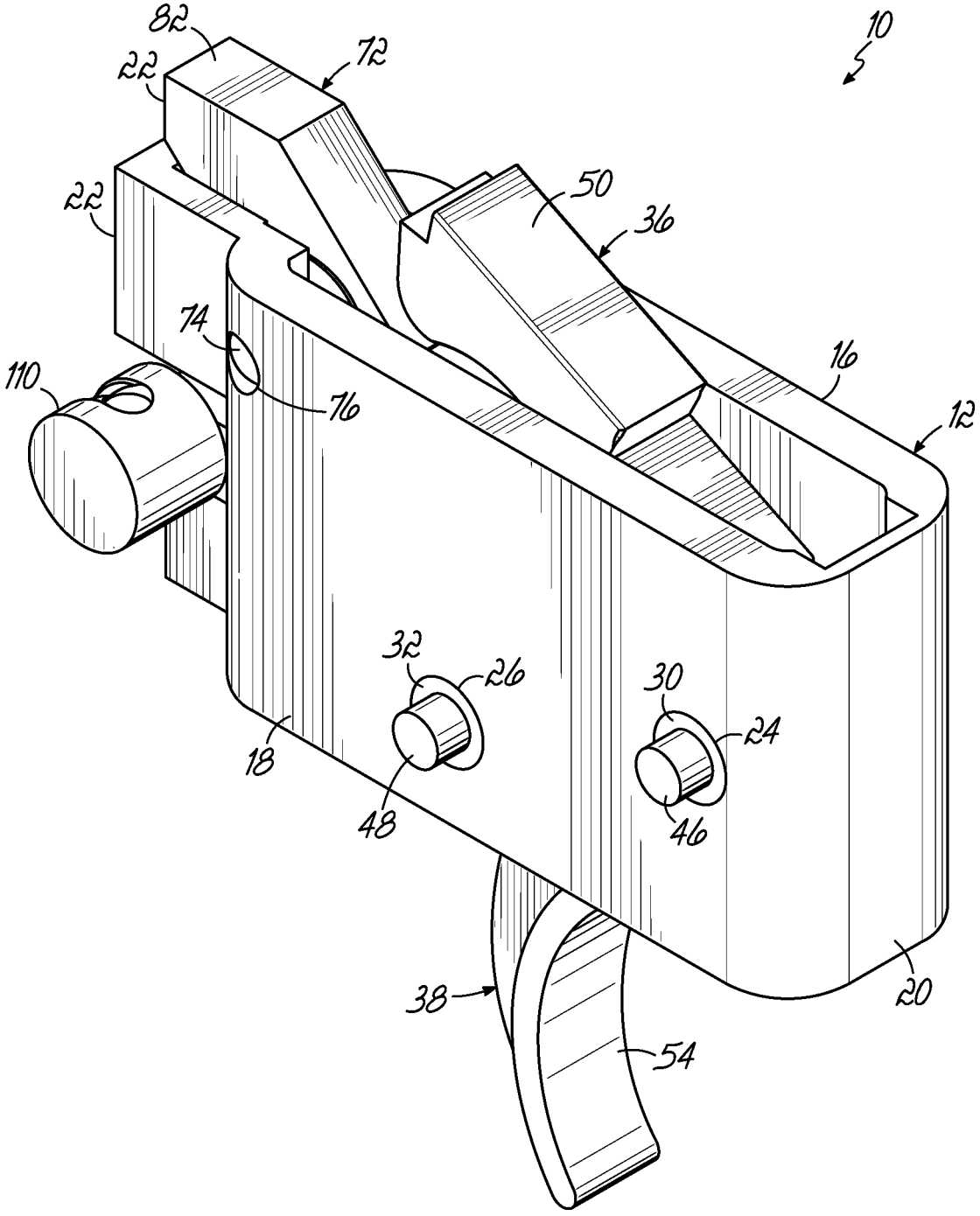

FIG. 1

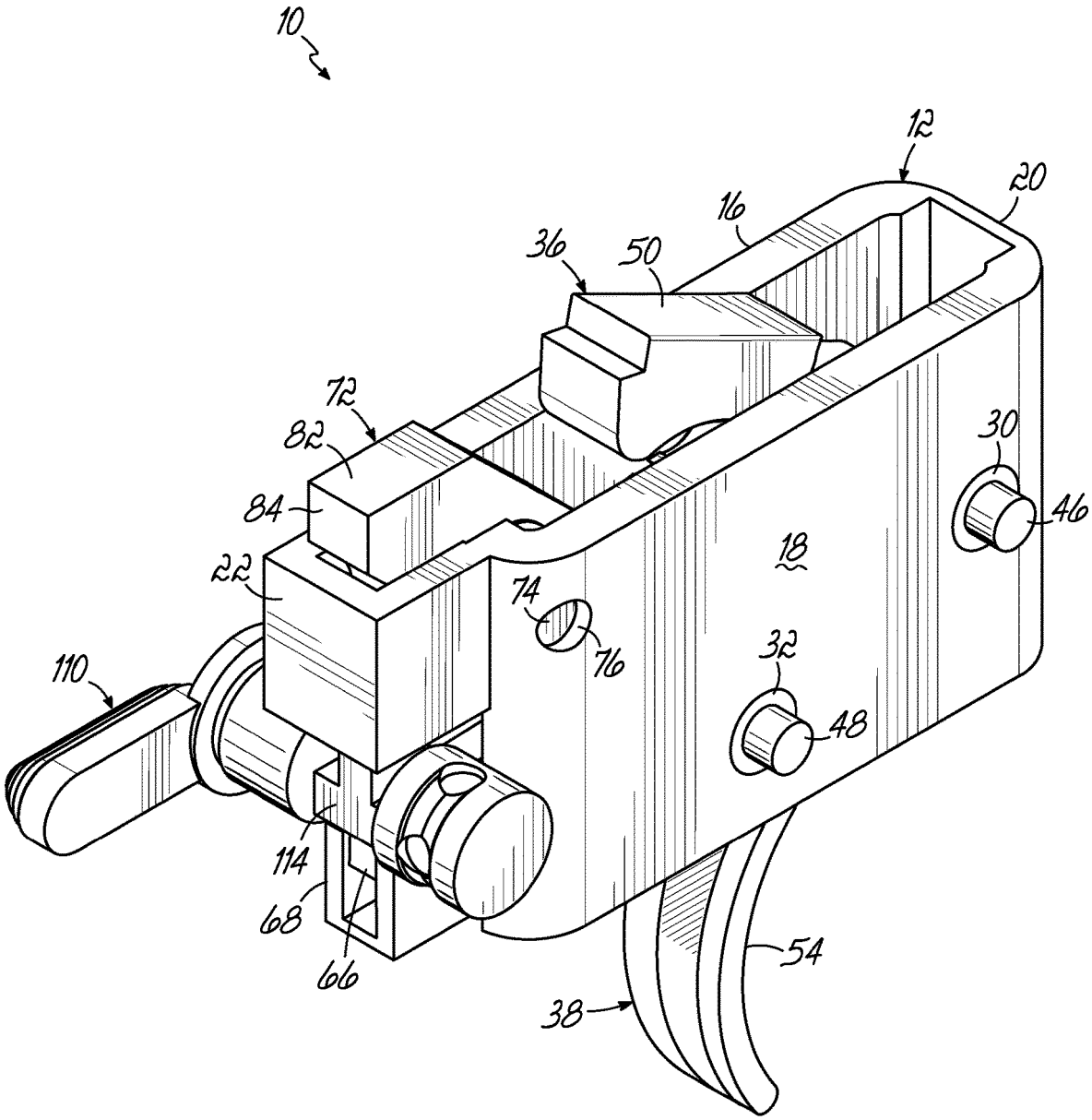

FIG. 2

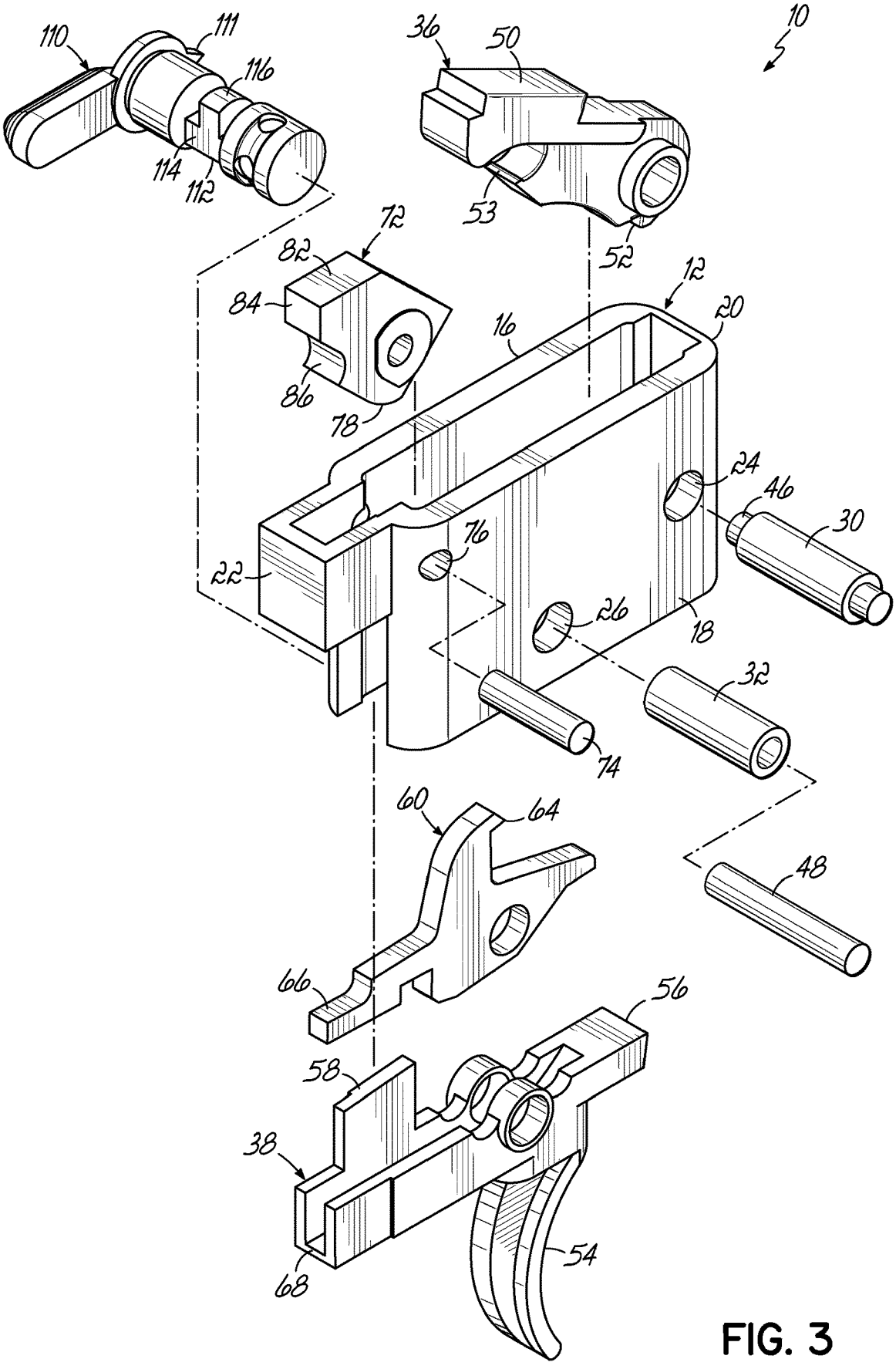
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FIG. 3

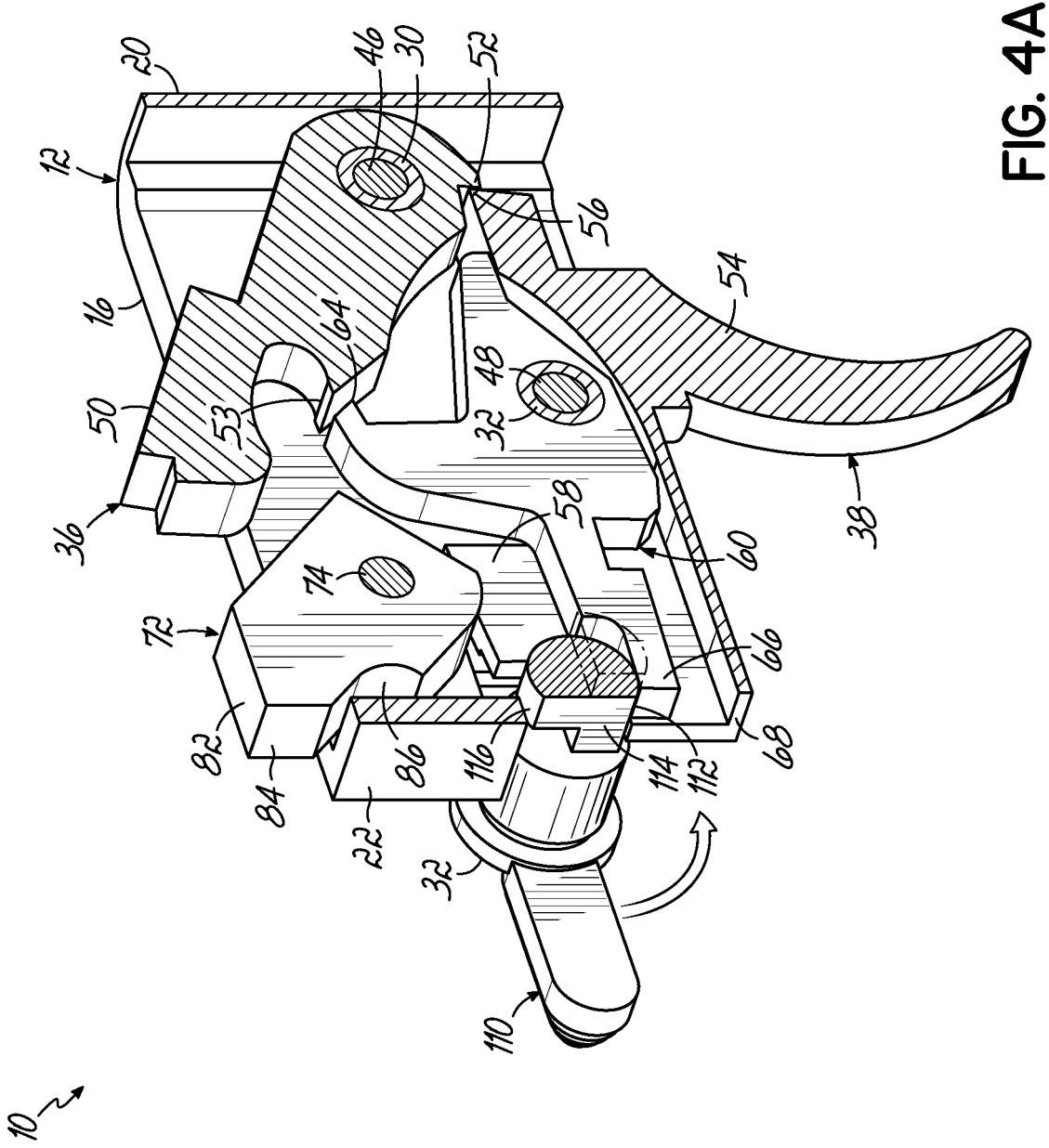
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FIG. 4A

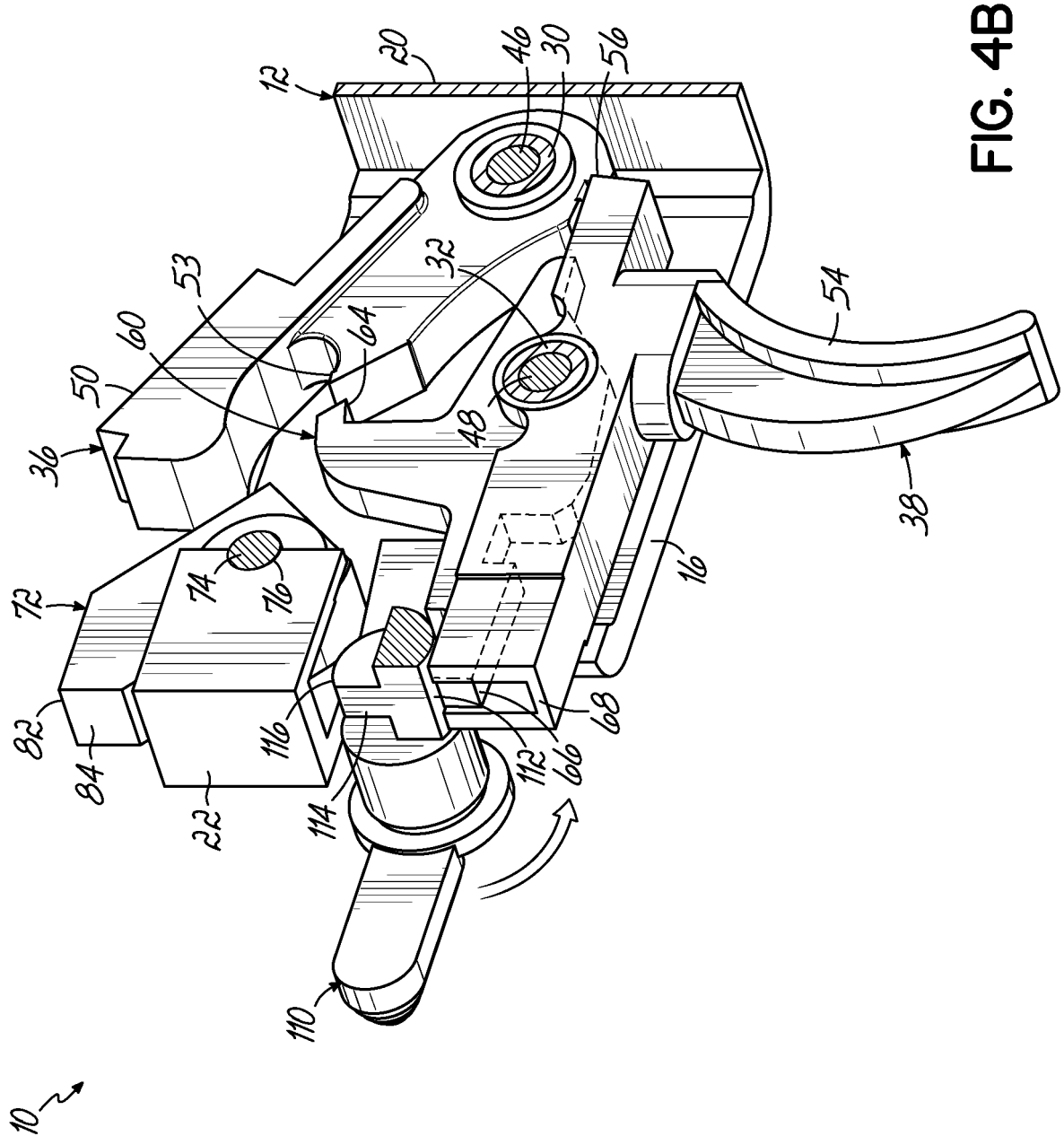
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FIG. 4B

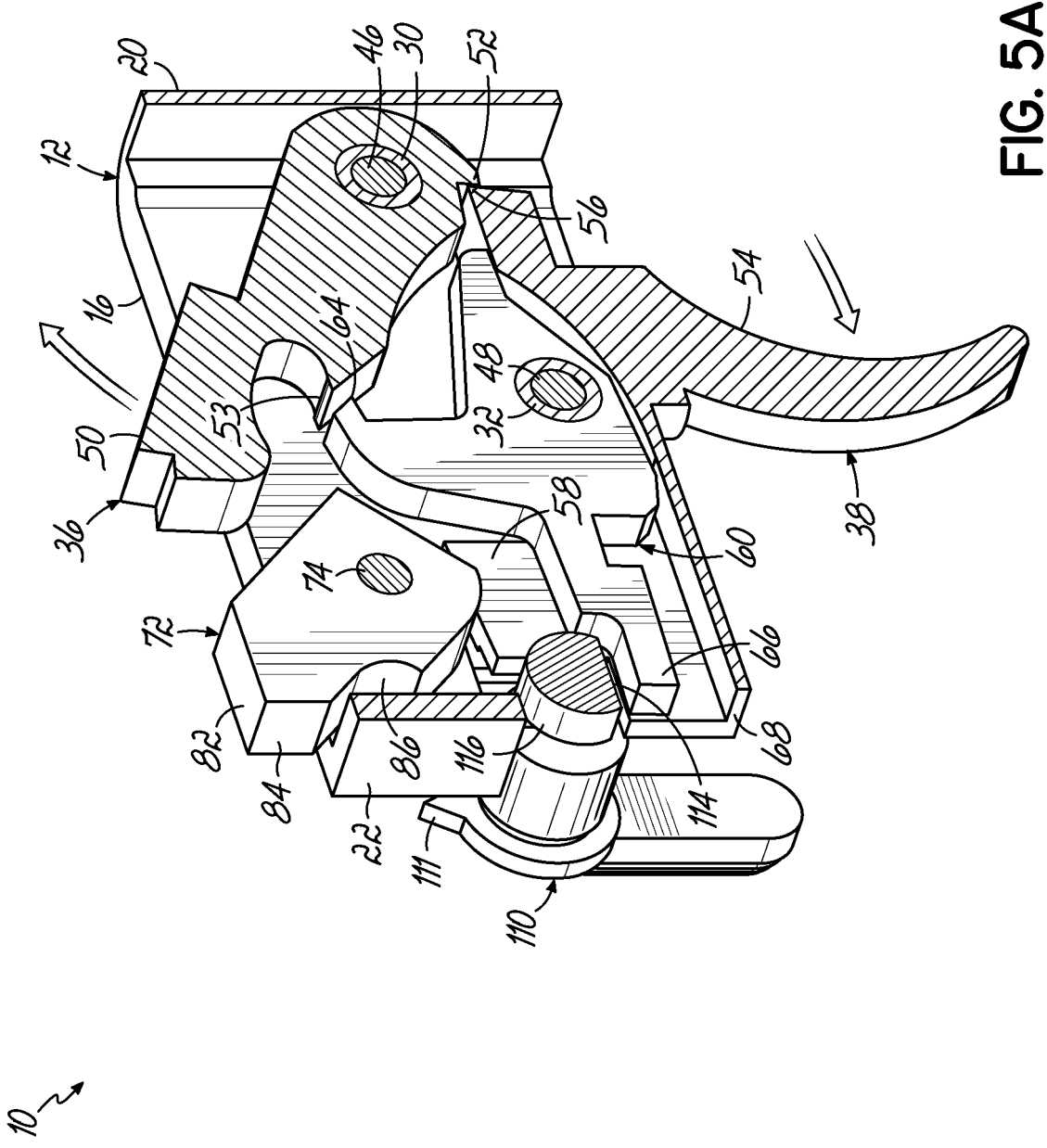
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FIG. 5A

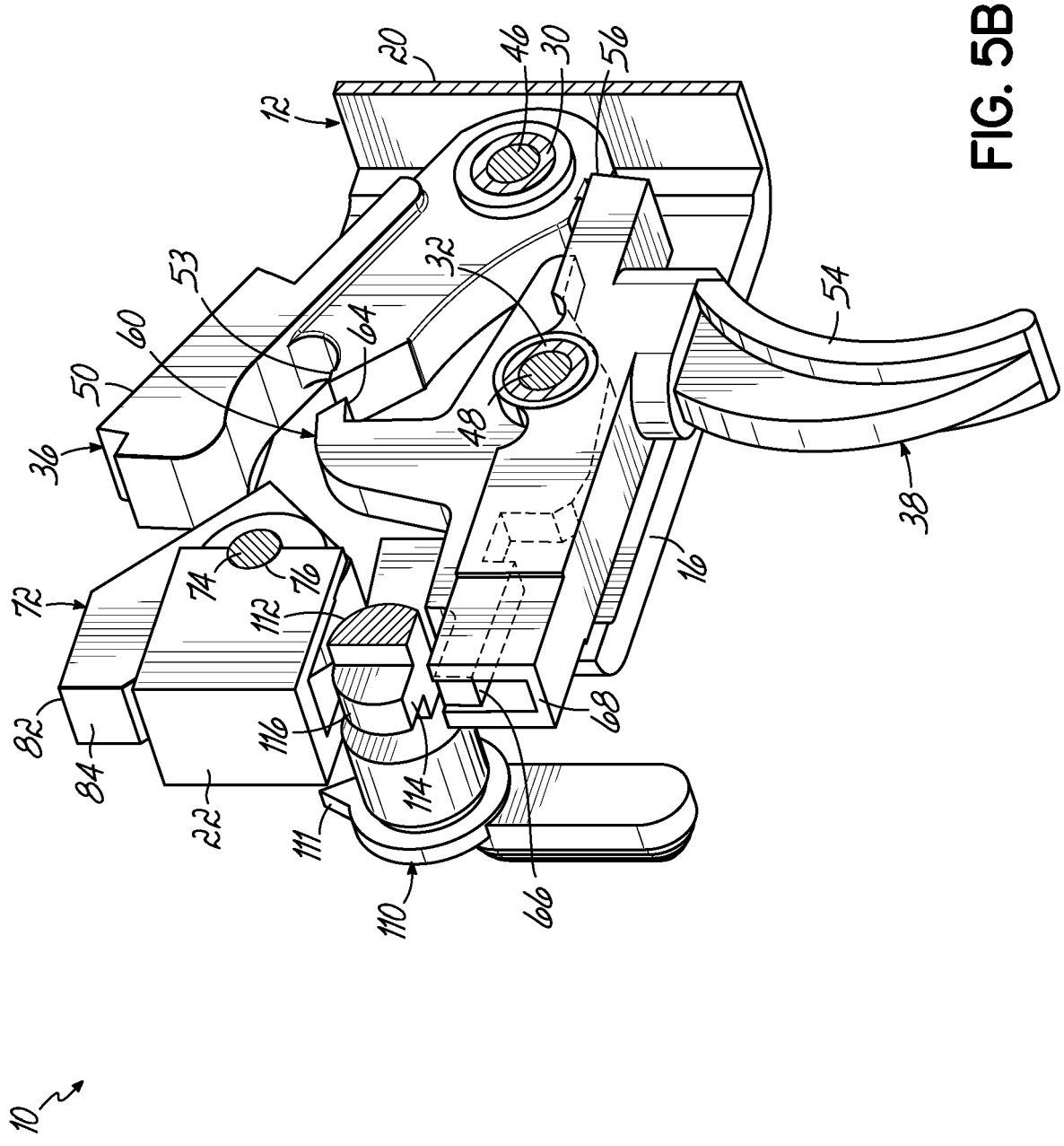
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FIG. 5B

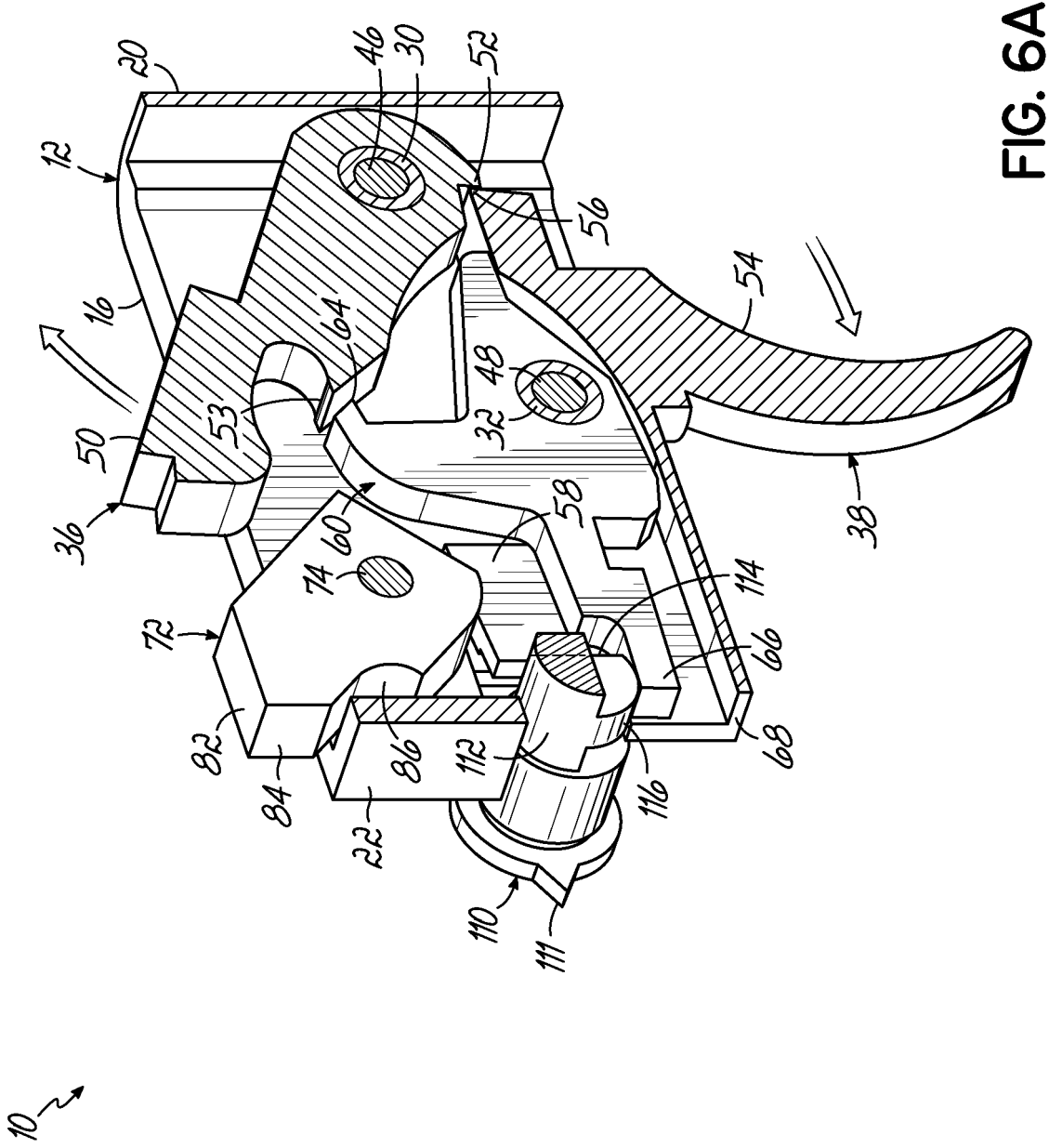
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FIG. 6A

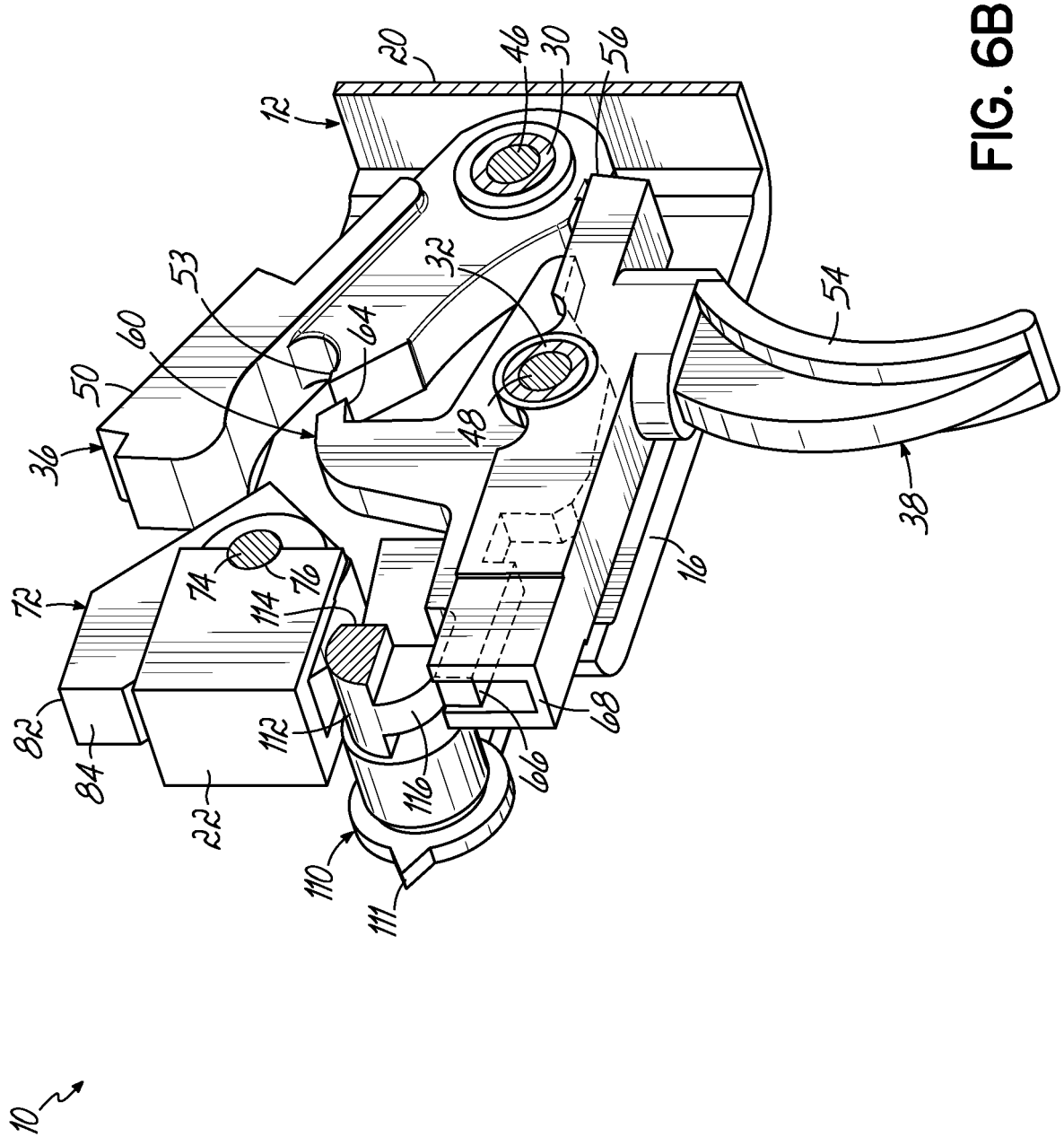
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FIG. 6B

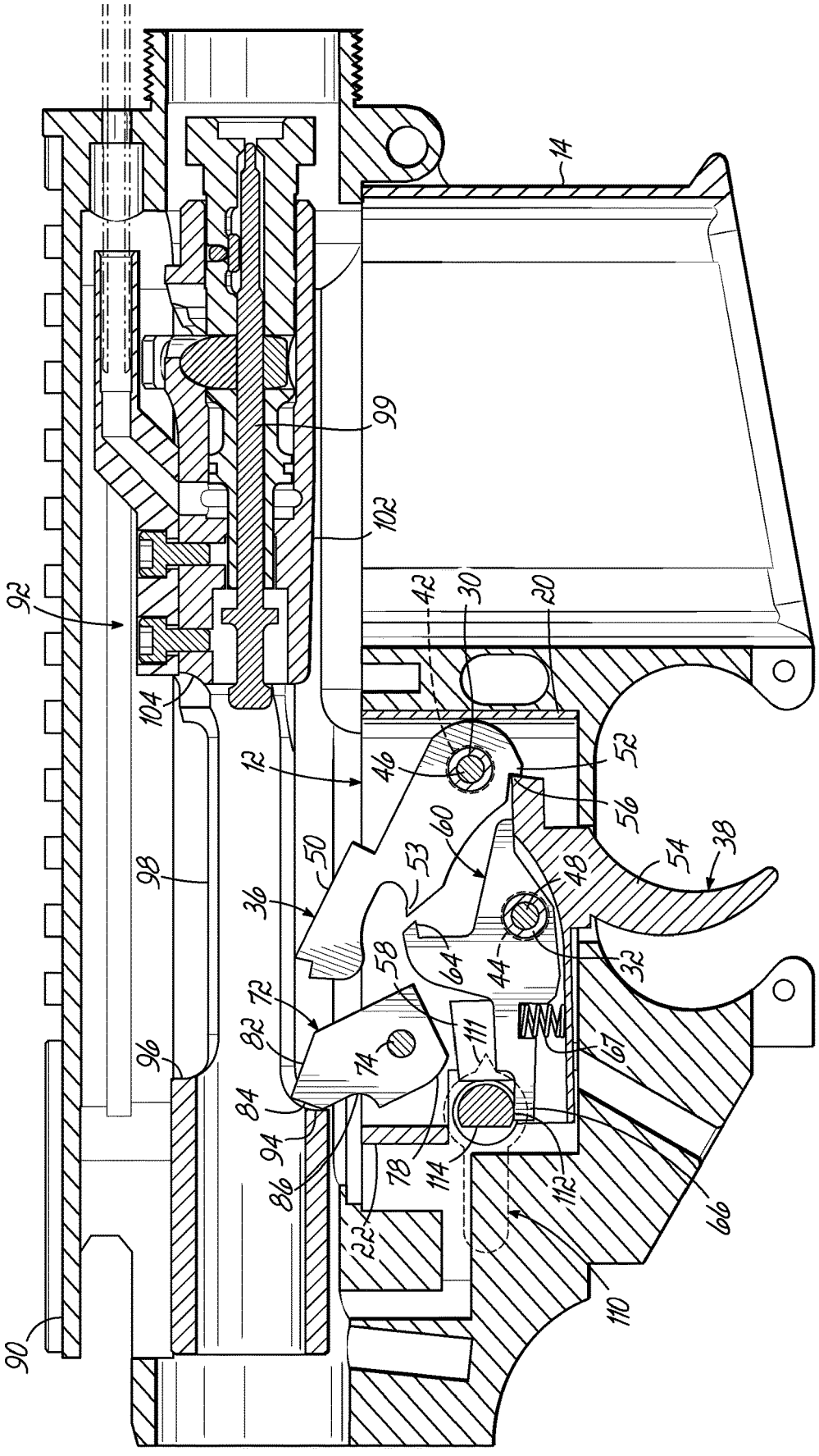
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FIG. 7

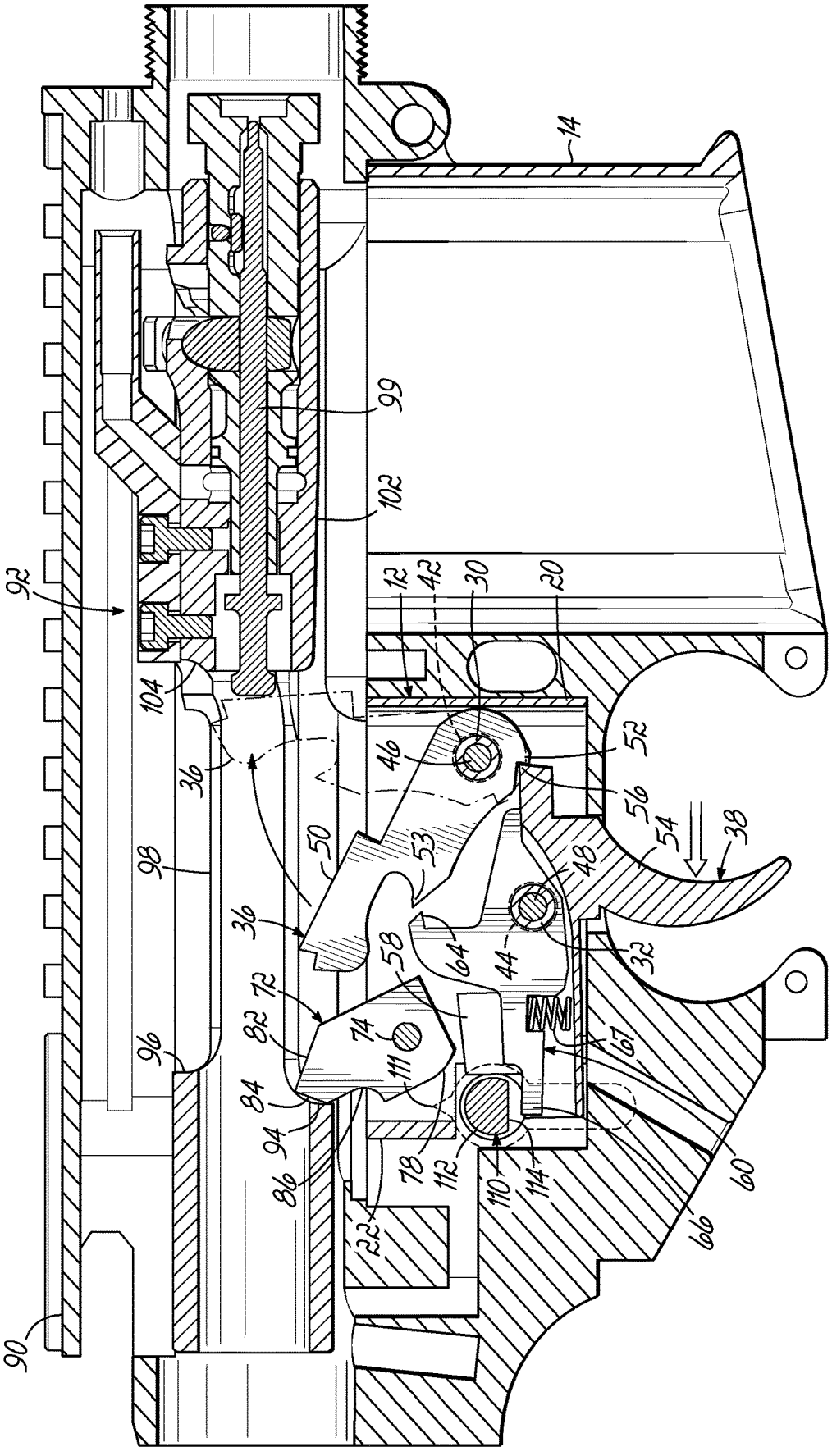
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FIG. 8A

