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(54) **BARREL OPENING MECHANISM OF GRENADE LAUNCHER**

LAUFÖFFNUNGSMECHANISMUS EINES GRANATWERFERS

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Description

Field of Invention

[0001] The present invention relates to a barrel opening mechanism for loading and unloading of cartridges into a barrel of a grenade launcher.

Background

[0002] A grenade launcher may be a standalone device or detachably mounted below a rifle. For example, the grenade launcher uses a spin-stabilised 40 mm cartridge. A conventional grenade launcher may employ different methods of opening the barrel: longitudinal sliding opening; lateral swinging to the left hand, to the right hand side, downward or upward; and a combination of longitudinal sliding followed by a lateral swing. These methods of opening the barrel involve many components and often only designed for a right- or left-handed operator; in other words, these conventional grenade launchers are often not ambidextrous. For example, US 7,487,612, assigned to FN Herstal S.A., discloses two sliding blocks (13, 14) operable to slide with two longitudinal slides (17) such that the barrel is advanced in a first longitudinal direction and swiveled laterally in the final phase of the longitudinal movement.

[0003] In another example, US 3,641,691, assigned to the US Army, discloses a grenade launcher in which the barrel is pivotable downwardly to a 15 degree angle and an ejector rod is used to eject the used cartridge. When the barrel is closed, the firing mechanism is automatically locked in the firing position.

[0004] Despite development of known grenade launchers, there exists a need for another type of barrel opening mechanism that is ambidextrous yet not complex or heavy in design.

Summary

[0005] The following presents a simplified summary to provide a basic understanding of the present invention. This summary is not an extensive overview of the invention, and is not intended to identify key features of the invention. Rather, it is to present some of the embodiments of this invention as defined in the appended independent claim 1 in a generalised form as a prelude to the detailed description that is to follow.

[0006] The present invention seeks to provide a barrel opening mechanism for a grenade launcher that is ambidextrous in operation yet designed with a minimum number of components. In addition, the Picatinny rail on the top portion of the barrel is configured to transfer recoil forces from the grenade launcher to a supporting rifle it is connected to.

[0007] In one embodiment, the present invention provides a receiver body, which is substantially an inverted L-shaped, with a forward pointing arm and a proximal

arm, wherein the proximal arm is configured for housing a trigger mechanism; and a barrel connected below the forward pointing receiver arm by a barrel pivot and a latch mechanism; wherein the latch mechanism comprises a latch disposed in the forward receiver arm and is operable to engage with a catch disposed on a top portion of the barrel so that: when the latch is engaged with the catch when the barrel is in a closed position and longitudinal X-axes of both the barrel and the forward receiver arm are substantially parallel, and when the latch is actuated by an appendage of a left or right hand of a user supporting the barrel, the latch becomes released from the catch, thereby allowing the barrel to droop or pivot away from the forward receiver arm about a transverse Y-axis at the barrel pivot and a chamber end of the barrel is operable to be turned laterally to the left or right hand side about a vertical Z-axis at the barrel pivot ambidextrously, so that a cartridge can be loaded into or unloaded from the chamber end without obstruction by the proximal arm.

[0008] In another embodiment, the present invention provides a method of opening a barrel release and lock mechanism of a grenade launcher. This method comprises: supporting a barrel of a grenade launcher with a left or right hand of a user; using an appendage of said left or right hand to push a lever portion that protrudes on each of two sides of a receiver arm to release a barrel latch, thereby allowing a chamber end of the barrel to droop about a transverse Y-axis of a barrel pivot disposed near a distal end of the receiver arm; turning said barrel with said appendage of the left or right hand so that the chamber end of the barrel is turned laterally to the left or right side of the receiver arm about a vertical Z-axis of the barrel pivot to allow the user to load or unload a cartridge into/from the chamber end of the barrel; and laterally turning the barrel back to align the barrel with the receiver arm and then pivoting the barrel back to the receiver arm to release a spring-loaded pin so that the barrel latch is engageable with a cooperating catch disposed on the barrel and the barrel becomes re-connected to the receiver arm at the latch.

[0009] Preferably, the barrel pivot comprises a substantially cylindrical pivot pin that is journaled in the forward receiver arm to pivot about the Z-axis and a clevis pin pivotable about the Y-axis, with the clevis pin passing through a bore on the pivot pin and the clevis pin being supported by a pair of clevises disposed on a top surface of the barrel.

[0010] Preferably, the clevis pin allows the barrel to pivot substantially 5 degree angle away from the X-axis whilst the pivot pin allows the barrel to be turned laterally to the left or right hand side of the receiver body by substantially 20 degree. Preferably, the barrel opening mechanism comprises a barrel pivot direction lockout pin or selector. The barrel opening mechanism has two notches formed on its cylindrical surface, with the notches being angularly oriented with respect to each other and a paw extending from the pivot pin is restricted to move within a length of the selected notch, so that the

direction of swivel of the barrel chamber end is selectable depending on whether the user is right-handed or left-handed.

[0011] Preferably, the latch mechanism comprises a spring-loaded release pin, which allows the latch to engage with the catch only when the catch is received in the recess and the spring-loaded release pin is depressed. The latch also comprises a hook configured integrally on a pivoted lever, such that a lever portion projects out on a left hand side of the forward receiver arm and another lever portion projects out on the right hand side of the forward receiver arm and the hook is engageable with a slot formed on the catch.

[0012] Preferably, a closed end of a Picatinny rail formed along an upper portion of the forward receiver arm is disposed a stopper plate. The stopper plate is located substantially above the barrel pivot and it keeps the pivot pin in position and at the same time transfer recoil forces from the grenade launcher to a supporting rifle mounted at the Picatinny rail.

Brief Description of the Drawings

[0013] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

FIG. 1A illustrates a grenade launcher (without a barrel guard) with a barrel latch in the locked position according to an embodiment of the present invention, whilst FIG. 1B illustrates the grenade launcher with the barrel disposed partially in a barrel sleeve; FIG. 1C illustrates the grenade launcher can be connected to a rifle by means of a Picatinny rail; FIG. 2A illustrates the grenade launcher shown in FIG. 1A with the barrel latch in the released position such that the chamber side of the barrel droops downward; FIGs. 2B and 2C illustrate the chamber side of the barrel being turned to the left hand side of the launcher; whilst FIG. 2D illustrates the chamber side of the barrel being turned to the right hand side; FIG. 3A illustrates an exploded view of the barrel from the receiver body showing the pivot and latch mechanism of the present invention; FIG. 3B illustrates a plan view of the grenade launcher shown in FIG. 1A; FIG. 3C illustrates a cut-out view showing the latch mechanism, whilst FIG. 3D illustrates a sectional view showing the latch mechanism and barrel pivot; FIG. 4A illustrates a sectional view of the grenade launcher shown in FIG. 2A, whilst FIGs. 4B and 4C illustrate the barrel being turned respectively to the right hand and left hand sides; and FIGs. 5A and 5B illustrate perspective and exploded views of the grenade launcher incorporating a barrel pivot direction lockout pin or selector, whilst FIGs. 5C and 5D illustrate the chamber end of the barrel

being restricted selectively to turn respectively to the right hand and left hand sides.

Detailed Description

[0014] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however, that this invention may be practised without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0015] FIGs. 1A and 1B show a grenade launcher 100 employing a barrel opening mechanism 105 according to the present invention. The barrel opening mechanism 105 includes a barrel pivot 150 and a barrel latch mechanism 170. The barrel opening mechanism 105 can be used in any single-shot gun, as exemplified by a grenade launcher. As shown in FIGs. 1A and 1B, the grenade launcher 100 includes a receiver body 110, a barrel 130 being connected to the receiver body 110 by the barrel pivot 150 and latch mechanism 170, a barrel sleeve 140 and a lock sleeve 132 to lock the barrel sleeve 140 to the barrel 130. The receiver body 110 is substantially inverted L-shaped, with a forward pointing arm 110a provided to support the barrel 130, and the other proximal arm 110b for housing a trigger mechanism, with a portion being shaped for handgrip or as a butt stock. The barrel pivot 150 is pivotable about two orthogonal axes, that is, a Y-axis transverse to the receiver arm 110a and a Z-axis perpendicular to the receiver arm 110a, with a longitudinal X-axis along a length of the receiver arm. The latch mechanism 170 includes a pivoted lever 172 mounted inside the receiver arm 110a and a catch 180 disposed on a top surface of the barrel. In the normal barrel closed position, the lever 172 engages with the catch 180. The lever 172 extends on both sides of the receiver arm 110a (as seen more clearly in FIG. 3B) so that it can be actuated with a thumb or finger of one's hand supporting the barrel 130. When the latch mechanism 170 is released by momentarily pressing on the lever 172 on either side of the receiver arm 110a, a chamber end 134 of the barrel (into which a projectile is inserted) is allowed to droop substantially 5 degree from the longitudinal X-axis about the Y-axis at the barrel pivot 150. In this drooped-down or open pivoted position, the barrel 130 is supported only at the barrel pivot 150, as seen more clearly in FIG. 2A. As the pivot 150 is close to the top surface of the barrel 130 and with a relief angle provided at a front tip 114 of the receiver arm 110a, the drooped barrel is no longer in contact with any part of the receiver body 110 and is free to be turned laterally to the left or right hand side of the receiver body 110 about the Z-axis at the pivot 150. In one embodiment, the barrel 130 is operable to be turned laterally to the left or right side of the receiver body 110

by substantially 20 degree about the pivot 150 such that the projectile can be loaded or unloaded at the chamber end 134 of the barrel 130 without obstruction by the receiver arm 110b, as seen more clearly in FIGs. 2B, 2C, 2D, 4B and 4C.

[0016] FIG. 3A shows an exploded view of the barrel opening mechanism 105. As shown in FIG. 3A, the pivot 150 is made up of a pivot pin 152, a pair of clevises 156 and a clevis pin 157. The pivot pin 152 is substantially cylindrical in shape along the Z-axis but has two parallel flat surfaces 153 to cooperate with the pair of clevises 156. A top part of the pivot pin 152 has a lateral projection 154 so that the lateral projection 154 is received in the receiver arm 110a for pivotal movement about the Z-axis. A stopper plate 122, mounted at the end of a Picatinny rail 120 formed on an upper surface of the receiver arm 110a, keeps the pivot pin 152 pivotable in the receiver arm 110a. The clevis pin 157 goes through a bore on the clevises 156 and another bore through the pivot pin 152 to allow the barrel to pivot about the Y-axis. With this pivot design, the pivot 150 allows the barrel 130 to tilt or droop substantially 5 degree from the X-axis and at the same time be pivotable laterally to the left- or right-hand side of the receiver body 110 by substantially 20 degree. An advantage of the present invention is that when the barrel 130 is in the open position, the chamber end 134 is unobstructed for loading and unloading of a projectile; this means that the barrel chamber is suitable to receive projectiles of a predetermined design but of varied lengths, thus ensuring the grenade launcher 100 incorporating the barrel opening mechanism 105 is usable with future projectiles that may be longer in lengths. The other advantage of the present invention is that the barrel 130 is pivotable to the left- or right-hand side of the receiver body 110, thus making the grenade launcher ambidexterous.

[0017] Referring back to FIGs. 1B and 3A, the barrel sleeve 140 has an open channel 142 formed on the top, longitudinal portion as seen in the figures. The open channel 142 is as wide as the distance between the outside faces of the clevises 156 or length of the clevis pin 157. Preferably, the width of the open channel 142 is substantially wider than the distance between the clevises or length of the clevis pin 157 but the edges of the open channel 142 are provided with a pair of projections 144, which are spaced apart to accommodate the distance between the clevises 156 or length of the clevis pin 157. In the later embodiment, tolerance of the width between the pair of projections 144 need only to be controlled instead of along the entire length of the open channel 142. In use, when the barrel sleeve 140 is in place around the barrel 130, the pair of projections 144 locate the clevis pin 157 in the clevises 156; with this arrangement, there is no need to provide any locking mechanism for the clevis pin 157, thus allowing the number of components of the barrel opening mechanism 105 to be reduced and further simplifying this mechanism.

