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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, and RARE BREED TRIGGERS,  
INC., a Texas corporation,

Plaintiffs,

v.

Inoculum-Group LLC, an Idaho limited  
liability company, and Ryan K.  
Jacobson, an individual,

Defendants.

Case No.:

**COMPLAINT FOR PATENT  
INFRINGEMENT**

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This is an action for patent infringement in which Rare Breed Triggers, Inc. (“Rare Breed”) and ABC IP LLC (“ABC”) (collectively, “Plaintiffs”) accuse Inoculum-Group LLC, (“Inoculum”) and Ryan Jacobson (“Jacobson”) (collectively, “Defendants”), of infringing U.S. Patent Nos.

10,514,223 (“the ’223 Patent”), 11,724,003 (“the ’003 Patent”), 12,036,336 (“the ’336 Patent”), 12,274,807 (“the ’807 Patent”), and 12,636,403 (“the ’403 Patent”) as follows:

### **PARTIES**

1. Rare Breed is a corporation organized under the laws of the State of Texas with an address at 2710 Central Fwy, Suite 150-151, Wichita Falls, TX 76306.

2. 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, DE 19901.

3. Upon information and belief, Inoculum, is a limited liability company existing under the laws of the state of Idaho and has a place of business at 2755 W. Gainsboro Dr., Kuna, ID 83634.

4. Upon information and belief, Ryan K. Jacobson is an individual residing in Kuna, Idaho.

### **JURISDICTION AND VENUE**

5. This is an action for patent infringement arising under 35 U.S.C. §§ 271(a), 281, and 284-85.

6. 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.

7. Personal jurisdiction and venue over Defendants are proper in this District because all Defendants reside in and/or have a place of business in this district.

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

### **BACKGROUND**

9. This lawsuit asserts direct, contributory, and induced infringement of U.S. Patent Nos. 10,514,223 (“the ’223 Patent”), 11,724,003 (“the ’003 Patent”), 12,036,336 (“the ’336 Patent”), 12,274,807 (“the ’807 Patent”), and 12,636,403 (“the ’403 Patent”) (together, “the Asserted Patents”).

10. The ’223 Patent was lawfully and properly issued by the United States Patent and Trademark Office on December 24, 2019. Each and every claim of the ’223 Patent is valid and enforceable. A true and correct copy of the ’223 Patent is attached as Exhibit A.

11. The ’003 Patent was lawfully and properly issued by the United States Patent and Trademark Office on August 15, 2023. Each and every claim of the ’003 Patent is valid and enforceable. A true and correct copy of the ’003 Patent is attached as Exhibit B.

12. The ’336 Patent was lawfully and properly issued by the United States Patent and Trademark Office on July 16, 2024. Each and every claim of the ’336 Patent is valid and enforceable. A true and correct copy of the ’336 Patent is attached as Exhibit C.

13. The ’807 Patent was lawfully and properly issued by the United States Patent and Trademark Office on April 15, 2025. Each and every claim of the ’807 Patent is valid and enforceable. A true and correct copy of the ’807 Patent is attached as Exhibit D.

14. 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 I.

15. 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”).

16. Rare Breed is the exclusive licensee of the Asserted Patents.

17. 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.

18. 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 Invention**

19. A typical AR15-pattern firearm, for example, is considered a semiautomatic firearm. The operation of a *standard disconnect* 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 disconnect 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 disconnect, 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 disconnect releases the hammer to engage the trigger sear.



20. In the standard AR-pattern trigger assembly, the purpose of the disconnecter 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 disconnecter 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 disconnecter 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.

21. In contrast, in a forced reset trigger mechanism, cycling of the bolt carrier or bolt causes the trigger member to be forced 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 disconnecter.

22. 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 force the trigger member to reset and prevent the trigger member from being pulled again until the action has returned to the in-battery position.

23. The '223 Patent describes and claims a device in which the cycling of the action causes hammer contact with the trigger member to forcefully reset the hammer and trigger member. A locking bar prevents the trigger member from being pulled again by the user until the bolt carrier has returned to the in-battery position.

24. The '003 Patent, the '336 Patent, the '807 Patent, and the '403 Patent describe and claim a similarly operating device with the additional feature that it can be selected to operate in either of two distinct modes: 1) standard disconnecter semiautomatic mode and 2) forced reset semiautomatic mode.

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

### **The Infringement**

26. On information and belief, Defendants are currently making, using, selling, offering for sale, and/or importing a forced reset trigger assembly, which includes a three-position safety selector, known as the “Disruptor” (“the Infringing Device”), which embodies the technology claimed in the Asserted Patents. Peak Tactical, LLC, d/b/a Partisan Triggers, recently changed its business name to “The Triggered Company,” continuing to make and sell the Disruptor trigger. As used herein, “Disruptor” refers to the trigger made or sold under either the Partisan Triggers or The Triggered Company brand.

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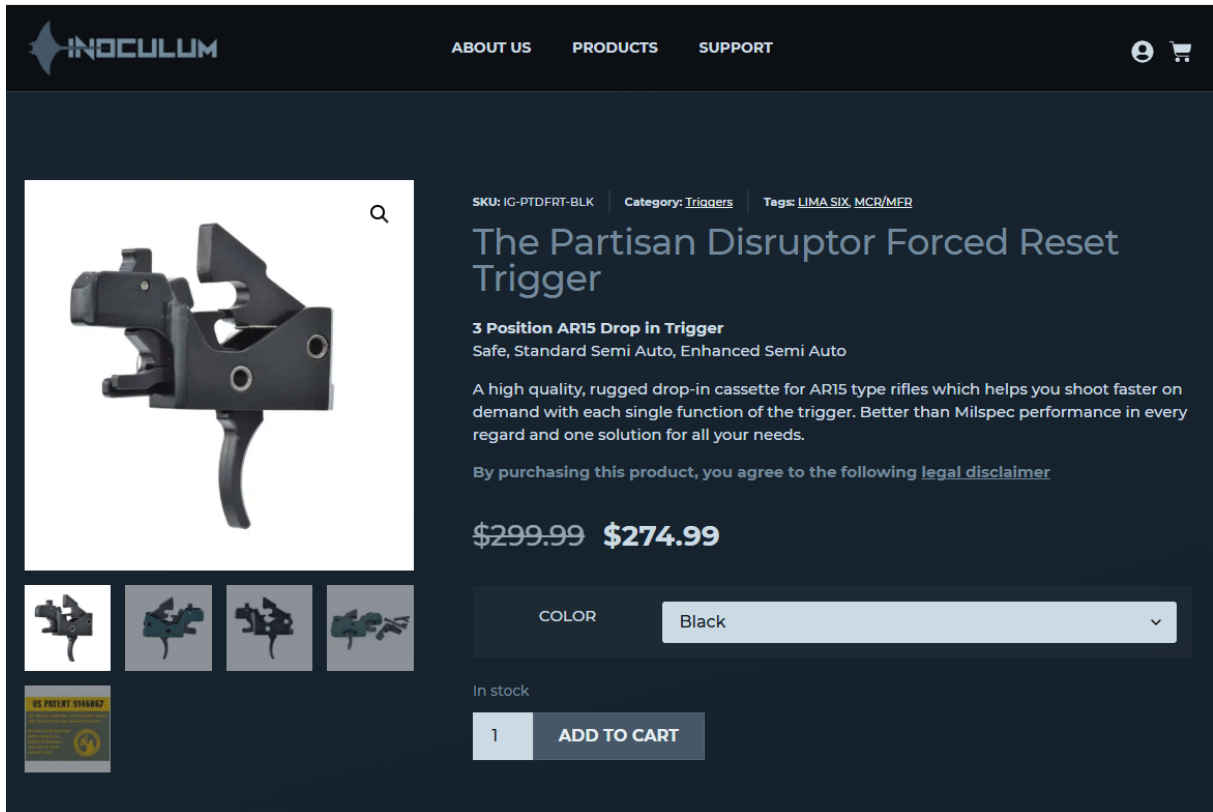
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27. On information and belief, Defendants used, sold and/or offered for sale the Infringing Device via the website <https://inoculum-group.com/product/the-partisan-disruptor-forced-reset-trigger/> (“Inoculum website”). Exemplary photographs of the Infringing Device are shown below:



DETAILS
REVIEWS (0)
FAQS

## DESCRIPTION

The Partisan Disruptor (US Patent 9146067) is an assisted reset trigger descended from the original TacCon 3MR trigger, designed for fast and hassle-free installation on the AR-15 platform. It requires no modification, gunsmithing, or fitting. Built for shooters who value precision and control, it features a three-position safety selector with Safe, SemiAutomatic, and Enhanced Semi-Automatic modes. This versatile trigger delivers a responsive and confident shooting experience while maintaining reliability and safety for users.

**Key Features & Specs**

- 17-4 Stainless steel and 4140 chromoly used on all wear surfaces for superior strength, durability, and long service life.
- Trigger Pull Weight: 3.75 – 4.1lbs
- Compatible with most lowers; anti-walk pins recommended.
- Requires a minimum H2 (recommend H3) carbine buffer weight for firearms with carbine extensions and 16" or shorter barrels, or a standard rifle buffer for 20" A2 stocks.
- Tested beyond 6,000 rounds under a course of fire derived from the USMC M27 IAR evaluation criteria.
- Legal in all 30+ Free American States (sales prohibited to CA, CT, CO (Boulder County and Broomfield), DE, FL, HI, IL, MA, MD, MN, NJ, NV, NY, OR, RI, WA, Washington DC, Puerto Rico).
  - Orders from prohibited states will be cancelled.



28. The Infringing Device also can operate in a “disconnecter mode,” which is much like that of a standard AR-15 trigger. The user can switch between safe, standard semiautomatic with disconnecter, and forced reset or semiautomatic modes by moving the safety selector between positions. The Inoculum website refers to these three modes as “Safe, Semi-Automatic, and Enhanced Semi-Automatic modes,” respectively.

29. When the Infringing Device operates in the forced reset mode, the cycling of the action causes hammer contact with the trigger member to forcefully reset the hammer and trigger member. A locking bar/member prevents the trigger member from being pulled again by the user until the bolt carrier has returned to the in-battery position according to the invention described

and claimed in the '223 Patent. The presence of another mode of operation in the Infringing Device does not affect the infringement analysis as to the '223 Patent claims.

30. As claimed in the '003 Patent, the '336 Patent, the '807 Patent, and the '403 Patent, the Infringing Device has the additional feature that it can be selected to operate in either of two distinct modes: 1) standard disconnecter semiautomatic mode and 2) forced reset semiautomatic mode.

31. When in the standard semi-automatic mode, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches the hammer hook, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnecter 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 again.

32. When in the forced reset semi-automatic mode, 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 disconnecter 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.

33. The website of Peak Tactical, LLC, the manufacturer of the Infringing Device, includes a page titled "FRT Legal Library" at <https://partisantriggers.com/library/> (now <https://triggeredcompany.com/library/>). This web page links to copies of several documents, including the '223 Patent, the '003 Patent, and the '336 Patent, showing that Partisan Triggers (now The Triggered Company) and its principals were and continue to be aware of Plaintiffs' patent rights and that they are relevant to the product it is making, using, selling, offering for sale,

and/or importing. This provides notice of Plaintiffs' patent rights to reseller customers of the Disruptor, including the Defendants.

34. Upon information and belief, Jacobson is a principal or the sole principal of Inoculum and had knowledge of Plaintiffs' patent rights at least by his access to and knowledge of the FRT Legal Library on Partisan Triggers' (now The Triggered Company's) website.

35. Upon information and belief, Jacobson directed Inoculum to infringe the Plaintiffs' patent rights.

36. In view of the Defendants' knowledge of the Plaintiffs' patent rights as evidenced by the FRT Legal Library on Partisan Triggers' (now The Triggered Company's) website, the infringement is willful.

37. For the reasons explained in more specificity below, the Infringing Devices each infringe at least one claim of Asserted Patents and thus, Defendants are liable for patent infringement pursuant to 35 U.S.C. § 271(a), (b) and/or (c).

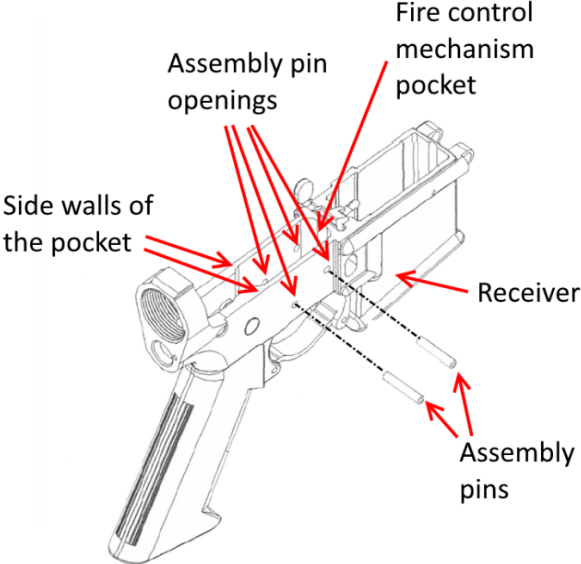
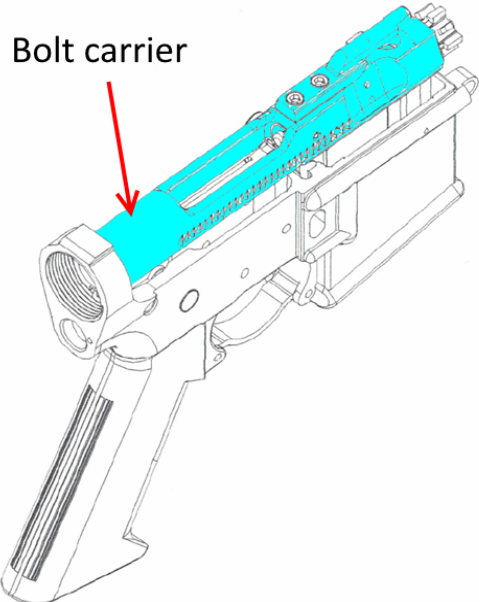
**COUNT I – DIRECT INFRINGEMENT OF THE '223 PATENT**

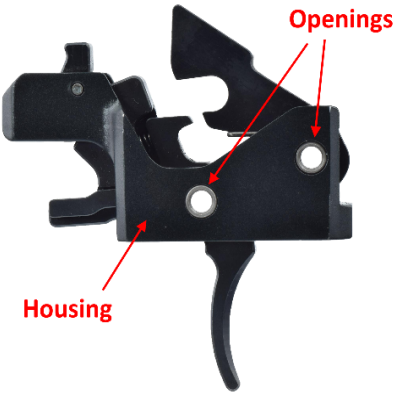
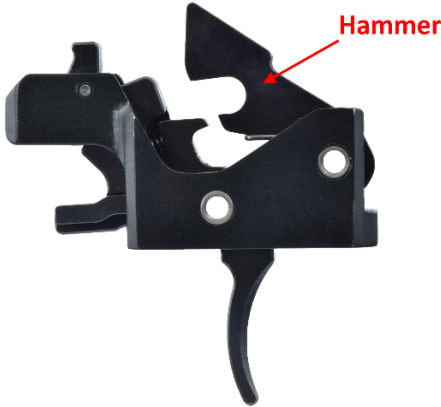
38. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

39. Upon information and belief, Defendants have and continue to willfully directly infringe at least Claim 4 of the '223 Patent by making, using, selling, offering for sale, and/or importing without authority within the United States, the Infringing Device.

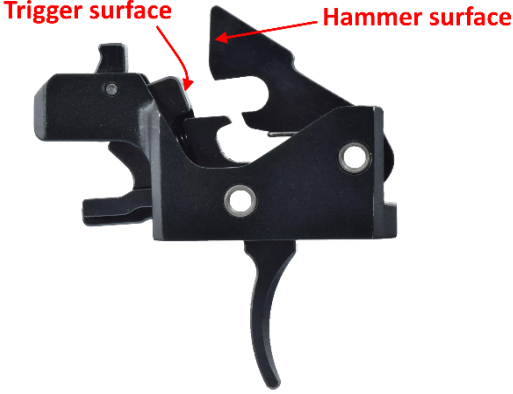
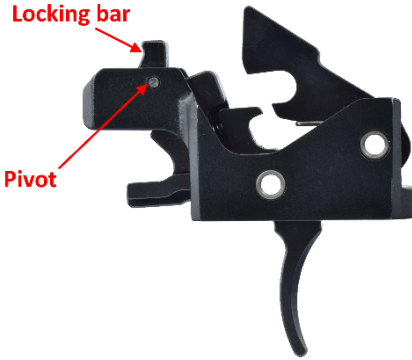
40. Because the claims use the term "comprising," the scope of the claims is not limited to the recited claim elements and the inclusion of additional structures or features not recited in a claim does not avoid infringement.

41. An exemplary comparison of the Infringing Device with claim 4 of the '223 Patent is illustrated in the chart below:

| Claim Language                                                                                                                                                                                                                                  | Infringing Device (Disruptor)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. For a firearm having a receiver with a fire control mechanism pocket, assembly pin openings in side walls of the pocket, and a bolt carrier that reciprocates and pivotally displaces a hammer when cycled, a trigger mechanism, comprising: | <p>The Infringing Device is for an AR-pattern firearm, which has a lower receiver with a fire control pocket and assembly pin openings in side walls of the pocket.</p>  <p>Assembly pin openings</p> <p>Fire control mechanism pocket</p> <p>Side walls of the pocket</p> <p>Receiver</p> <p>Assembly pins</p> <p>An AR-pattern firearm has a bolt carrier that reciprocates and pivotally displaces a hammer when cycled.</p>  <p>Bolt carrier</p> |

|                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a housing having transversely aligned pairs of openings for receiving hammer and trigger assembly pins;</p>                                                                                                                                                                                                                                         | <p>The Infringing Device includes a housing with transversely aligned pairs of openings for receiving hammer and trigger assembly pins.</p>                        |
| <p>a hammer having a sear notch and mounted in the housing to pivot on a transverse axis between set and released positions;</p>                                                                                                                                                                                                                       | <p>The Infringing Device includes a hammer with a sear notch and is mounted in the housing to pivot on a transverse axis between set and released positions.</p>  |
| <p>a trigger member having a sear and mounted in the housing to pivot on a transverse axis between set and released positions, the trigger member having a surface positioned to be contacted by the hammer when the hammer is displaced by the bolt carrier when cycled, the contact causing the trigger member to be forced to the set position;</p> | <p>The Infringing Device includes a trigger member with a sear and that is mounted in the housing to pivot on a transverse axis between set and released positions.</p>                                                                              |



|                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                        |  <p>The trigger member has a surface positioned to be contacted by the hammer when the hammer is displaced by the bolt carrier when cycled.</p> <p>The contact causes the trigger member to be forced to the set position.</p>                                                                                                                                                                                                                                                                                                                                     |
| <p>a locking bar pivotally mounted in the housing and spring biased toward a first position in which the locking bar mechanically blocks the trigger member from moving to the released position, and movable against the spring bias to a second position when contacted by the bolt carrier reaching a substantially in-battery position in which the trigger member can be moved by an external force to the released position.</p> | <p>The Infringing Device includes a locking bar that is pivotally mounted in the housing.</p>  <p>The locking bar is spring biased toward a first position in which the locking bar mechanically blocks the trigger member from moving to the released position.</p> <p>The locking bar is movable against the spring bias to a second position when contacted by the bolt carrier reaches a substantially in-battery position. In this position, the trigger member can be moved by an external force (pull by the trigger finger) to the released position.</p> |

42. Accordingly, Defendants' sale and/or offer to sell the Infringing Device is direct infringement under 35 U.S.C. § 271(a).

43. Accordingly, the Defendants' making, using, selling, offering for sale, and/or importing of the Infringing Device is a direct infringement of the '223 Patent.

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

45. 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 – DIRECT INFRINGEMENT OF THE '003 PATENT**

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

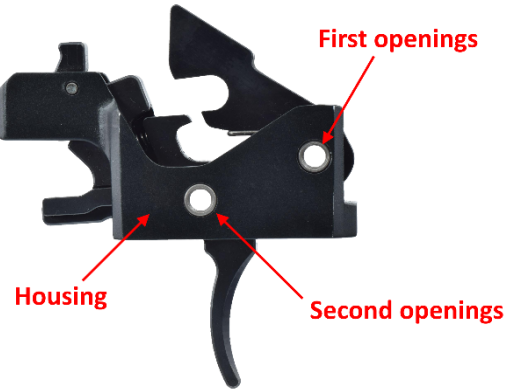
47. Upon information and belief, Defendants have and continue to willfully directly infringe at least Claim 4 of the '003 Patent by making, using, selling, offering for sale, and/or importing without authority within the United States, the Infringing Device.

48. An exemplary comparison of the Infringing Device with claim 4 of the '003 Patent is illustrated in the chart below:

| <b>Claim Language</b>                      | <b>Infringing Device (Disruptor)</b>                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. A firearm trigger mechanism comprising: | The Infringing Device is a firearm trigger mechanism. Inoculum describes the Disruptor as an "assisted reset trigger" for "the AR-15 platform" on the Inoculum website. See <a href="https://inoculum-group.com/product/the-partisan-disruptor-forced-reset-trigger/">https://inoculum-group.com/product/the-partisan-disruptor-forced-reset-trigger/</a> and Paragraph 24, above. |

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,

The Infringing Device includes a housing that has 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.

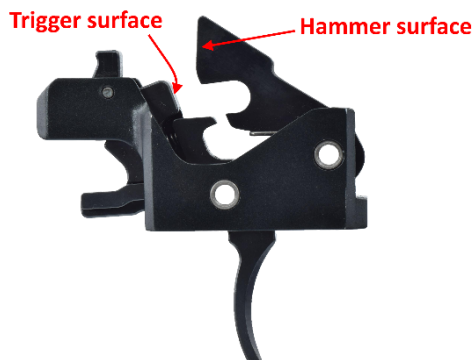


The Infringing Device is sold with hammer and trigger pins.

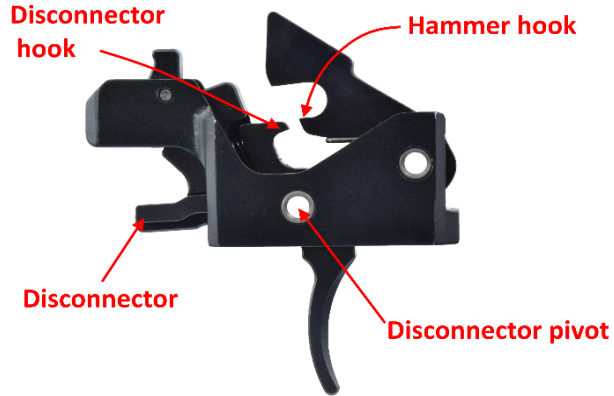


a hammer having a sear catch and a hook for engaging a disconnector and mounted in said housing to pivot on said hammer pin between set and released positions, said hammer adapted to be pivoted rearward by rearward movement of a bolt carrier,

The Infringing Device includes a hammer that has a sear catch and a hook for engaging a disconnector. It is mounted in the housing to pivot on the hammer pin between set and released positions. The hammer is pivoted rearward by rearward movement of a bolt carrier.

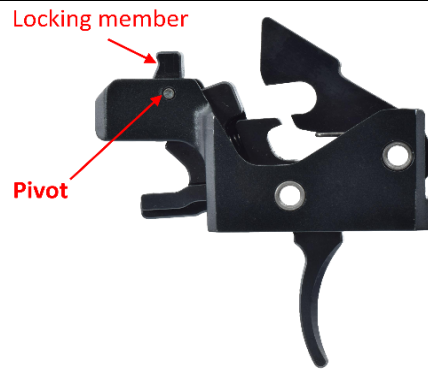
|                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                                                               |  <p>Hammer</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>a trigger member having a sear and mounted in said housing to pivot on said trigger member pin between set and released positions, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,</p> |  <p>Trigger</p> <p>The Infringing Device includes a trigger member that has a sear and is mounted in the housing to pivot on the trigger member pin between set and released positions. The trigger member has a surface positioned to be contacted by a surface of said hammer during rearward pivoting of the hammer to cause the trigger member to be forced to the set position.</p>  <p>Trigger surface</p> <p>Hammer surface</p> |
| <p>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,</p>                                                                                                                                     | <p>The sear and sear catch are in engagement in the hammer and trigger member set positions and are out of engagement in the hammer and trigger member released positions.</p>                                                                                                                                                                                                                                                                                                                                                                                                                               |

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



The Infringing Device includes a disconnecter that has a hook for engaging the hammer and is mounted in the housing to pivot on the trigger member pin.

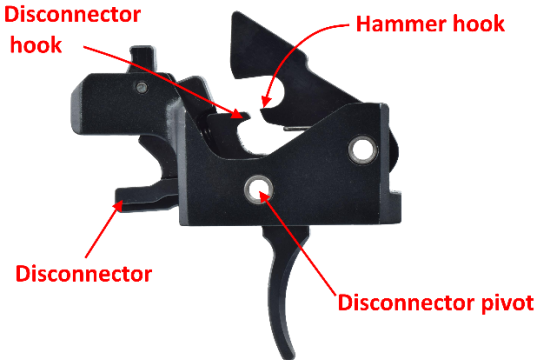
a locking member mounted in said housing to pivot on a transverse locking member pin, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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



The Infringing Device includes a locking member mounted in the housing to pivot on a transverse locking member pin. The locking member is pivotable between a first position at which it mechanically blocks the trigger member from moving to the released position and a second position at which it 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 is 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.

a safety selector adapted to be mounted in a fire control mechanism pocket of a receiver to pivot between safe, standard

The Infringing Device includes a safety selector that is mounted in the fire control mechanism pocket of a receiver to pivot between safe,

|                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>semi-automatic, and forced reset semi-automatic positions,</p>                                                                                                                                                                                                                                                                                                                                                                                            | <p>standard semi-automatic, and forced reset semi-automatic positions.</p>                                                                                                                                                                                                                                                                                                                                                                   |
| <p>whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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</p> | <p>When in the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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.</p>  |
| <p>whereupon in said forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the firearm</p>              | <p>When 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 prevents the disconnecter hook from catching the hammer hook. 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.</p>                                                 |

|                                                 |  |
|-------------------------------------------------|--|
| without manually releasing said trigger member. |  |
|-------------------------------------------------|--|

49. Accordingly, Defendants' sale and/or offer to sell the Infringing Device is direct infringement under 35 U.S.C. § 271(a).

50. Accordingly, the Defendants' making, using, selling, offering for sale, and/or importing of the Infringing Device is a direct infringement of the '003 Patent.

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

52. 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.

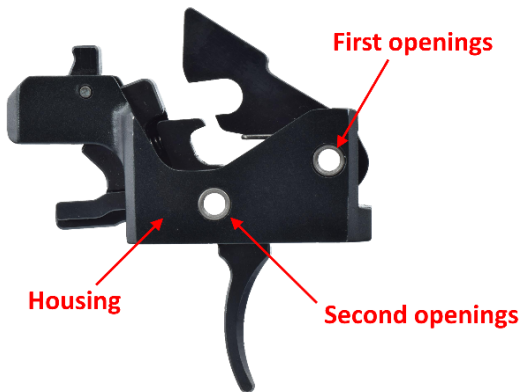
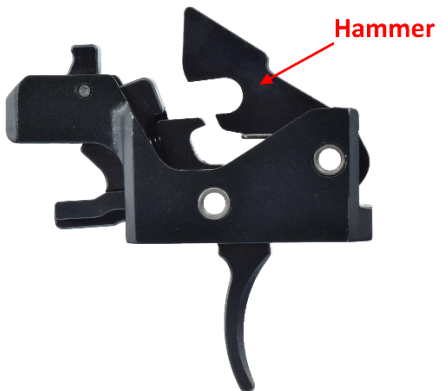
### **COUNT III – DIRECT INFRINGEMENT OF THE '336 PATENT**

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

54. Upon information and belief, Defendants have and continue to willfully directly infringe at least Claim 3 of the '336 Patent by making, using, selling, offering for sale, and/or importing without authority within the United States, the Infringing Device.

55. An exemplary comparison of the Infringing Device with claim 3 of the '336 Patent is illustrated in the chart below:

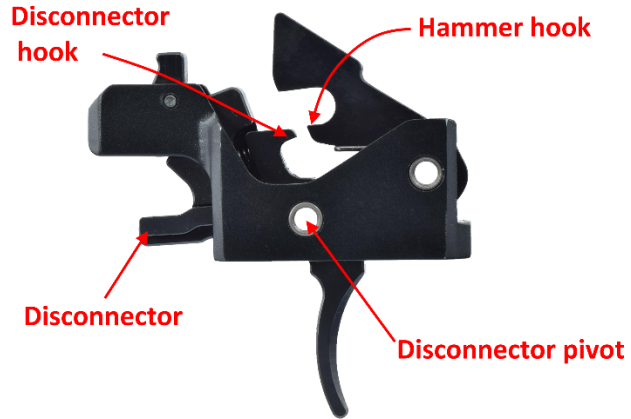
| <b>Claim Language</b>                      | <b>Infringing Device (Partisan Disruptor)</b>                                                                                                                                                                                 |
|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3. A firearm trigger mechanism comprising: | The Infringing Device is a firearm trigger mechanism. Inoculum describes the Disruptor as an "assisted reset trigger" for "the AR-15 platform" on the Inoculum website. See <a href="https://inoculum-">https://inoculum-</a> |

|                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                           | <p><a href="https://www.group.com/product/the-partisan-disruptor-forced-reset-trigger/">group.com/product/the-partisan-disruptor-forced-reset-trigger/</a> and Paragraph 24, above.</p>                                                                                                                                                                                                                                                                           |
| <p>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,</p>                                                                   |  <p>The Infringing Device includes a housing that has 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.</p> <p>The Infringing Device is sold with hammer and trigger pins.</p>  |
| <p>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,</p> |                                                                                                                                                                                                                                                                                                                                                                               |



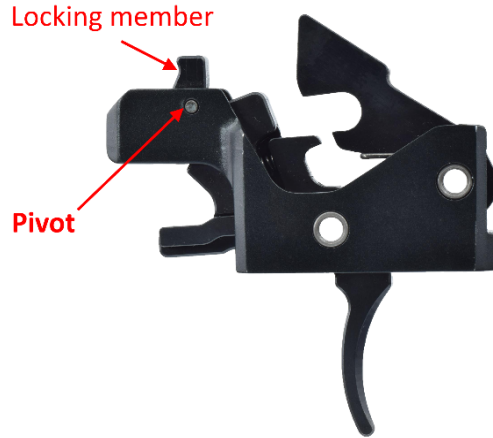
|                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                                                                                                                                                                                                                                                                                                                                               | <p>The Infringing Device includes a hammer that has a sear catch and a hook for engaging a disconnecter 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.</p>                                                                                                                                                                                                                    |
| <p>a trigger member having a sear and mounted in said housing to pivot on said trigger member pin between set and released positions, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,</p> | <div data-bbox="824 468 1222 852" data-label="Image"> </div> <p>The Infringing Device includes a trigger member that has a sear and is mounted in the housing to pivot on the trigger member pin between set and released positions.</p> <div data-bbox="846 1058 1312 1419" data-label="Image"> </div> <p>The trigger member has 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.</p> |
| <p>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,</p>                                                                                                                                     | <p>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.</p>                                                                                                                                                                                                                                                                                                               |

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



The Infringing Device includes a disconnecter that has a hook for engaging the hammer and mounted in the housing to pivot on the trigger member pin.

a locking member mounted in said housing to pivot on a transverse locking member pin, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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



The Infringing Device includes a locking member mounted in the housing to pivot on a transverse locking member pin. 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 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.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p>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, said safety selector configured such that, when said safety selector is in said forced reset semi-automatic position, said safety selector causes said disconnecter to be repositioned and in doing so prevents said disconnecter hook from catching said hammer hook,</p> |  <p>The Infringing Device includes a safety selector that is mounted in a fire control mechanism pocket of a receiver to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions. The safety selector is configured such that, when said safety selector is in the forced reset semi-automatic position, it causes the disconnecter to be repositioned and in doing so prevents the disconnecter hook from catching the hammer hook.</p> |
| <p>whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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</p>      | <p>When in the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches said hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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.</p>                                                                                                                |
| <p>whereupon in said forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position the user can pull said</p>                                                      | <p>When 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 prevents the disconnecter hook from catching the hammer hook. 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.</p>                                                                            |

|                                                                                    |  |
|------------------------------------------------------------------------------------|--|
| trigger member to fire the firearm without manually releasing said trigger member. |  |
|------------------------------------------------------------------------------------|--|

56. Accordingly, Defendants' sale and/or offer to sell the Infringing Device is direct infringement under 35 U.S.C. § 271(a).

57. Accordingly, the Defendants' making, using, selling, offering for sale, and/or importing of the Infringing Device is a direct infringement of the '336 Patent.

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

59. 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 – DIRECT INFRINGEMENT OF THE '807 PATENT**

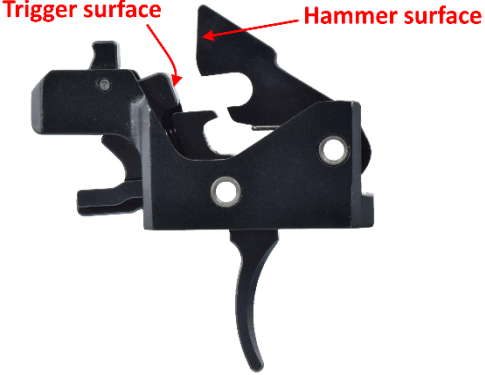
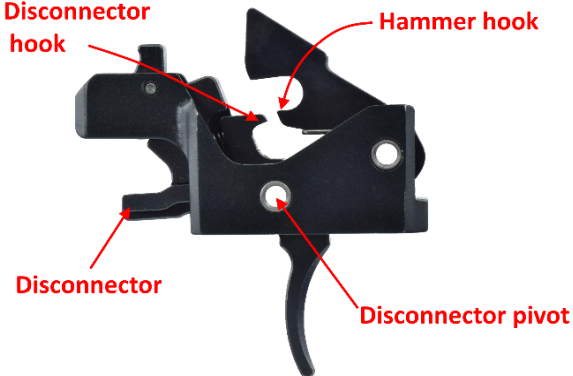
60. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

61. Upon information and belief, Defendants have and continue to willfully directly infringe at least claim 1 of the '807 Patent by making, using, selling, offering for sale, and/or importing without authority within the United States, the Infringing Device.

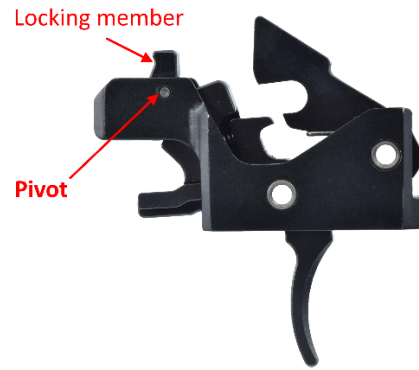
62. An exemplary comparison of the Infringing Device with claim 1 of the '807 Patent is illustrated in the chart below:

| <b>Claim Language</b>                      | <b>Infringing Device (Partisan Disruptor)</b>                                                                                                                               |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. A firearm trigger mechanism comprising: | The Infringing Device is a firearm trigger mechanism. Inoculum describes the Disruptor as an "assisted reset trigger" for "the AR-15 platform" on the Inoculum website. See |

|                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                               |
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|                                                                                                                                                                                                                                                                                                                                                                                                 | <a href="https://inoculum-group.com/product/the-partisan-disruptor-forced-reset-trigger/">https://inoculum-group.com/product/the-partisan-disruptor-forced-reset-trigger/</a> and Paragraph 24, above.                                                                                                                                                                                                        |
| <p>a hammer having a sear catch and a 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, said hammer adapted to be pivoted rearward by rearward movement of a bolt carrier,</p>                                                                                                     |  <p>The Infringing Device includes a hammer that has a sear catch and a hook and is mounted in a housing that fits into a fire control mechanism pocket of a receiver to pivot on a transverse hammer pivot axis between set and released positions. The hammer pivots rearward by rearward movement of a bolt carrier.</p> |
| <p>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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,</p> |  <p>The Infringing Device includes a trigger member that has a sear and is mounted in a housing that fits into a fire control mechanism pocket to pivot on a transverse trigger member pivot axis between set and released positions.</p>                                                                                 |

|                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                           |  <p>The trigger member has a surface positioned to be contacted by a surface of said hammer during rearward pivoting of the hammer to cause said trigger member to be forced to the set position.</p>                                                                        |
| <p>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,</p> | <p>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.</p>                                                                                                                                                                   |
| <p>a disconnecter having a hook for engaging said hammer hook and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnecter pivot axis,</p>                        |  <p>The Infringing Device includes a disconnecter that has a hook for engaging the hammer hook and is mounted in a housing that fits into the fire control mechanism pocket to pivot on a transverse disconnecter pivot axis, which it shares with the trigger member.</p> |

a locking member adapted to be movably mounted in the fire control mechanism pocket, said locking member being movable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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



The Infringing Device includes a locking member that is movably mounted in a housing that fits into the fire control mechanism pocket. The locking member is 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 said trigger member to be moved to the released position. The locking member is spring biased toward the first position and is moved against said 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.

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,



The Infringing Device includes a safety selector that is 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, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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                                    | In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches the hammer hook, at which time a user must manually release said trigger member to free the hammer from the disconnecter 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.                                    |
| whereupon in said forced reset semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the firearm without manually releasing said trigger member. | 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 prevents the disconnecter hook from catching the hammer hook. 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 said trigger member. |

63. Accordingly, Defendants' use, sale and/or offer to sell the Infringing Device is direct infringement under 35 U.S.C. § 271(a).

64. Accordingly, the Defendants' making, using, selling, offering for sale, and/or importing of the Infringing Unit is a direct infringement of the '807 Patent.

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

66. 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**

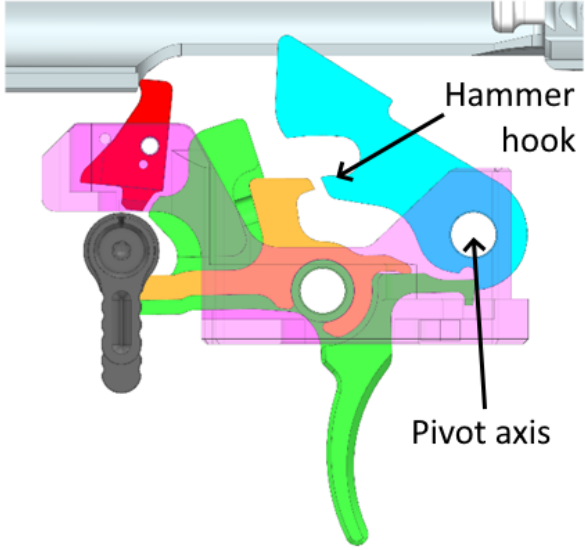
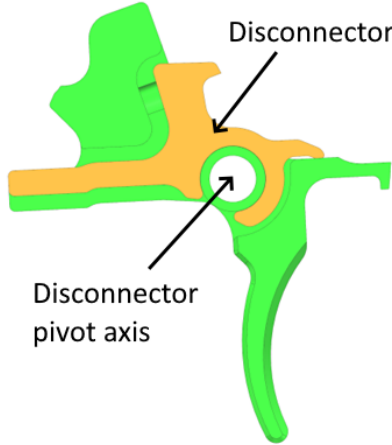
67. Plaintiffs re-allege and incorporate the allegations of the preceding paragraphs as if fully set forth herein.

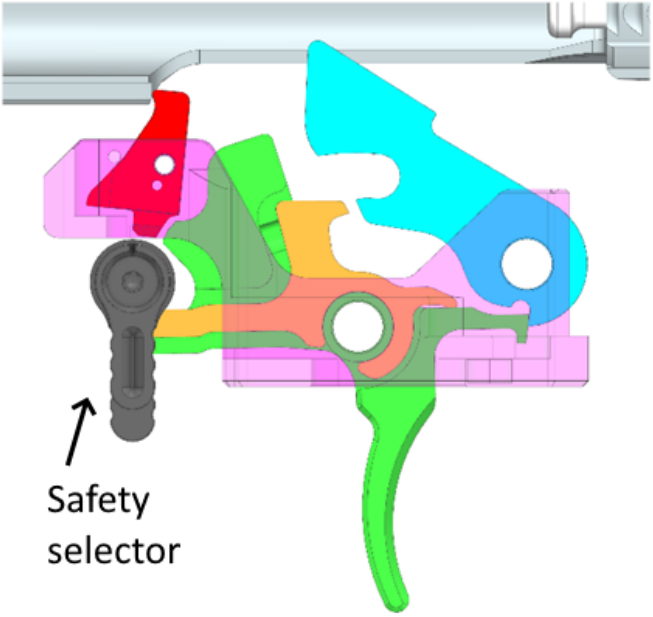
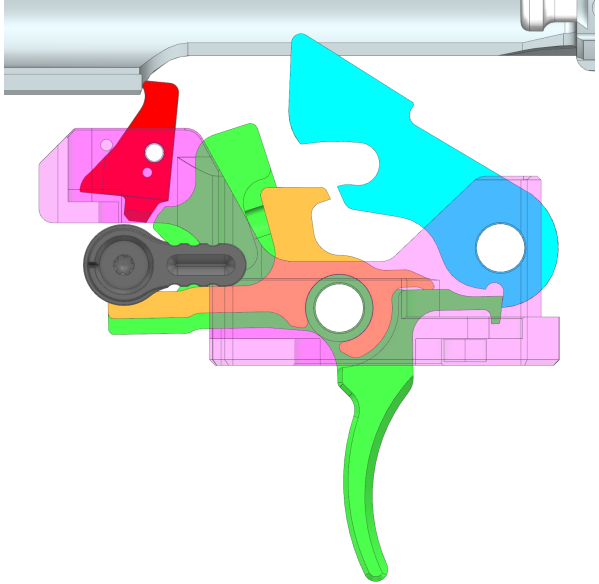
68. In violation of 35 U.S.C. § 271, as of the date of its issuance, Defendants have infringed, induced others to infringe, and/or contributed to the infringement of one or more claims of the '403 Patent, including but not limited to claim 38, literally and/or under the doctrine of equivalents, by among 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 Disruptor.

69. 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 claim 38, literally and/or under the doctrine of equivalents.

70. Claim 38 of the '403 Patent covers the Disruptor. By way of nonlimiting example, an exemplary comparison of the Disruptor, when assembled and used as intended, with claim 38 of the '403 Patent is illustrated in the chart below:

| Claim Language '403 Patent                            | Infringing Device (Disruptor)                                                                                                                                                                                             |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 38. A forced reset trigger mechanism, comprising:     | <p>The Disruptor is a forced reset trigger mechanism.</p>  <p style="color: red; text-align: center;">Hammer and<br/>trigger pins</p> |
| a hammer having a hammer hook and adapted to pivot on | <p>The Disruptor has a hammer (<b>Blue</b>) that has a hammer hook and pivots on a transverse axis.</p>                                                                                                                   |

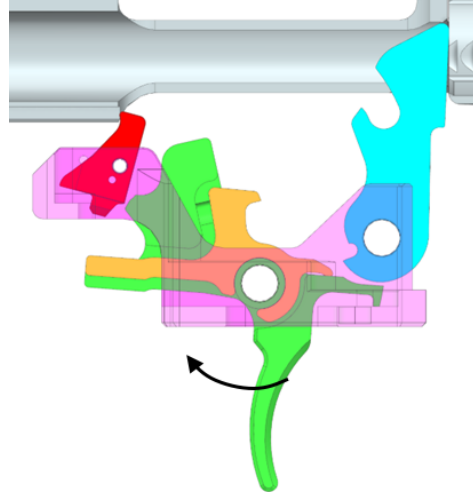
|                                                                                                                                       |                                                                                                                                                                                                                                                                                 |
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| <p>a transverse hammer pivot axis;</p>                                                                                                |  <p>(Plaintiff-generated renderings of Disruptor here and below)</p>                                                                                                                          |
| <p>a disconnecter having a disconnecter hook and adapted to pivot on a transverse disconnecter pivot axis; a trigger member; and</p>  | <p>The Disruptor has a disconnecter (<b>Orange</b>) which has a disconnecter hook and pivots on a transverse disconnecter pivot axis. The Disruptor has a trigger member (<b>Green</b>)</p>  |
| <p>a safety selector adapted to be movable between a standard semi-automatic position and a forced reset semi-automatic position,</p> | <p>The Disruptor has a safety selector adapted to be movable between a standard semi-automatic position,</p>                                                                                                                                                                    |

|                                                                                        |                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                        |  <p><b>Safety Selector in Standard Semi-Automatic Position</b></p> <p>... and a forced reset semi-automatic)position,</p>  <p><b>Safety Selector in Forced Reset Semi-Automatic Position</b></p> |
| <p>wherein when the safety selector is in the standard semi-automatic position and</p> | <p>When safety selector is in the standard semi-automatic position and the trigger member (<b>Green</b>) is rearwardly actuated.</p>                                                                                                                                                                                                                                  |

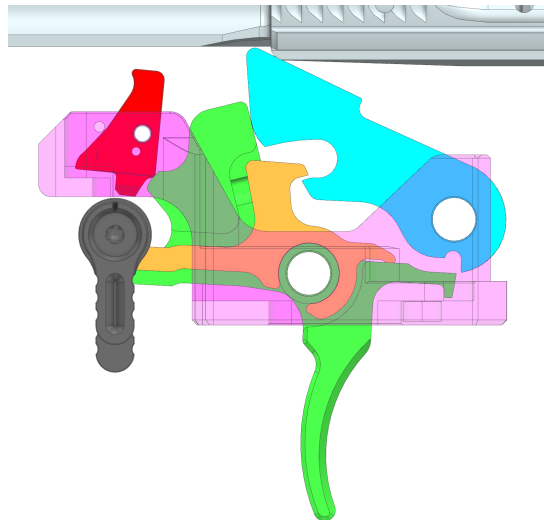
the trigger member is rearwardly actuated,

and after the hammer pivots rearward to a position where the hammer hook is past the disconnecter hook,

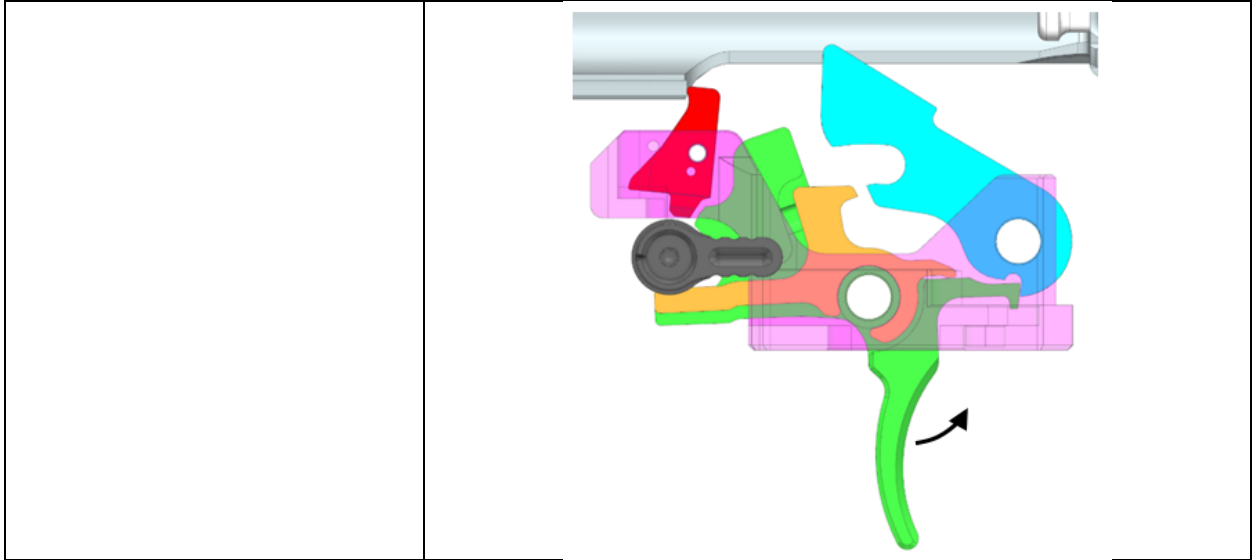
rearward pressure on the trigger member must be reduced to permit the trigger member to then be actuated to fire a firearm.