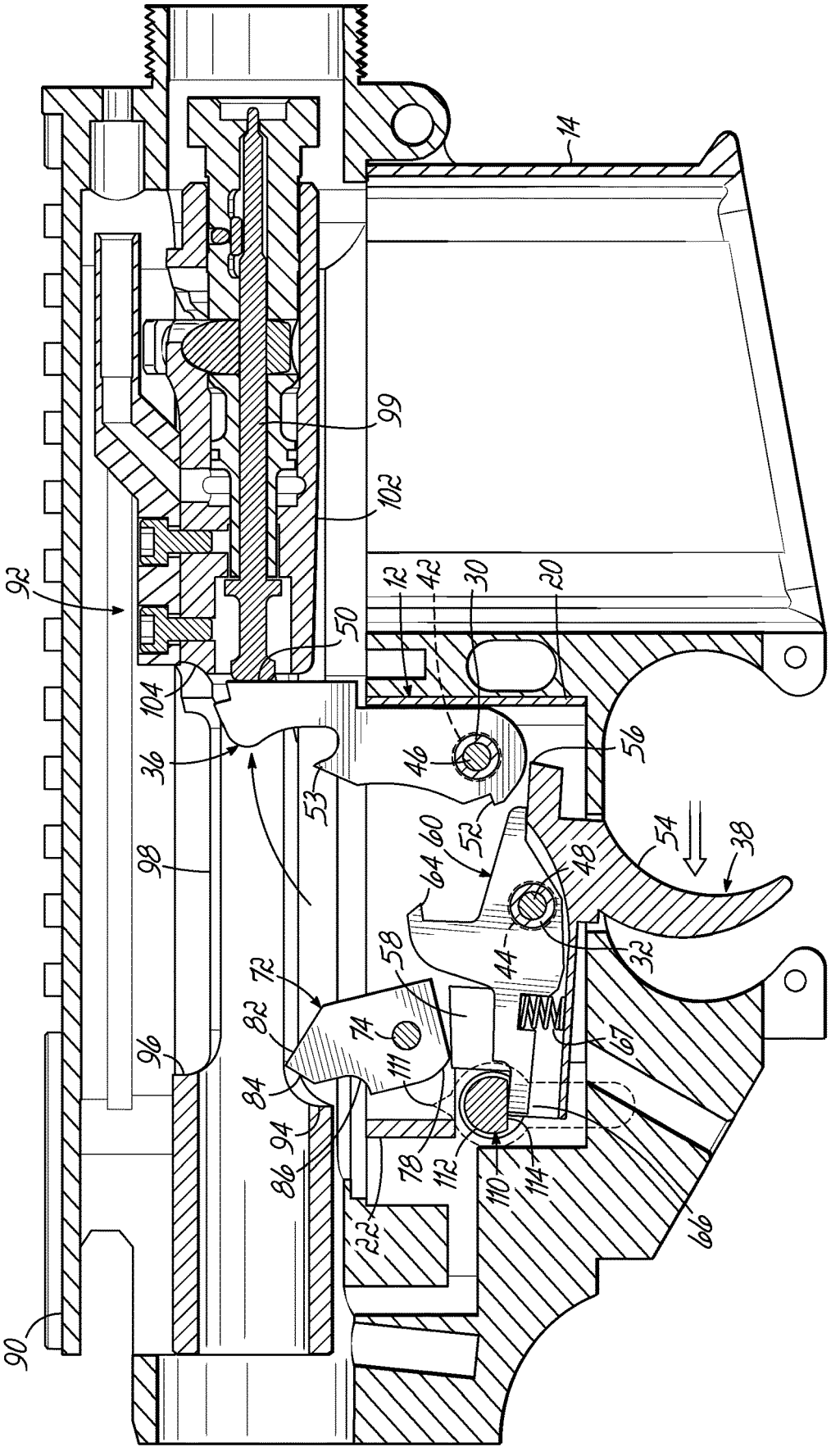
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FIG. 8B

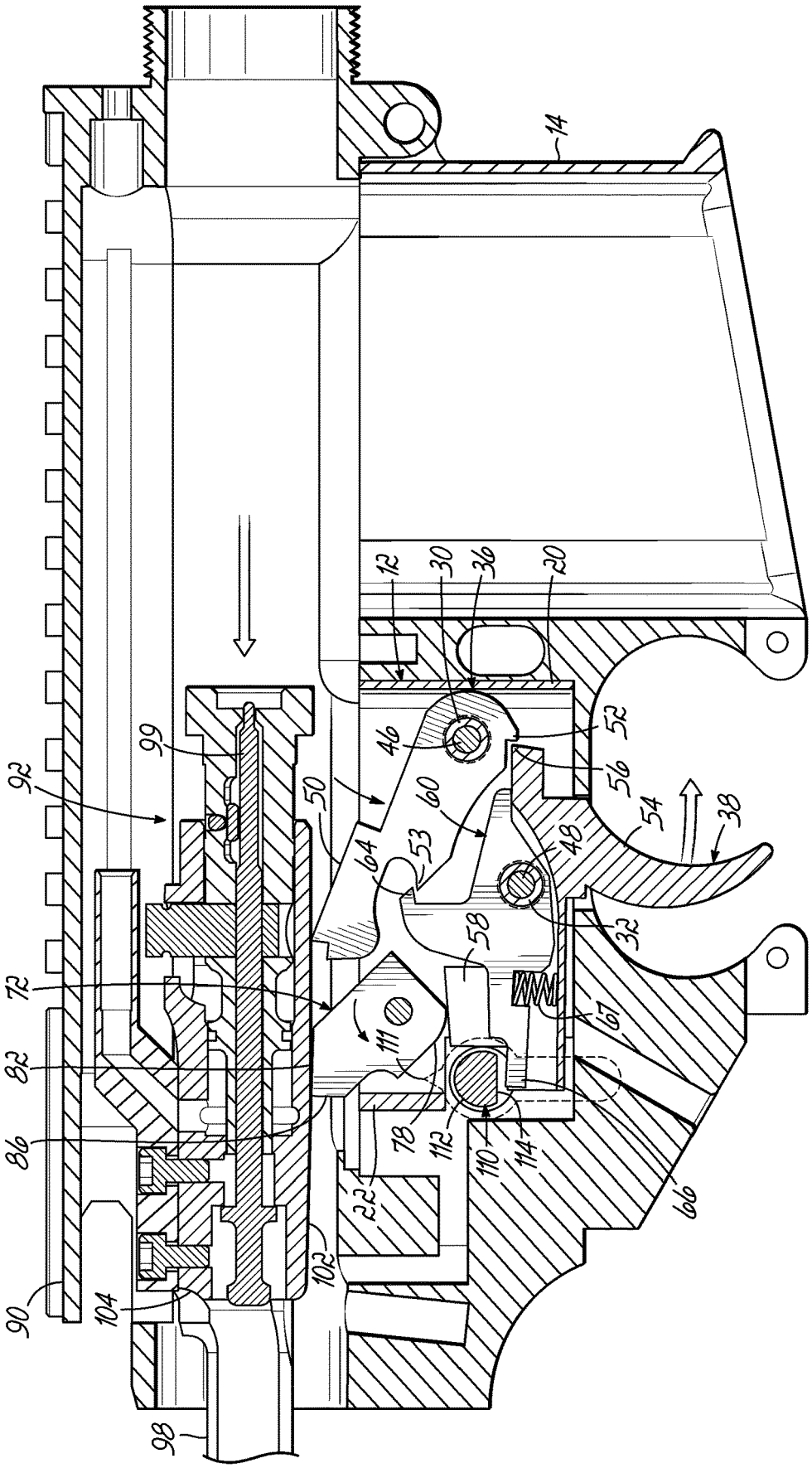
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FIG. 8C

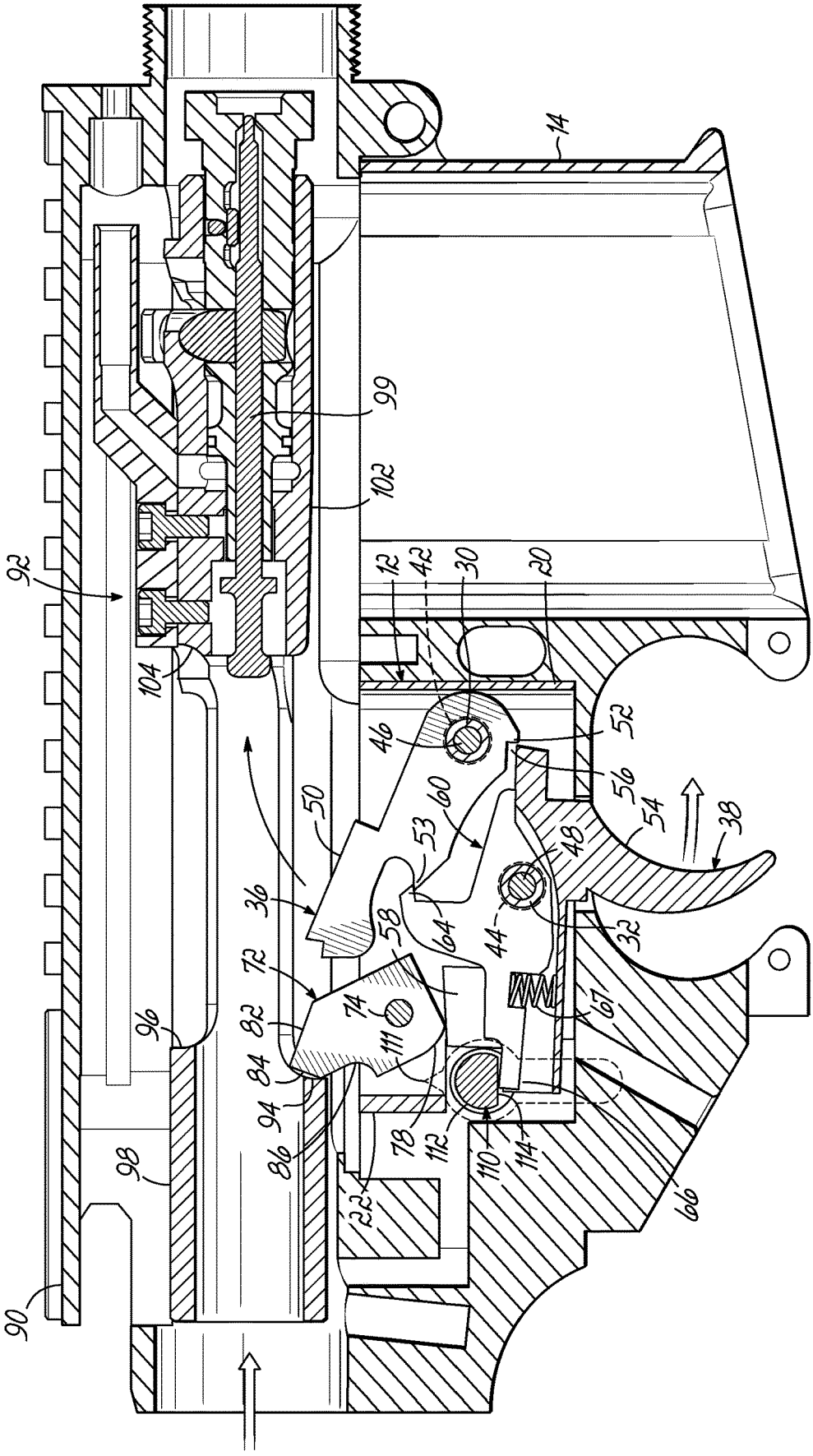
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FIG. 8D

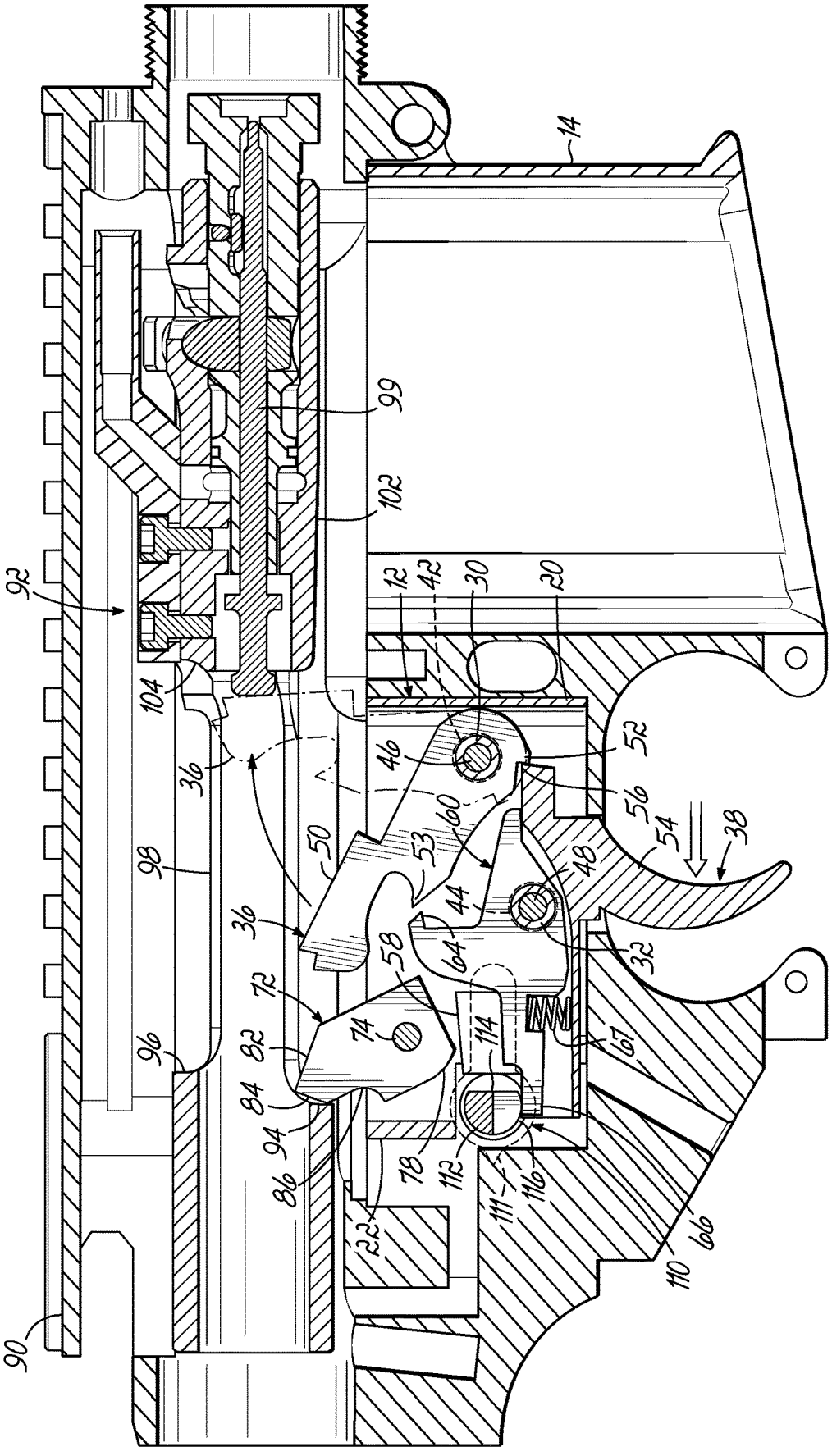
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FIG. 9A

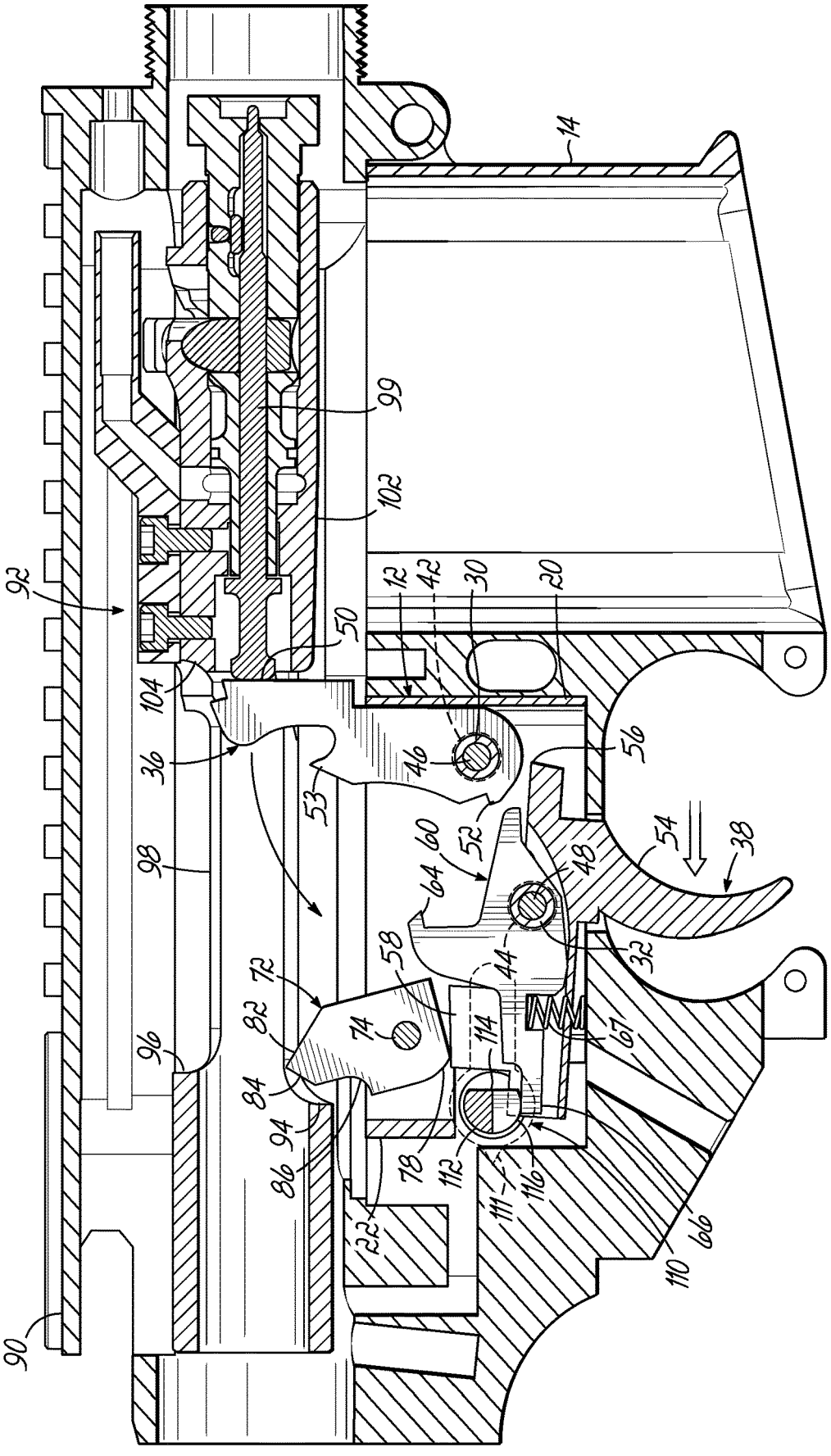
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FIG. 9B

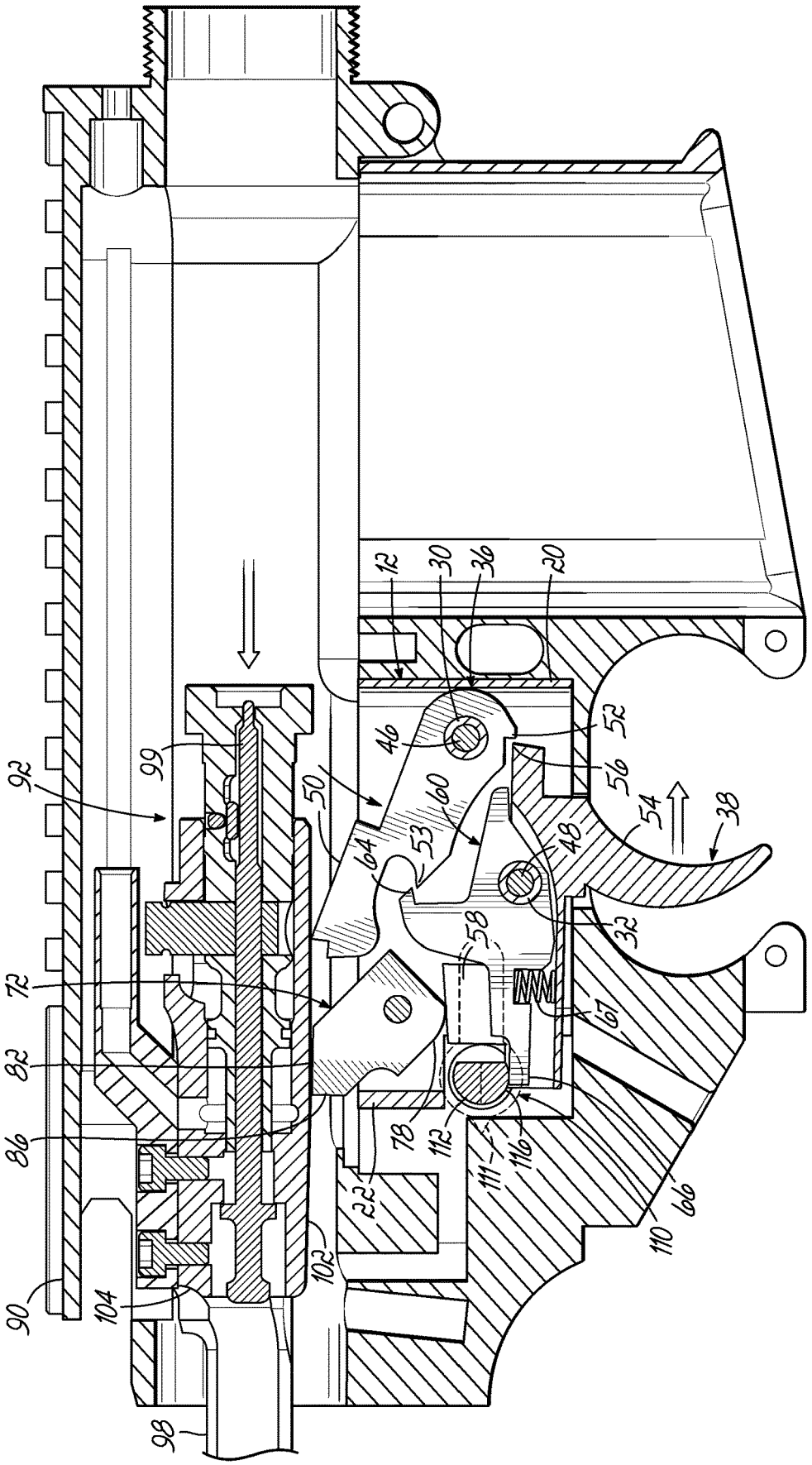
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FIG. 9C

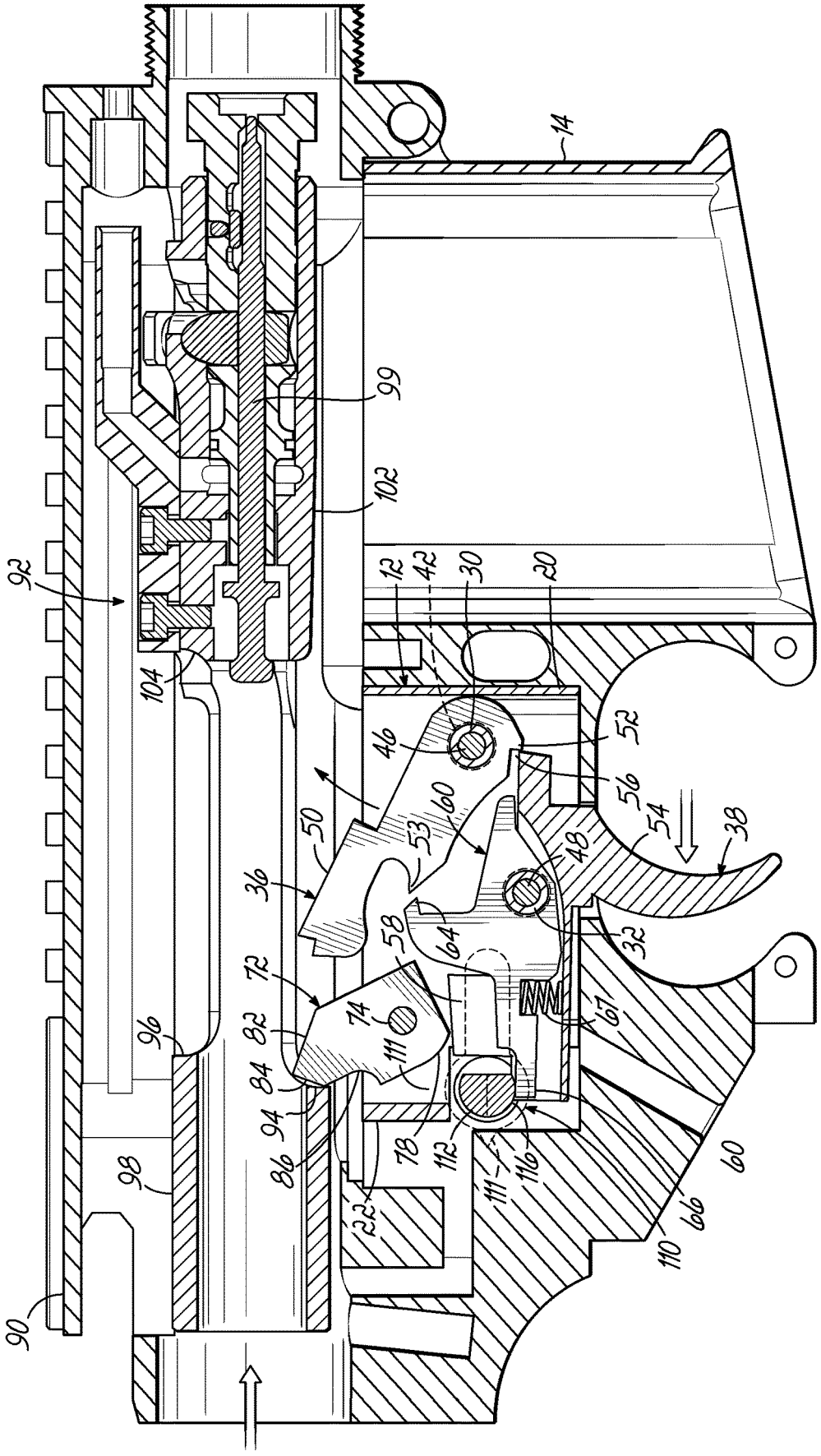
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FIG. 9D

FIREARM TRIGGER MECHANISM

RELATED APPLICATIONS

This application claims the priority benefit of U.S. Provisional Patent Application No. 63/374,941 filed Sep. 8, 2022, which is hereby incorporated by reference herein as if fully set forth in its 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 positions.

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 comprising:

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, said 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 said sear and sear catch are in engagement in said set positions of said hammer and trigger member and are out of engagement in said released positions of said hammer and trigger member,

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

a cam having a cam lobe and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse cam pivot axis, said cam being pivotable between a first position at which said cam lobe does not force said trigger member towards said set position and a second position at which said cam lobe does force said trigger member towards said 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,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer and pivoting of said cam from said first position to said second position such that said cam lobe forces said trigger member towards said set position but prior to reaching said set position said disconnector hook catches said hammer hook, and thereafter forward movement of the bolt carrier causes said cam to pivot to said first position, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and

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

2. The trigger mechanism of claim **1**, wherein said safety selector has a protuberance thereon which, when said safety selector is in said forced reset semi-automatic position, contacts said disconnector preventing said disconnector hook from catching said hammer hook.

3. The trigger mechanism of claim **1** further including a spring which biases said trigger member towards said set position.

4. A firearm trigger mechanism comprising:

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 said housing to pivot on said hammer pin between set and released positions, said hammer adapted to be pivoted rearward by rearward movement of a bolt carrier,

a trigger member having a sear and mounted in said housing to pivot on said trigger member pin between set and released positions,

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

a disconnector having a hook for engaging said hammer and mounted in said housing to pivot on said trigger member pin,

a cam having a cam lobe and mounted in said housing to pivot on said cam pin, said cam being pivotable between a first position at which said cam lobe does not force said trigger member towards said set position and a second position at which said cam lobe does force said trigger member towards said 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,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer and pivoting of said cam from said first position to said second position such that said cam lobe forces said trigger member towards said set position but prior to reaching said set position said disconnector hook catches said hammer hook, and thereafter forward movement of the bolt carrier causes said cam to pivot to said first position, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and

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

5. The trigger mechanism of claim **4**, wherein said safety selector has a protuberance thereon which, when said safety selector is in said forced reset semi-automatic position, contacts said disconnector preventing said disconnector hook from catching said hammer hook.

6. The trigger mechanism of claim **4**, wherein said first and second pairs of transversely aligned openings in said housing are adapted to be aligned with first and second pairs of transversely aligned assembly pin openings in the fire control mechanism pocket.

7. The trigger mechanism of claim **4** further including a spring which biases said trigger member towards said set position.

8. The trigger mechanism of claim **7** wherein said spring is a torsion spring.

9. A firearm comprising:

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 said fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, said hammer adapted to be pivoted rearward by rearward movement of said bolt carrier,

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

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

a disconnector having a hook for engaging said hammer and mounted in said fire control mechanism pocket to pivot on said transverse trigger member pivot axis,

a cam having a cam lobe and mounted in said fire control mechanism pocket to pivot on a transverse cam pivot axis, said cam being pivotable between a first position at which said cam lobe does not force said trigger member towards said set position and a second position at which said cam lobe does force said trigger member towards said set position, and

a safety selector mounted in said fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions,

whereupon in said standard semi-automatic position, rearward movement of said bolt carrier causes rearward pivoting of said hammer and pivoting of said cam from said first position to said second position such that said cam lobe forces said trigger member towards said set position but prior to reaching said set position said disconnector hook catches said hammer hook, and thereafter forward movement of said bolt carrier causes said cam to pivot to said first position, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said

hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire said firearm, and

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

10. The firearm of claim **9** 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,

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

11. The firearm of claim **10** further comprising:

said receiver having a first pair of transversely aligned assembly pin openings and a second pair of transversely aligned assembly pin openings,

said housing first pair of openings coaxial with said receiver first pair of openings and said housing second pair of openings coaxial with said receiver second pair of openings,

a first assembly pin passing through said receiver first pair of openings and through said housing first pair of openings, and

a second assembly pin passing through said receiver second pair of openings and through said housing second pair of openings.

12. The firearm of claim **10** further comprising a spring which biases said trigger member towards said set position.

13. The firearm of claim **12** wherein said spring is a torsion spring.

14. A firearm trigger mechanism comprising:

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, said 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 said sear and sear catch are in engagement in said set positions of said hammer and trigger member and are out of engagement in said released positions of said hammer and trigger member,

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

a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, said cam being movable between a first position at which said cam lobe does not force said trigger member towards said set position and a second position at which said cam lobe does force said trigger member towards said 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,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer and movement of said cam from said first position to said second position such that said cam lobe forces said trigger member towards said set position but prior to reaching said set position said disconnector hook catches said hammer hook, and thereafter forward movement of the bolt carrier causes said cam to move to said first position, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and

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

15. A firearm trigger mechanism comprising:

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, said 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 said sear and sear catch are in engagement in said set positions of said hammer and trigger member and are out of engagement in said released positions of said hammer and trigger member,

said disconnector having a hook for engaging said 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, said cam being movable between a first position and a second position, in said second position said cam lobe forces said trigger member towards said set position,

whereupon in a standard semi-automatic mode, said cam is in said first position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook catches said hammer hook, and thereafter the bolt carrier moves forward into battery, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and

whereupon in a forced reset semi-automatic mode, said cam is in said second position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook is prevented from

catching said hammer hook, and thereafter the bolt carrier moves forward into battery, at which time the user can pull said trigger member to fire the firearm.

16. The trigger mechanism of claim **15**, 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,

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

17. The trigger mechanism of claim **15**, further comprising a spring which biases said trigger member towards said set position.

18. The trigger mechanism of claim **17**, wherein said spring is a torsion spring.

19. The trigger mechanism of claim **15**, wherein the trigger member pivot axis and disconnector pivot axis are coaxial.

20. A firearm trigger mechanism comprising:

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, said 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 said sear and sear catch are in engagement in said set positions of said hammer and trigger member and are out of engagement in said released positions of said hammer and trigger member,

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

a cam having a cam lobe and adapted to be movably mounted in the fire control mechanism pocket, said cam being movable between a first position at which said cam lobe does not force said trigger member into said set position and a second position at which said cam lobe does force said trigger member into said set position, and

a safety selector adapted to be movably mounted in the fire control mechanism pocket to move between safe, standard semi-automatic, and forced reset semi-automatic positions,

whereupon in said standard semi-automatic position, said cam is in said first position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook catches said hammer hook, and thereafter the bolt carrier moves forward into battery, at which time a user must manually release said trigger member to free said hammer from said disconnector to permit said hammer and trigger member to pivot to said set positions so that the user can pull said trigger member to fire the firearm, and

whereupon in said forced reset semi-automatic position, said cam is in said second position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnector hook is prevented from catching said hammer hook, and thereafter the bolt carrier moves forward into battery, at which time the user can pull said trigger member to fire the firearm.

21. The trigger mechanism of claim **20**, wherein said cam is not a part of said safety selector.

22. The trigger mechanism of claim **20**, wherein said safety selector moves between safe, standard semi-automatic, and forced reset semi-automatic positions by rotation.

23. The trigger mechanism of claim **20**, wherein the trigger member pivot axis and disconnector pivot axis are coaxial.

* * * * *

EXHIBIT B

US012031784B1

(12) **United States Patent**
DeMonico

(10) **Patent No.: US 12,031,784 B1**
(45) **Date of Patent: Jul. 9, 2024**

(54) **ADAPTED FORCED RESET TRIGGER**

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

(72) Inventor: **Lawrence DeMonico**, Austin, TX (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 0 days.

(21) Appl. No.: **18/052,606**

(22) Filed: **Nov. 4, 2022**

Related U.S. Application Data

(60) Provisional application No. 63/276,090, filed on Nov. 5, 2021.

(51) **Int. Cl.**
F41A 17/46 (2006.01)
F41A 19/10 (2006.01)
F41A 19/43 (2006.01)

(52) **U.S. Cl.**
CPC ***F41A 17/46*** (2013.01); ***F41A 19/10*** (2013.01); ***F41A 19/43*** (2013.01)

(58) **Field of Classification Search**
CPC F41A 17/46; F41A 19/10; F41A 19/43
See application file for complete search history.

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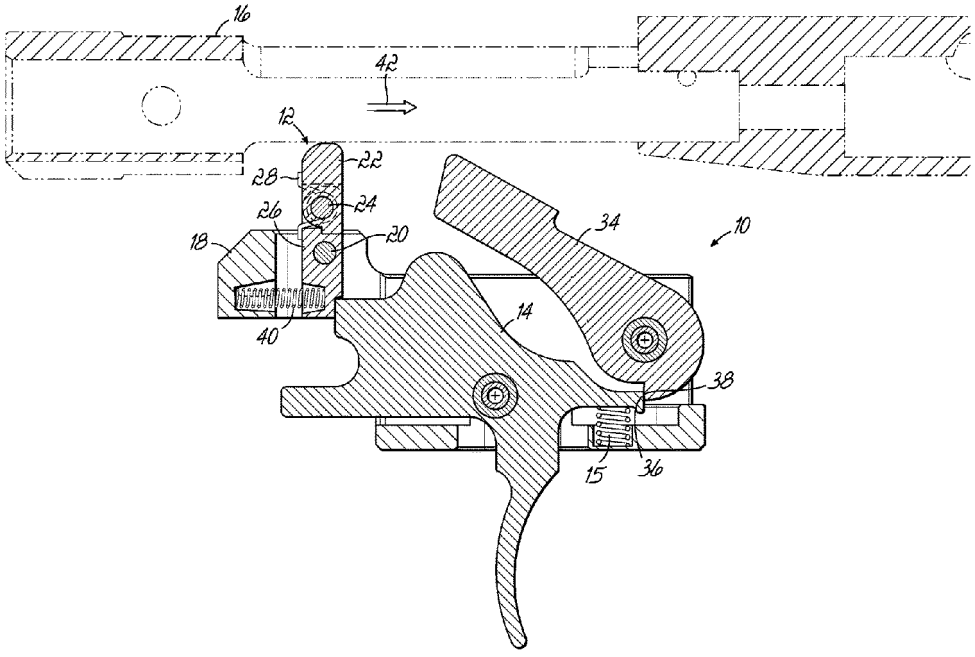
Primary Examiner — Michelle Clement
(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP

(57) **ABSTRACT**

In a forced rest trigger mechanism, provided is an extended trigger member locking device having a locking member that is movable between a first position in which it locks a trigger member against pulling movement and a second position where it does not restrict movement of the trigger member. The locking member is configured to be movably supported by a frame and includes a generally upward extension portion configured to make actuating contact with a surface of a bolt carrier. The locking member has a body portion that is movably supported and an upward extension portion that is separately movable relative to the body portion between an extended position and a deflected position.

6 Claims, 5 Drawing Sheets



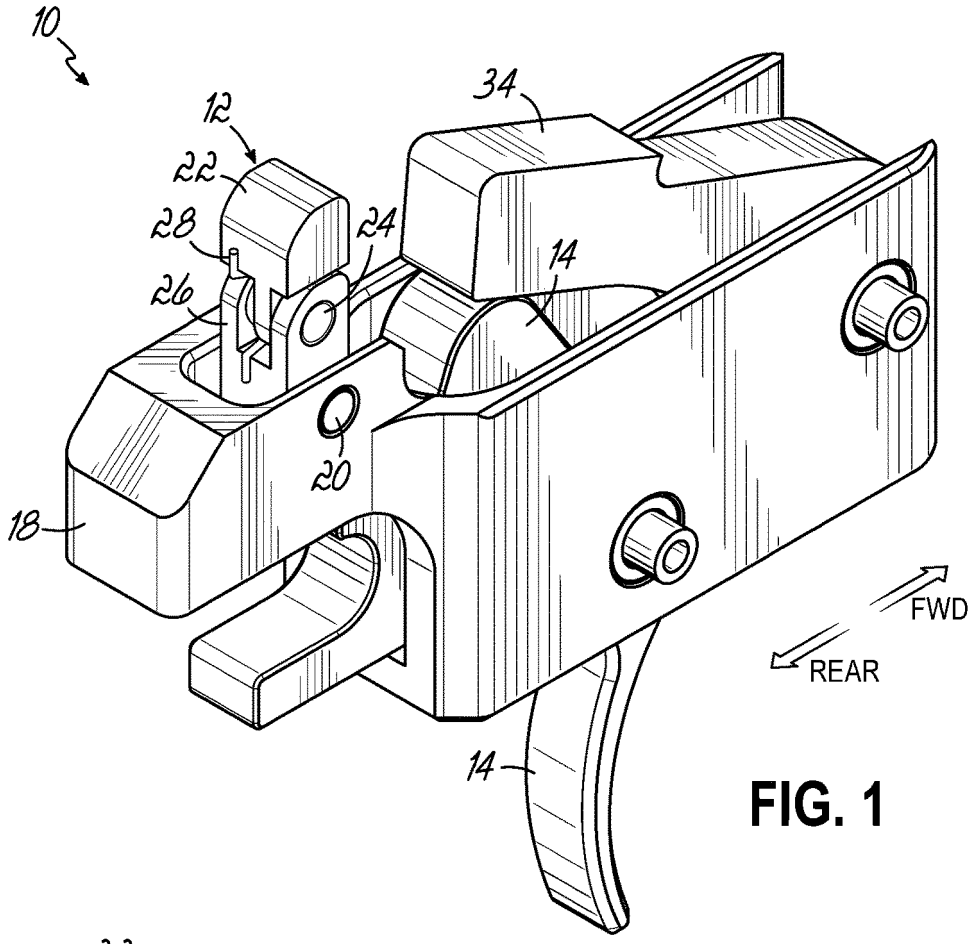


FIG. 1

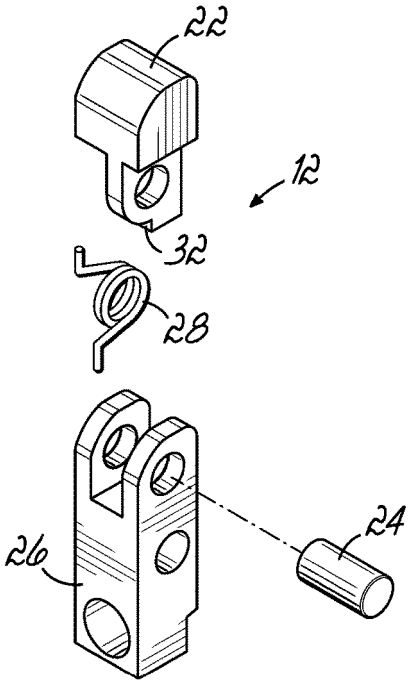


FIG. 2

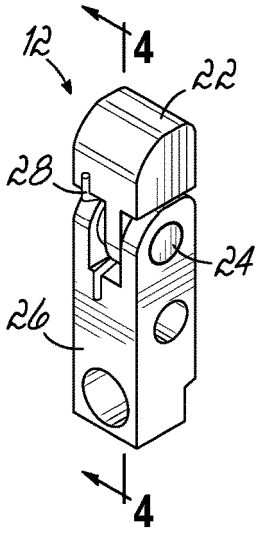


FIG. 3

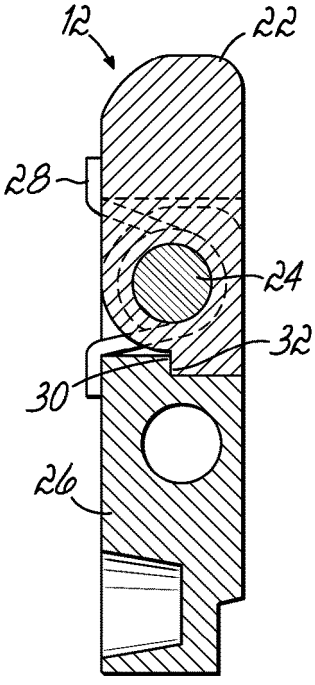
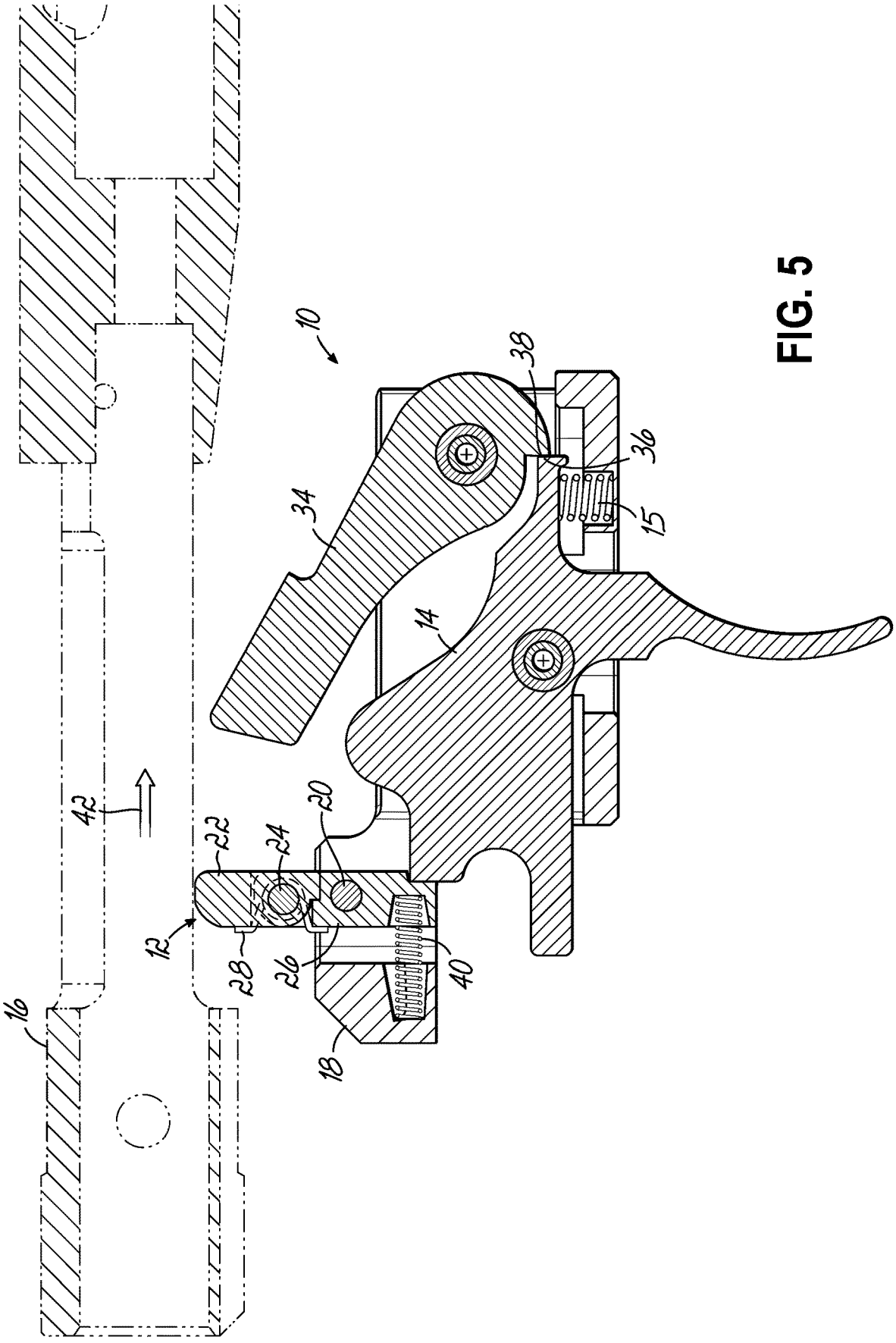