[0018] As can also be seen in FIG. 3A, the latch mech-

anism 170 includes the lever 172 and the cooperating catch 180 disposed on the top surface of the barrel 130 along the longitudinal X-axis. FIG. 3C shows a cut-out portion of the latch mechanism 170 and shows the lever 172 has a portion being formed with a hook 174 to engage with a slot 182 formed on the catch 180. The lever 172 is biased in the normal, engaged position by a spring 176. As seen in FIGs. 2A, 2B or 3A, the catch 180 extends out of the top surface of the barrel 130 but when the barrel is in the closed position, the catch 180 is received into the receiver arm 110a within a cavity located below the lever 172, as seen more clearly in FIG. 3C, so that the longitudinal axes of the barrel 130 and receiver arm 110a are substantially parallel. In order to ensure that the latch mechanism 170 is operable only when the catch 180 is received in the cavity located below the lever 172, a spring-loaded pin 178 (not shown in the figures) is extended to prevent the lever 172 from returning to its original position after the latch mechanism 170 is activated and the barrel 130 is released from its connection at the catch 180 with the receiver arm 110a; in other words, the spring-loaded pin 178 is provided to prevent the hook 174 from re-engaging with the slot 182 until the barrel 130 is returned to its closed position, the catch 180 is fully received into its cavity below the receiver arm 110a and the spring loaded pin 178 is depressed. In this way, the spring-loaded pin 178 serves as a very important safety lock to ensure that the barrel 130 is connected to the receiver arm 110a by the latch mechanism 170 before the grenade launcher 100 is deployed.

[0019] In the above barrel opening mechanism 105, the latch mechanism 170 is spaced apart from the pivot 150. Preferably, the latch mechanism 170, such as the parts of the lever 172 that projects out of the receiver arm 110a are located substantially forward with respect to the trigger guard 136. This allows a user to support the grenade launcher 100 with one hand at a position forward of the trigger guard 136 yet allowing a finger or thumb of the same hand to actuate the latch lever 172, with the other hand on the handgrip and its finger to activate the trigger.

[0020] In a further embodiment, a transverse lock pin 210 is disposed across the Picatinny rail 120 to lock a matching male component of the Picatinny rail disposed on a rifle 200 (as seen in FIG. 1 C) to which the grenade launcher 100 is to be mounted to. In use, the free end of the male component of the rifle's Picatinny rail is in butt contact with a thickness edge of the stopper plate 122 such that locking of the two Picatinny rail components at the lock pin 210 has a clearance fit. With clearance fit between the lock pin 210 and the rifle's Picatinny rail component, recoil forces on the receiver body 100 are transferred to the rifle 200 through the stopper plate 122 and Picatinny rail without the lock pin 210 taking up the recoil forces. In other words, in the present invention, the lock pin 210 is used to lock together the two components of the Picatinny rail when the grenade launcher 100 is mounted below the rifle 200 but does not take up any

recoil forces during deployment. For this reason, the lock pin 210 is relatively small in size of substantially 2 to 3 mm square in cross-section. By providing the lock pin 210, the grenade launcher 100 according to the present invention can be deployed as a stand-alone equipment or detachably mounted to a rifle.

[0021] FIGs. 5A and 5B show exploded views of the above grenade launcher 100 incorporating a barrel pivot direction lockout pin or selector 160. The pivot direction lockout pin or selector 160 is disposed on the receiver arm 110a parallel to and at a distance aft of the clevis pin 157. As shown in FIGs. 5A and 5B, the direction lockout pin 160 has two notches 162a, 162b formed on the cylindrical surface, with the notches 162a, 162b being angularly oriented with each other; preferably, the notches 162a, 162b are substantially 90 degrees oriented to each other. When assembled, one of the notch 162a or 162b engages with a paw 158 extending laterally from a pivot pin 152a (which is a variation of the above pivot pin 152). The direction lockout pin 160 extends out of the width of the receiver arm 110 and each end terminates with a knurled knob 164. Each knurled knob 164 may be located on the direction lockout pin 160 by means of a locking pin 166. By turning the knurled knob 164, a user sets the rotational orientation of the direction lockout pin or selector 160 so that the paw 158 engages with the notch 162a or 162b; in effect, the direction of barrel swivel to the left- or right-hand side of the receiver arm 110a is restricted by the paw 158 moving within a length of the notch 162a or 162b. In this manner, the user selectively determines the direction of swivel of the barrel 130 to the left- or right-hand side of the receiver arm 110a by setting the direction lockout pin or selector 160 in a clockwise or anti-clockwise position 5 depending on whether the user is right-handed or left-handed. For illustration, FIG. 5C shows a left-handed user (ie. left hand on the hand-grip or butt 110b) and the position lockout pin 160 being set so that the paw 158 engages with the notch 162a and the chamber end 134 of the barrel 130 is to the right side of the receiver arm 110a. On the other hand, FIG. 5D shows a right-handed user having set the position lockout pin 160 so that the paw 158 engages with the notch 162b and the chamber end 134 of the barrel 130 is swiveled to the left side of the receiver arm 110a.

[0022] From the above description, a reader will appreciate that the barrel opening mechanism of the present invention is advantageously ambidextrous. In addition, the grenade launcher incorporating the barrel mechanism has relatively few additional parts, so making the grenade launcher still relatively light. Another advantage of the present invention is that no tools are required to dismantle the barrel opening mechanism 105 or the entire barrel 130, for example, for cleaning. For example, by unscrewing the lock sleeve 132 from the barrel 130, the barrel sleeve 140 can be removed from the barrel 130, thereby allowing the clevis pin 157 to be removed and the entire barrel 130 to be dismantled from the receiver body 110. In the same manner, no tools are re-

quired to re-assemble the barrel opening mechanism or barrel onto the receiver body.

[0023] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the claimed subject. For example, the above barrel opening mechanism 105 can be used on any single-shot gun, such as, a shotgun, irrespective of it being single- or double-barrel and its barrel size. In a further example, the spring-loaded pin 178 may be configured as a detent ball.

15 Claims

1. A grenade launcher (100) comprising:

a receiver body (110), which is substantially an inverted L-shaped, with a forward pointing arm (110a) and a proximal arm (110b), wherein the proximal arm is configured for housing a trigger mechanism; and

a barrel (130) connected below the forward pointing receiver arm (110a) by a barrel pivot (150) and a latch mechanism (170); wherein the latch mechanism comprises a latch (170) disposed in the forward receiver arm and is operable to engage with a catch (180) disposed on a top portion of the barrel so that:

when the latch (170) is engaged with the catch (180), the barrel is in a closed position and longitudinal X-axes of both the barrel and the forward receiver arm are substantially parallel, and

when the latch (170) is actuated by an appendage of a left or right hand of a user supporting the barrel, the latch (170) becomes released from the catch (180), thereby allowing the barrel to droop or pivot away from the forward receiver arm about a transverse Y-axis at the barrel pivot (150)

characterised in that

a chamber end (134) of the barrel is operable to be turned laterally to the left or right hand side about a vertical Z-axis at the barrel pivot (150) ambidextrously, so that a cartridge can be loaded into or unloaded from the chamber end (134) without obstruction by the proximal arm.

2. A grenade launcher (100) according to claim 1, wherein said barrel pivot (150) comprises a substantially cylindrical pivot pin (152) that is journaled in the forward receiver arm to pivot about the Z-axis and a clevis pin (157) pivotable about the Y-axis, with the clevis pin passing through a bore on the pivot pin

and the clevis pin being supported by a pair of clevises (156) disposed on a top surface of the barrel.

3. A grenade launcher (100) according to claim 2, wherein the clevis pin (157) allows the barrel to pivot substantially 5 degree angle away from the X-axis whilst the pivot pin (152) allows the barrel to be turned laterally to the left or right hand side of the receiver body by substantially 20 degree.
4. A grenade launcher (100) according to any one of claims 1-3, wherein the catch (180) is a projected element mounted on the top surface portion of the barrel.
5. A grenade launcher (100) according to claim 4, wherein the catch (180) is received in a recess formed in the forward receiver at the position below the latch (170).
6. A grenade launcher (100) according to claim 5, wherein said latch mechanism (170) further comprises a spring-loaded release pin (178), which allows the latch (170) to engage with the catch (180) only when the catch is received in the recess and the spring-loaded release pin (178) is depressed.
7. A grenade launcher (100) according to any one of claims 1-6, wherein the latch (170) comprises a hook (174) configured integrally on a pivoted lever (172), such that a lever portion (172) projects out on a left hand side of the forward receiver arm and another lever portion projects out on the right hand side of the forward receiver arm and the hook (174) is engageable with a slot (182) formed on the catch (180).
8. A grenade launcher (100) according to any one of claims 2-7, further comprising a pivot direction lock-out pin (160) disposed on the forward receiver arm (110a) in a position parallel to the clevis pin (157) and at a distance to engage with a paw (158) projecting laterally from the pivot pin (152).
9. A grenade launcher (100) according to claim 8, wherein the pivot direction lockout pin (160) has two notches (162a, 162b) formed on a cylindrical surface of the direction lockout pin, with the notches being angularly oriented with respect to each other and the paw (158) is restricted to move within a length of the selected notch depending on whether the user is right-handed or left-handed.
10. A grenade launcher (100) according to any one of claims 1-9, further comprising a barrel sleeve (140) to receive the barrel.
11. A grenade launcher (100) according to claim 10, wherein the barrel sleeve comprises an open chan-

nel (142), with a width of the open channel being controlled only at a pair of projections (144) projecting into the open channel and the pair of projections are configured to locate the clevis pin (157).

12. A grenade launcher (100) according to any one of claims 1-11, wherein an upper portion of the forward receiver arm (110a) comprises a female half of a Picatinny rail.
13. A grenade launcher (100) according to claim 12, wherein a closed end of the Picatinny rail is oriented in a forward direction with respect to the grenade launcher and a stopper plate (122) is located in the closed end to keep the barrel pivot (150) in place.
14. A grenade launcher (100) according to claim 13, further comprising a lock pin (210) disposed transversely through the female half of the Picatinny rail to prevent an external device mounted in the Picatinny rail from dislodgment, wherein the lock pin (210) is disposed a predetermined distance from a contiguous face of the stopper plate (122) so that impulse forces of the grenade launcher are transmitted to the external device directly through the contiguous face of the stopper plate.
15. A method of operating a barrel release and lock mechanism (105), said method comprising:
 - supporting a barrel (130) of a grenade launcher (100) according to any of claims 1-14 with a left or right hand of a user;
 - using an appendage of said left or right hand to push a lever portion (172) that protrudes on each of two sides of a receiver arm (110a) to release a barrel latch (170), thereby allowing a chamber end (134) of the barrel to droop about a transverse Y-axis of a barrel pivot (150) disposed near a distal end of the receiver arm;
 - turning said barrel (130) with said appendage of the left or right hand so that the chamber end (134) of the barrel is turned laterally to the left or right side of the receiver arm (110a) about a vertical Z-axis of the barrel pivot (150) to allow the user to load or unload a cartridge into/from the chamber end (134) of the barrel; and
 - laterally turning the barrel (130) back to align the barrel with the receiver arm (110a) and then pivoting the barrel back to the receiver arm to release a spring-loaded pin (178) so that the barrel latch (170) is engageable with a cooperating catch (180) disposed on the barrel (130) and the barrel (130) becomes re-connected to the receiver arm at the latch (170).