. . . cycling of the action causes the hammer (**Blue**) to pivot rearward to a position where the hammer hook is past the disconnecter hook (**Orange**),



Rearward pressure on the trigger member (**Green**) must be reduced to allow the trigger member to reset so it to then can be actuated to fire a firearm.



71. 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 device, such as the trigger assembly. 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 forcibly reset a trigger mechanism and infringe the '003 Patent.

72. 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 and filing 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 '003 Patent.

73. 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.

74. 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.

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

76. 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.

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

78. 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.

#### **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. 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 infringement or contributing to the infringement of each of the Asserted Patents, or other such equitable relief as the Court determines is warranted;

e. 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 infringement; or

f. 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 infringement;

g. 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;

h. An award of all other damages permitted by 35 U.S.C. § 284, including increased damages up to three times the amount of compensatory damages found;

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

j. 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, requests a trial by jury of any issues so triable by right.

DATED: May 29, 2026.

Respectfully submitted,

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Attorneys for Plaintiffs



US010514223B1

(12) **United States Patent  
Rounds**(10) **Patent No.: US 10,514,223 B1**(45) **Date of Patent: Dec. 24, 2019**(54) **FIREARM TRIGGER MECHANISM**(71) Applicant: **Wolf Tactical LLC**, Buda, TX (US)(72) Inventor: **Jeffrey Cooper Rounds**, Buda, TX (US)(73) Assignee: **Wolf Tactical LLC**, Buda, TX (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.: **16/143,624**(22) Filed: **Sep. 27, 2018****Related U.S. Application Data**

(60) Provisional application No. 62/565,247, filed on Sep. 29, 2017.

(51) **Int. Cl.****F41A 19/43** (2006.01)**F41A 19/14** (2006.01)**F41A 19/10** (2006.01)**F41A 19/12** (2006.01)**F41A 17/82** (2006.01)(52) **U.S. Cl.**CPC ..... **F41A 19/43** (2013.01); **F41A 19/10** (2013.01); **F41A 19/12** (2013.01); **F41A 19/14** (2013.01); **F41A 17/82** (2013.01)(58) **Field of Classification Search**CPC ..... **F41A 19/10**; **F41A 19/12**; **F41A 19/14**; **F41A 19/43**; **F41A 17/82**USPC ..... **89/136**, **139**; **42/69.01**, **69.02**, **69.03**  
See application file for complete search history.(56) **References Cited****U.S. PATENT DOCUMENTS**5,704,153 A \* 1/1998 Kaminski ..... **F41A 17/063**  
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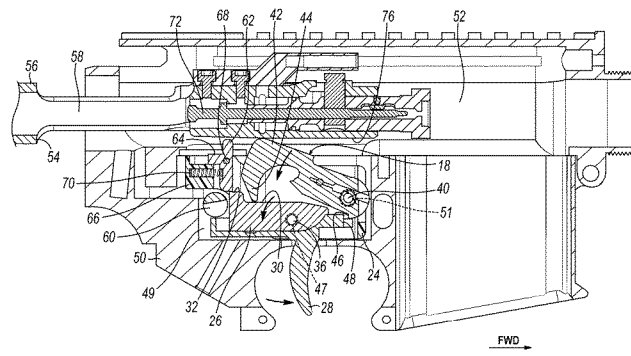
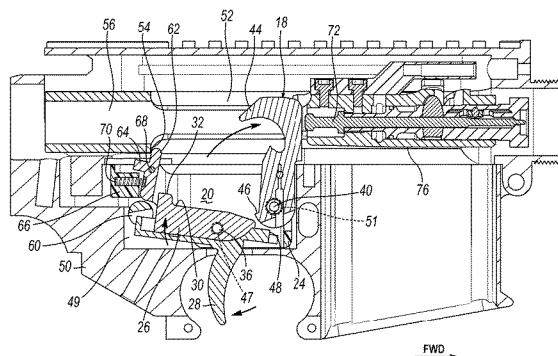
(Continued)

**FOREIGN PATENT DOCUMENTS**

TW 409847 U 10/2000

*Primary Examiner* — Bret Hayes(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP(57) **ABSTRACT**

A trigger mechanism for use in a firearm having a receiver with a fire control mechanism pocket, transversely aligned pairs of hammer and trigger pin openings in the pocket, and a bolt carrier that reciprocates and pivotally displaces a hammer when cycled. The trigger mechanism includes a hammer, a trigger member, and a locking bar. The hammer has a sear notch and is mounted in the fire control mechanism pocket to pivot on a transverse hammer pin between set and released positions. The trigger member has a sear and is mounted in the fire control mechanism pocket to pivot on a transverse trigger pin between set and released positions. The trigger member has a surface positioned to be contacted by hammer when the hammer is displaced by cycling of the bolt carrier, the contact causing the trigger member to be forced to the set position. The locking bar is pivotally mounted in a frame and spring biased toward a first position in which it mechanically blocks the trigger member from moving to the release position, and is movable against the spring bias to a second position when contacted by the bolt carrier reaching a substantially in-battery position, allowing the trigger member to be moved by an external force to the released position.

**7 Claims, 4 Drawing Sheets**

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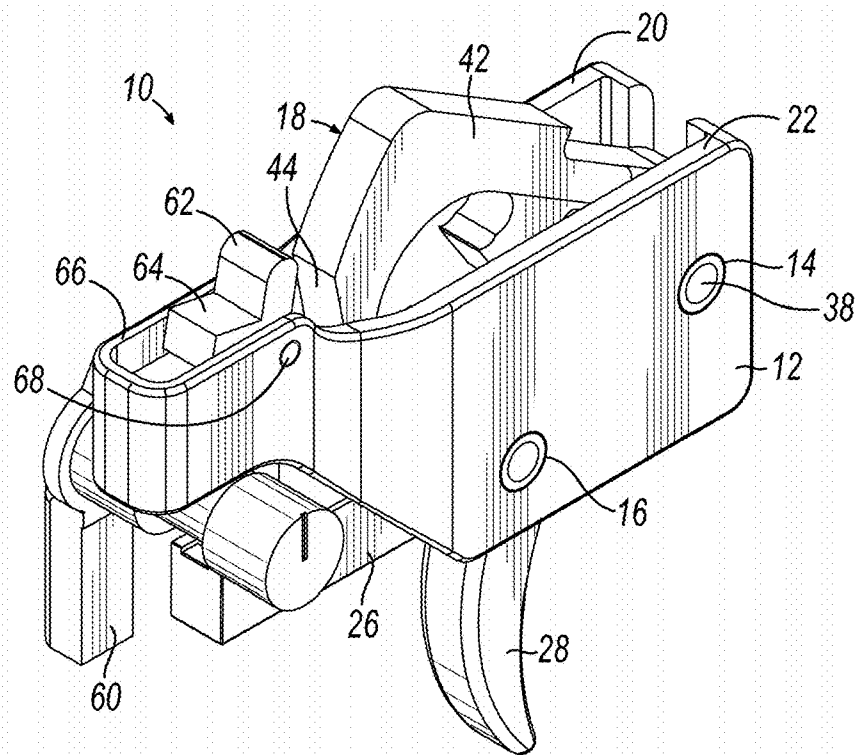
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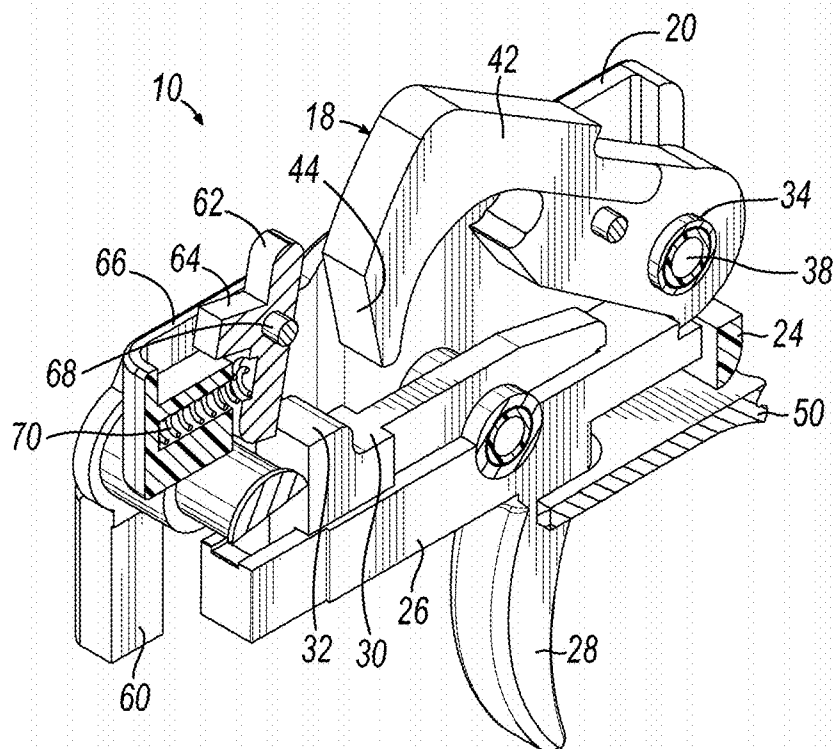
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**FIG. 1**



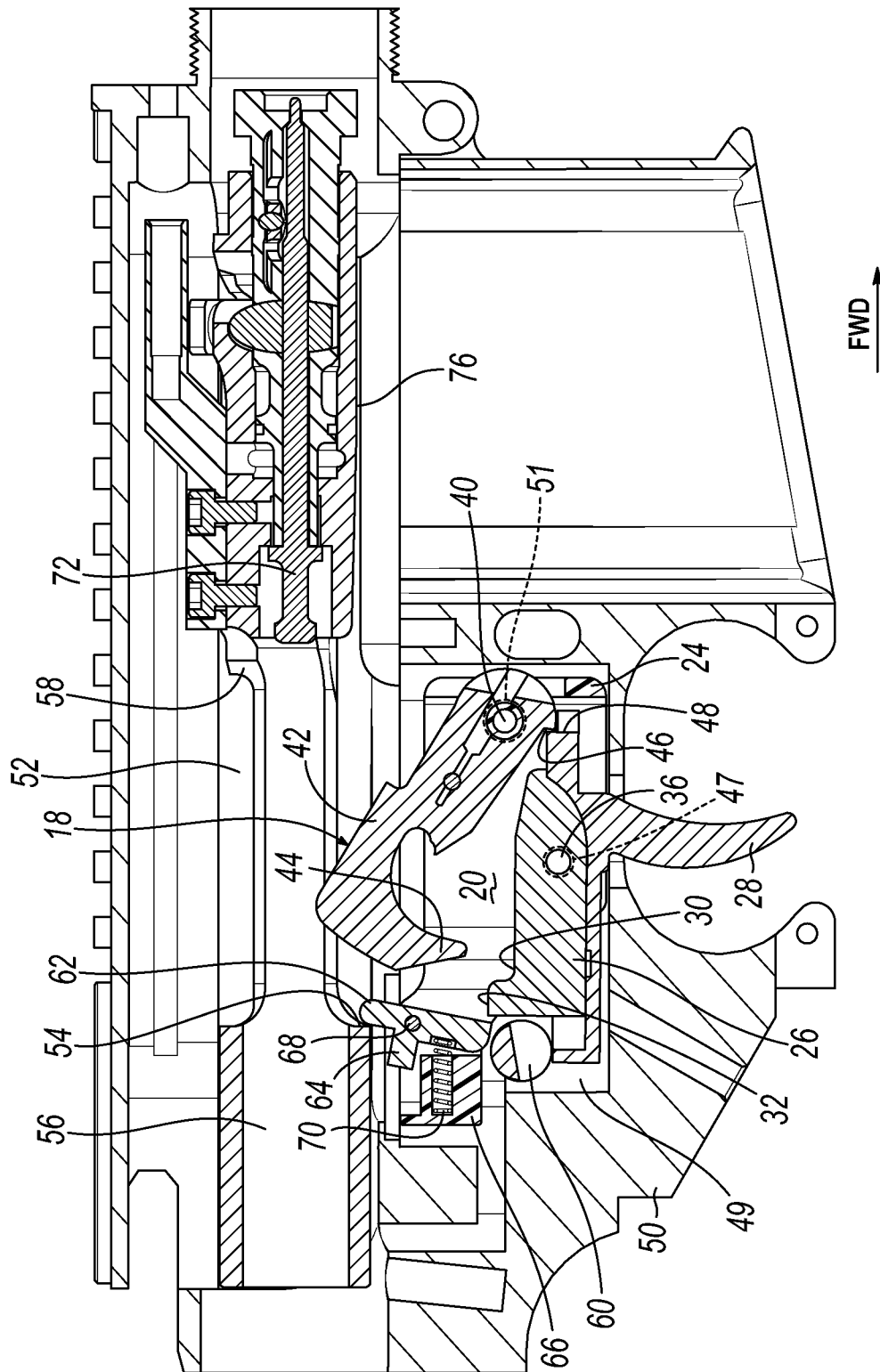
**FIG. 2**

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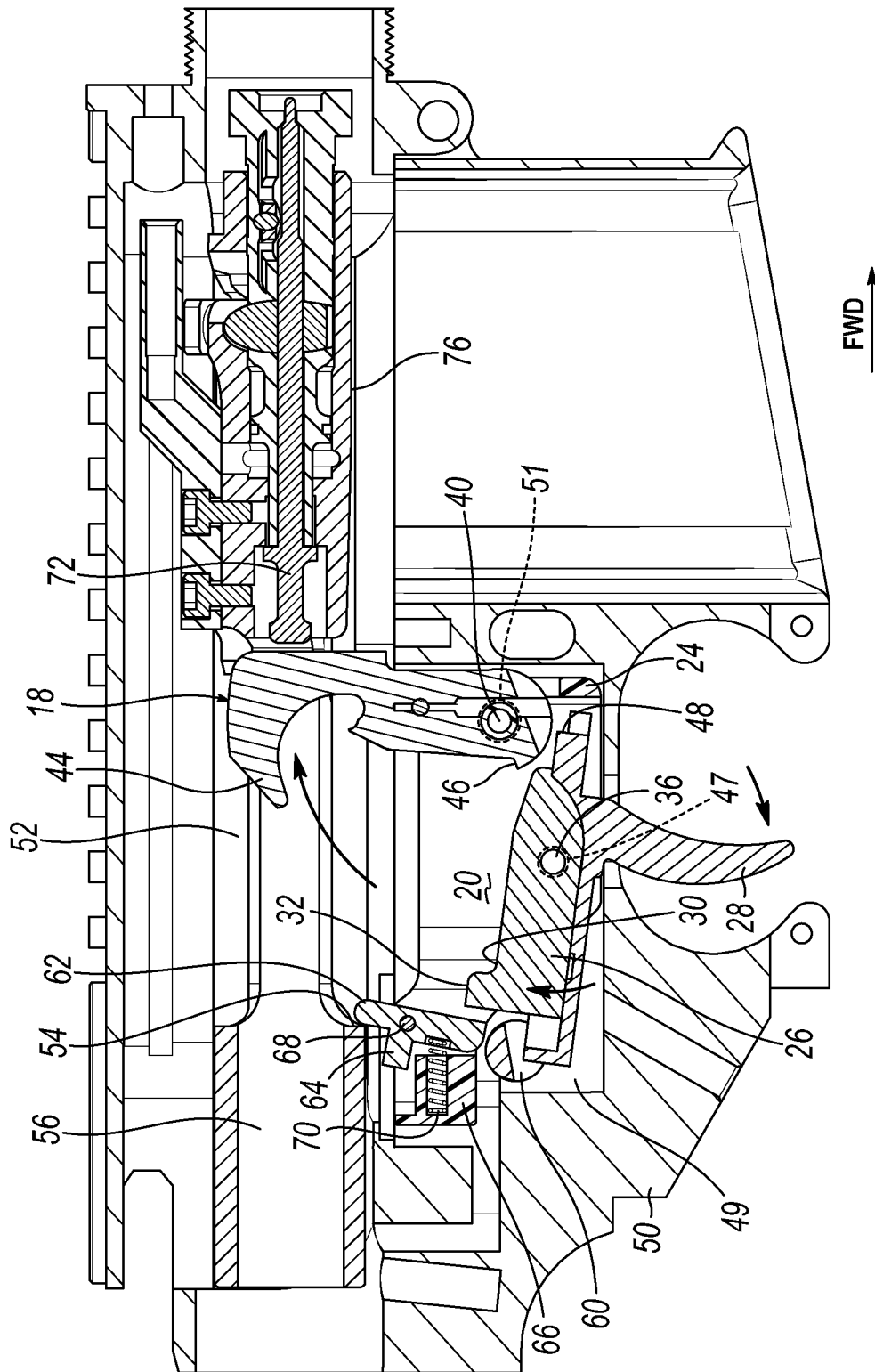


FIG. 4

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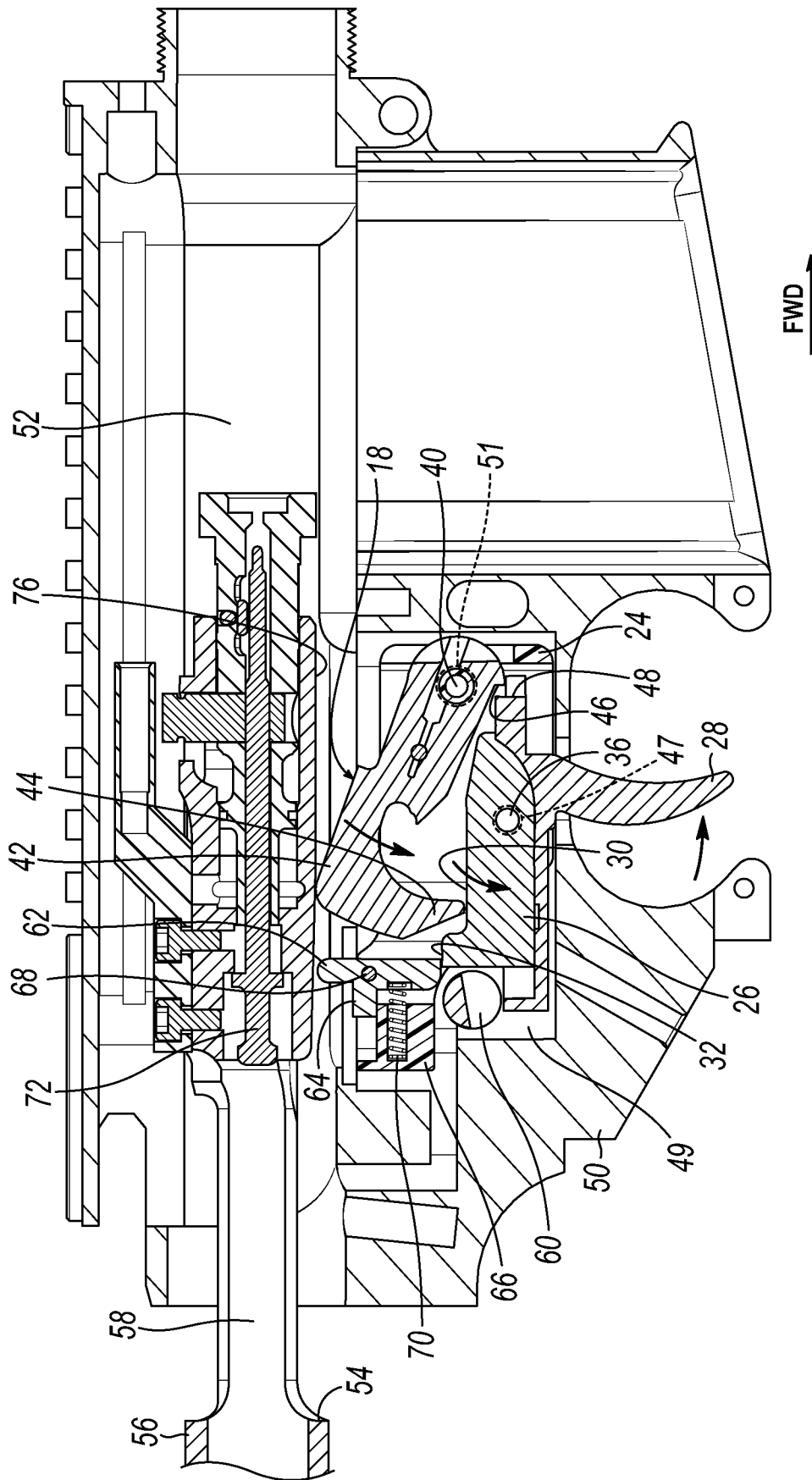


FIG. 5

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**FIREARM TRIGGER MECHANISM****RELATED APPLICATIONS**

This application claims priority to U.S. Provisional Patent Application No. 62/565,247 filed Sep. 29, 2017, and incorporates the same herein by reference.

**TECHNICAL FIELD**

This invention relates to a firearm trigger mechanism. More particularly, it relates to a semiautomatic trigger that is mechanically reset by movement of the hammer when it is reset by 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 ammunitions 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 disconnecter, 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 disconnecter 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.

Other devices have been offered that facilitate the bump fire process. One is shown in U.S. Pat. No. 6,101,918, issued Aug. 15, 2000, to William Akins for a Method and Apparatus for Accelerating the Cyclic Firing Rate of a Semiautomatic Firearm. This device, sold for some time as the Akins Accelerator™, allowed the receiver and action of the firearm to move longitudinally relative to the butt stock and used a spring to assist forward return movement. Other devices, such as that shown in U.S. Pat. No. 8,127,658, issued Mar. 6, 2012, and other patents owned by Slide Fire Solutions provide a replacement stock and handgrip assembly that facilitates bump firing, but without spring assistance.

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Other solutions to increase the rate of semiautomatic fire include pull/release trigger mechanisms. These devices cause one round to be fired when the trigger is pulled and a second round to be fired when the trigger is released. Such a device is shown in U.S. Pat. No. 8,820,211, issued Sep. 2, 2014, entitled Selectable Dual Mode Trigger for Semiautomatic Firearms. A device like this is offered by FosTecH Outdoors, LLC as the ECHO TRIGGER™. Another device, offered by Digital Trigger Technologies, LLC under the name DigiTrigger™, provides a dual mode trigger in which the pull/release operating function is achieved electronically.

The above-described devices either require practice to use reliably, are complex, and/or are expensive to manufacture and install.

Another device for increasing the rate of semiautomatic fire is shown in U.S. Pat. Nos. 9,568,264; 9,816,772; and U.S. Pat. No. 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. This invention, however, does not provide a “drop-in” solution for existing popular firearm platforms, like the AR15, AK47 variants, or the Ruger 10/22™. 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.

**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. In the disclosed embodiments, the normal resetting of the hammer, as the bolt or bolt carrier is cycled, causes the trigger to be forcibly reset by contact between the hammer and a surface of the trigger member. Once reset, movement of the trigger is blocked by a locking bar and cannot be pulled until the bolt has returned to battery, thus preventing “hammer follow” behind the bolt or bolt carrier.

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 drop-in trigger module for an AR-pattern firearm according to one embodiment of the invention;

FIG. 2 is a partially cut-away view thereof;

FIG. 3 is a longitudinal section view showing the module of the embodiment installed in a typical AR15-pattern lower receiver in a cocked and ready to fire status with the bolt and bolt carrier in an in-battery position;

FIG. 4 is a similar view in which the trigger has been pulled and the hammer has fallen against a firing pin; and

FIG. 5 is a similar view showing the bolt carrier in a retracted position, forcing the hammer and trigger into a reset status.



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## 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.

Referring first to FIGS. 1 and 2, therein is shown at 10 a “drop-in” trigger module 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™ or AK-pattern variants.

The module 10 includes a frame or housing 12 that may be sized and shaped to fit within the internal fire control mechanism pocket of an AR-pattern lower receiver. It includes first and second pairs of aligned openings 14, 16 that are located to receive transverse pins (40, 36, respectively, shown in FIGS. 3-5) used in a standard AR-pattern trigger mechanism as pivot axes for the hammer and trigger member, respectively. The housing 12 includes left and right sidewalls 20, 22, which extend substantially vertically and parallel to one another in a laterally spaced-apart relationship. The sidewalls 20, 22 may be interconnected at the bottom of the housing 12 at the front by a crossmember 24.

A hammer 18 of ordinary (MIL-SPEC) AR-pattern shape and construction may be used. The illustrated hammer 18 may be standard in all respects and biased by a typical AR-pattern hammer spring (not shown).

A modified trigger member 26 may be sized to fit between the sidewalls 20, 22 of the housing 12 and may include a trigger blade portion 28 that extends downwardly. The trigger blade portion 28 is the part of the trigger member 26 contacted by a user's finger to actuate the trigger mechanism. The trigger blade portion 28 may be curved (shown) or straight, as desired. The trigger member 26 may pivot on a transverse pin 36 (not shown in FIGS. 1 and 2) that extends through aligned openings 16 in the sidewalls 20, 22 of the housing 12. The same pin 36 is aligned and positioned within aligned openings 47 of a lower receiver 50 to assemble the module 10 into a fire control mechanism pocket 49 of the lower receiver 50, as shown in FIGS. 3-5, for example. The modified trigger member 26 may have integral first and second contact surfaces 30, 32. Some part of the trigger member 26 includes contact surfaces for interaction with the hammer 18 and locking bar 62. For

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example, the trigger member 26 can include first and second upwardly extended rear contact surfaces 30, 32. The first contact surface 30 is positioned to interact, for example, with a tail portion 44 of the hammer 18 that extends rearwardly from a head part 42 of the hammer 18. The second contact surface 32 is positioned to interact with a locking bar 62. The contact surfaces may be integral to a specially formed trigger body or may be a separate insert (shown) that is made to closely fit and mate with a standard AR-pattern trigger member, held in place by the trigger pin 36, with no lost motion between the parts.

The hammer 18 may include bosses 34 coaxial with a transverse pivot pin opening 38 that receives an assembly/pivot pin 40 (not shown in FIGS. 1 and 2) through the first set of aligned openings 14 in the housing 12 (and through openings 51 in the firearm receiver, to position the trigger module 10 within the fire control mechanism pocket 49 of the lower receiver 50, as shown in FIGS. 3-5). The bosses 34 may fit between the sidewalls 20, 22 of the housing 12 to laterally position the hammer 18, or can be received in the openings 14 (if enlarged) so that the hammer 18 stays assembled with the module 10 when the hammer's pivot pin is removed and/or when the module 10 is not installed in a firearm receiver. The hammer 18 includes a head portion 42 and a tail portion 44. The hammer 18 also includes a sear catch 46 that engages the sear 48 on the trigger member 26, when cocked. The trigger and hammer pins 36, 40 provide pivot axes at locations (openings 47, 51, shown in FIGS. 3-5, for example) standard for an AR-pattern fire control mechanism. Although FIGS. 3-5 are a longitudinal section view and only show one of the aligned openings 47, 51, it is understood that a typical AR15-pattern lower receiver 50 includes second, corresponding and aligned openings 47, 51 in the half of the receiver 50 not shown).

Referring now also to FIG. 3, the trigger module 10 is shown installed in the fire control mechanism pocket 49 of an AR-pattern lower receiver 50. Other lower receiver parts not important to the present invention are well-known in the art and are omitted from all figures for clarity. As is well-known in the art, the bolt carrier assembly 52 (or blow-back bolt) would be carried by an upper receiver (not shown) and engage 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 hammer 18 is shown in a cocked position and a bolt carrier assembly 52 is shown in an in-battery position. The sear 48 engages the sear catch 46 of the hammer 18.

The bolt carrier assembly 52 used with the embodiments of this invention can be an ordinary (mil-spec) M16-pattern bolt carrier assembly, whether operated by direct impingement or a gas piston system, that has a bottom cut position to engage an auto sear in a fully automatic configuration. The bottom cut creates an engagement surface 54 in a tail portion 56 of the bolt carrier body 58. This is distinct from a modified AR15 bolt carrier that is further cut-away so that engagement with an auto sear is impossible. The semiautomatic AR-pattern safety selector switch 60 may also be standard (MIL-SPEC) in all respects.

The trigger module of the present invention includes a trigger locking bar 62 carried on a frame 66 for pivotal movement on a transverse pivot pin 68. The frame 66 may be part of the module housing 12, if configured as a “drop-in” unit. An upper end of the locking bar 62 extends above the upper edge of the housing 12 and lower receiver 50 to be engaged by the engagement surface 54 of the bolt



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carrier body 58 when the bolt carrier assembly 52 is at or near its in-battery position (as shown in FIG. 3). Contact between the engagement surface 54 and upper end of the locking bar 62 causes the locking bar 62 to pivot into a first position (FIG. 3) against a biasing spring 70 and allows pivotal movement of the trigger member 26. If desired, the locking bar 62 may include a rearward extension 64 that serves as a means to limit the extent to which it can pivot toward the blocking position.

Referring now also to FIG. 4, when the safety selector 60 is in the “fire” position (as shown in all figures), finger pressure pulling rearward against the trigger blade portion 28 causes the trigger member 26 to rotate on the pivot pin 36, as indicated by arrows. This rotation causes the sear 48 to disengage from the sear catch 46 of the hammer 18. This release allows the hammer 18 to rotate by spring force (hammer spring omitted for clarity) into contact with the firing pin 72. Any contact between the rear portion of the trigger member 26 and front surface of the locking bar 62 will simply cause the locking bar 62 to rotate out of the way, as illustrated in FIG. 4.

Referring now to FIG. 5, discharging an ammunition cartridge (not shown) causes the action to cycle by moving the bolt carrier assembly 52 rearwardly, as illustrated. The same effect occurs when the action is cycled manually. As in an ordinary AR15-pattern configuration, a lower surface 76 of the bolt carrier body 58 pushes rearwardly against the head portion 42 of the hammer 18, forcing it to pivot on the hammer pivot/assembly pin 40 against its spring (not shown) toward a reset position. As the rearward movement of the bolt carrier body 58 and pivotal movement of the hammer 18 continues, mechanical interference or contact between a rear surface 74 of the hammer 18 (such as on the tail portion 44) and a contact surface 30 of the trigger member 26 forces the trigger to pivot (arrows in FIG. 5) toward and to its reset position. At the same time, as the trigger member 26 is reset, the biasing spring 70 moves the lower end of the locking bar 62 into a second position (FIG. 5) in which it blocks pivotal movement of the trigger 26, including by finger pressure applied (or reapplied) to the trigger blade 28. Thus, as the bolt carrier assembly 52 returns forward, the trigger member 26 is held in its reset position by the locking bar 62 where the hammer sear catch 46 will engage with the sear 48 carried on the trigger member 26 to reset the fire control mechanism. The trigger member 26 cannot be pulled to release the sear/hammer engagement, thus precluding early hammer release or “hammer follow” against the bolt carrier assembly 52 and firing pin 72 as the bolt carrier assembly 52 is returning to battery. A trigger return spring (not shown) of the type used in a standard AR-pattern trigger mechanism may be unnecessary in this case, because the trigger member 26 is forced to return by the hammer 18, but may be used, if desired.

When the bolt carrier assembly 52 has reached (or nearly reached) its closed, in-battery position (shown in FIG. 3), the engagement surface 54 of the bolt carrier tail portion 56 contacts and forwardly displaces the upper end of the locking bar 62, disengaging the second contact surface 32 of the trigger member 26, allowing the trigger 26 to be pulled a second time. The distance of travel during which there is no interference between the locking bar 62 and second contact surface 32 of the trigger member 26, allowing the trigger member 26 to be manually displaced, may be about from about 0.10 to 0.31 inch. This prevents early release of the hammer 18 and contact of the hammer against the firing pin 72 before the bolt is completely locked and in-battery.

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Force applied by the user's trigger finger against the trigger blade portion 28 is incapable of overcoming the mechanical interference and force of the hammer 18 against the contact surface 30 of the trigger member 26. However, the trigger can immediately be pulled again—only by application of an external force—as soon as the locking bar 62 has been rotated against the spring 70 and out of blocking engagement with the trigger member 26, as the bolt carrier assembly 52 approaches or reaches its in-battery position. This allows the highest possible standard rate of fire, without risk of hammer-follow, for the semiautomatic action of the firearm.

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. 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. For a firearm having a receiver with a fire control mechanism pocket, transversely aligned pairs of hammer and trigger pin openings in side walls of the pocket, and a bolt carrier that reciprocates and pivotally displaces a hammer when cycled, a trigger mechanism, comprising:

a hammer having a sear notch and mounted in the fire control mechanism pocket to pivot on a transverse hammer pin between set and released positions;

a trigger member having a sear and mounted in the fire control mechanism pocket to pivot on a transverse trigger pin between set and released positions, the trigger member having a surface positioned to be contacted by the hammer when the hammer is displaced by cycling of the bolt carrier, the contact causing the trigger member to be forced to the set position;

a locking bar pivotally mounted in a frame and spring biased toward a first position in which the locking bar mechanically blocks the trigger member from moving to the released position, and movable against the spring bias to a second position when contacted by the bolt carrier reaching a substantially in-battery position, allowing the trigger member to be moved by an external force to the released position.

2. The trigger mechanism of claim 1, wherein the trigger member has a second surface positioned to be contacted by the locking bar when the locking bar is in the first position.

3. The trigger mechanism of claim 1, wherein the locking bar includes means for limiting the extent to which the locking bar can pivot by the spring bias toward the first position.

4. For a firearm having a receiver with a fire control mechanism pocket, assembly pin openings in side walls of the pocket, and a bolt carrier that reciprocates and pivotally displaces a hammer when cycled, a trigger mechanism, comprising:

a housing having transversely aligned pairs of openings for receiving hammer and trigger assembly pins;

a hammer having a sear notch and mounted in the housing to pivot on a transverse axis between set and released positions;

a trigger member having a sear and mounted in the housing to pivot on a transverse axis between set and

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released positions, the trigger member having a surface positioned to be contacted by the hammer when the hammer is displaced by the bolt carrier when cycled, the contact causing the trigger member to be forced to the set position;

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a locking bar pivotally mounted in the housing and spring biased toward a first position in which the locking bar mechanically blocks the trigger member from moving to the released position, and movable against the spring bias to a second position when contacted by the bolt carrier reaching a substantially in-battery position in which the trigger member can be moved by an external force to the released position.

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5. The trigger mechanism of claim 4, wherein the trigger member has a second surface positioned to be contacted by the locking bar when the locking bar is in the first position.

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6. The trigger mechanism of claim 4, wherein the housing's transversely aligned pairs of openings for receiving hammer and trigger assembly pins are aligned with the assembly pin openings in the fire control mechanism pocket of the receiver.

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7. The trigger mechanism of claim 4, wherein the locking bar includes means for limiting the extent to which the locking bar can pivot by the spring bias toward the first position.

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\* \* \* \* \*



*To Promote the Progress*

*of Science and Useful Arts*

## *The Director*

*of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.*

*Therefore, this United States*

# *Patent*

grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.



*Katherine Kelly Vidal*



DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE

Exhibit B

## Maintenance Fee Notice

If the application for this patent was filed on or after December 12, 1980, maintenance fees are due three years and six months, seven years and six months, and eleven years and six months after the date of this grant, or within a grace period of six months thereafter upon payment of a surcharge as provided by law. The amount, number and timing of the maintenance fees required may be changed by law or regulation. Unless payment of the applicable maintenance fee is received in the United States Patent and Trademark Office on or before the date the fee is due or within a grace period of six months thereafter, the patent will expire as of the end of such grace period.

## Patent Term Notice

If the application for this patent was filed on or after June 8, 1995, the term of this patent begins on the date on which this patent issues and ends twenty years from the filing date of the application or, if the application contains a specific reference to an earlier filed application or applications under 35 U.S.C. 120, 121, 365(c), or 386(c), twenty years from the filing date of the earliest such application (“the twenty-year term”), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b), and any extension as provided by 35 U.S.C. 154(b) or 156 or any disclaimer under 35 U.S.C. 253.

If this application was filed prior to June 8, 1995, the term of this patent begins on the date on which this patent issues and ends on the later of seventeen years from the date of the grant of this patent or the twenty-year term set forth above for patents resulting from applications filed on or after June 8, 1995, subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b) and any extension as provided by 35 U.S.C. 156 or any disclaimer under 35 U.S.C. 253.



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(12) **United States Patent**  
**Strbac**

(10) **Patent No.:** **US 11,724,003 B2**

(45) **Date of Patent:** **Aug. 15, 2023**

(54) **FIREARM TRIGGER MECHANISM**

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

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

Primary Examiner — J. Woodrow Eldred

(74) Attorney, Agent, or Firm — Wood Herron & Evans LLP

(21) Appl. No.: **18/048,572**

(22) Filed: **Oct. 21, 2022**

(57) **ABSTRACT**

(65) **Prior Publication Data**

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**Related U.S. Application Data**

(60) Provisional application No. 63/297,884, filed on Jan. 10, 2022.

(51) **Int. Cl.**

**F41A 19/24** (2006.01)

**F41A 19/10** (2006.01)

(Continued)

(52) **U.S. Cl.**

CPC ..... **F41A 19/10** (2013.01); **F41A 17/48** (2013.01); **F41A 19/15** (2013.01); **F41A 19/24** (2013.01)

(58) **Field of Classification Search**

CPC ..... F41A 19/24; F41A 19/10; F41A 19/15; F41A 19/16; F41A 17/46

See application file for complete search history.

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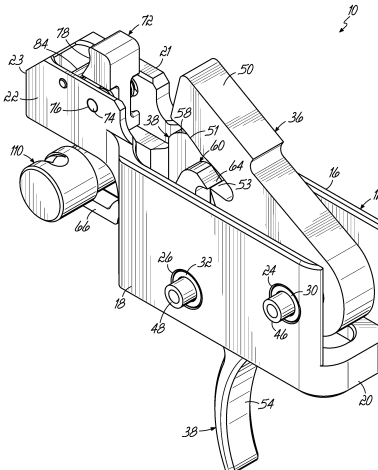
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A trigger mechanism that can be used in AR-pattern firearms has a hammer, a trigger member, a disconnecter, a locking member, and a “three position” safety selector having safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 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

(Continued)





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Page 2

carrier during forward movement of the bolt carrier as the bolt carrier reaches a substantially in-battery position.

## 14 Claims, 18 Drawing Sheets

- (51) **Int. Cl.**  
**F41A 17/48** (2006.01)  
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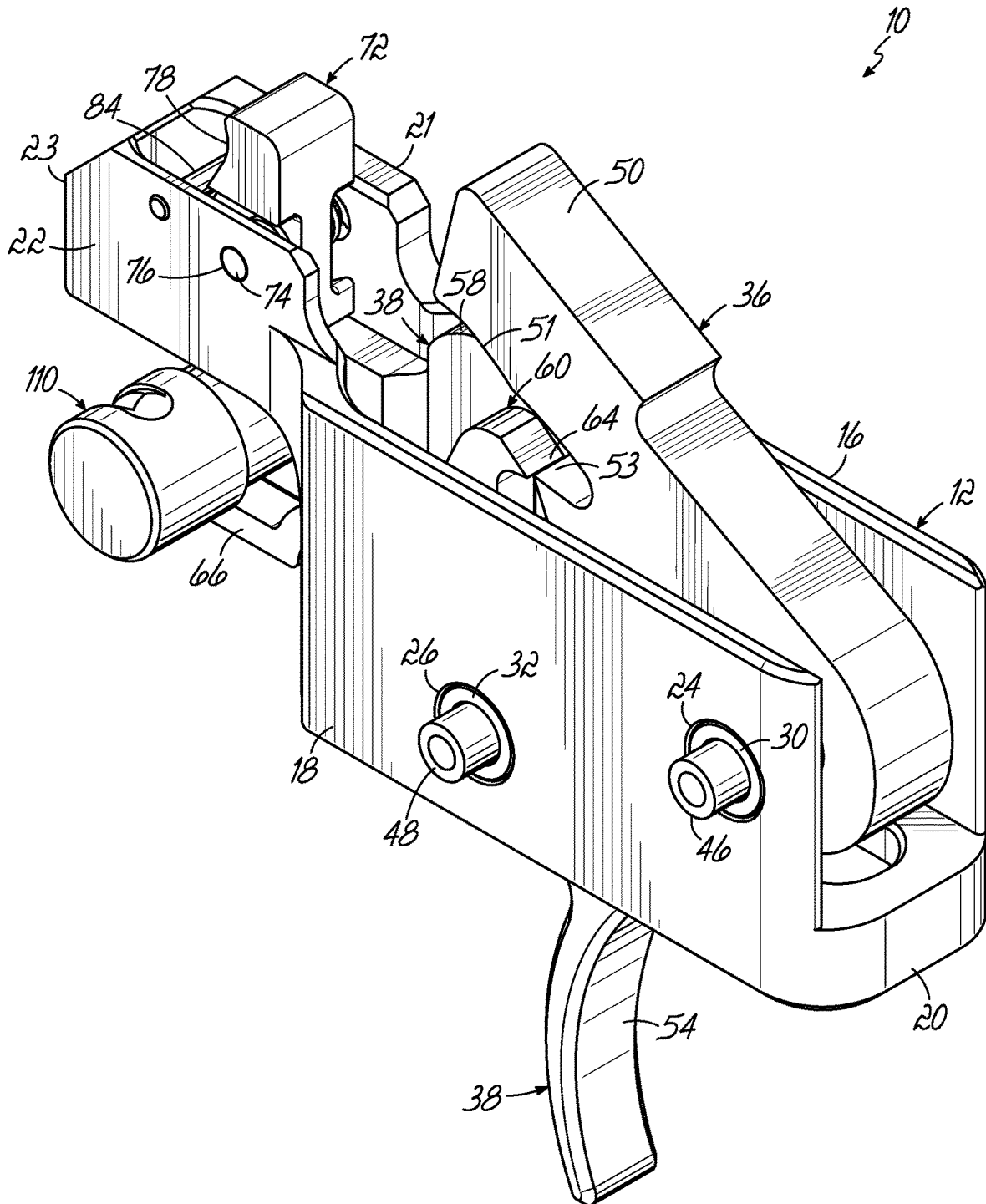