FIG. 4



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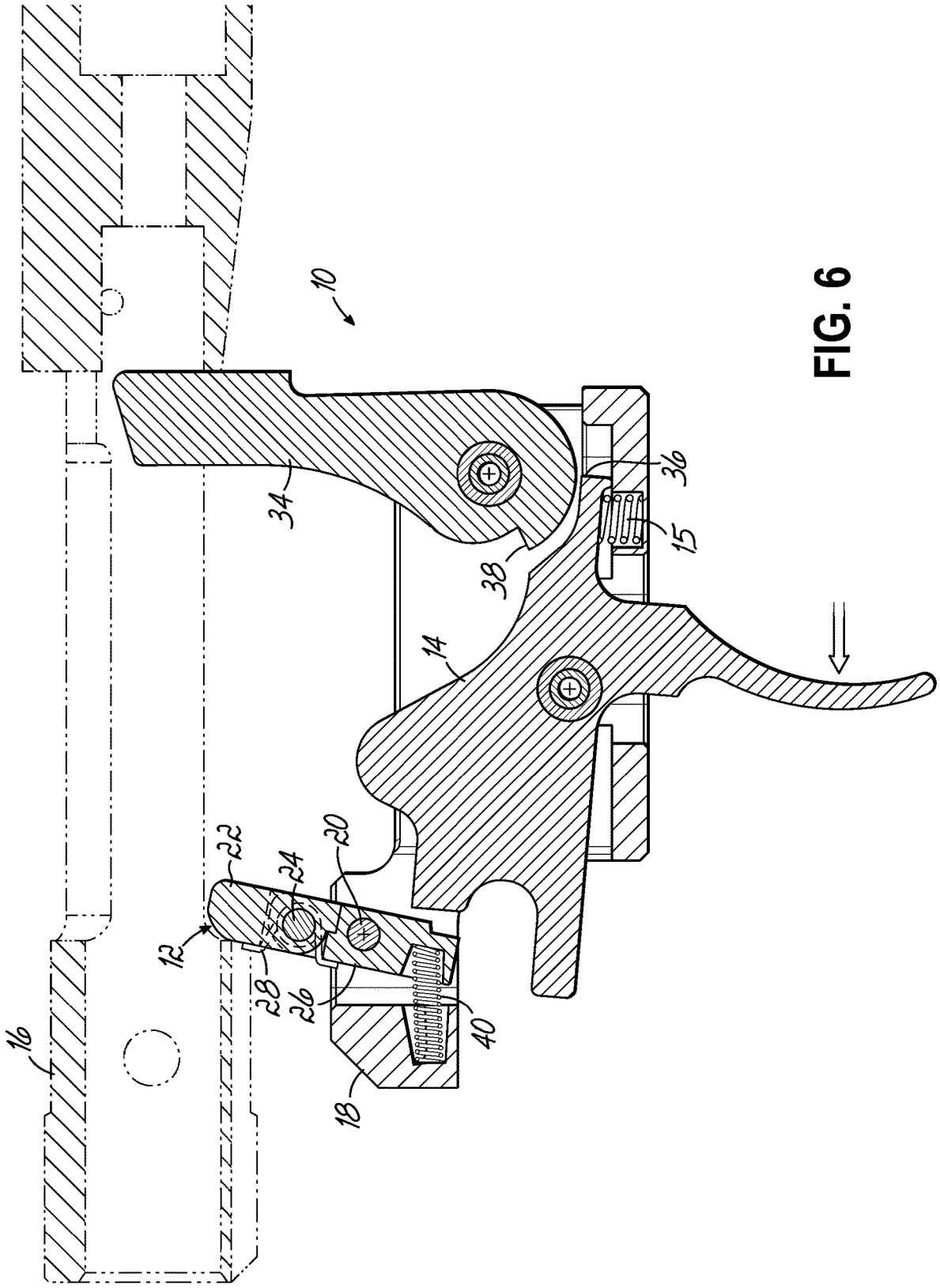

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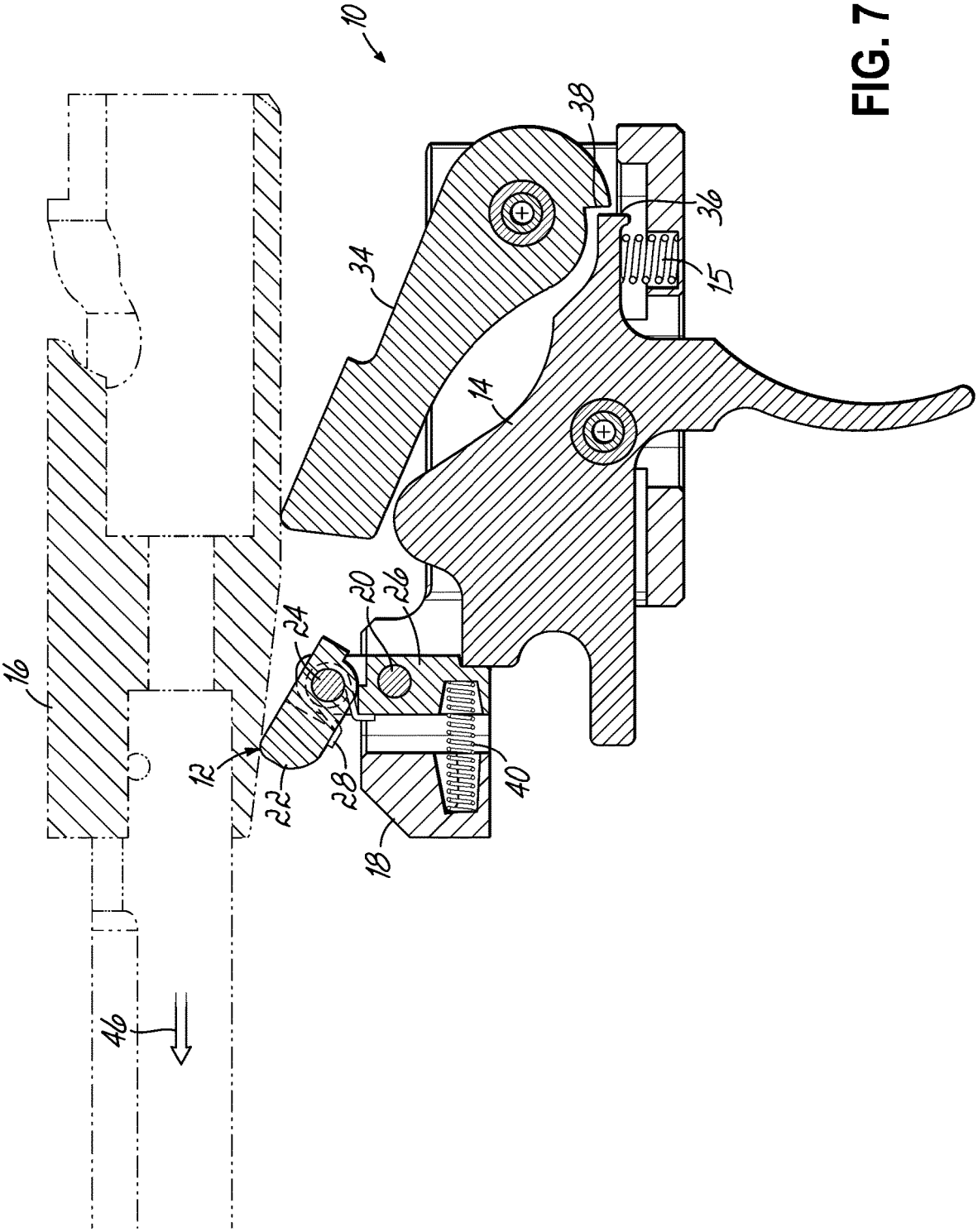

FIG. 7

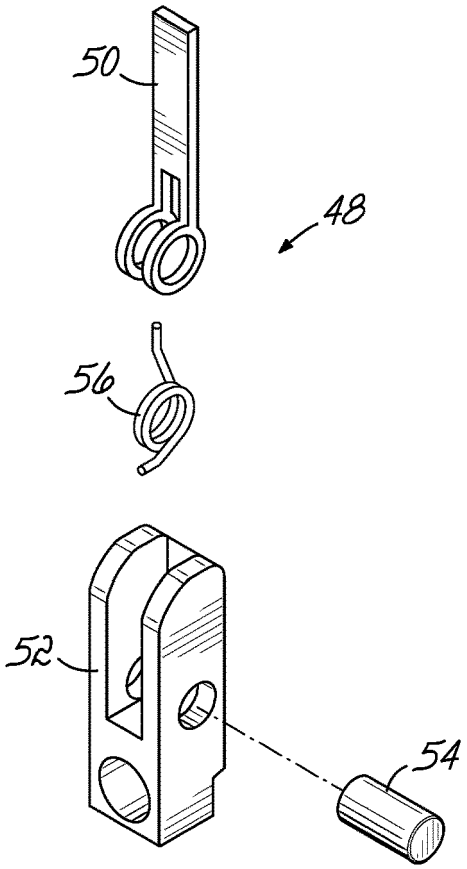

FIG. 8

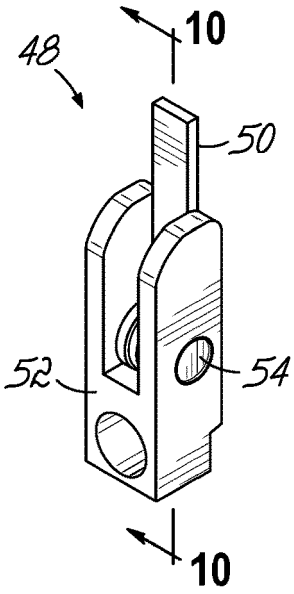

FIG. 9

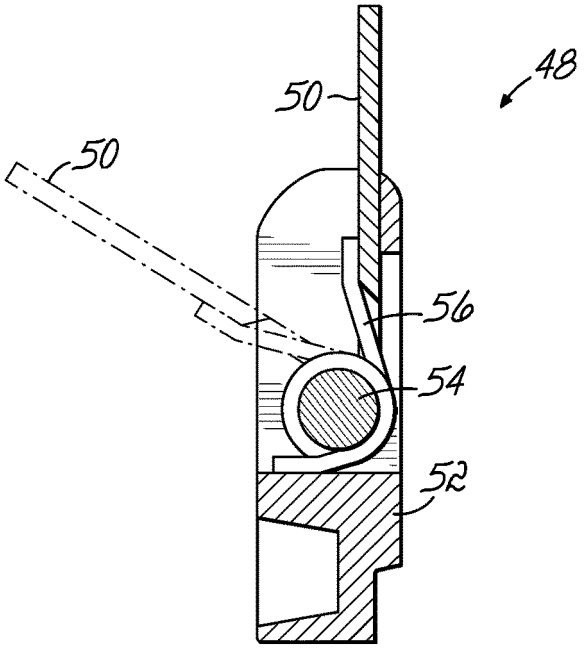

FIG. 10

ADAPTED FORCED RESET TRIGGER

TECHNICAL FIELD

This invention relates to a semiautomatic firearm trigger adapted for use in certain weapons platforms or calibers. In particular, it relates to a forced rest trigger assembly having a trigger locking member with a one-way folding capability to be actuated by forward movement of a bolt carrier assembly while allowing the bolt carrier to pass while cycling to the rear.

BACKGROUND

A forced reset semiautomatic trigger is described and shown in U.S. Pat. No. 10,514,223, issued Dec. 24, 2019, the contents of which are hereby incorporated herein in its entirety by this reference. Its structure and function are fully described therein. The embodiment illustrated in that patent is particularly adapted for use in an AR15-pattern firearm.

The AR10 firearm pattern is similar in design, concept, and function to the AR15, but fires the larger 7.62 mm NATO (.308 Winchester) caliber cartridge and some dimensional specifications are somewhat less standardized. The larger caliber requires certain parts to be scaled differently from the AR15 pattern, resulting, for example, in a different profile of the bolt carrier body and spacing relative to the lower receiver and trigger mechanism. In particular, the rear or tail portion of the AR10-pattern bolt carrier is positioned vertically further from the lower receiver and trigger assembly parts, while a forward portion of the AR10-pattern bolt carrier is situated lower.

The embodiment illustrated in U.S. Pat. No. 10,514,223 could be installed in an AR10-pattern lower receiver (because the assembly/pivot pin locations are substantially the same), but it would not be operable because the upward extension of the locking member (bar) would be too short to be contacted and actuated (to release the trigger member) by the rear/tail portion of the bolt carrier as it reaches the in-battery position. However, if the upward length/height of the locking member is extended sufficiently to be actuated, it would then interfere with a lower surface of a forward portion of the bolt carrier as it cycles rearward, again making the device inoperable.

SUMMARY OF THE INVENTION

The present invention provides a deflectable extension of the locking member that is actuated by forward movement of the bolt carrier, but deflects or folds to avoid interfering contact with the forward portion of the bolt carrier as the bolt carrier cycles to the rear.

In a forced rest trigger mechanism a trigger member locking device has a locking member that is movable between a first position in which it locks a trigger member against pulling movement and a second position where it does not restrict movement of the trigger member. The locking member is configured to be movably supported by a frame and includes a generally upward extension portion configured to make actuating contact with a surface of a bolt carrier. According to an aspect of the invention, the locking member has a body portion that is movably supported and an upward extension portion that is separately movable relative to the body portion between an extended position and a deflected position.

Two example embodiments are illustrated having a one-way hinge feature that causes the locking member to pivot in one direction when actuated by a rear portion of the bolt carrier as it returns to the in-battery position, and to give way (i.e., deflect or fold) without pivoting the remainder of the locking member when contacted by the forward portion of the bolt carrier as it cycles to the rear.

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 an isometric view of a trigger mechanism incorporating one embodiment of the present invention;

FIG. **2** is an exploded isometric view of the locking member according to this embodiment of the invention;

FIG. **3** is an assembled isometric view thereof;

FIG. **4** is a cross-sectional view taken substantially along line **4-4** of FIG. **3**;

FIG. **5** is a side sectional view of a trigger mechanism with a locking member according to this embodiment of the invention and a bolt carrier, in phantom lines, showing the bolt carrier moving forward toward the in-battery position

FIG. **6** is a similar view showing the bolt carrier in an in-battery position with the blocking member displaced (actuated) by the bolt carrier, the trigger member pulled, and the hammer released;

FIG. **7** is a similar view showing the bolt carrier moving toward its rearward cycled position in which it has pivoted the hammer against the trigger member to force the trigger member to the reset position and the upper extension of the locking member is pivoted to allow passage of the bolt carrier without interference or affecting the locking status of the locking member;

FIG. **8** is an exploded isometric view of an alternative embodiment locking member;

FIG. **9** is an assembled view thereof; and

FIG. **10** is a side sectional view taken substantially along line **10-10** of FIG. **9**, showing the displaced position of the hinged extension in phantom line.

DETAILED DESCRIPTION

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 indicate 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.

Referring first to FIG. **1**, therein is shown a forced reset semiautomatic trigger assembly **10** with a locking member **12** according to a first embodiment of the present invention. As described in the aforementioned U.S. Pat. No. 10,514,223, the locking member (bar) **12** locks the trigger member **14** and prevents it from being pulled any time the bolt carrier assembly **16** is not in the substantially in-battery position. The bolt, firing pin, and other parts of the bolt carrier, the operation of which are well known to a person of ordinary skill in the art, are omitted from the illustrations for clarity. The trigger assembly can also include a trigger spring **15** that determines the pull force needed to pull the trigger member **14**, but the force of the spring **15** may be insignificant in returning the trigger member **14** to the reset position relative to the force of the hammer **34**. As used herein, "bolt," "bolt carrier," "bolt carrier body," and/or "bolt carrier assembly" may be used interchangeably to refer to the part of the firearm action that reciprocates as the action cycles. The locking member **12** of the present invention includes a deflectable portion that moves to allow passage of the forward portion of the bolt carrier **16** as it cycles to the rear, which can include a hinging structure, as will be described in greater detail below.

The locking member **12** is supported to move (in this case, pivot, on a transverse axis) by the trigger housing **18**. It may be carried, for example on a substantially transverse pivot pin **20**, which allows the locking member **12**, to pivot as a whole unit. Likewise, the locking member could be supported by a frame other than a trigger housing, such as a separate frame or the receiver of the firearm (not shown).

Referring now also to FIGS. **2-4**, the locking member **12** acts as a pivot lever with lever arms extending substantially upwardly and downwardly from a substantially central pivot axis. The upper lever arm portion includes a foldable extension portion **22** that pivots on, for example a transverse pivot pin **24** relative to the locking bar body **26**. A spring means is provided to maintain the foldable extension **22** in the extended position. The spring means may be a torsion spring **28**, as illustrated, or may be some other type of spring, such as a leaf spring, etc. the extension portion **22** could be made from a resilient material configured to deflectably bend in one direction while retaining rigidity in an opposite direction.

As best indicated in FIG. **4**, the locking member body **26** and foldable extension **22** may include corresponding abutment surfaces **30**, **32** configured to limit the movement of the foldable extension **22** in one direction. Thus, force applied from a rearward direction toward the front to the foldable extension **22** causes the entire locking member **12** to pivot on the pivot pin **20** relative to the housing **18**. Rearward force applied to the foldable extension **22** from the front toward the rear causes the foldable extension **22** to fold on the pivot pin **24** and allow the bolt carrier **16** to pass without causing pivotal movement of the locking member body **26**.

Referring now to FIG. **5**, therein is shown in a sectional side view the relative positions of the trigger assembly **10** and bolt carrier body **16**. As shown in FIG. **5**, the hammer **34** has been reset by prior rearward reciprocating movement of the bolt carrier **16**. The pivotal reset of the hammer **34** has forced the trigger member **14** to its reset position, at which the sear **36** engages and holds the sear notch **38** of the hammer **34**. Likewise in this position, the locking member **12** is biased to the locked position by a spring **40** and prevents the trigger member **14** from being pulled by the user. This function is described in the aforementioned U.S. Pat. No. 10,514,223. As depicted by arrow **42** in FIG. **5**, the bolt carrier **16** is reciprocating forwardly toward the in-battery position.

Referring now to FIG. **6**, therein the bolt carrier **16** has returned to the substantially in-battery position, contacting the deflectable extension portion **22** of the locking member **12** from the rear and causing the locking bar **12** to deflect (e.g., pivot) as a whole about transverse pivot pin **20** against the bias of the spring **40**. As understood by a person of ordinary skill in the art, the bolt carrier **16** first contacts the locking member **12** before it reaches the fully in-battery position and then continues to travel forward the remaining distance as it moved the locking member **12** from one position to another. In this position, the locking member **12** has released the trigger member **14**, allowing the user to pull the trigger member **14** (see arrow **44**), releasing the hammer **34**, and allowing it to be spring biased into contact with the firing pin (not shown).

Referring now to FIG. **7**, therein is shown the trigger assembly **10** with the hammer **34** and trigger member **14** forced to the reset position in which the sear **36** is engaged with the sear notch **38**. As the bolt carrier **16** reciprocates to the rear (arrow **44** in FIG. **7**), a lower side surface of the bolt carrier **16** contacts the foldable extension portion **22**, causing it to pivot toward the rear on the pivot pin **24** and against the bias of the spring **28** without displacing the locking bar body **26** or affecting its locking of the trigger member **14**. In this manner, the locking member **12** can be of sufficient of upward extension length to be engaged by the bolt carrier **14** when it reaches its substantially in-battery position (FIG. **6**), while allowing rearward reciprocation of the bolt carrier **16** without causing damage to the locking member **12** or inducing an interference malfunction.

Referring now to FIGS. **8-10**, therein is shown a locking member **48** according to an alternate embodiment of the present invention. According to this embodiment, a foldable extension portion **50** is pivotable in one direction relative to the locking bar body **52** and both parts **50**, **52** pivot along a single substantially transverse pivot axis provided by pivot pin **54**. Again, the foldable extension portion **50** may be biased toward the extended position by a spring **56** and, as shown in FIG. **10**, the hinging movement of the foldable extension portion is operable separate from the locking bar body **52** in a rearward direction but engages an abutment surface **58** for unitary movement when the foldable extension portion **50** is actuated toward a forward direction.

The deflectable extension portion **22**, **50** of any embodiment can include a feature to reduce contact friction as the bolt carrier **16** slides rearwardly over it. For example, the contact surface would include a coating or treatment, it would include a friction-reducing material, such as ultra-high-molecular-weight (UHMW) polyurethane, or could include a rolling member, like a wheel.

The present invention can be adapted to other embodiments. For example, it can be adapted to sliding locking member, such as that shown in U.S. Pat. No. 11,346,627, issued May 31, 2022. A sliding locking member (not shown) can include an upward extension that is engaged by the bolt carrier **16** to slide the locking member to the unlocked position, but that also is deflectable to allow passage of the retracting forward portion of the bolt carrier **16**.

While one or more 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. 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. In a forced rest trigger mechanism, an extended trigger member locking device, comprising:

a locking member that is movable between a first position in which it locks a trigger member against pulling movement and a second position where it does not restrict movement of the trigger member, the locking member configured to be movably supported by a frame and including a generally upward extension portion configured to make actuating contact with a surface of a bolt carrier, such actuating contact causing the locking member to move from the first position to the second position, the locking member having a body portion that is movably supported and an upwardly extending deflectable portion that is separately movable relative to the body portion between an extended position and a deflected position.

2. The device of claim **1**, wherein the locking member is supported by a trigger housing.

3. The device of claim **1**, wherein the locking member body portion pivots between the first and second positions.

4. The device of claim **1**, wherein the locking member deflectable portion pivots relative to the body portion.

5. The device of claim **3**, wherein the locking member deflectable portion pivots relative to the body portion on a pivot axis coaxial with that of the body portion.

6. The device of claim **1**, wherein the locking member deflectable portion is spring biased toward the extended position.

* * * * *

EXHIBIT C

US012529538B2

(12) **United States Patent**
Smith

(10) **Patent No.: US 12,529,538 B2**
(45) **Date of Patent: Jan. 20, 2026**

(54) **SAFETY MECHANISM FOR FIREARM**

(71) Applicant: **Cameron Smith**, Wabash, IN (US)

(72) Inventor: **Cameron Smith**, Wabash, IN (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 0 days.

(21) Appl. No.: **18/968,984**

(22) Filed: **Dec. 4, 2024**

(65) **Prior Publication Data**

US 2025/0180315 A1 Jun. 5, 2025

Related U.S. Application Data

(60) Provisional application No. 63/605,793, filed on Dec. 4, 2023.

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

(52) **U.S. Cl.**
CPC ***F41A 17/46*** (2013.01)

(58) **Field of Classification Search**
CPC F41A 17/46; F41A 19/46; F41A 19/02; F41A 19/10
USPC 42/70.06; 89/142, 132
See application file for complete search history.

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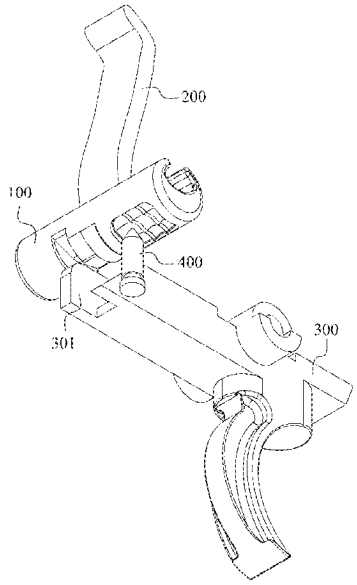
Primary Examiner — Reginald S Tillman, Jr.
(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP

(57) **ABSTRACT**

A safety mechanism for a firearm includes a cam selector, a lever, and a trigger. The cam selector comprises a first end, a second end, a top side, and a bottom side. The cam selector comprises a longitudinal slot positioned on the top side of the cam selector. The lever comprises a proximal end and a distal end. The longitudinal slot is configured to receive the lever. The cam selector further comprises a first recess and a second recess on the bottom side of the cam selector. The trigger comprises a first trigger tail portion. In addition to the standard semi-automatic and safe modes, the present invention provides an additional active reset mode in which the cam selector is configured to allow the first trigger tail portion to engage the second recess and be moved down by a cam portion of the second recess when the cam selector rotates.