Patentansprüche

1. Granatwerfer (100), aufweisend:

einen Aufnahmekörper (110), der im Wesentlichen eine umgedrehte L-Form ist, mit einem nach vorne weisenden Arm (110a) und einem proximalen Arm (110b), wobei der proximale Arm zur Aufnahme eines Auslösemechanismus eingerichtet ist; und
 einen Lauf (130), der unterhalb des nach vorne weisenden Aufnahmearms (110a) durch einen Zapfen (150) des Laufs und einen Rastmechanismus (170) verbunden ist; wobei der Rastmechanismus eine in dem vorderen Aufnahmearm angeordnete Klinke (170) aufweist und betreibbar ist, um mit einer Arretierung (180) in Eingriff zu gelangen, die an einem oberen Abschnitt des Laufs angeordnet ist, so dass:

wenn die Klinke (170) mit der Arretierung (180) in Eingriff steht, der Lauf in einer geschlossenen Position ist und X-Längsachsen von sowohl dem Lauf als auch dem vorderen Aufnahmearm im Wesentlichen parallel sind, und

wenn die Klinke (170) durch einen Fortsatz einer linken oder rechten Hand eines Nutzers, der den Lauf stützt, betätigt wird, die Klinke (170) von der Arretierung (180) gelöst wird, wodurch es dem Lauf ermöglicht wird,

herunterzuklappen oder von dem vorderen Aufnahmearm um eine Y-Querachse an dem Zapfen (150) des Lauf weg zu schwenken,

dadurch gekennzeichnet, dass

ein Kammerende (134) des Laufs bedienbar ist, um beidseitig nach rechts oder nach links um eine vertikale Z-Achse an dem Zapfen (150) des Laufs gedreht zu werden, so dass eine Patrone ohne Behinderung durch den proximalen Arm hinein geladen oder aus dem Kammerende (134) entladen werden kann.

2. Granatwerfer (100) nach Anspruch 1, wobei der Zapfen (150) des Laufs einen im Wesentlichen zylindrischen Lagerbolzen (152) aufweist, der in dem vorderen Aufnahmearm gleitend eingesetzt ist, um um die Z-Achse zu verschwenken, und einen um die Y-Achse verschwenkbaren Gabelbolzen (157), wobei der Gabelbolzen durch eine Bohrung an dem Gelenkzapfen verläuft und der Gabelbolzen durch ein Paar Gabeln (156), die auf einer Oberseite des Laufs angeordnet sind, gelagert wird.

3. Granatwerfer (100) nach Anspruch 2, wobei es der

Gabelbolzen (157) dem Lauf ermöglicht, im Wesentlichen 5 Winkelgrade von der X-Achse weg zu schwenken, während der Lagerbolzen (152) es dem Lauf ermöglicht, im Wesentlichen um 20 Grad seitlich nach links oder rechts des Aufnahmekörpers gedreht zu werden.

4. Granatwerfer (100) nach einem der Ansprüche 1-3, wobei die Arretierung (180) ein vorstehendes Element ist, das an dem Oberseitenabschnitt des Laufs montiert ist.

5. Granatwerfer (100) nach Anspruch 4, wobei die Arretierung (180) in einer Ausnehmung aufgenommen ist, die in der vorderen Aufnahmeeinrichtung an der Position unterhalb der Klinke (170) gebildet ist.

6. Granatwerfer (100) nach Anspruch 5, wobei der Rastmechanismus (170) ferner einen federgespannten Auslösebolzen (178) aufweist, der es der Klinke (170) ermöglicht, nur dann in Wirkverbindung mit der Arretierung (180) zu gelangen, wenn die Arretierung in der Ausnehmung aufgenommen ist und der federgespannte Auslösebolzen (178) heruntergedrückt ist.

7. Granatwerfer (100) nach einem der Ansprüche 1-6, wobei die Klinke (170) einen Haken (174) aufweist, der einstückig an einem Schwenkhebel (172) derart ausgestaltet ist, dass ein Hebelabschnitt (172) auf einer linken Seite des vorderen Aufnahmearms hervorsteht und ein anderer Hebelabschnitt auf der rechten Seite des vorderen Aufnahmearms hervorsteht und der Haken (174) mit einem an der Arretierung (180) gebildeten Schlitz (182) in Eingriff gelangen kann.

8. Granatwerfer (100) nach einem der Ansprüche 2-7, ferner aufweisend einen Schwenkrichtungs-Sperrbolzen (160), der an dem vorderen Aufnahmearm (110a) an einer Position beabstandet und parallel zu dem Gabelbolzen (157) angeordnet ist, um mit einer Krallen (158) in Eingriff zu gelangen, die seitlich von dem Gelenkzapfen (152) vorsteht.

9. Granatwerfer (100) nach Anspruch 8, wobei der Schwenkrichtungs-Sperrbolzen (160) zwei Einkerbungen (162a, 162b) hat, die auf einer zylindrischen Fläche des Schwenkrichtungs-Sperrbolzen gebildet sind, wobei die Einkerbungen in einem Winkel zueinander ausgerichtet sind und die Krallen (158) dahingehend beschränkt wird, um sich innerhalb einer Länge der ausgewählten Einkerbung zu bewegen in Abhängigkeit davon, ob der Nutzer Rechtshänder oder Linkshänder ist.

10. Granatwerfer (100) nach einem der Ansprüche 1-9, ferner aufweisend eine Rohrhülse (140), um das

Rohr aufzunehmen.

11. Granatwerfer (100) nach Anspruch 10, wobei die Rohrhülse einen offenen Kanal (142) aufweist, wobei eine Breite des offenen Kanals nur durch ein Paar Vorsprünge (144) gesteuert wird, die in den offenen Kanal vorstehen, und das Paar Vorsprünge ausgestaltet ist, um den Gabelbolzen (157) zu verorten. 5
12. Granatwerfer (100) nach einem der Ansprüche 1-11, wobei ein oberer Abschnitt des vorderen Aufnahmearms (110a) eine innere Hälfte einer Picatinny-Schiene aufweist. 10
13. Granatwerfer (100) nach Anspruch 12, wobei ein geschlossenes Ende der Picatinny-Schiene in einer Vorwärtsrichtung bezüglich des Granatwerfers ausgerichtet ist und sich eine Anschlagplatte (122) in dem geschlossenen Ende befindet, um den Zapfen (150) des Laufs an Ort und Stelle zu halten. 20
14. Granatwerfer (100) nach Anspruch 13, ferner aufweisend einen Sperrzapfen (210), der quer durch die innere Hälfte einer Picatinny-Schiene angeordnet ist, um zu verhindern, dass eine in der Picatinny-Schiene montierte, externe Vorrichtung sich ablöst, wobei der Sperrzapfen (210) in einem vorgegebenen Abstand zu einer durchgehenden Fläche der Anschlagplatte (122) angeordnet ist, so dass Impulskräfte des Granatwerfers unmittelbar durch die durchgehende Stirnseite der Anschlagplatte auf die externe Vorrichtung übertragen werden. 25
15. Verfahren zur Bedienung eines Laufentsicherungs- und Sicherungsmechanismus, das Verfahren umfassend: 35
- Stützen eines Laufs (130) eines Granatwerfers (100) nach einem der Ansprüche 1-14 mit einer linken oder rechten Hand eines Nutzers; 40
- Verwenden eines Fortsatzes der linken oder rechten Hand, um einen Hebelabschnitt (172) zu drücken, der auf jeder von zwei Seiten eines Aufnahmearms (110a) vorsteht, um eine Klinke (170) eines Laufs zu lösen, wodurch es einem Kammerende (134) des Laufs ermöglicht wird, um eine Quer-Y-Achse des Zapfens (150) des Laufs) herunterzuklappen, der nahe einem distalen Ende des Aufnahmearms angeordnet ist; 45
- Drehen des Laufs (130) mit besagtem Fortsatz der linken oder rechten Hand, so dass das Kammerende (134) des Laufs seitlich nach links oder rechts des Aufnahmearms (110a) um eine vertikale Z-Achse des Laufgelenks (150) gedreht wird, um es dem Nutzer zu ermöglichen, eine Patrone in das/aus dem Kammerende (134) des Laufs zu laden/entladen; und 50
- seitliches Zurückdrehen des Laufs (130), um 55

den Lauf mit dem Aufnahmearm (110a) zu fluchten und dann Zurückschwenken des Laufs zu dem Aufnahmearm, um einen federgespannten Zapfen (178) zu lösen, so dass die Klinke (170) des Laufs mit einer mitwirkenden Arretierung (180) in Eingriff gelangen kann, die an dem Lauf angeordnet ist, und der Lauf erneut mit dem Aufnahmearm an der Klinke (170) verbunden wird.

Revendications

1. Lance-grenades (100), comprenant :

un corps de réception (110), lequel présente une forme essentiellement en L inversé, avec un bras pointant vers l'avant (110a) et un bras proximal (110b), dans lequel le bras proximal est configuré pour loger un mécanisme de détente, et

un canon (130) raccordé sous le bras de réception pointant vers l'avant (110a) par un pivot de canon (150) et un mécanisme de verrou (170) ; dans lequel le mécanisme de verrou comprend un verrou (170) disposé dans le bras de réception avant et pouvant fonctionner pour venir en prise avec un encliquetage (180) disposé sur une portion supérieure du canon, de sorte que :

lorsque le verrou (170) est en prise avec l'encliquetage (180), le canon se trouve dans une position fermée et des axes X longitudinaux à la fois du canon et du bras de réception avant sont essentiellement parallèles, et

lorsque le verrou (170) est actionné par un appendice d'une main gauche ou droite d'un utilisateur supportant le canon, le verrou (170) se retrouve libéré de l'encliquetage (180), ceci permettant au canon de s'abaisser ou de s'écarter par pivotement du bras de réception avant autour d'un axe Y transversal au niveau du pivot de canon (150),

caractérisé en ce que

une extrémité de chambre (134) du canon peut fonctionner pour être tournée latéralement sur le côté gauche ou droit autour d'un axe Z vertical au niveau du pivot de canon (150) de manière ambidextre, de sorte qu'une cartouche peut être chargée dans l'extrémité de chambre (134), ou déchargée hors de celle-ci, sans obstruction du bras proximal.

2. Lance-grenades (100) selon la revendication 1, dans lequel ledit pivot de canon (150) comprend un axe d'articulation essentiellement cylindrique (152), le-

- quel est tourillonné dans le bras de réception avant pour pivoter autour de l'axe Z, et un axe d'assemblage (157) pivotant autour de l'axe Y, l'axe d'assemblage traversant un alésage sur l'axe d'articulation et l'axe d'assemblage étant supporté par une paire de fourches à articulation (156) disposée sur une surface supérieure du canon.
3. Lance-grenades (100) selon la revendication 2, dans lequel l'axe d'assemblage (157) permet l'écartement par pivotement du canon sur un angle de sensiblement 5 degrés de l'axe X tandis que l'axe d'articulation (152) permet au canon d'être tourné latéralement vers le côté gauche ou droit du corps de réception de sensiblement 20 degrés.
4. Lance-grenades (100) selon l'une quelconque des revendications 1 à 3, dans lequel l'encliquetage (180) est un élément projeté monté sur la portion de surface supérieure du canon.
5. Lance-grenades (100) selon la revendication 4, dans lequel l'encliquetage (180) est reçu dans un retrait formé dans le moyen de réception avant au niveau de la position au-dessous du verrou (170).
6. Lance-grenades (100) selon la revendication 5, dans lequel ledit mécanisme de verrou (170) comprend en outre une goupille de libération à ressort (178), laquelle permet au verrou (170) de venir en prise avec l'encliquetage (180) uniquement lorsque l'encliquetage est reçu dans le retrait et que la broche de libération à ressort (178) est enfoncée.
7. Lance-grenades (100) selon l'une quelconque des revendications 1 à 6, dans lequel le verrou (170) comprend un crochet (174) configuré d'un seul tenant sur un levier pivotant (172), de sorte qu'une portion de levier (172) fait saillie vers l'extérieur sur un côté gauche du bras de réception avant et qu'une autre portion de levier fait saillie vers l'extérieur sur un côté droit du bras de réception avant et le crochet (174) peut venir en prise avec une fente (182) formée sur l'encliquetage (180).
8. Lance-grenades (100) selon l'une quelconque des revendications 2 à 7, comprenant en outre une broche de blocage de direction de pivot (160) disposée sur le bras de réception avant (110a) dans une position parallèle à la broche d'assemblage (157) et à une distance pour venir en prise avec une patte (158) faisant saillie latéralement à partir de la broche d'articulation (152).
9. Lance-grenades (100) selon la revendication 8, dans lequel la broche de blocage de direction de pivot (160) présente deux encoches (162a, 162b) formées sur une surface cylindrique de la broche de blocage de direction, les encoches étant orientées avec un angle l'une par rapport à l'autre, et la patte (158) est restreinte pour se déplacer dans les limites d'une longueur de l'encoche sélectionnée en fonction de si l'utilisateur est droitier ou gaucher.
10. Lance-grenades (100) selon l'une quelconque des revendications 1 à 9, comprenant en outre un manchon de canon (140) pour recevoir le canon.
11. Lance-grenades (100) selon la revendication 10, dans lequel le manchon de canon comprend un canal ouvert (142), une largeur du canal ouvert étant contrôlée uniquement sur une paire de saillies (144) faisant saillie dans le canal ouvert, et la paire de saillies sont configurées pour placer la broche d'assemblage (157).
12. Lance-grenades (100) selon l'une quelconque des revendications 1 à 11, dans lequel une portion supérieure du bras de réception avant (110a) comprend une moitié femelle d'un rail Picatinny.
13. Lance-grenades (100) selon la revendication 12, dans lequel une extrémité fermée du rail Picatinny est orientée dans une direction avant par rapport au lance-grenades, et une plaque d'arrêt (122) se trouve dans l'extrémité fermée pour maintenir le pivot de canon (150) en place.
14. Lance-grenades (100) selon la revendication 13, comprenant en outre une goupille d'arrêt (210) disposée transversalement à travers la moitié femelle du rail Picatinny pour empêcher un dispositif externe monté dans le rail Picatinny d'être délogé, dans lequel la goupille d'arrêt (210) est disposée à une distance prédéterminée d'une face contigüe de la plaque d'arrêt (122) de sorte que des forces d'impulsion du lance-grenades sont transmises au dispositif externe directement par le biais de la face contigüe de la plaque d'arrêt.
15. Procédé de fonctionnement d'un mécanisme de libération et de blocage de canon (105), ledit procédé comprenant les étapes consistant à :
- supporter un canon (130) d'un lance-grenades (100) selon l'une quelconque des revendications 1 à 14 avec une main gauche ou droite d'un utilisateur ;
- utiliser un appendice de ladite main gauche ou droite pour pousser une portion de levier (172) qui fait saillie sur chacun des deux côtés d'un bras de réception (110a) pour libérer un verrou de canon (170), permettant ainsi l'abaissement d'une extrémité de chambre (134) du canon autour d'un axe Y transversal d'un pivot de canon (150) disposé à proximité d'une extrémité