FIG. 1



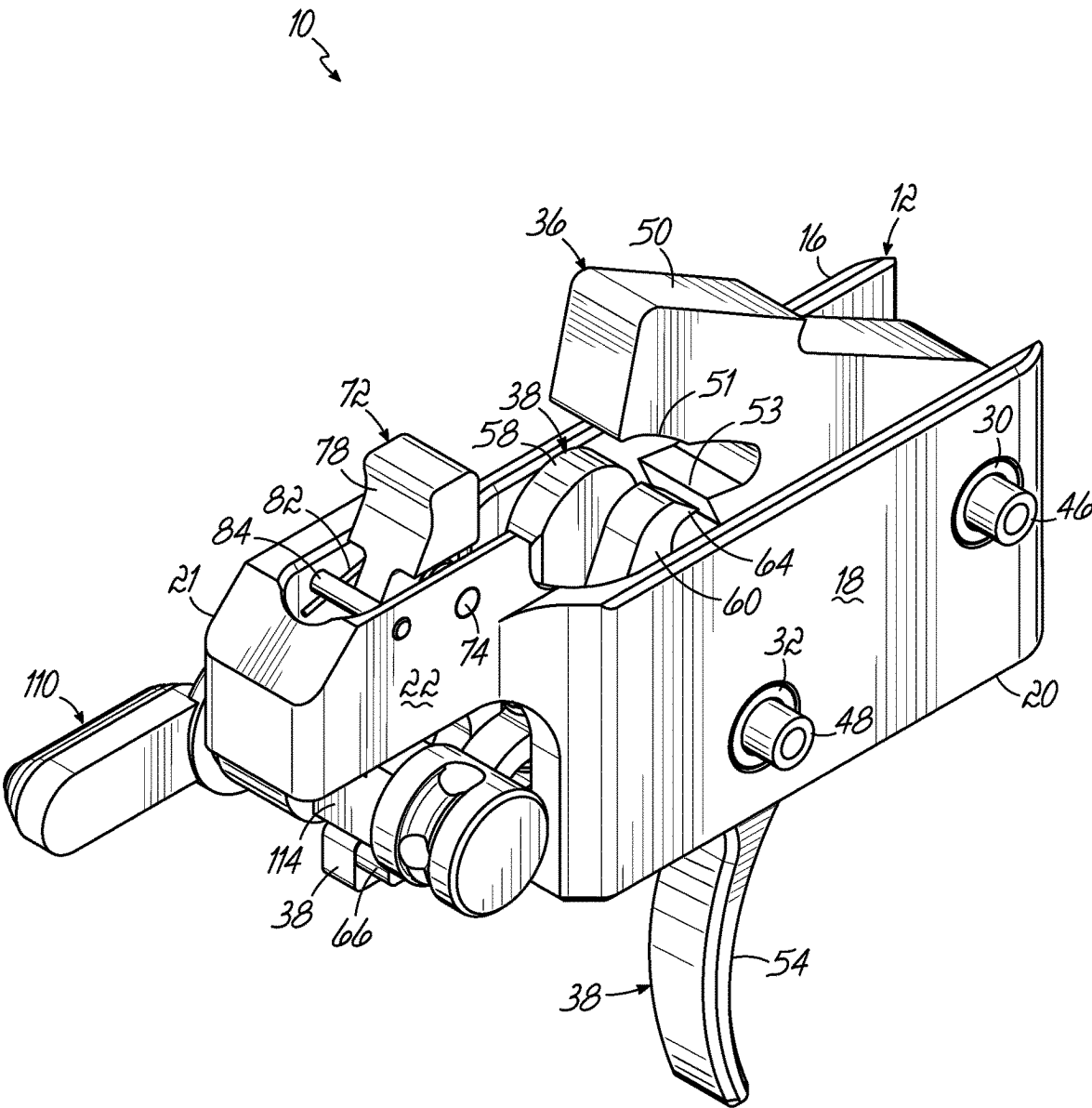


FIG. 2

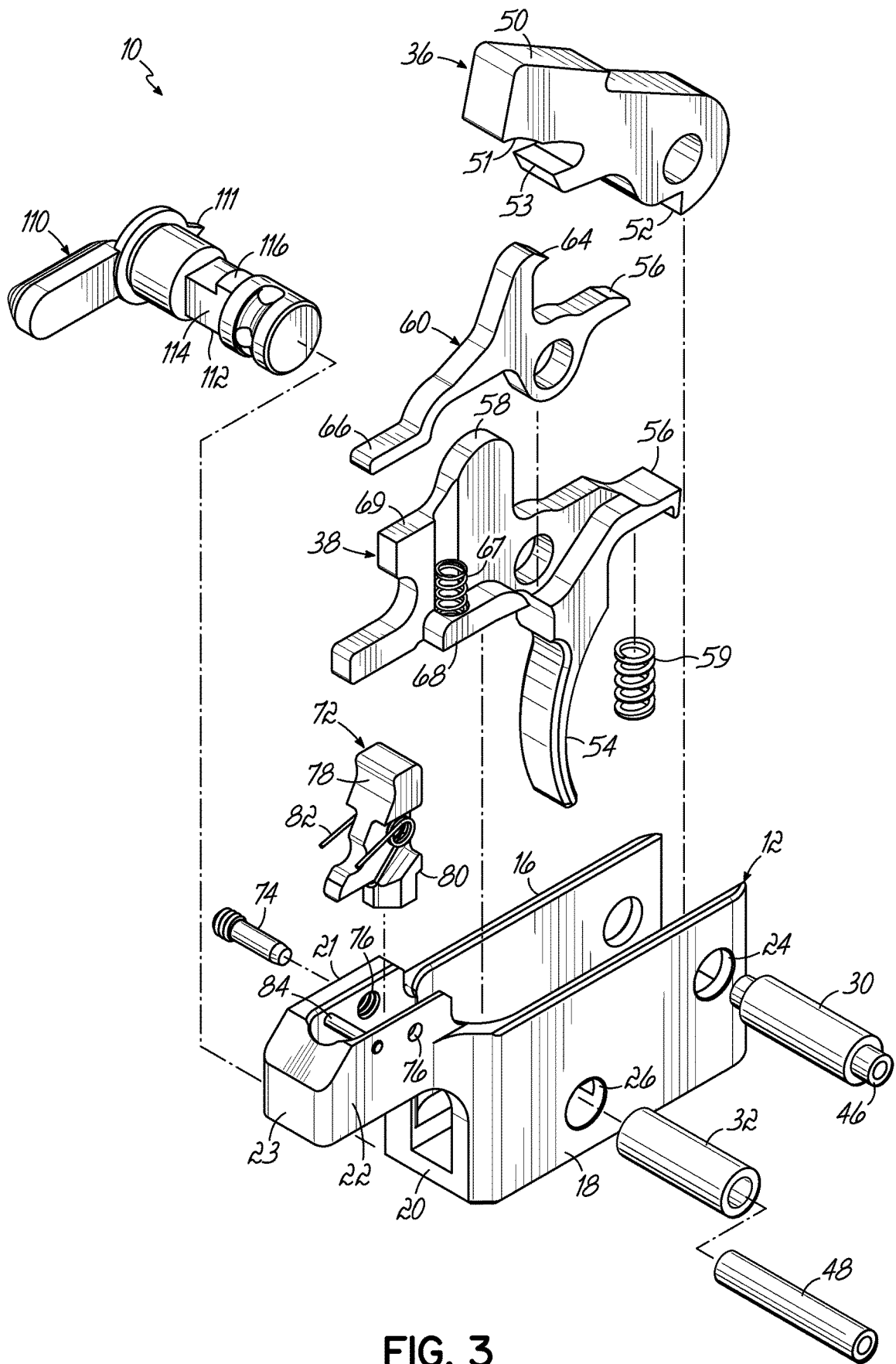


FIG. 3

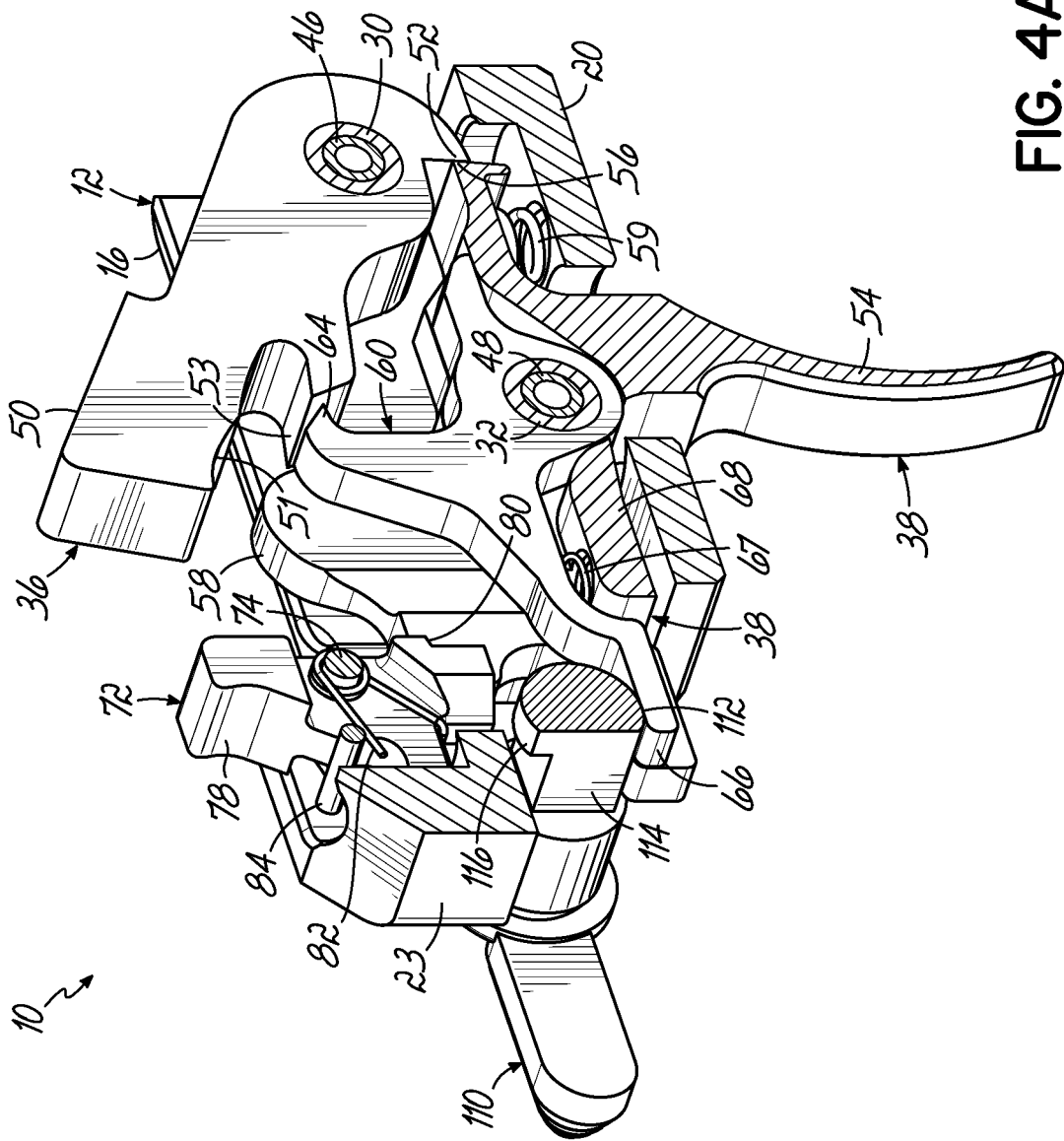
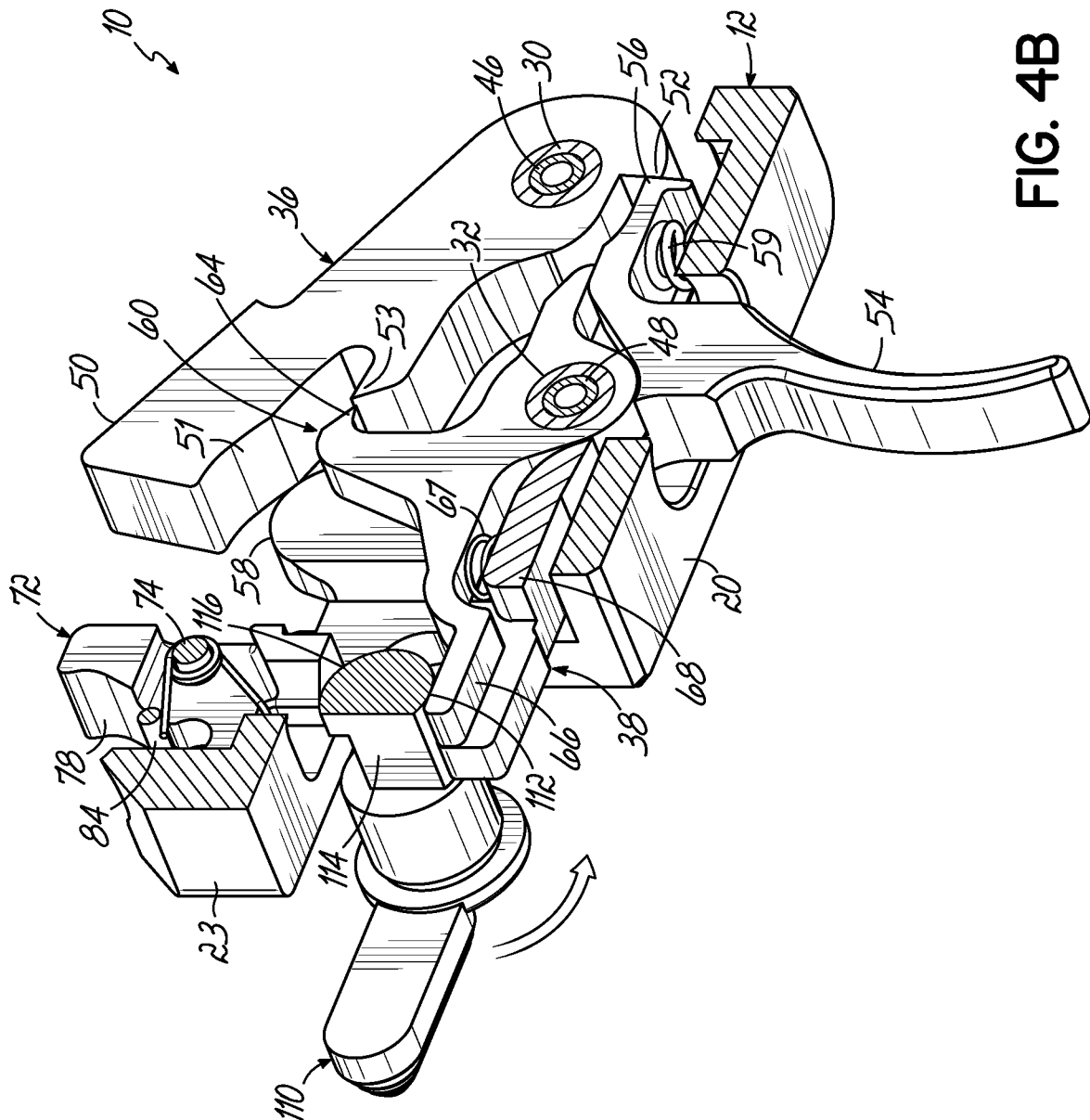
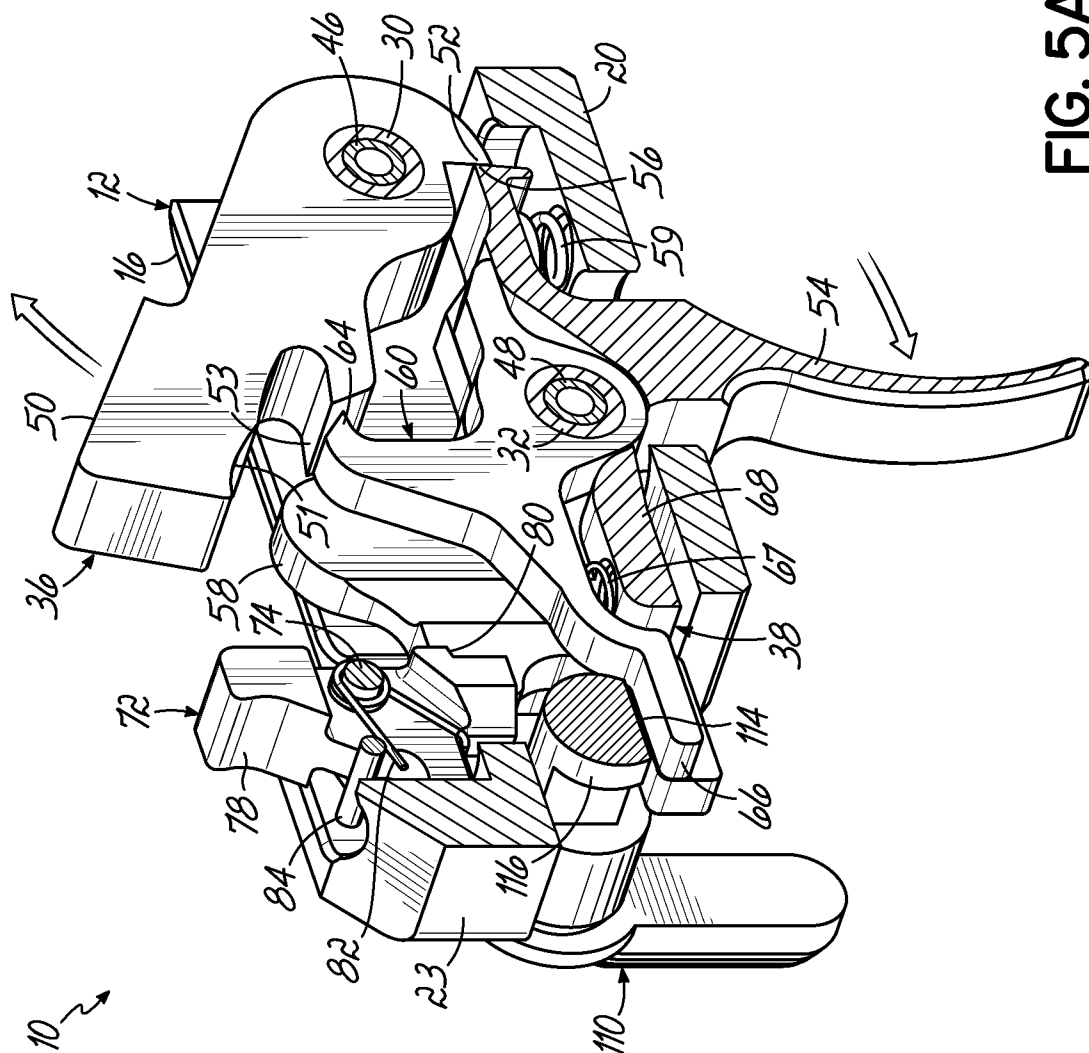


FIG. 4A





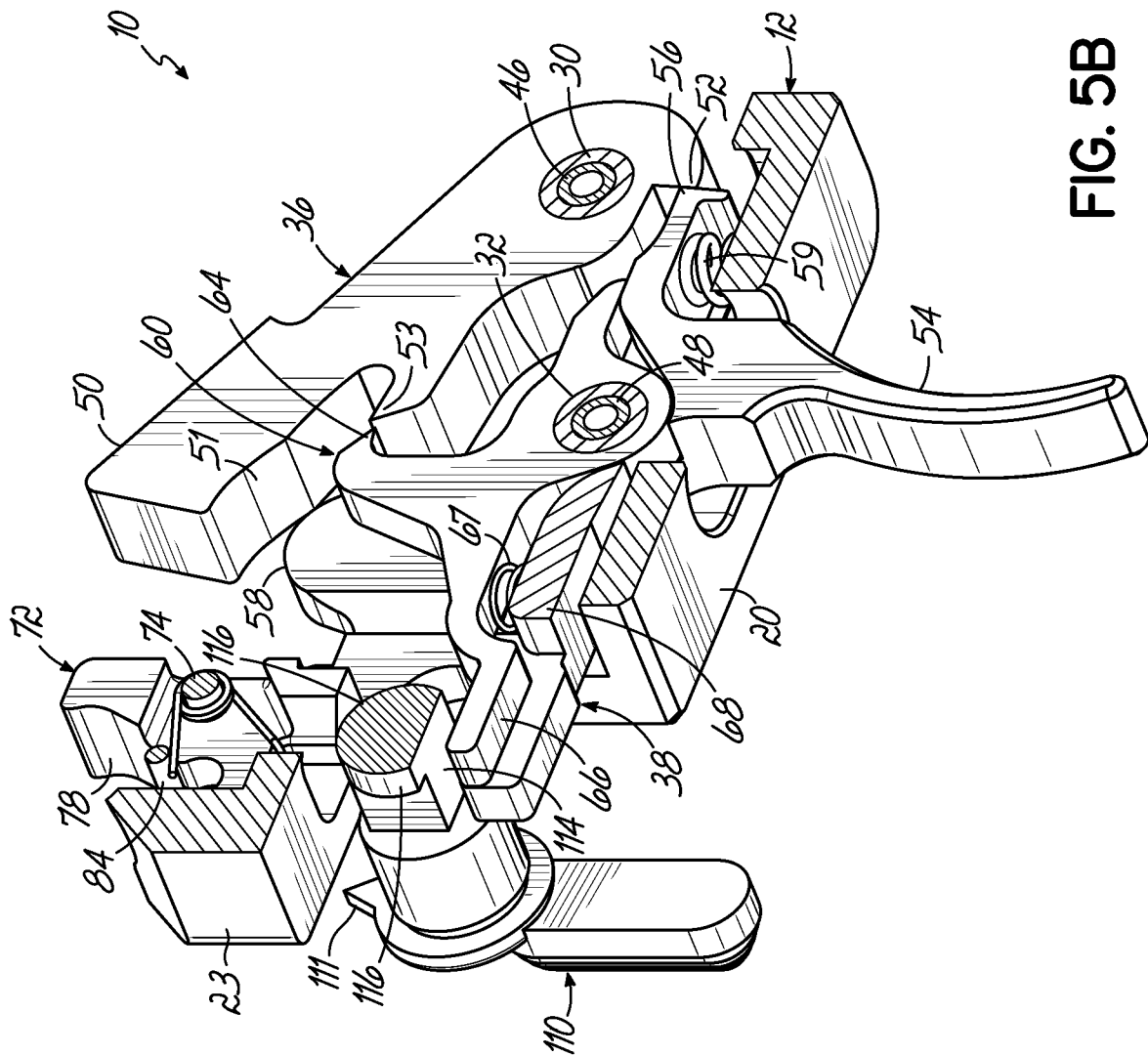
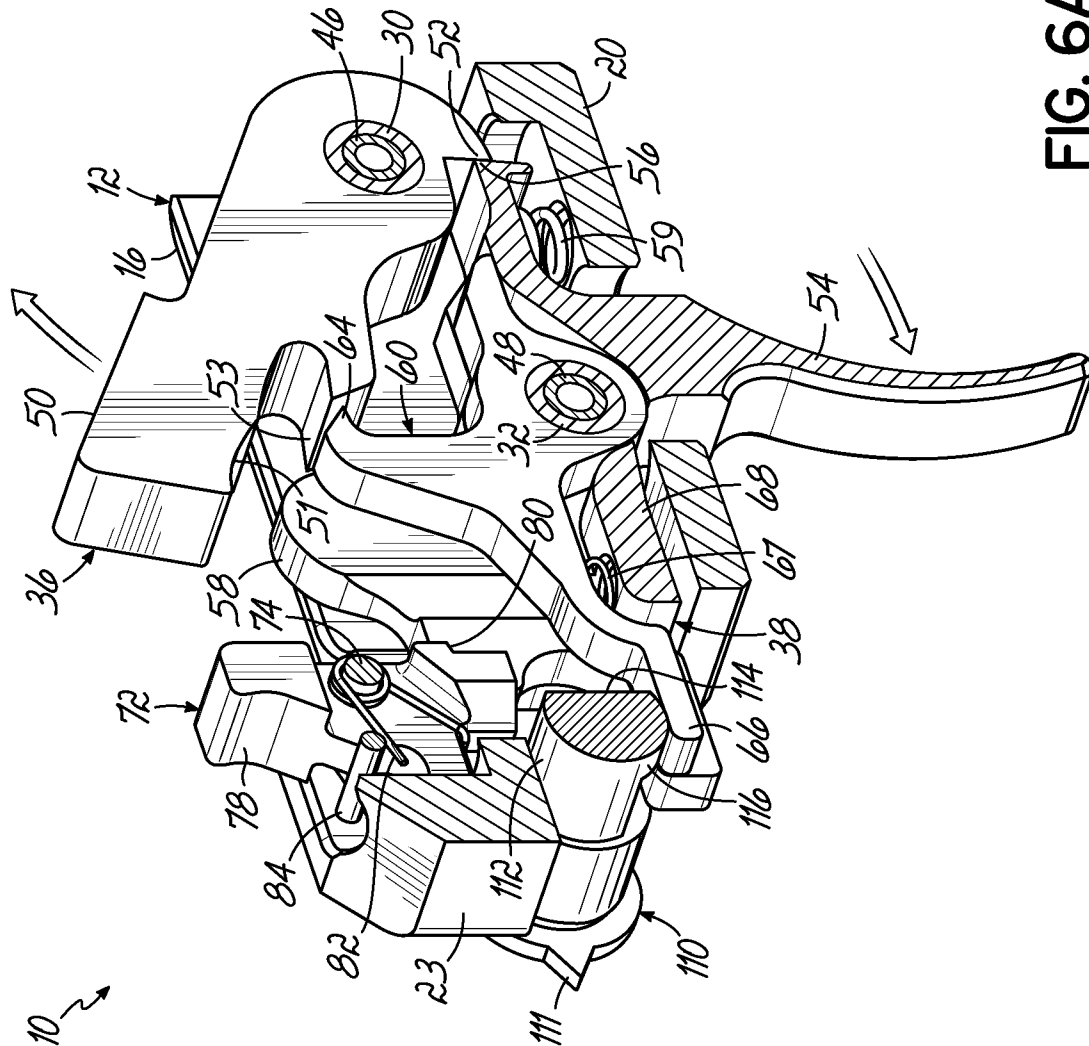


FIG. 5B



**FIG. 6A**

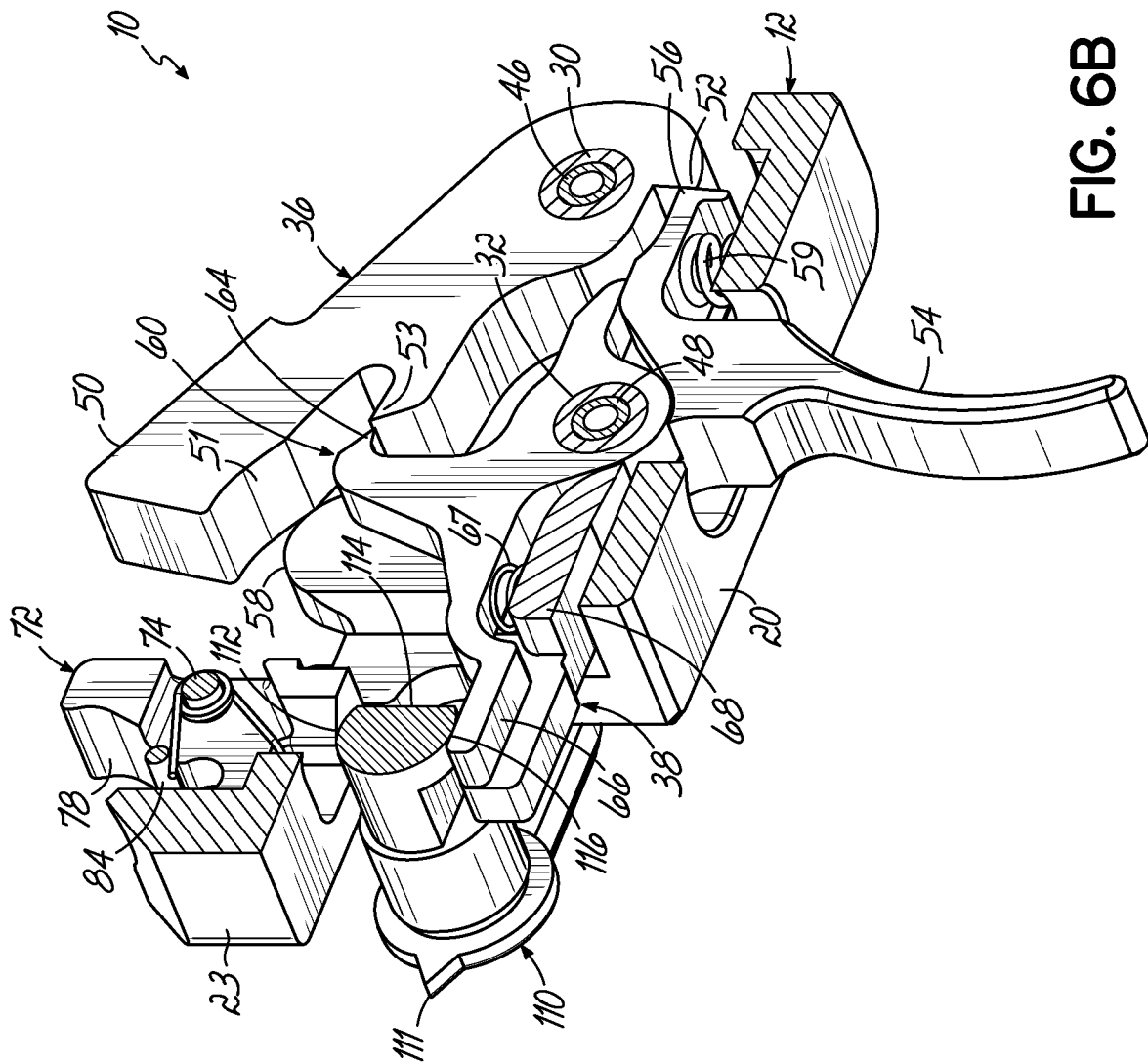


FIG. 6B



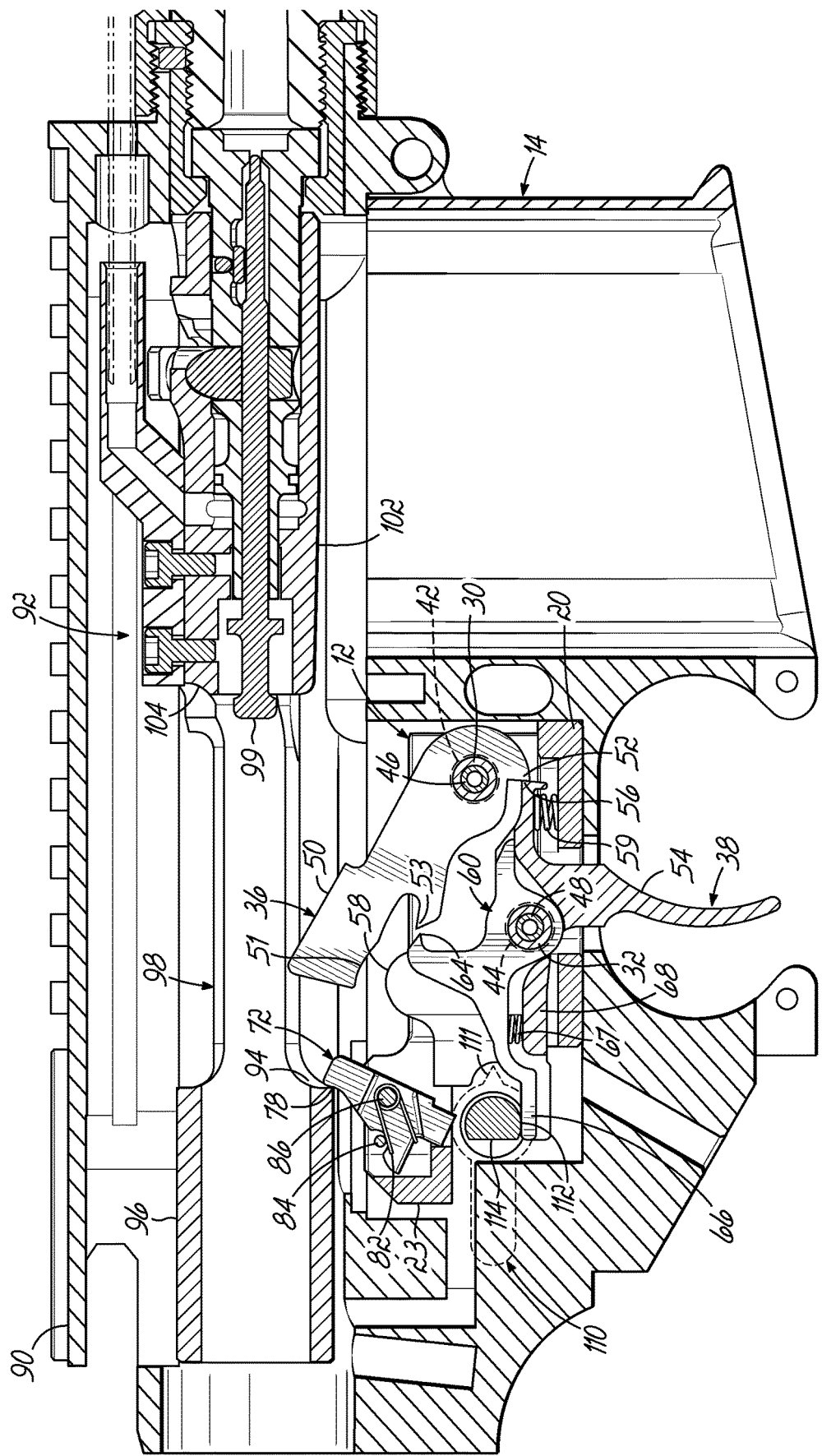
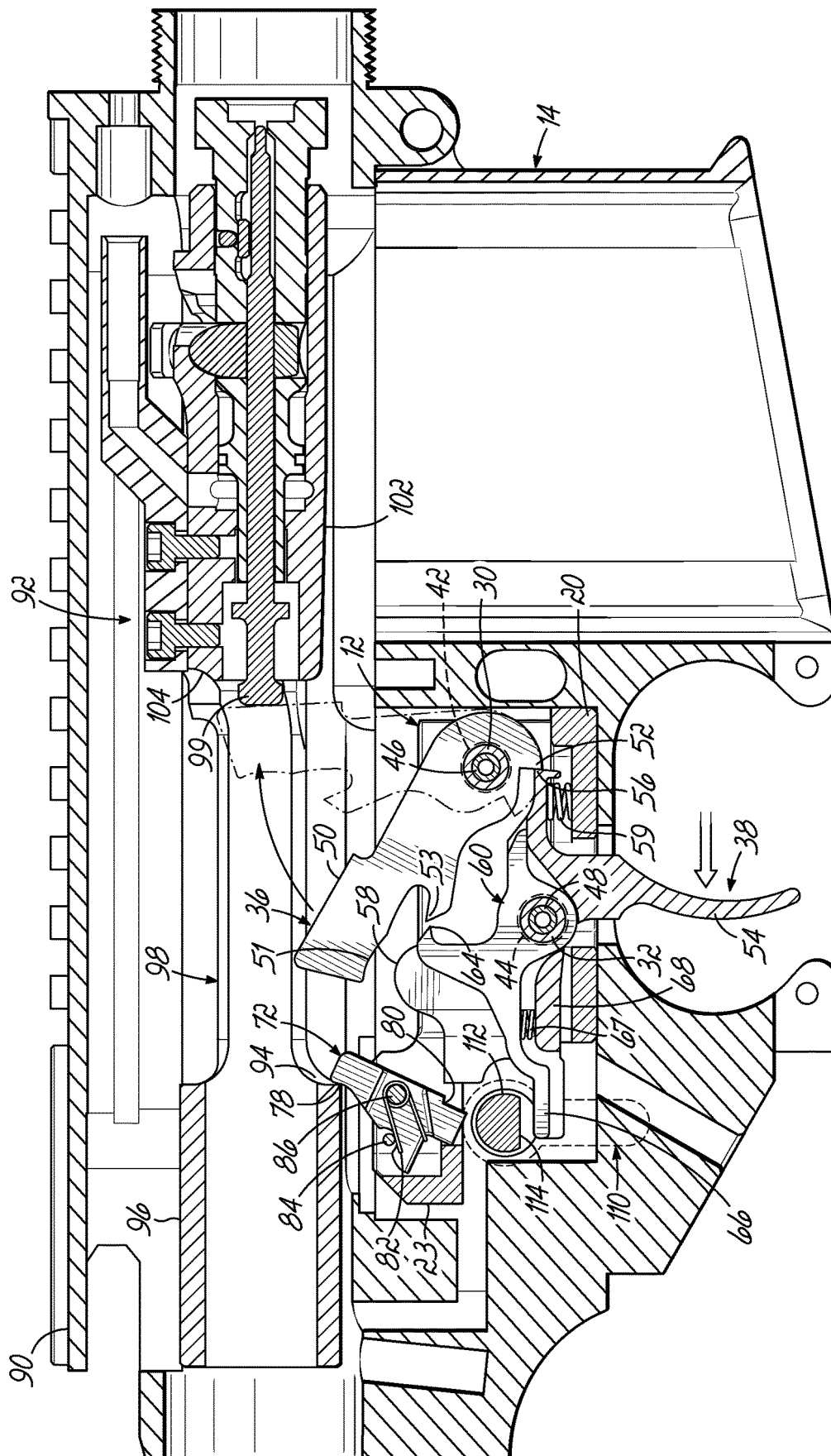


FIG. 7



**FIG. 8A**

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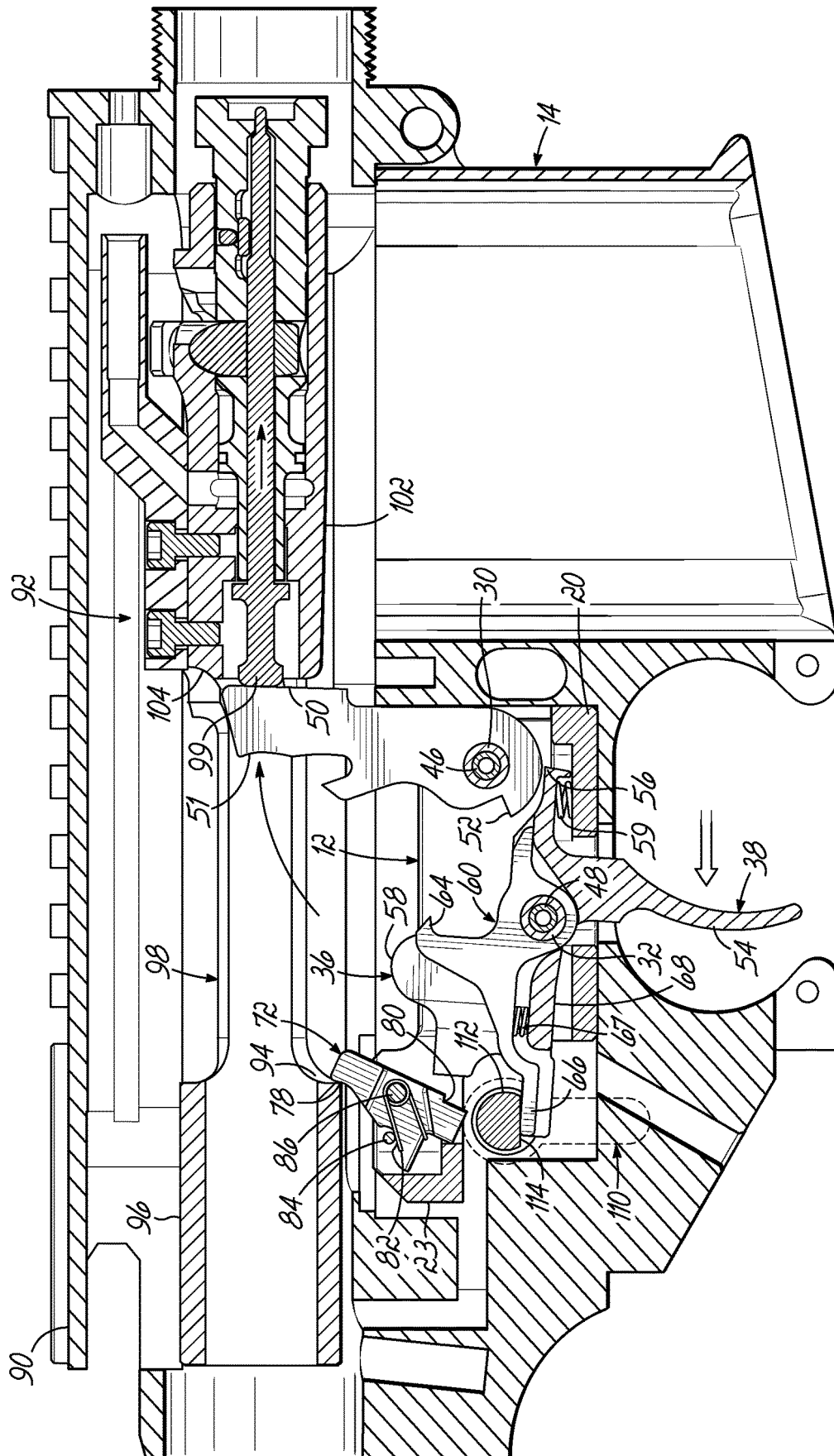


