US012031784B1

(12) **United States Patent**
DeMonico

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

(54) **ADAPTED FORCED RESET TRIGGER**

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

(72) Inventor: **Lawrence DeMonico**, Austin, TX (US)

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

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

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

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

Related U.S. Application Data

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

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

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

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

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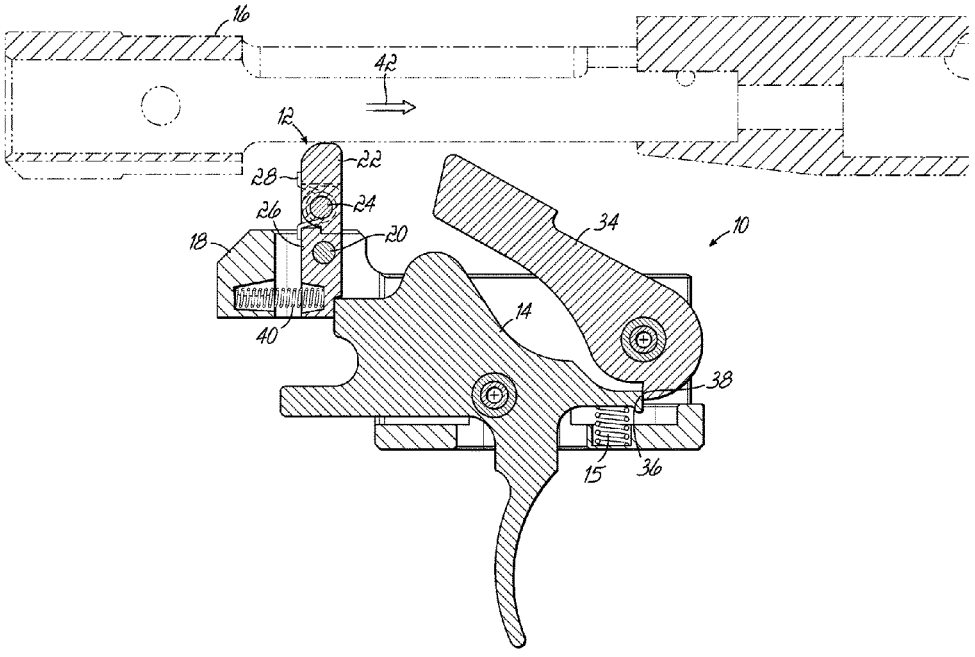
Primary Examiner — Michelle Clement
(74) *Attorney, Agent, or Firm* — Wood Herron & Evans LLP