distale du bras de réception ;
faire tourner ledit canon (130) avec ledit appendice de la main gauche ou droite de sorte que l'extrémité de chambre (134) du canon est tournée latéralement vers le côté gauche ou droit du bras de réception (110a) autour d'un axe Z vertical du pivot de canon (150), afin de permettre à l'utilisateur de charger ou décharger une cartouche dans/hors de l'extrémité de chambre (134) du canon, et
faire tourner latéralement le canon (130) en retour pour aligner le canon avec le bras de réception (110a), puis faire pivoter le canon en retour sur le bras de réception afin de libérer une broche à ressort (178), de sorte que le verrou de canon (170) peut venir en prise avec un encliquetage en coopération (180) disposé sur le canon (130), et que le canon (130) se retrouve à nouveau raccordé au bras de réception au niveau du verrou (170).

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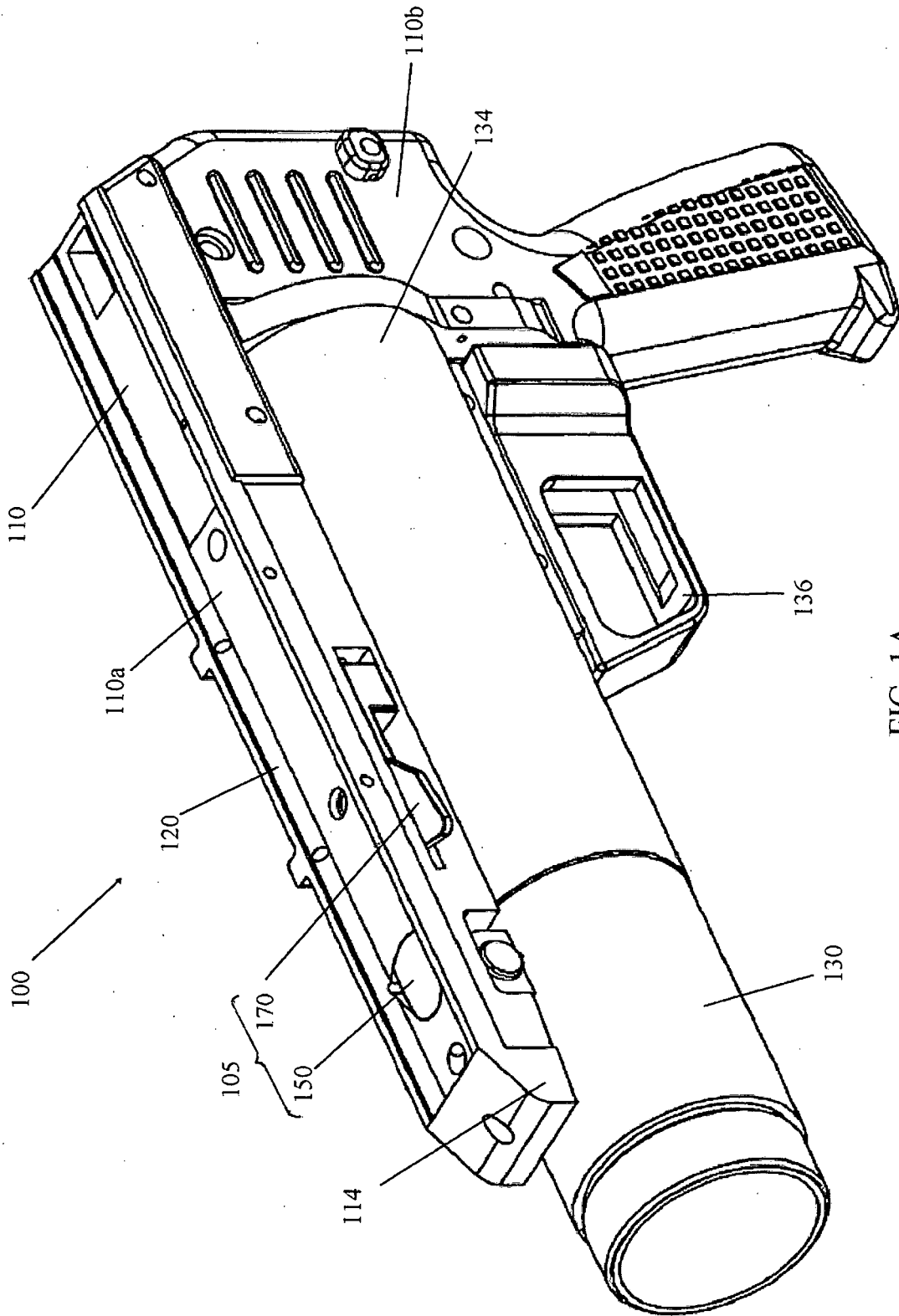