FIG. 8B

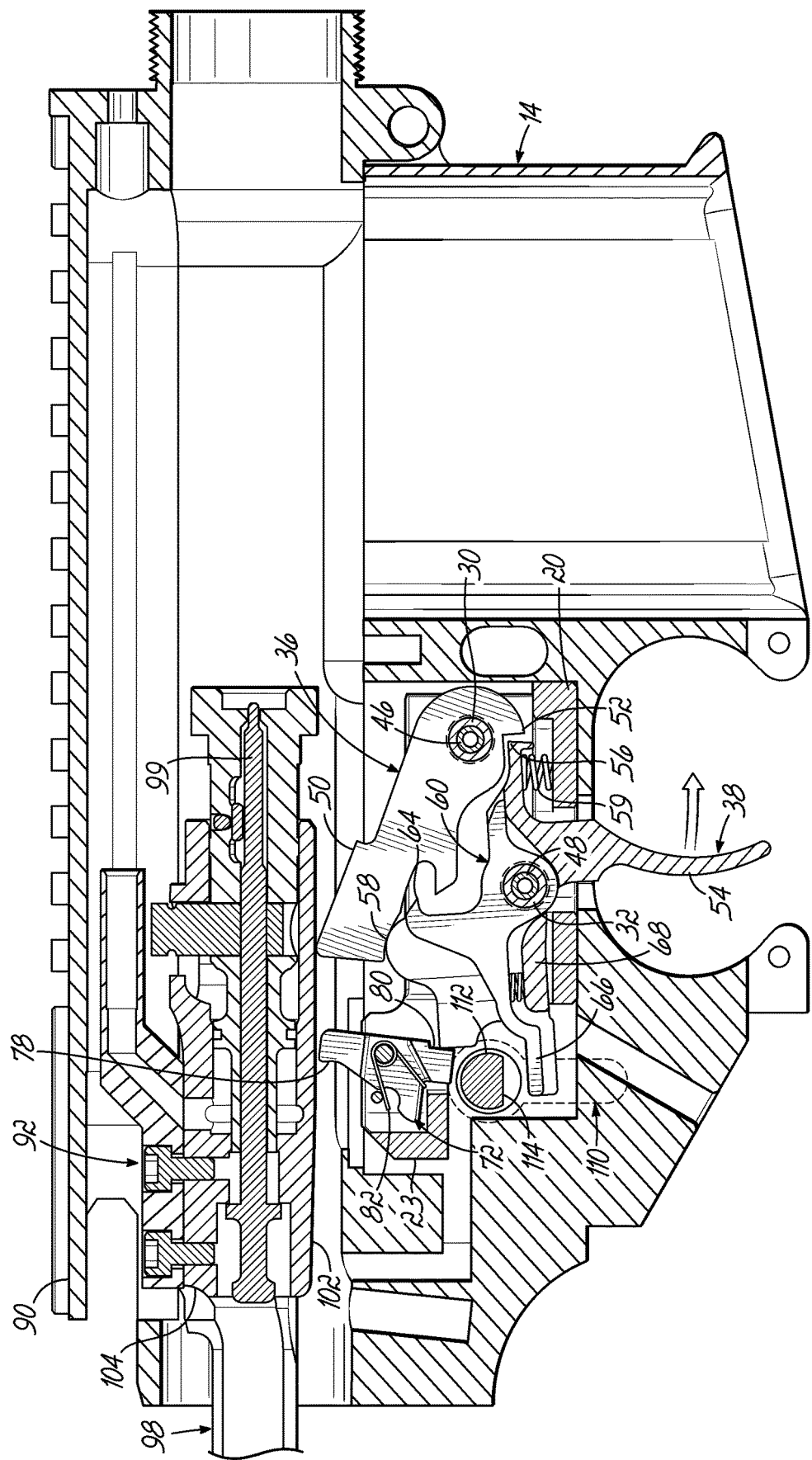


FIG. 8C

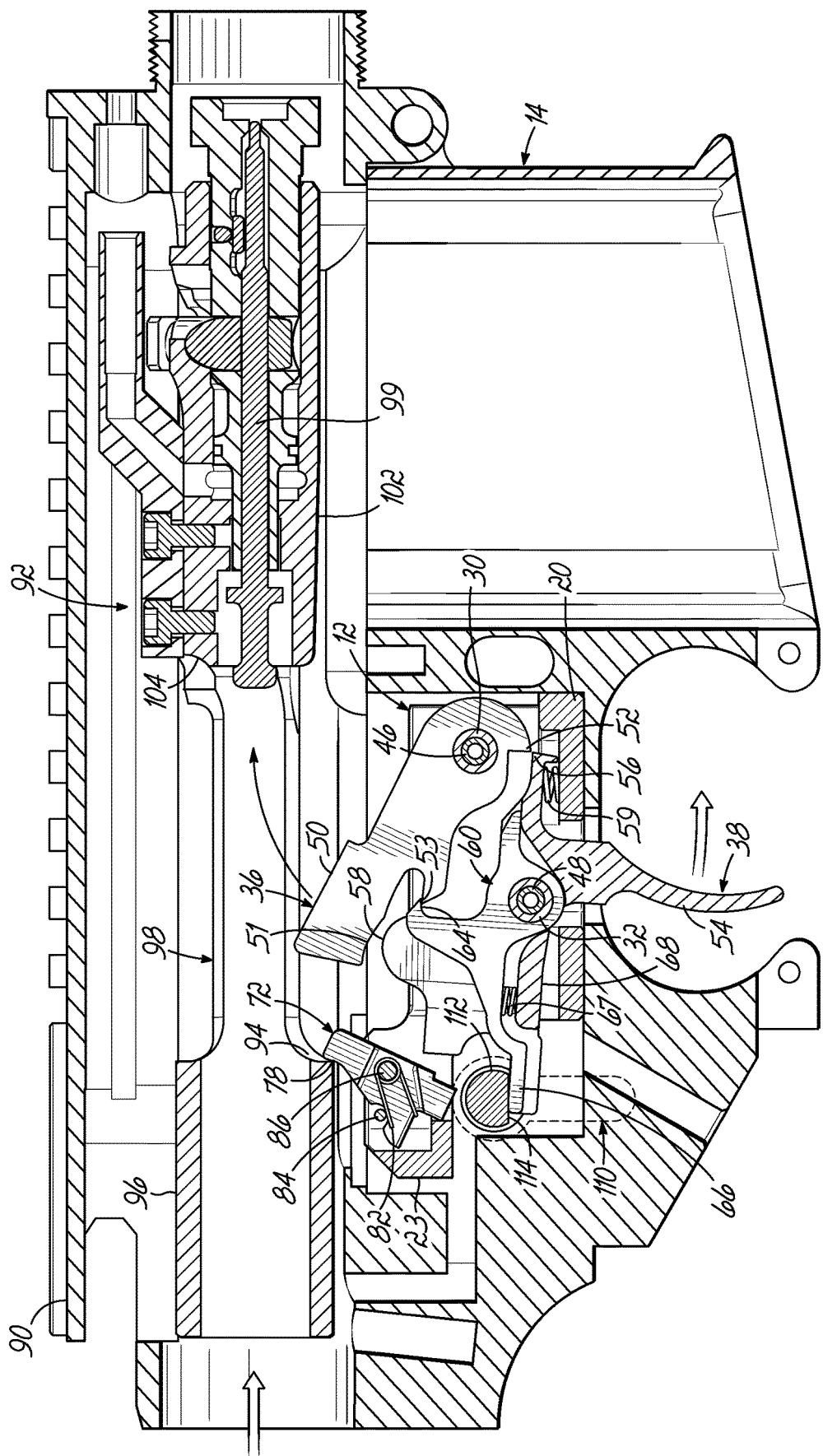


FIG. 8D



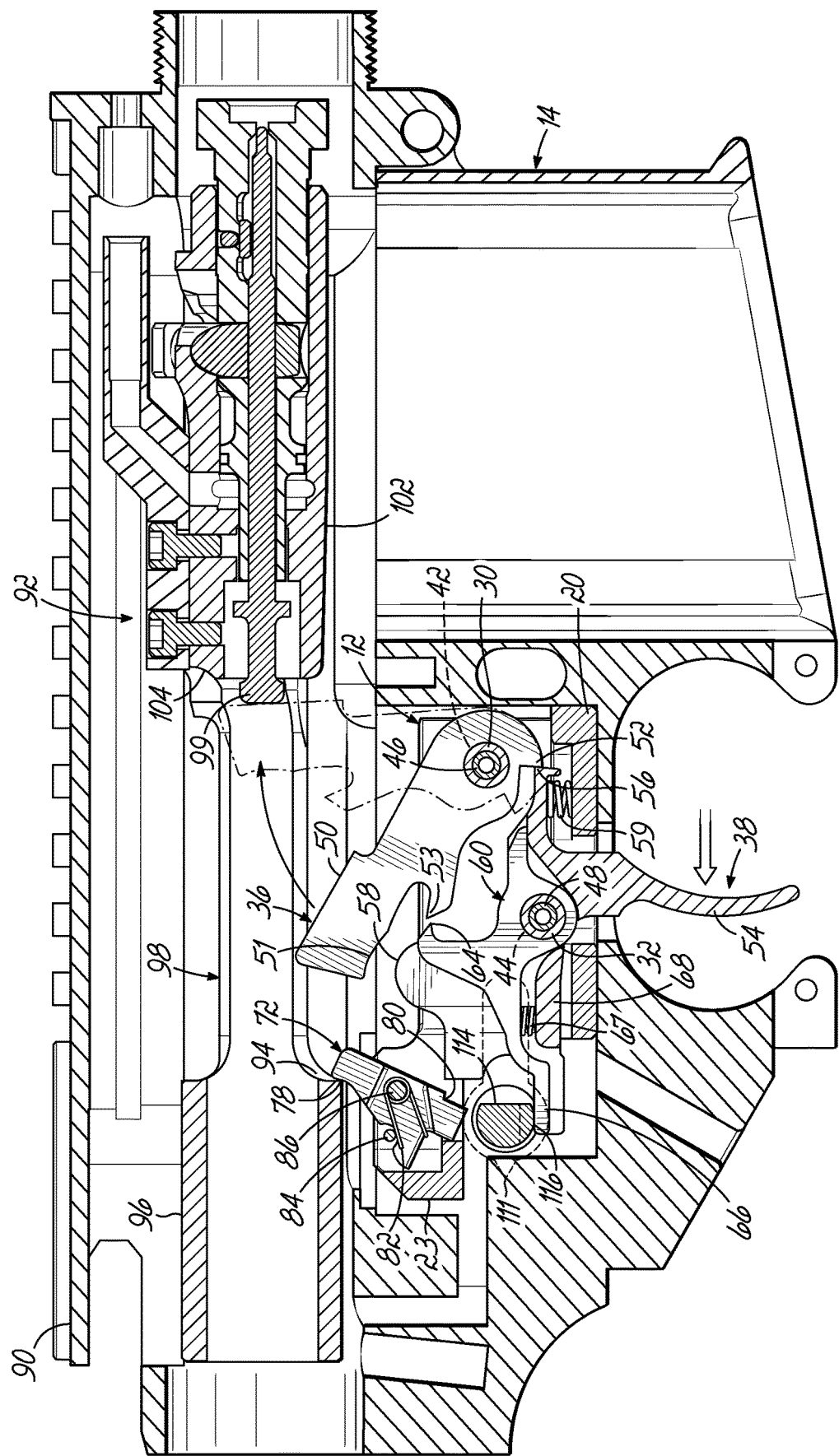


FIG. 9A

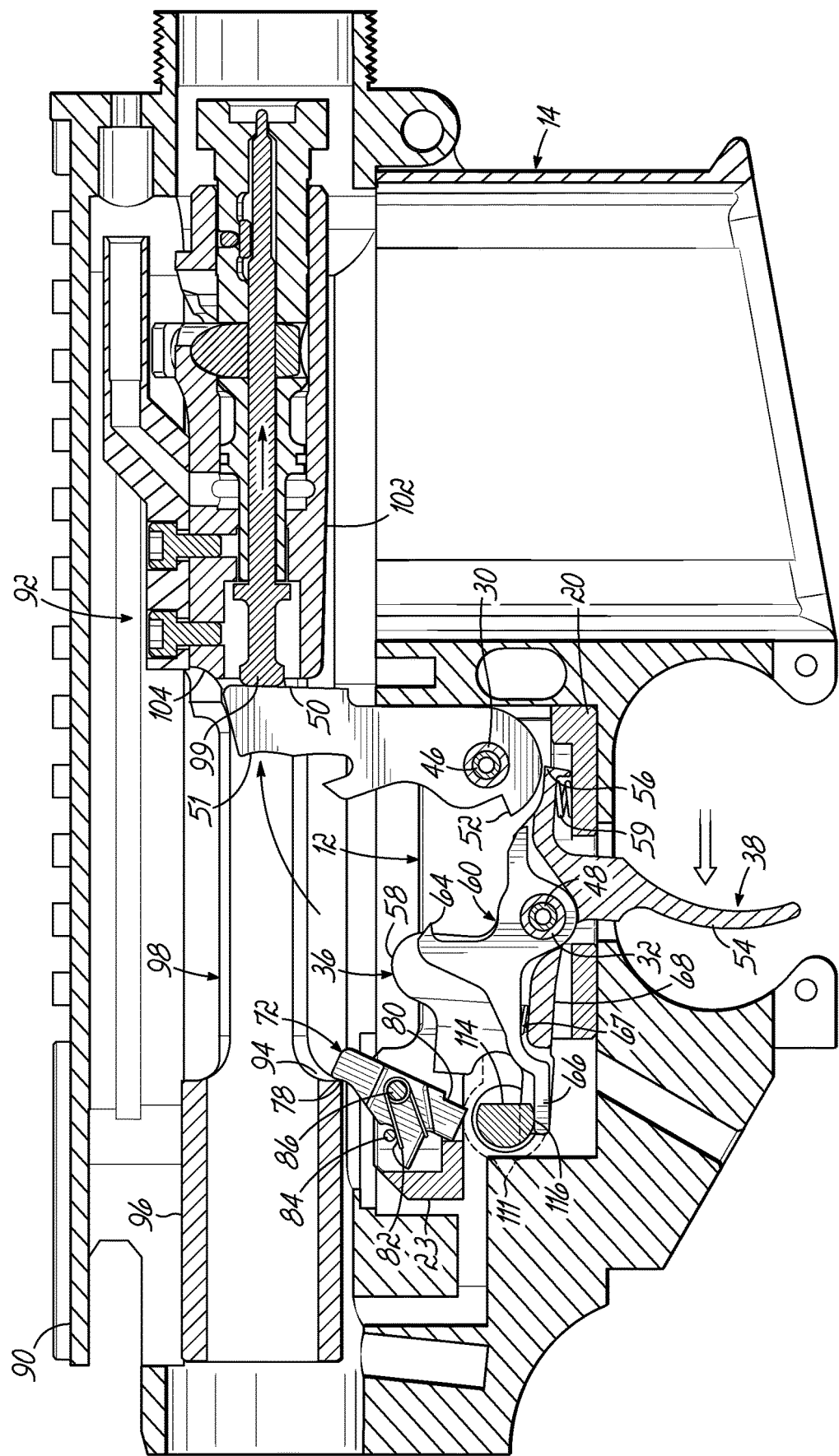


FIG. 9B

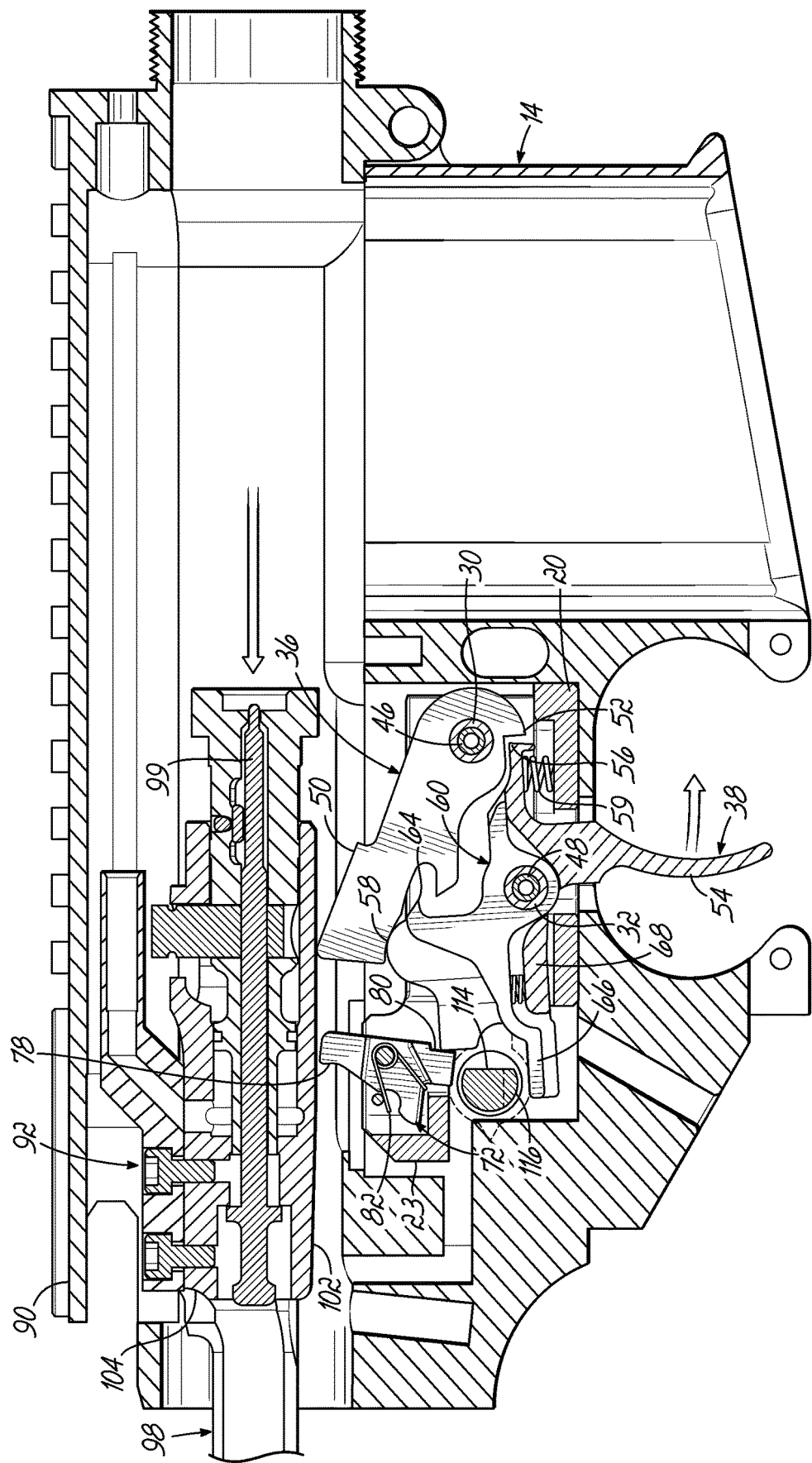
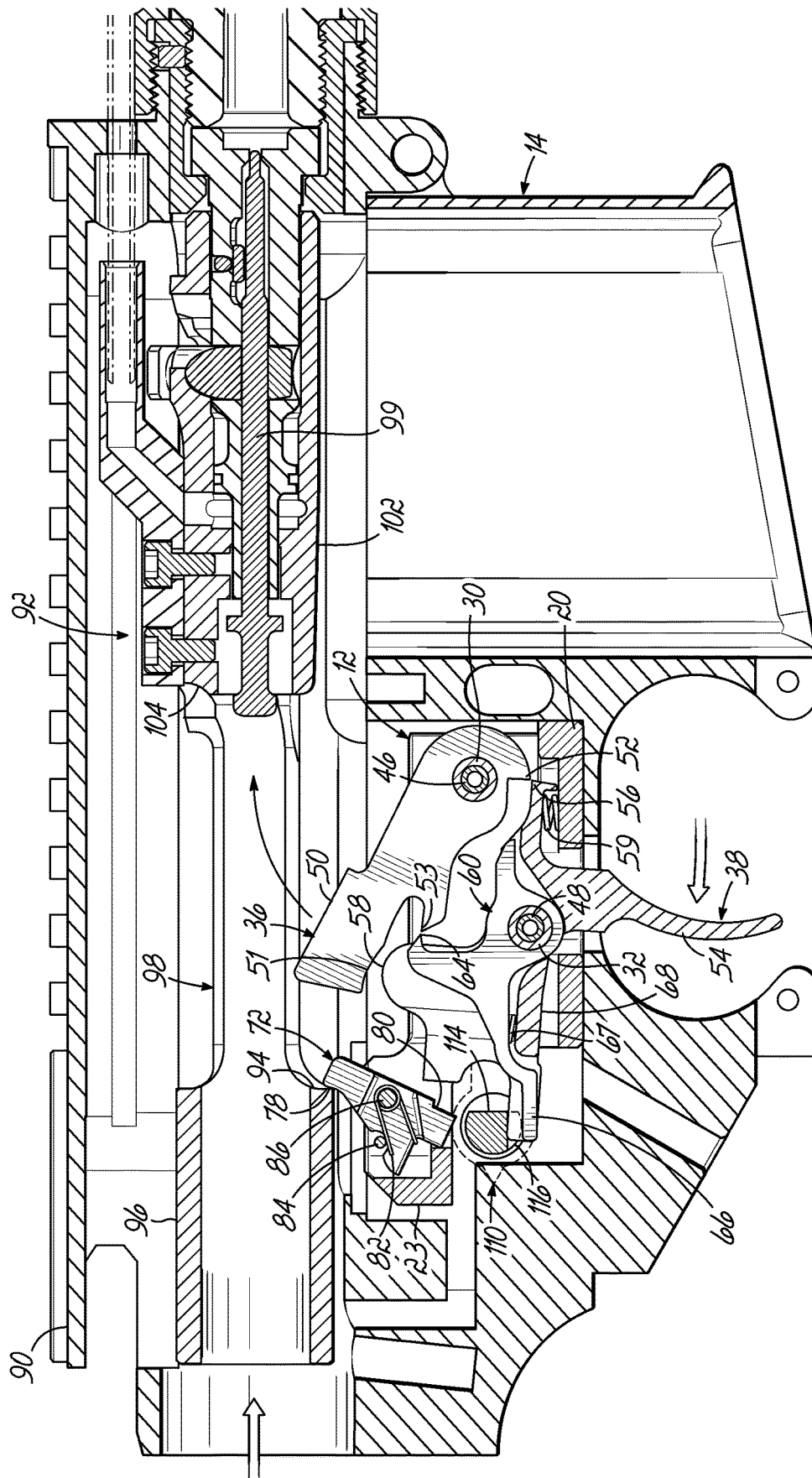


FIG. 9C





**FIG. 9D**

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**FIREARM TRIGGER MECHANISM****RELATED APPLICATIONS**

This application claims the priority benefit of US Provisional Patent Application No. 63/297,884 filed Jan. 10, 2022, which is hereby incorporated by reference herein as if fully set forth in its 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 disconnecter, 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 disconnecter 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

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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 semiautomatic, 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 disconnecter 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 disconnecter 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

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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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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

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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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter hook from catching the hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position

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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 disconnecter 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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

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the set position, the safety selector preventing the disconnecter 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. 4A 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. 4B 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. 5A 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. 5B 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. 6A 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. 6B 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. 8A is a view similar to FIG. 7 but with the safety selector in the standard semi-automatic position.

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

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

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

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

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

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

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



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## 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. 1-6B, 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.

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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 disconnecter 60 is pivoted on the hollow transverse pin 32 upon which the trigger member 38 pivots. The disconnecter 60 has a disconnecter hook 64 and a tail 66. The tail 66 of the disconnecter 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

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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. 4A, 4B, 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 disconnecter 60 can pivot with the trigger member 38 and the disconnecter hook 64 can catch the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 5A and 5B). 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 disconnecter 60 from pivoting with the trigger member 38 thus preventing the disconnecter hook 64 from catching the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 6A and 6B). In other words, in the forced reset semi-automatic position, the disconnecter 60 is “disabled” in that the disconnecter hook 64 is unable to catch the hammer hook 53 during cycling of the bolt carrier assembly 92.

Referring now to FIGS. 8A-8D, 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 disconnecter 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. 9A-9D, 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 discon-

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necter 60 from rotating with the trigger member 38, thus “disabling” the disconnecter 60, preventing the disconnecter 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 firearm trigger mechanism comprising:

a hammer having a sear catch and a hook for engaging a disconnecter 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

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transverse trigger member pivot axis between set and released positions, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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 disconnecter 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 locking member adapted to be mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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 causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 disconnecter preventing said disconnecter 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 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 disconnecter and mounted in said housing to pivot on said hammer pin between set and released positions,

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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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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

a locking member mounted in said housing to pivot on a transverse locking member pin, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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 causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 disconnecter preventing said disconnecter hook from catching said hammer hook.

6. The trigger mechanism of claim 4, wherein said first and second pairs of 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 compression spring positioned between a forward end of said trigger member and a floor of said housing.

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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  
 disconnecter and mounted in said fire control mechanism pocket to pivot on a transverse hammer pivot axis between set and released positions, said hammer 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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,  
 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 disconnecter 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 locking member mounted in said fire control mechanism pocket to pivot on a transverse locking member pivot axis, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and moved against said spring bias to said second position by contact from said bolt carrier during forward movement of said bolt carrier as said bolt carrier reaches a substantially in-battery position, and  
 a safety selector adapted 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 such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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 said bolt carrier causes rearward pivoting of said hammer causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when said bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the 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 disconnecter mounted on said trigger member pin.

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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 including a spring which biases said trigger member towards said set position.

13. The firearm of claim 12 wherein said spring is a compression spring positioned between a forward end of said trigger member and a floor of said housing.

14. A firearm trigger mechanism comprising:  
 a hammer having a sear catch and a hook for engaging a disconnecter 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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,  
 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 disconnecter 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 locking member adapted to be movably mounted in the fire control mechanism pocket, said locking member being movable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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,  
 whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter to permit said hammer



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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 5  
pivoting of said hammer causing said trigger member  
to be forced to said set position, said safety selector  
preventing said disconnecter hook from catching said  
hammer hook, and thereafter when the bolt carrier  
reaches the substantially in-battery position the user 10  
can pull said trigger member to fire the firearm without  
manually releasing said trigger member.

\* \* \* \* \*

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(12) **United States Patent**  
**Strbac**

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(54) **FIREARM TRIGGER MECHANISM**

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(57) **ABSTRACT**

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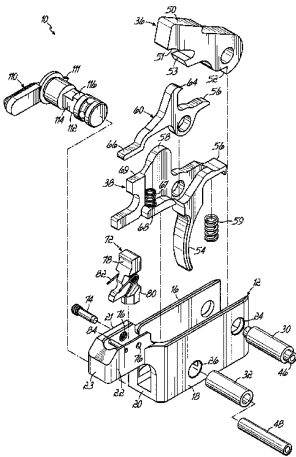
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A trigger mechanism that can be used in AR-pattern firearms has a hammer, a trigger member, a disconnecter, a locking member, and a “three position” safety selector having safe, standard semi-automatic, and forced reset semi-automatic positions. In the standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of the hammer such that the disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 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.

**12 Claims, 18 Drawing Sheets**



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- (51) **Int. Cl.**  
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*F41A 19/15* (2006.01)
- (52) **U.S. Cl.**  
 CPC ..... *F41A 17/48* (2013.01); *F41A 19/10* (2013.01); *F41A 19/15* (2013.01); *F41A 19/24* (2013.01); *A61L 2300/252* (2013.01); *A61L 2300/418* (2013.01); *A61L 2400/04* (2013.01); *A61L 2430/36* (2013.01)

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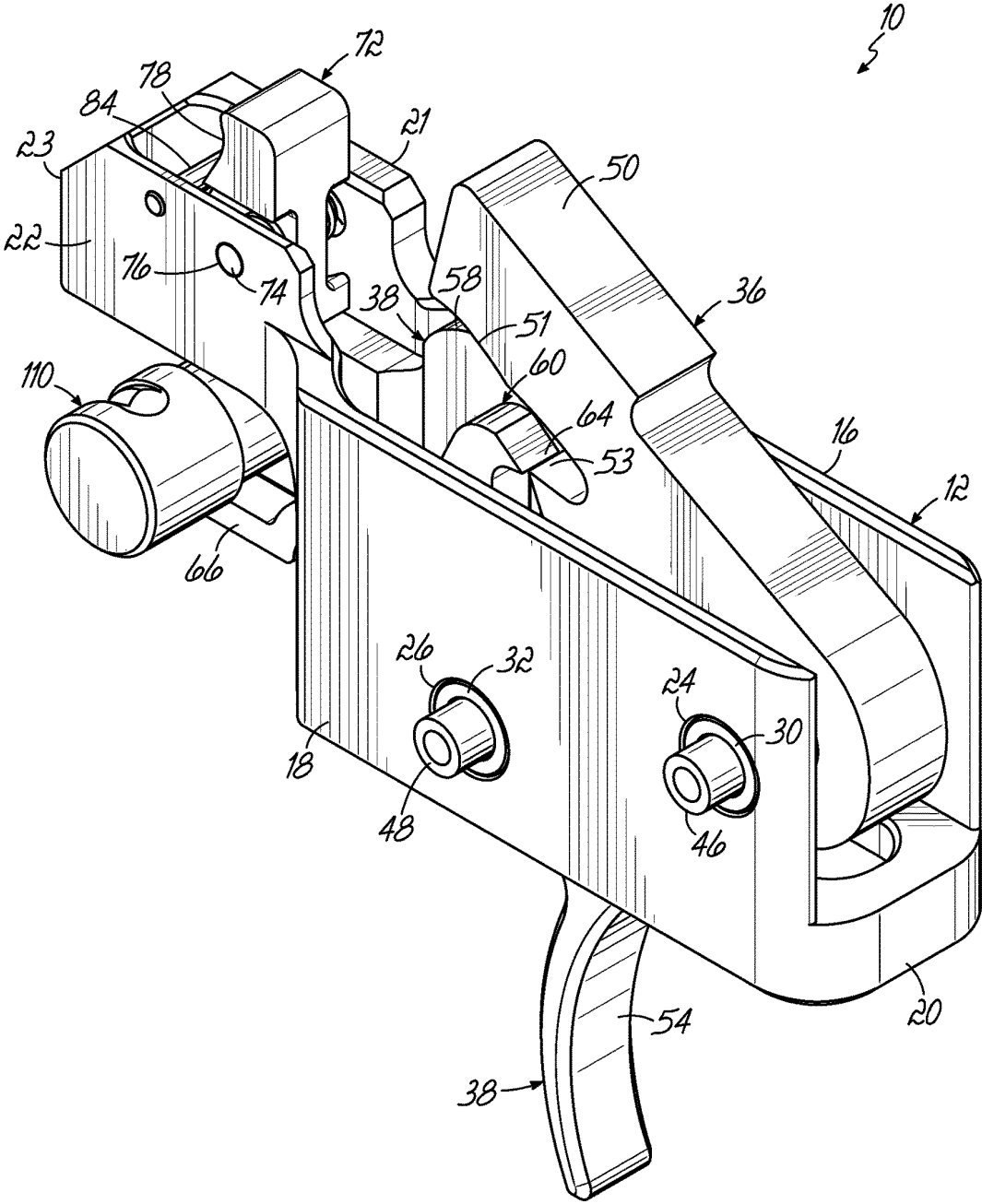


FIG. 1

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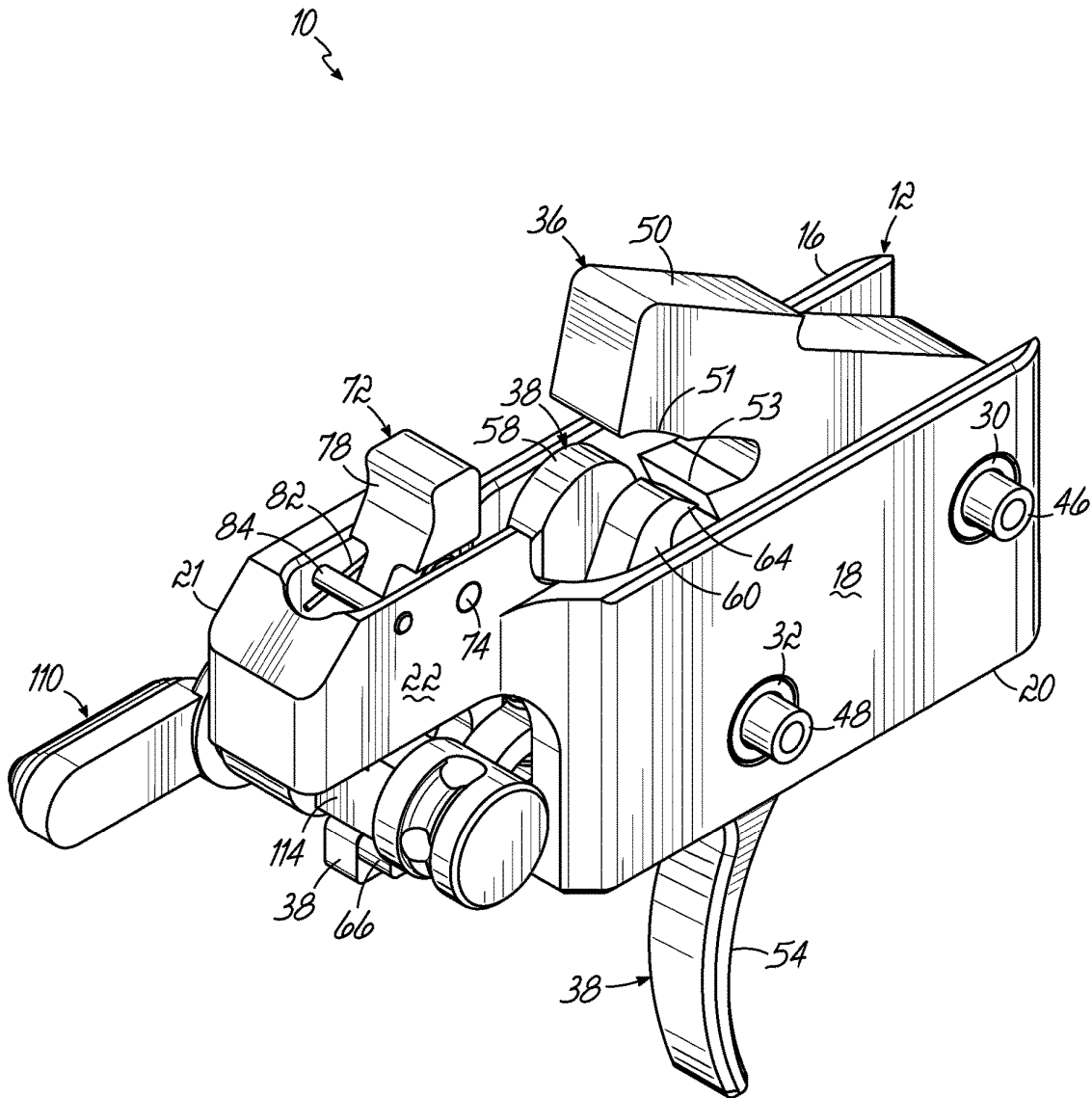


FIG. 2

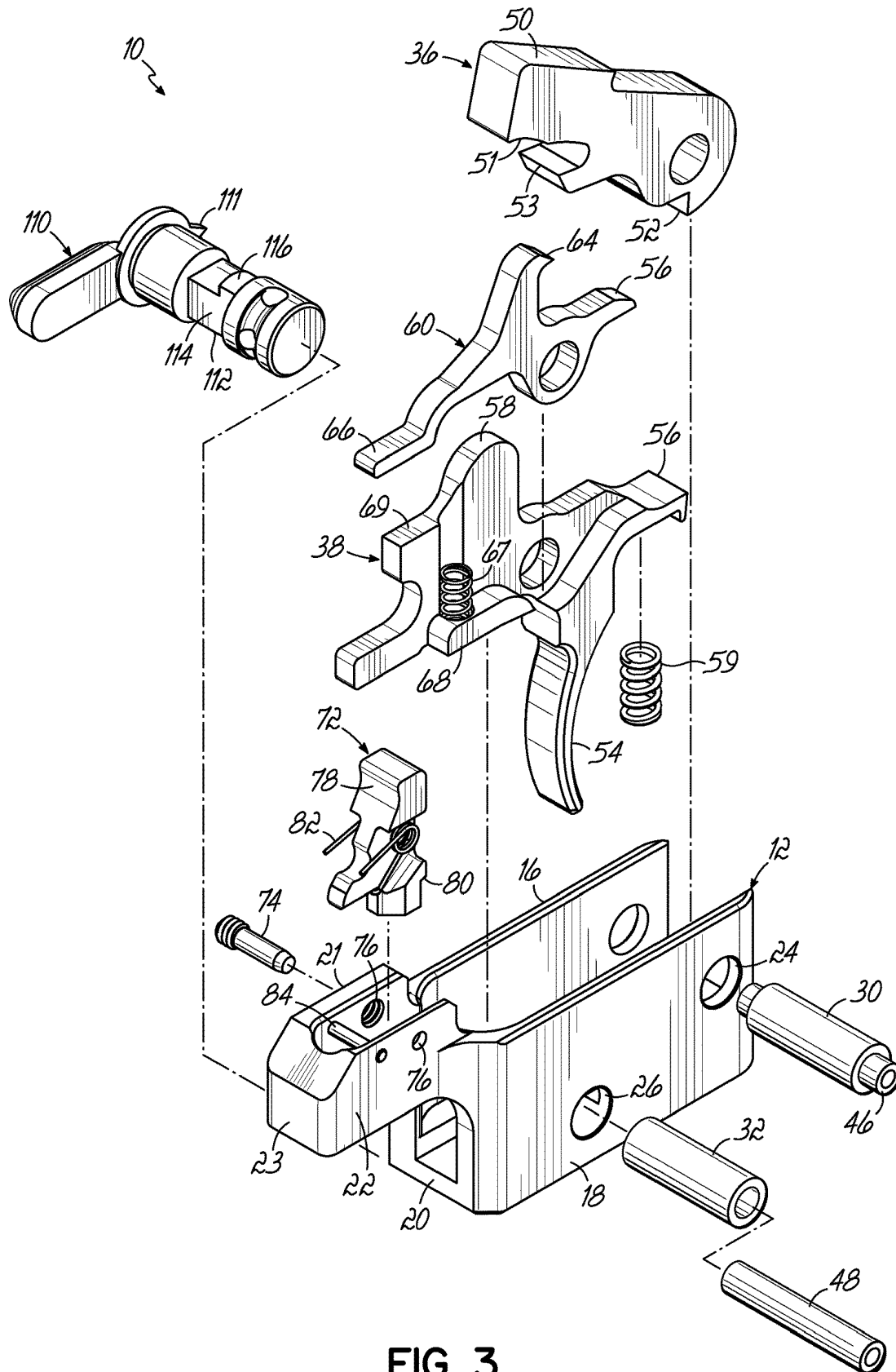
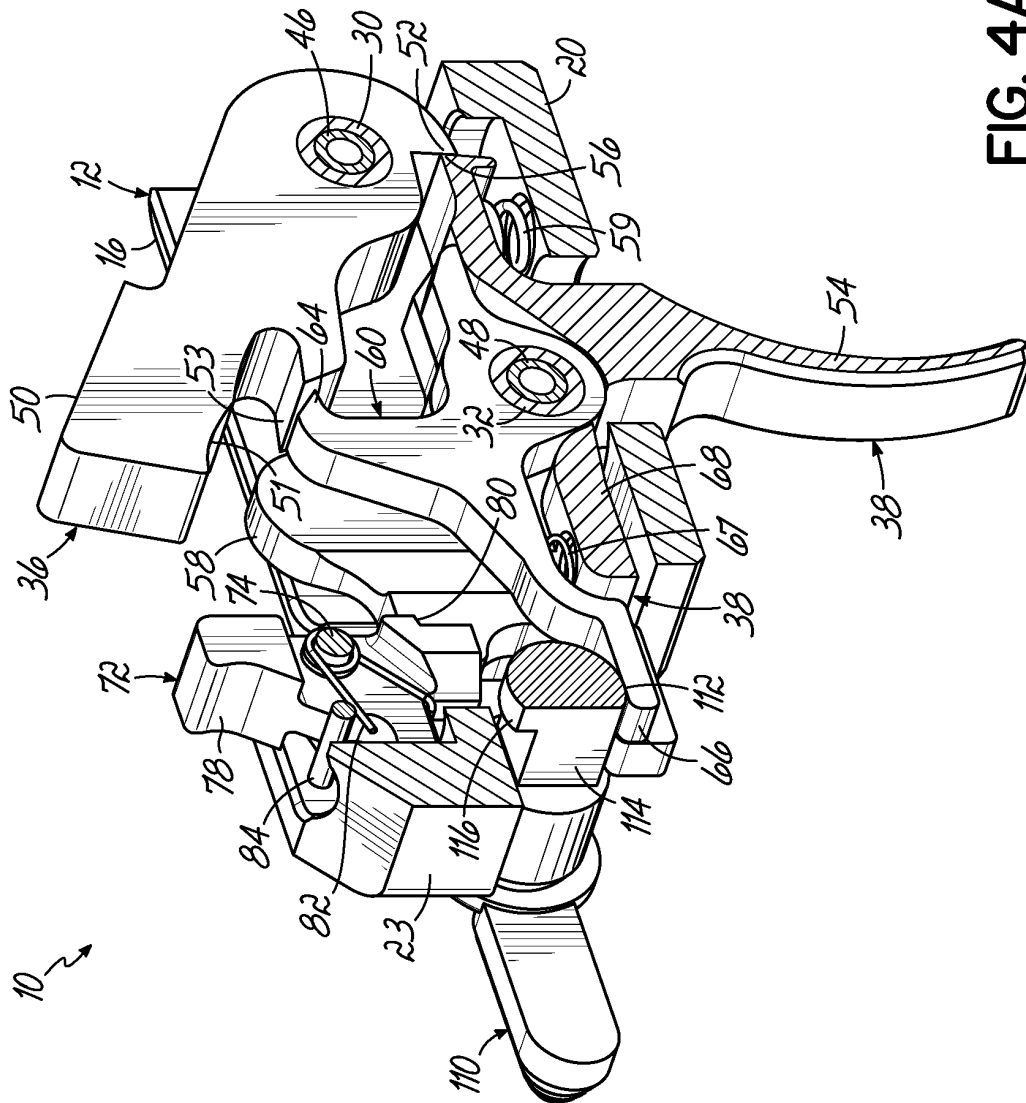
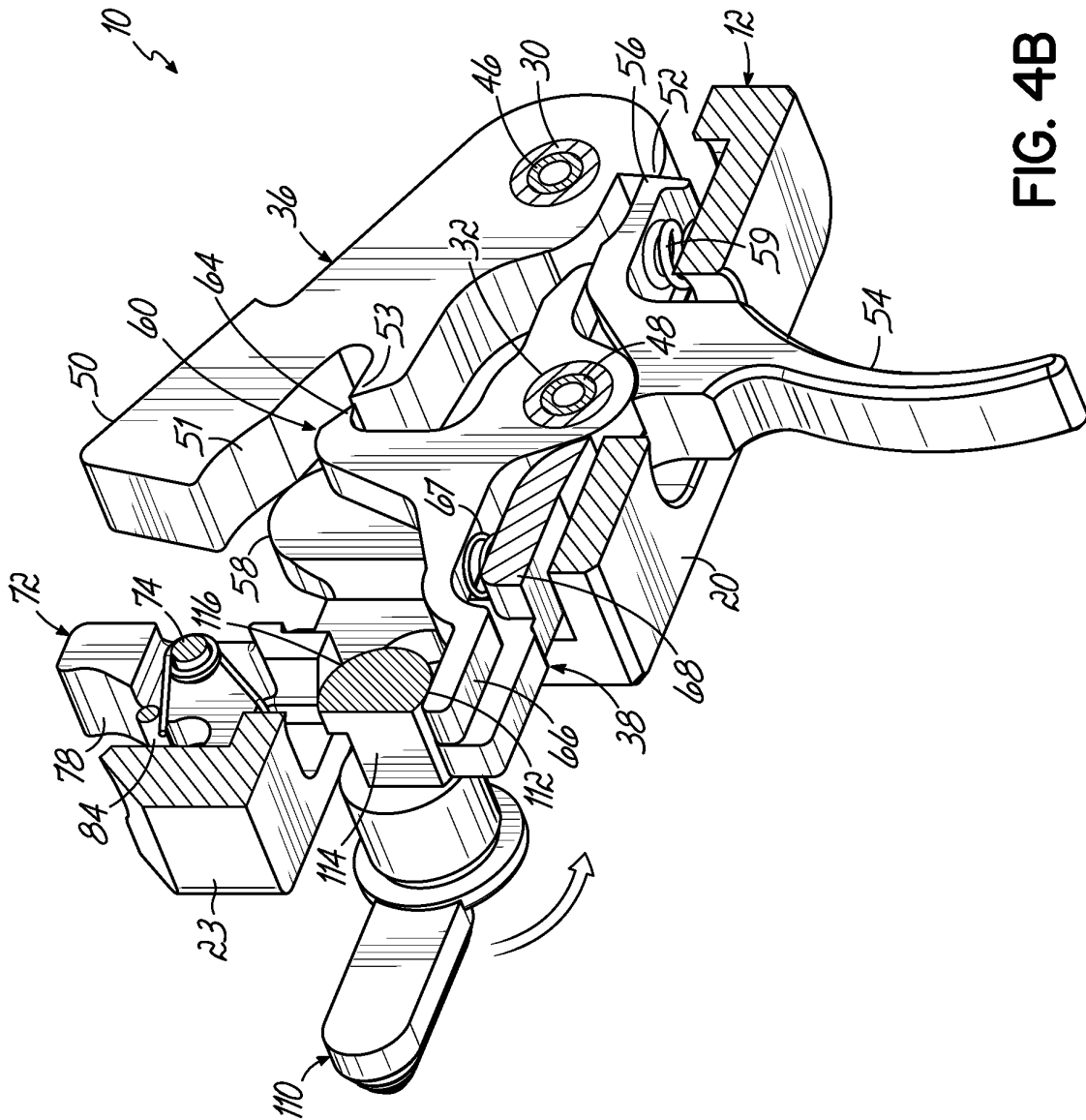


FIG. 3







**FIG. 4B**

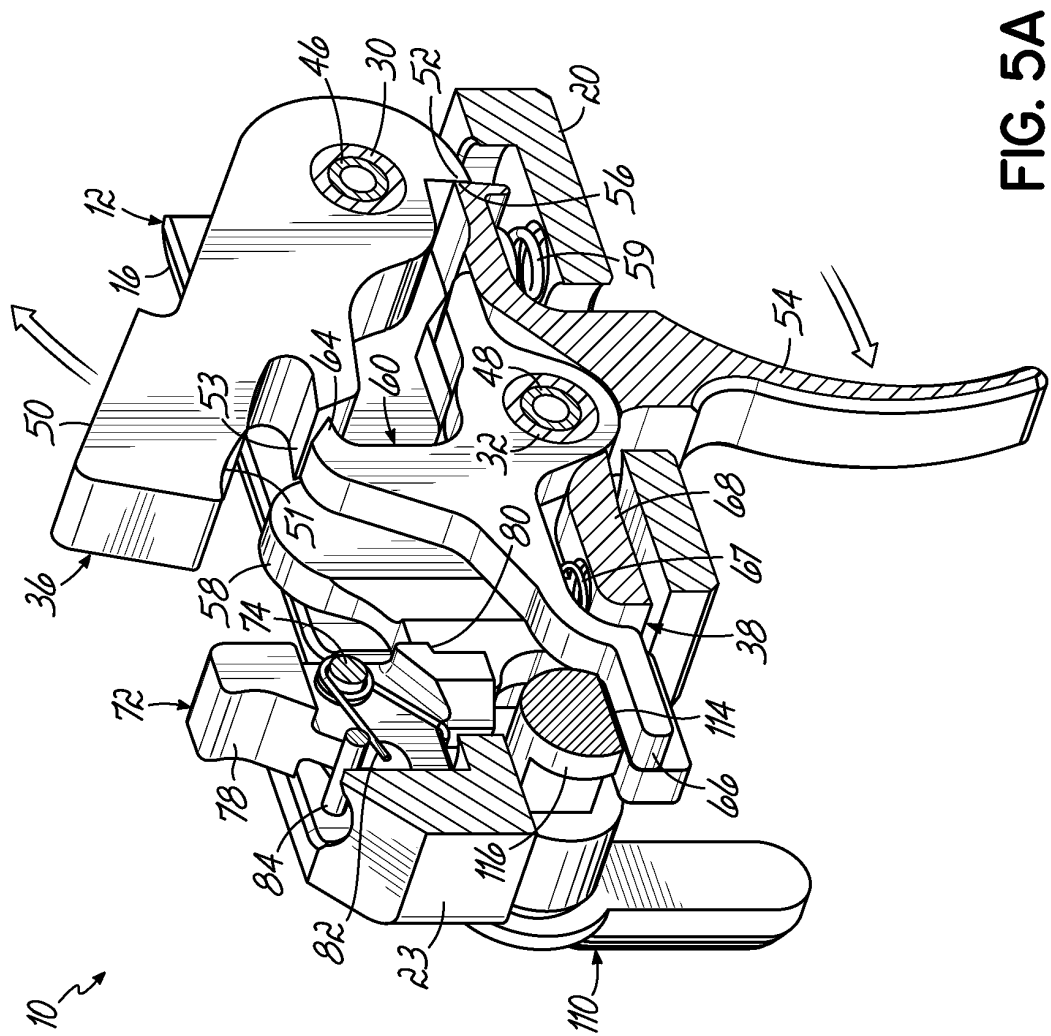
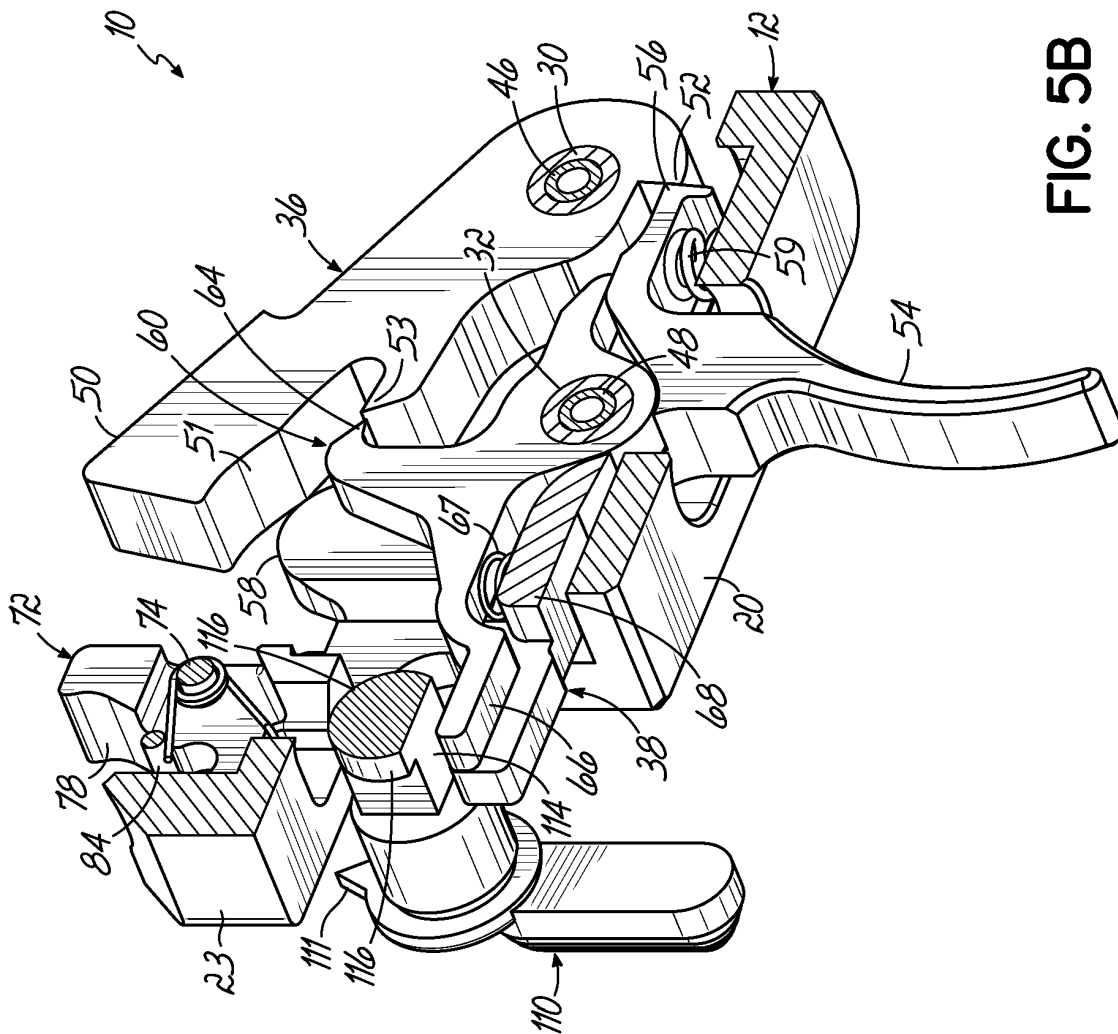
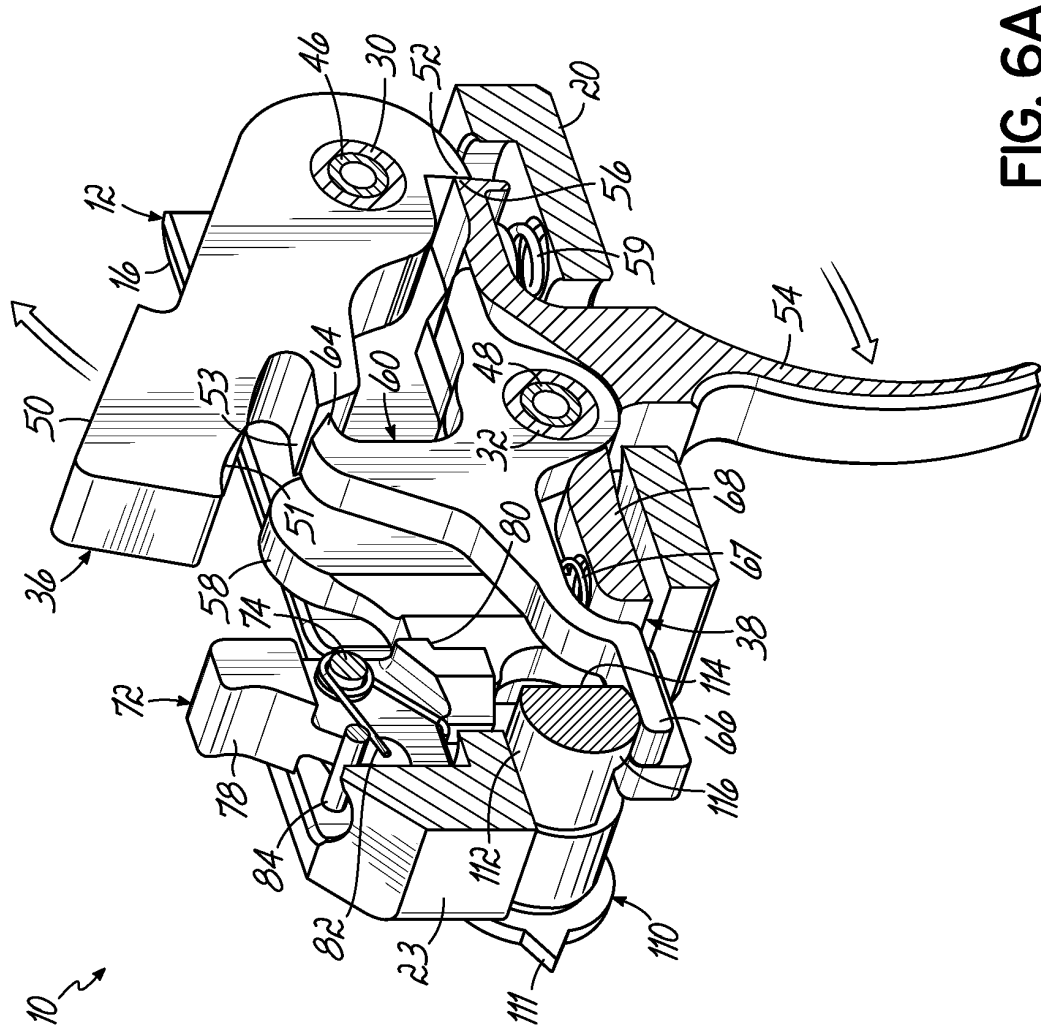