13 Claims, 15 Drawing Sheets



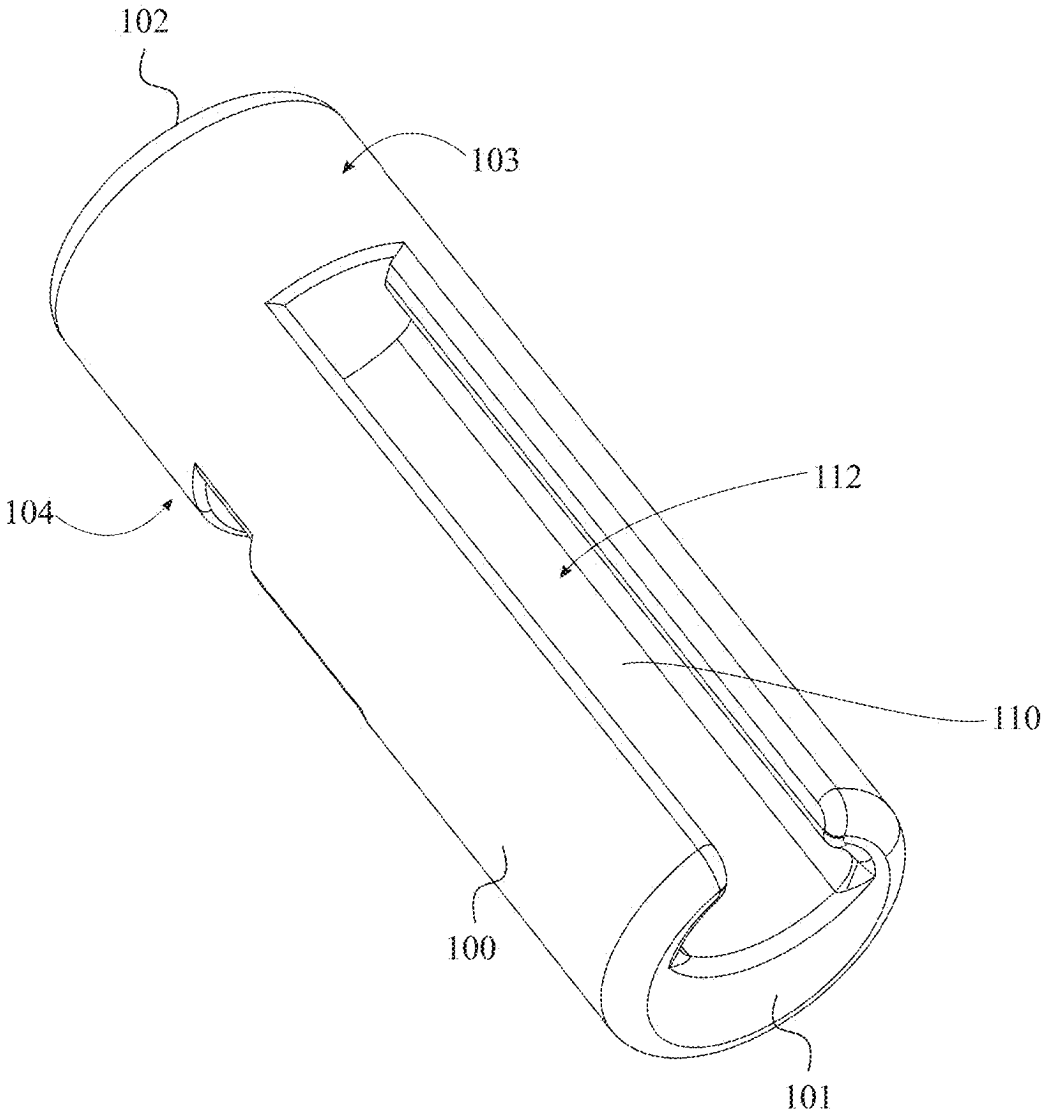


FIG. 1

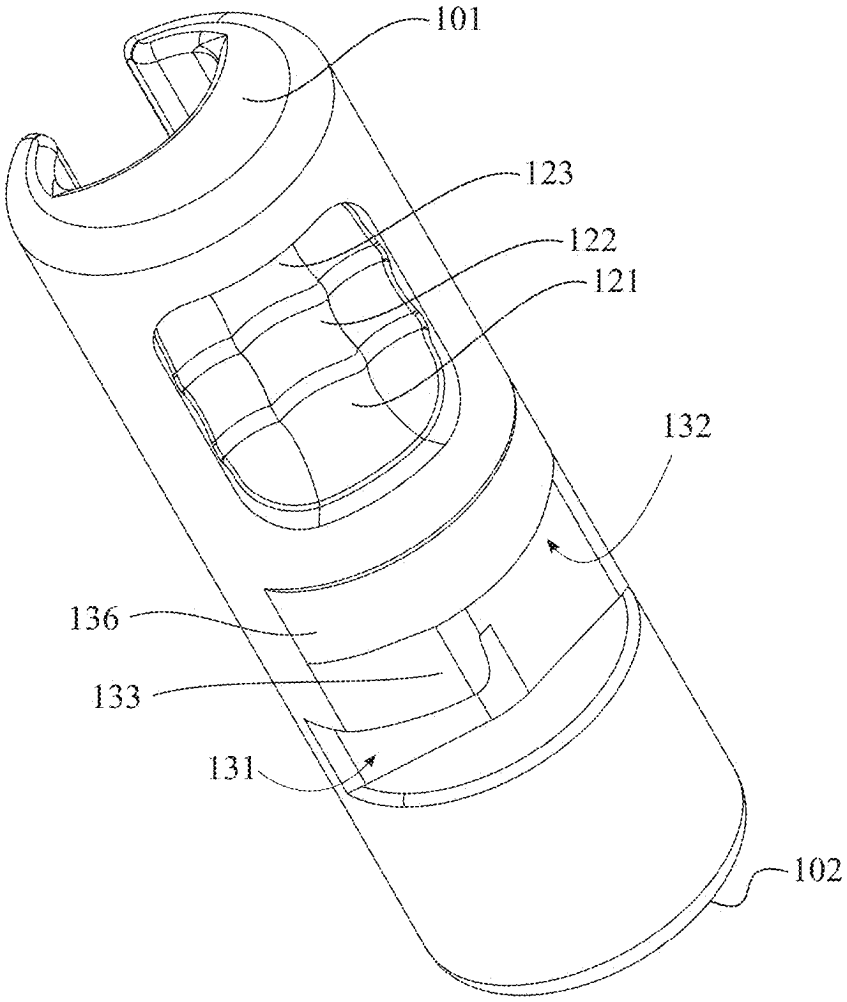


FIG. 2

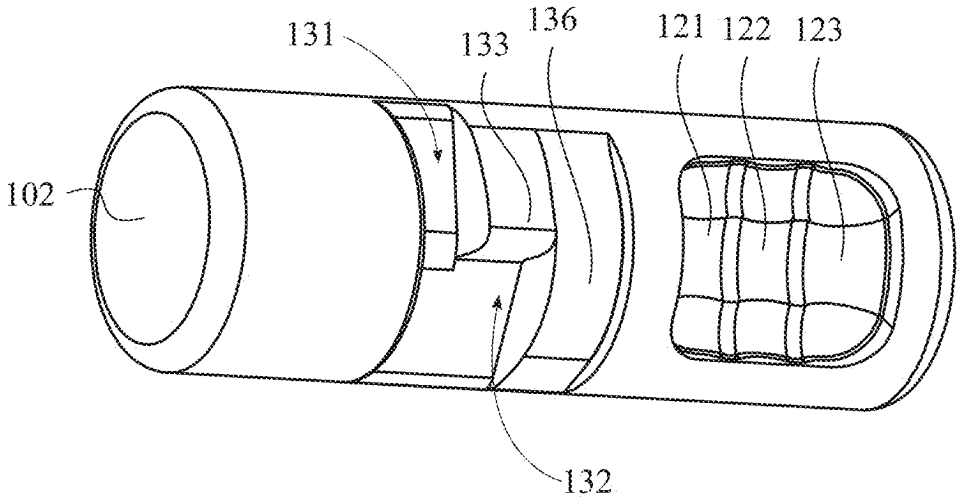


FIG. 3

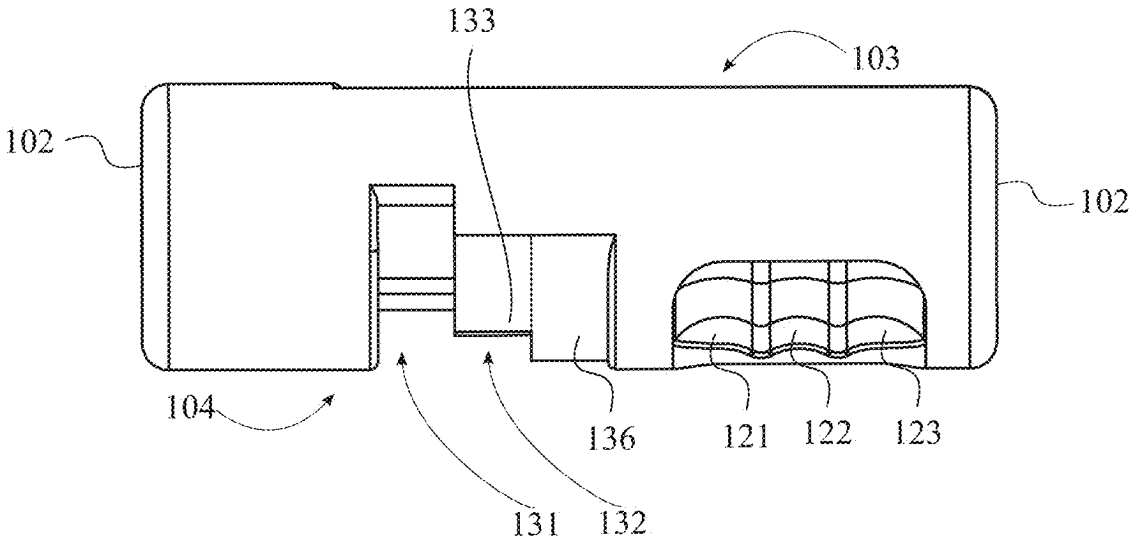


FIG. 4

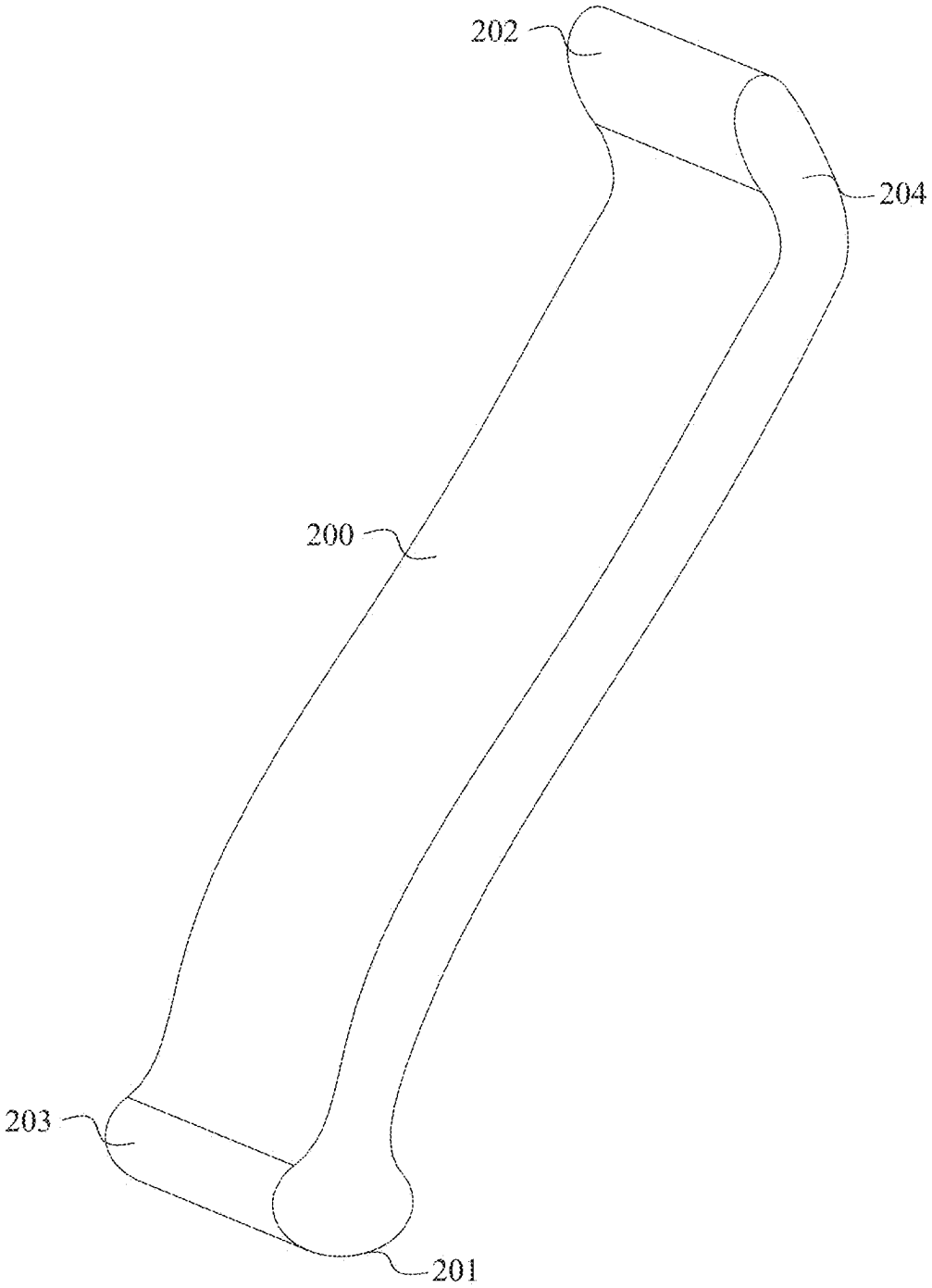


FIG. 5

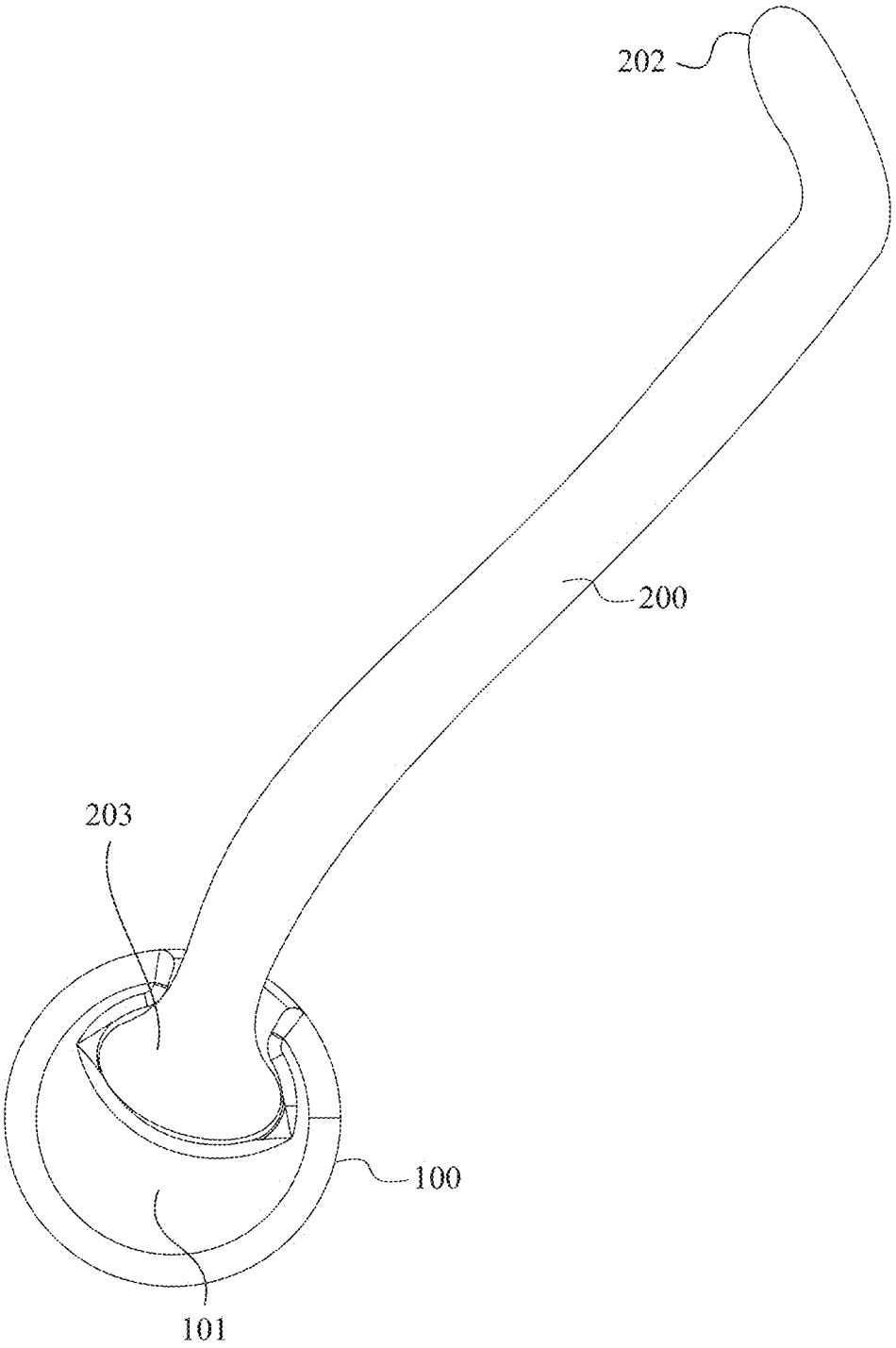


FIG. 6

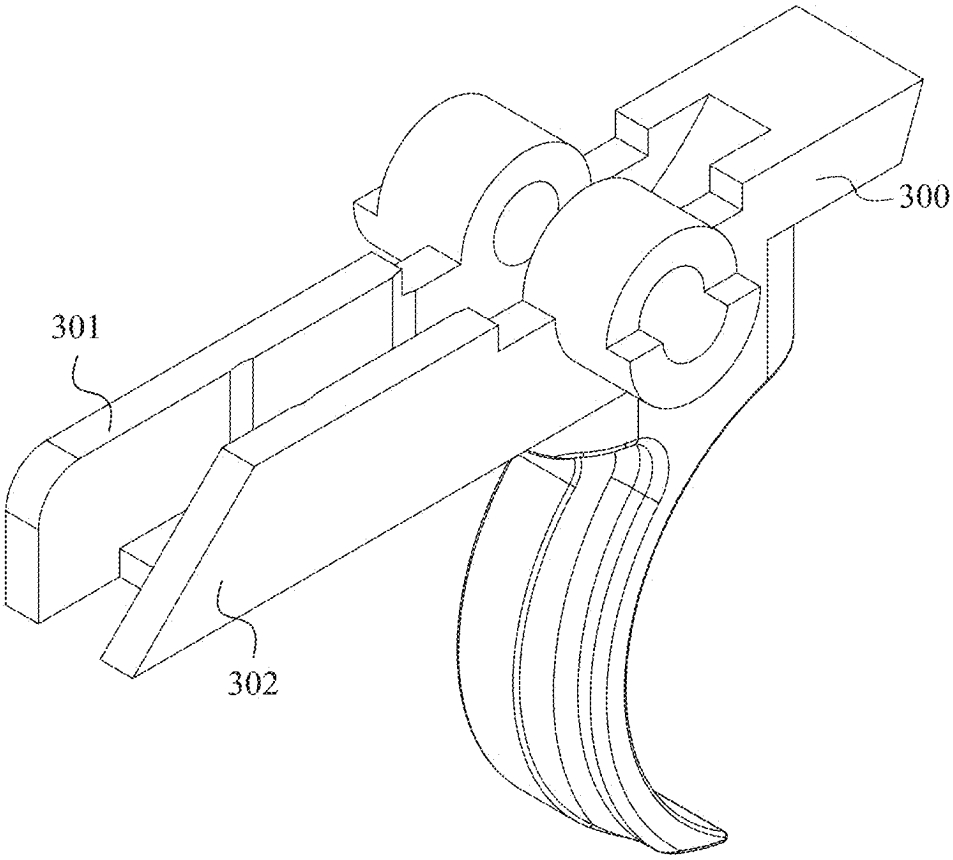


FIG. 7

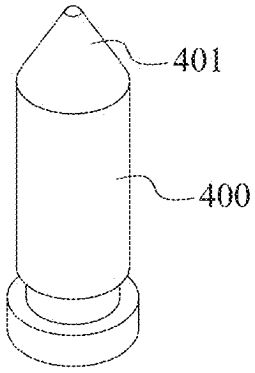


FIG. 8

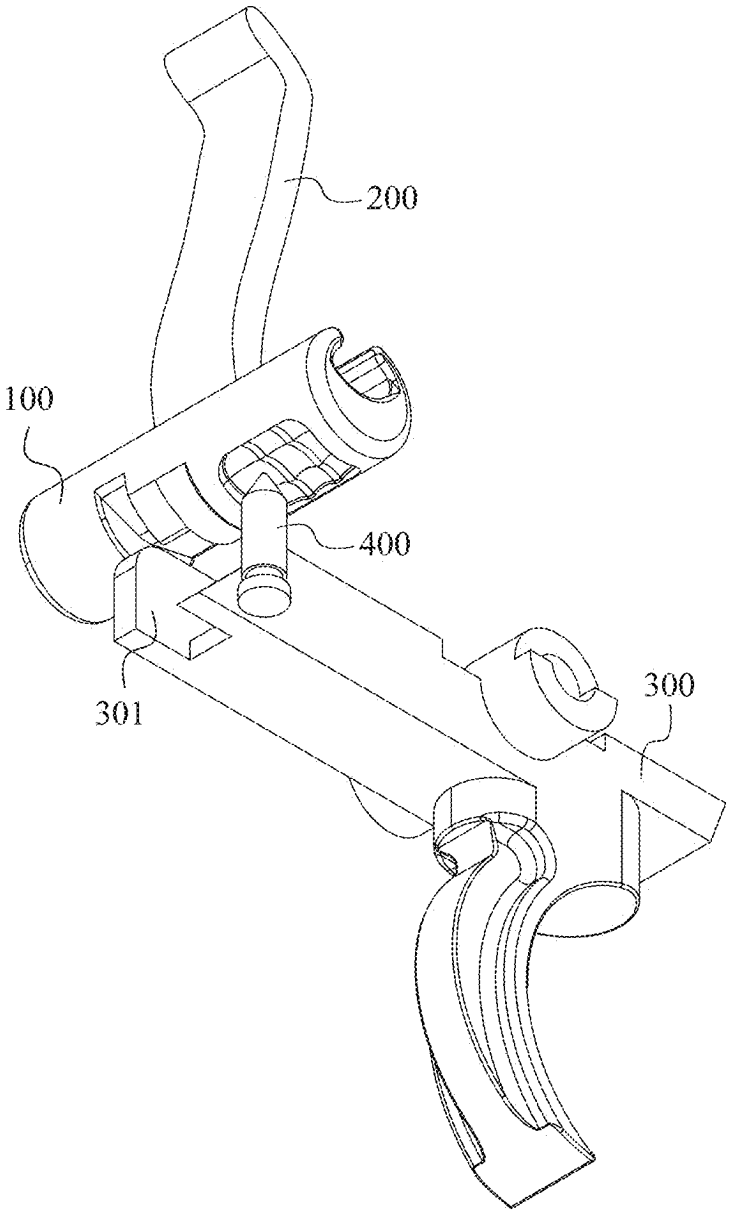


FIG. 9

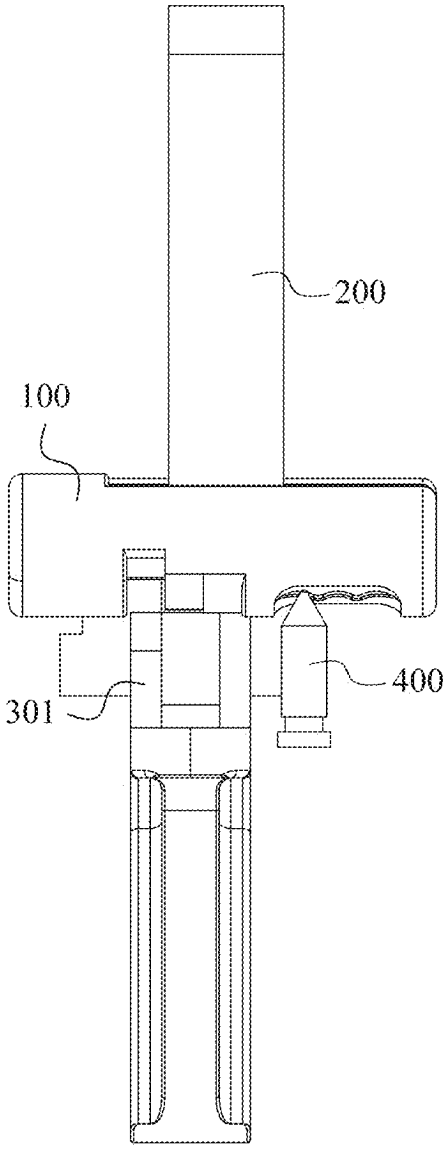


FIG. 10

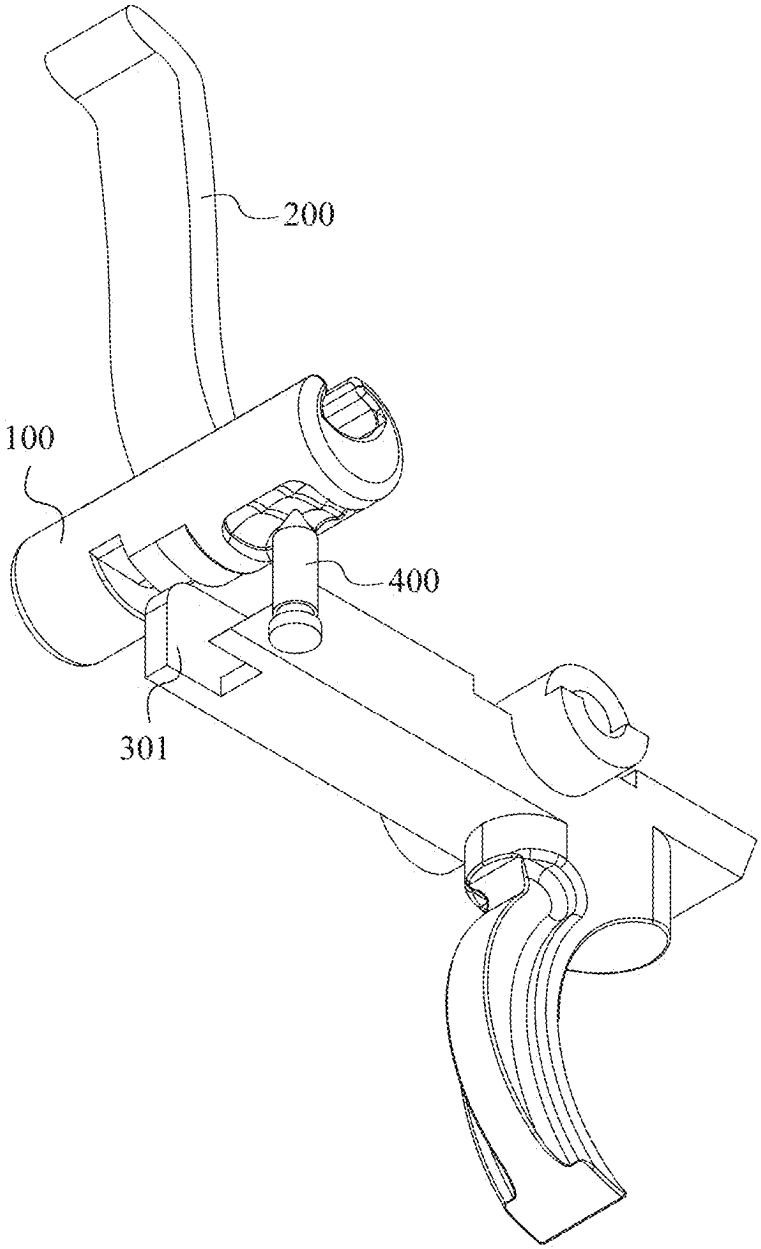


FIG. 11

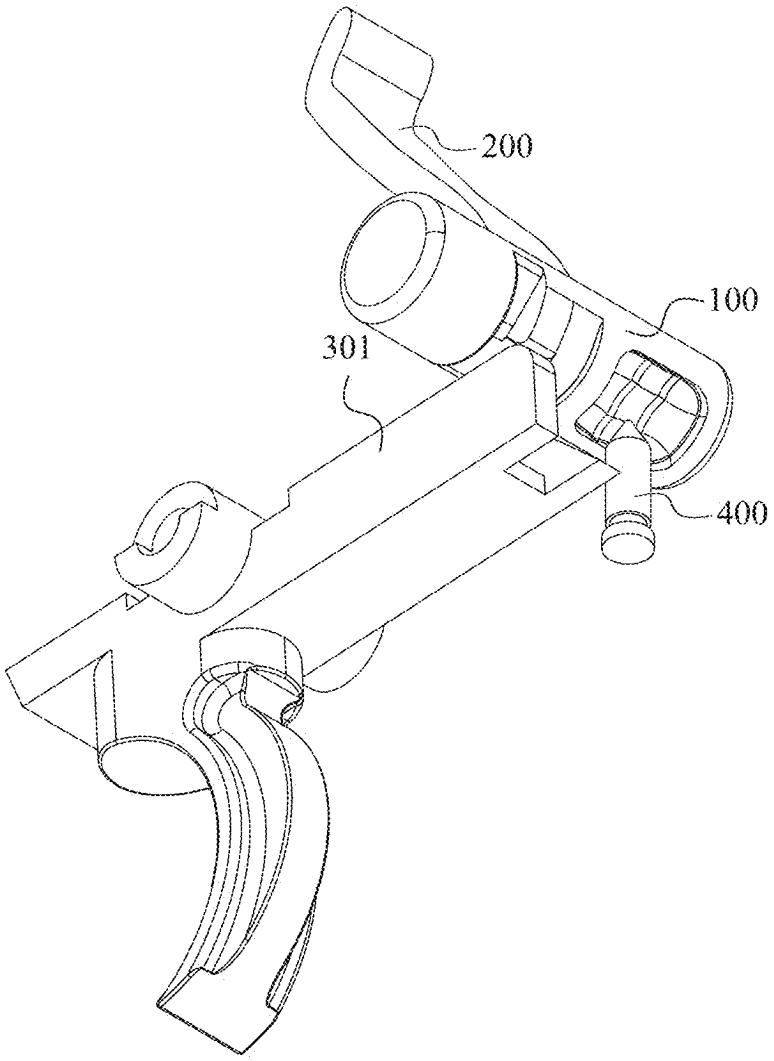


FIG. 12

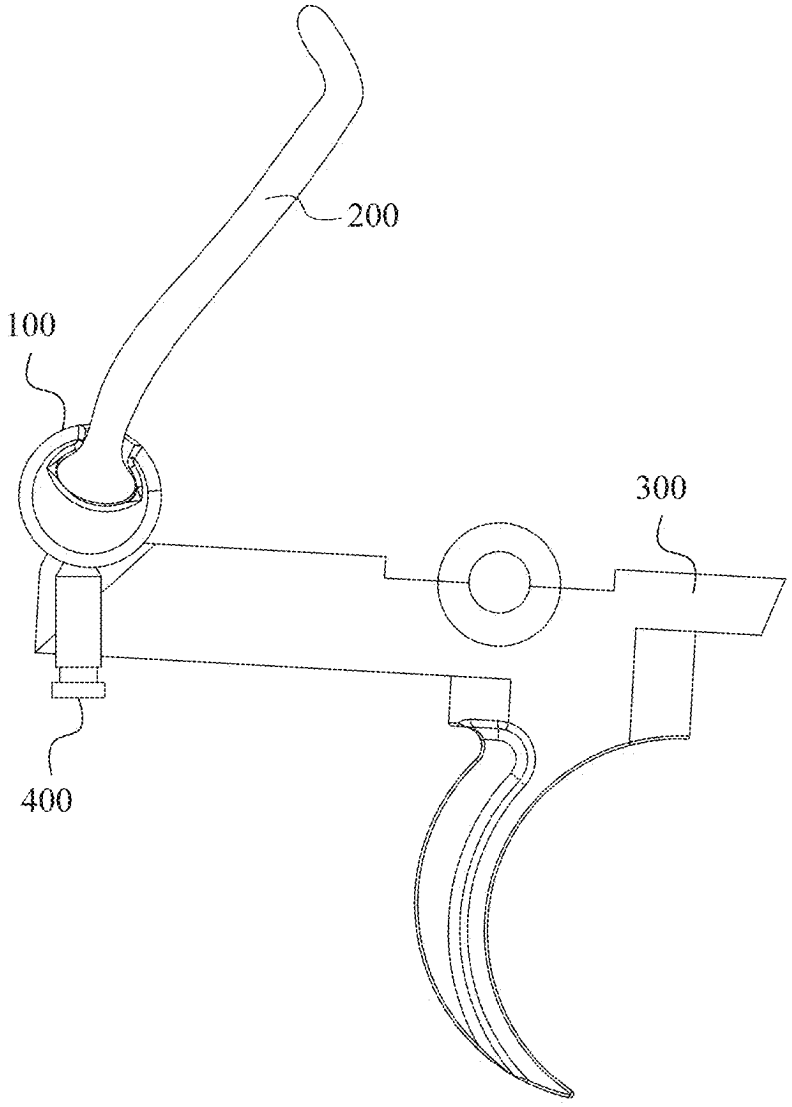


FIG. 13

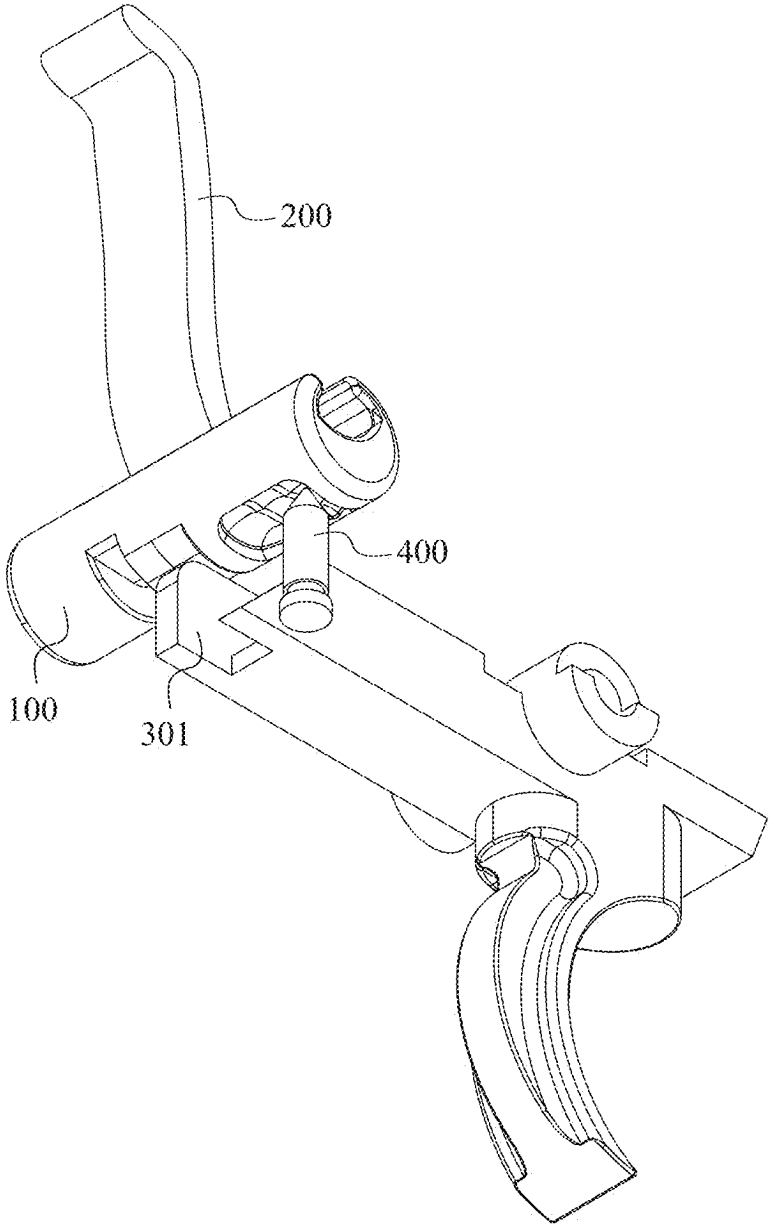


FIG. 14

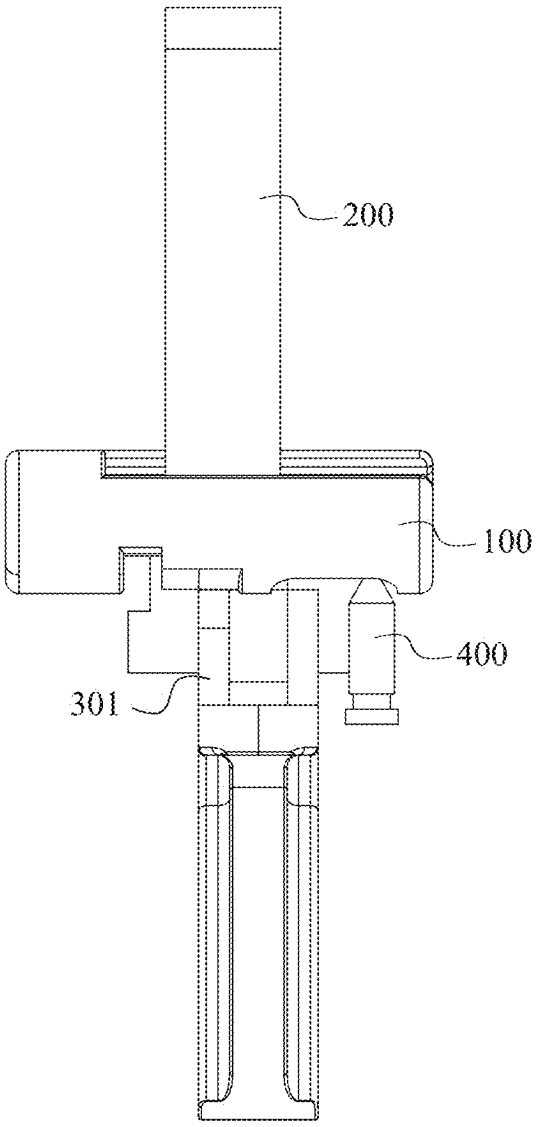


FIG. 15

SAFETY MECHANISM FOR FIREARM

FIELD OF THE INVENTION

The present invention relates generally to a safety selector mechanism. More specifically, the present invention is a safety selector mechanism suitable for semi-auto firearms and rifles.

BACKGROUND OF THE INVENTION

A firearm safety catch encompasses various safety mechanisms integral to responsible gun design, aimed at preventing accidental discharges and ensuring overall safety. One common type is the manual safety switch, typically located near the trigger or on the firearm's frame, which physically obstructs the firing mechanism when engaged. Trigger safety, integrated directly into the trigger, requires a specific action for the trigger to move, preventing unintentional pulls. A grip safety, found in certain handguns, necessitates depression by the shooter's hand for the firearm to fire. Other safety features include a drop safety or firing pin block to prevent accidental discharges if the firearm is dropped, and a magazine disconnect safety that inhibits firing when the magazine is removed. These safety catches collectively contribute to responsible firearm handling, and users are encouraged to familiarize themselves with these features, adhering to proper procedures to ensure safe gun ownership.

SUMMARY OF THE INVENTION

The present invention discloses a safety mechanism for a firearm. It comprises a cam selector, a lever, and a trigger. The cam selector comprises a first end, a second end, a top side, and a bottom side. The cam selector comprises a longitudinal slot positioned on the top side of the cam selector. The lever comprises a proximal end and a distal end. The longitudinal slot is configured to receive the proximal end of the lever. The cam selector further comprises a first recess and a second recess on the bottom side of the cam selector. The trigger comprises a first trigger tail portion. The cam selector is configured to operate between a first mode, a second mode, and a third mode. The first mode of the cam selector is configured to allow the first trigger tail portion to be movable within the first recess. The second mode of the cam selector is configured to allow the first trigger tail portion to engage the second recess and be moved down by a cam portion of the second recess when the cam selector rotates. The third mode of the cam selector is configured to prevent the trigger from being pulled.

In one embodiment, the cam selector has a substantially cylindrical shape.

In one embodiment, the present invention further comprises a detent. The cam selector further comprises a first detent track, a second detent track and a third detent track. The detent is configured to move between the first detent track, the second detent track and the third detent track to select between the first mode, the second mode, and the third mode of the cam selector.

In one embodiment, the first detent track, the second detent track, and the third detent track are configured to allow the detent to move along the first detent track, the second detent track, and the third detent track, respectively.

In one embodiment, the first detent track, the second detent track, and the third detent track are transverse grooves on the bottom side of the cam selector.

In one embodiment, the first detent track, the second detent track and the third detent track are positioned adjacent to the first end of the cam selector.

In one embodiment, the detent comprises a rounded top end.

In one embodiment, the longitudinal slot extends from the first end of the cam selector.

In one embodiment, the longitudinal slot is ovular shaped and comprises an opening to allow the lever to travel trough.

In one embodiment, the lever comprises a dovetail portion at the proximal end.

In one embodiment, the lever further comprises a bent portion adjacent to the distal end.

In one embodiment, the first trigger tail portion of the trigger is rounded.

In one embodiment, the trigger further comprises a second trigger tail portion that has a corner cutout.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention are incorporated in and constitute a part of this specification, illustrate an embodiment of the invention and together with the description serve to explain the principles of the invention. They are meant to be exemplary illustrations provided to enable persons skilled in the art to practice the disclosure and are not intended to limit the scope of the present invention. That is, the dimensions of the components of the present invention, independently and in relation to each other can be different. It should be noted that the drawings are schematic and not necessarily drawn to scale. Some drawings are enlarged or reduced to improve drawing legibility.

FIG. **1** depicts a top perspective view of a cam selector of the present invention.

FIG. **2** depicts a bottom perspective view of the cam selector of the present invention.

FIG. **3** depicts another bottom perspective view of the cam selector of the present invention.

FIG. **4** depicts another perspective view of the cam selector of the present invention.

FIG. **5** depicts a perspective view of a lever of the present invention.

FIG. **6** depicts a left-side view of the cam and lever assembled together.

FIG. **7** depicts a perspective view of a trigger of the present invention.

FIG. **8** depicts a perspective view of a detent of the present invention.

FIG. **9** depicts a perspective view of the present invention in its semi-automatic position.

FIG. **10** depicts a rear view of the present invention in its semi-automatic position.

FIG. **11** depicts a perspective view of the present invention in its active reset position.

FIG. **12** depicts a perspective view of the present invention in its active reset position, wherein the trigger is pulled.

FIG. **13** depicts a side view of the present invention in its active reset position, wherein the trigger is pulled.

FIG. **14** depicts a perspective view of the present invention in its safe position.

FIG. **15** depicts a rear view of the present invention in its safe position.

DETAIL DESCRIPTIONS OF THE INVENTION

As a preliminary matter, it will readily be understood by one having ordinary skill in the relevant art that the present

disclosure has broad utility and application. As should be understood, any embodiment may incorporate only one or a plurality of the above-disclosed aspects of the disclosure and may further incorporate only one or a plurality of the above-disclosed features. Furthermore, any embodiment discussed and identified as being "preferred" is considered to be part of a best mode contemplated for carrying out the embodiments of the present disclosure. Other embodiments also may be discussed for additional illustrative purposes in providing a full and enabling disclosure. Moreover, many embodiments, such as adaptations, variations, modifications, and equivalent arrangements, will be implicitly disclosed by the embodiments described herein and fall within the scope of the present disclosure.

Accordingly, while embodiments are described herein in detail in relation to one or more embodiments, it is to be understood that this disclosure is illustrative and exemplary of the present disclosure and is made merely for the purposes of providing a full and enabling disclosure. The detailed disclosure herein of one or more embodiments is not intended, nor is to be construed, to limit the scope of patent protection afforded in any claim of a patent issuing here from, which scope is to be defined by the claims and the equivalents thereof. It is not intended that the scope of patent protection be defined by reading into any claim a limitation found herein that does not explicitly appear in the claim itself. Accordingly, it is intended that the scope of patent protection is to be defined by the issued claim(s) rather than the description set forth herein.

Additionally, it is important to note that each term used herein refers to that which an ordinary artisan would understand such term to mean based on the contextual use of such term herein. When not explicitly defined herein, to the extent that the meaning of a term used herein—as understood by the ordinary artisan based on the contextual use of such term—differs in any way from any particular dictionary definition of such term, it is intended that the meaning of the term as understood by the ordinary artisan should prevail.

Furthermore, it is important to note that, as used herein, "a" and "an" each generally denotes "at least one," but does not exclude a plurality unless the contextual use dictates otherwise. When used herein to join a list of items, "or" denotes "at least one of the items," but does not exclude a plurality of items of the list. Finally, when used herein to join a list of items, "and" denotes "all of the items of the list."

The following detailed description refers to the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the following description to refer to the same or similar elements. While many embodiments of the disclosure may be described, modifications, adaptations, and other implementations are possible. For example, substitutions, additions, or modifications may be made to the elements illustrated in the drawings, and the methods described herein may be modified by substituting, reordering, or adding stages to the disclosed methods. Accordingly, the following detailed description does not limit the disclosure. Instead, the proper scope of the disclosure is defined by the appended claims. The present disclosure contains headers. It should be understood that these headers are used as references and are not to be construed as limiting upon the subject matter disclosed under the header.

Other technical advantages may become readily apparent to one of ordinary skill in the art after review of the following figures and description. It should be understood at the outset that, although exemplary embodiments are illustrated in the figures and described below, the principles of the present disclosure may be implemented using any number of techniques, whether currently known or not. The present disclosure should in no way be limited to the exemplary implementations and techniques illustrated in the drawings and described below.

Unless otherwise indicated, the drawings are intended to be read together with the specification and are to be considered a portion of the entire written description of this invention. As used in the following description, the terms "horizontal", "vertical", "left", "right", "up", "down" and the like, as well as adjectival and adverbial derivatives thereof (e.g., "horizontally", "rightwardly", "upwardly", "radially", etc.), simply refer to the orientation of the illustrated structure as the particular drawing figure faces the reader. Similarly, the terms "inwardly," "outwardly" and "radially" generally refer to the orientation of a surface relative to its axis of elongation, or axis of rotation, as appropriate. As used herein, the term "proximate" refers to positions that are situated close/near in relationship to a structure. As used in the following description, the term "distal" refers to positions that are situated away from positions.

The present disclosure includes many aspects and features. Moreover, while many aspects and features relate to, and are described in the context of safety mechanisms for a firearm, embodiments of the present disclosure are not limited to use only in this context.

The present invention is a safety mechanism for a firearm, in particular an AR-15. It is an aim of the present invention to turn a standard AR-15 into a three-position fire control unit (i.e., semi-automatic, active reset and safe positions). It is another aim of the present invention to provide a safety mechanism that can rotate within the firearm to engage various firing modes.

Referring now to the figures of the present disclosure. The safety mechanism of the present invention comprises a cam selector **100**, a lever **200**, and a trigger **300**.

The cam selector **100** of the present invention is designed to replace a standard safety selector in the firearm. It should be noted that the cam selector **100** can be of any shape, size, material, features, type or kind, orientation, location, quantity, components, and arrangements of components that would allow the present invention to fulfill the objectives and intents of the present invention. In one embodiment, the cam selector **100** comprises a first end **101**, a second end **102**, a top side **103**, and a bottom side **104**. Preferably, the cam selector **100** has a substantially cylindrical shape. It should be noted that the cam selector **100** may be made of any suitable material but is preferably made of stainless steel. The cam selector **100** comprises a longitudinal slot **110** positioned on the top side of the cam selector **100**. The longitudinal slot **110** is configured to receive a proximal end **201** of the lever **200**. In one embodiment, the longitudinal slot **110** extends from the first end **101** of the cam selector **100**. Preferably, the longitudinal slot **110** is ovular shaped and comprises an opening **112** to allow the lever **200** to travel through. The lever **200**, which will be described in more detail hereinafter, will interact with other components of the firearm, such as the hammer or the bolt carrier, to rotate about the proximal end **201** reciprocally within a certain angular range (e.g., 8-12 degrees), thereby creating a torque force on the cam selector **100** to rotate the cam selector **100** forward or backward.

The cam selector **100** comprises a first recess **131** and a second recess **132** on the bottom side **104** of the cam selector **100**. The first recess **131** and a second recess **132** are transverse recesses on the cam selector **100**, perpendicular to the rotation axis of the cam selector **100**. A length of the first

recess **131** is greater than a length of the second recess **132**. Preferably, the length of the first recess **131** is twice the length of the second recess **132**. The first recess **131** and the second recess **132** abut each other, forming an overall "L" shaped cutout. Due to the shorter length of the second recess **132**, a cam portion **133** is formed by the second recess **132**. The trigger **300** is similar to a standard trigger in the firearm (e.g., an AR-15) but features a modified trigger tail designed to interact with the cam selector **100** of the present invention. Specifically, the trigger **300** comprises a first trigger tail portion **301**. The first trigger tail portion **301** will interact with the first recess **131**, the second recess **132**, and a safety cam profile **136** of the cam selector **100**, respectively in different firing modes. Preferably, the first trigger tail portion **301** of the trigger **300** is rounded to facilitate the operation of the present invention. In another embodiment, the trigger **300** further comprises a second trigger tail portion **302** that has a corner cutout such that the second trigger tail portion **302** will not interfere with the operation of the trigger **300** and/or the cam selector **100**.

The cam selector **100** is configured to operate between a first mode, a second mode, and a third mode, corresponding to the semi-automatic position, the active reset, and the safe position of the cam selector **100**, respectively. The first mode of the cam selector **100** is configured to allow the first trigger tail portion **301** to be movable within the first recess **131**. In this mode, the cam selector **100** will not interfere with the trigger **300**, allowing the firearm to operate in the standard semi-automatic mode. The second mode of the cam selector **100** is configured to allow the first trigger tail portion **301** to engage the second recess and be moved down by a cam portion **133** of the second recess **132** when the cam selector rotates. The second mode resets the pressure and forces the trigger **300** to reset. The third mode of the cam selector **100** is configured to prevent the trigger **300** from being pulled. Specifically, the safety cam profile **136** of the cam selector **100** restricts any rotation of the trigger **300**, preventing it from being pulled regardless of the direction in which the dual cam is rotated.

In a preferred embodiment, the present invention employs a unique detent-track mechanism to switch between different firing modes. The present invention may comprise a detent **400**, and the cam selector **100** further comprises a first detent track **121**, a second detent track **122**, and a third detent track **123**. The detent **400** is configured to move between the first detent track **121**, the second detent track **122**, and the third detent track **123** to select between the first mode, the second mode, and the third mode of the cam selector **100**. The detent **400** may be a pin-like member, as shown in FIG. **8**. In a preferred embodiment, the detent **400** may have a rounded top end **401** to facilitate smooth transitions between the different firing modes. The top end **401** slides against the first detent track **121**, the second detent track **122**, or the third detent track **123** in different firing modes. The detent **400** may be contained in a passage within the lower receiver of the firearm and biased against the cam selector **100** by a spring. This design allows the user to switch between firing modes by simply pushing the cam selector **100** to the right or left, while effectively preventing unintended lateral movement of the cam selector **100**. In a preferred embodiment, the first detent track **121**, the second detent track **122**, and the third detent track **123** are configured to allow the detent to move along the first detent track **121**, the second detent track **122**, and the third detent track **123**, respectively. In this way, the detent **400** allows the cam selector **100** to rotate within a certain range. Preferably, the first detent track **121**, the second detent track **122**, and the third detent track **123** are transverse grooves on the bottom side **101** of the cam selector **100**. In one embodiment, the first detent track **121**, the second detent track **122**, and the third detent track **123** may be formed by a plurality of ridges and grooves. In another embodiment, the first detent track **121**, the second detent track **122**, and the third detent track **123** are positioned adjacent to the first end of the cam selector. The detent **400** and the plurality of detent tracks serve dual purposes: restricting the cam selector's rotation to its intended range of motion and selecting different cam selector profiles to engage with the trigger **300**.

The lever **200** is configured to transfer torque onto the cam selector **100** and thus rotate the cam selector **100**. It should be noted that the lever **200** can be of any shape, size, material, features, type or kind, orientation, location, quantity, components, and arrangements of components that would allow the present invention to fulfill the objectives and intents of the present invention. In one embodiment, the lever **200** comprises a proximal end **201** and a distal end **202**. Preferably, the lever comprises a dovetail portion **203** at the proximal end **201**. In one embodiment, the lever **200** further comprises a bent portion **204** adjacent to the distal end **202**. It should be noted that the opening **112** of the longitudinal slot **110** is wider than the lever **200**, allowing a void or clearance to be formed between the lever **200** and the edge of the opening **112**. The void can be on either side of the lever **200**, depending on which direction the lever is pivoting. In other words, when the lever **200** pivots, it does not immediately transfer torque onto the cam selector **100** until the void is filled.

The present invention is designed to replace the standard safety within the receiver of a firearm such as an AR-15. The present invention engages with external components within a standard firearm as explained below. In its preferred embodiment, the trigger **300** and disconnector are pivotally mounted to the lower receiver by a transverse pin and pushed forward by a spring. The hammer is pivotally mounted to the lower receiver by a transverse pin and is pushed forward and can be rotated by a spring.

As mentioned above, the detent **400** is contained in a passage within the lower receiver and is pushed up against the cam by a spring. The bolt carrier reciprocates within the upper receiver. In the second mode of the present invention (i.e., the active reset mode), when the hammer is cocked and the trigger is in its forward position, the firearm is ready to fire. When the trigger bow is pulled to the rear by the operator, the trigger sear releases the hammer sear, allowing the hammer to swing forward under spring pressure. The striking surface of the hammer strikes the firing pin, thereby firing the firearm. As the trigger bow is pulled, the first trigger tail portion **301** of the trigger **300** moves up into the second recess **132** of the cam selector **100**.

The first trigger tail portion **301** of the trigger **300** slides against the cam portion **132**, rotating the cam selector **110** forward until the upper surface of the trigger is resting in the relief area of the modified trigger. The disconnector is rotated forward about its pivot congruent with the motion of the trigger. This allows the fire control group and mechanism to be in the fired state. This is when the hammer falls, and the trigger bow is pulled. As the bolt carrier moves to the rear under gas pressure, the hammer cam point pivotally displaces the hammer back down into the former ready state. The tail of the hammer may push the lever **200** out of its path as it swings back. The hammer hook on the hammer snaps past and may engage with the disconnector hook. The hammer is held down by the hammer cam surface as the bolt carrier continues to move toward the back of the firearm.

As the bolt carrier continues to move, the hammer cam presses against the distal end **202** of the lever **200**, rotating the lever **200** toward the back. As the lever **200** rotates, it transfers torque to the cam selector **100** via the dovetail portion **203**. As the cam selector **100** rotates, the cam portion **133** slides against the first trigger tail portion **301** of the trigger **300**, moving the tail of the trigger down, and rotating the trigger back into the former ready position. The trigger sear then engages the hammer sear. The disconnector pivots back rearward about its pivot congruent with the motion of the trigger **300**. The hammer hook on the hammer may no longer engage with the disconnector hook.

When the bolt carrier is in its most rearward position, the lever **200** is held to the rear by the hammer cam surface and the cam selector is rotated so that the cam selector is against the top surface of the trigger tail. The trigger is held in the reset position by the cam selector **100** and cannot be pulled by the operator as the cam selector **100** is blocking the trigger's tail from moving up. As the bolt carrier moves forward again under spring pressure, the hammer is released by the hammer cam surface and the hammer sear engages the trigger sear, preventing the hammer from falling. As the bolt carrier moves forward, the rear surface of the bolt carrier presses against the second end **202** of the lever **200**, rotating the lever **200** forward. It should be noted that the lever **200** does not immediately transfer torque onto the cam selector **100**. The lever **200** pivots in the cam selector **100** until the void is filled. Once the void is filled, the lever **200** can transfer torque to the cam selector **100**.

The amount that the lever **200** rotates in the longitudinal slot **110** before transferring torque to the cam selector **100** is such that as the bolt carrier completes its forward movement, the cam selector **100** rotates to a position where the first trigger tail portion **301** begins to slide against the cam portion **133**. Once the cam selector **100** moves into this position, the trigger bow can be pulled again by the operator as previously described.

If the left side of the cam selector **100** is pressed by the operator, the cam selector **100** will transversely shift to the right and be held in the right position by the detent track and detent. In this example, when the cam selector **100** is resting to the right, the first recess **131** of the cam selector **100** can engage with the first trigger tail portion **301**, and the present invention will operate in the semi-automatic mode, as described previously. If the right side of the cam selector **100** is pressed by the operator, the cam selector **100** will transversely shift to the left and be held in this position by the detent track and the detent. In this example, when the cam selector **100** is resting to the left, the safety cam profile **136** engages with the trigger tail and prevents the trigger from being pulled regardless of what position the cam is rotated to. In other words, by pressing the right side or the left side, the manual safety can be engaged or disengaged. When the cam selector **100** is transversely shifted to the right or left, the lever is held approximately in the center of the firearm by the walls of the receiver of the firearm. The cam selector **100** can move transversely in the firearm independent of the lever **200**, as the dovetail portion **203** on the lever can move transversely within the longitudinal slot **110** on the cam selector **100**.

In one embodiment, the cam selector **100** can be expanded to support more cam profiles. Additional detent tracks may be provided to support another position, and another cam profile would be added to the cam selector **100** alongside, or in between the current profiles. An example of this would be to add another profile similar to the safety profile, but of a smaller diameter. If this profile was selected by transversely sliding the cam selector **100** to the proper position, it would be of a small enough diameter not to engage the first trigger tail portion regardless of what position the cam selector **100** was rotated to. This would result in the fire control group functioning as before, but without the cam selector **100** actively resetting the trigger. This would allow the operator to fire precise single shots more effectively due to the geometric constraints of the AR-15. With all the components working in tandem with each other, it can be seen that the present invention is a safety mechanism that provides the firearm user with a three-position fire control unit.

Although the disclosure has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the disclosure.