FIG. 1A

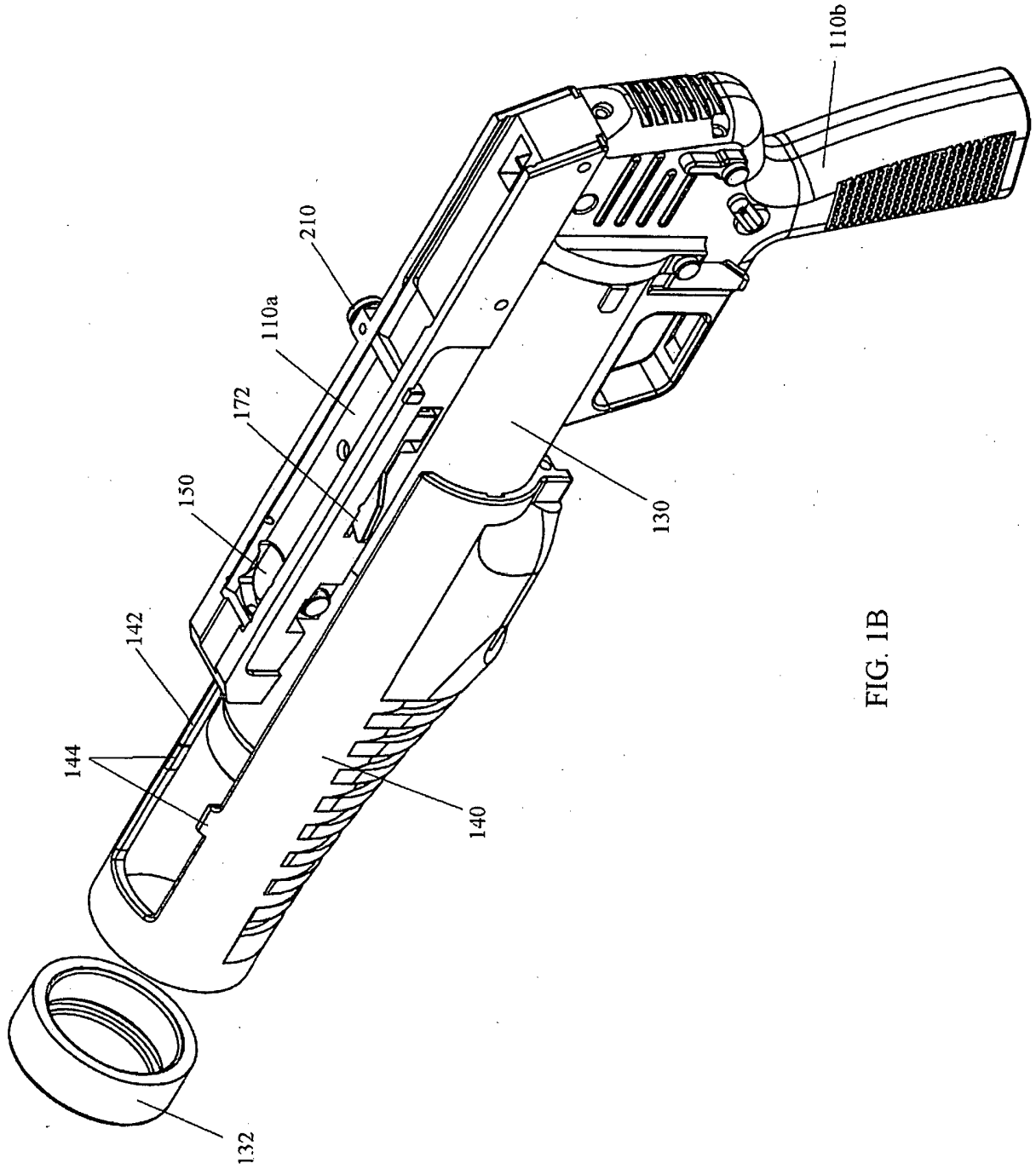


FIG. 1B

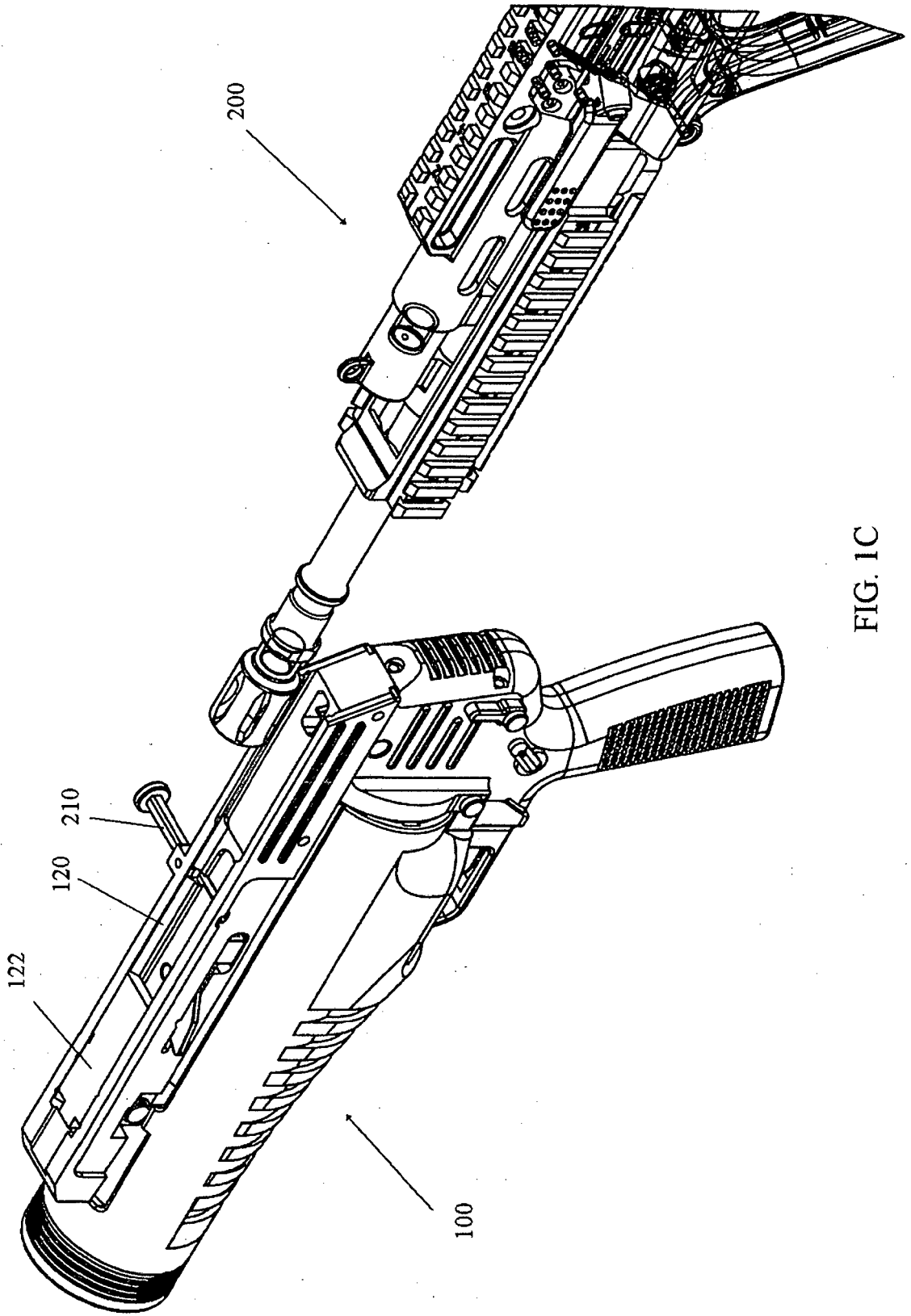


FIG. 1C

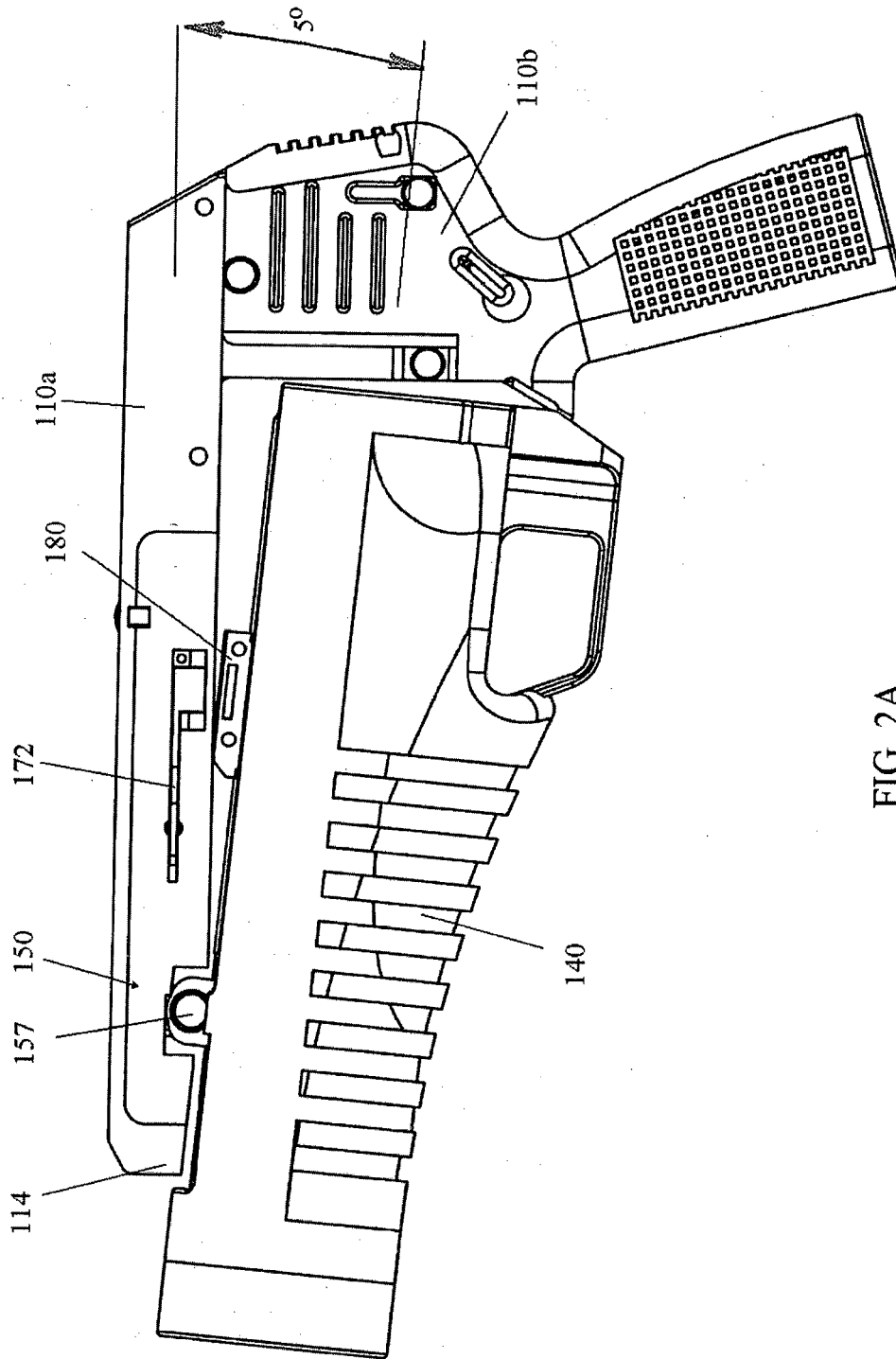


FIG. 2A

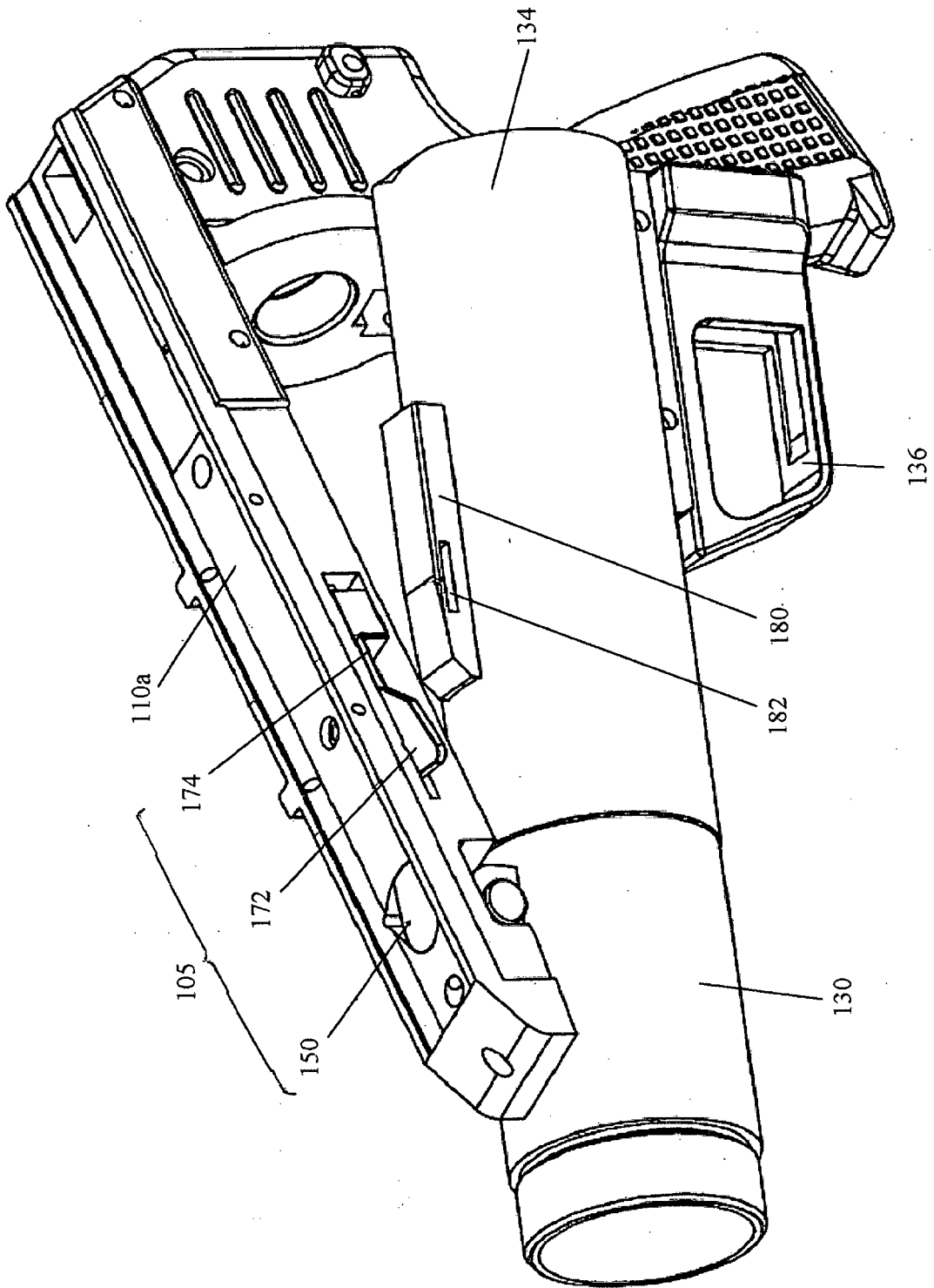


FIG. 2B