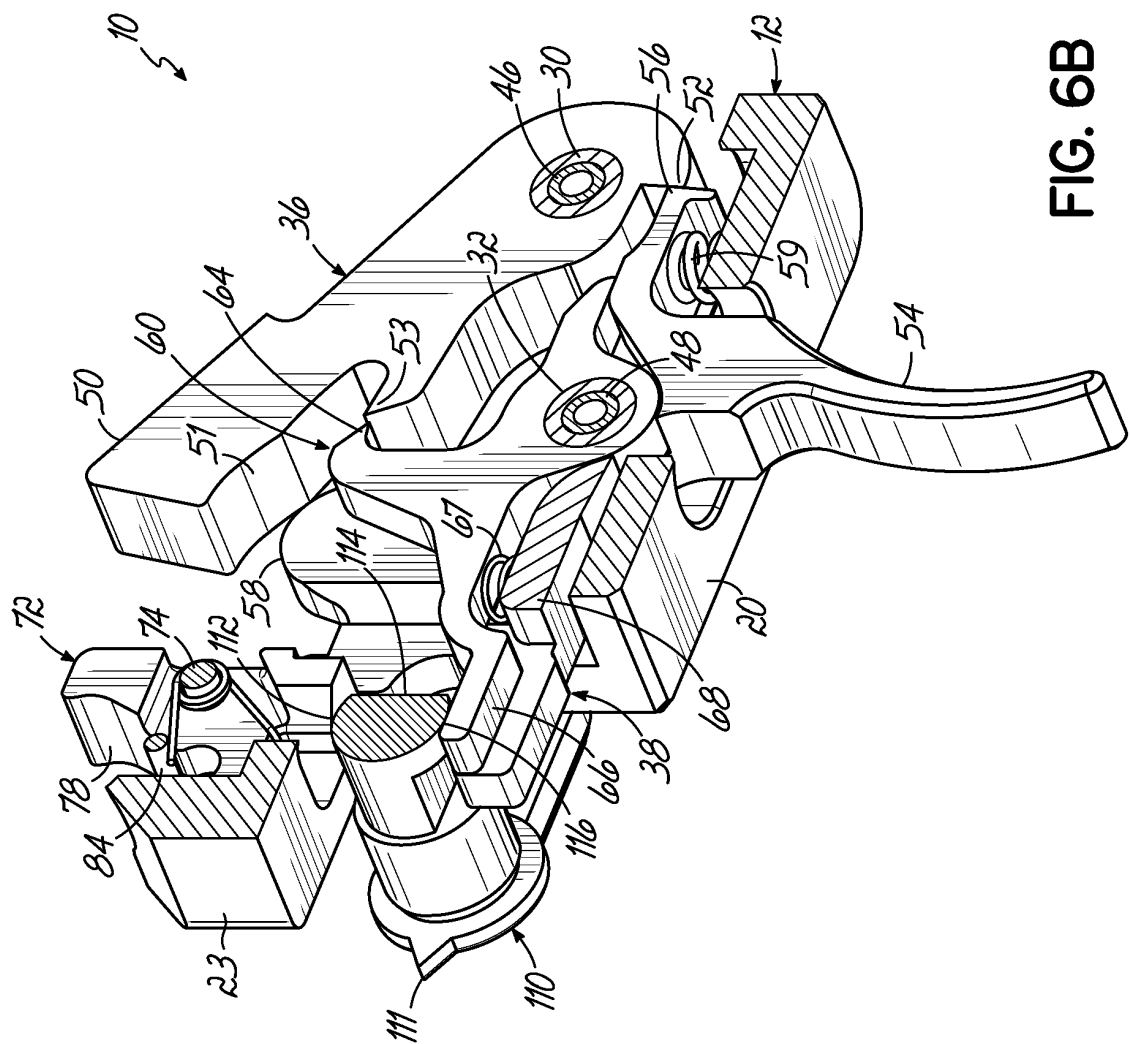
FIG. 5A



**FIG. 5B**



**FIG. 6A**



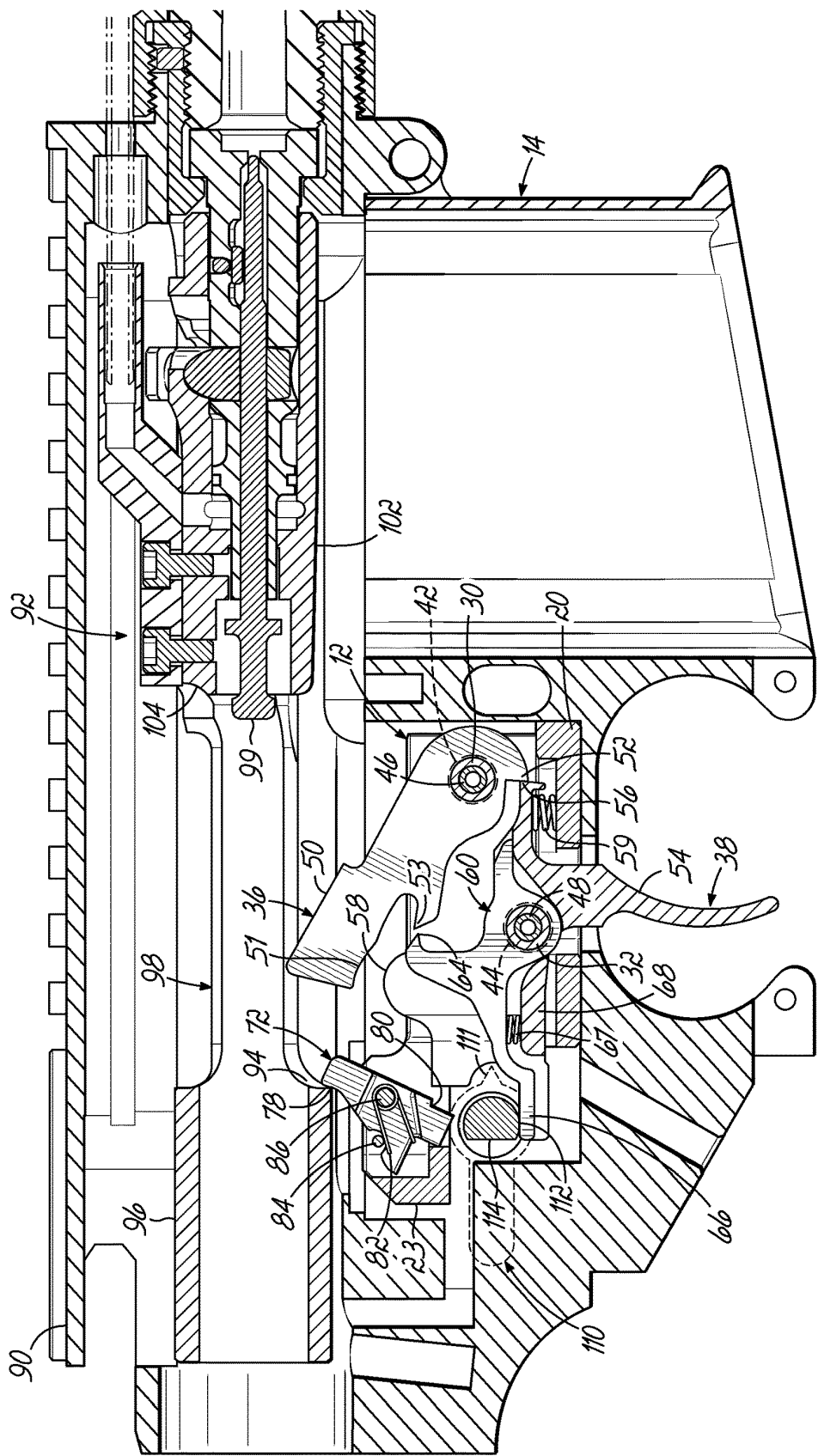
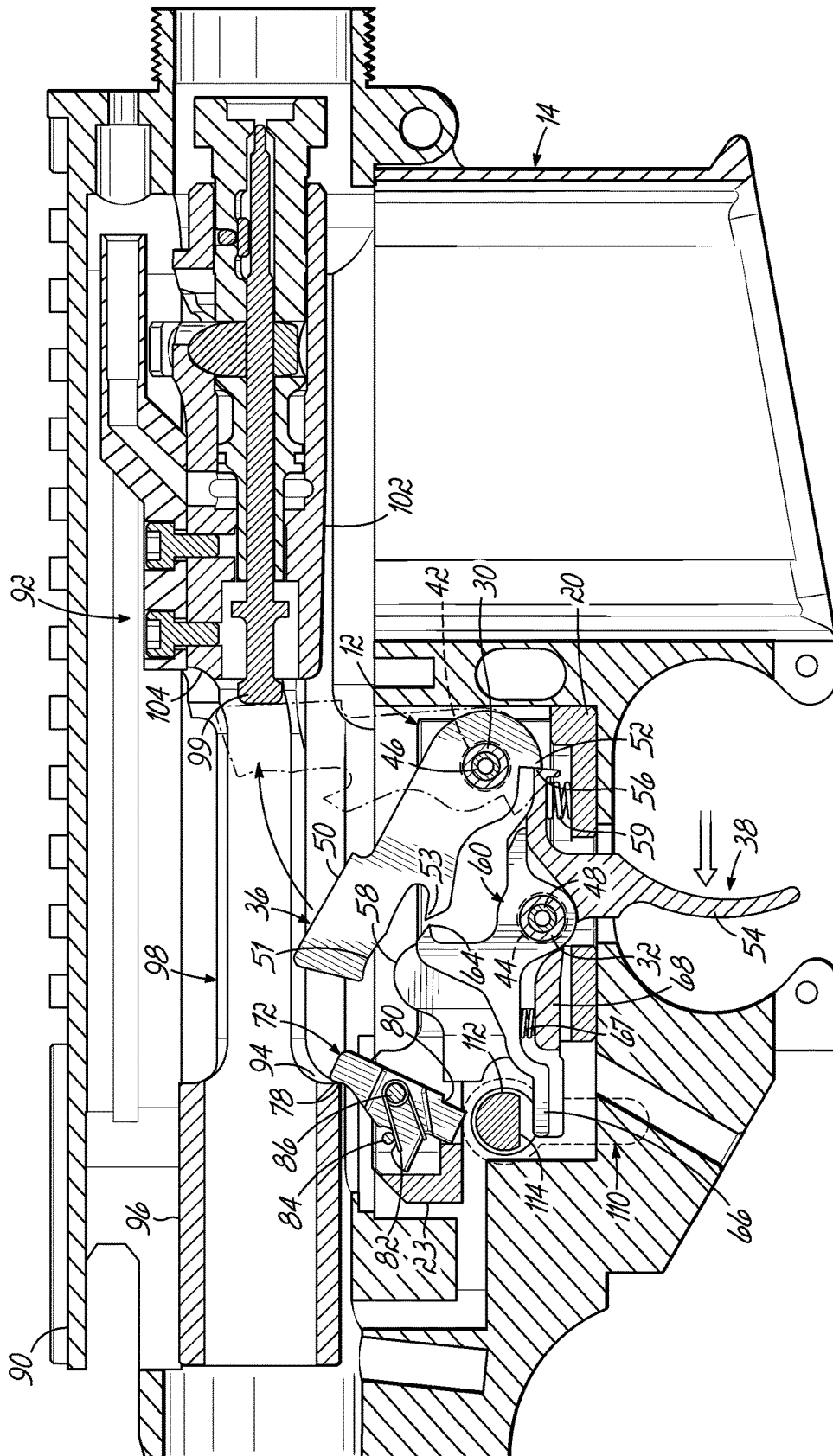


FIG. 7





**FIG. 8A**

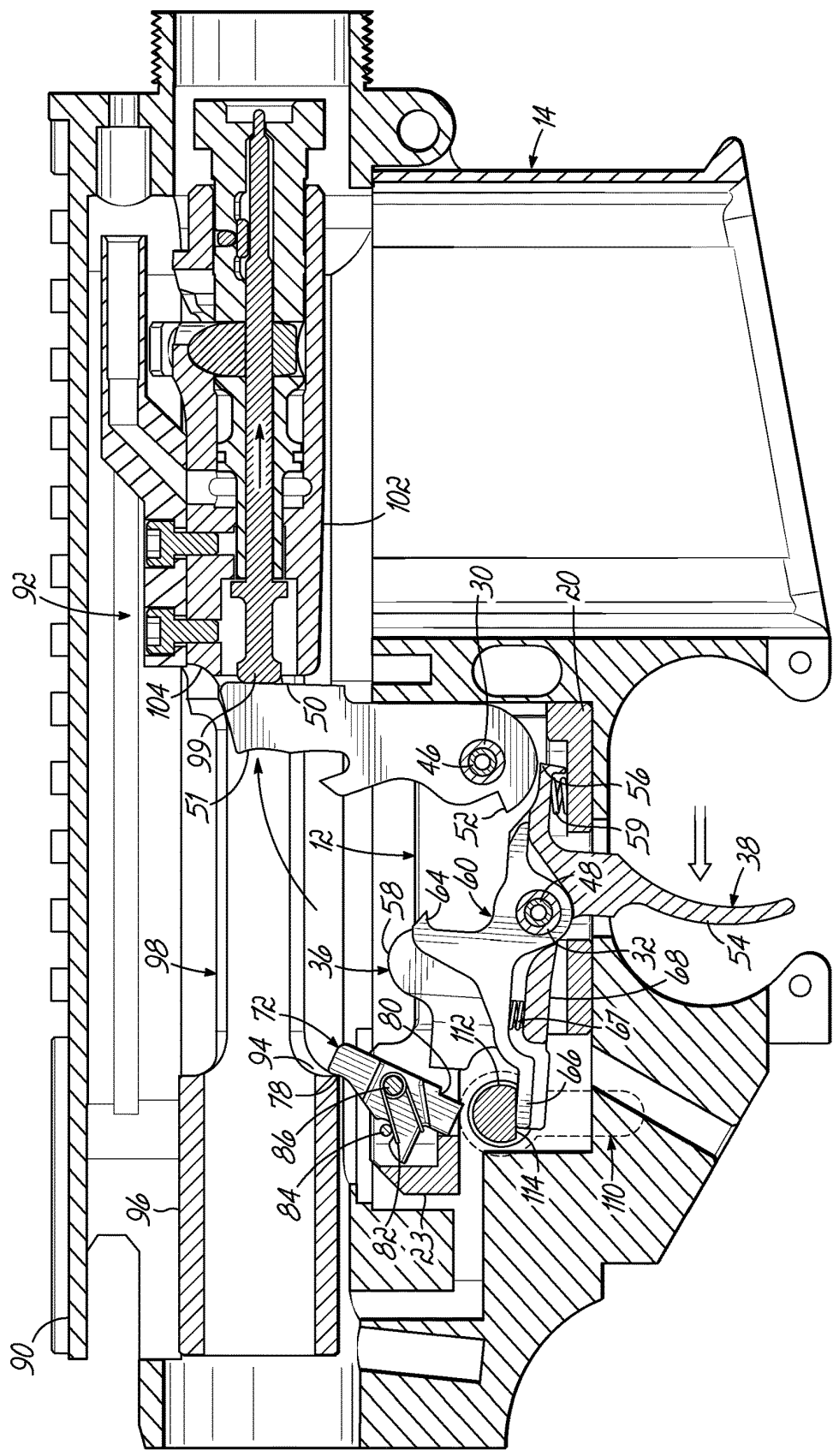


FIG. 8B

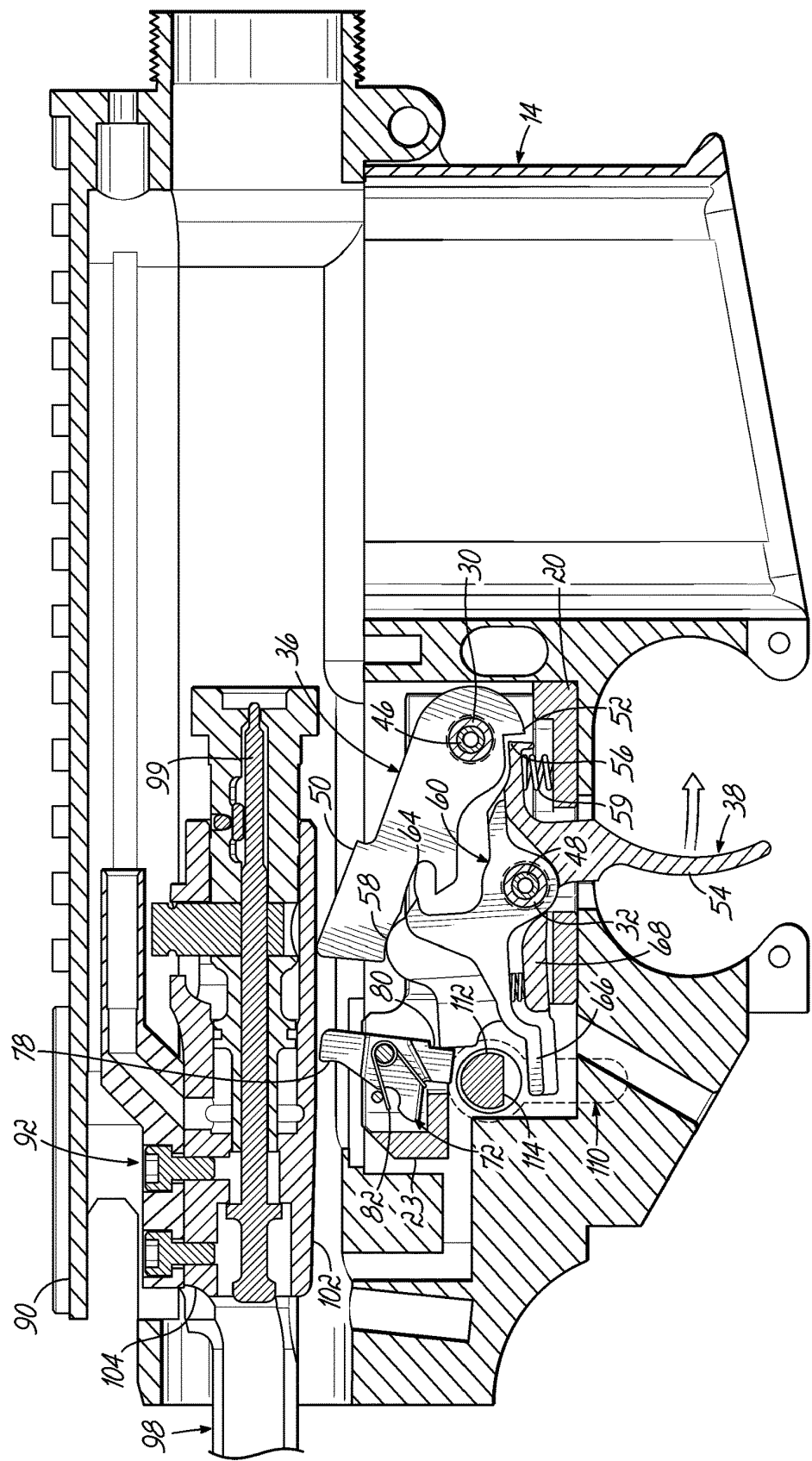


FIG. 8C

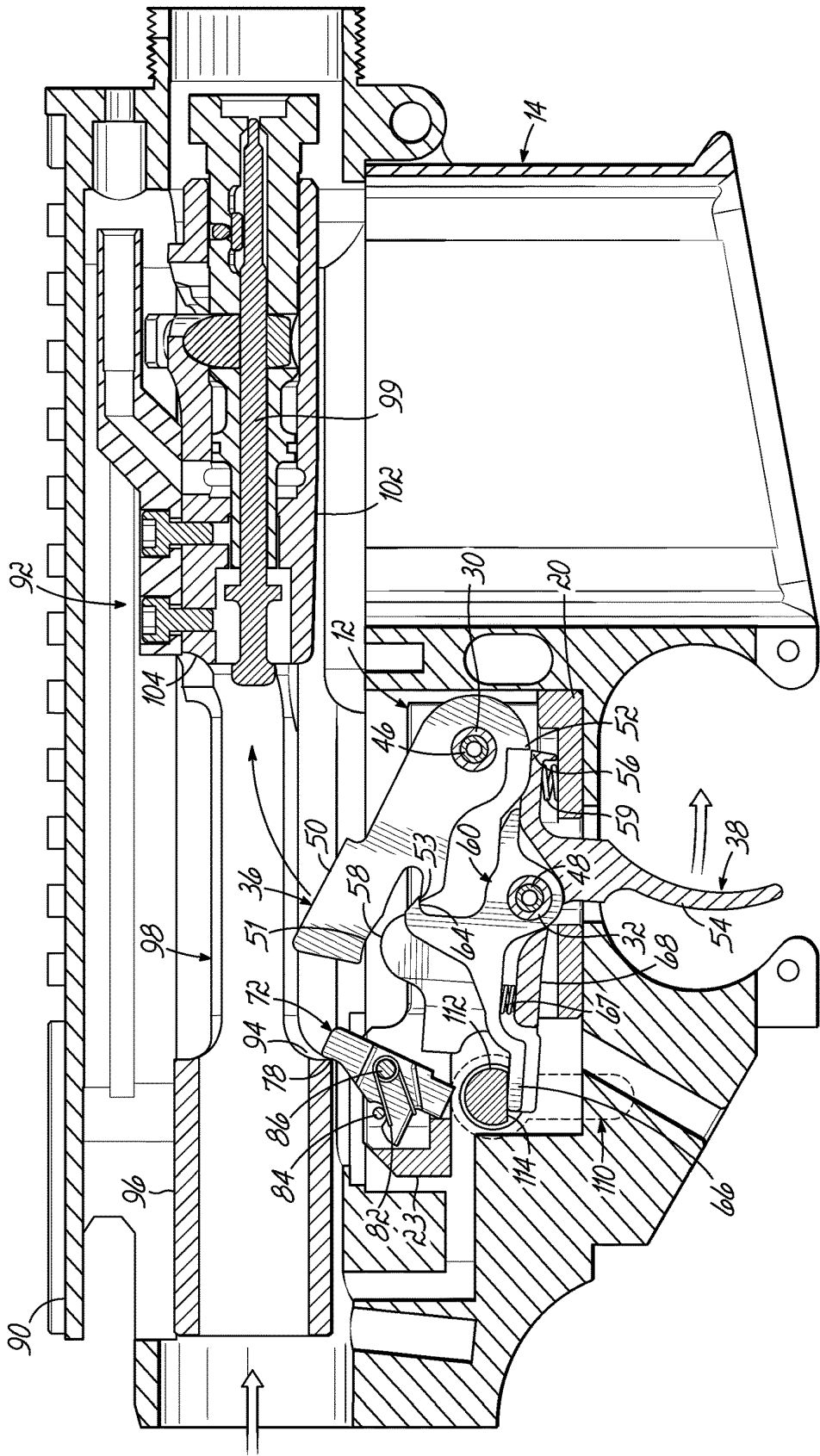


FIG. 8D

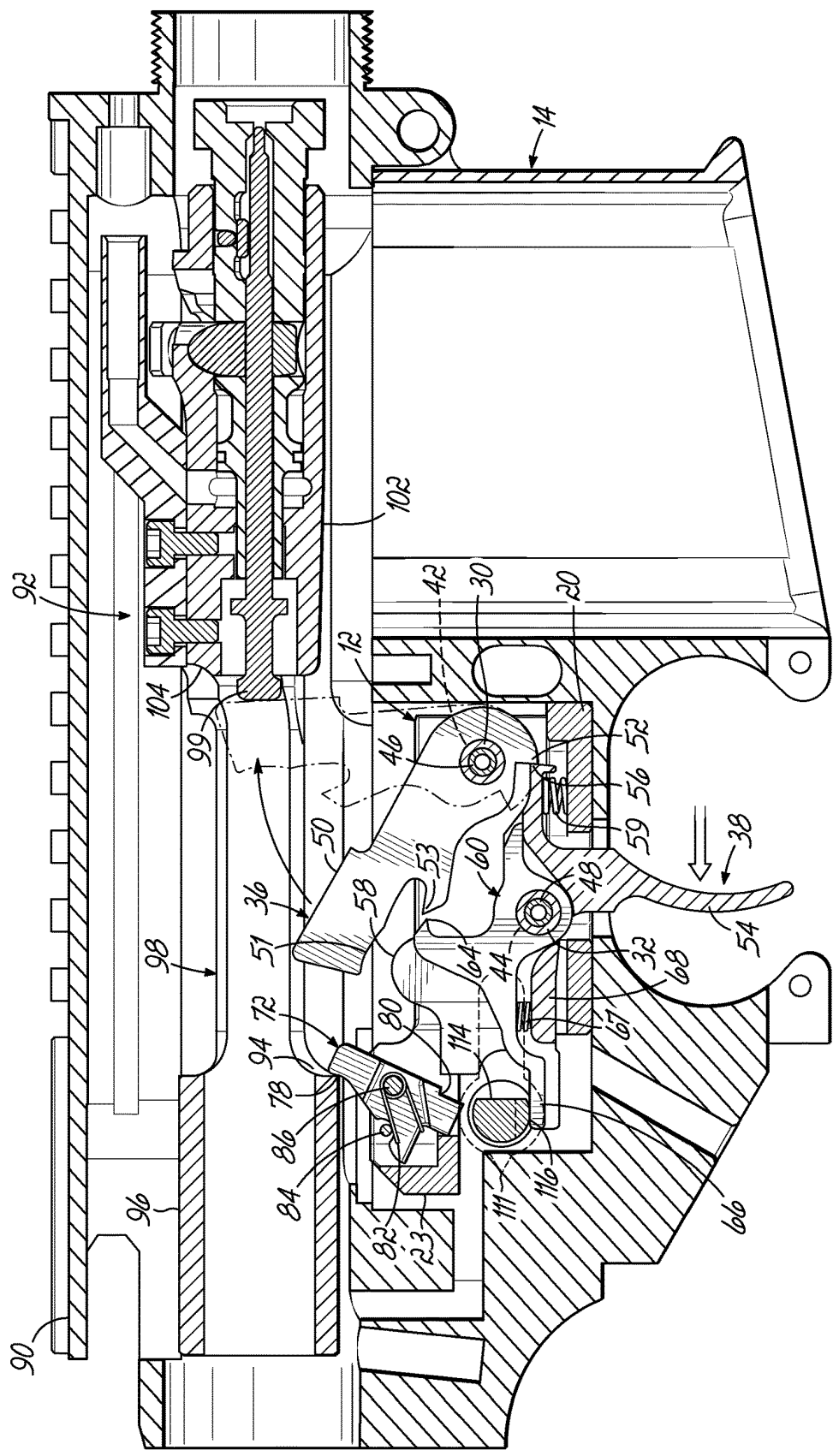


FIG. 9A

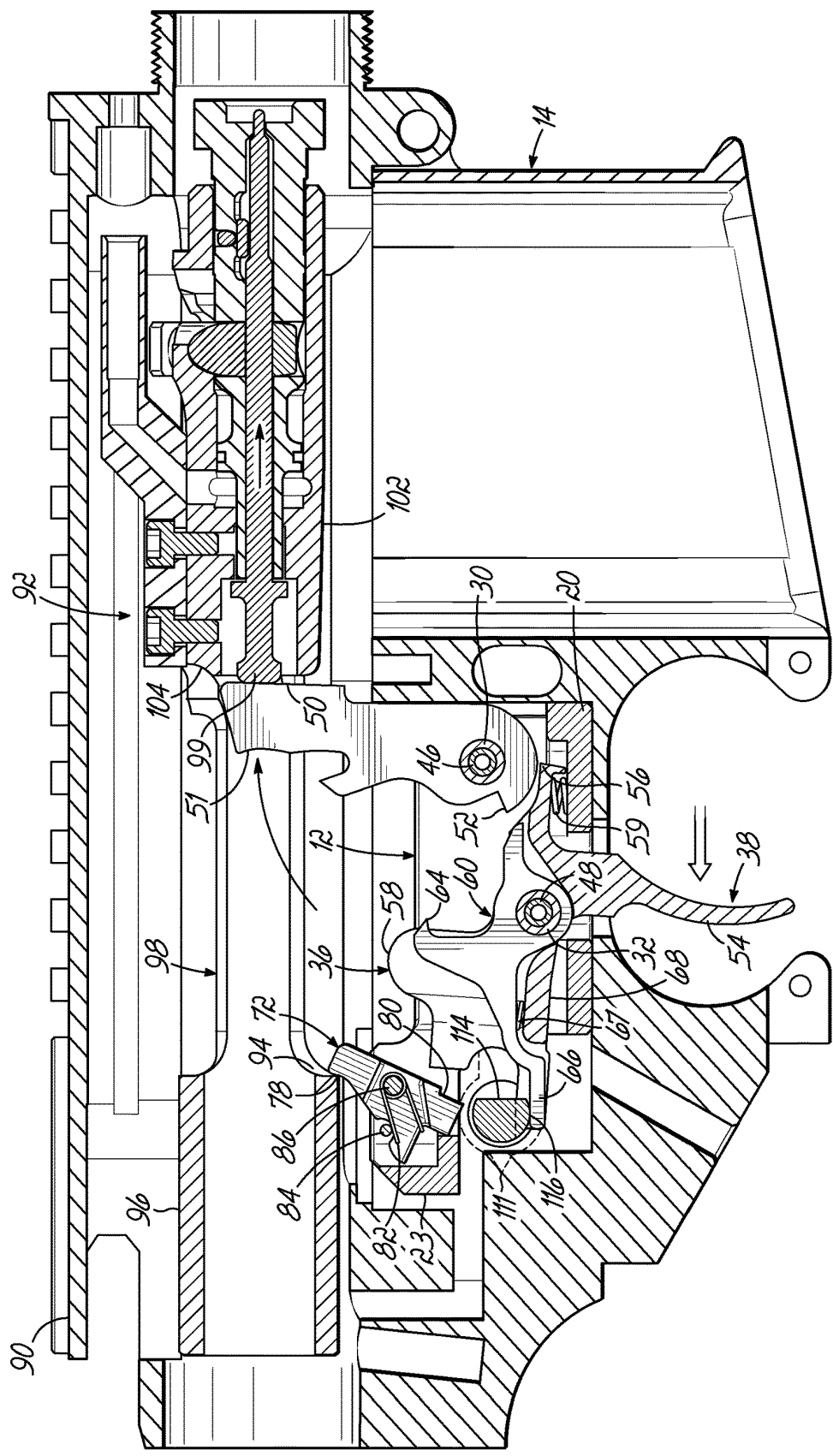
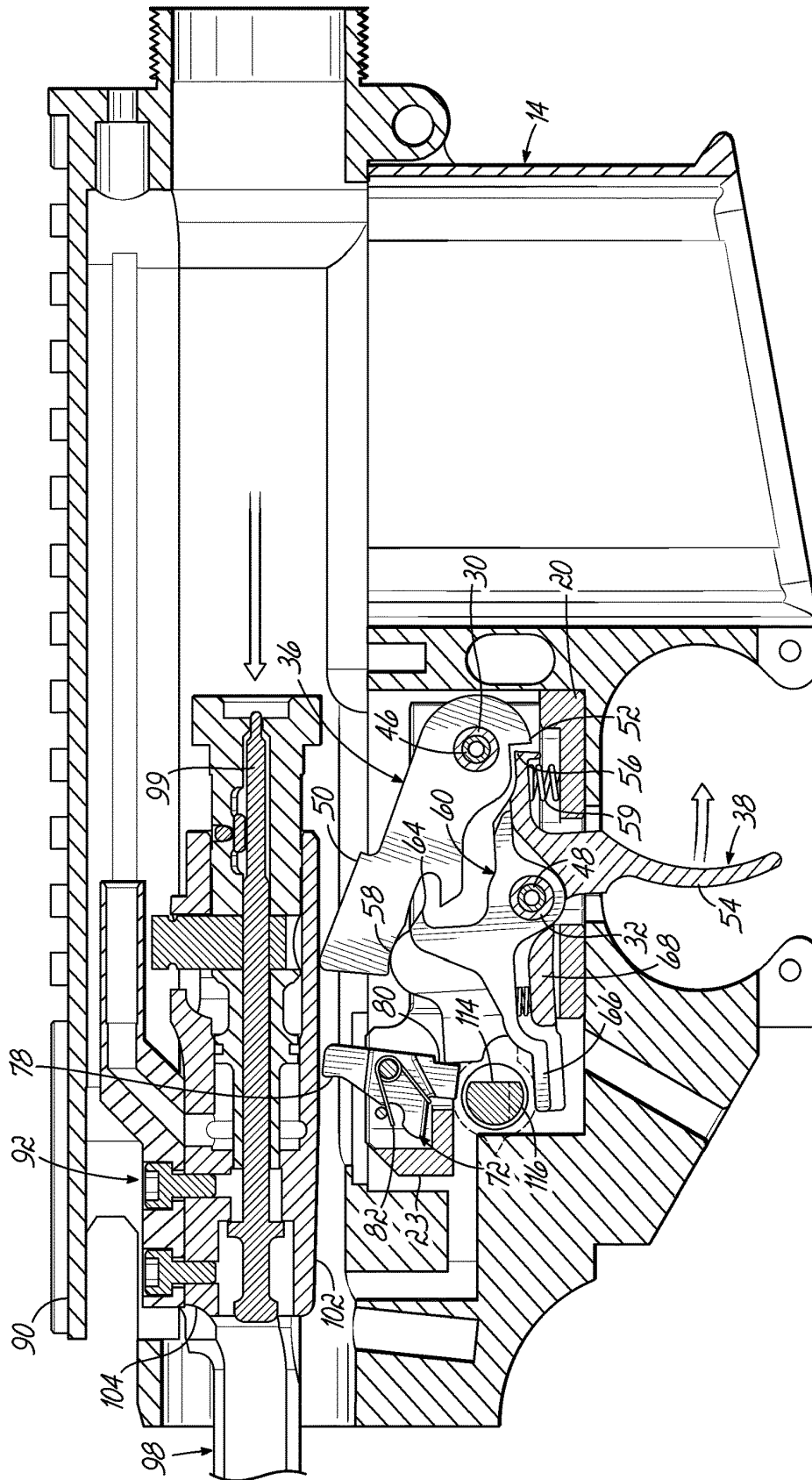


FIG. 9B





**FIG. 9C**



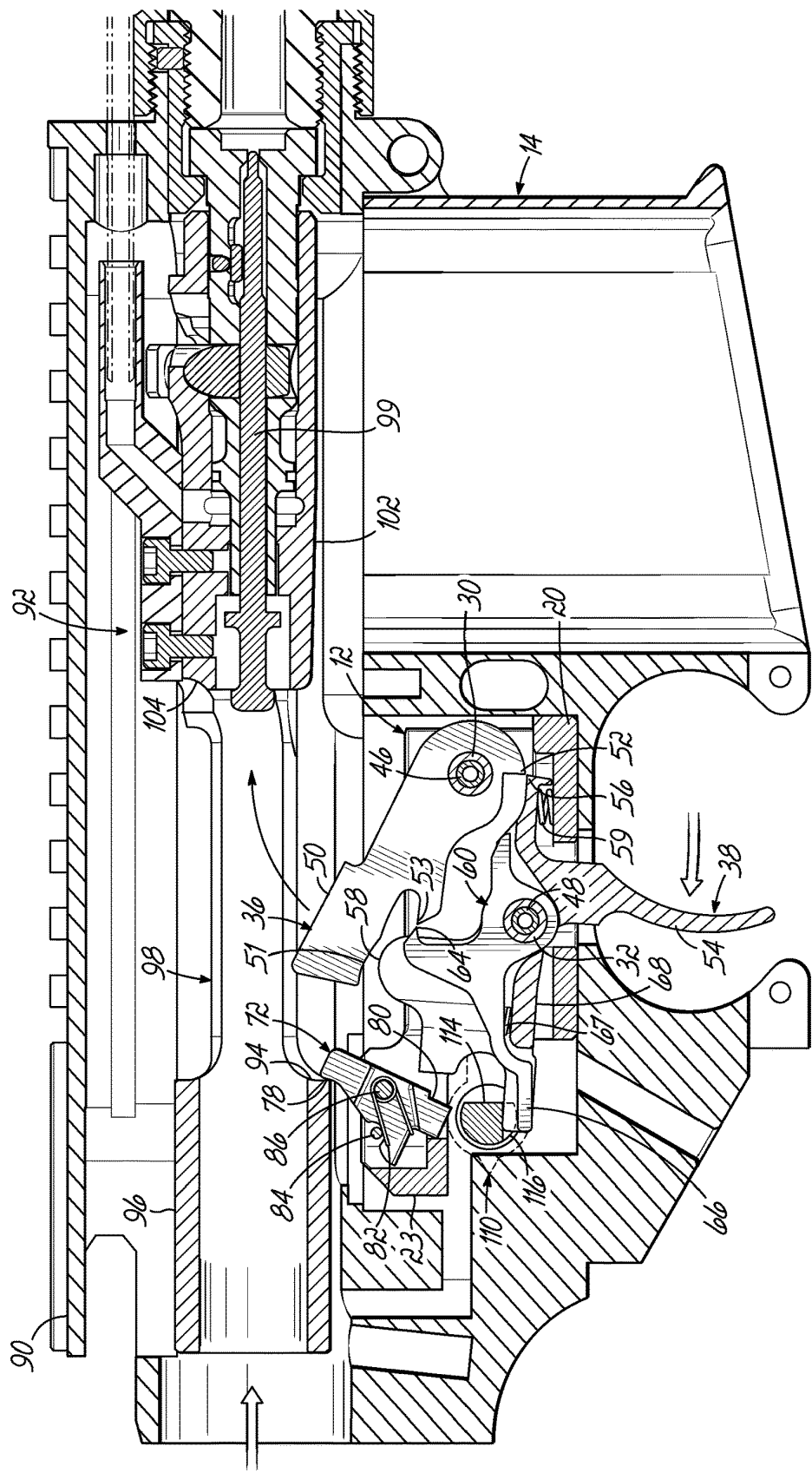


FIG. 9D

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**FIREARM TRIGGER MECHANISM****RELATED APPLICATIONS**

This application is a continuation of U.S. patent application Ser. No. 18/048,572 filed Oct. 21, 2022, which claims the priority benefit of U.S. Provisional Patent Application No. 63/297,884 filed Jan. 10, 2022, both 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 disconnecter, 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 disconnecter 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 U.S. Pat. No. 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,

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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 semiautomatic, 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 disconnecter 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 disconnecter 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

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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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter to permit the hammer and trigger member to pivot to the set positions so that the user

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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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter hook from catching the hammer hook, and thereafter when

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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 disconnecter 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 through 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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

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of the hammer causing the trigger member to be forced to the set position, the safety selector preventing the disconnecter 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. 4A 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. 4B 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. 5A 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. 5B 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. 6A 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. 6B 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. 8A is a view similar to FIG. 7 but with the safety selector in the standard semi-automatic position.

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

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

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

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

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

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



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FIG. 9D is a view similar to FIG. 9C 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. 1-6B, 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

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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 disconnecter 60 is pivoted on the hollow transverse pin 32 upon which the trigger member 38 pivots. The disconnecter 60 has a disconnecter hook 64 and a tail 66. The tail 66 of the disconnecter 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

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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. 4A, 4B, 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 disconnecter 60 can pivot with the trigger member 38 and the disconnecter hook 64 can catch the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 5A and 5B). 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 disconnecter 60 from pivoting with the trigger member 38 thus preventing the disconnecter hook 64 from catching the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 6A and 6B). In other words, in the forced reset semi-automatic position, the disconnecter 60 is “disabled” in that the disconnecter hook 64 is unable to catch the hammer hook 53 during cycling of the bolt carrier assembly 92.

Referring now to FIGS. 8A-8D, 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 disconnecter 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. 9A-9D, with the safety selector 110 set in the forced reset semi-automatic position, rearward

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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 disconnecter 60 from rotating with the trigger member 38, thus “disabling” the disconnecter 60, preventing the disconnecter 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 firearm trigger mechanism comprising:

a hammer having a sear catch and a hook for engaging a disconnecter 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

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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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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 disconnecter 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 locking member adapted to be mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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, said safety selector configured such that, when said safety selector is in said forced reset semi-automatic position, said safety selector causes said disconnecter to be repositioned and in doing so prevents said disconnecter hook from catching said hammer hook, whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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 causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the firearm without manually releasing said trigger member.

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

3. A firearm trigger mechanism comprising:

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,

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a hammer having a sear catch and a hook for engaging a disconnecter 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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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

a locking member mounted in said housing to pivot on a transverse locking member pin, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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, said safety selector configured such that, when said safety selector is in said forced reset semi-automatic position, said safety selector causes said disconnecter to be repositioned and in doing so prevents said disconnecter hook from catching said hammer hook,

whereupon in said standard semi-automatic position, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said hammer from said disconnecter 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 causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the firearm without manually releasing said trigger member.

4. The trigger mechanism of claim 3, wherein said first and second pairs of 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.

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



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6. The trigger mechanism of claim 5 wherein said spring is a compression spring positioned between a forward end of said trigger member and a floor of said housing.

7. 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 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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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 locking member mounted in said fire control mechanism pocket to pivot on a transverse locking member pivot axis, said locking member being pivotable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and moved against said spring bias to said second position by contact from said bolt carrier during forward movement of said bolt carrier as said bolt carrier reaches a substantially in-battery position, and

a safety selector adapted mounted in said fire control mechanism pocket to pivot between safe, standard semi-automatic, and forced reset semi-automatic positions, said safety selector configured such that, when said safety selector is in said forced reset semi-automatic position, said safety selector causes said disconnector to be repositioned and in doing so prevents said disconnector hook from catching said hammer hook, whereupon in said standard semi-automatic position, rearward movement of said bolt carrier causes rearward pivoting of said hammer such that said disconnector hook catches said hammer hook, 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 said bolt carrier causes rearward pivoting of said hammer causing said trigger member to be forced to said set position, said safety selector preventing said disconnector hook from catching said hammer hook, and thereafter when said bolt carrier reaches the substantially in-battery position the user can pull said trigger member to fire the firearm without manually releasing said trigger member.

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8. The firearm of claim 7 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.

9. The firearm of claim 8 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.

10. The firearm of claim 7 further including a spring which biases said trigger member towards said set position.

11. The firearm of claim 10 wherein said spring is a compression spring positioned between a forward end of said trigger member and a floor of said housing.

12. 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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,

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 locking member adapted to be movably mounted in the fire control mechanism pocket, said locking member being movable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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 posi-

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tions, said safety selector configured such that, when  
said safety selector is in said forced reset semi-auto-  
matic position, said safety selector causes said discon-  
nector to be repositioned and in doing so prevents said  
disconnecter hook from catching said hammer hook, 5  
whereupon in said standard semi-automatic position, rear-  
ward movement of the bolt carrier causes rearward  
pivoting of said hammer such that said disconnecter  
hook catches said hammer hook, at which time a user  
must manually release said trigger member to free said 10  
hammer from said disconnecter 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, 15  
rearward movement of the bolt carrier causes rearward  
pivoting of said hammer causing said trigger member  
to be forced to said set position, said safety selector  
preventing said disconnecter hook from catching said  
hammer hook, and thereafter when the bolt carrier 20  
reaches the substantially in-battery position the user  
can pull said trigger member to fire the firearm without  
manually releasing said trigger member.

\* \* \* \* \*

(12) **United States Patent**  
**Strbac**

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(54) **FIREARM TRIGGER MECHANISM**

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

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**Related U.S. Application Data**

(63) Continuation of application No. 18/346,423, filed on Jul. 3, 2023, now Pat. No. 12,036,336, which is a (Continued)

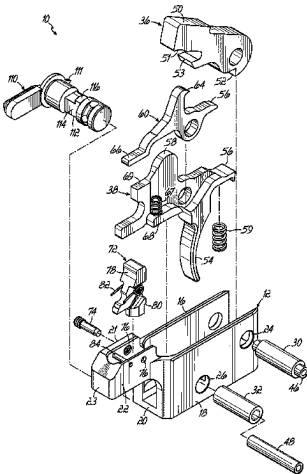
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See application file for complete search history.

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(57) **ABSTRACT**  
A trigger mechanism that can be used in AR-pattern firearms has a hammer, a trigger member, a disconnecter, 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 locking member is pivotable between a first position at which the locking member mechanically blocks the trigger  
(Continued)



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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.