What is claimed is:

1. A safety mechanism for a firearm comprising:
- a cam selector;
- a lever;
- a trigger;
- the cam selector comprising a first end, a second end, a top side, and a bottom side;
- the cam selector comprising a longitudinal slot positioned on the top side of the cam selector;
- the lever comprising a proximal end and a distal end;
- the longitudinal slot being configured to receive the proximal end of the lever;
- the cam selector further comprising a first recess and a second recess on the bottom side of the cam selector;
- the trigger comprising a first trigger tail portion;
- the cam selector being configured to operate between a first mode, a second mode, and a third mode;
- wherein the first mode of the cam selector is configured to allow the first trigger tail portion to be movable within the first recess, wherein the second mode of the cam selector is configured to allow the first trigger tail portion to engage the second recess and be moved down by a cam portion of the second recess when the cam selector rotates, and wherein the third mode of the cam selector is configured to prevent the trigger from being pulled.

2. The safety mechanism as claimed in claim **1**, wherein the cam selector has a substantially cylindrical shape.

3. The safety mechanism as claimed in claim **1**, further comprising:
- a detent;
- the cam selector further comprising a first detent track, a second detent track and a third detent track;
- the detent being configured to move between the first detent track, the second detent track and the third detent track to select between the first mode, the second mode, and the third mode of the cam selector.

4. The safety mechanism as claimed in claim **3**, wherein the first detent track, the second detent track, and the third detent track are configured to allow the detent to move along the first detent track, the second detent track, and the third detent track, respectively.

5. The safety mechanism as claimed in claim **4**, wherein the first detent track, the second detent track, and the third detent track are transverse grooves on the bottom side of the cam selector.

6. The safety mechanism as claimed in claim **5**, wherein the first detent track, the second detent track and the third detent track are positioned adjacent to the first end of the cam selector.

7. The safety mechanism as claimed in claim **3**, wherein the detent comprises a rounded top end.

8. The safety mechanism as claimed in claim **1**, wherein the longitudinal slot extends from the first end of the cam selector.

9. The safety mechanism as claimed in claim **8**, wherein the longitudinal slot is ovular shaped and comprises an opening to allow the lever to travel trough.

10. The safety mechanism as claimed in claim **9**, wherein the lever comprises a dovetail portion at the proximal end.

11. The safety mechanism as claimed in claim **10**, wherein the lever further comprises a bent portion adjacent to the distal end.

12. The safety mechanism as claimed in claim **1**, wherein the first trigger tail portion of the trigger is rounded.

13. The safety mechanism as claimed in claim **12**, wherein the trigger further comprises a second trigger tail portion that has a corner cutout.

* * * * *

Exhibit C

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 12,529,538 B2
APPLICATION NO. : 18/968984
DATED : January 20, 2026
INVENTOR(S) : Cameron Smith

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification

Column 2, Line 9, reads “travel trough” and should read -- travel through --.

Column 3, Lines 40-41, reads “denotes “at least one,” but does not exclude” and should read -- denote “at least one” but do not exclude --.

In the Claims

Column 9, Claim 9, Line 6, reads “travel trough” and should read -- travel through --.

Signed and Sealed this
Thirty-first Day of March, 2026

John A. Squires
Director of the United States Patent and Trademark Office

EXHIBIT D

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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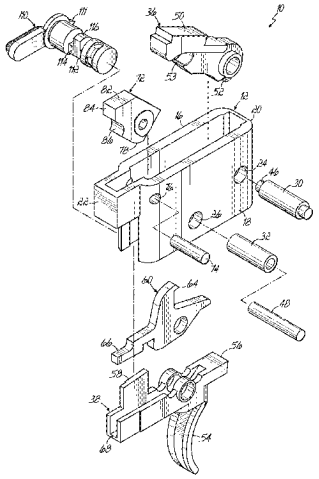
(Continued)

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).

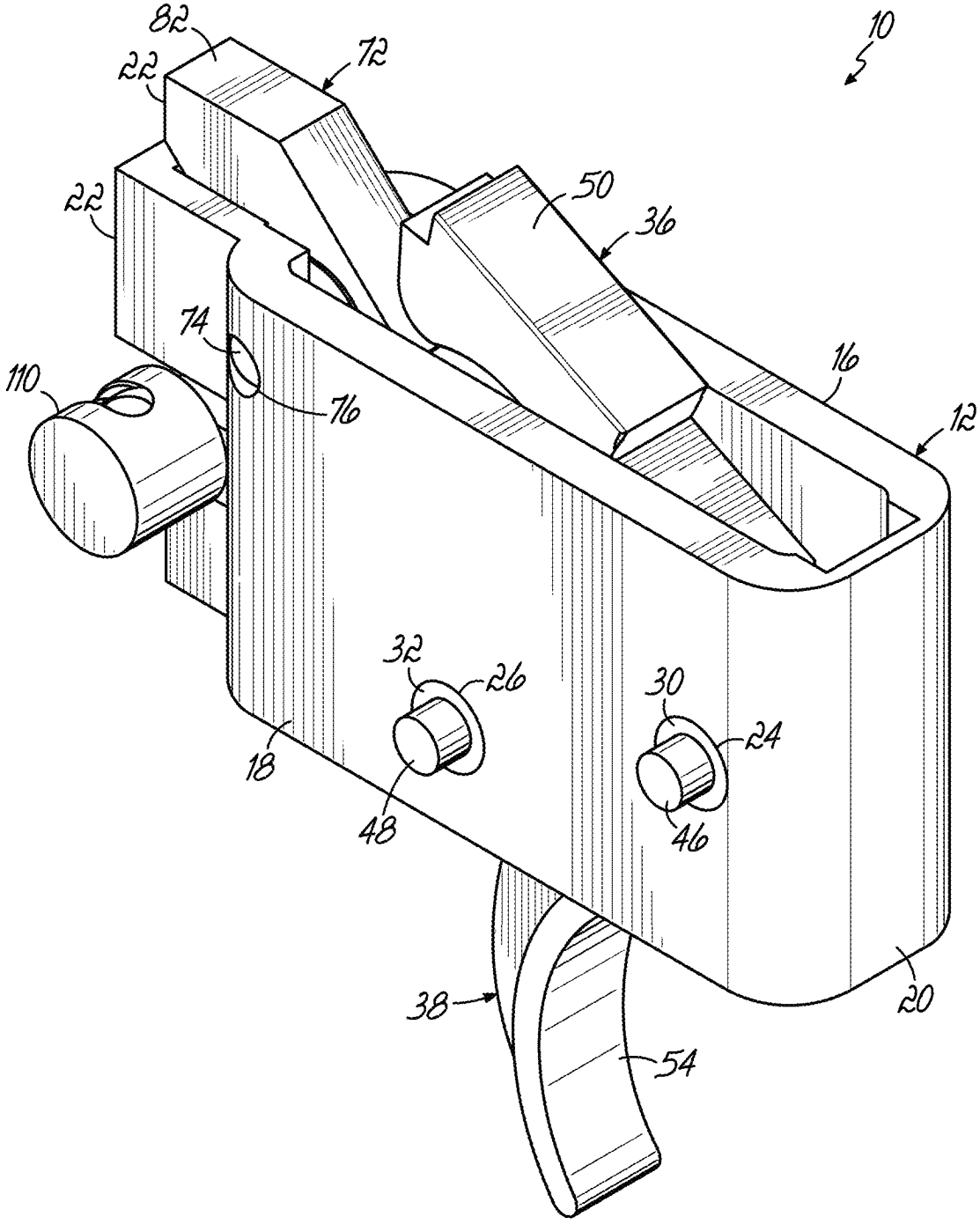

FIG. 1

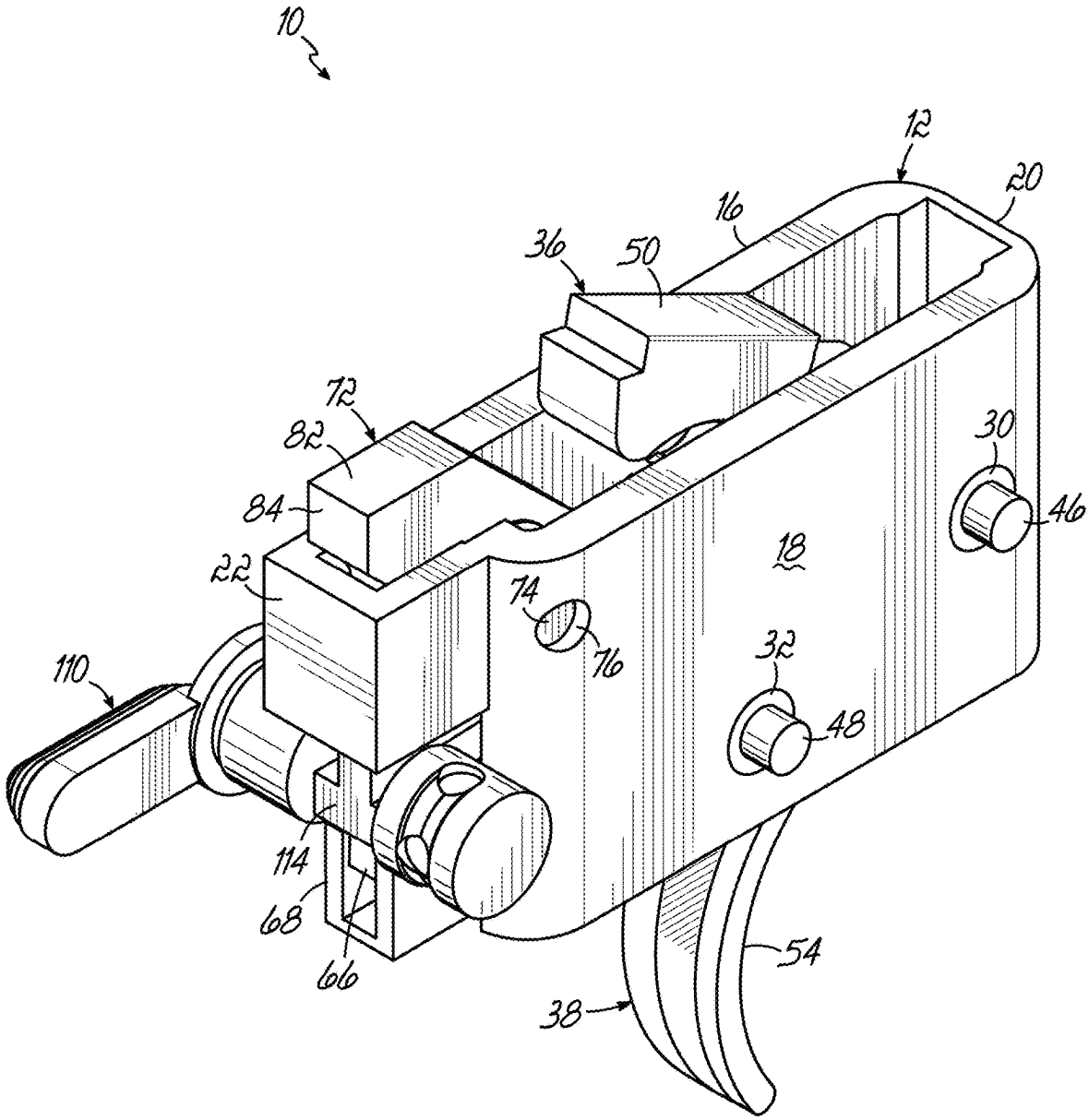

FIG. 2

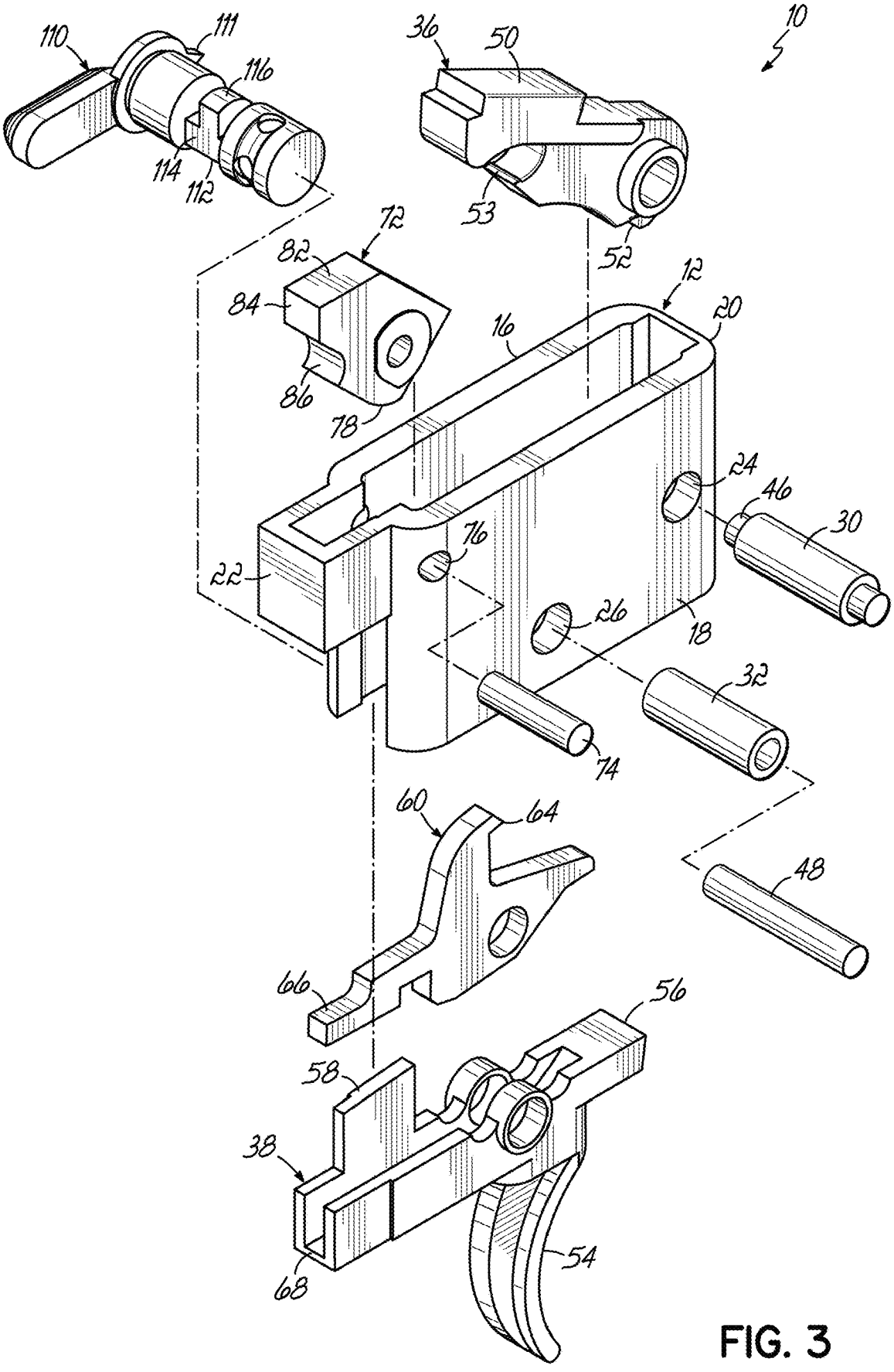
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FIG. 3

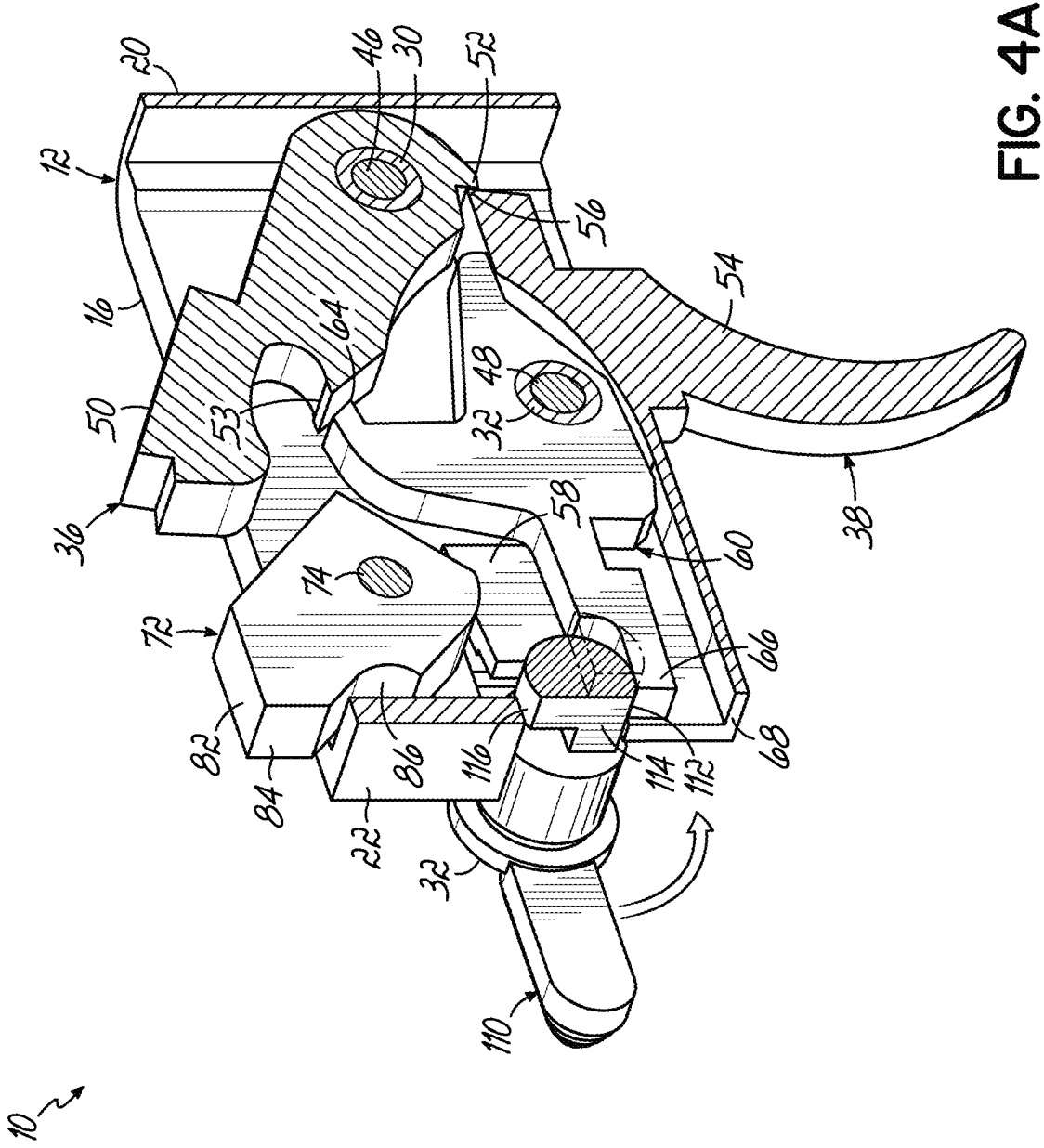
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FIG. 4A

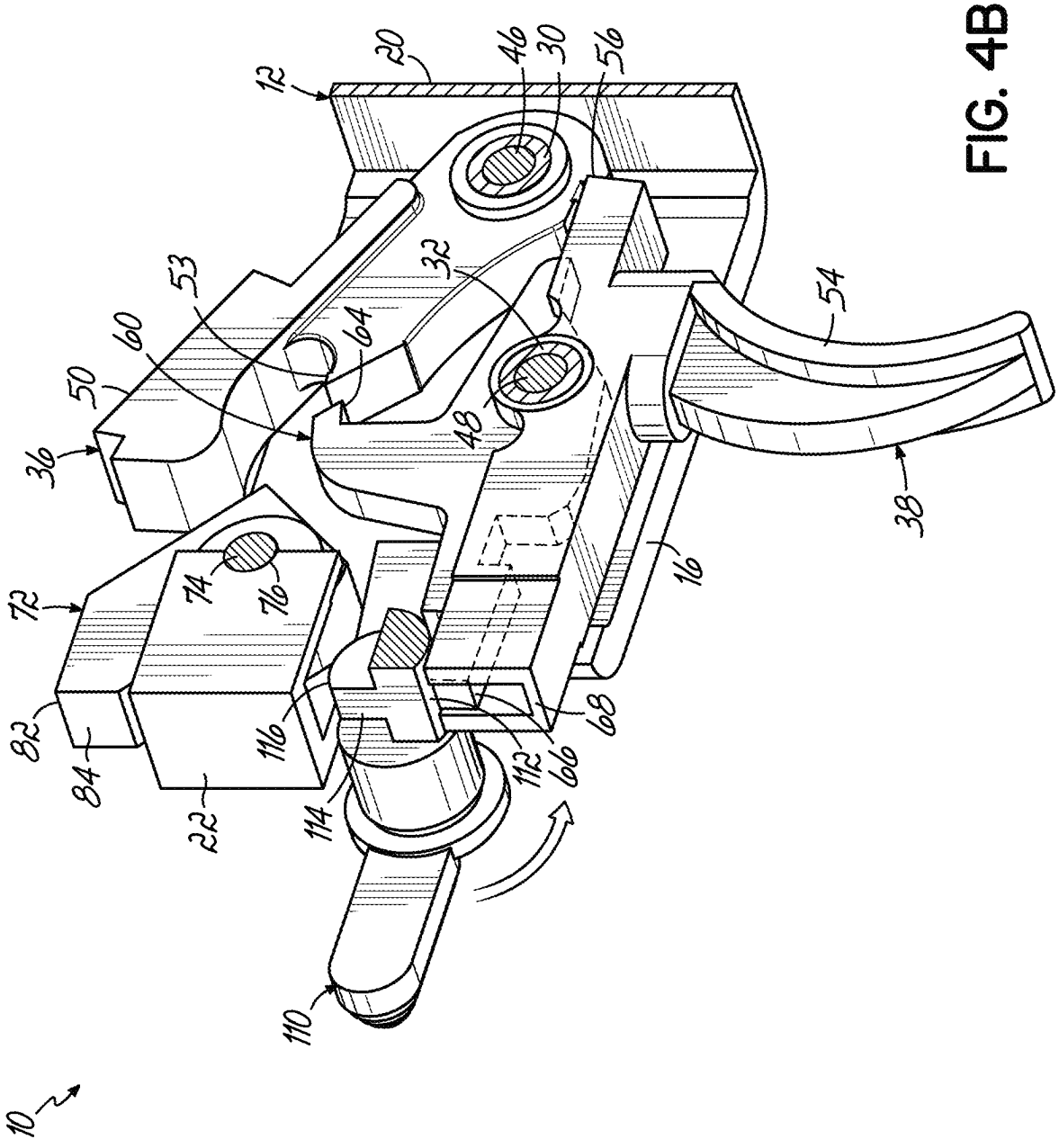
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FIG. 4B

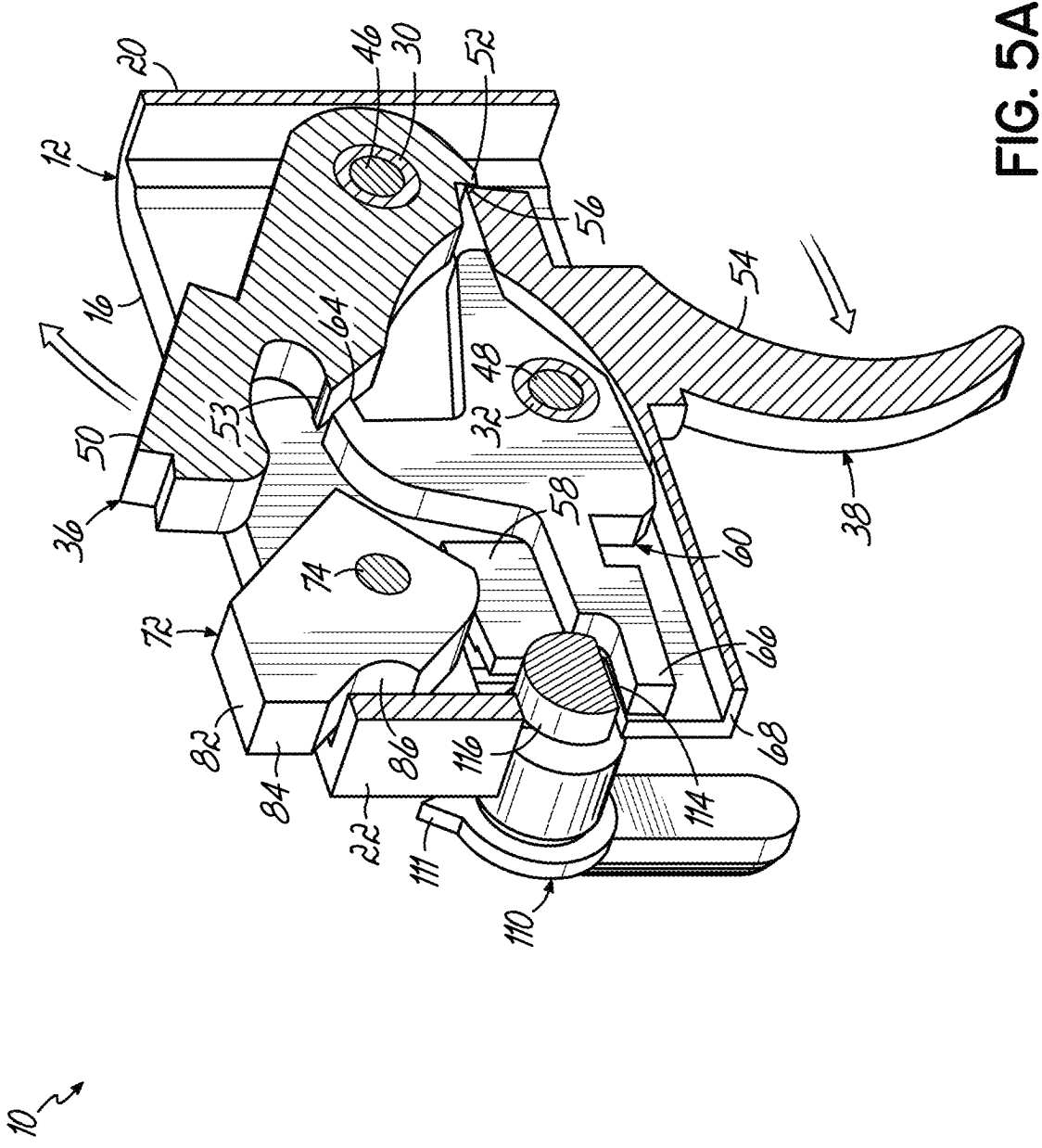
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FIG. 5A

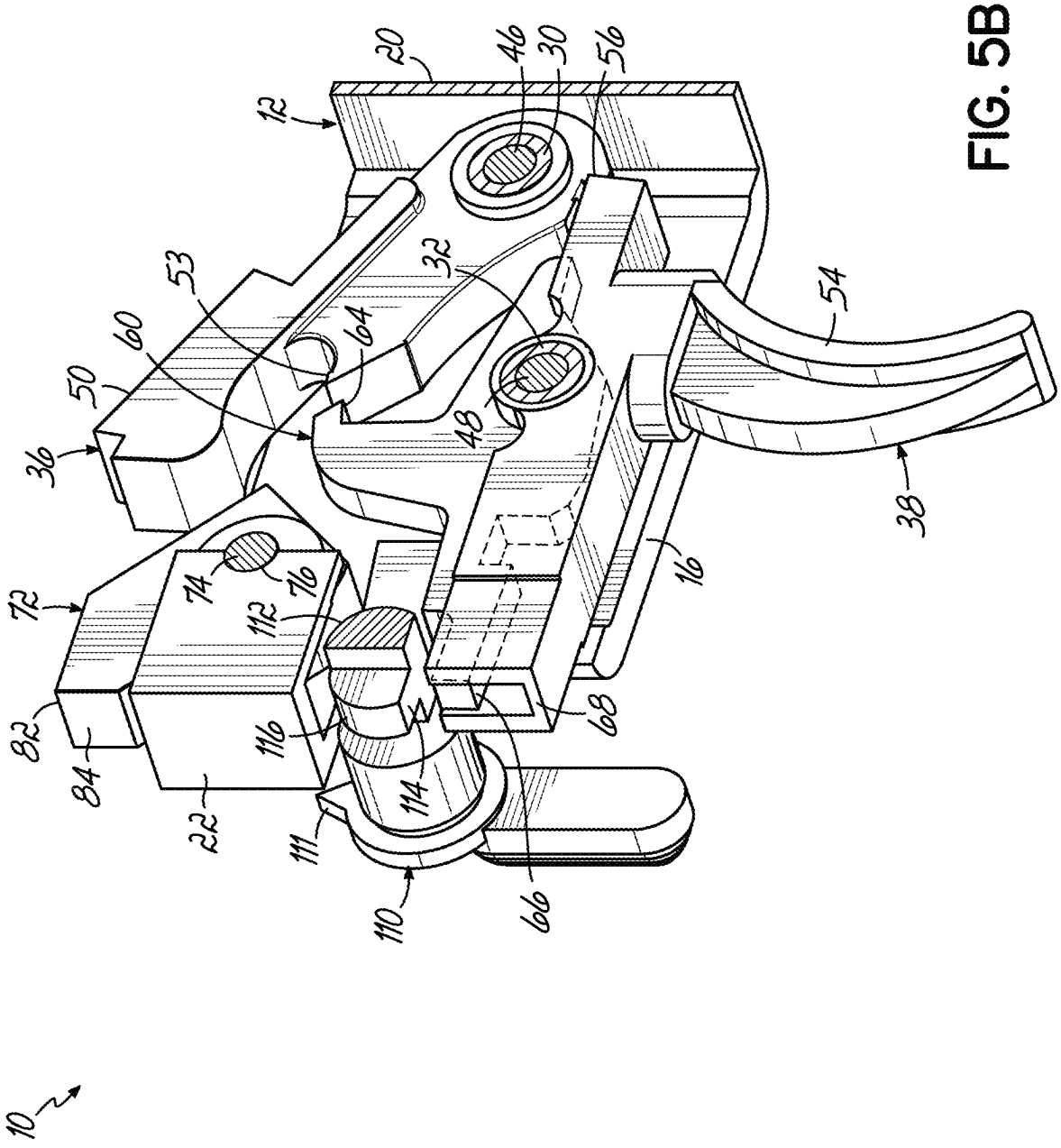
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FIG. 5B

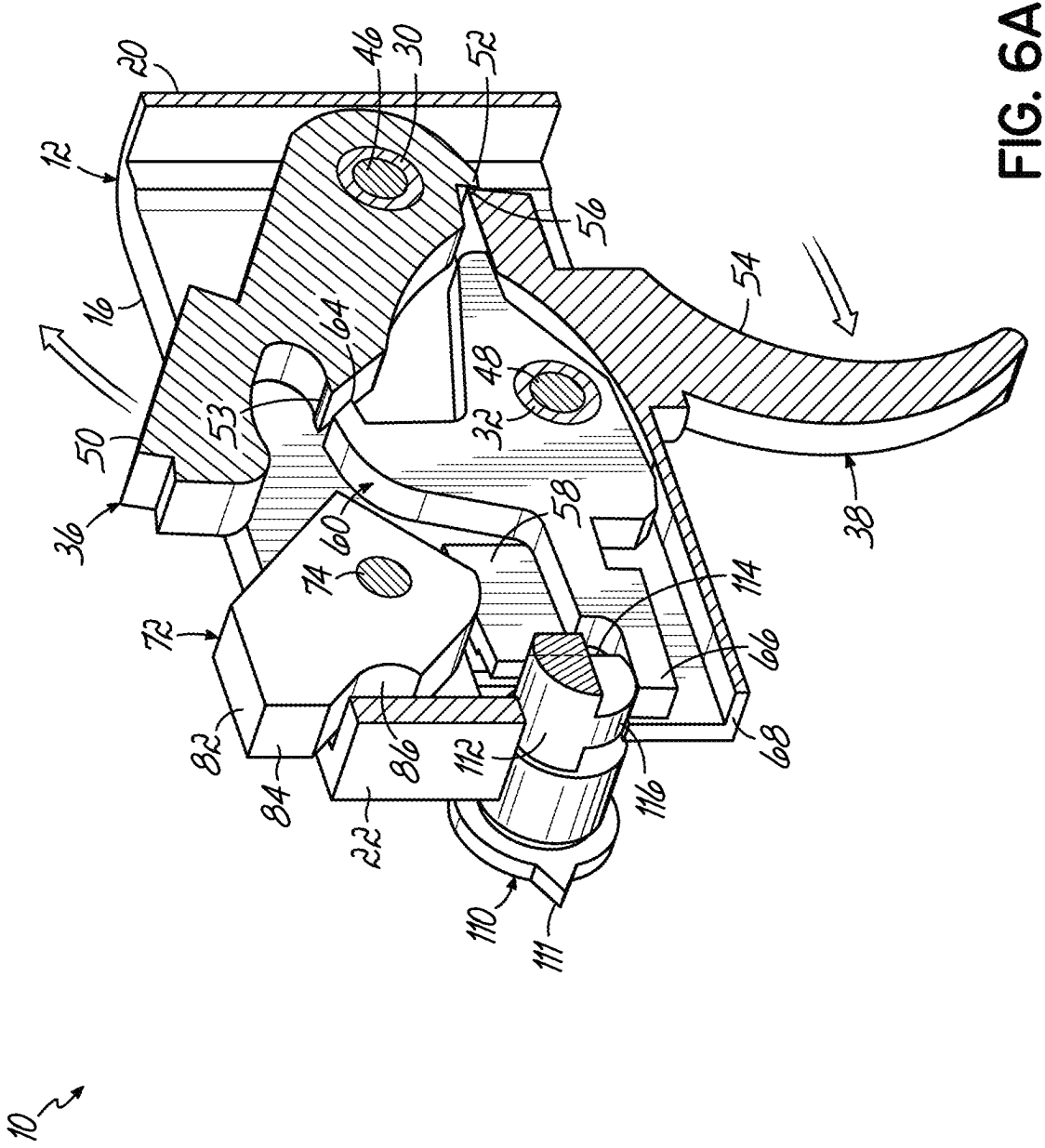
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FIG. 6A

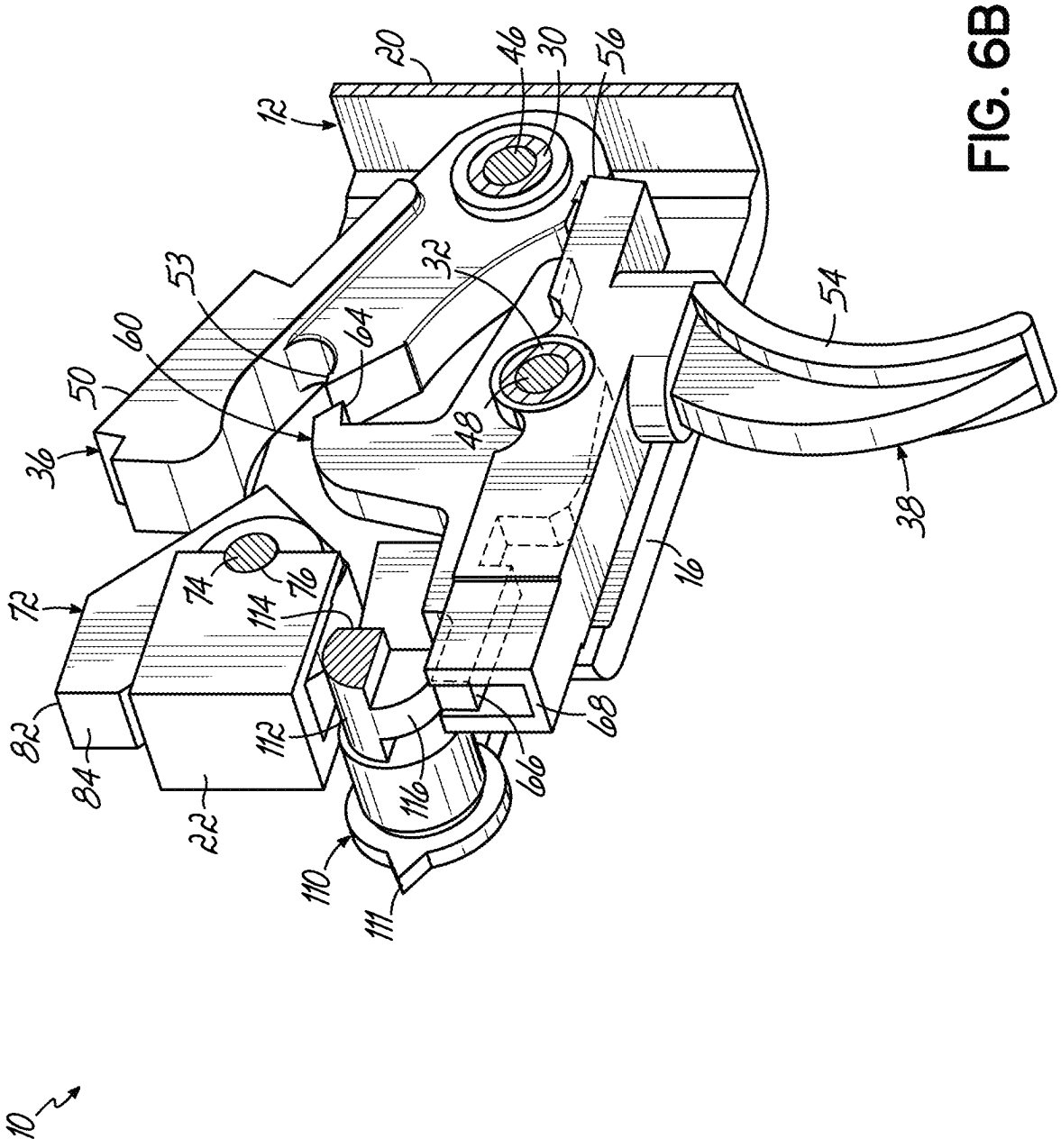
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FIG. 6B

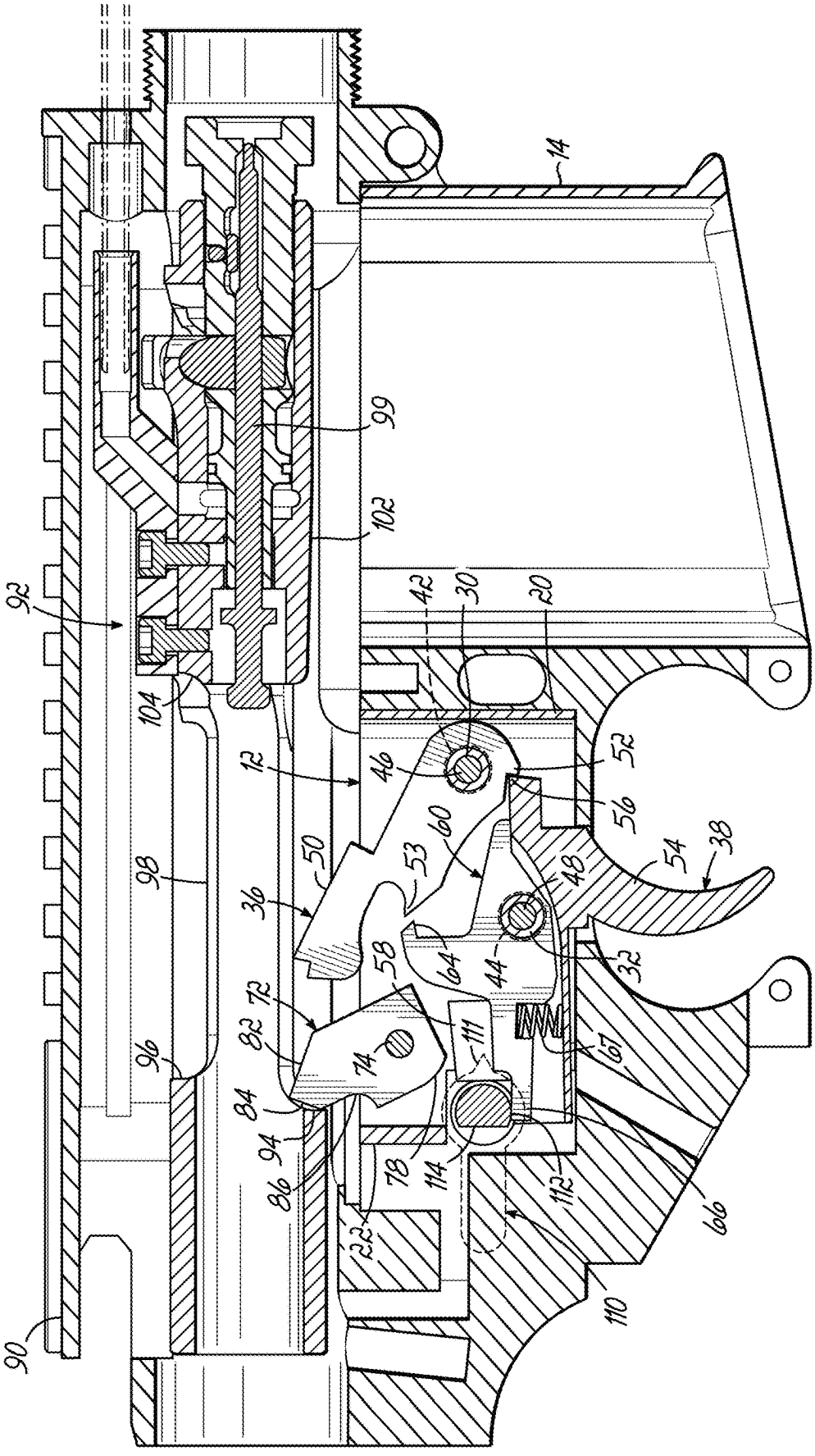
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FIG. 7