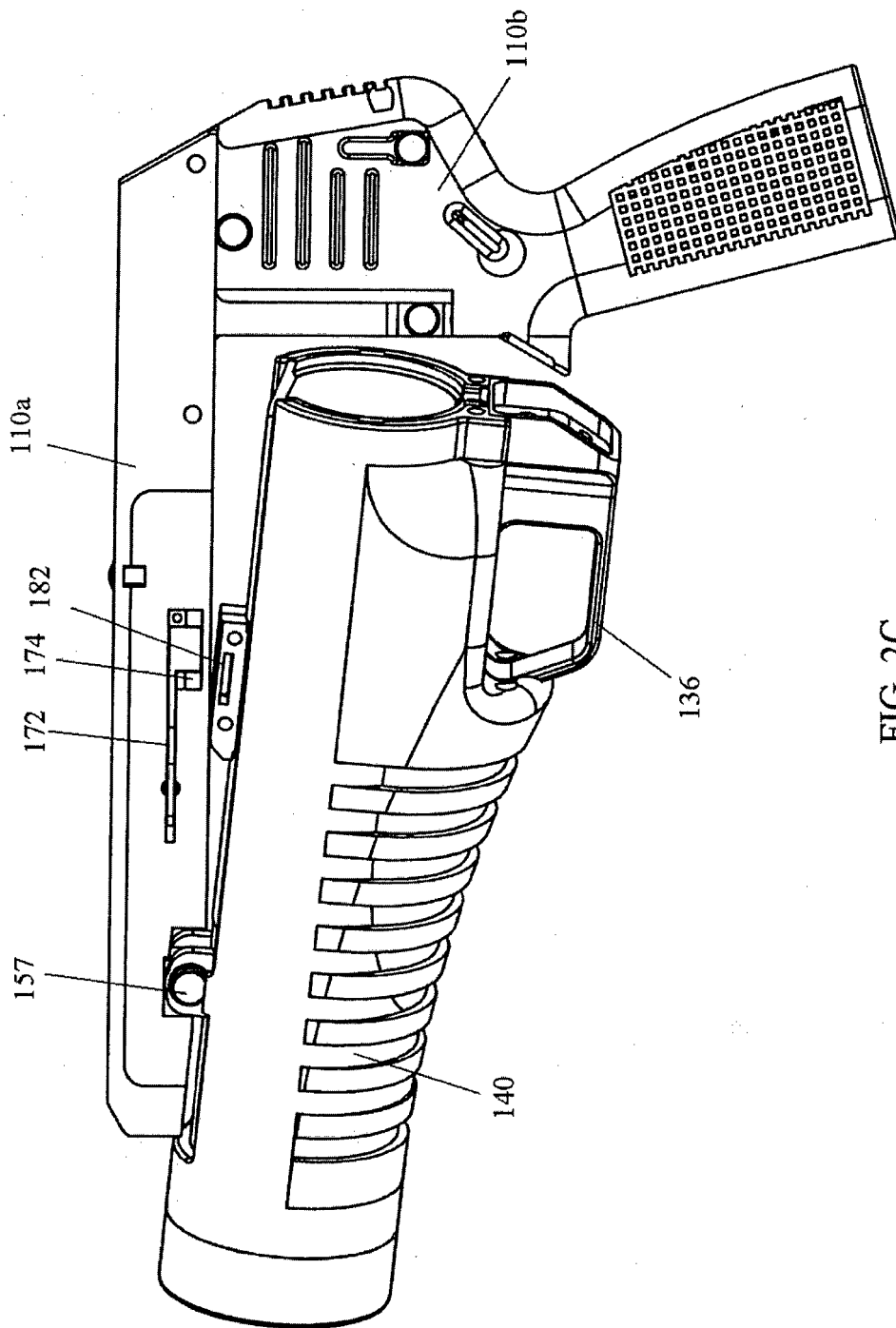


FIG. 2C

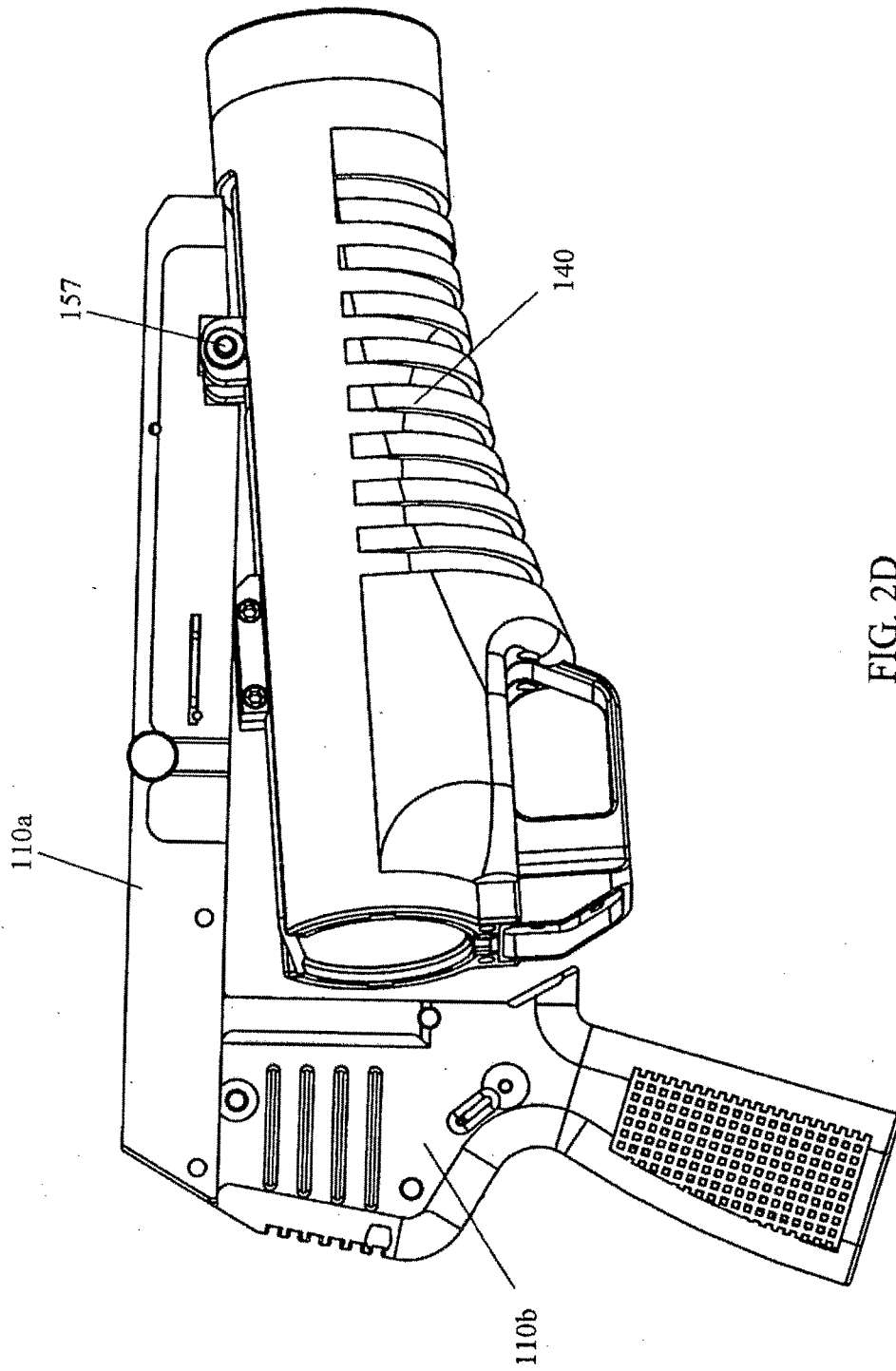


FIG. 2D

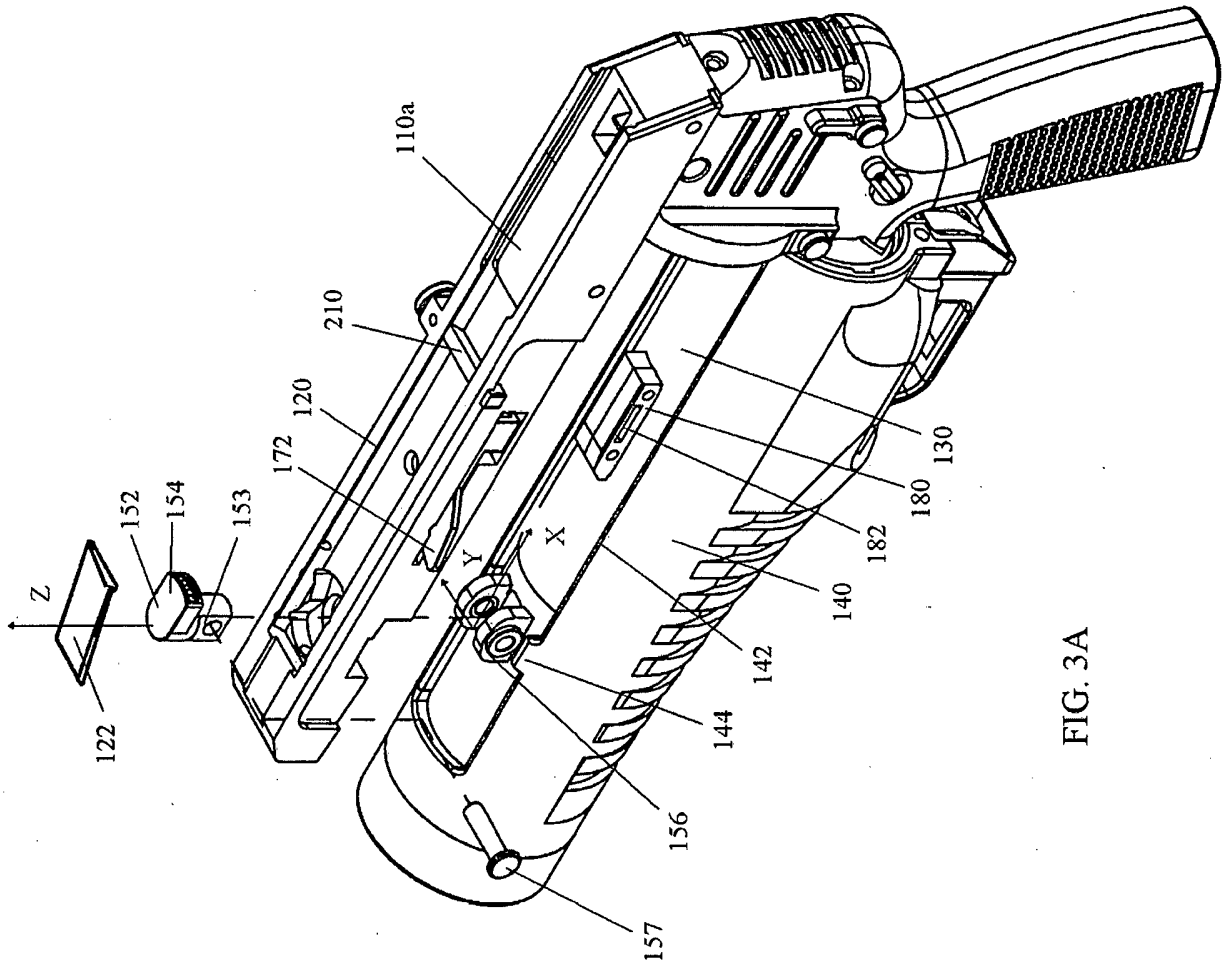


FIG. 3A

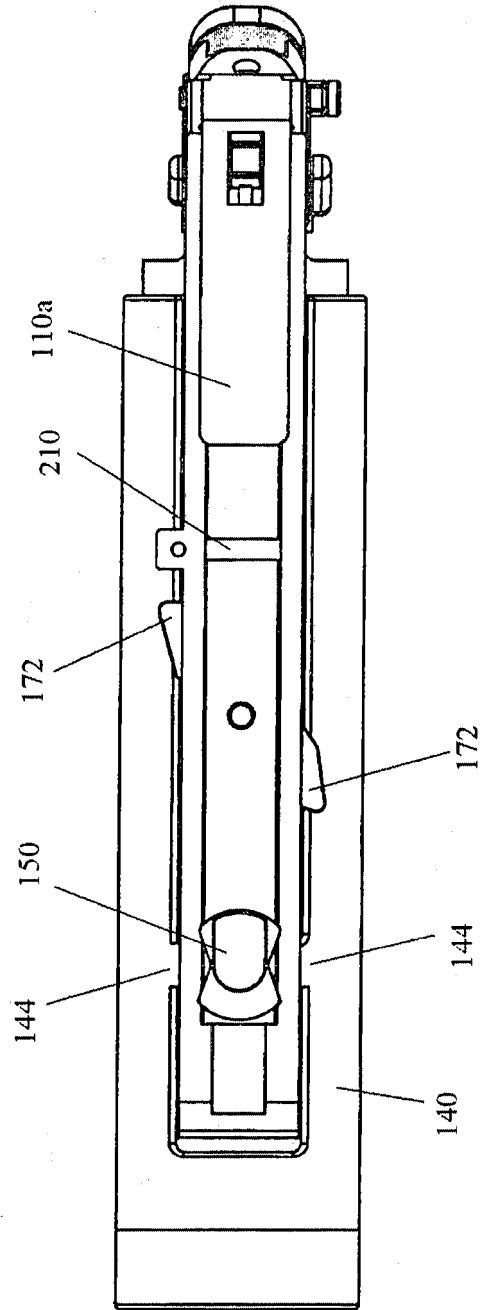


FIG. 3B

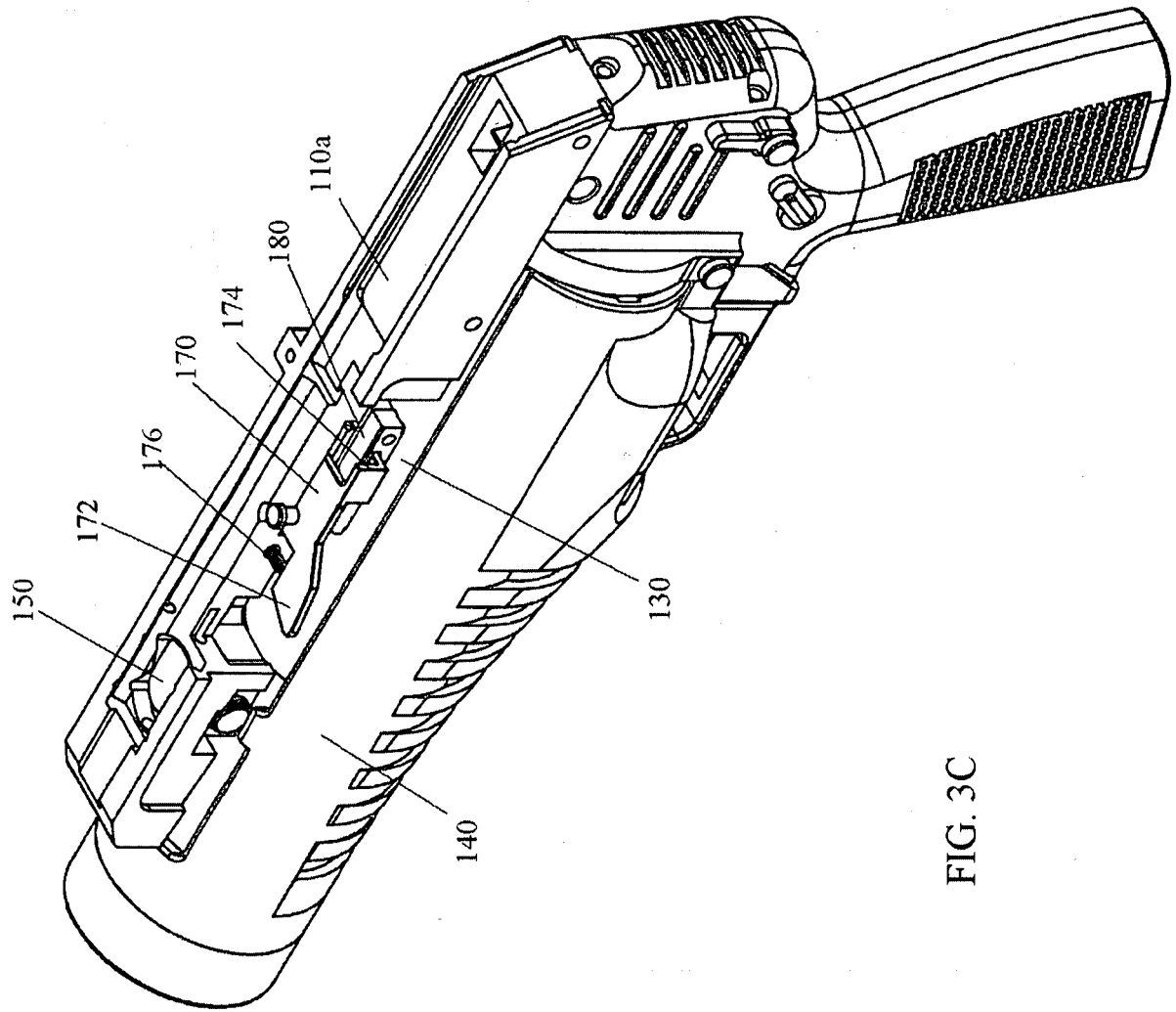