## 8 Claims, 18 Drawing Sheets

## Related U.S. Application Data

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*F41A 17/48* (2006.01)

*F41A 19/10* (2006.01)

*F41A 19/24* (2006.01)

## (52) U.S. Cl.

CPC ..... *F41A 17/48* (2013.01); *F41A 19/10* (2013.01); *F41A 19/15* (2013.01); *F41A 19/24* (2013.01); *A61L 2300/252* (2013.01); *A61L 2300/418* (2013.01); *A61L 2400/04* (2013.01); *A61L 2430/36* (2013.01)

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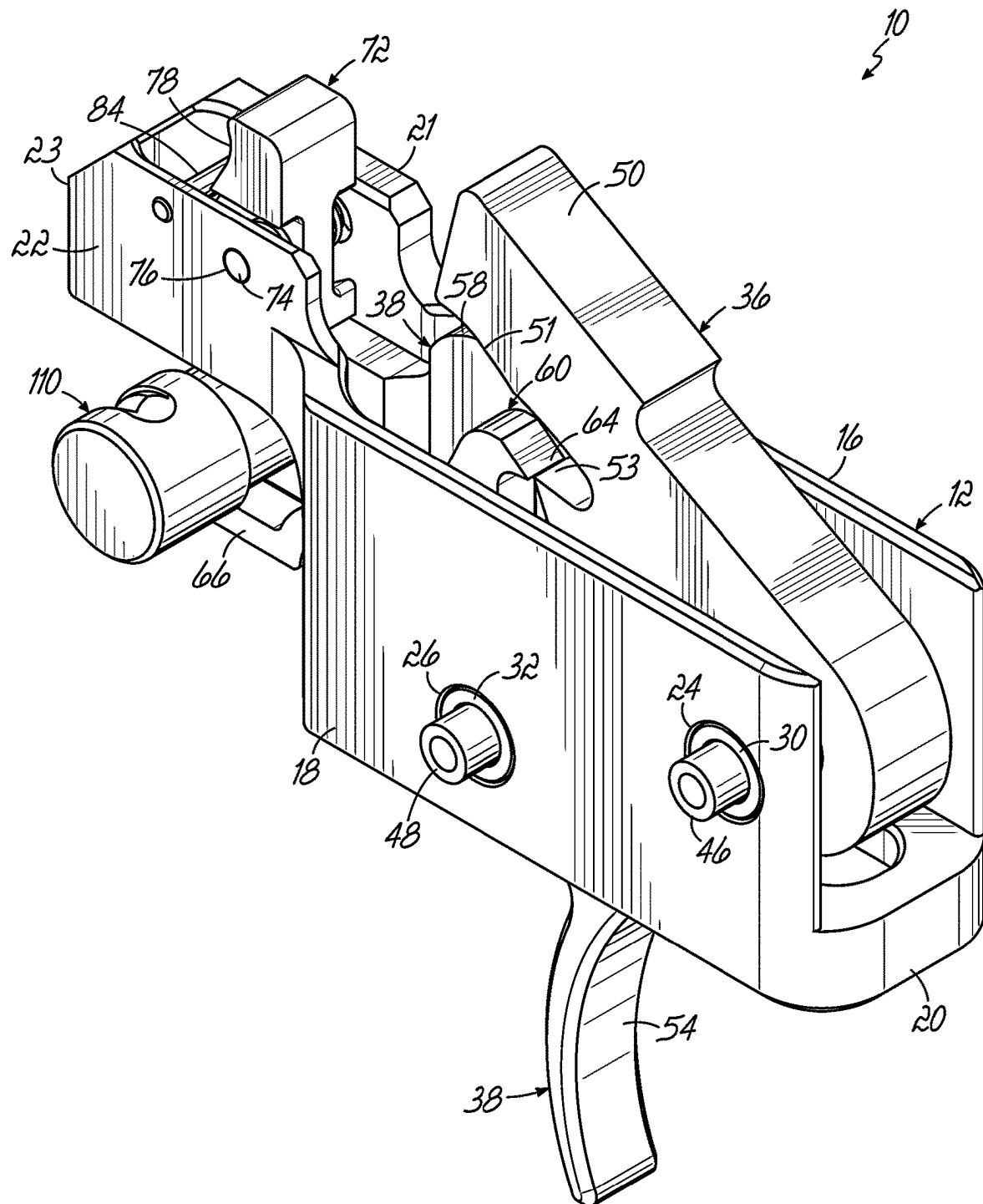


FIG. 1

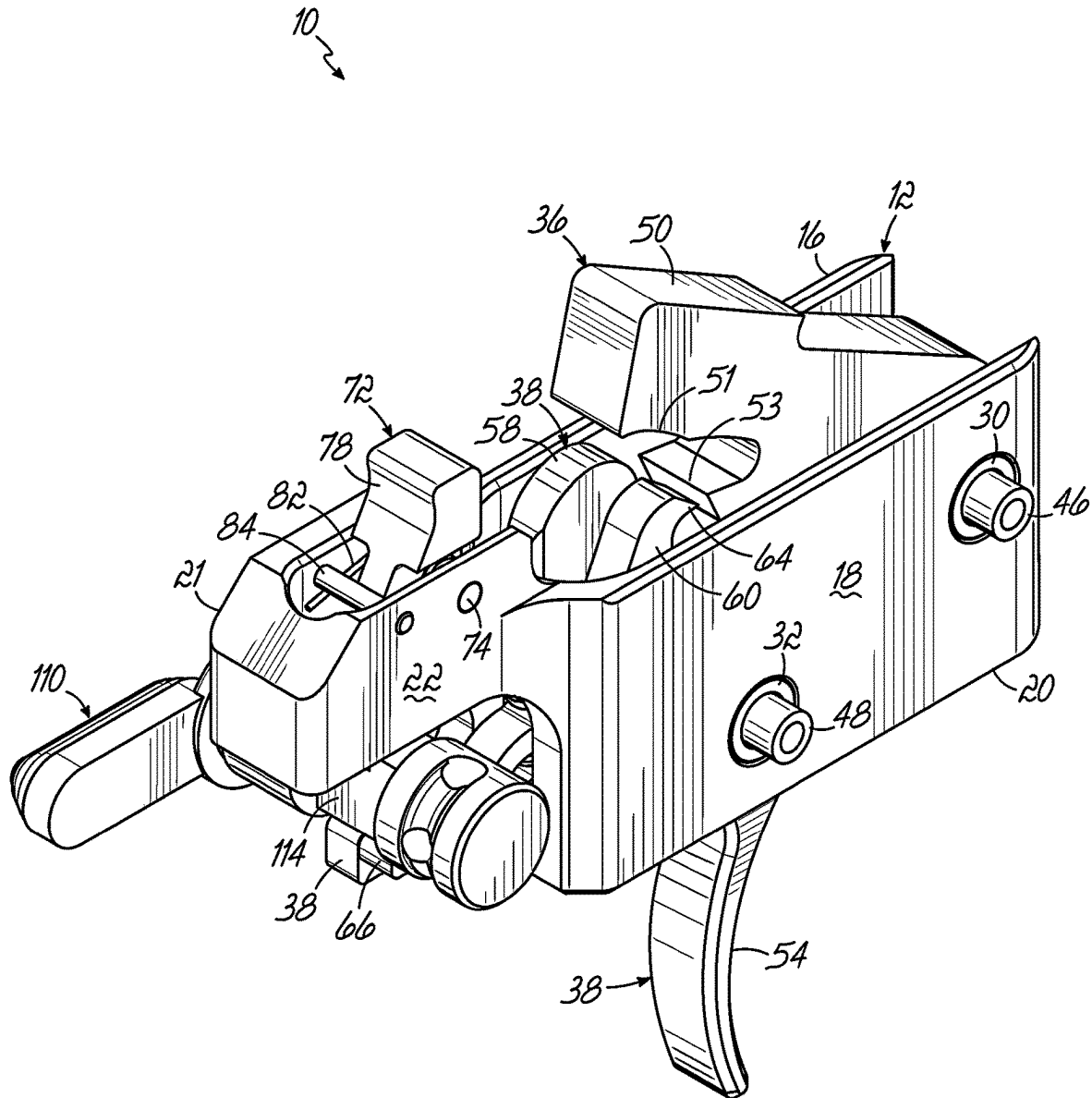


FIG. 2



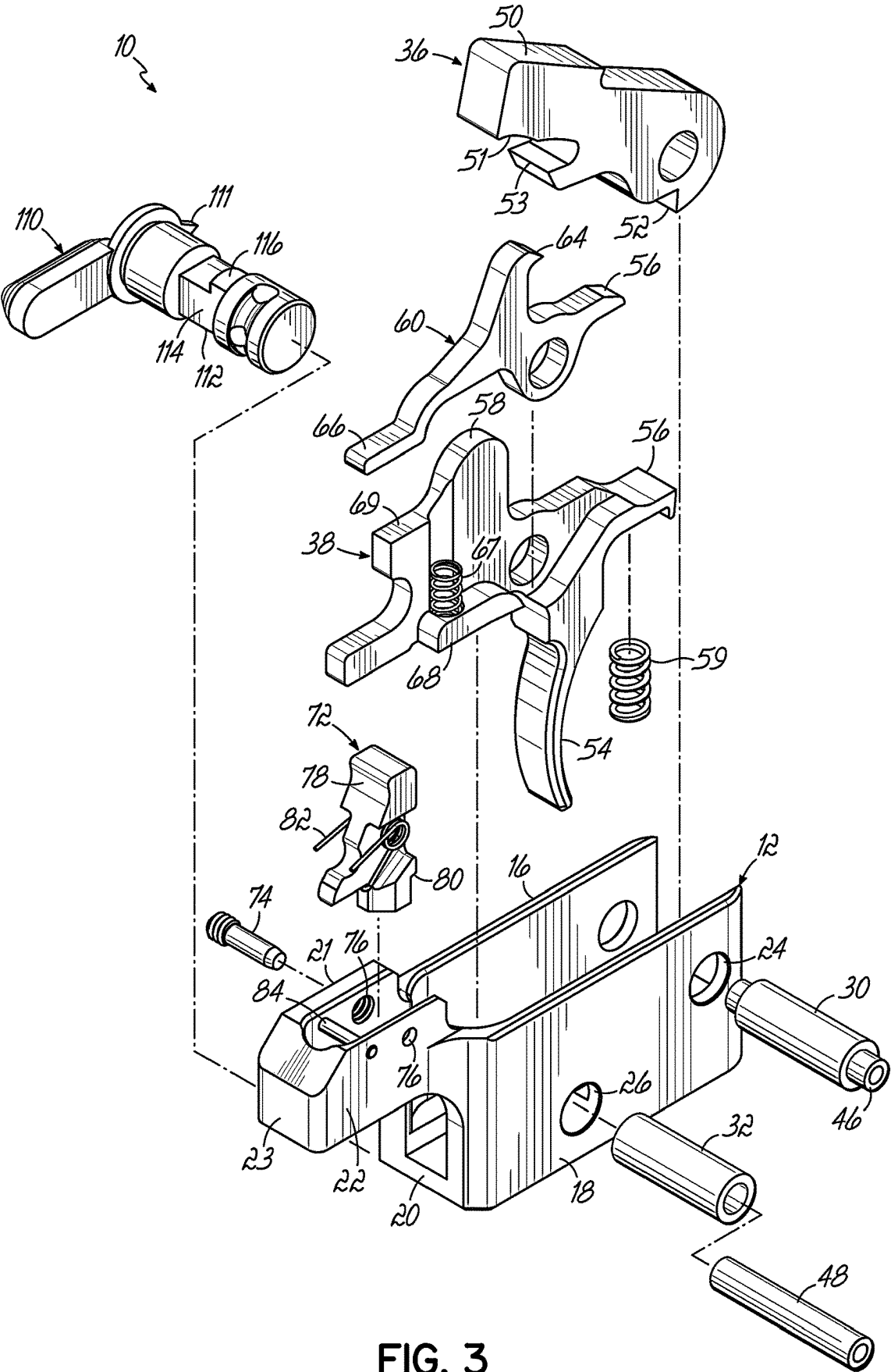
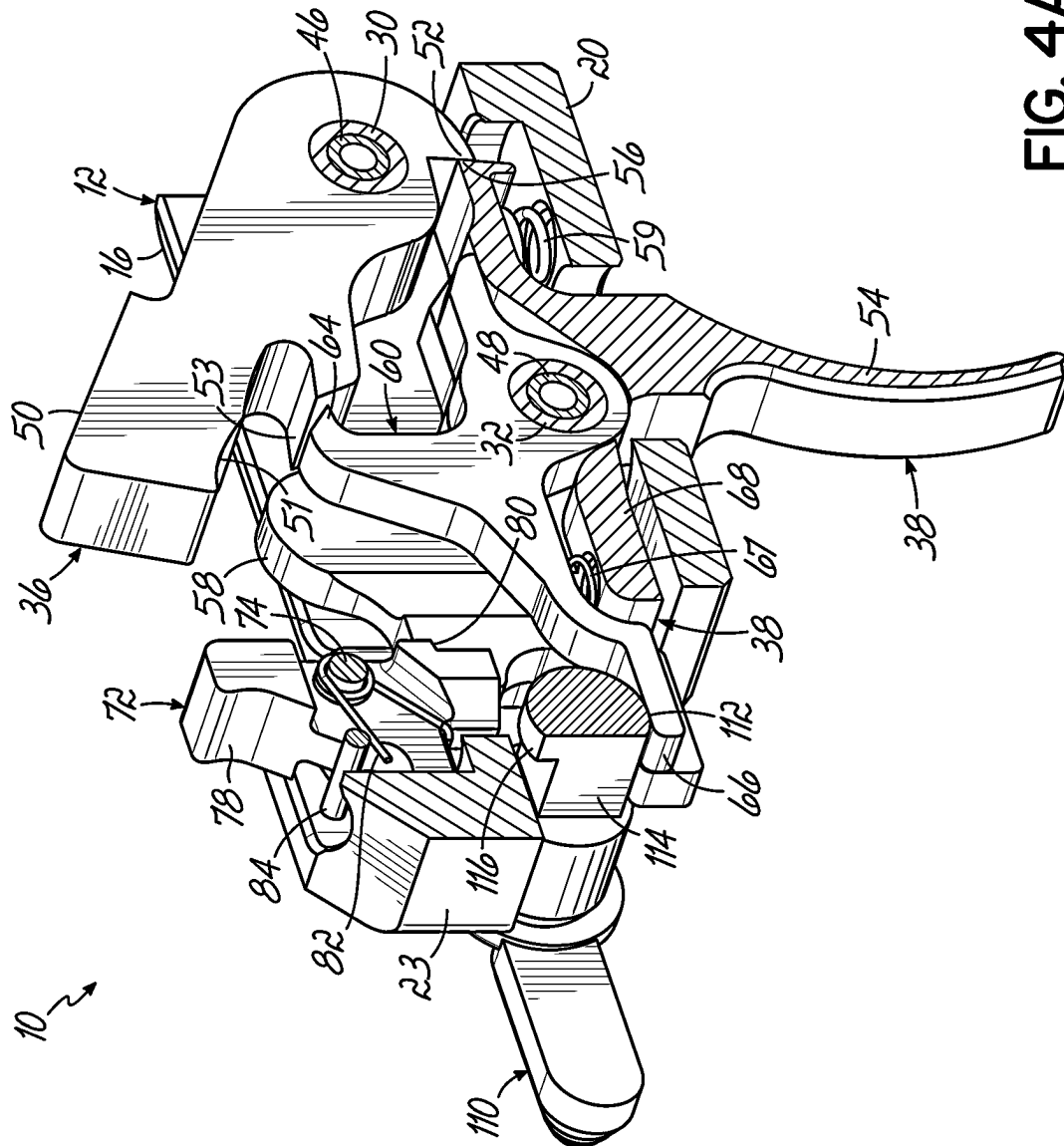
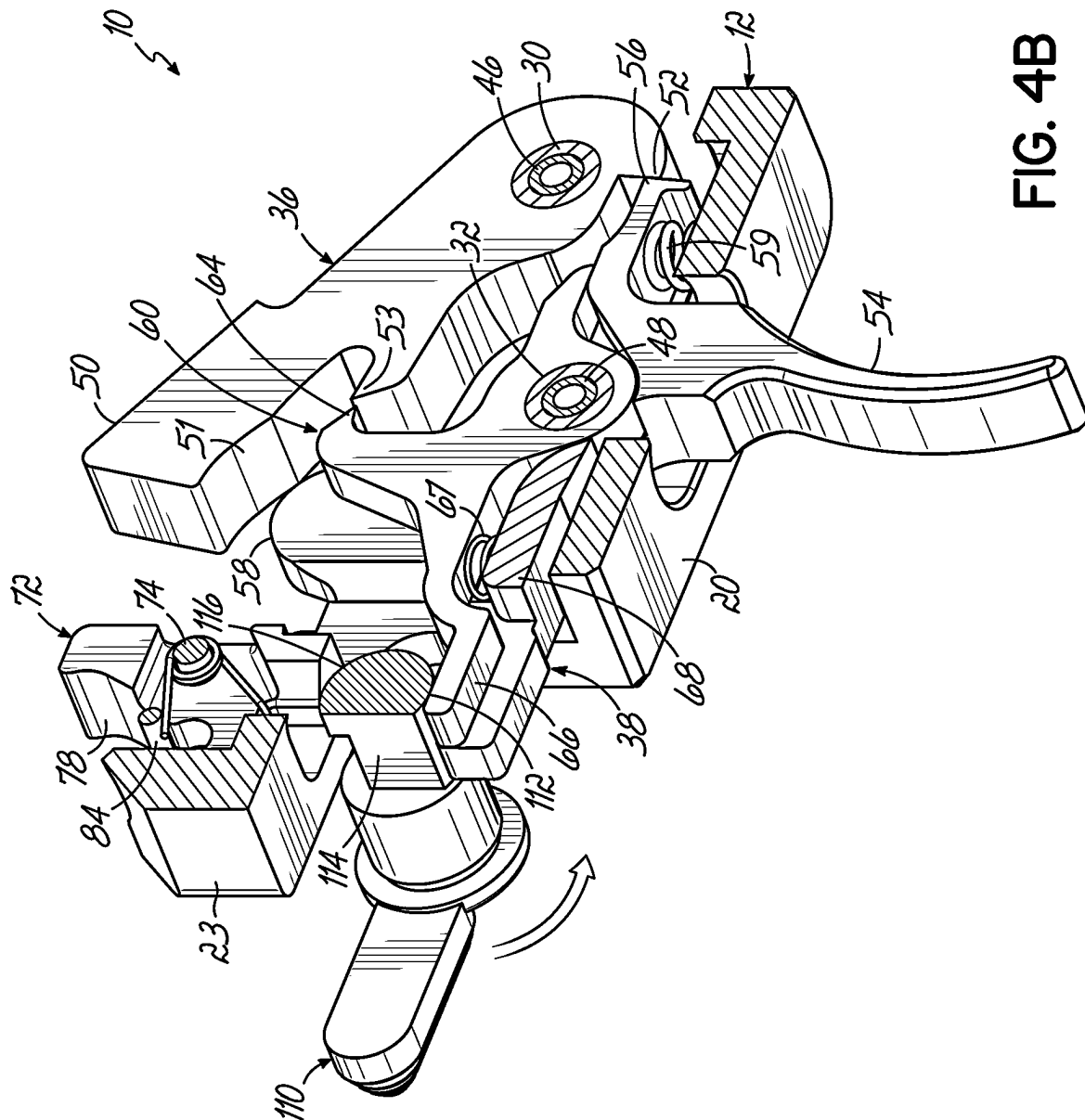
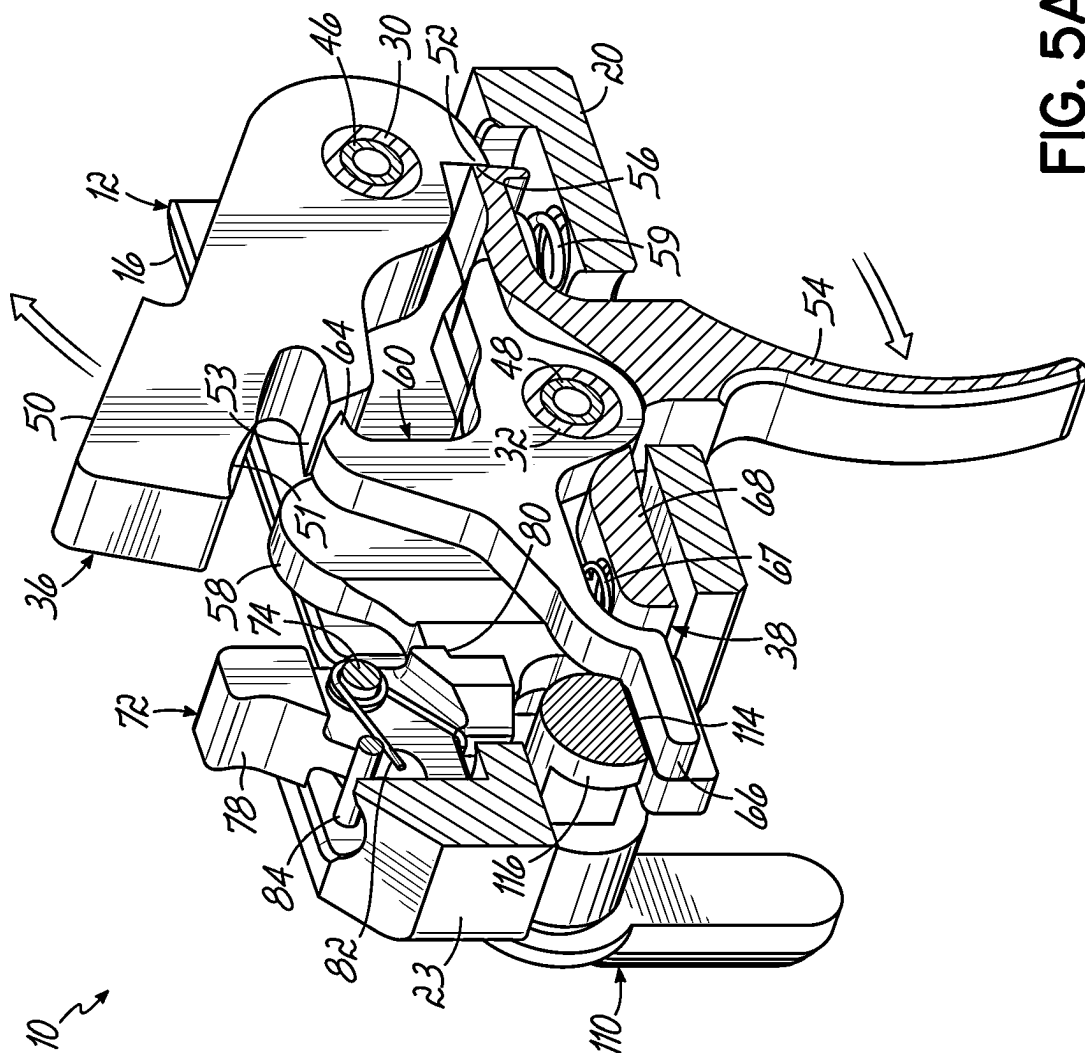
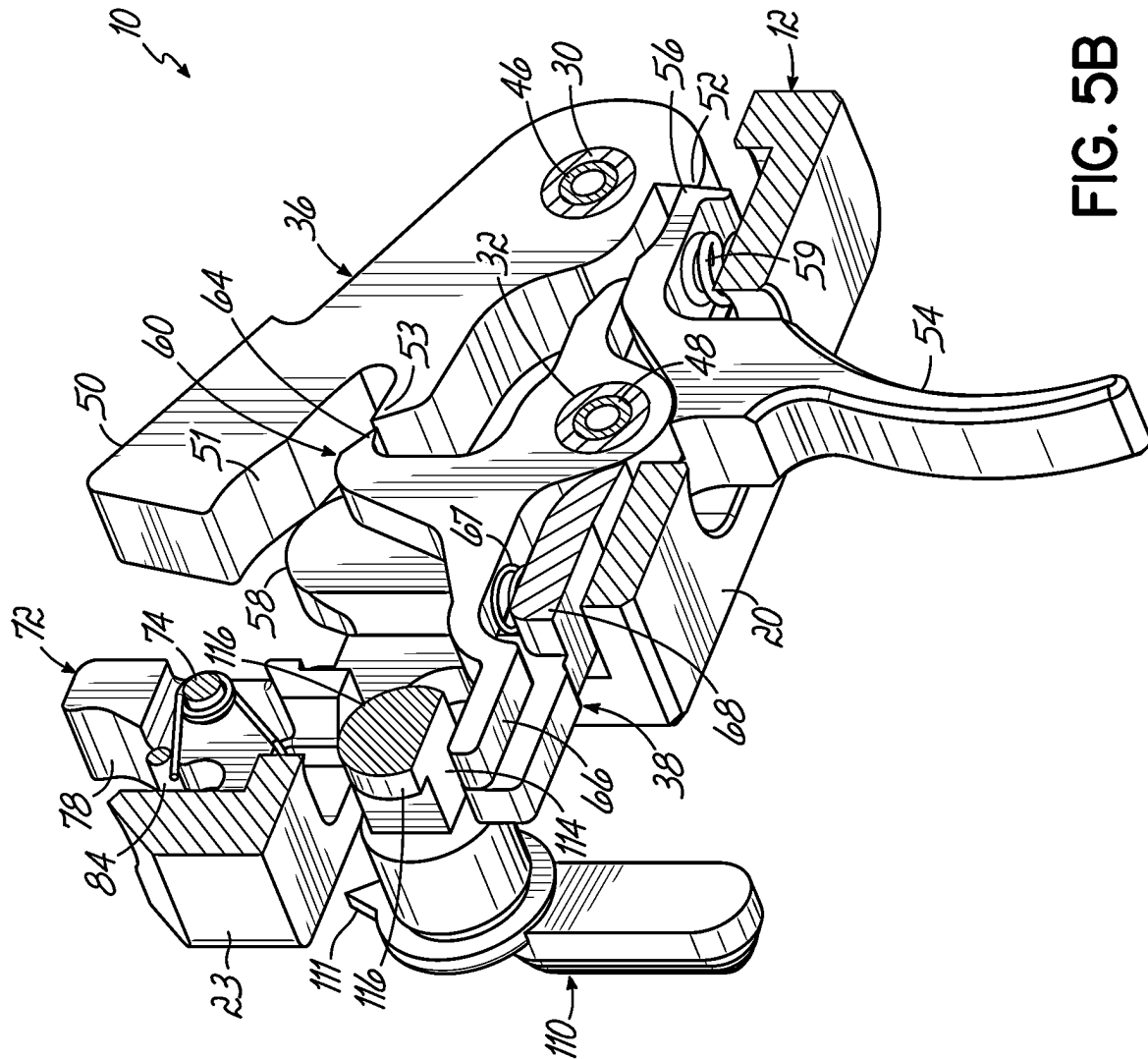


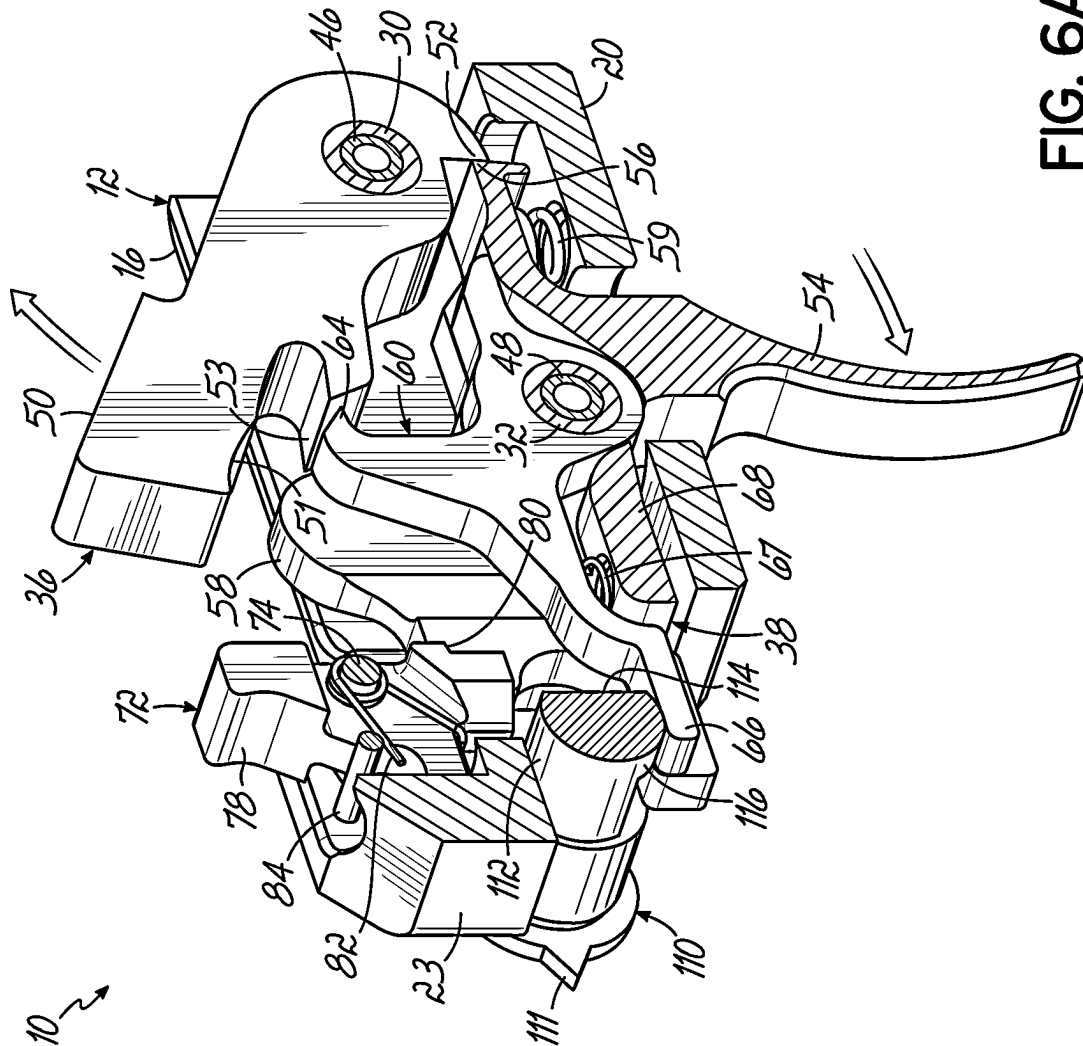
FIG. 3











**FIG. 6A**

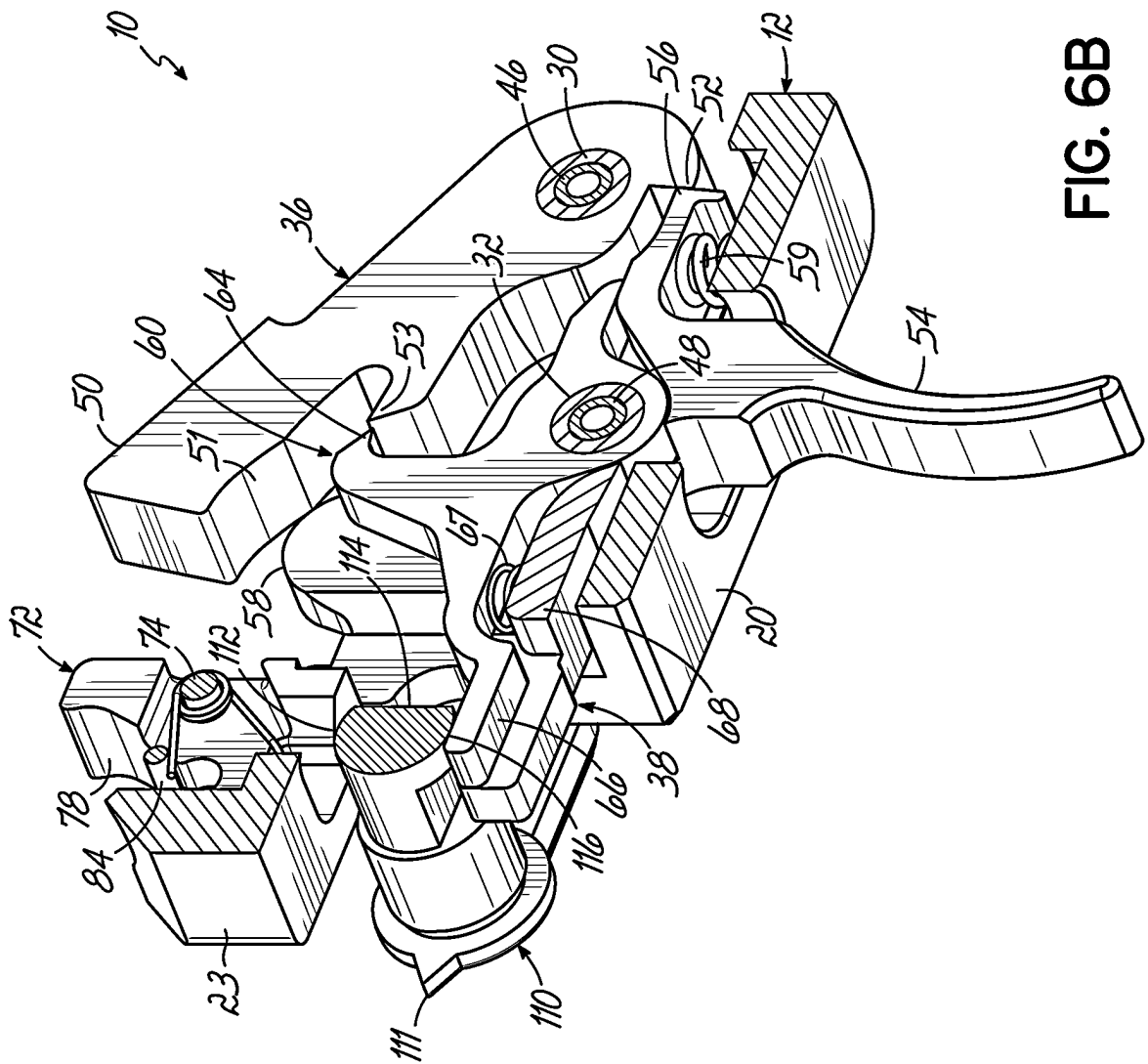


FIG. 6B



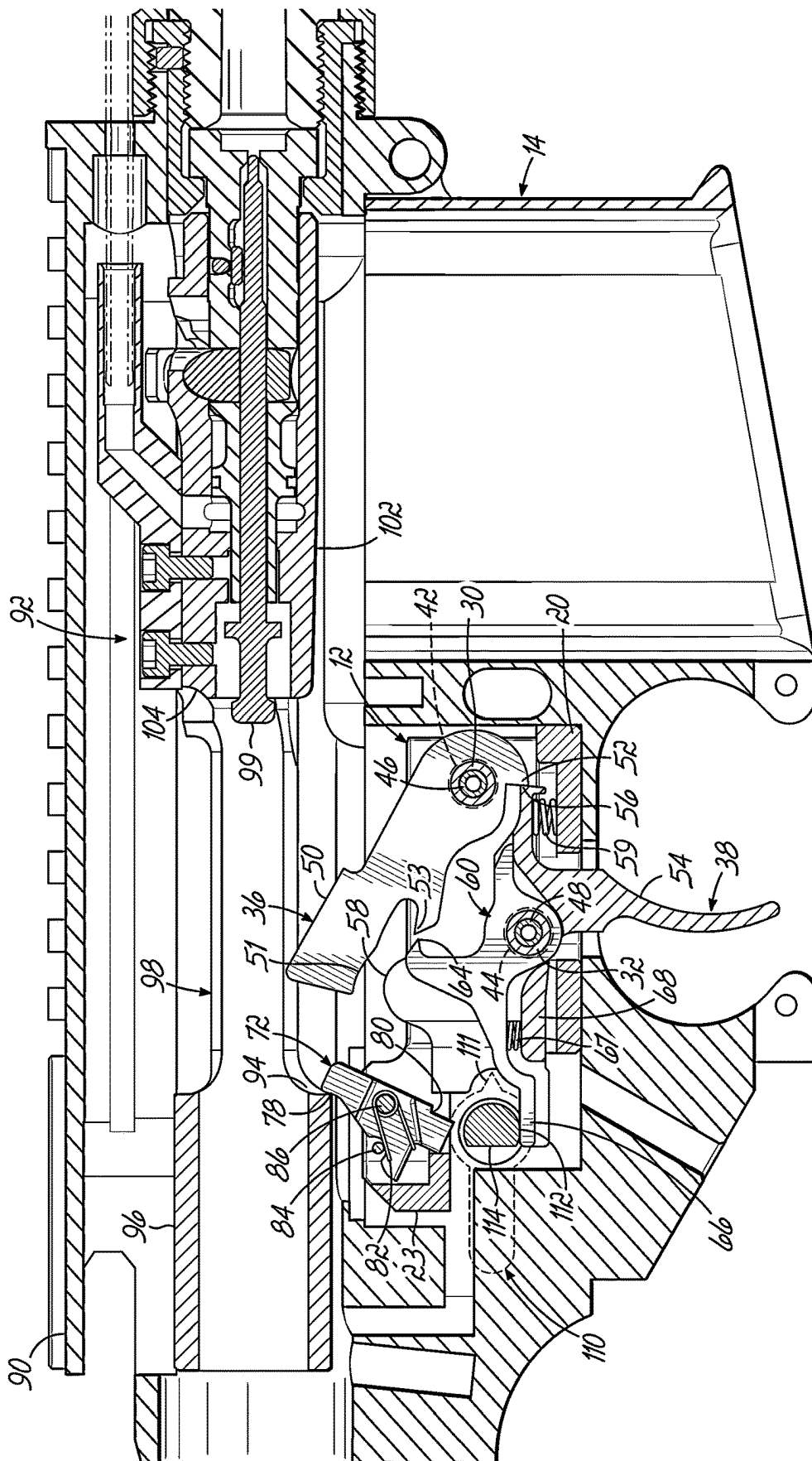


FIG. 7

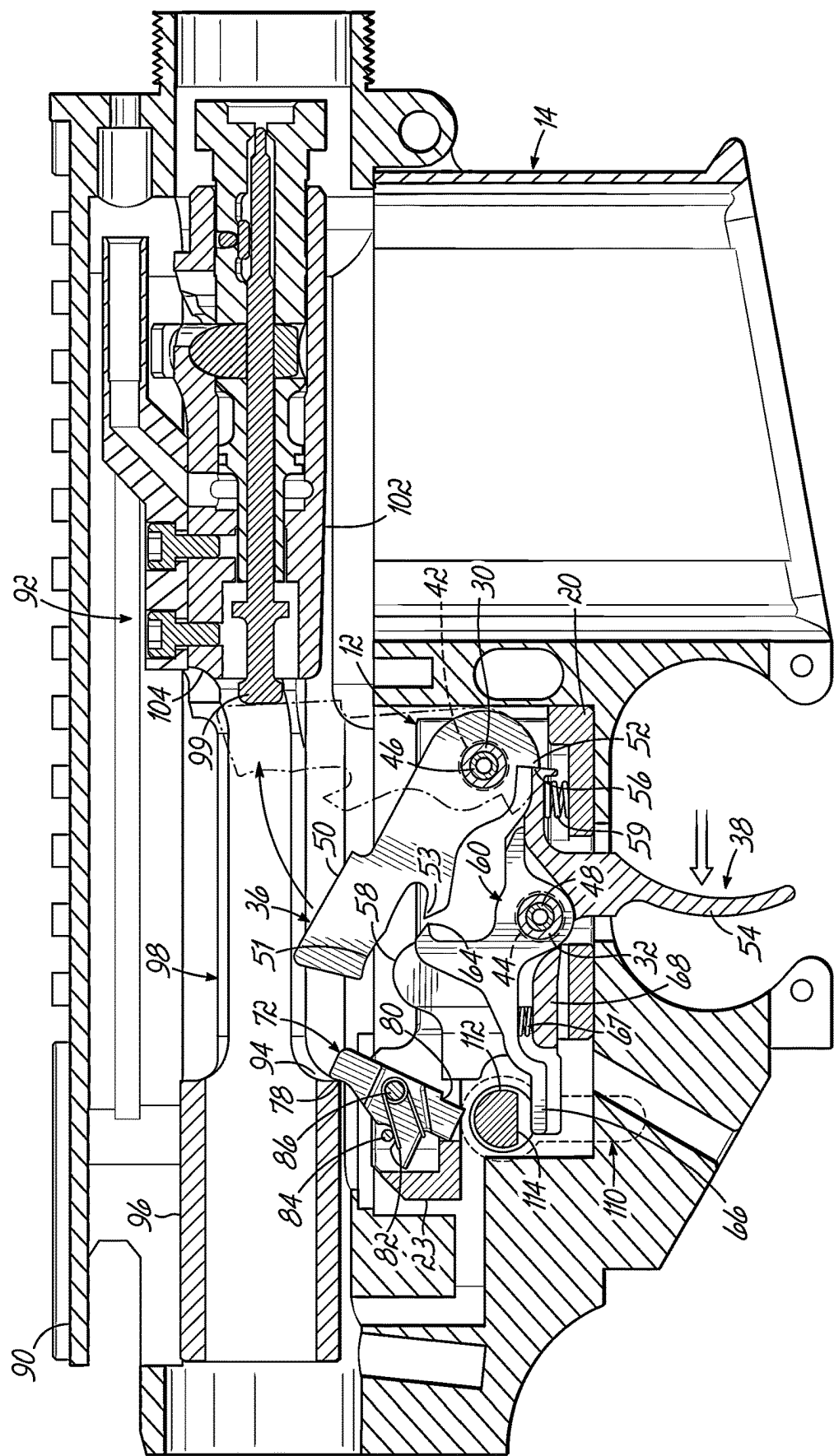


FIG. 8A

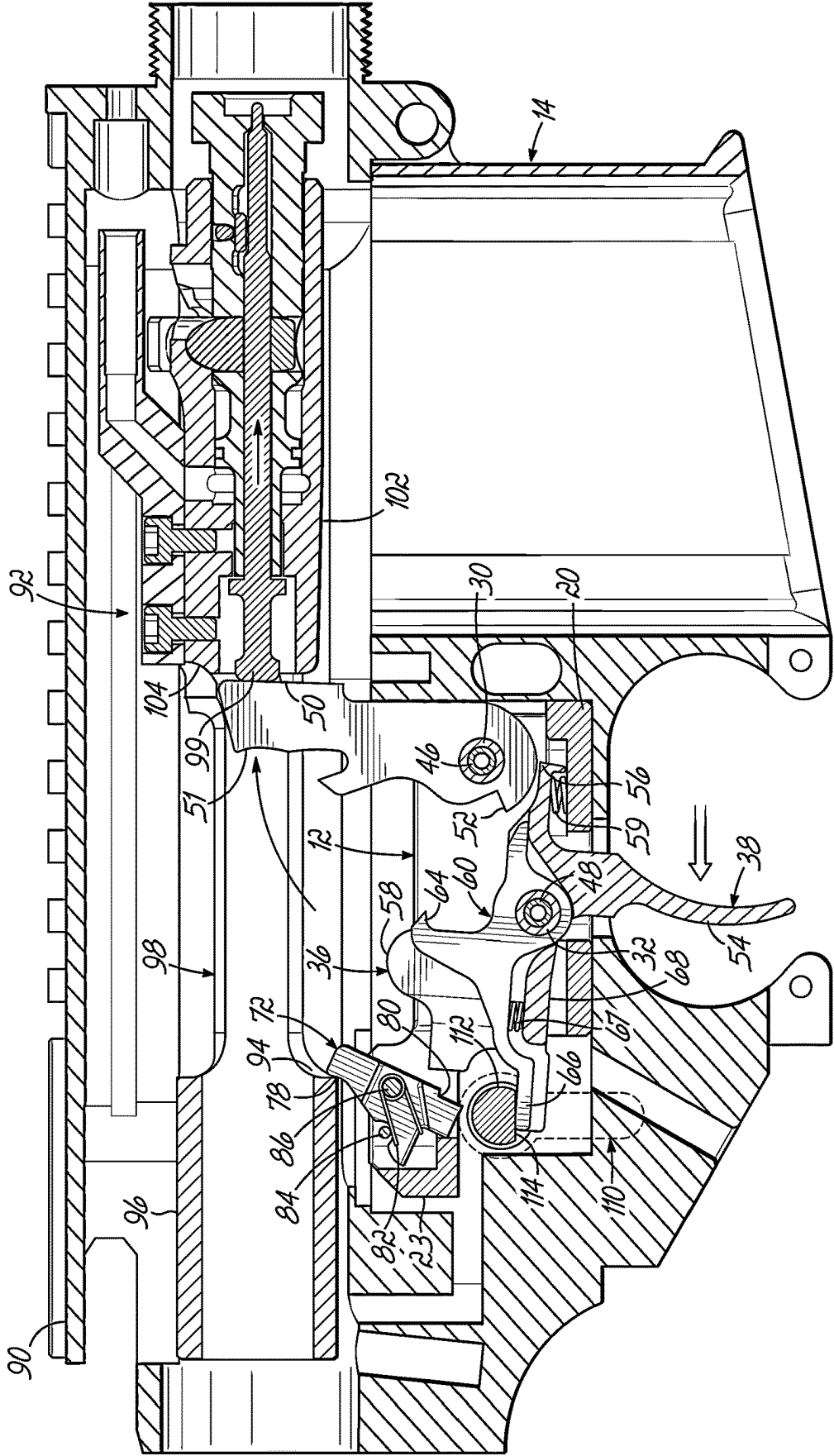


FIG. 8B

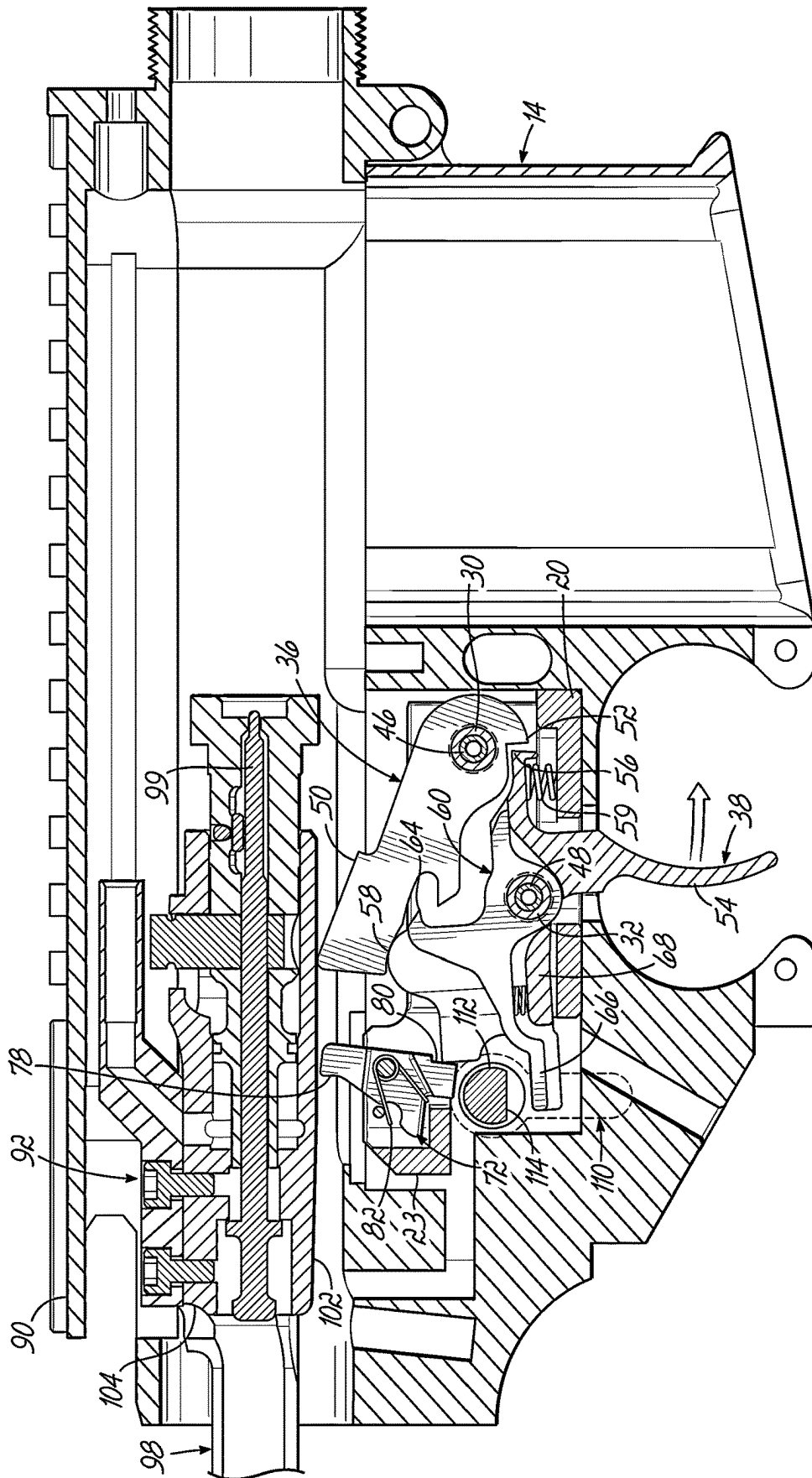
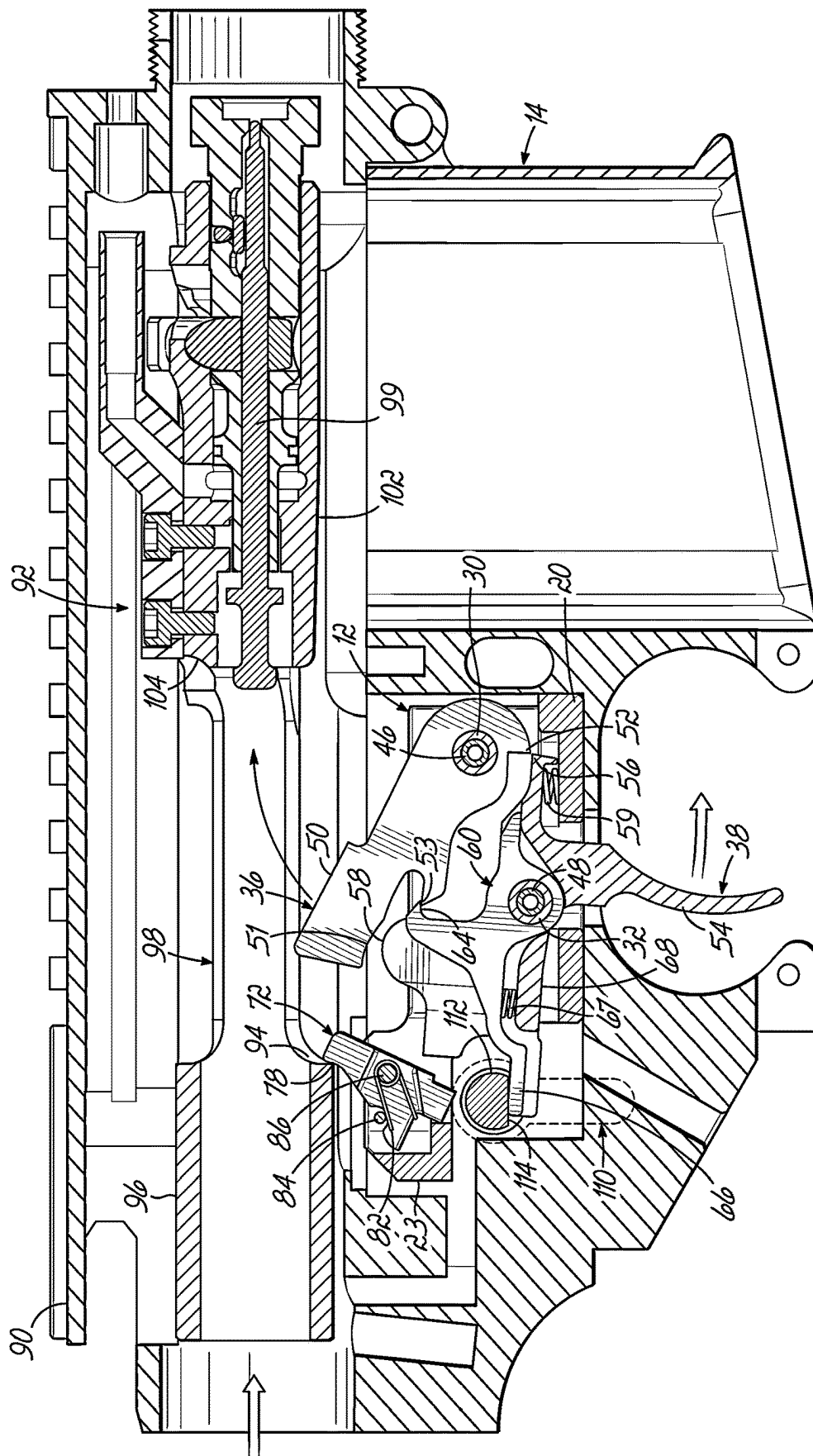
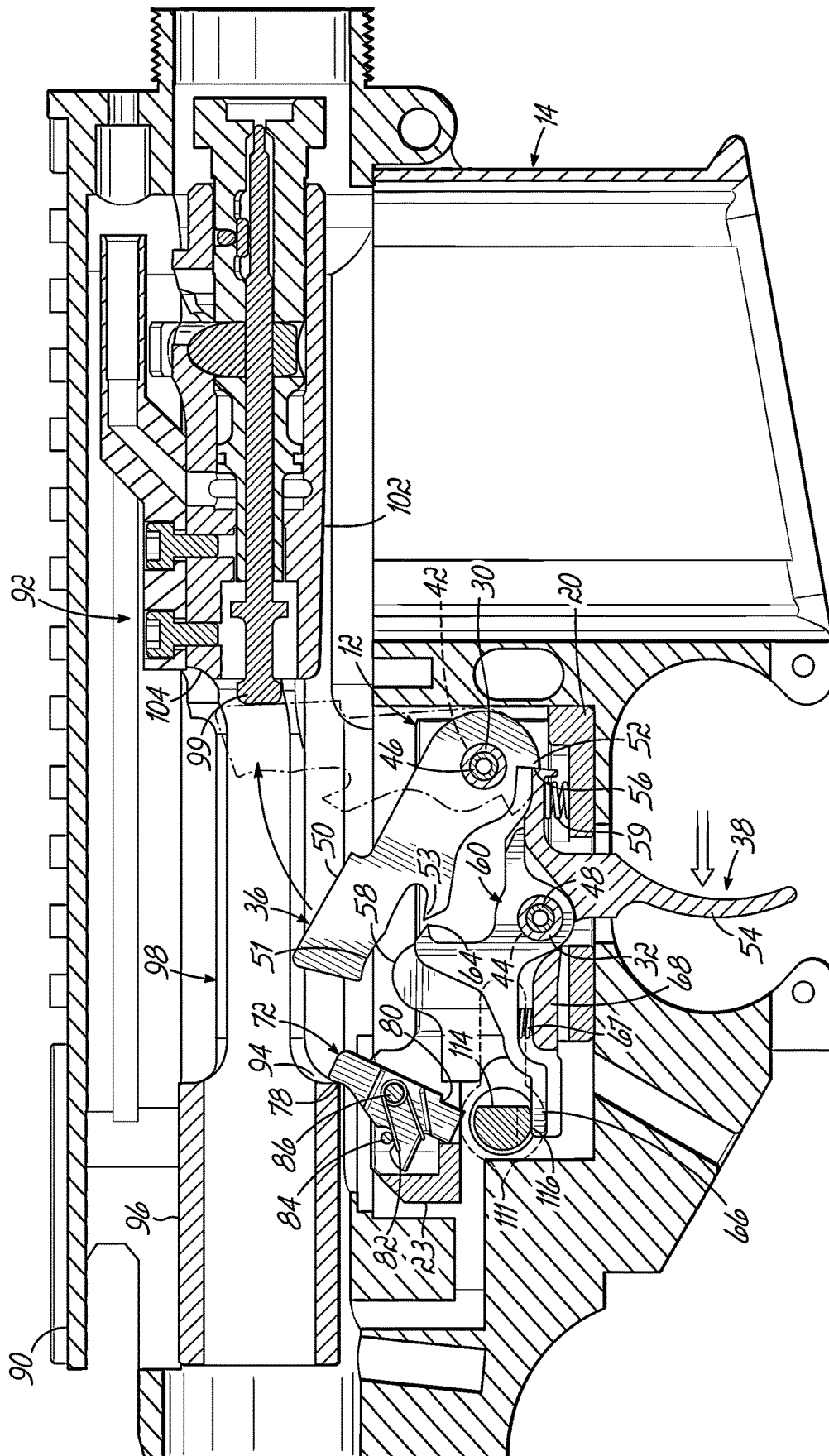