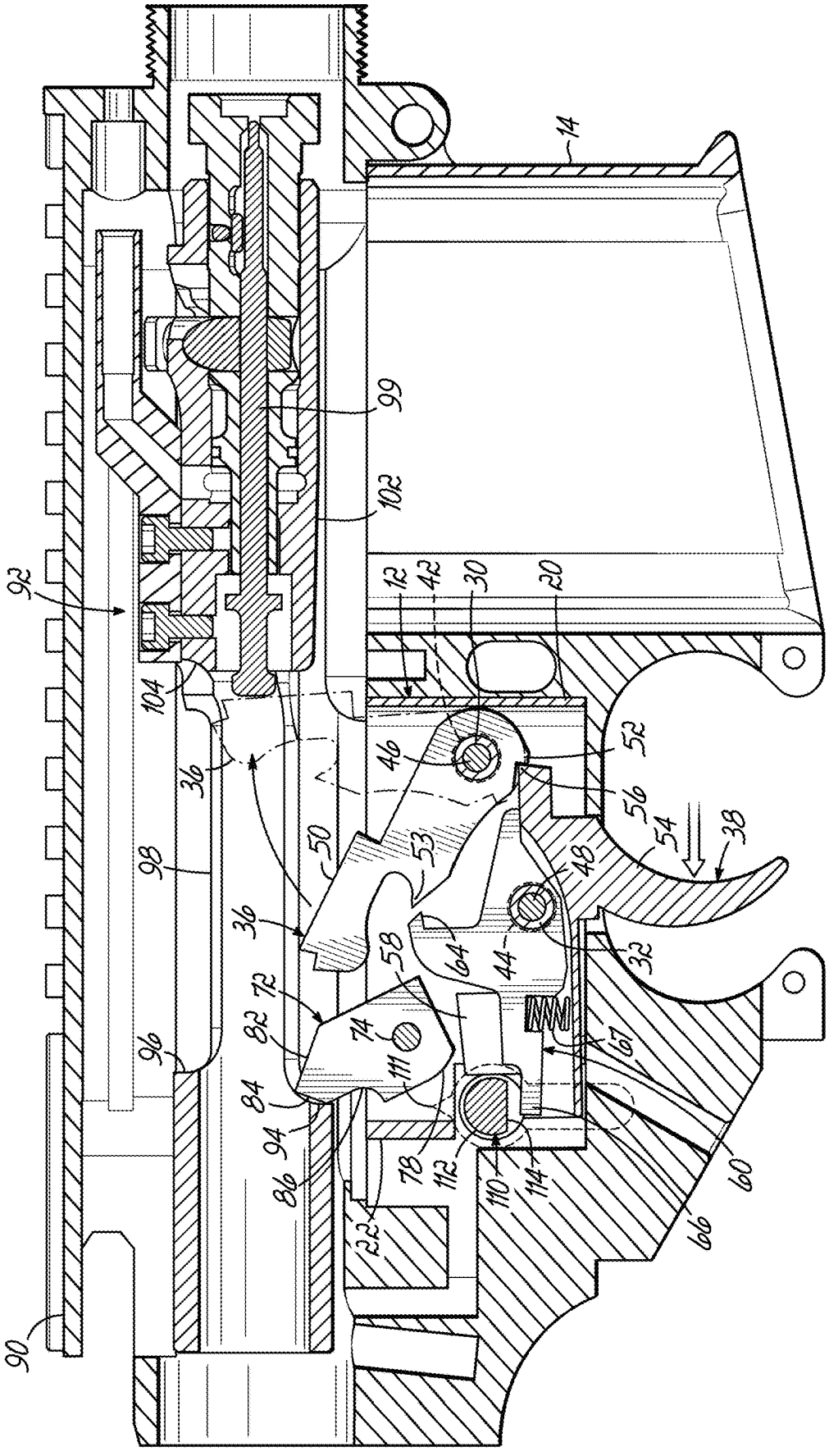
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FIG. 8A

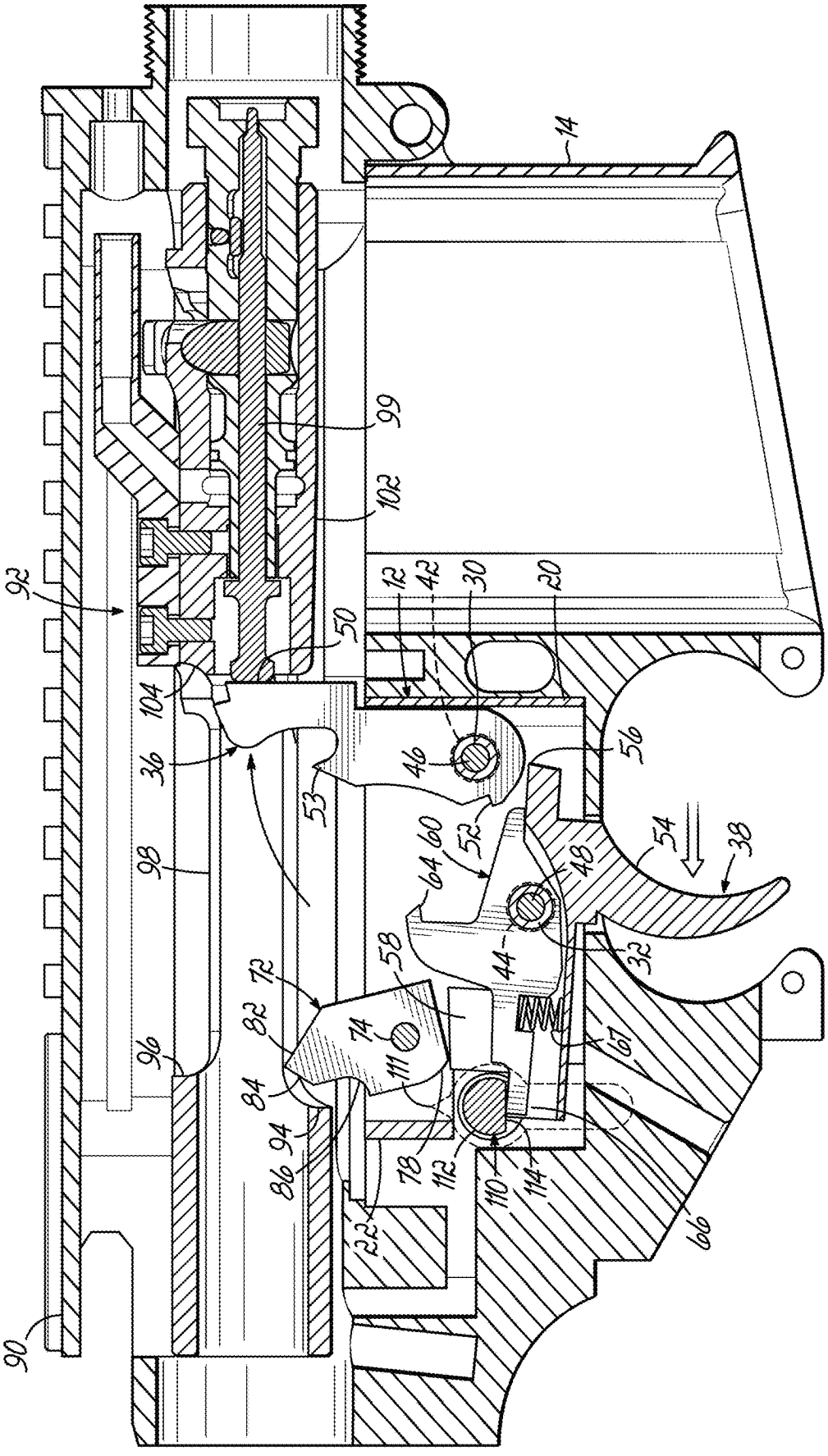
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FIG. 8B

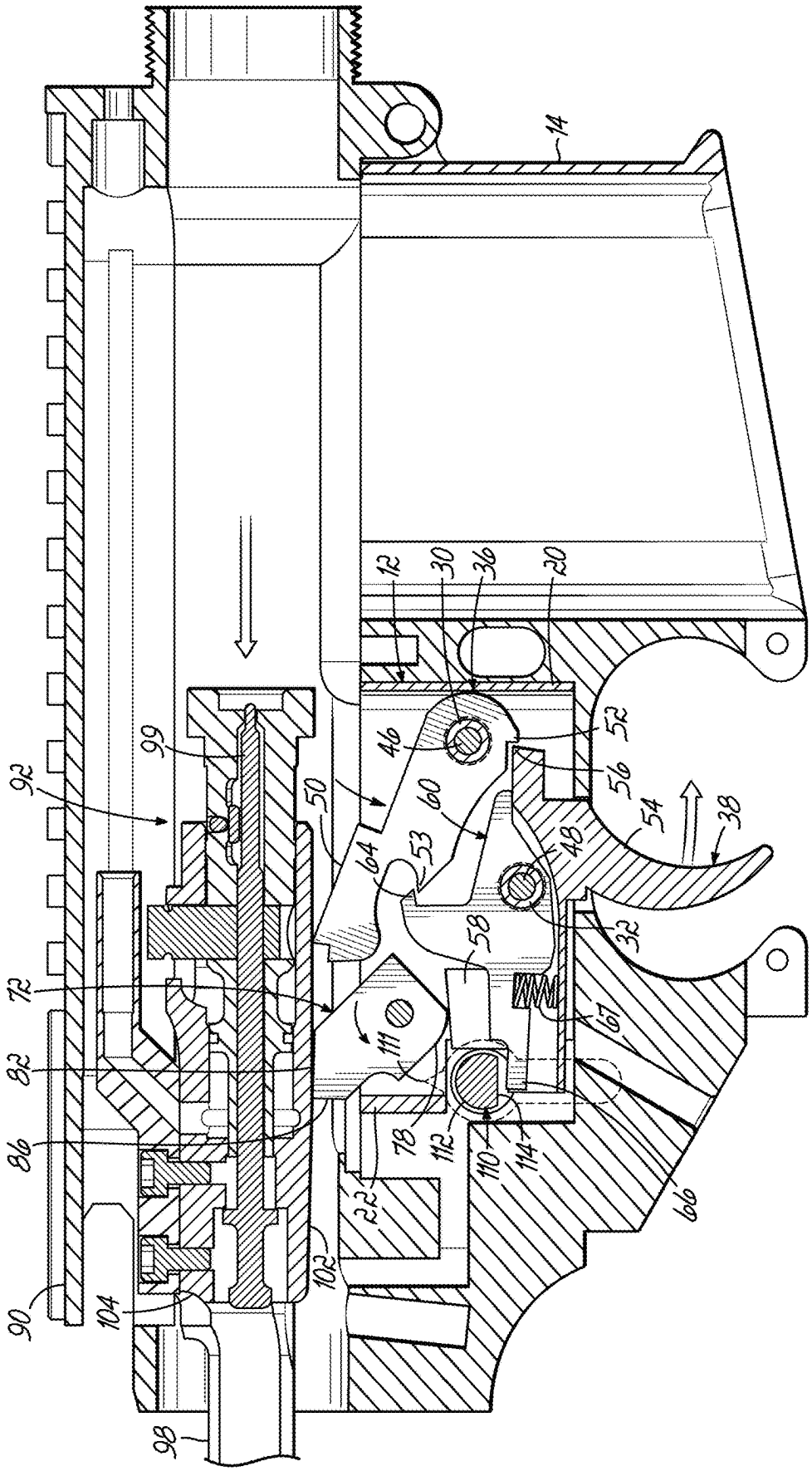
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FIG. 8C

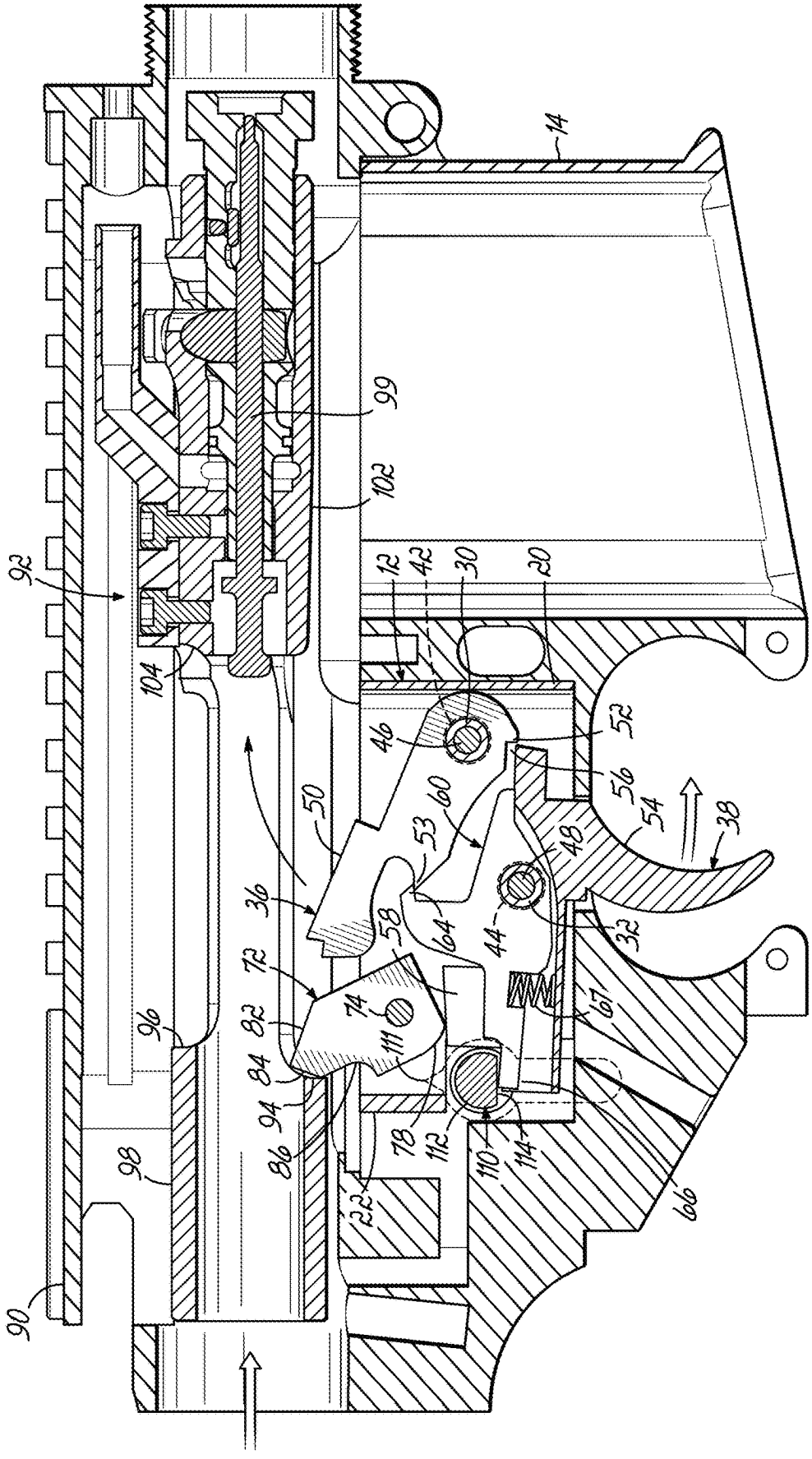
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FIG. 8D

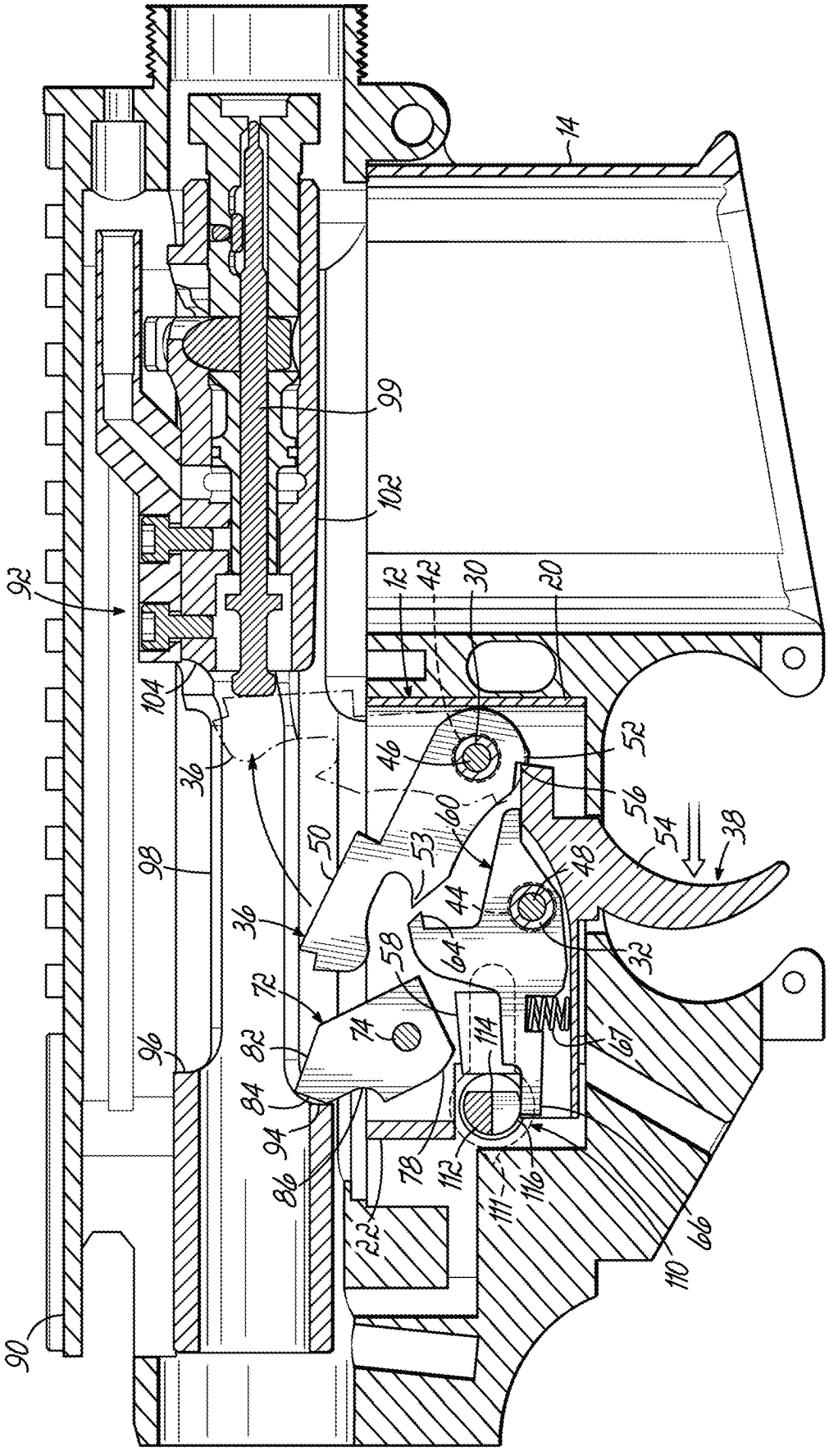
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FIG. 9A

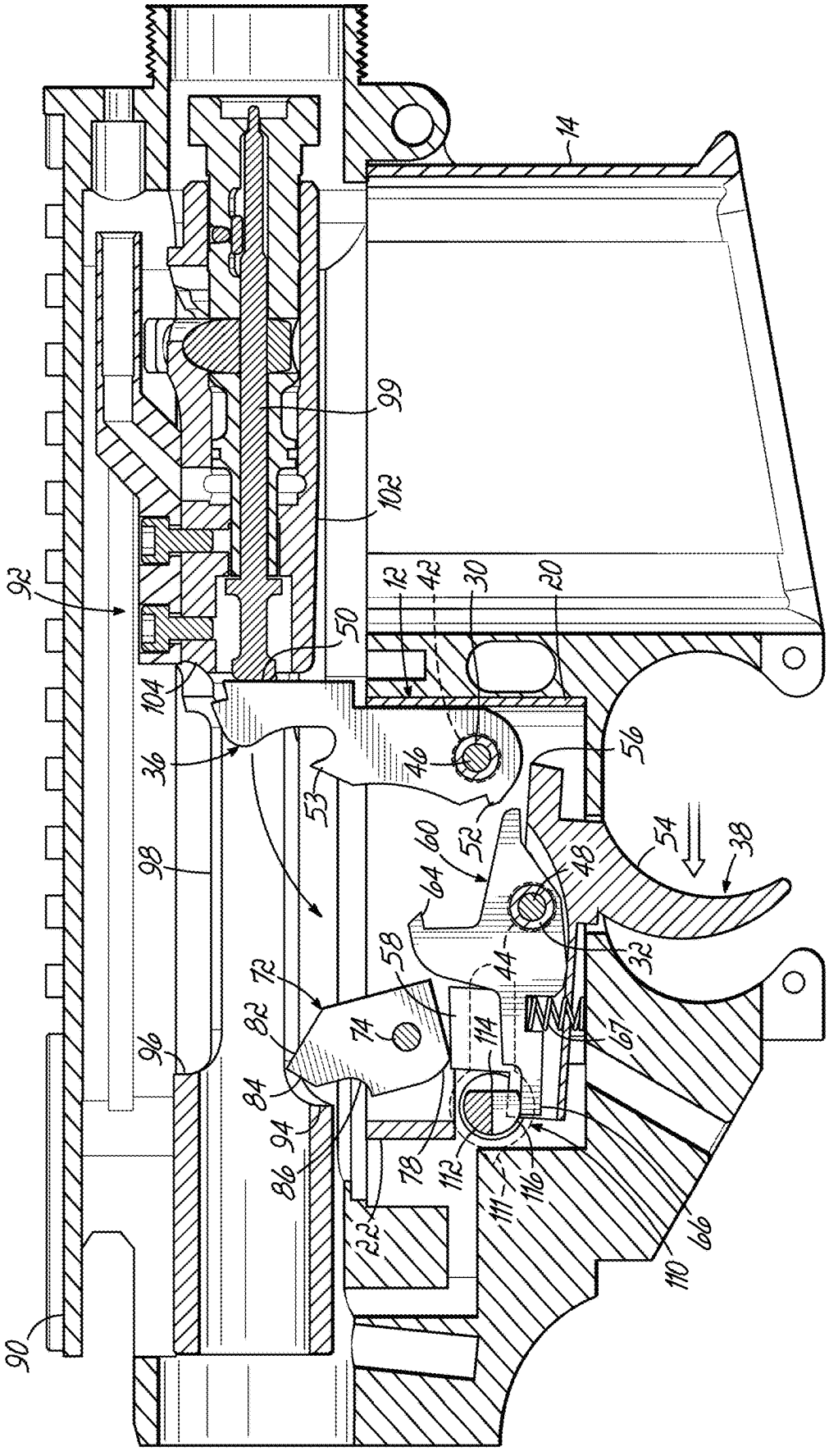
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FIG. 9B

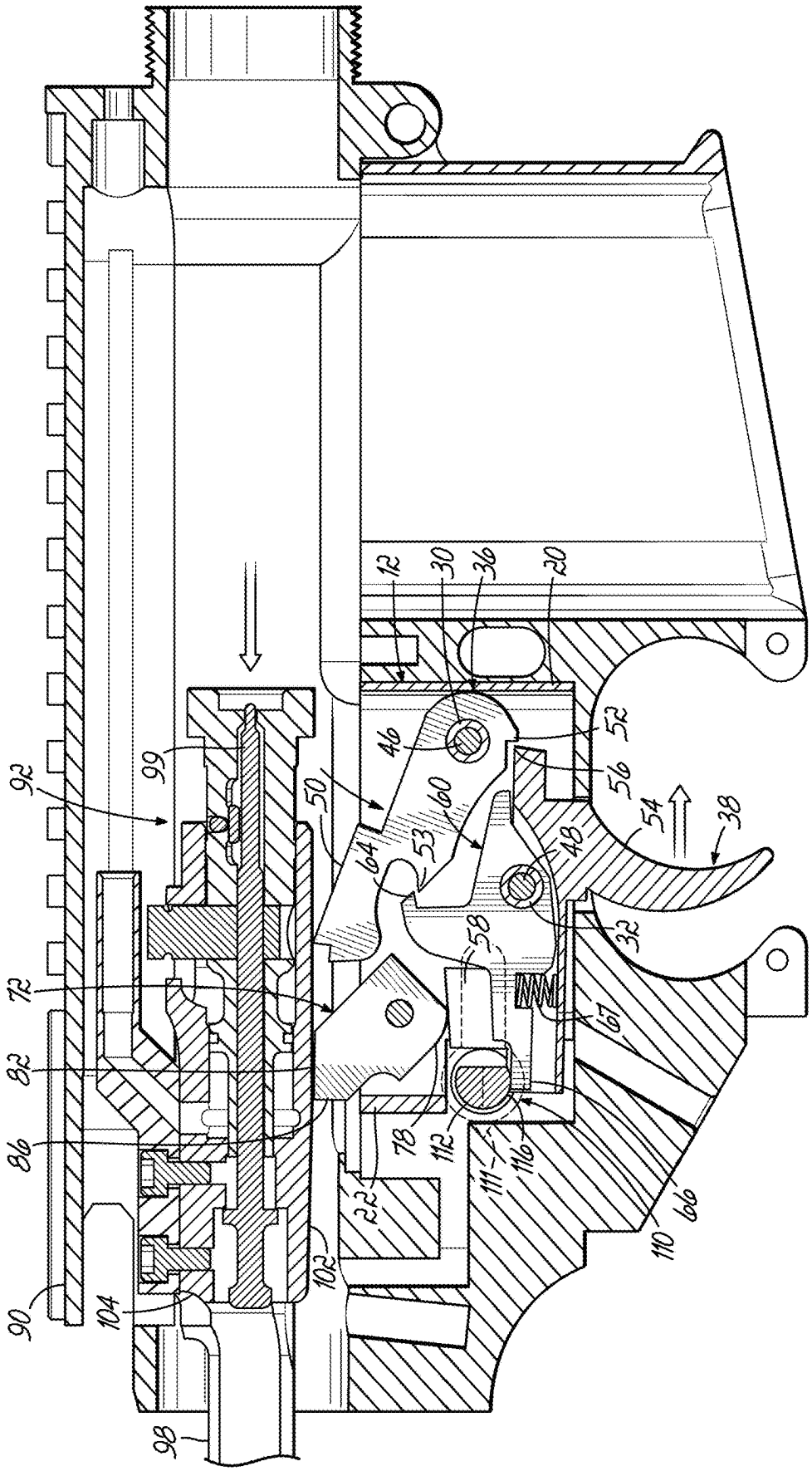
12
30
36
20
92
99
46
52
50
56
60
54
38
64
53
48
58
32
72
67
82
86
78
112
116
111
22
66
110
102
90
104
98

FIG. 9C

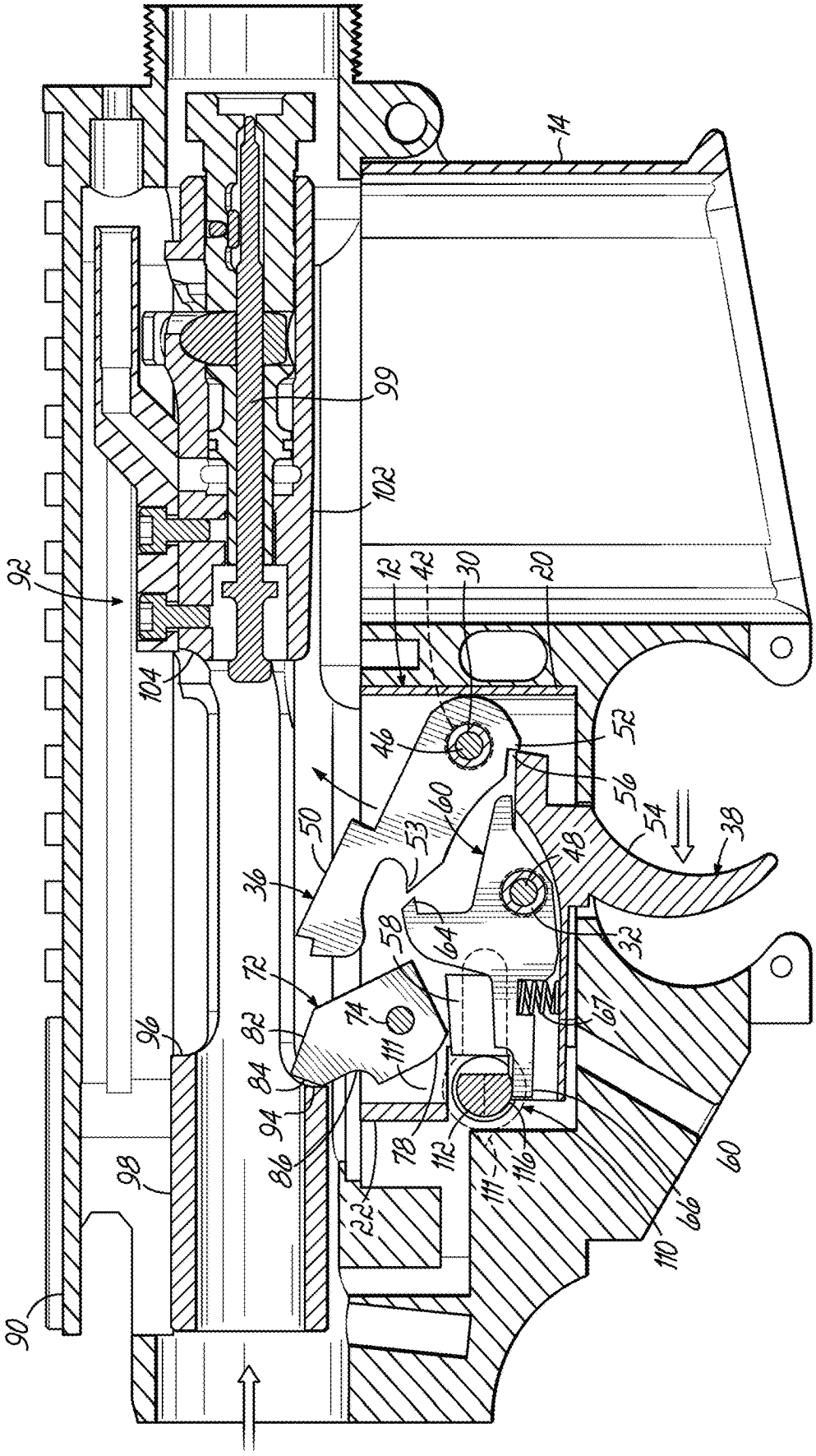
14
99
102
92
12
42
30
20
104
46
52
56
54
38
50
53
160
48
36
58
64
32
72
74
82
96
111
61
84
94
86
78
112
116
111
60
66
110
98
90

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.

* * * * *

EXHIBIT E

US012636403B2

(12) **United States Patent**
Strbac

(10) **Patent No.: US 12,636,403 B2**
(45) **Date of Patent: *May 26, 2026**

(54) **FIREARM TRIGGER MECHANISM**

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This patent is subject to a terminal disclaimer.

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(58) **Field of Classification Search**

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See application file for complete search history.

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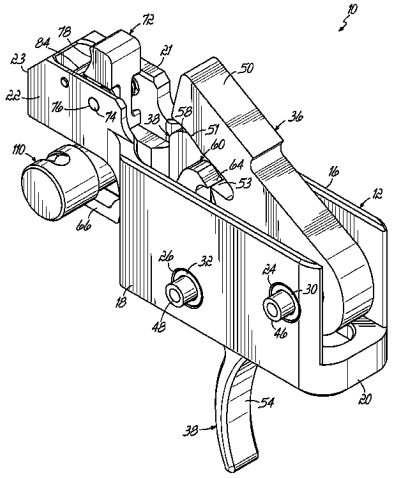
Primary Examiner — J. Woodrow Eldred

(57) **ABSTRACT**

A trigger mechanism that can be used in AR-pattern firearms has a hammer, a trigger member, a disconnector, a locking member, 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 such that 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 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 causing the trigger member to be forced to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery (Continued)



position the user can pull the trigger member to fire the firearm without manually releasing the trigger member. The locking member is pivotable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position. The locking member is spring biased toward the first position and moved against the spring bias to the second position by contact from the bolt carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery position.

55 Claims, 18 Drawing Sheets

Related U.S. Application Data

continuation of application No. 18/346,423, filed on Jul. 3, 2023, now Pat. No. 12,036,336, which is a continuation of application No. 18/048,572, filed on Oct. 21, 2022, now Pat. No. 11,724,003.

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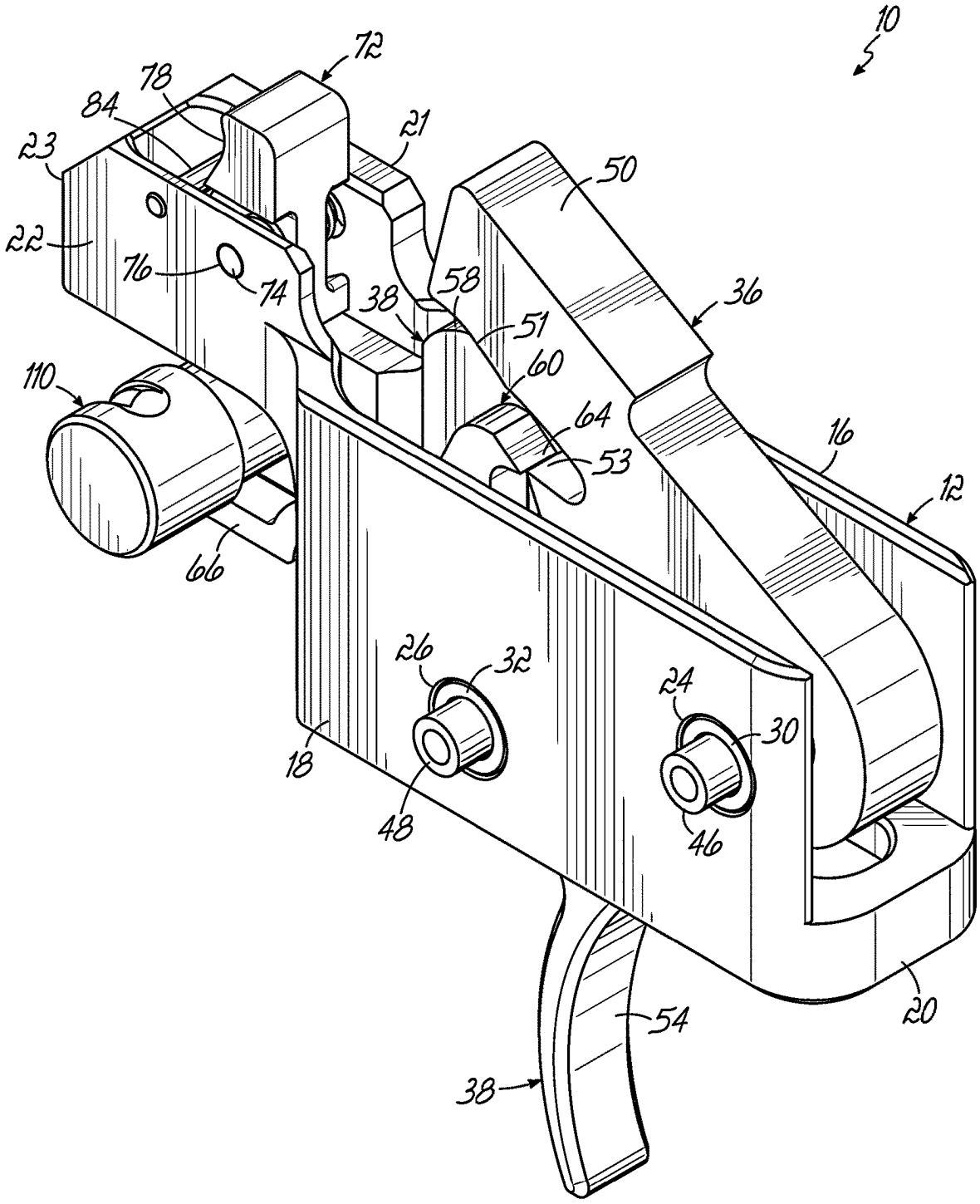
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FIG. 1

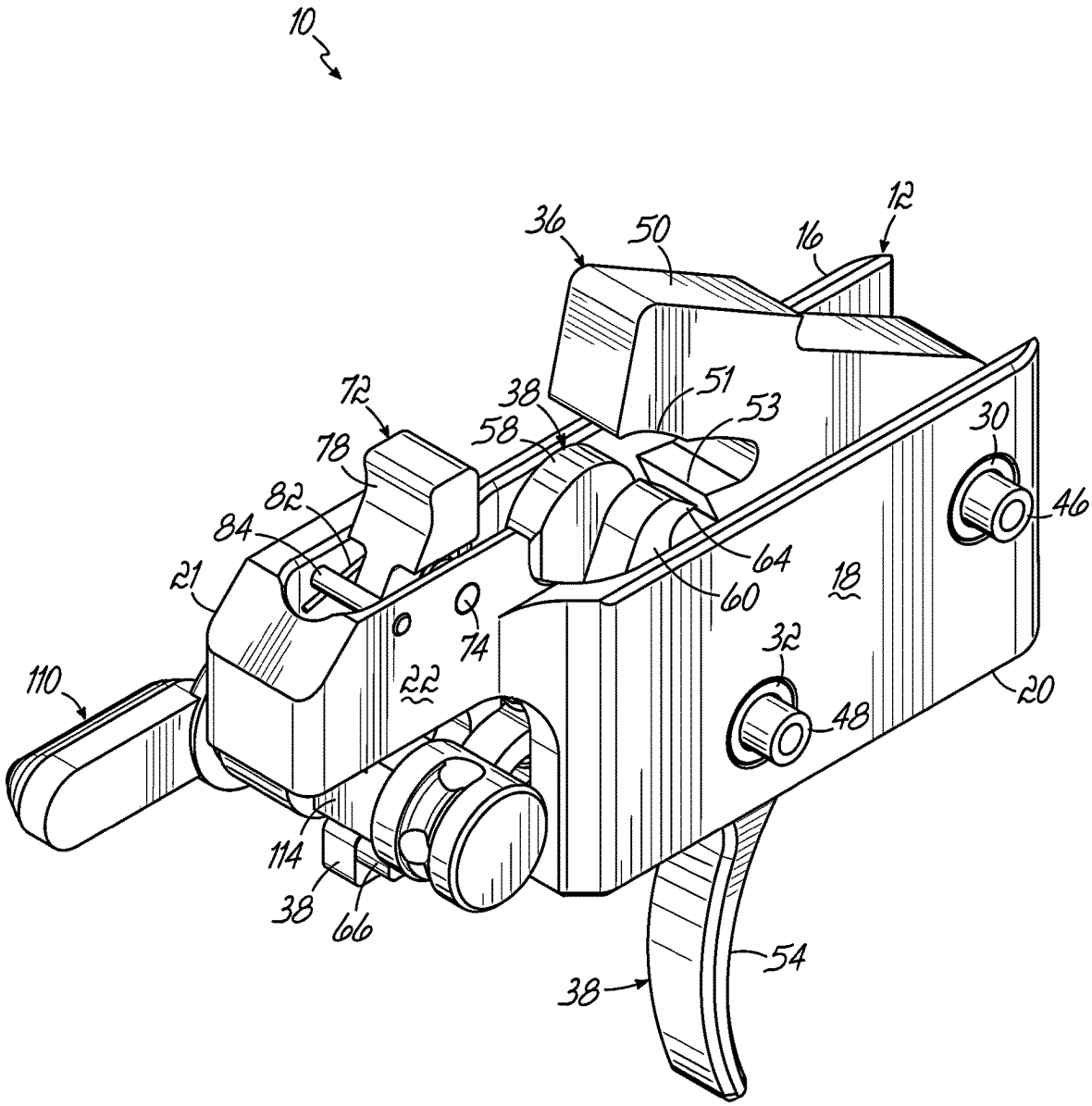
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FIG. 2

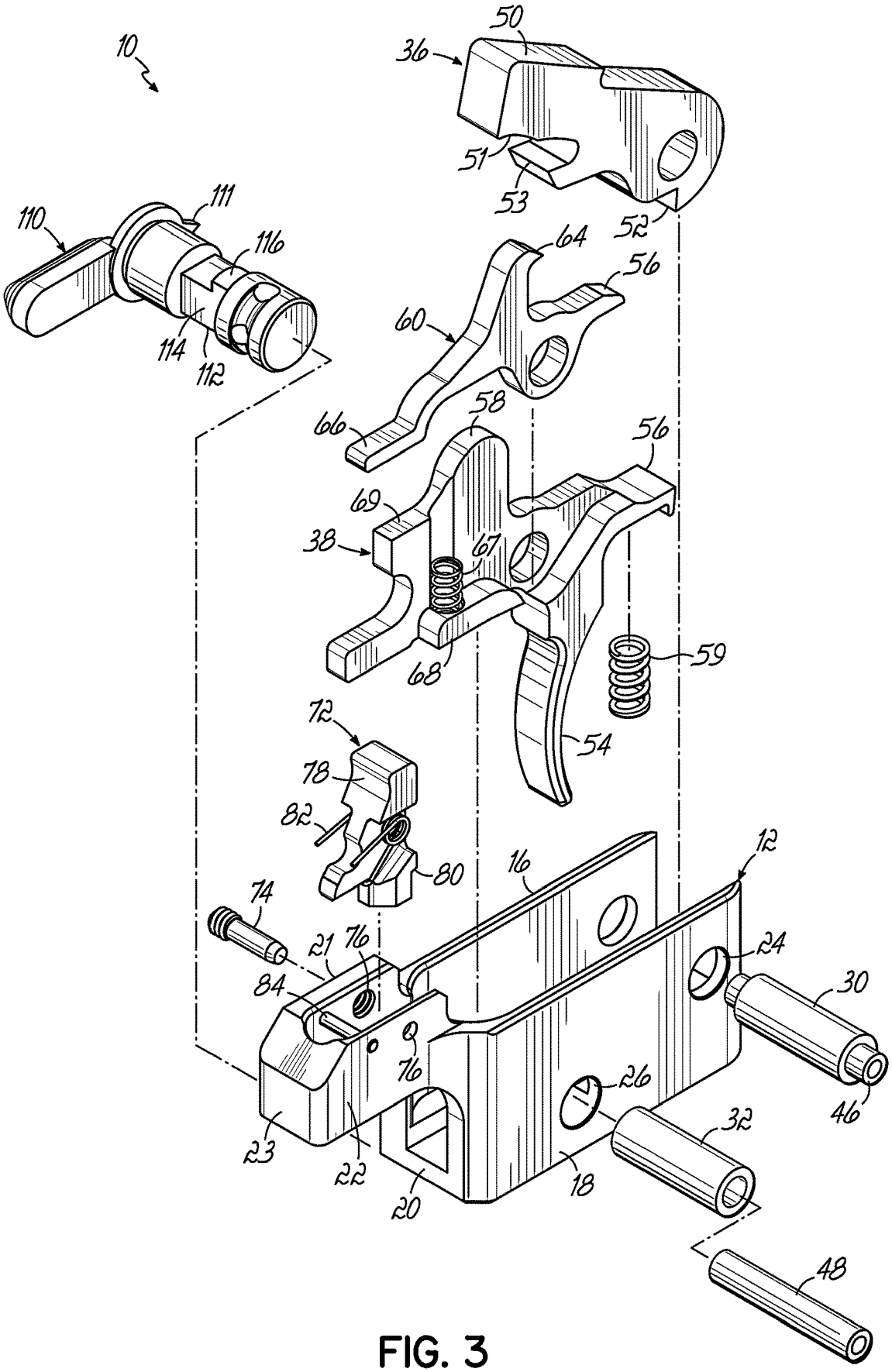
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FIG. 3