FIG. 3C

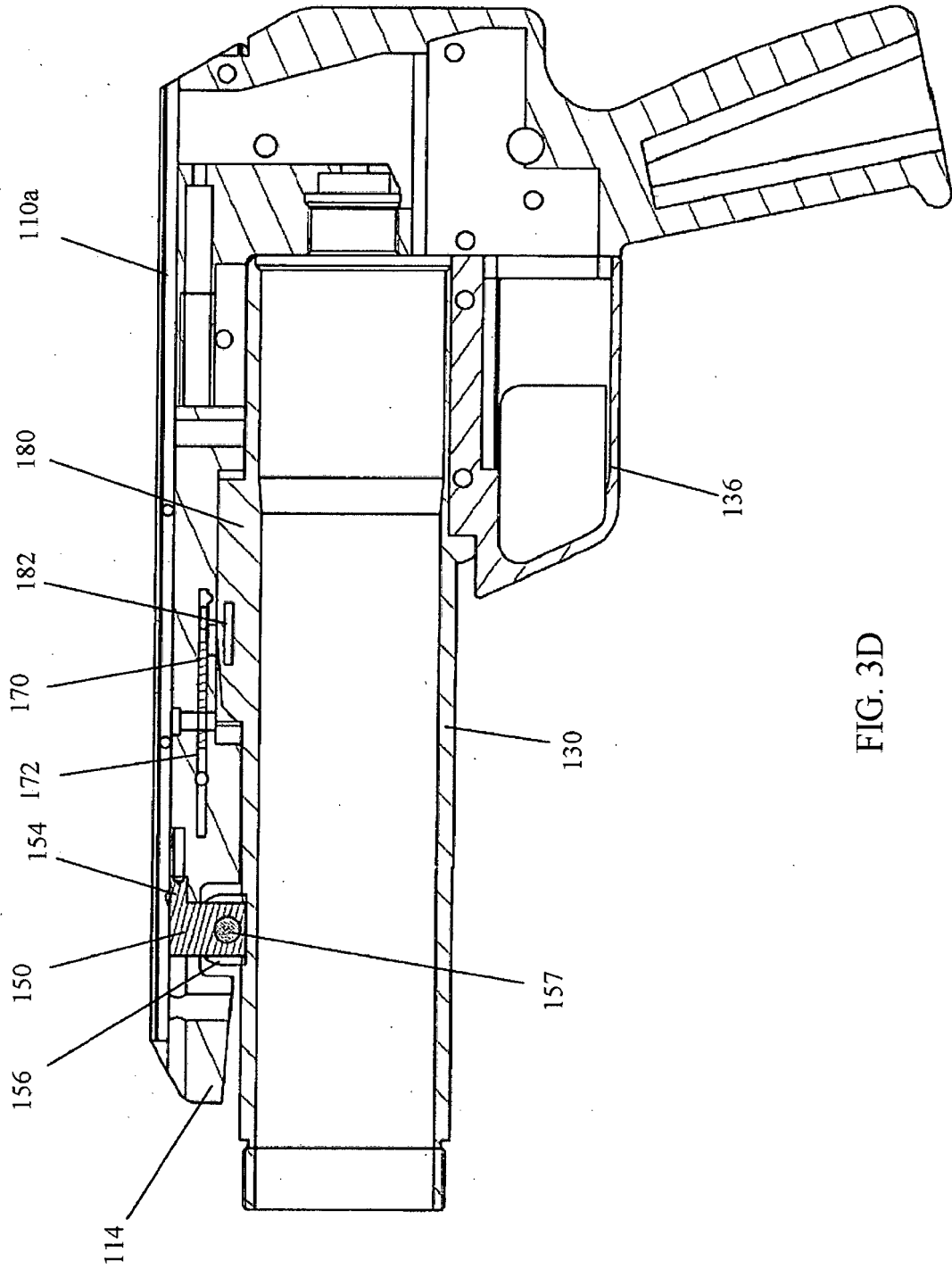


FIG. 3D

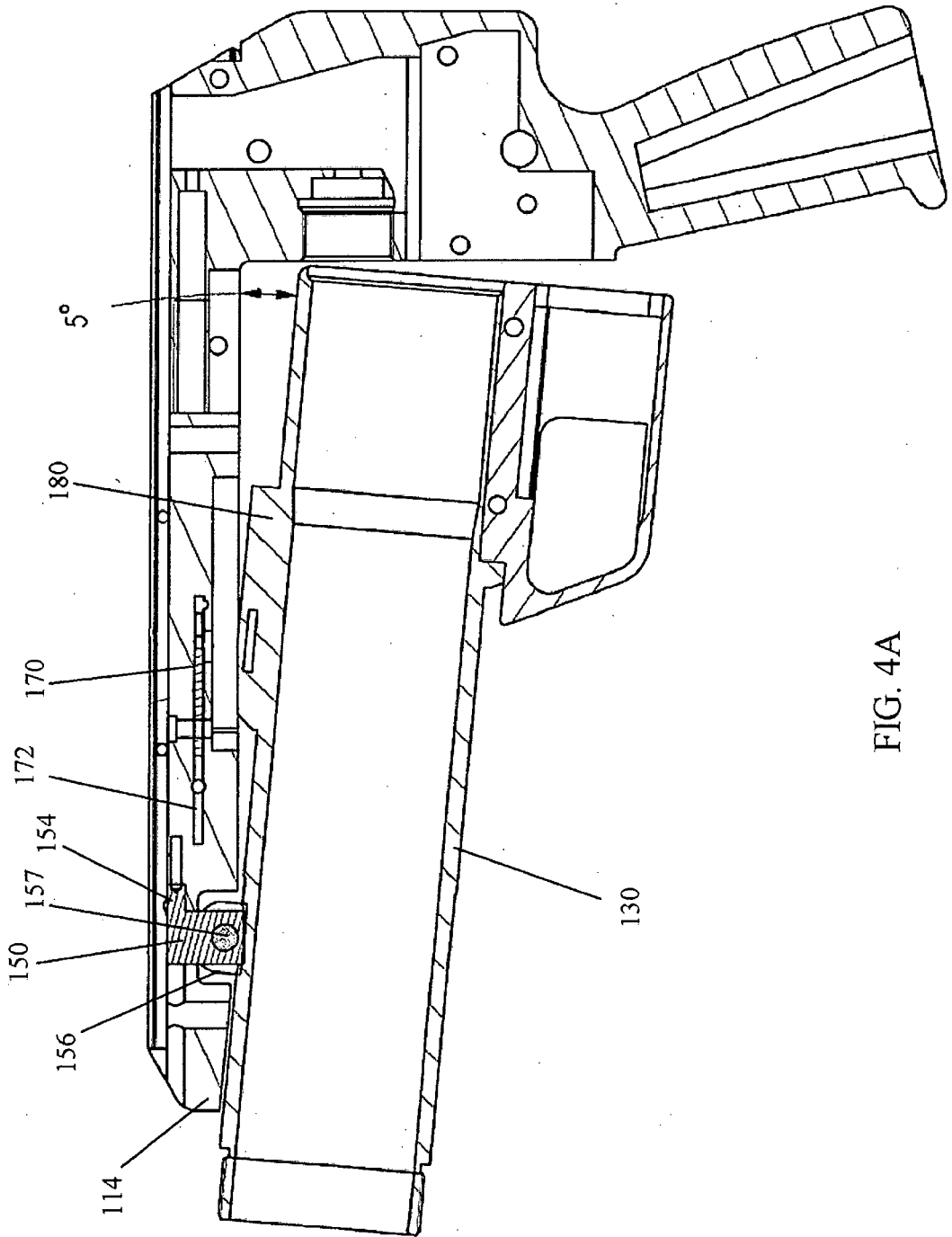


FIG. 4A

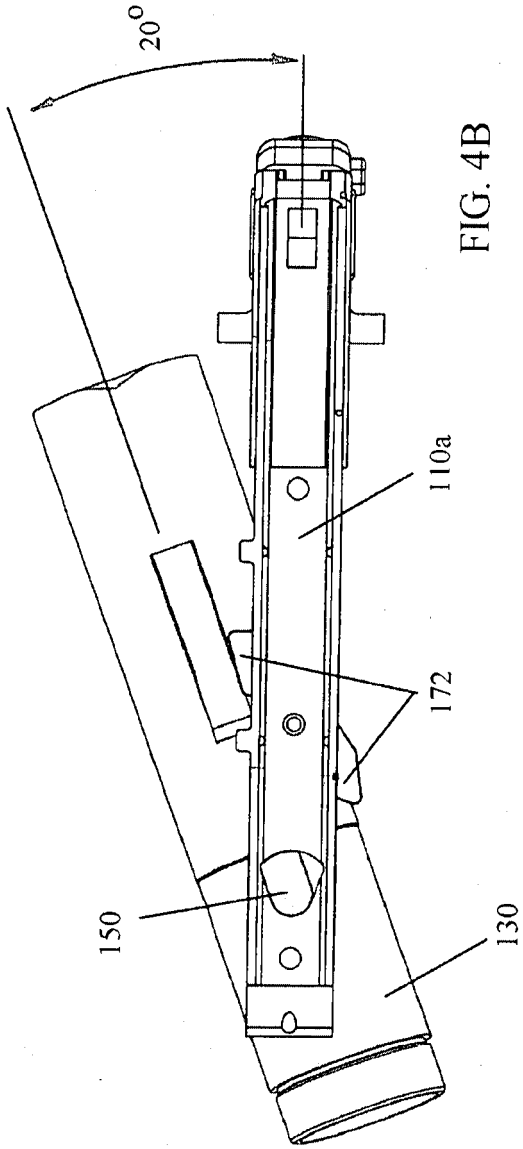


FIG. 4B

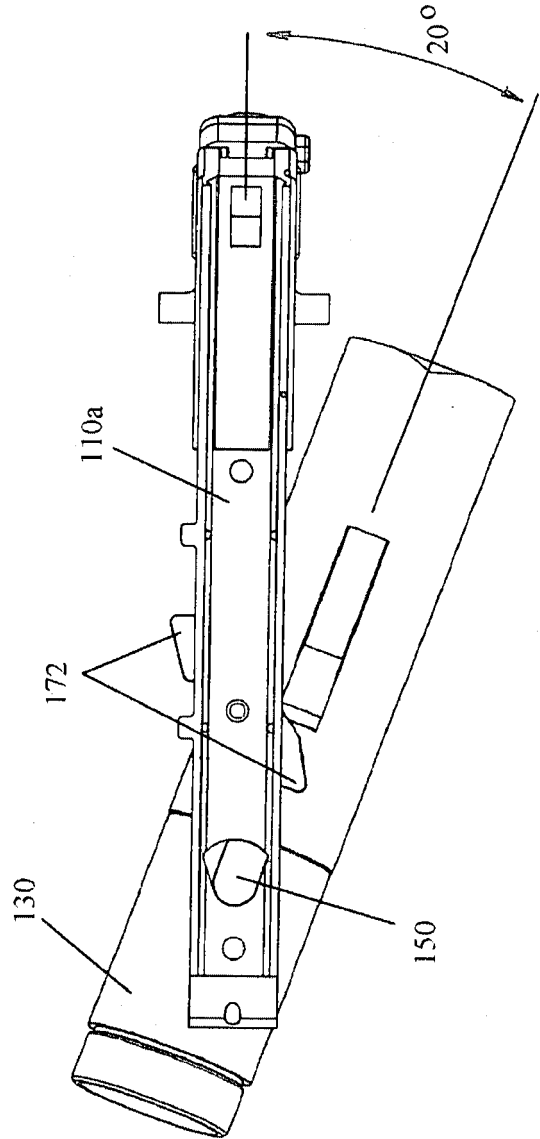