FIG. 8C

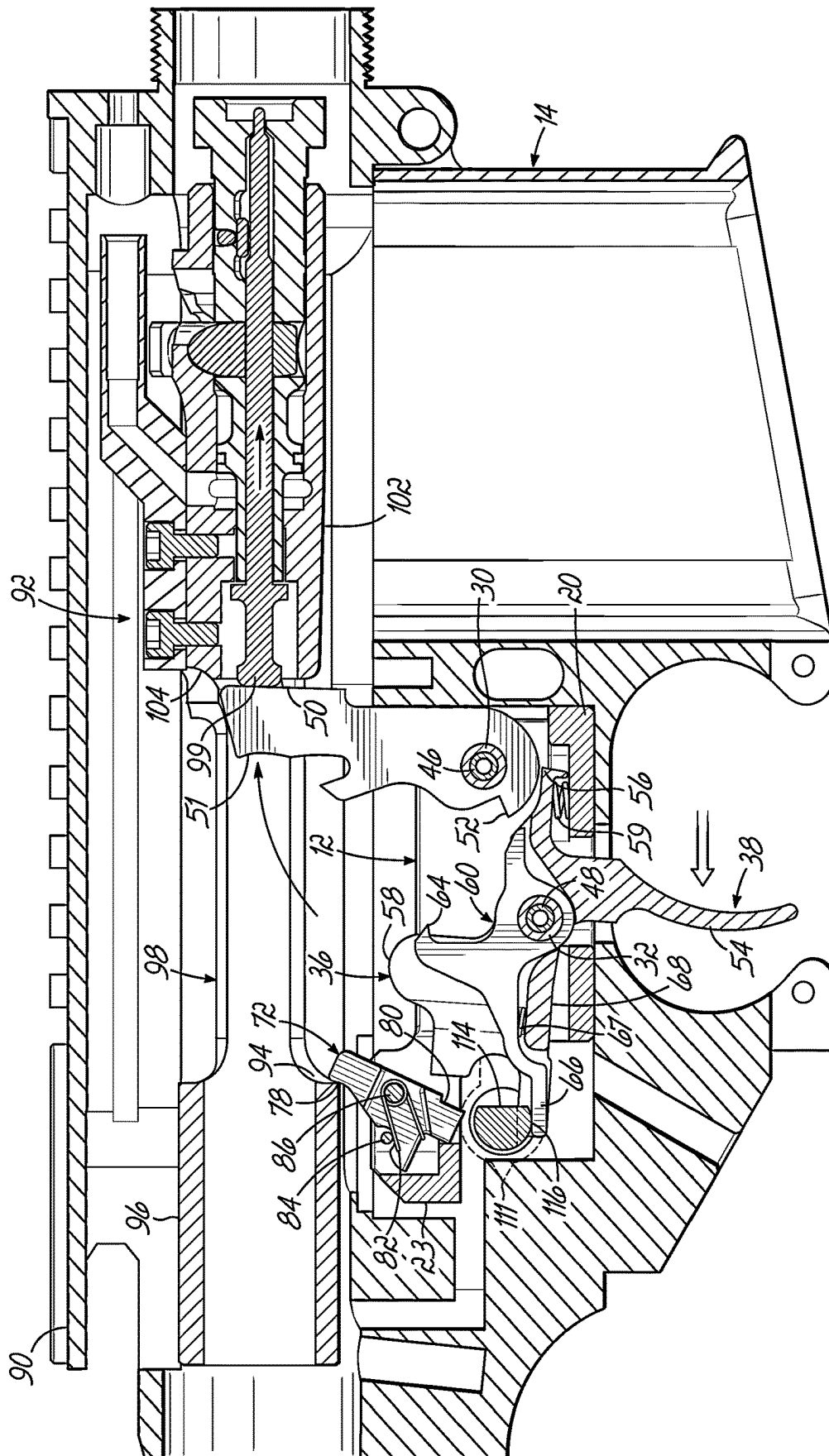


**FIG. 8D**





**FIG. 9A**



**FIG. 9B**



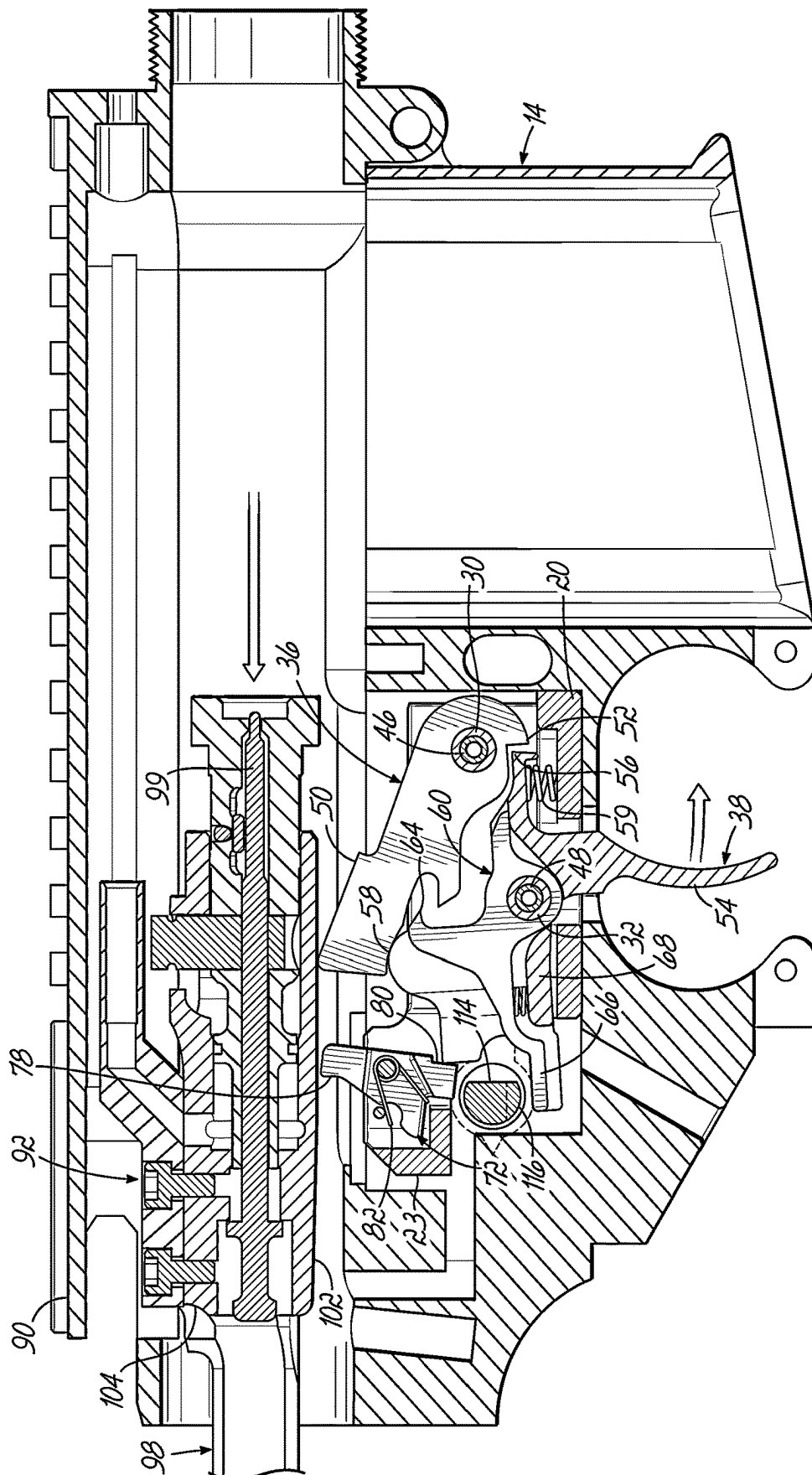


FIG. 9C

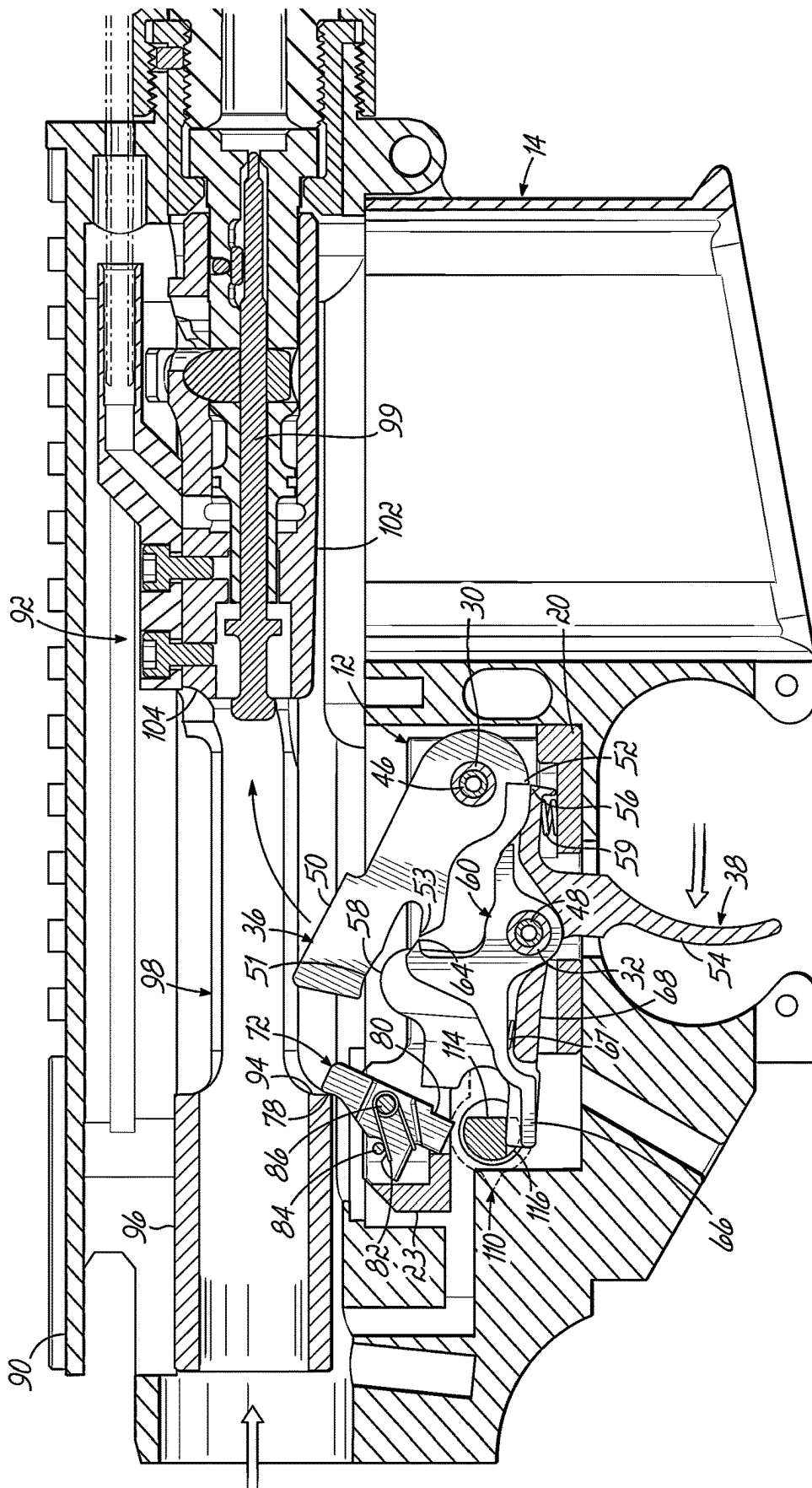


FIG. 9D

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**FIREARM TRIGGER MECHANISM****RELATED APPLICATIONS**

This application 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 disconnecter, 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 disconnecter 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

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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 semiautomatic, 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 disconnecter 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 disconnecter 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

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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

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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-



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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

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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. 4A 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. 4B 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. 5A 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. 5B 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. 6A 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. 6B 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. 8A is a view similar to FIG. 7 but with the safety selector in the standard semi-automatic position.

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

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

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

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

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

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

FIG. 9D is a view similar to FIG. 9C 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. 1-6B, 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,

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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 disconnecter 60 is pivoted on the hollow transverse pin 32 upon which the trigger member 38 pivots. The disconnecter 60 has a disconnecter hook 64 and a tail 66. The tail 66 of the disconnecter 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

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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. 4A, 4B, 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 disconnecter 60 can pivot with the trigger member 38 and the disconnecter hook 64 can catch the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 5A and 5B). 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 disconnecter 60 from pivoting with the trigger member 38 thus preventing the disconnecter hook 64 from catching the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 6A and 6B). In other words, in the forced reset semi-automatic position, the disconnecter 60 is "disabled" in that the disconnecter hook 64 is unable to catch the hammer hook 53 during cycling of the bolt carrier assembly 92.

Referring now to FIGS. 8A-8D, 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 disconnecter 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.

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Referring now to FIGS. 9A-9D, 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 disconnecter 60 from rotating with the trigger member 38, thus "disabling" the disconnecter 60, preventing the disconnecter 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 firearm trigger mechanism comprising:
  - a hammer having a sear catch and a hook and adapted to be mounted in a fire control mechanism pocket of a receiver to pivot on a transverse hammer pivot axis



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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, said trigger member having a surface positioned to be contacted by a surface of said hammer during rearward pivoting of said hammer to cause said trigger member to be forced to said set position,  
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 disconnecter having a hook for engaging said hammer hook and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnecter pivot axis,  
a locking member adapted to be movably mounted in the fire control mechanism pocket, said locking member being movable between a first position at which said locking member mechanically blocks said trigger member from moving to said released position and a second position at which said locking member does not mechanically block said trigger member allowing said trigger member to be moved to said released position, said locking member spring biased toward said first position and adapted to be moved against said spring bias to said 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 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, rearward movement of the bolt carrier causes rearward pivoting of said hammer such that said disconnecter hook catches said hammer hook, at which time a user must manually release said trigger member to free said

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hammer from said disconnecter 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 causing said trigger member to be forced to said set position, said safety selector preventing said disconnecter hook from catching said hammer hook, and thereafter when the bolt carrier reaches the substantially in-battery position 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 is configured such that, when said safety selector is in said forced reset semi-automatic position, said safety selector contacts said disconnecter preventing said disconnecter hook from catching said hammer hook.  
3. The trigger mechanism of claim 1, further comprising a spring which biases said trigger member towards said set position.  
4. The trigger mechanism of claim 1, wherein said trigger member pivot axis and said disconnecter pivot axis are the same axis.  
5. The trigger mechanism of claim 1, wherein said safety selector is adapted to be pivotably mounted in the fire control mechanism pocket to pivot on a transverse safety selector pivot axis.  
6. The trigger mechanism of claim 1, wherein said locking member is adapted to be pivotably mounted in the fire control mechanism pocket to pivot on a transverse locking member pivot axis.  
7. The trigger mechanism of claim 1, further comprising a housing having a first pair of transversely aligned openings for receiving a hammer pivot pin and a second pair of transversely aligned openings for receiving a trigger member pivot pin.  
8. The trigger mechanism of claim 7, wherein said housing has a third pair of transversely aligned openings for receiving a locking member pivot pin or screw.

\* \* \* \* \*

# **Exhibit I**

## **U.S. Patent No. 12,636,403**

4153117636403182

United States Patent  
Office

(10) Patent No.: US 12,630,403 B2

Date of Patent: May 26, 2026

#### 1) GUN ARM TRIGGER MECHANISM

<sup>†</sup>Y. Ogino and A. Kato, JP. T.I.C., Toyoko, DR (198).

2) **Inventory:** *Minden Thomas Station* (Cleveland, 1994) (100).

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1. **Plots:** Eighteen 1-acre plots were established in the pasture, consisting of adjacent areas of 0.5 ha. Plots for 14 days

This product is subject to a limited warranty.

3)  $\text{aqd} = \text{aq} - 1$  (200, 55, 144)

2) *Poland* (Law 93/2025)

Press Publication Date

10-0000000-71 MAY 6 91

### Delayed Use—Application Issues

5) Continuation of application No. 18/003,026, filed on May 16, 2001, now Pat. No. 12,377,807, which is a  
(Continued)

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Field of Classification Research  
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(10) *Indonesian* (Indo)

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## CYCLE POLYMERIZATION

<sup>a</sup>Answers: Literature: Regeneration: 100%; Success: 100%; Survival: 100%; 1985/1986: 100%; 1986/1987: 100%.

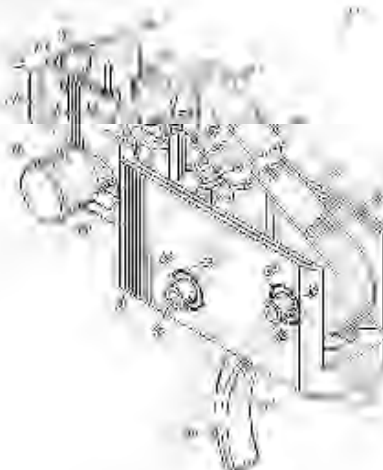
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*Aluminum Isotopes* | *Windward* | *Barro*

## LITERATURE CITED

A trigger mechanism that can be used in 4:8-pattern systems has a hammer, a trigger member, a disconnector, a locking member, and a "finger position" safety selector having sub-adjusted rest, normally, and locked rest semi-normal positions. In the closed rest semi-normal position, forward movement of the bolt carrier causes retraction and pivoting of the hammer such that the disconnector block catches the hammer nose, effectively 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 position so that the user can pull the trigger member to free the hammer. In the locked rest semi-normal position, outward movement of the bolt carrier causes retraction and pivoting of the hammer causing the trigger member to be forced to the set position; the safety selector preventing the disconnector block from catching the hammer nose, and allowing when the bolt carrier reaches the substantially in forward

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Page 2

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.

(60) Provisional application No. 63/297,884, filed on Jan. 10, 2022.

## (52) U.S. Cl.

CPC ..... *F41A 19/24* (2013.01); *A61L 2300/252* (2013.01); *A61L 2300/418* (2013.01); *A61L 2400/04* (2013.01); *A61L 2430/36* (2013.01)

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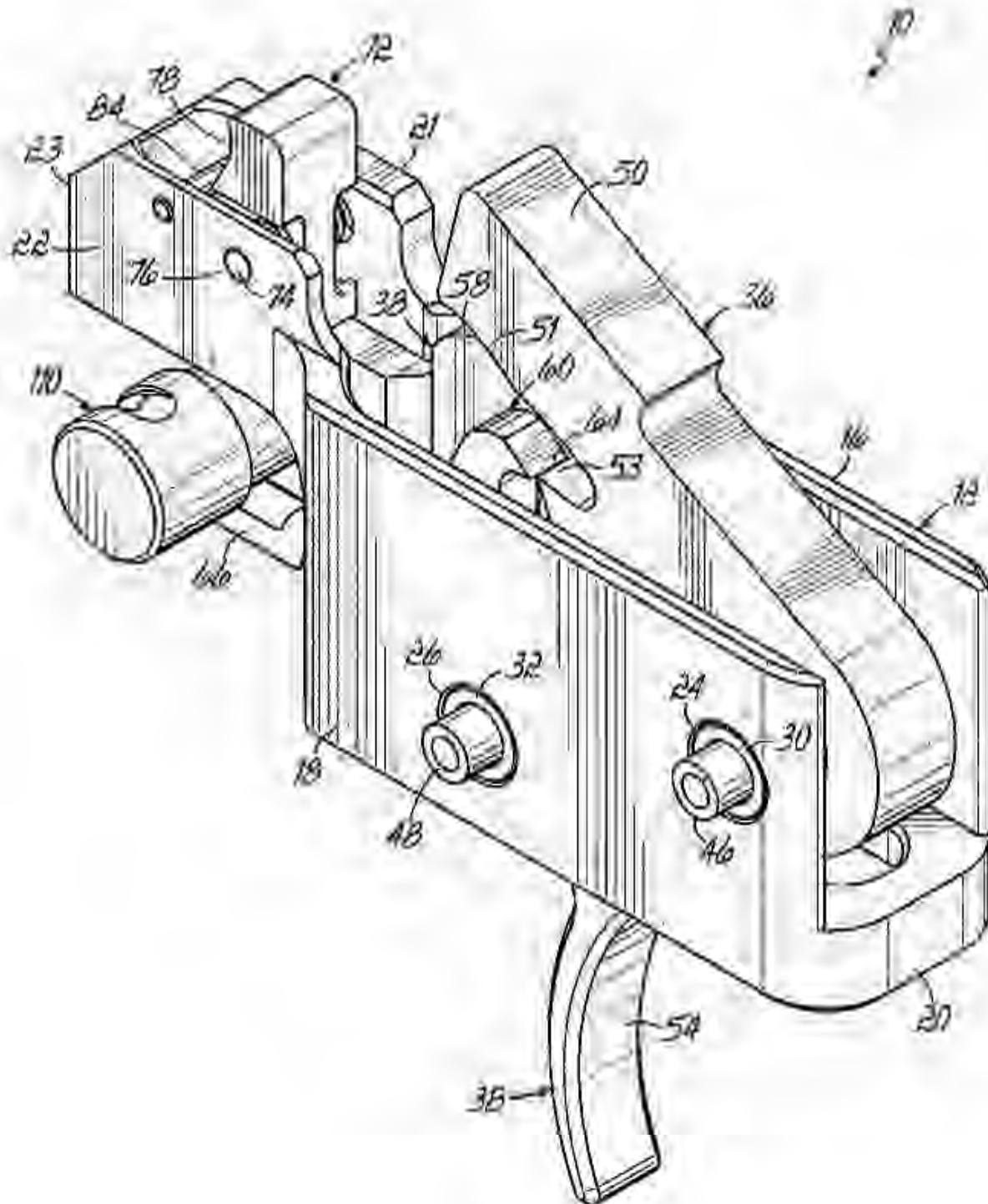


FIG. 1



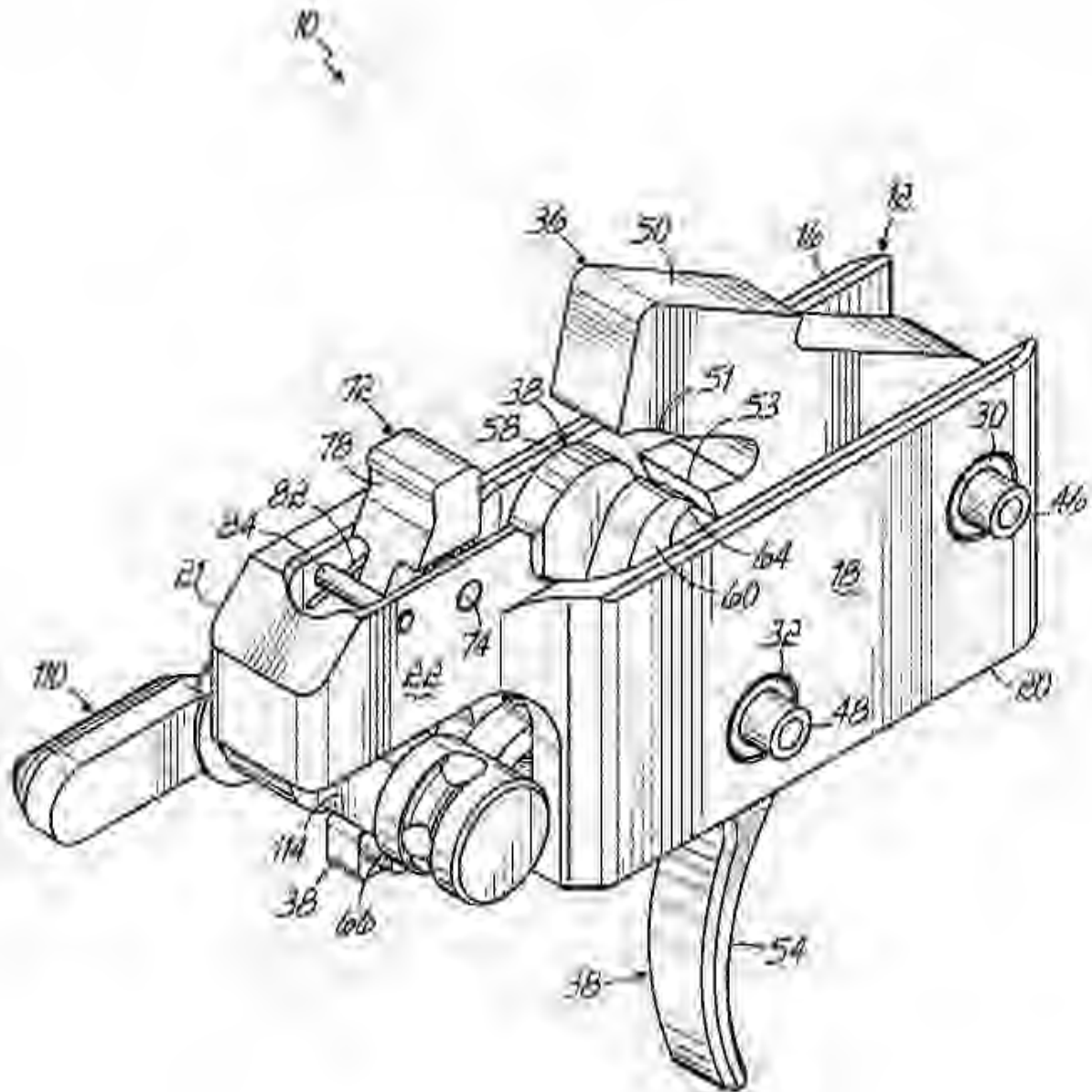


FIG. 2

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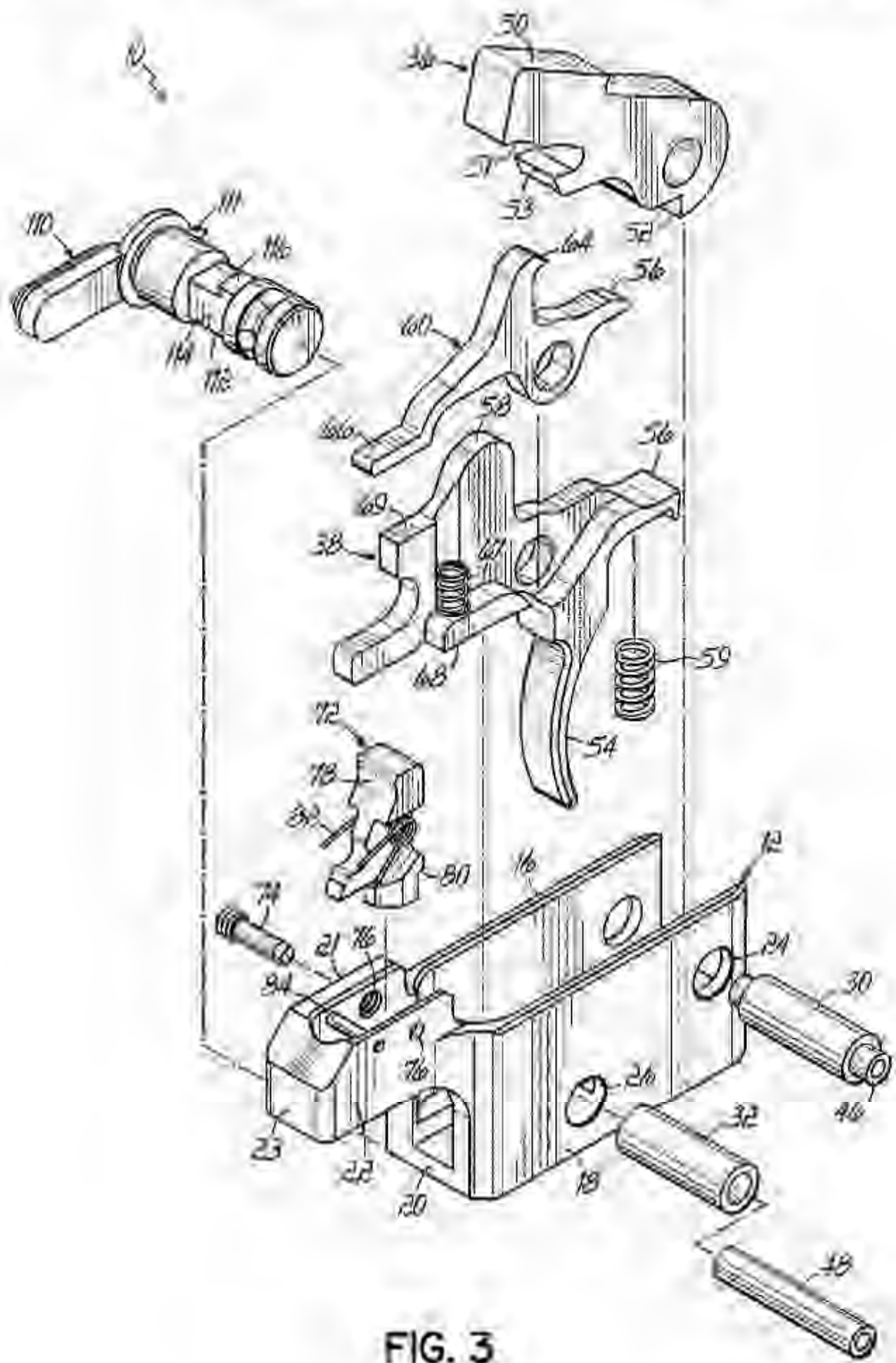
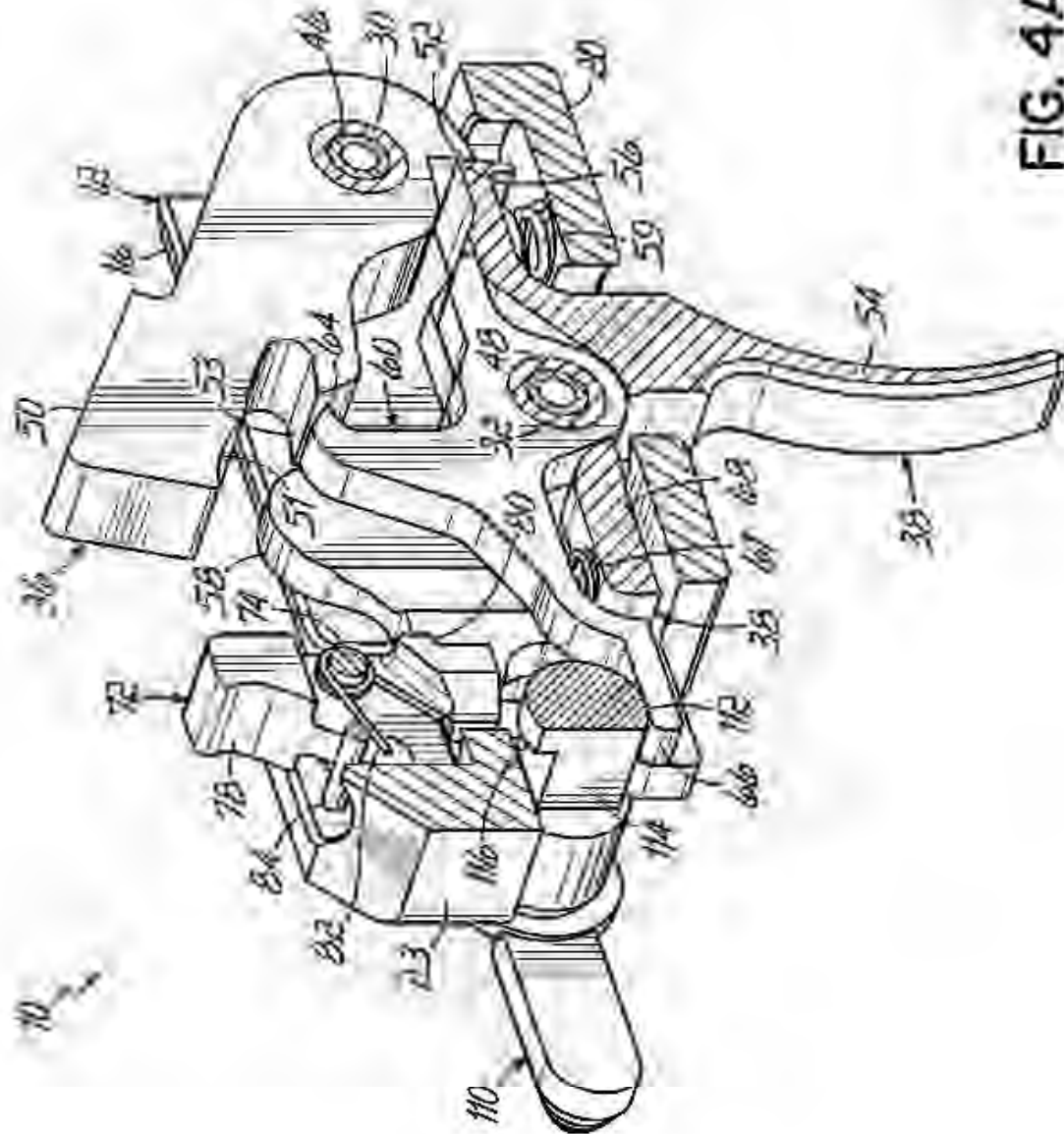


FIG. 3

Exhibit I



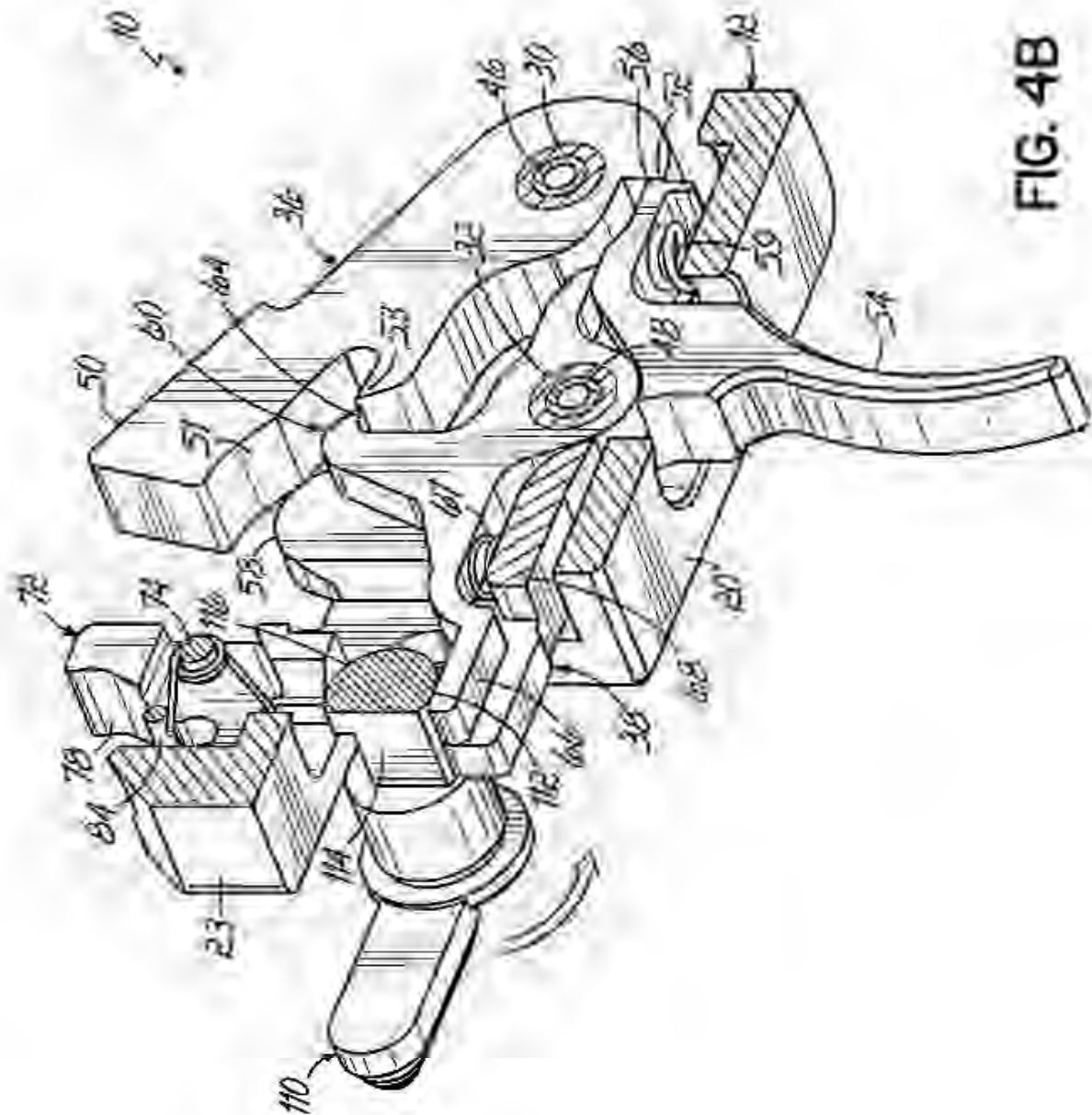


FIG. 4B



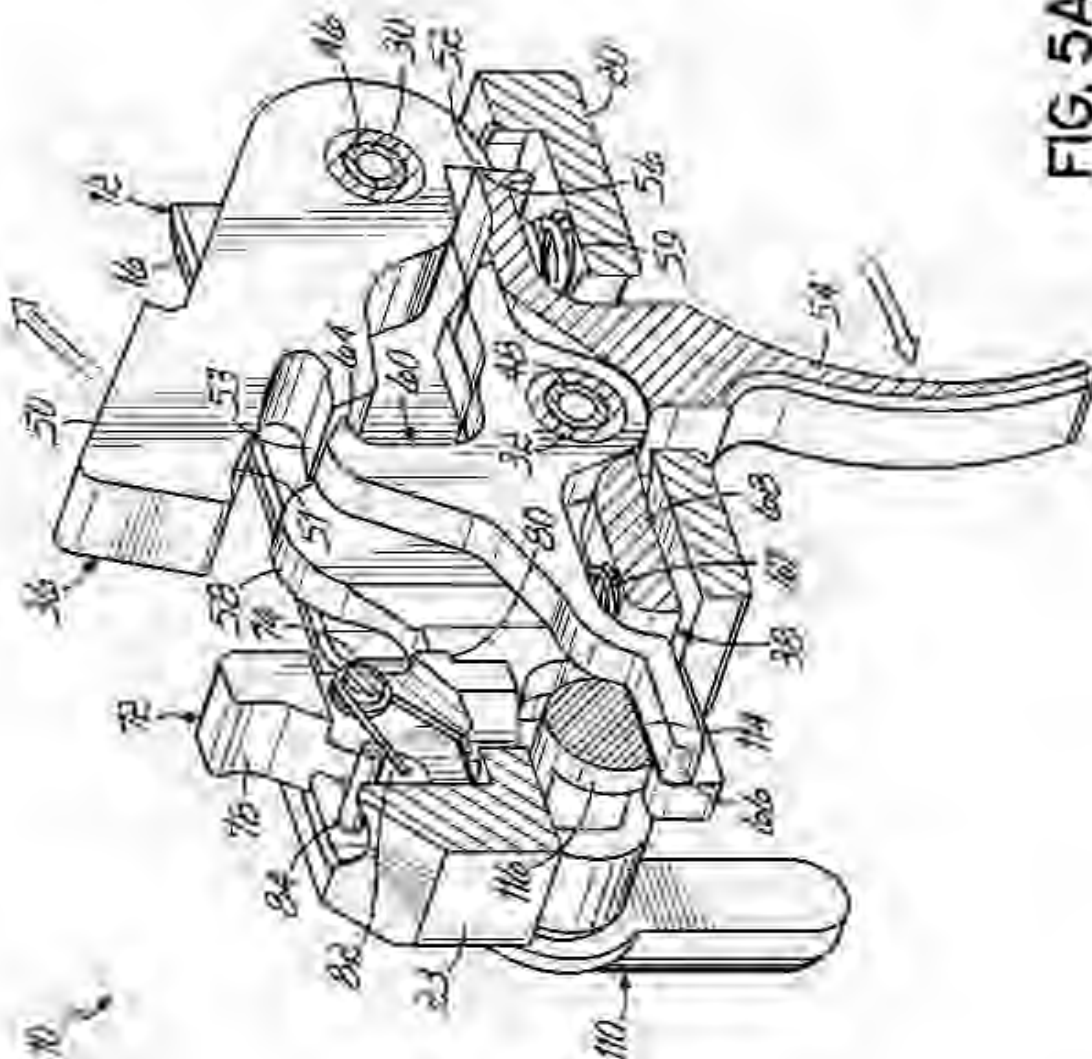
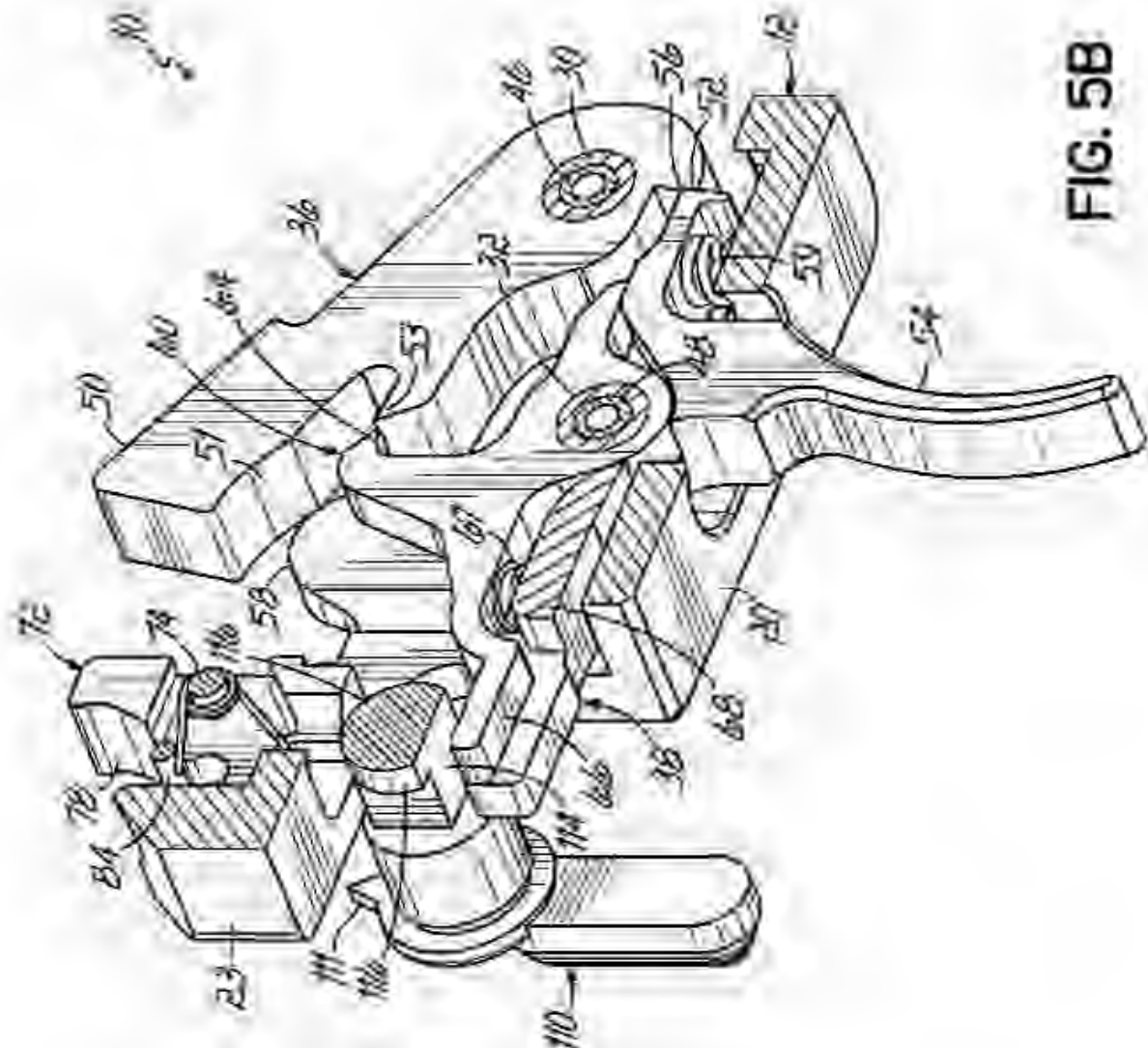