(57) **ABSTRACT**

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

6 Claims, 5 Drawing Sheets



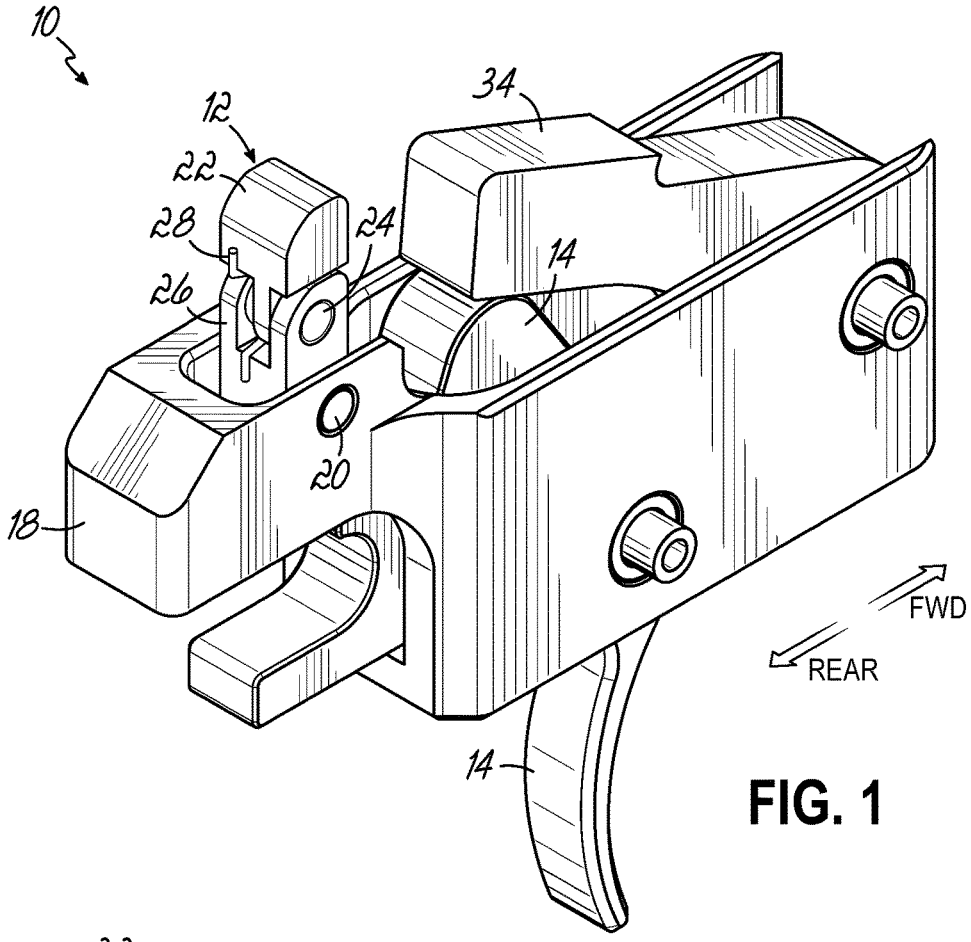


FIG. 1

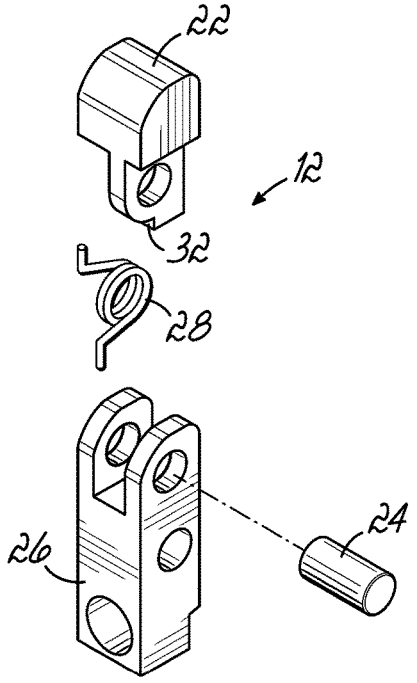


FIG. 2

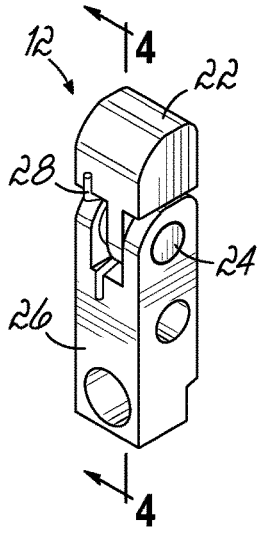


FIG. 3

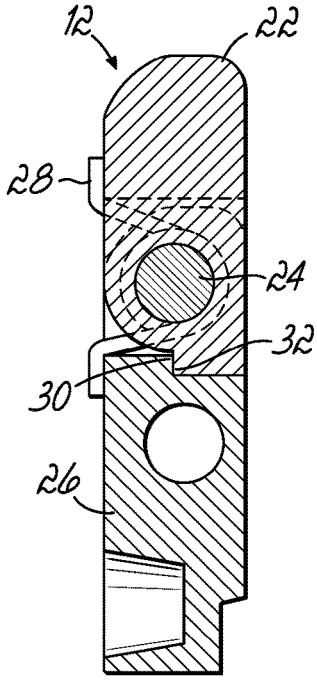


FIG. 4

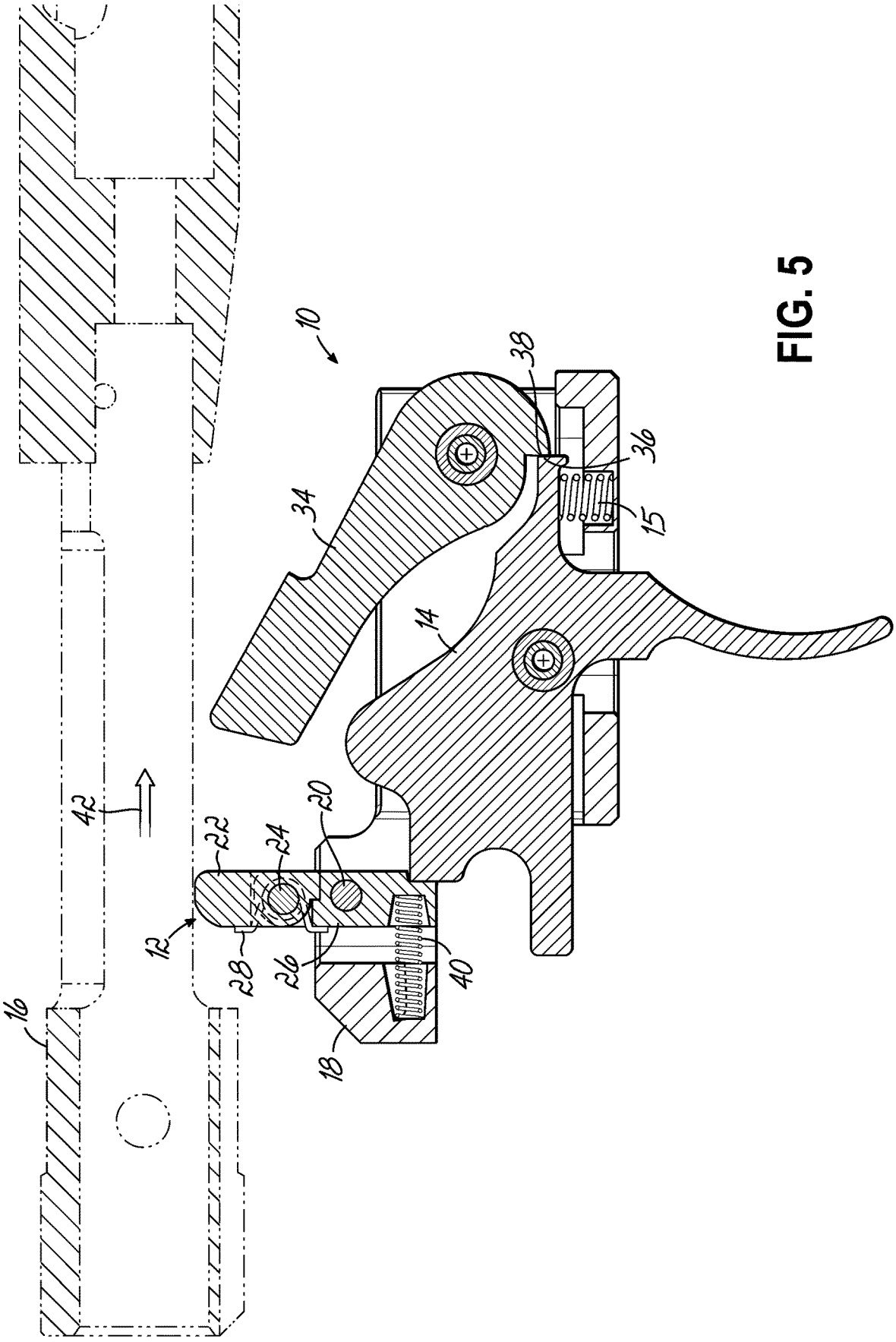


FIG. 5

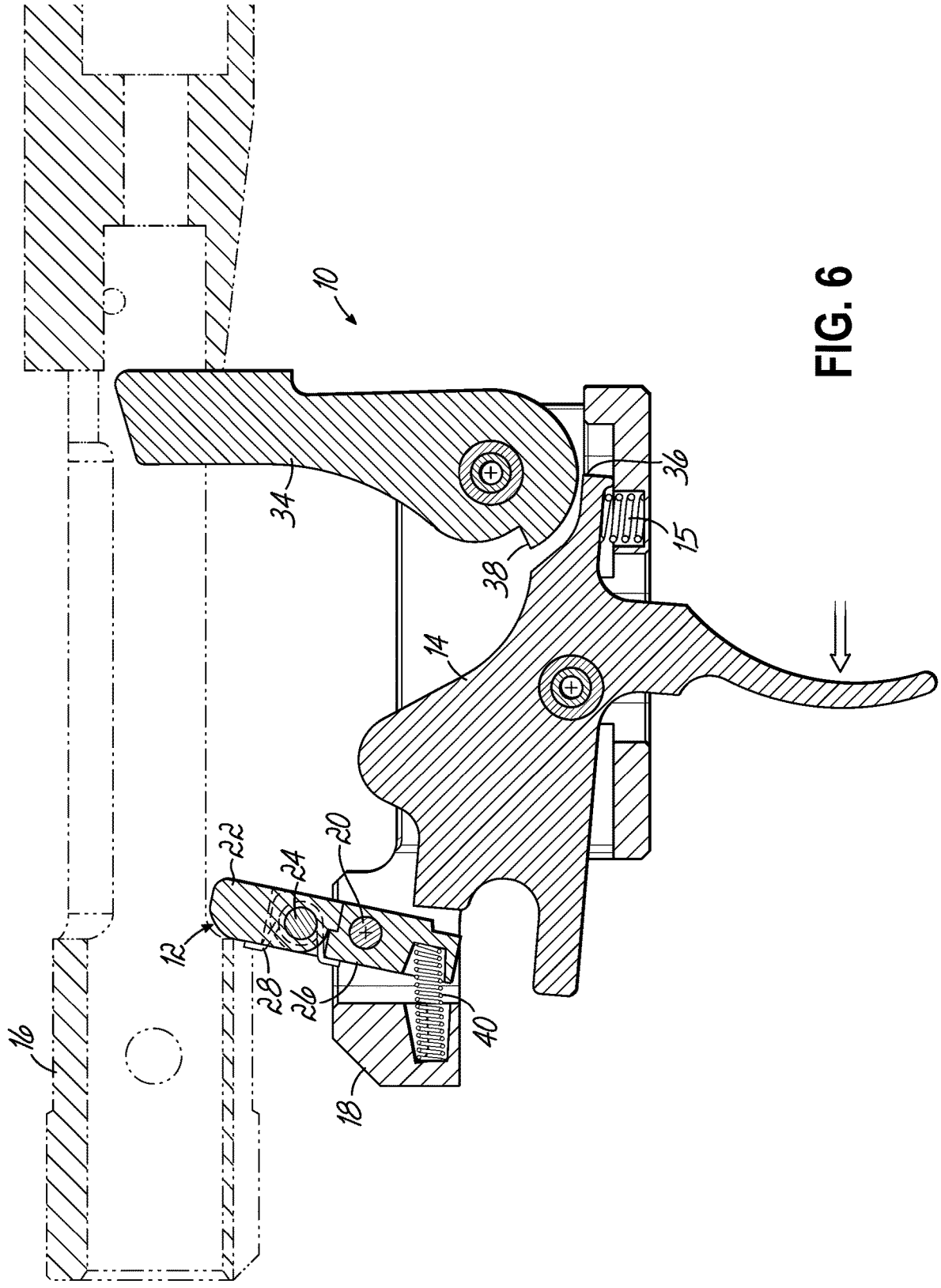


FIG. 6

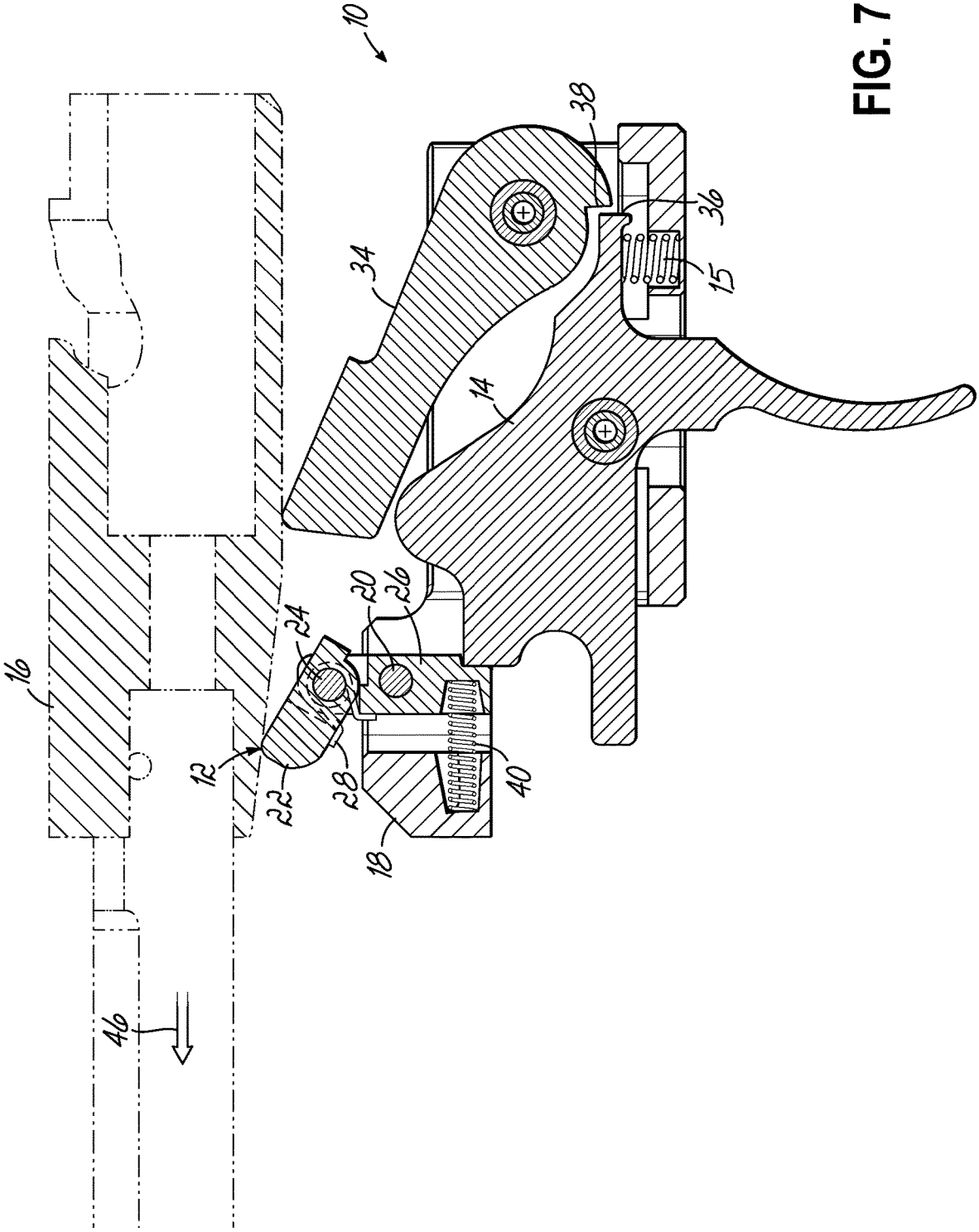


FIG. 7

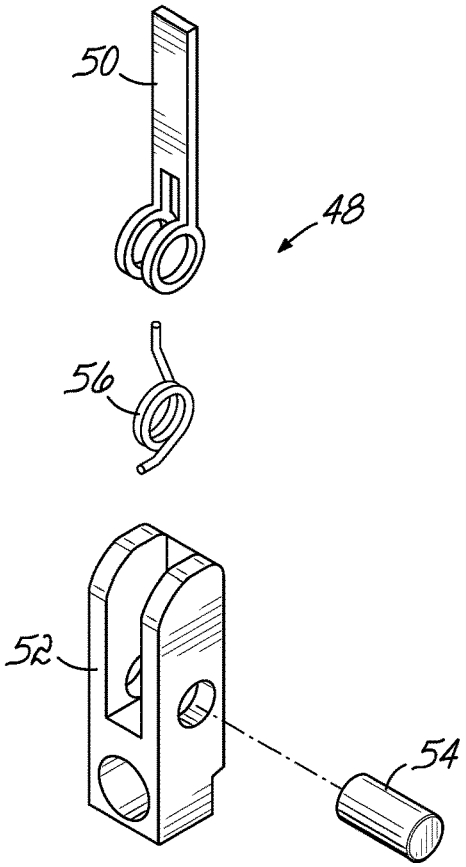


FIG. 8

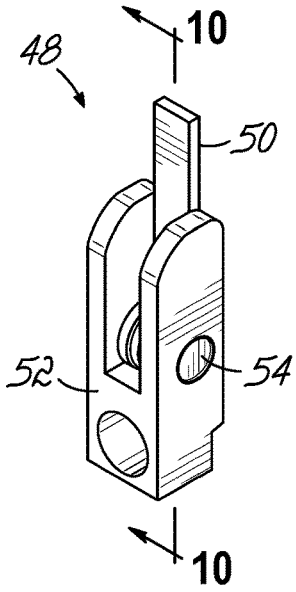


FIG. 9

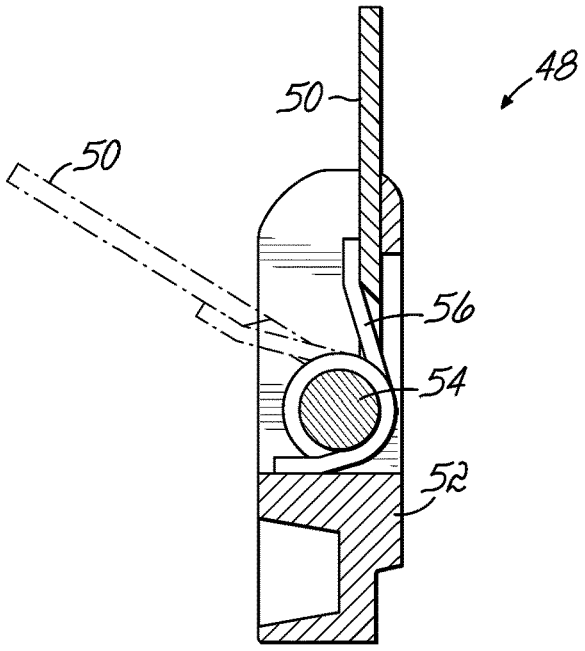


FIG. 10

ADAPTED FORCED RESET TRIGGER

TECHNICAL FIELD

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

BACKGROUND

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

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

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

SUMMARY OF THE INVENTION

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

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

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

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

BRIEF DESCRIPTION OF THE DRAWINGS

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

FIG. **1** is an isometric view of a trigger mechanism incorporating one embodiment of the present invention;

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

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

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

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

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

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

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

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

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

DETAILED DESCRIPTION

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

opposite direction. "Lateral" or "transverse" indicates a side-to-side direction generally perpendicular to the axis of the barrel. Although firearms may be used in any orientation, "left" and "right" will generally indicate the sides according to the user's orientation, "top" or "up" will be the upward direction when the firearm is gripped in the ordinary manner.

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

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

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

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

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

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

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

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

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

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

While one or more embodiments of the present invention have been described in detail, it should be apparent that

modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention. Therefore, the foregoing is intended only to be illustrative of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not intended to limit the invention to the exact construction and operation shown and described. Accordingly, all suitable modifications and equivalents may be included and considered to fall within the scope of the invention, defined by the following claim or claims.

What is claimed is:

1. In a forced rest trigger mechanism, an extended trigger member locking device, comprising:

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

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

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

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

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

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

* * * * *