FIG. 4C

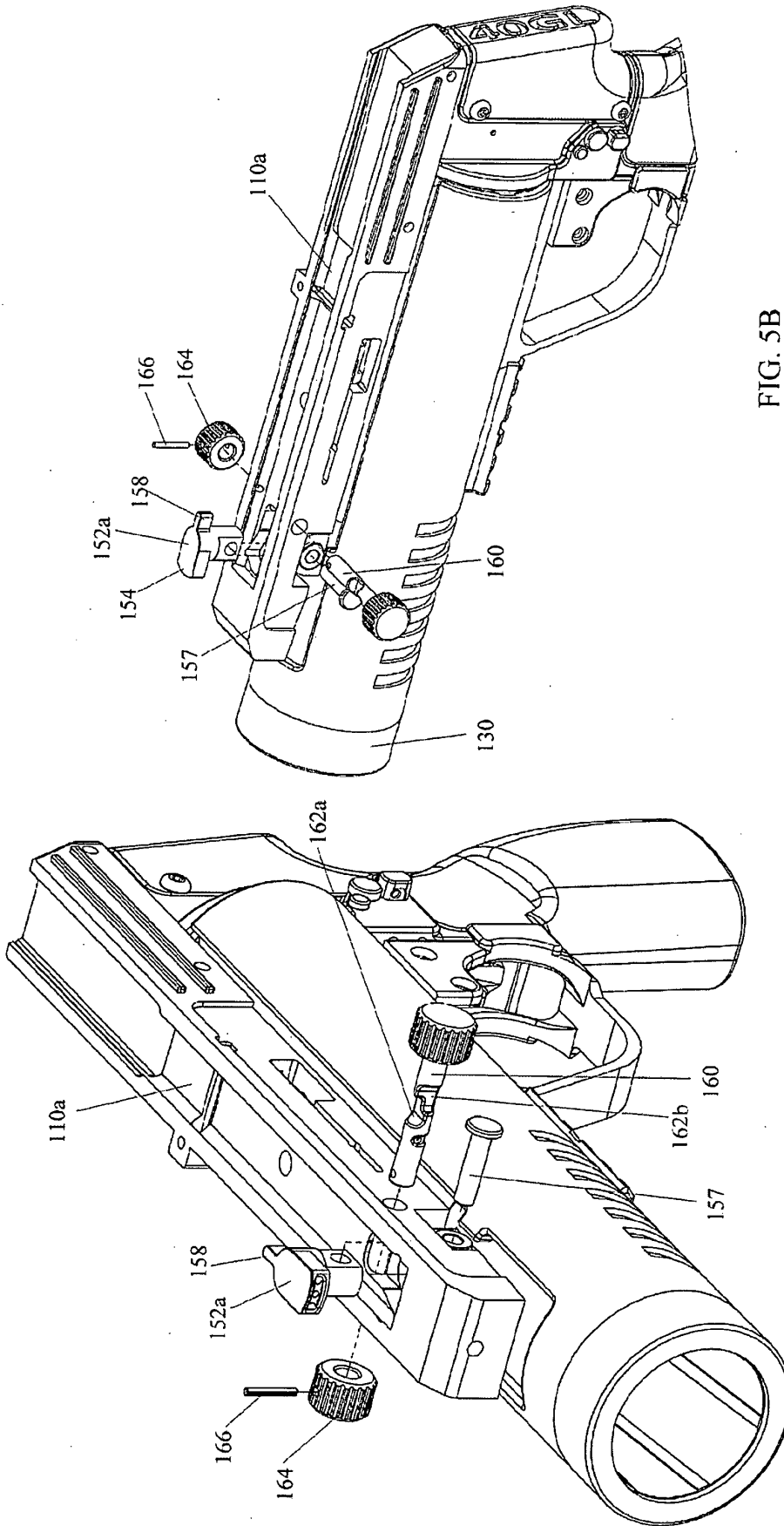


FIG. 5B

FIG. 5A

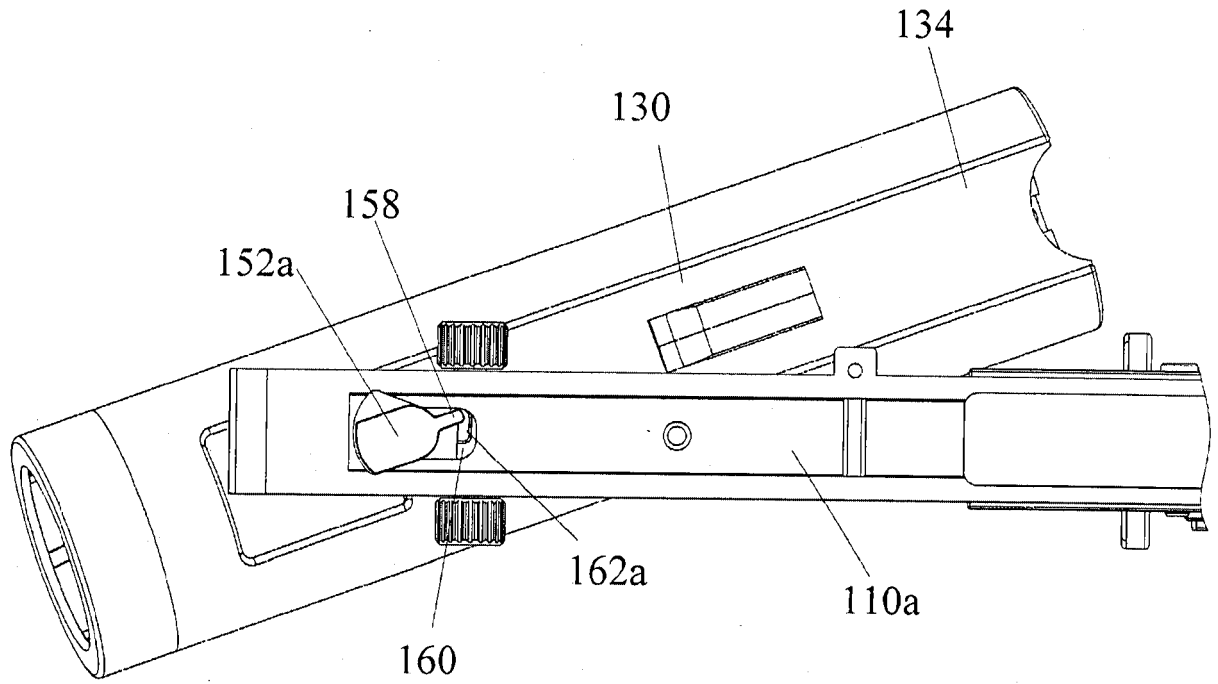


FIG. 5C

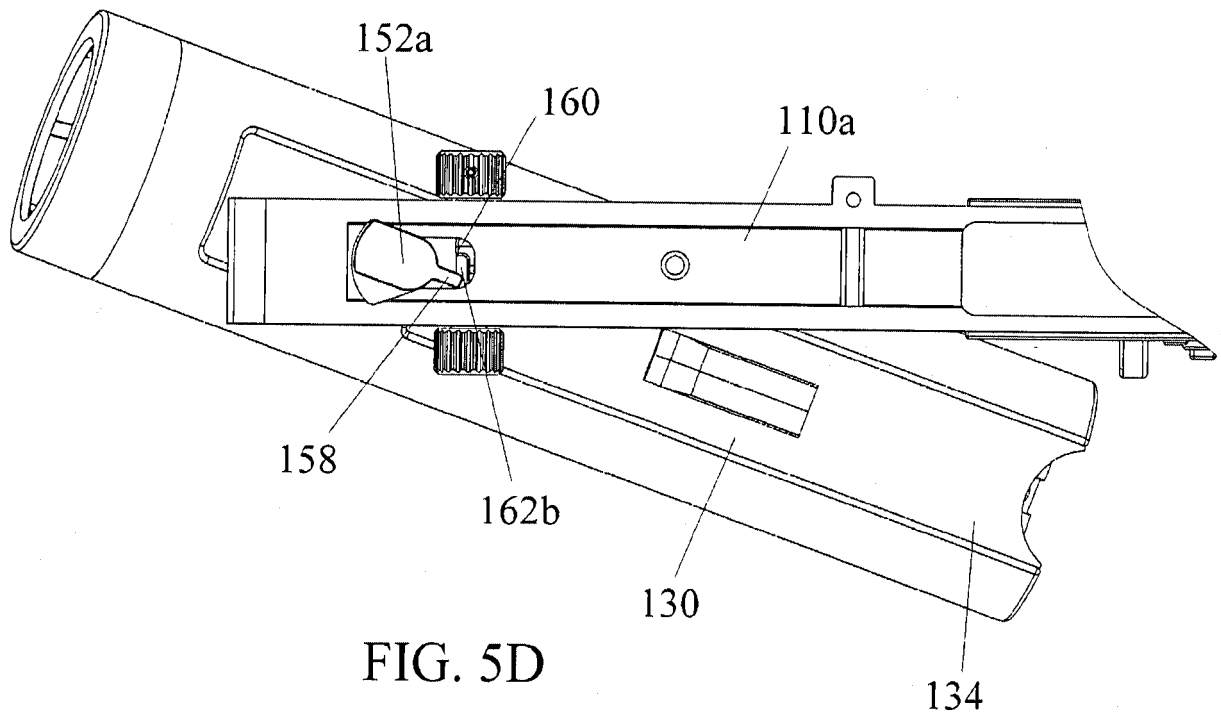


FIG. 5D

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