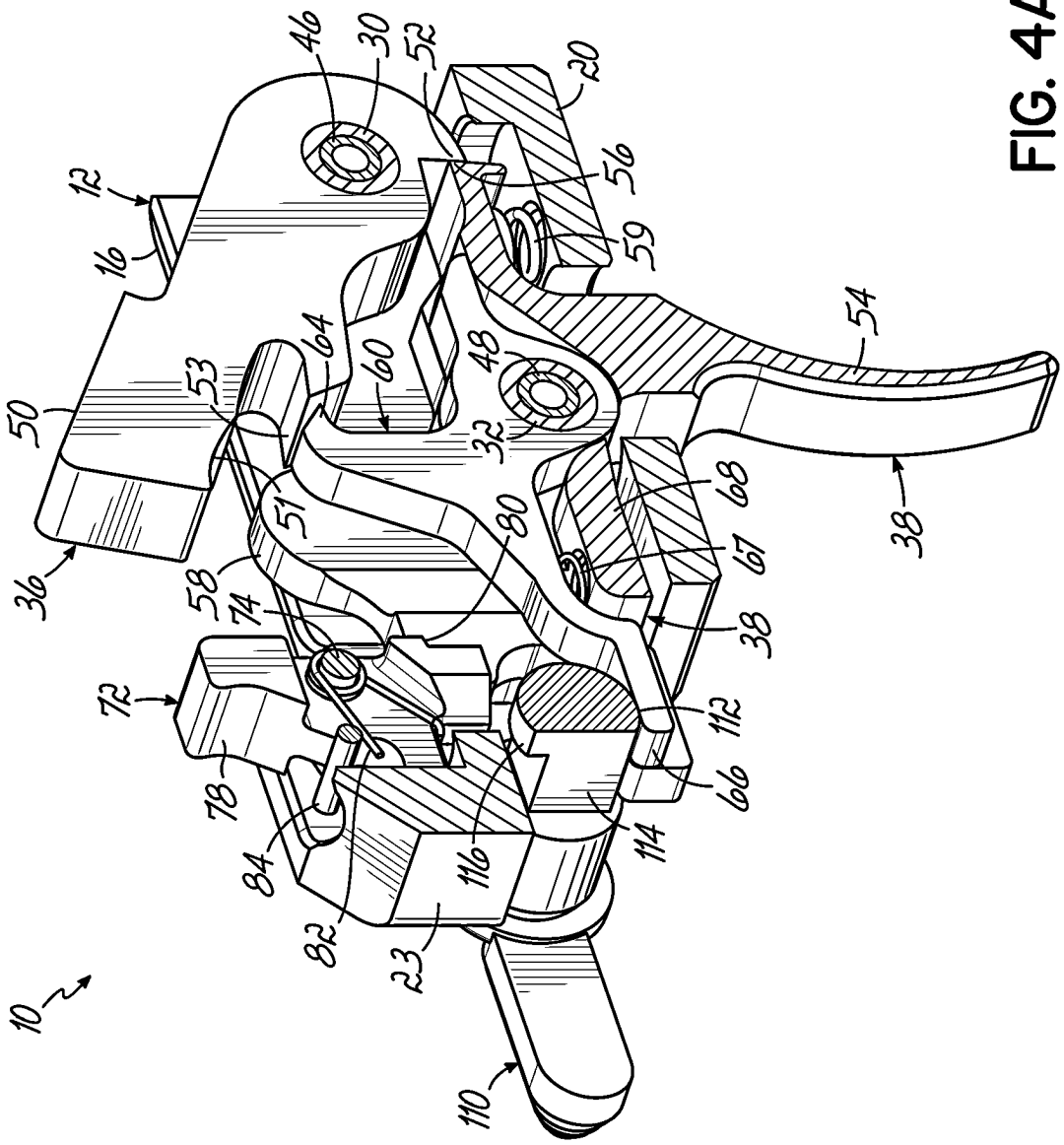
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FIG. 4A

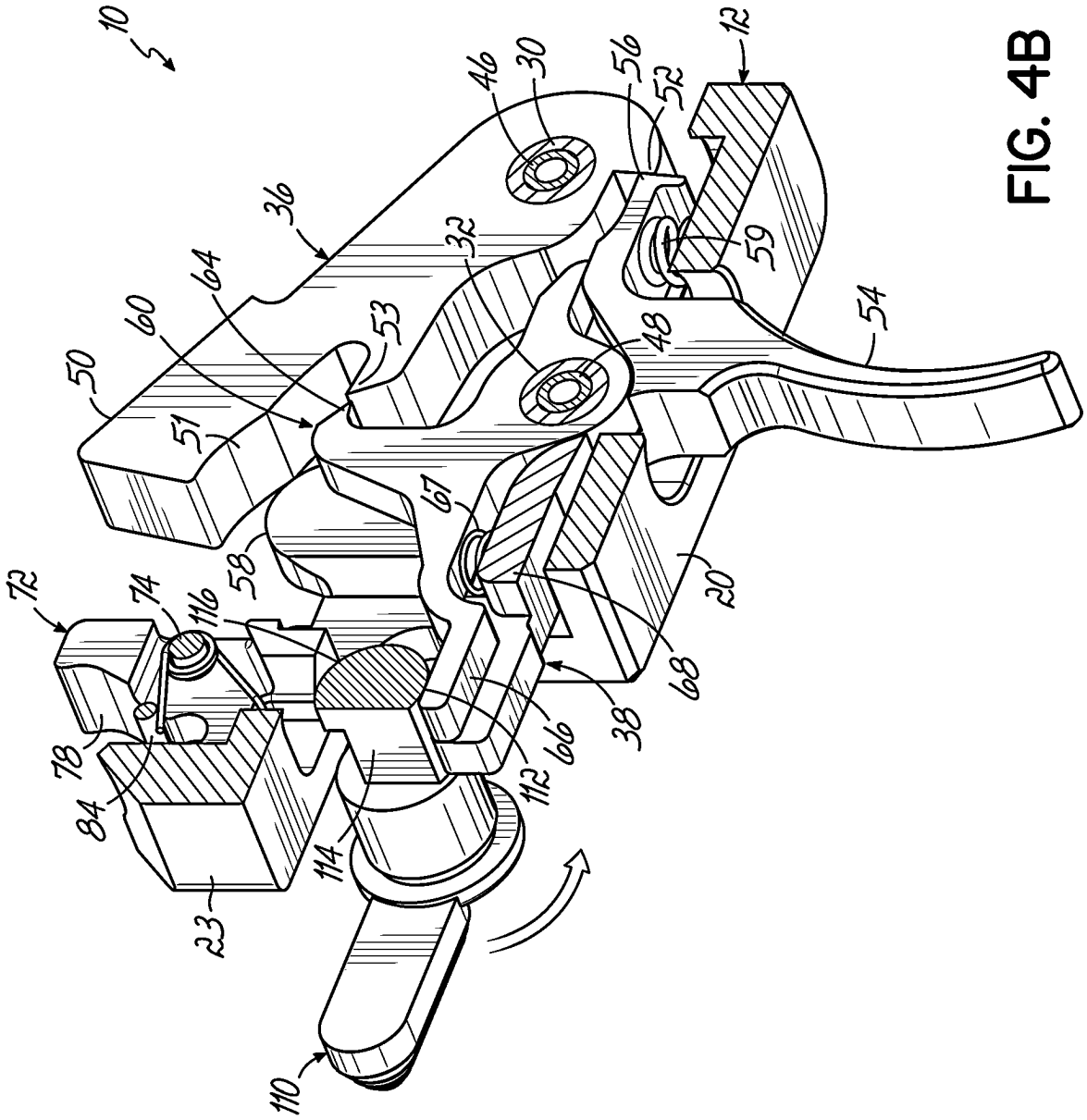
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FIG. 4B

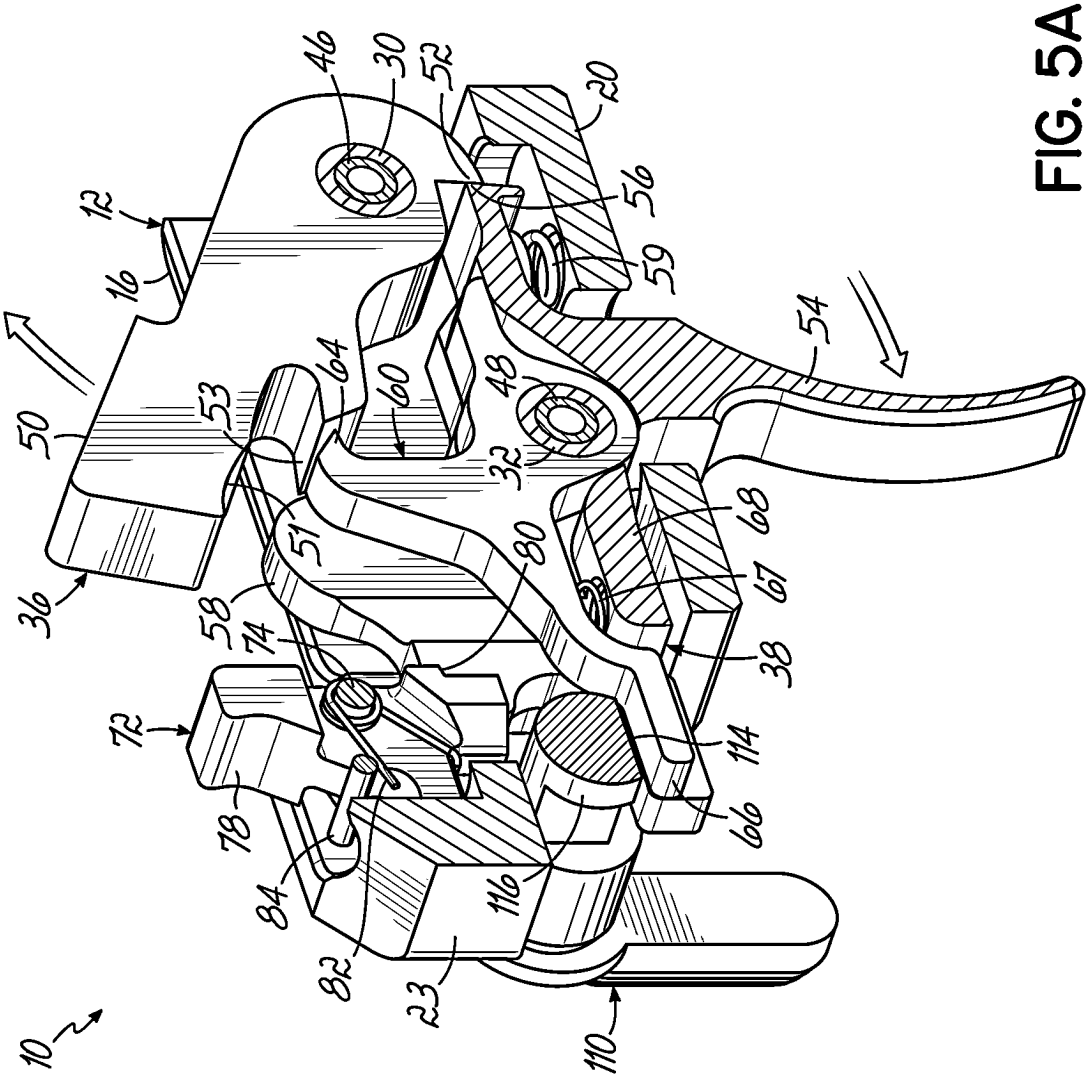
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FIG. 5A

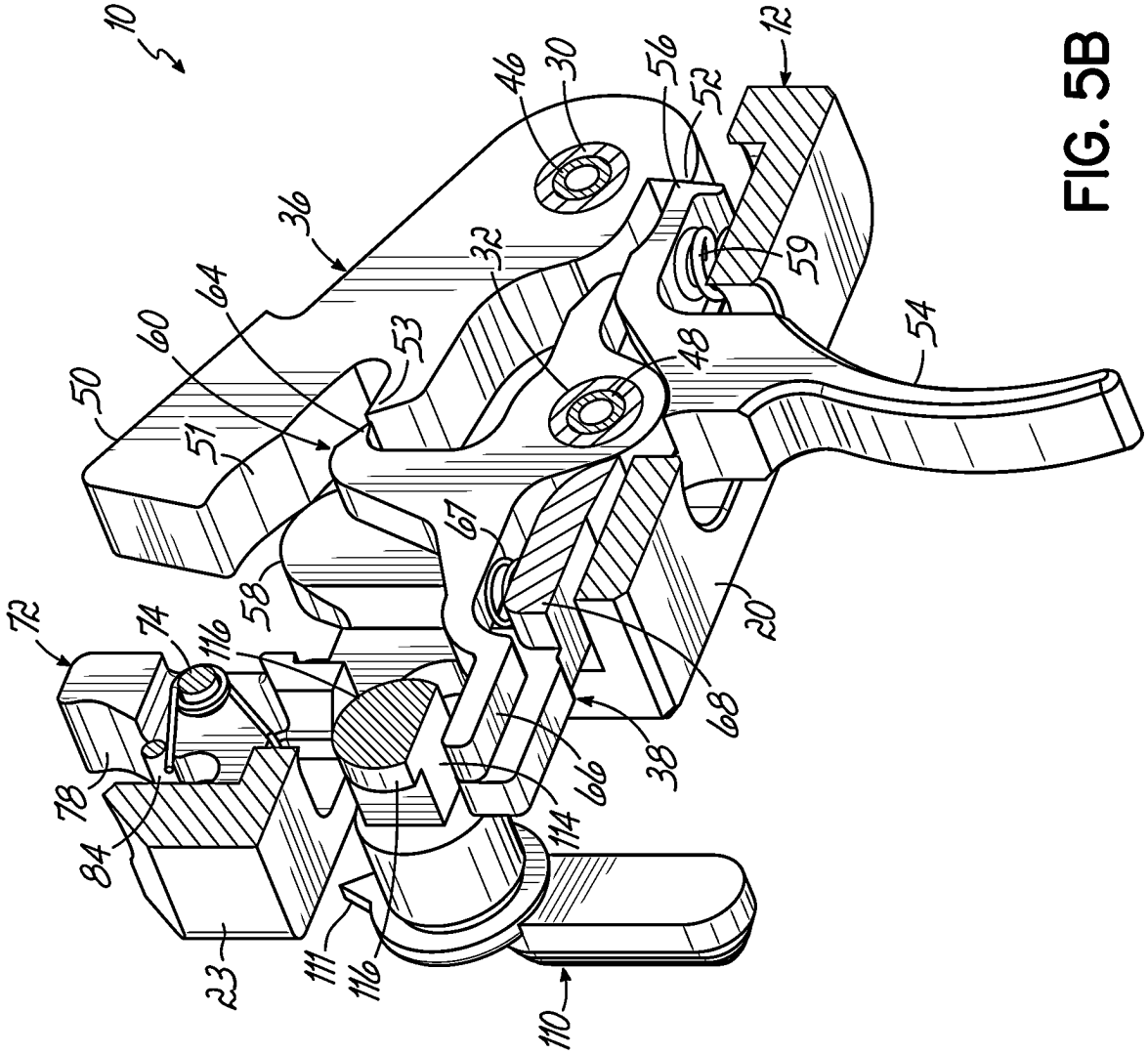
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FIG. 5B

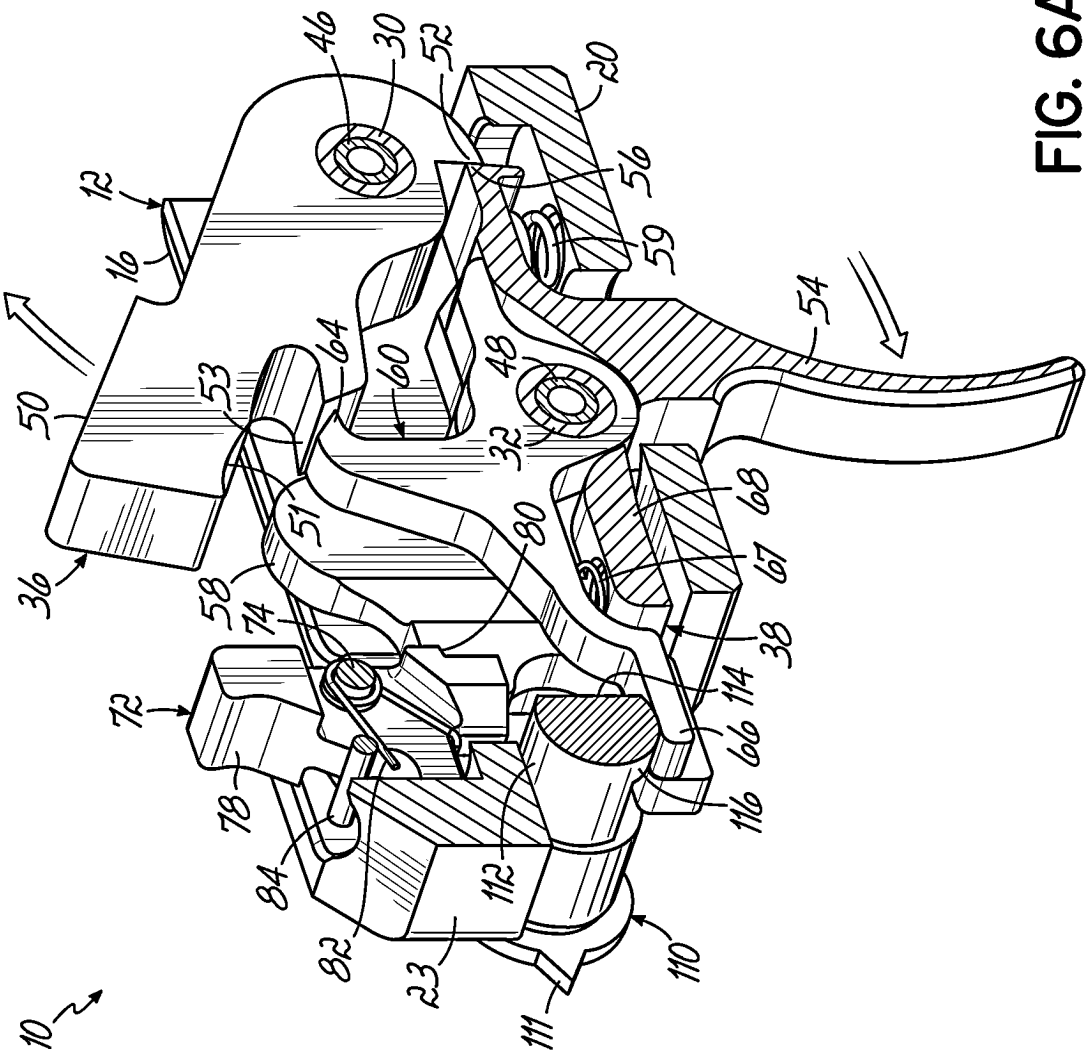
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FIG. 6A

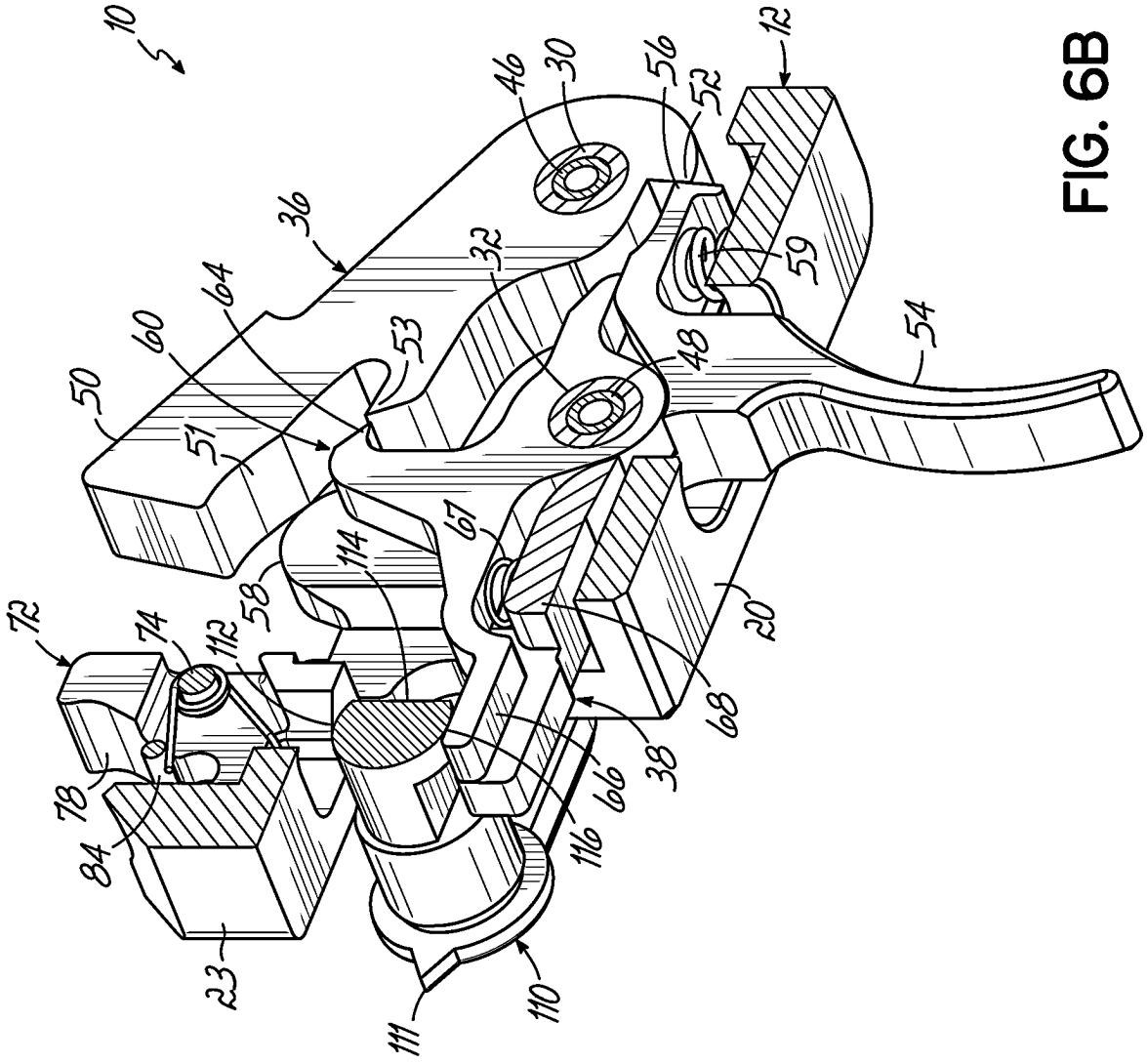
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FIG. 6B

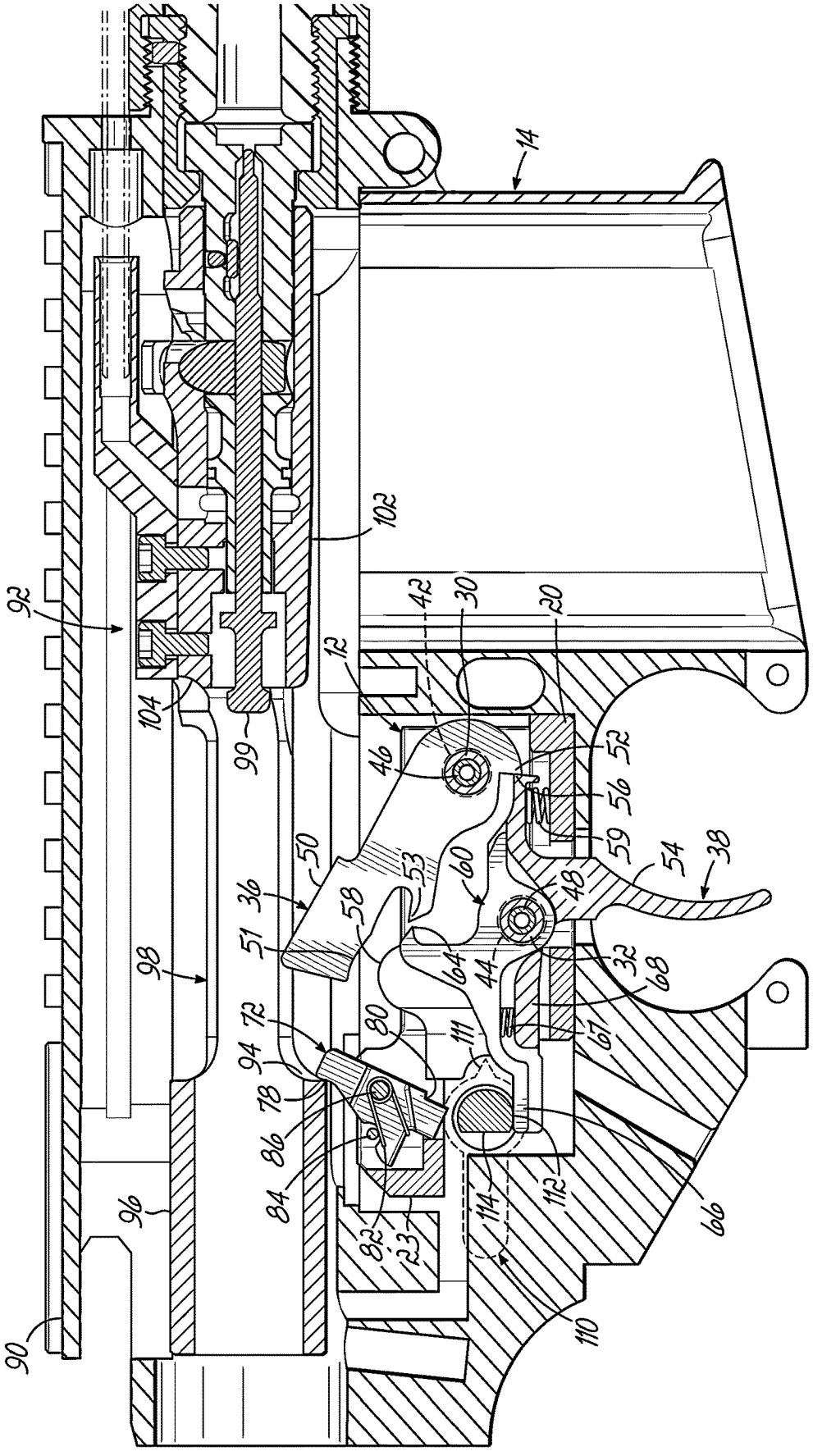
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FIG. 7

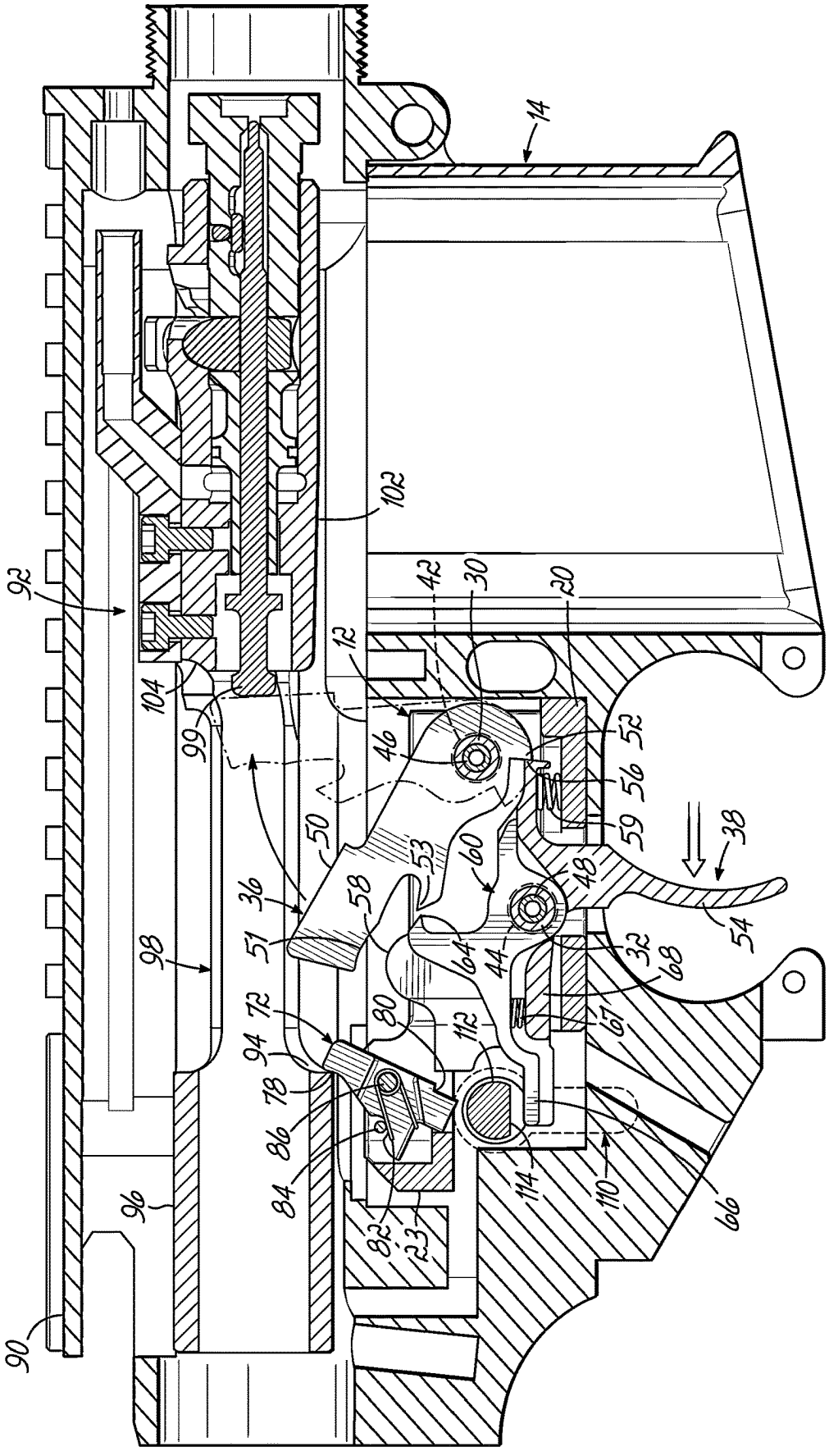
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FIG. 8A

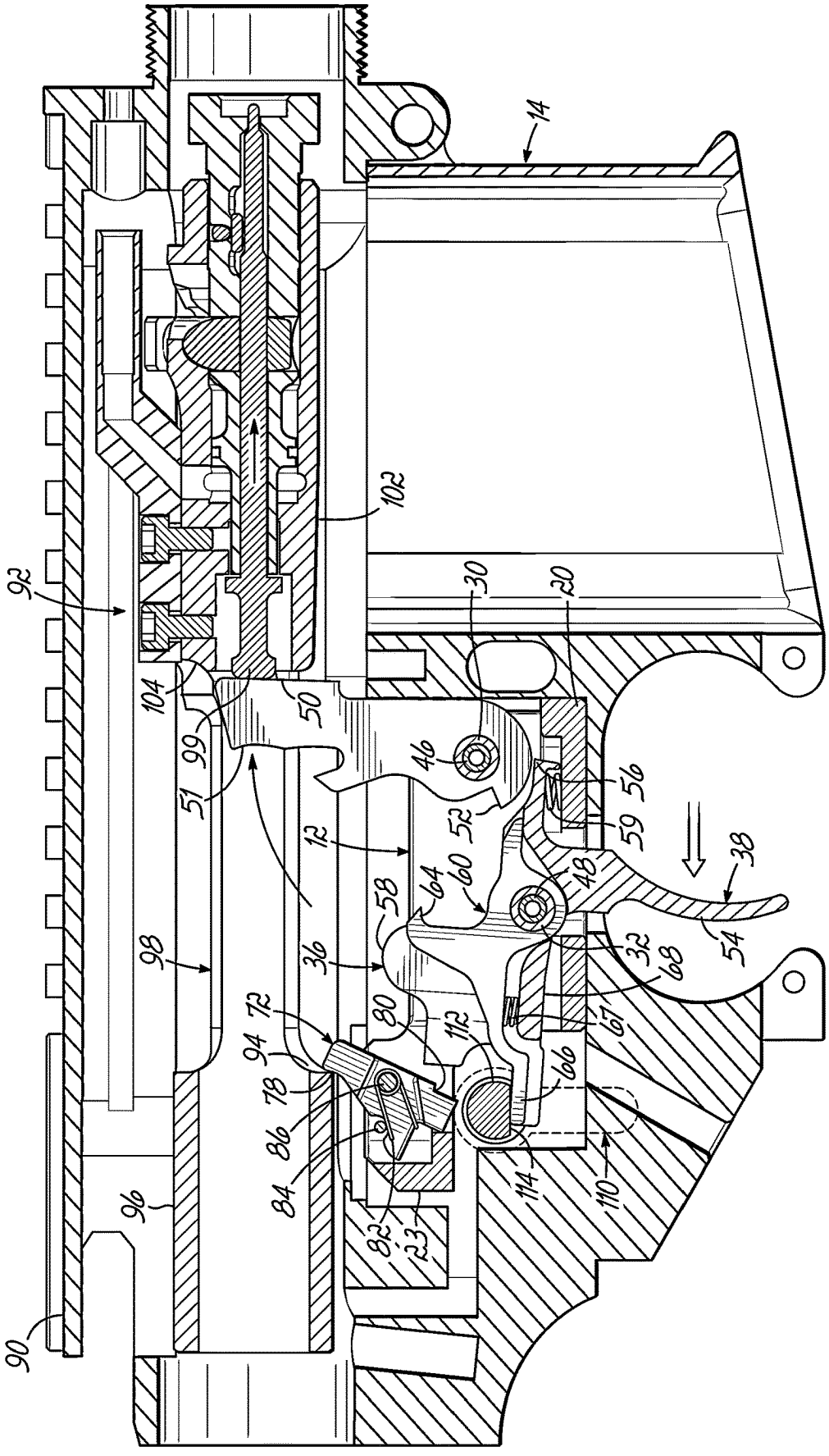
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FIG. 8B

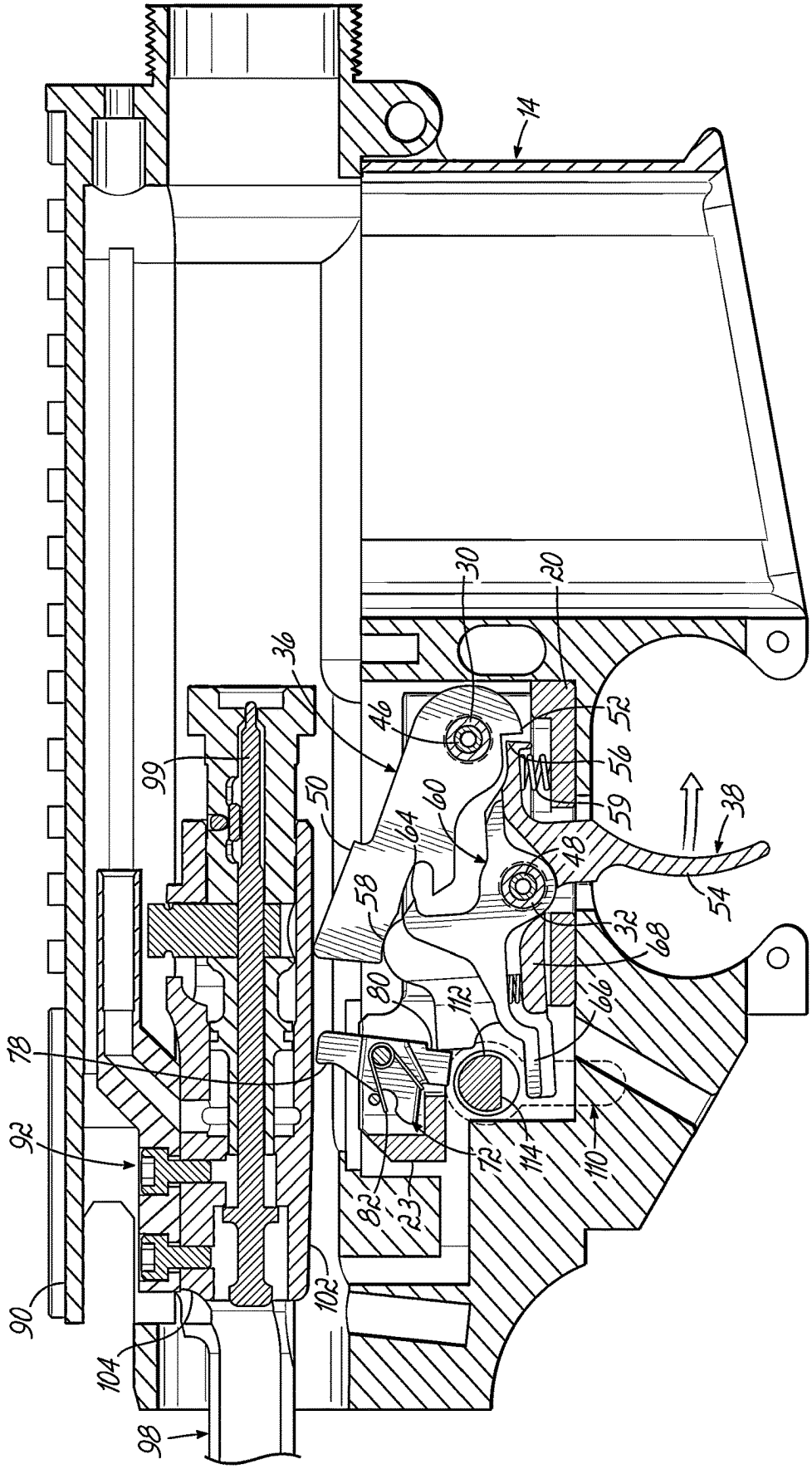
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FIG. 8C

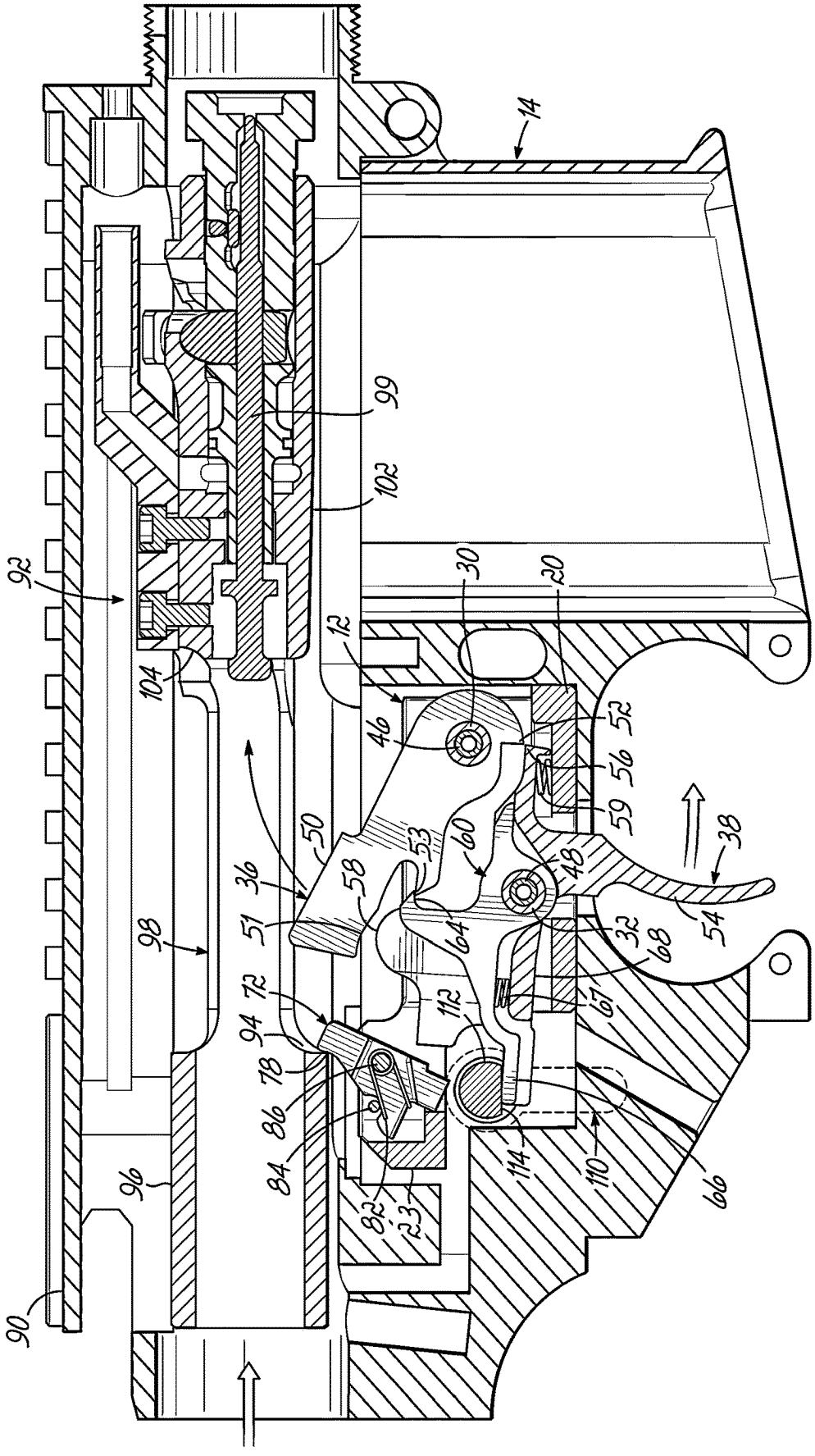
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FIG. 8D