FIG. 5A





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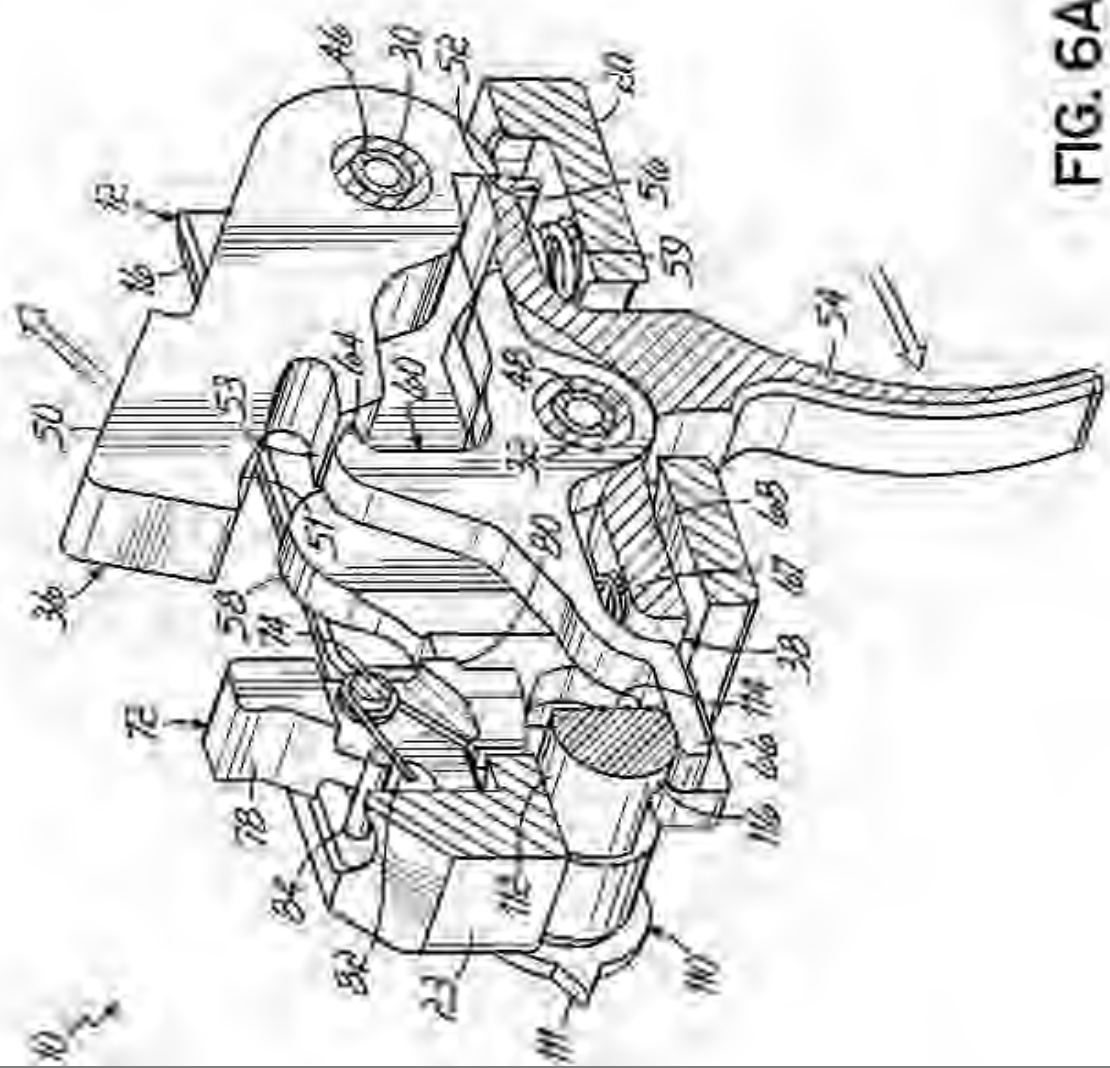


FIG. 6A

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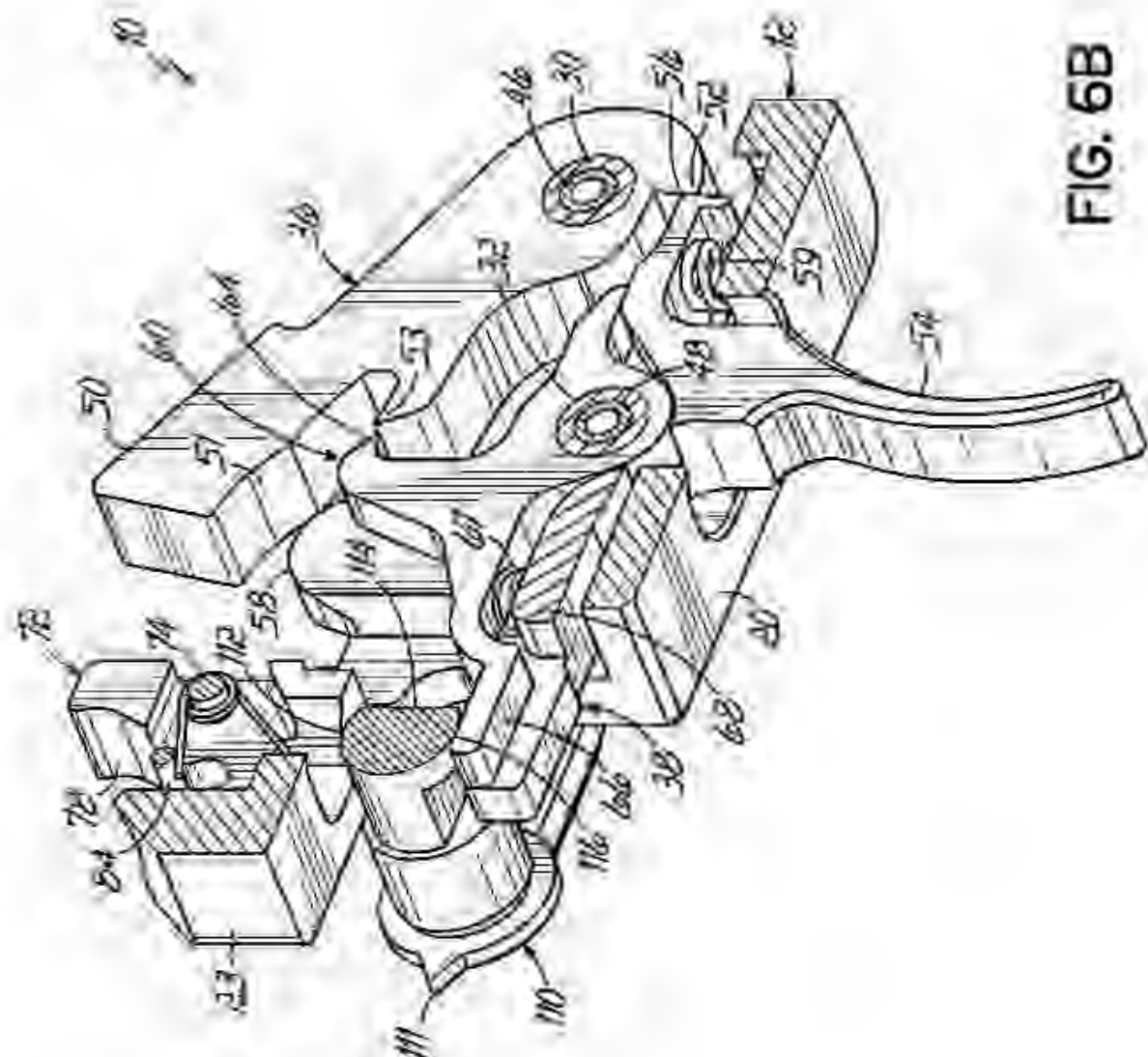


FIG. 6B

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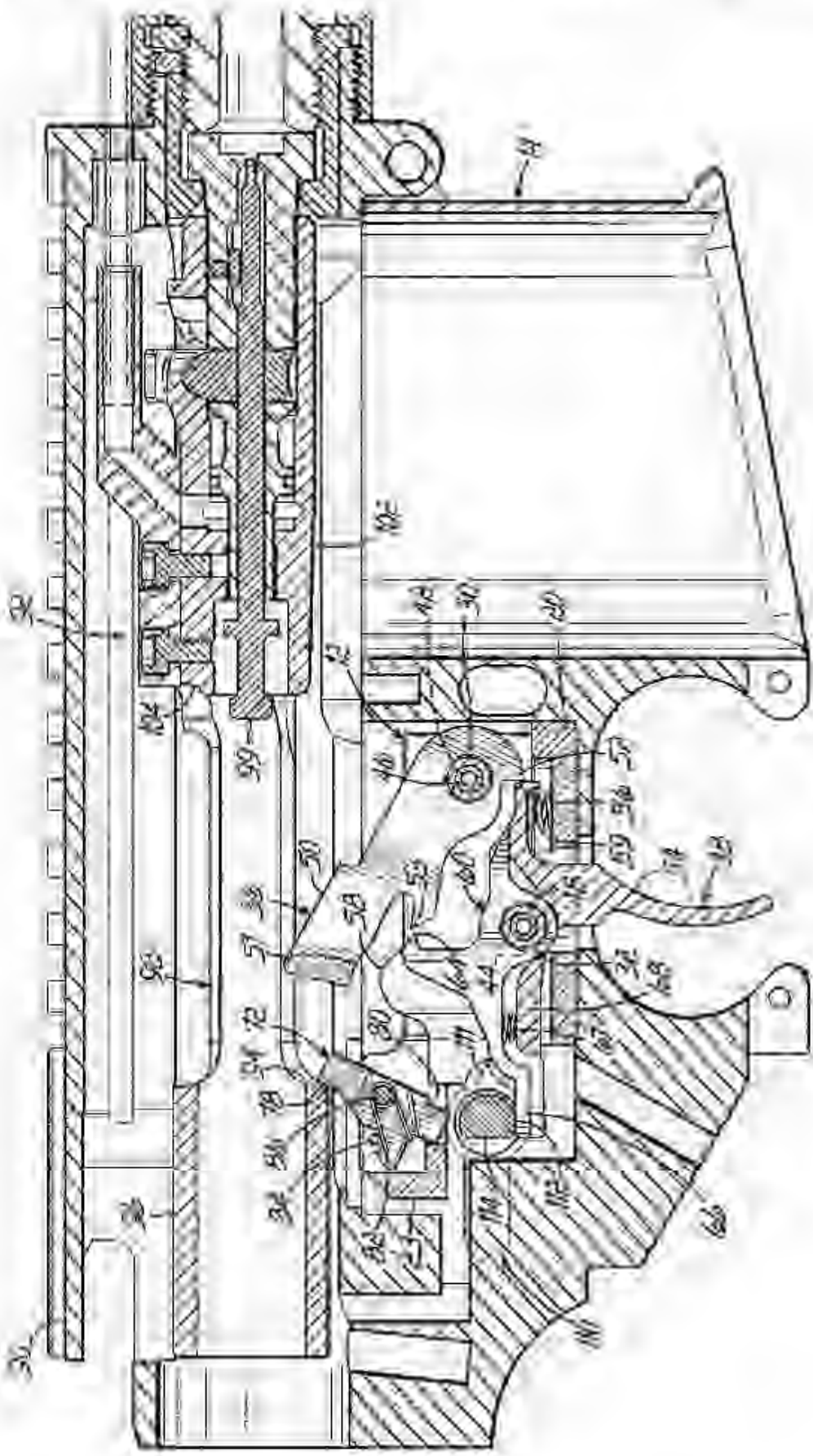


FIG. 7



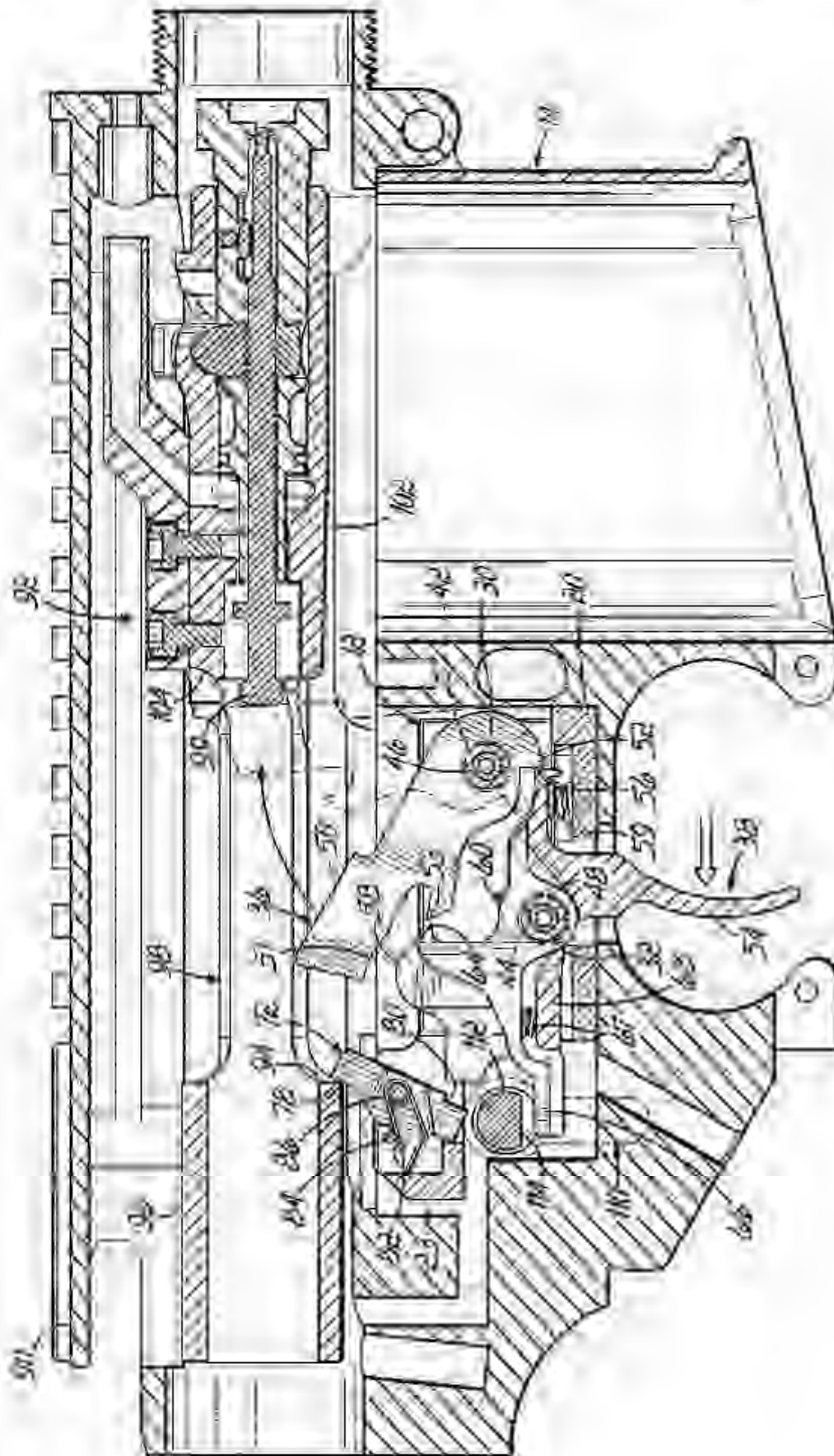


FIG. 8A

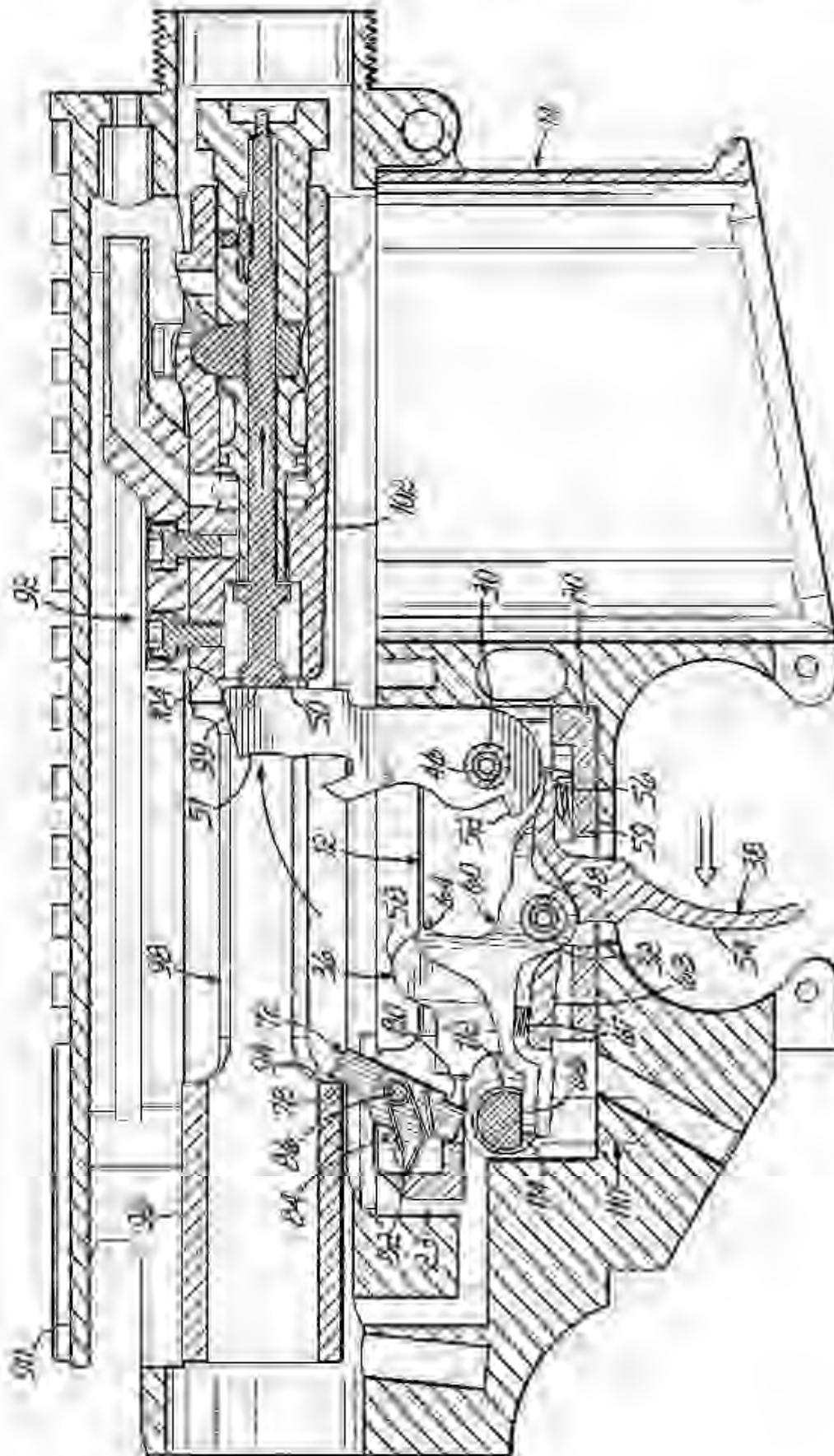


FIG. 8B



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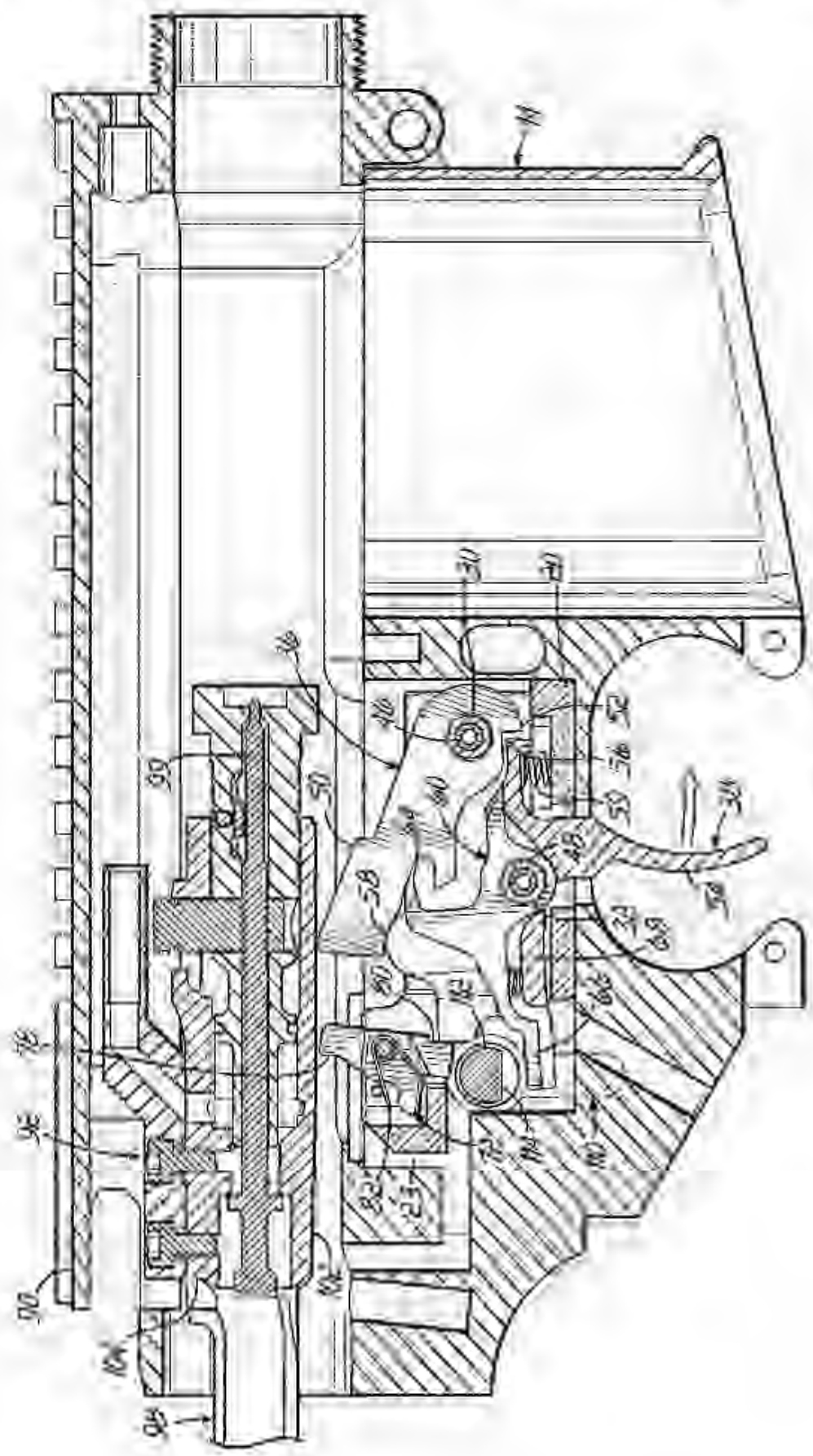


FIG. 8C



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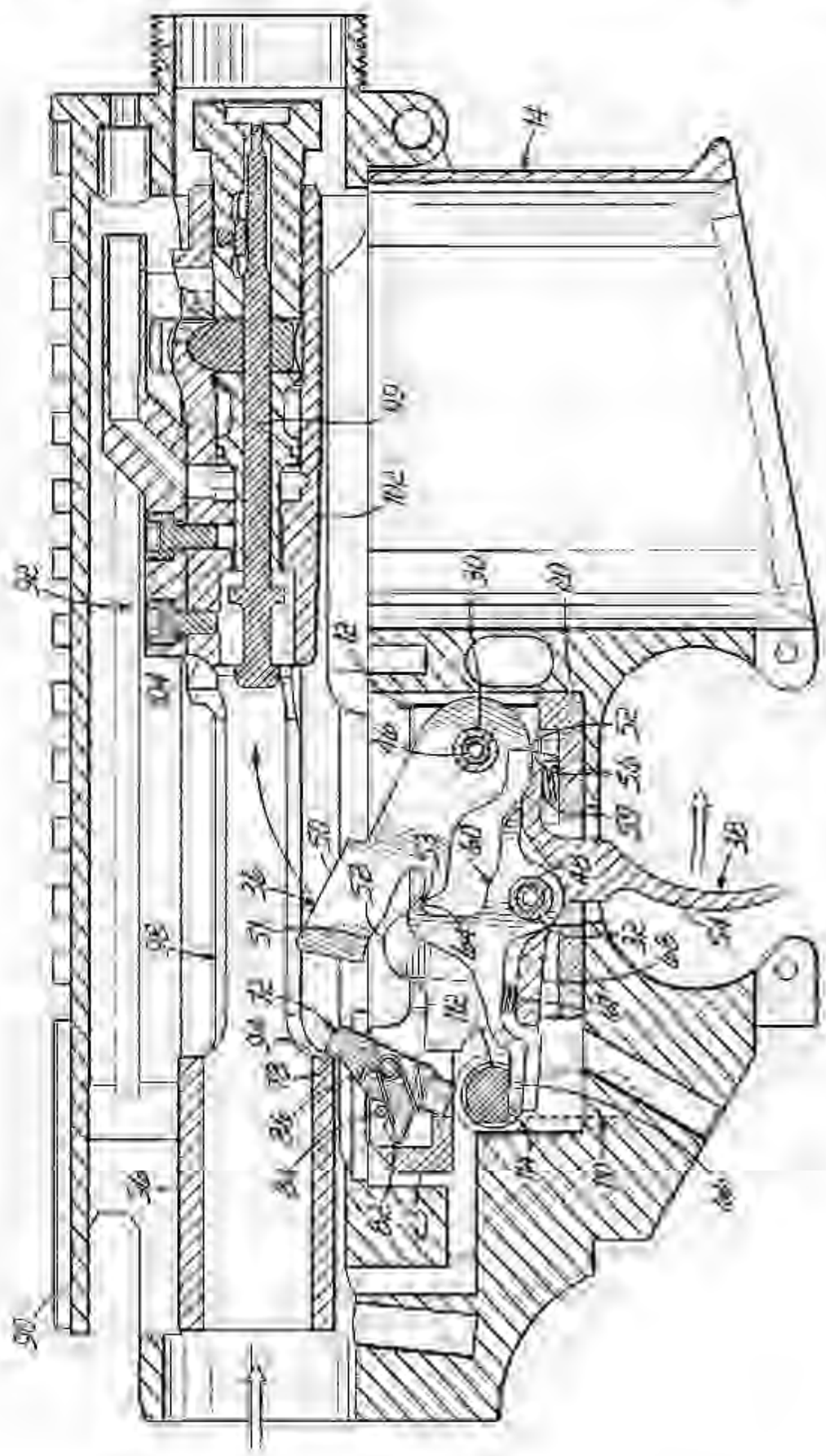


FIG. 8D

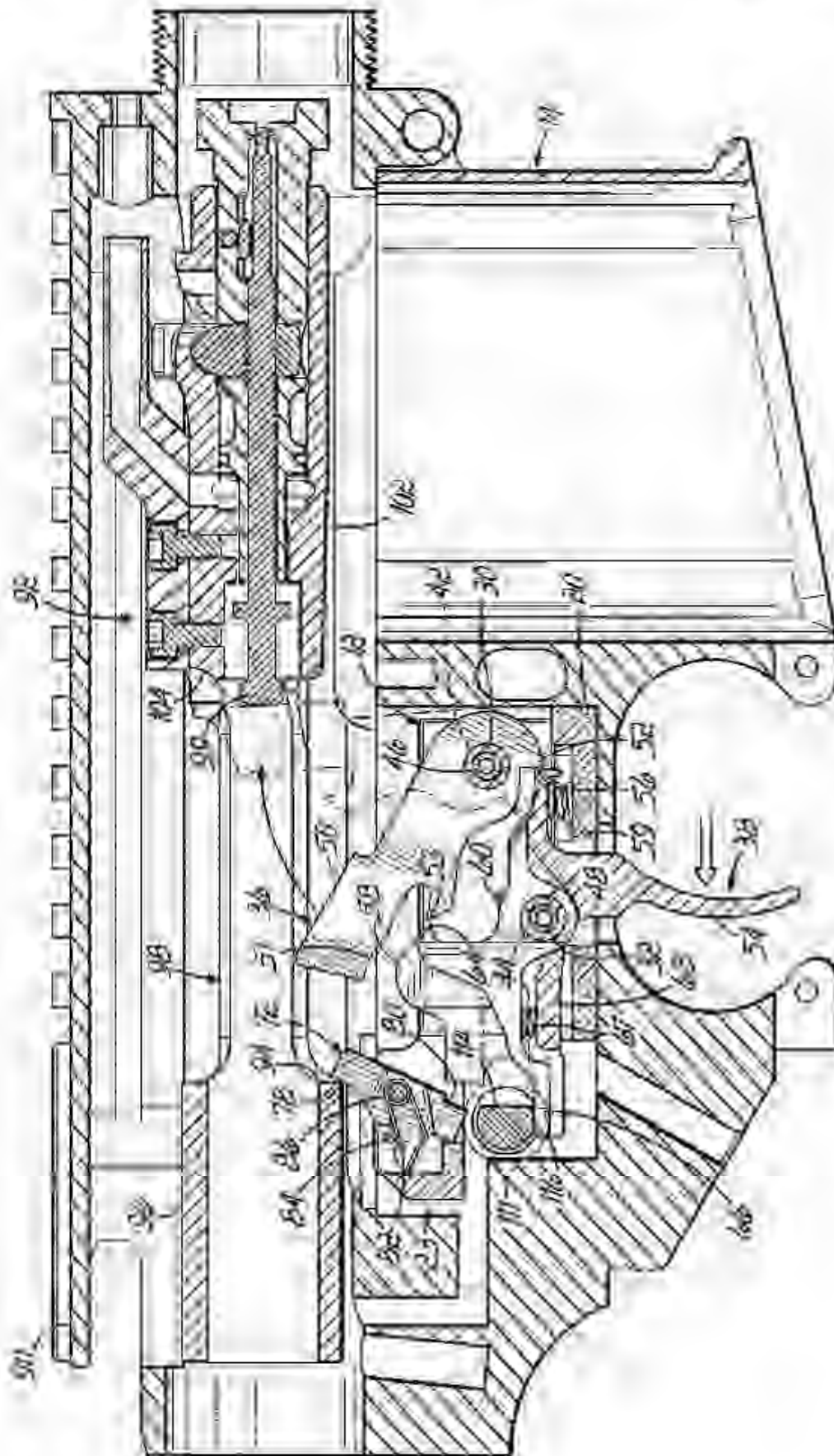


FIG. 9A



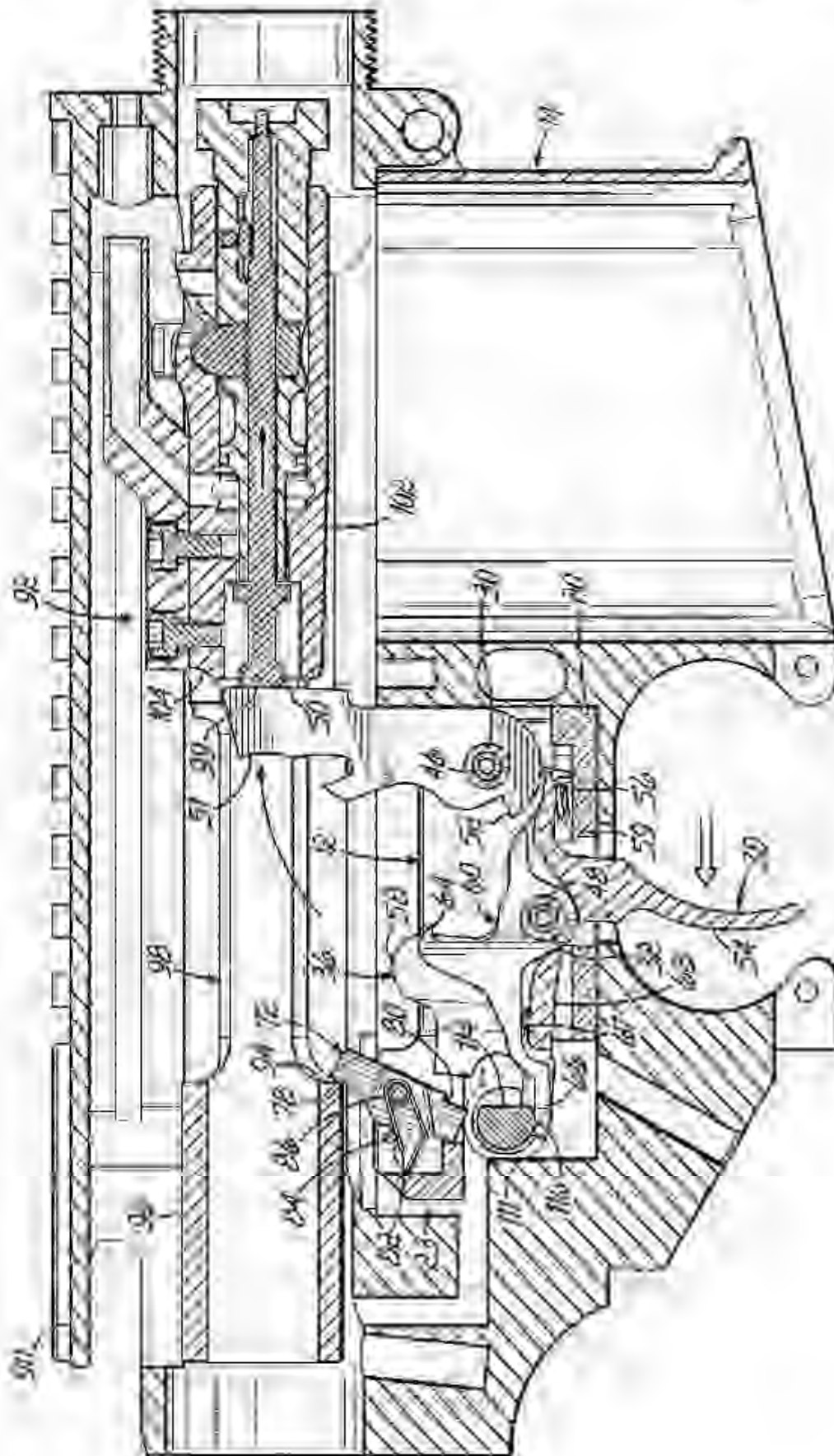


FIG. 9B

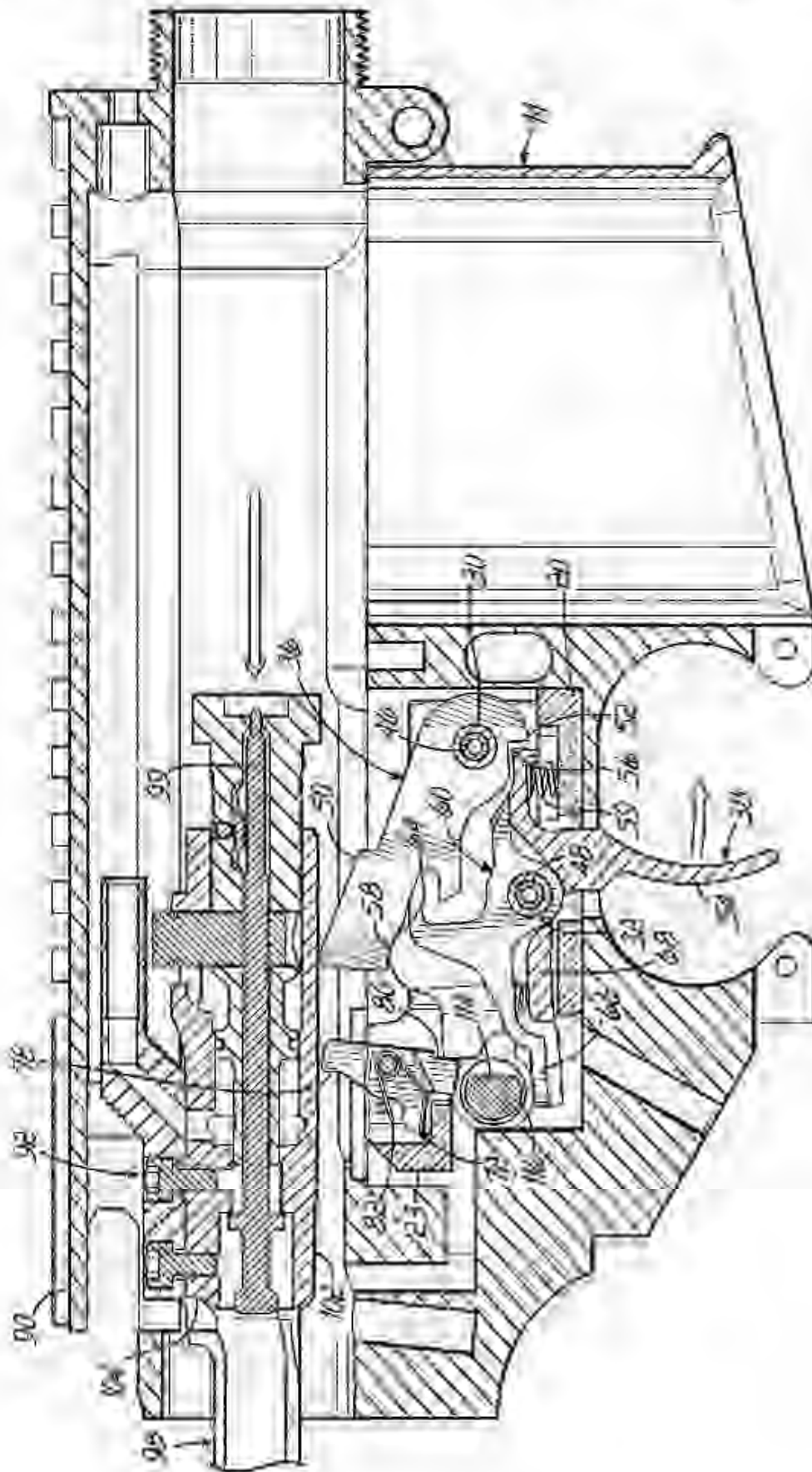


FIG. 9C



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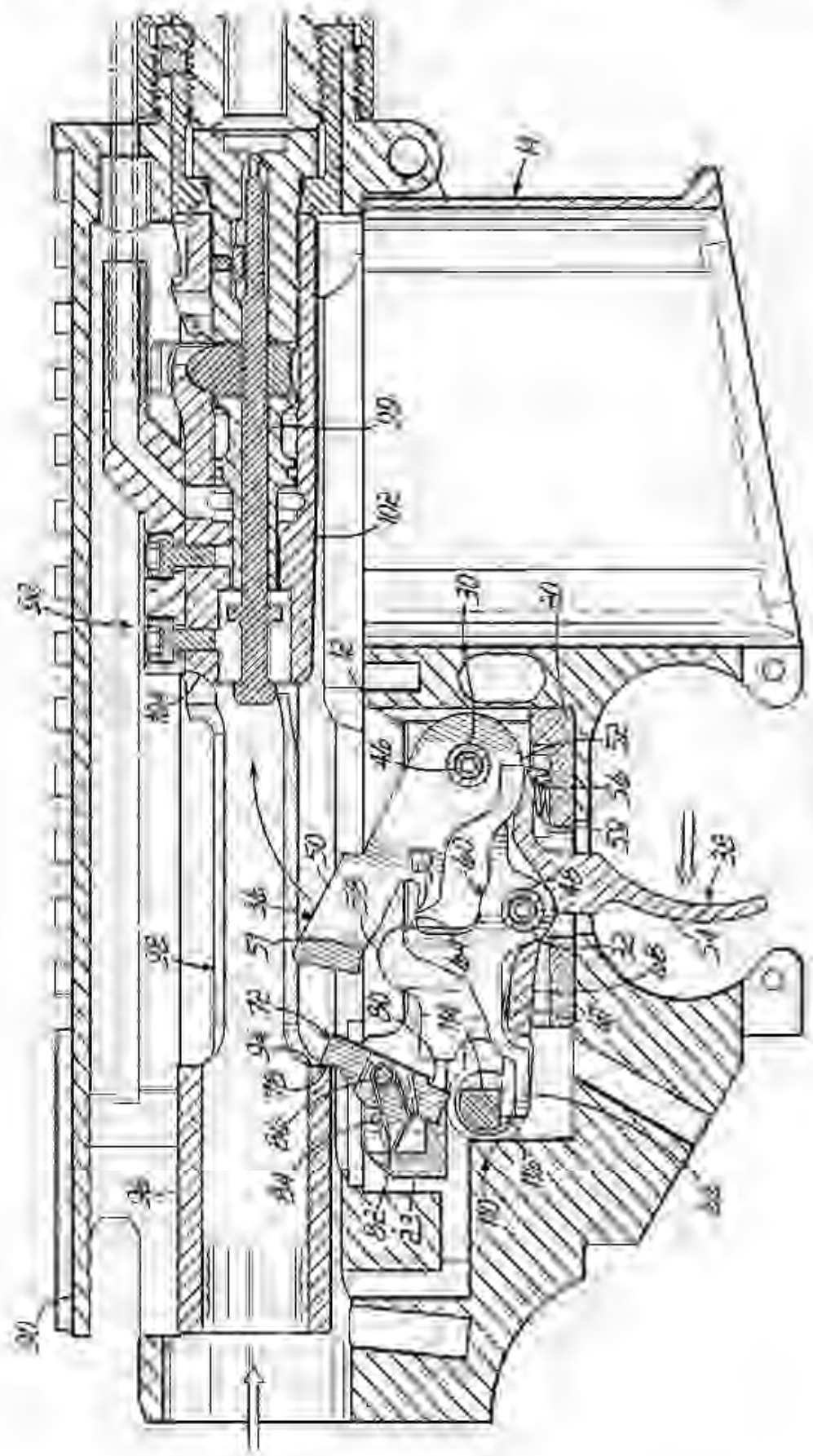


FIG. 9D

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## 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 disconnecter, 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 disconnecter 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

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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 semiautomatic, 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 disconnecter 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 disconnecter 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



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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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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

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disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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 disconnecter 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 disconnecter preventing the disconnecter 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter 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-

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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 disconnect 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 disconnecter 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 disconnecter 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 disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release the trigger member to free the hammer from the disconnecter to permit

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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 disconnecter 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. 4A 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. 4B 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. 5A 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. 5B 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. 6A 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. 6B 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. 8A is a view similar to FIG. 7 but with the safety selector in the standard semi-automatic position.

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

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

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

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

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



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

FIG. 9D is a view similar to FIG. 9C 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. 1-6B, 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,

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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 disconnecter 60 is pivoted on the hollow transverse pin 32 upon which the trigger member 38 pivots. The disconnecter 60 has a disconnecter hook 64 and a tail 66. The tail 66 of the disconnecter 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

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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. 4A, 4B, 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 disconnecter 60 can pivot with the trigger member 38 and the disconnecter hook 64 can catch the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 5A and 5B). 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 disconnecter 60 from pivoting with the trigger member 38 thus preventing the disconnecter hook 64 from catching the hammer hook 53 during rearward pivoting travel of the hammer head 50. (FIGS. 6A and 6B). In other words, in the forced reset semi-automatic position, the disconnecter 60 is "disabled" in that the disconnecter hook 64 is unable to catch the hammer hook 53 during cycling of the bolt carrier assembly 92.

Referring now to FIGS. 8A-8D, 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 disconnecter 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.

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Referring now to FIGS. 9A-9D, 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 disconnecter 60 from rotating with the trigger member 38, thus "disabling" the disconnecter 60, preventing the disconnecter 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

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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 disconnecter having a disconnecter hook for engaging the hammer hook and adapted to be mounted in the fire control mechanism pocket to pivot on a transverse disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually release pressure on the trigger member to free the hammer from the disconnecter 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 disconnecter 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

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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 disconnecter having a disconnecter hook for engaging the hammer hook and adapted to pivot on a transverse disconnecter 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 disconnecter hook catches the hammer hook, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnecter 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 disconnecter 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.



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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 disconnecter having a disconnecter hook for engaging the hammer hook and adapted to pivot on a transverse disconnecter 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 disconnecter hook holds the hammer hook, at which time a user must manually reduce pressure on the trigger member to free the hammer from the disconnecter 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 disconnecter 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.

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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 disconnecter having a disconnecter hook for engaging the hammer hook and adapted to pivot on a transverse disconnecter 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 disconnecter 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 disconnecter 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 disconnecter comprising a disconnecter 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



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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 disconnecter 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 disconnecter 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 disconnecter 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:

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a disconnecter;

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 disconnecter 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 disconnecter having a disconnecter hook and adapted to pivot on a transverse disconnecter 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

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a rearward pivot of the hammer to a position where the hammer hook is past the disconnecter 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 disconnecter 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 disconnecter 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 disconnecter 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 disconnecter having a disconnecter hook and adapted to pivot on a transverse disconnecter 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 disconnecter 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 disconnecter having a disconnecter hook and adapted to pivot on a transverse disconnecter 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 disconnecter 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.

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**40.** A forced reset trigger mechanism, comprising:  
 a hammer having a hammer hook and adapted to pivot on a transverse hammer pivot axis;  
 a disconnecter having a disconnecter hook and adapted to pivot on a transverse disconnecter 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 disconnecter 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 disconnecter 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 disconnecter 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 disconnecter.

**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 disconnecter 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 disconnecter is received at least partially within the reduced-thickness region such that the trigger member and the disconnecter 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 disconnecter positioned laterally adjacent to the trigger member,  
 wherein the trigger member defines a lateral accommodation space, and the disconnecter occupies at least a portion of the lateral accommodation space such that the trigger member and the disconnecter 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.

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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 disconnecter having a disconnecter 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 disconnecter is moved into a position where, after the hammer hook passes the disconnecter 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 disconnecter having a disconnecter 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 disconnecter into a position so as to prevent the disconnecter hook from catching the hammer hook where, after the hammer hook passes the disconnecter 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 disconnecter, having a disconnecter hook for engaging the hammer hook, adapted to pivot on a disconnecter 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

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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 disconnecter 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 disconnecter hook, and thereafter the rearward pressure on the trigger member must be reduced to allow the hammer hook to pivot forward above the disconnecter 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 disconnecter 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 disconnecter 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

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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.

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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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