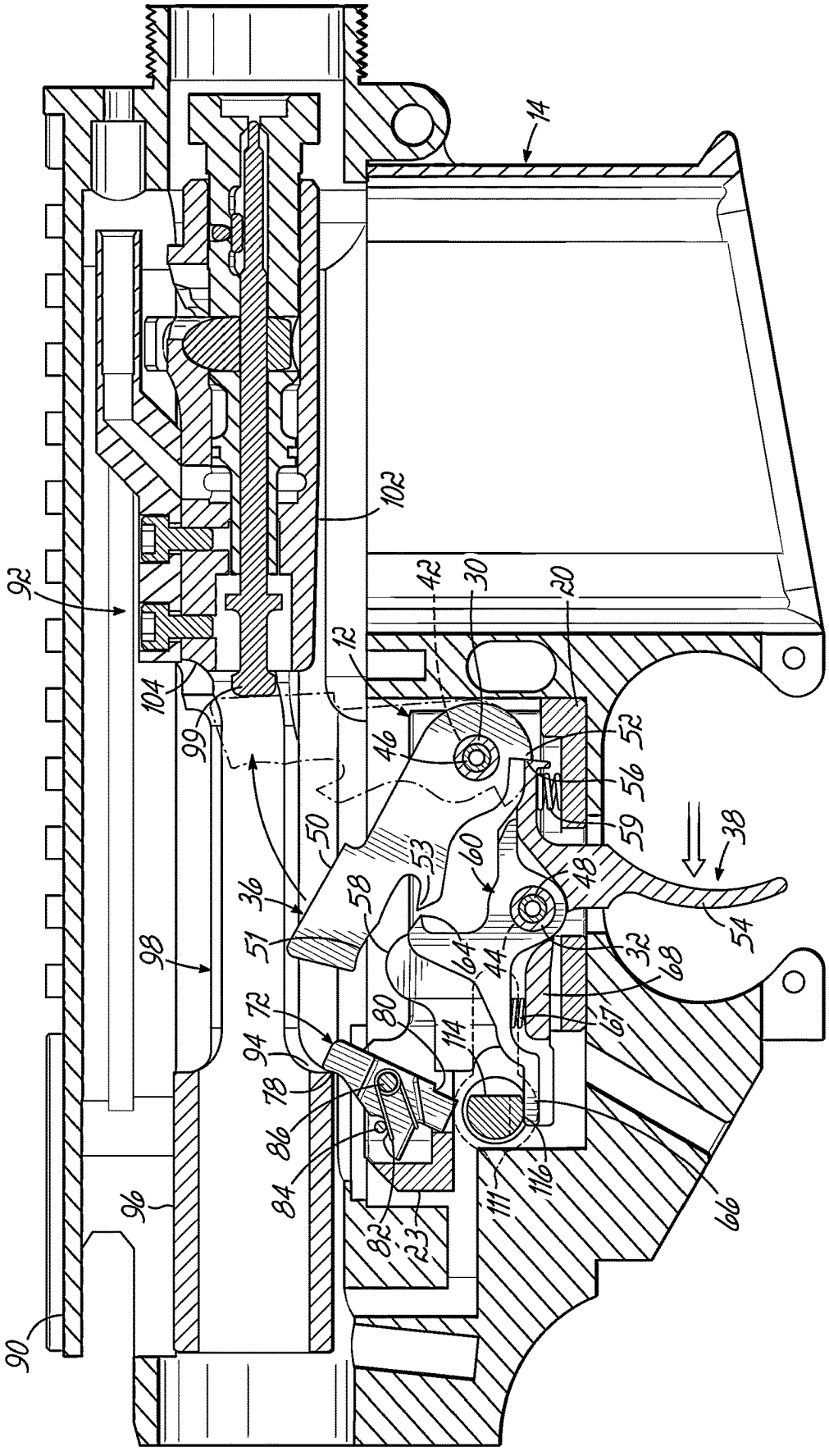
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FIG. 9A

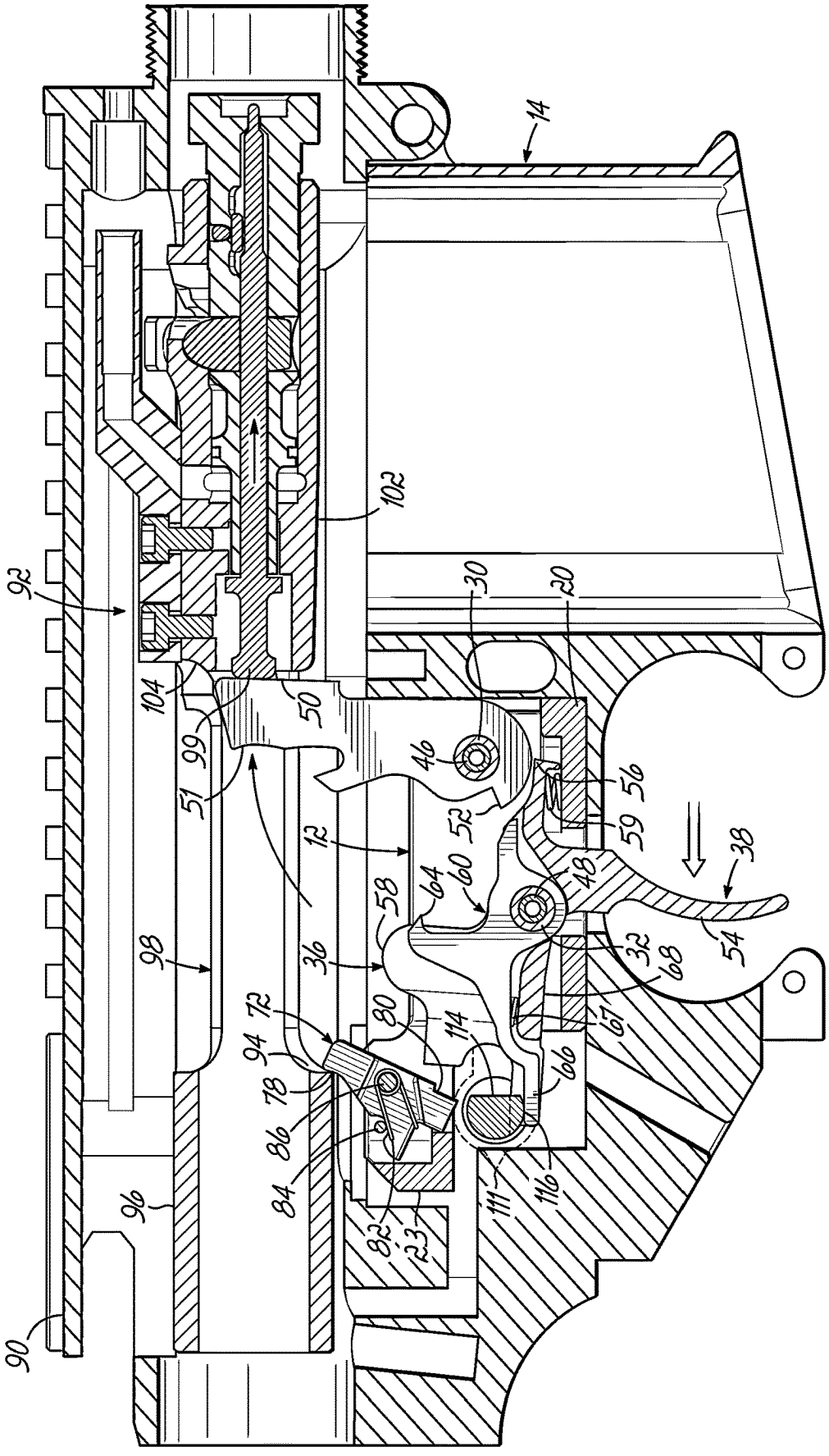
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FIG. 9B

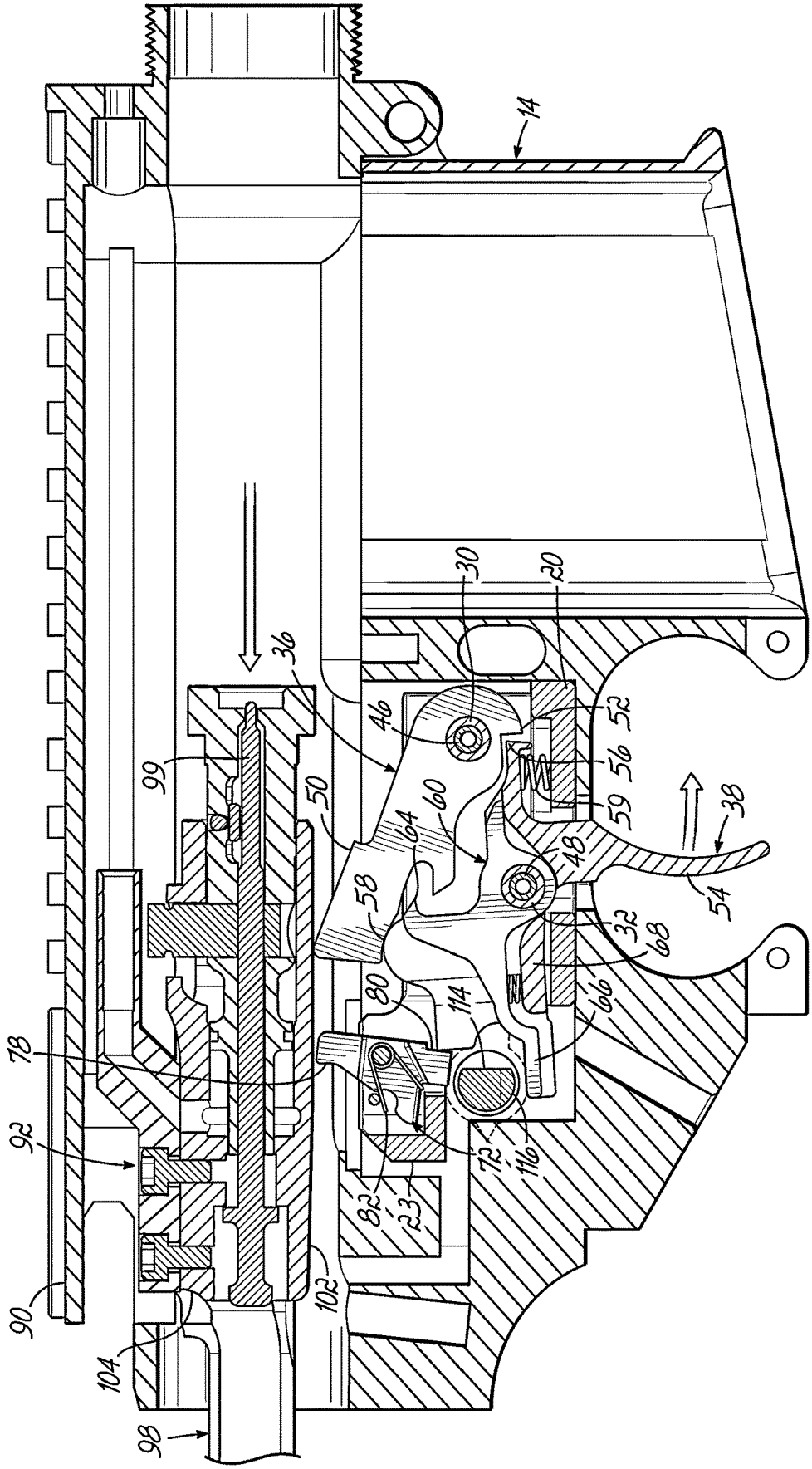
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FIG. 9C

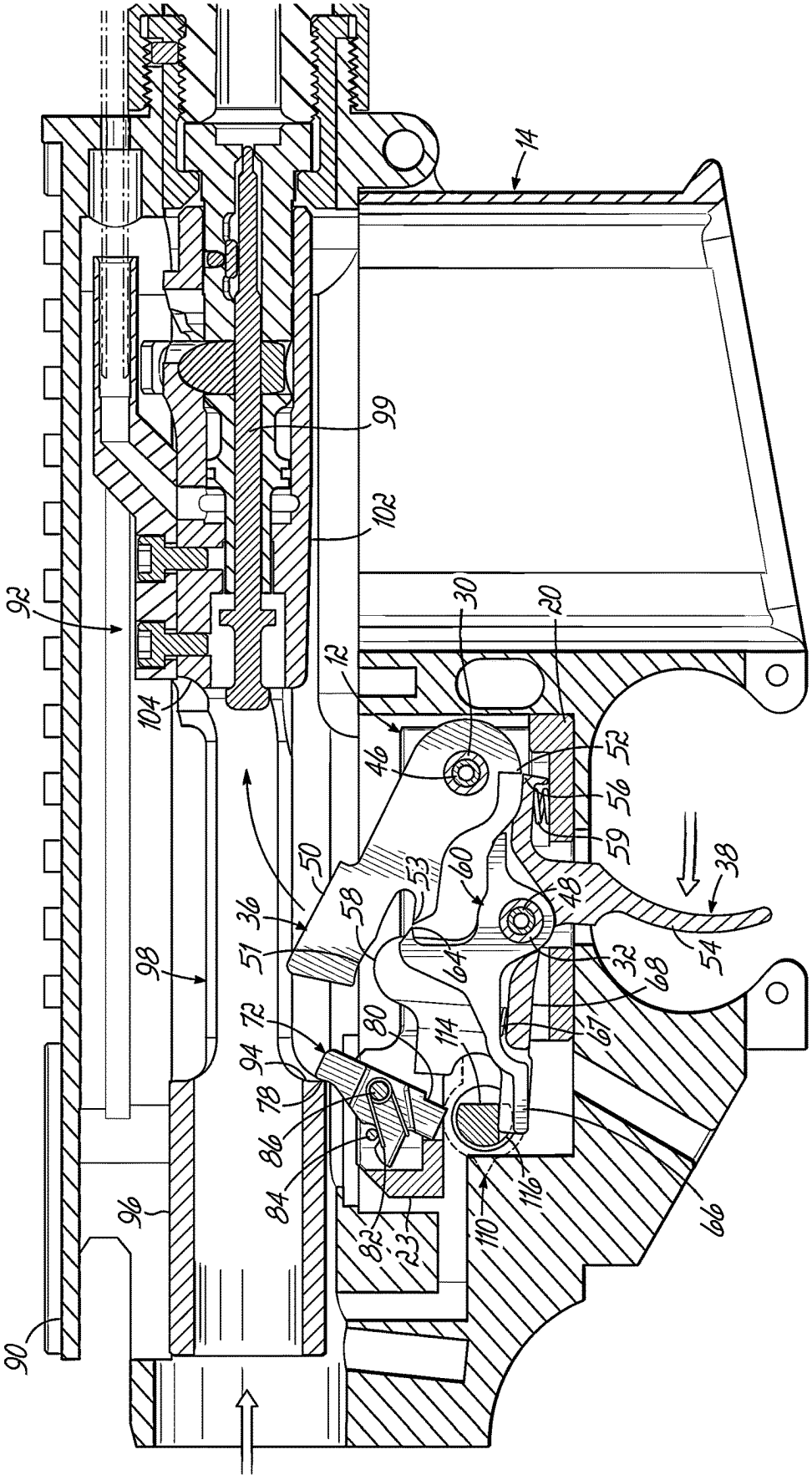
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FIG. 9D

FIREARM TRIGGER MECHANISM

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 18/665,926 filed May 16, 2024, which is a continuation of U.S. patent application Ser. No. 18/346,423 filed Jul. 3, 2023, now U.S. Pat. No. 12,036,336 issued Jul. 16, 2024, which is a continuation of U.S. patent application Ser. No. 18/048,572 filed Oct. 21, 2022, now U.S. Pat. No. 11,724,003 issued Aug. 15, 2023, which claims the priority benefit of U.S. Provisional Patent Application No. 63/297,884 filed Jan. 10, 2022, all of which are hereby incorporated by reference herein as if fully set forth in their entirety.

TECHNICAL FIELD

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

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 U.S. Pat. Nos. 10,514,223 and 11,346,627, which are hereby incorporated by reference herein 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 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. Another device for increasing the rate of semiautomatic fire employing a pivoting cam arrangement is shown in U.S. Provisional Patent Application No. 63/374,941 filed Sep. 8, 2022, also invented by Brian A. Blakley, and which is hereby incorporated by reference herein as if fully set forth in its entirety. This pivoting cam arrangement incorporates a three-position safety selector and associated structure to provide safe, standard semi-automatic, and forced reset semi-automatic modes.

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. The present invention is 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 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, the trigger member having a surface positioned to be contacted by the hammer during rearward pivoting of the hammer to cause the trigger member to be forced to the set position, 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 locking member adapted to be mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis, the locking member being pivotable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member

does not mechanically block the trigger member allowing the trigger member to be moved to the released position, the locking member spring biased toward the first position and adapted to be moved against the spring bias to the second position by contact from the bolt carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery 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 such that 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 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 causing the trigger member to be forced to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 having a first pair of transversely aligned openings for receiving a hammer pin and a second pair of transversely aligned openings for receiving a trigger member 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, the trigger member having a surface positioned to be contacted by the hammer during rearward pivoting of the hammer to cause the trigger member to be forced to the set position, 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 locking member mounted in the housing to pivot on a transverse locking member pin, the locking member being pivotable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position, the locking member spring biased toward the first position and adapted to be moved against the spring bias to the second position by contact from the bolt carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery position, and a safety selector adapted to be mounted in a fire control mechanism pocket of a receiver 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 such that 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 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 causing the trigger member to be forced to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 transversely aligned pairs of openings in the housing for receiving the hammer and trigger member pins can be adapted to be aligned with assembly pin openings in the fire control mechanism pocket. The trigger mechanism can further include a spring which biases the trigger member towards the set position. The spring can be a compression spring positioned between a forward end of the trigger member and a floor of the housing.

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 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, the trigger member having a surface positioned to be contacted by the hammer during rearward pivoting of the hammer to cause the trigger member to be forced to the set position, 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 locking member mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis, the locking member being pivotable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position, the locking member spring biased toward the first position and moved against the spring bias to the second position by contact from the bolt carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery 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 such that 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 the set positions so that the user can pull the trigger member to fire the firearm. In the forced reset semi-automatic position, rear-

ward movement of the bolt carrier causes rearward pivoting of the hammer causing the trigger member to be forced to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 firearm can further comprise the receiver having 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 include a spring which biases the trigger member towards the set position. The spring can be a compression spring positioned between a forward end of the trigger member and a floor of the housing.

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, the trigger member having a surface positioned to be contacted by a surface of the hammer during rearward pivoting of the hammer to cause the trigger member to be forced to the set position, 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 locking member adapted to be movably mounted in the fire control mechanism pocket, the locking member being movable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position, the locking member spring biased toward the first position and adapted to be moved against the spring bias to the second position by contact from the bolt carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery 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 such that 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 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 causing the trigger member to be forced to the set position, the safety selector preventing the disconnector hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 positions.

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.

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.

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

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 indicate 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.

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 forward 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 a floor **20**. Shorter, more narrowly spaced apart and substantially vertical and parallel rear sidewalls **21**, **22** extend rearward from forward sidewalls **16**, **18** and are interconnected by a rear end wall **23**. 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**, a hammer hook **53**, and a concave contact surface **51**. 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** has a convex contact surface **58** that interacts with concave surface **51** on hammer **36** in a manner described below. The trigger member **38** also has a contact surface **69**. The trigger member **38** is spring biased by a compression spring **59** positioned between a forward end of the trigger member **38** and the floor **20** of the housing **12** 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 compression spring **67**.

A locking or blocking member **72** is movably mounted to the housing **12**. For example, the locking/blocking member **72** can be pivoted on a locking/blocking member pin or screw **74** that is installed in aligned openings **76** in the sidewalls **21**, **22** of the housing **12**. The locking member **72** has a first contact surface **78** that interacts with an engagement surface **94** in a rear portion **96** of a bolt carrier body **98** of a bolt carrier assembly **92**, in a manner to be described below. The locking member **72** has a second contact surface **80** that interacts with surface **69** of trigger member **38** in a manner to be described below. The locking member **72** is spring biased by a torsion spring **82** acting between a pin **84** in the sidewalls **21**, **22** and a lower portion of the locking member **72** such that surface **78** is biased rearward and surface **80** is biased forward. Alternatively, the locking/blocking member **72** can be slidably mounted to the housing **12** and spring biased forward by a compression spring.

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 locking member **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. Rearward travel of bolt carrier assembly **92** also moves engagement surface **94** rearward and away from surface **78** of locking member **72**. The action of spring **82** causes locking member **72** to pivot in a first direction from a first position wherein surface **80** of locking member **72** does not impede upward movement of surface **69** of trigger member **38** to a second position wherein surface **80** of locking member **72** does impede upward movement of surface **69** of trigger member **38** thus preventing the trigger blade **54** from being pulled by the user. During forward travel of the bolt carrier assembly **92** the engagement surface **94** of the bolt carrier body **98** contacts the surface **78** of the locking member **72** to pivot the locking member **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. 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** frees the locking member **72** to pivot such that surface **80** is moved into a blocking position. Rearward travel of the bolt carrier assembly **92** also 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** surface **51** contacts surface **58** of trigger member **38** forcing trigger member **38** to pivot counter-clockwise. Also during pivoting travel of the hammer **36** the disconnector hook **64** catches the hammer hook **53**. Forward travel of the bolt carrier assembly **92** returning to battery causes the surface **94** to contact the surface **78** of the locking member **72** to pivot the locking member **72** clockwise moving surface **80** out of the blocking position. 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**. 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** frees the locking member **72** to pivot such that surface **80** is moved into a blocking position. Rearward travel of the bolt carrier assembly **92** also 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** surface **51** contacts surface **58** of trigger member **38** forcing trigger member **38** to pivot 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 **78** of the locking member **72** to pivot the locking member **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 the locking member **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 **78** of the locking member **72**, disengaging the contact surface **80** of the locking member **72** from the contact surface **69** of the trigger member **38**, 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 trigger mechanism for a firearm comprising:

a hammer having a hammer sear surface and a hammer hook 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 means;

a trigger member having a trigger member sear surface and adapted to be mounted in the fire control mechanism pocket to move between a set position and a released position, rearward pivoting of the hammer causing the trigger member to be forced to the set position;

wherein the hammer sear surface and trigger member sear surface are in engagement in the set position of the hammer and the set position of the trigger member and are out of engagement in the released position of the hammer and the released position of the trigger member;

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

a locking member adapted to be movably mounted in the fire control mechanism pocket, the locking member being movable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position and adapted to be moved to the second position by forward movement of the bolt; and

a safety selector adapted to be movably mounted in the fire control mechanism pocket to move between at least a safe position, a standard semi-automatic position, and a forced reset-semi-automatic position;

wherein in the standard semi-automatic position, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook, at which time a user must manually release pressure on the trigger member to free the hammer from the disconnector to permit the hammer and the trigger member to pivot to the set positions so that the user can actuate the trigger member to fire the firearm again; and

wherein in the forced reset semi-automatic position, rearward movement of the bolt means causes rearward pivoting of the hammer causing the trigger member to be forced to the set position, and the disconnector hook is prevented from catching the hammer hook, and thereafter when the bolt means reaches a substantially in-battery position or an in-battery position the user can actuate the trigger member to fire the firearm again.

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

3. The trigger mechanism of claim **1**, wherein the safety selector is adapted to be pivotably mounted in the fire control mechanism pocket to pivot on a transverse safety selector pivot axis.

4. The trigger mechanism of claim **1**, wherein the locking member is adapted to be pivotably mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis.

5. The trigger mechanism of claim **1**, wherein the trigger member pivots on a transverse trigger member pivot axis between the set position and the released position.

6. The trigger mechanism of claim **1**, wherein the locking member is spring biased toward the first position and adapted to be moved against the spring bias to the second position by contact from the bolt means during forward movement of the bolt means.

7. A trigger mechanism operable in a standard semi-automatic mode and in a forced reset semi-automatic mode for a firearm having a semi-automatic cycling action, comprising:

a hammer having a hammer sear surface and a hammer hook and adapted to pivot on a transverse hammer pivot axis between a hammer set position and hammer released position, the hammer adapted to be pivoted rearward by rearward movement of a bolt means;

a trigger member having a trigger member sear surface and adapted to move between a trigger member set position and a trigger member released position, cycling of the action causing the trigger member to be forced to the trigger member set position;

wherein the trigger member sear surface and the hammer sear catch are in engagement in the hammer set position-and the trigger member set position-and are out of engagement in the hammer released position-and the trigger member released position;

a disconnector having a disconnector hook for engaging the hammer hook and adapted to pivot on a transverse disconnector pivot axis; and

a locking member adapted to be movable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position when in at least one mode of operation and a second position at which the locking member does not mechanically block the trigger member allowing said trigger member to be moved to the released position and adapted to be moved to the second position by forward movement of the bolt means,

wherein in the standard semi-automatic mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook catches the hammer hook, 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 the trigger member to pivot to the hammer set position and the trigger member set position so that the user can actuate the trigger member to fire the firearm again, and

wherein in the forced reset semi-automatic mode, rearward movement of the bolt means causes rearward pivoting of the hammer causing the trigger member to be forced to the trigger member set position, and the disconnector hook is prevented from holding the hammer hook, and thereafter when the bolt means reaches a substantially in-battery position or an in-battery position the user can actuate the trigger member to fire the firearm again.

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

9. The trigger mechanism of claim **7**, wherein a safety selector is adapted to be pivotably mounted to pivot on a transverse safety selector pivot axis.

10. The trigger mechanism of claim **7**, wherein the locking member is adapted to be pivotably mounted in a fire control mechanism pocket to pivot on a transverse locking member pivot axis.

11. The trigger mechanism of claim **7**, wherein the trigger member pivots on a transverse trigger member pivot axis between the trigger member set position and the trigger member released position.

12. The trigger mechanism of claim 7, wherein the locking member is spring biased toward the first position and adapted to be moved against the spring bias to the second position by contact from the bolt means during forward movement of the bolt means.

13. The trigger mechanism of claim 7, further comprising a safety selector that is a separate part from the locking member.

14. A trigger mechanism for a firearm operable in at least a standard semi-automatic mode and a forced reset semi-automatic mode, comprising:

a hammer having a hammer sear catch and a hammer hook and adapted to pivot on a transverse hammer pivot axis between a set position and a released position, the hammer adapted to be pivoted rearward by rearward movement of a bolt means;

a trigger member having a trigger member sear and adapted to move between a set position and a released position, the trigger member being forced to the set position as a result of cycling action of the bolt means, such that the trigger member sear and the hammer sear catch are in engagement in the set position of the hammer and the set position of the trigger member and are out of engagement in the released position of the hammer and the released position of the trigger member;

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

a disconnector having a disconnector hook for engaging the hammer hook and adapted to pivot on a transverse disconnector pivot axis; and

a locking member adapted to be movably mounted, the locking member being movable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the released position and adapted to be moved to the second position by forward movement of the bolt means,

wherein in the standard semi-automatic mode, rearward movement of the bolt means causes rearward pivoting of the hammer such that the disconnector hook holds the hammer hook, 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 the trigger member to pivot to the set positions so that the user can pull the trigger member to fire the firearm again; and

wherein in the forced reset semi-automatic mode, rearward movement of the bolt means causes the trigger member to be forced to the set position, and the disconnector hook is prevented from holding the hammer hook, and thereafter when the bolt means reaches a substantially in-battery position or an in-battery position the user can actuate the trigger member to fire the firearm again.

15. The trigger mechanism of claim 14, further comprising a safety selector, movement of which selects between at least standard semi-automatic mode and forced reset semi-automatic mode.

16. A trigger mechanism for a firearm comprising:

a hammer having a hammer sear catch and a hammer hook and adapted to pivot on a transverse hammer pivot axis between a hammer set position and a hammer released position, the hammer adapted to be pivoted rearward by rearward movement of a bolt means;

a trigger member having a trigger member sear and adapted to move between a trigger member set position and a trigger member released position, the trigger member being forced to the trigger member set position as a result of cycling action of the bolt means;

wherein the trigger member sear and the hammer sear catch are in engagement in the hammer set position-and trigger member set position-and are out of engagement in the hammer released position-and the trigger member released position;

a disconnector having a disconnector hook for engaging the hammer hook and adapted to pivot on a transverse disconnector pivot axis;

a locking member adapted to be movably mounted, the locking member being movable between a first position at which the locking member mechanically blocks the trigger member from moving to the trigger member released position and a second position at which the locking member does not mechanically block the trigger member allowing the trigger member to be moved to the trigger member released position and adapted to be moved to the second position by forward movement of the bolt means; and

a safety selector adapted to be movably mounted to move between at least standard semi-automatic position and forced reset semi-automatic position, wherein in the standard semi-automatic position, rearward movement of the bolt means causes rearward pivoting of the hammer such that thereafter the disconnector hook holds the hammer hook, after which a user must reduce rearward pressure on the trigger member before the trigger member can be actuated to fire the firearm again, and

wherein in the forced reset semi-automatic position, rearward movement of the bolt means causes the trigger member to be forced to the set position, the disconnector hook is prevented from holding the hammer hook, and thereafter, when the bolt means reaches a substantially in-battery position or an in-battery position, the trigger member can be actuated to fire the firearm again.

17. A trigger mechanism for a semi-automatic firearm, comprising:

a hammer comprising a hammer hook;

a disconnector comprising a disconnector hook for holding the hammer hook;

a trigger member, wherein the trigger member can be is forced into a trigger set position responsive to rearward motion of a cyclic semi-automatic action of the semi-automatic firearm; and

a locking member configured to move between a block position and a non-block position, wherein the block position mechanically blocks the trigger member from moving from the trigger set position to a trigger released position, wherein the non-block position permits the trigger member to be moved from the trigger set position to the trigger released position, wherein the locking member is moved into the block position during rearward motion of the cyclic semi-automatic

action and moved into the non-block position during forward motion of the cyclic semi-automatic action, and wherein:

in a standard semi-automatic mode, after cycling of the action and while the trigger member is in the trigger released position, the trigger mechanism is configured such that the disconnector hook holds the hammer hook, at which point, rearward pressure on the trigger member must be reduced before the trigger member can be actuated, and

in a forced reset semi-automatic mode, the disconnector hook is prevented from holding the hammer hook, and the trigger member can be actuated when the cyclic semi-automatic action reaches a substantially in-battery position or an in-battery position.

18. The trigger mechanism of claim **17**, wherein the cyclic semi-automatic action comprises a bolt.

19. The trigger mechanism of claim **17**, wherein the hammer is configured to pivot on an axis substantially perpendicular to an axis of the cyclic semi-automatic action.

20. The trigger mechanism of claim **17**, wherein the hammer is configured to pivot between a hammer set position and a hammer released position.

21. The trigger mechanism of claim **17**, wherein the disconnector is configured to pivot on an axis substantially perpendicular to an axis of the cyclic semi-automatic action.

22. The trigger mechanism of claim **17**, wherein the trigger member is configured to pivot on an axis substantially perpendicular to an axis of the cyclic semi-automatic action.

23. The trigger mechanism of claim **17**, wherein the trigger member is configured to pivot between the trigger set position and a trigger released position.

24. The trigger mechanism of claim **17**, wherein the hammer is configured to pivot rearwardly responsive to rearward motion of the cyclic semi-automatic action.

25. The trigger mechanism of claim **17**, wherein the hammer comprises a hammer sear surface and the trigger member comprises a trigger sear surface, and wherein the hammer sear surface and the trigger sear surface are in engagement when, simultaneously, the hammer is in a hammer set position and the trigger member is in the trigger set position.

26. The trigger mechanism of claim **17**, wherein the locking member is configured to pivot on an axis substantially transverse to a reciprocation axis of the cyclic semi-automatic action.

27. The trigger mechanism of claim **17**, further comprising a spring which biases the trigger member toward the trigger set position.

28. The trigger mechanism of claim **17**, comprising a safety selector, wherein the safety selector is configured to be pivotably mounted to pivot on a transverse axis of the semi-automatic firearm and substantially perpendicular to an axis of the cyclic semi-automatic action.

29. The trigger mechanism of claim **17**, comprising a safety selector, wherein the safety selector is selectable between at least the standard semi-automatic mode and the forced reset semi-automatic mode.

30. The trigger mechanism of claim **17**, comprising a safety selector that is separate from the locking member.

31. The trigger mechanism of claim **17**, wherein the locking member is biased by a spring toward the block position.

32. A trigger mechanism for a semi-automatic firearm operable in at least a standard semi-automatic mode and a forced reset semi-automatic mode, comprising:

a disconnector;

a trigger member, wherein the trigger member is forced into a trigger set position responsive to rearward motion of a cyclic semi-automatic action of the semi-automatic firearm; and

a locking member configured to move between a block position and a non-block position, wherein the block position mechanically blocks the trigger member from moving from the trigger set position to a trigger released position, wherein the non-block position permits the trigger member to be moved from the trigger set position to the trigger released position, wherein the locking member is moved into the block position during rearward motion of the cyclic semi-automatic action and moved into the non-block position during forward motion of the cyclic semi-automatic action;

a safety selector, wherein the safety selector is selectable between at least the standard semi-automatic mode and the forced reset semi-automatic mode; and wherein:

in the standard semi-automatic mode, rearward pressure on the trigger member must be reduced to disengage a hammer from the disconnector before the trigger member can again be actuated; and

in the forced reset semi-automatic mode, the trigger member is forced to the trigger set position and can be actuated without reducing pressure on the trigger member to fire another round when the cyclic semi-automatic action reaches a substantially in-battery position or an in-battery position.

33. The trigger mechanism of claim **1**, wherein the bolt means comprises a bolt carrier assembly.

34. The trigger mechanism of claim **7**, wherein the bolt means comprises a bolt carrier assembly.

35. The trigger mechanism of claim **14**, wherein the bolt means comprises a bolt carrier assembly.

36. The trigger mechanism of claim **16**, wherein the bolt means comprises a bolt carrier assembly.

37. A trigger mechanism operable in a standard semi-automatic mode and in a forced reset semi-automatic mode for a firearm having a semi-automatic cycling action, comprising:

a hammer having a hammer sear surface and a hammer hook and adapted to pivot on a transverse hammer pivot axis between a set position and released position, the hammer adapted to be pivoted rearward by a rearward phase of the semi-automatic cycling action;

a trigger member having a trigger member sear surface and adapted to move between a set position and a released position;

wherein the trigger member sear surface and the hammer sear surface are in engagement when the hammer and trigger member are each in their respective set position and are out of engagement when either the hammer or trigger member is not in their respective set position;

a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis; and

a locking member adapted to be movable between a first position at which the locking member mechanically blocks the trigger member from moving to the released position when in at least one mode of operation and a second position at which the locking member does not mechanically block the trigger member allowing said trigger member to be moved to the released position and adapted to be moved to the second position by a forward phase of the semi-automatic cycling action;

wherein in the standard semi-automatic mode, the rearward phase of the semi-automatic cycling action causes

a rearward pivot of the hammer to a position where the hammer hook is past the disconnector hook, the hammer sear surface is not in engagement with the trigger member sear surface, and, thereafter, rearward pressure on the trigger member must be reduced to permit the hammer and the trigger member to pivot to their respective set positions where the hammer sear surface engages with the trigger member sear surface, so the trigger member can be actuated to fire the firearm again; and

wherein in the forced reset semi-automatic mode the disconnector hook is prevented from catching the hammer hook and the rearward phase of the semi-automatic cycling action causes (1) rearward pivoting of the hammer to a position where the hammer hook is past the disconnector hook, (2) the trigger member to be forced to its respective set position, and (3) the hammer sear surface to be not in engagement with the trigger member sear surface, and thereafter, the hammer forwardly pivots to its respective set position with the hammer hook passing the disconnector hook, the hammer sear surface engages with the trigger member sear surface, and when the forward phase of the semi-automatic cycling action reaches an in-battery position, rearward pressure on the trigger member the trigger member does not need to be released to actuate the trigger member to fire the firearm again.

38. A forced reset trigger mechanism, comprising:

a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;

a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis;

a trigger member; and

a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position,

wherein when the safety selector is in the standard semi-automatic position and the trigger member is rearwardly actuated, and after the hammer pivots rearward to a position where the hammer hook is past the disconnector hook, rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm.

39. A forced reset trigger mechanism, comprising:

a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;

a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis;

a trigger member; and

a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position,

wherein, when in either position, when the trigger member is pulled rearward, cycling of a firearm action rearwardly pivots the hammer to a position where the hammer hook is past the disconnector hook,

wherein if the safety selector is in the standard semi-automatic position, rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm, and

wherein, if the safety selector is in the forced reset semi-automatic position, the trigger member is forced to move to a full reset position against rearward pressure on the trigger member and the rearward pressure on the trigger member does not need to be reduced to actuate the trigger to fire the firearm.

40. A forced reset trigger mechanism, comprising:

a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;

a disconnector having a disconnector hook and adapted to pivot on a transverse disconnector pivot axis;

a trigger member; and

a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position, wherein, when in either position, when the trigger member is pulled rearward, cycling of a firearm action rearwardly pivots the hammer to a position where the hammer hook is past the disconnector hook,

wherein, if the safety selector is in the standard semi-automatic position, rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm, and

wherein, when the safety selector is in the forced reset semi-automatic position, the hammer contacts the trigger member and forces the trigger member to move to a full reset position against rearward pressure on the trigger member and the rearward pressure on the trigger member does not need to be reduced to actuate the trigger to fire the firearm.

41. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot about a transverse pivot axis and having a thickness defined between opposing lateral side surfaces; and

a disconnector positioned laterally adjacent to the trigger member.

42. The trigger mechanism of claim **41**, wherein a combined lateral width of the trigger member and the disconnector is sized to fit within a fire control mechanism pocket.

43. The trigger mechanism of claim **41**, wherein the trigger member includes a relieved portion extending inward from one of the opposing lateral side surfaces, the relieved portion being configured to receive at least a portion of the disconnector.

44. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot about a transverse pivot axis and having opposing lateral side surfaces; and

a disconnector disposed laterally adjacent to the trigger member,

wherein the trigger member includes a reduced-thickness region defined at one of the opposing lateral side surfaces, and the disconnector is received at least partially within the reduced-thickness region such that the trigger member and the disconnector collectively define an overall lateral width.

45. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot about a transverse pivot axis; and

a disconnector positioned laterally adjacent to the trigger member,

wherein the trigger member defines a lateral accommodation space, and the disconnector occupies at least a portion of the lateral accommodation space such that the trigger member and the disconnector overlap laterally.

46. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot on a transverse trigger pivot axis, a forward of the trigger member comprising a downward oriented stop surface configured to abut an arresting surface that stops travel of the trigger when the trigger is pulled.

47. The forced reset trigger mechanism of claim 46, wherein the arresting surface is an interior surface of a trigger cassette housing.

48. A forced reset trigger mechanism, comprising:

a hammer having a hammer hook;

a disconnector having a disconnector hook;

a trigger member; and

a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position, wherein when the safety selector is moved from the standard semi-automatic position and into the forced reset semi-automatic position, the disconnector is moved into a position where, after the hammer hook passes the disconnector hook during firearm cycling, a reduction in rearward pressure on the trigger member is not required to fire a next shot.

49. A forced reset trigger mechanism, comprising:

a hammer having a hammer hook;

a disconnector having a disconnector hook;

a trigger member; and

a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position, wherein when the safety selector is moved from the standard semi-automatic position and into the forced reset semi-automatic position, a portion of the safety selector moves the disconnector into a position so as to prevent the disconnector hook from catching the hammer hook where, after the hammer hook passes the disconnector hook during firearm cycling, a reduction in rearward pressure on the trigger member is not required to fire a next shot.

50. A trigger mechanism operable in a standard semi-automatic mode and in a forced reset semi-automatic mode for a firearm having a semi-automatic cycling action, comprising:

a hammer, having a hammer sear surface and a hammer hook, adapted to pivot on a hammer pivot axis between a hammer set position and a hammer released position, the hammer adapted to pivot rearward by a rearward phase of the semi-automatic cycling action;

a trigger member, having a trigger member sear surface, adapted to move between a trigger set position and a trigger released position;

wherein the trigger member sear surface and the hammer sear surface are in engagement when the hammer and trigger member are both in their respective set position and are out of engagement when either the hammer or trigger member is not in its respective set position;

a disconnector, having a disconnector hook for engaging the hammer hook, adapted to pivot on a disconnector pivot axis; and

a locking member adapted to be movable between a first position, where the locking member mechanically blocks the trigger member from moving from the trigger set position to the trigger released position, and a second position, where the locking member does not mechanically block the trigger member;

wherein said locking member is adapted to be moved from said first position to said second position by a forward phase of the semi-automatic cycling action;

whereas, in the standard semi-automatic mode, the trigger mechanism is configured such that rearward pressure on the trigger member causes the trigger member to move from the trigger set position toward the trigger released position, this movement causes the hammer to move from the hammer set position to the hammer release position, thereafter the hammer is positioned to pivot rearward;

whereas, the semi-automatic cycling action rearwardly pivots the hammer to a position where the hammer hook is below the disconnector hook;

following rearward pivot of the hammer from the hammer release position and while there is rearward pressure on the trigger member, the hammer hook is configured to engage the disconnector hook, and thereafter the rearward pressure on the trigger member must be reduced to allow the hammer hook to pivot forward above the disconnector hook and for the trigger member sear surface to engage with the hammer sear surface;

whereas, in the forced reset semi-automatic mode, the trigger mechanism is configured such that the disconnector hook is rearwardly displaced such that it cannot engage the hammer hook and rearward movement of the hammer causes the trigger member to move from the trigger released position to the trigger set position despite rearward pressure on the trigger member; and

whereas thereafter, the hammer returns to the hammer set position such that the hammer sear surface and the trigger member sear surface are engaged.

51. In a forced reset trigger mechanism, an assembly, comprising:

a trigger housing configured to be mounted in a fire control mechanism pocket of a firearm, the housing supporting a locking member, the locking member configured to be movable between a first position and a second position, wherein in the second position the locking member blocks the trigger from being actuate, and

a safety selector capable of at least standard semi-automatic mode and forced reset semi-automatic mode.

52. A forced reset trigger assembly for installation within a fire control pocket of a firearm, comprising:

a trigger housing configured to be receivable within the fire control pocket;

a trigger member pivotally supported by the trigger housing;

a locking member movably supported by the trigger housing and movable relative to the trigger member, the locking member movable between:

(a) a blocking position in which movement of the trigger member is prevented; and

(b) a non-blocking position in which the trigger member is permitted to move; and

a selector having at least two discrete operating positions including:

(i) a standard semi-automatic position; and

(ii) a forced-reset position in which the trigger assembly operates in a forced reset firing mode.

53. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot about a transverse axis;

a hammer;

a disconnector operatively associated with the trigger member and the hammer; and

a locking member operatively associated with the trigger member,

wherein cycling of the action causes the trigger member to be forced to the set position in at least one operating mode; and

wherein the trigger mechanism is configured such that, when combined with a selector having an alternate selectable position, the trigger mechanism is enabled

for a forced reset operating mode corresponding to the alternate selectable position.

54. A forced reset trigger mechanism, comprising:

a trigger member configured to pivot about a transverse axis;

a hammer;

a disconnector operatively associated with the trigger member and the hammer;

a locking member operatively associated with the trigger member;

wherein cycling of the action causes the trigger member to be forcibly returned to a set position in at least one operating mode; and

wherein the trigger mechanism includes a selector interface structured to cooperate with a selector having at least two discrete selectable positions including:

(i) a standard semi-automatic position; and

(ii) a forced-reset position,

such that rotation of the selector to the forced reset position enables said forced reset operating mode.

55. A forced reset trigger mechanism, comprising:

a trigger member pivotable about a transverse axis;

a hammer;

a disconnector operatively associated with the trigger member and the hammer;

a locking member operatively associated with the trigger member;

wherein cycling of the firearm action causes the trigger member to be returned to a set position; and

wherein the trigger mechanism includes a selector interface structured to cooperate with a selector rotatable between at least two discrete positions including:

(i) a semi-automatic position in which the trigger resets without forced forward drive; and

(ii) a forced-reset position in which cycling of the action positively drives the trigger member forward to the set position.

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