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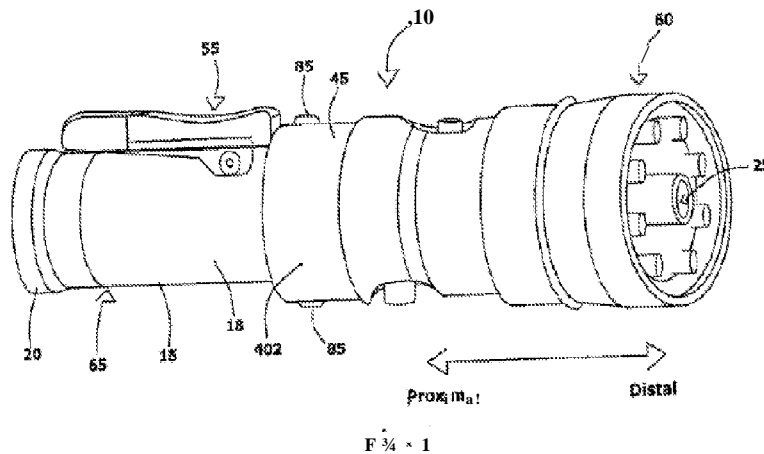
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(54) Title: SYSTEMS AND METHODS FOR PROVIDING A FIREARM WITH AN EXTENDABLE LIGHT SOURCE



(57) Abstract: The present invention relates to systems and methods for making and using a firearm that includes an extendable light source that can be selectively moved closer to and farther from a longitudinal axis of a barrel of the firearm. In some cases, the light source includes a laser or a light bulb, such as an LED. By being able to selectively move closer to and farther from the barrel's longitudinal axis, the light source can be adjusted so that it is able to shine past one or more attachments that are placed on a distal end of the firearm. Other implementations are also described.

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SYSTEMS AND METHODS FOR PROVIDING A FIREARM WITH AN EXTENDABLE LIGHT SOURCE

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

The present invention relates to firearms. In particular, the present invention relates to systems and methods for making and using a firearm that includes a light source that can be selectively moved closer to and farther from a longitudinal axis of a barrel of the firearm.

2. Background and Related Art

10 Guns currently exist that have characteristics to make them more practical or better suited for certain uses. For example, while some guns are specially configured for use in hunting, other guns are designed to be used in combat and tactical situations. Similarly, while some guns have longer barrels to increase their accuracy and bullet velocity, other guns have shorter barrels to make them easier to conceal. As a general rule, guns that are mounted against a user's shoulder,
15 such as rifles and shotguns, are called long guns, while guns that can be held and operated with a single hand, such as pistols and revolvers, are called handguns.

In many cases, guns can be accessorized or otherwise customized to improve their utility, appearance, and/or ease of use. Indeed, in some cases, a light is attached to a gun (such as a handgun or an assault rifle) to help the gun's user illuminate his or her surroundings and
20 potential targets. Similarly, in some cases, a laser is attached to a gun to help the gun's user aim the gun and hit the desired target.

Despite their utility, many conventional lights and lasers that attach to guns can have shortcomings. Indeed, in some cases, because a light or laser may attach to a gun in a single, substantially-fixed location, the light beam of such a light/laser can easily be blocked by another
25 gun accessory that attaches to the gun in front of the light/laser.

Thus, while techniques currently exist that are used to attach lights and lasers to guns, challenges still exist. Accordingly, it would be an improvement in the art to augment or even replace current techniques with other techniques.

SUMMARY OF THE INVENTION

30 The present invention relates to firearms. In particular, the present invention relates to systems and methods for making and using a firearm that includes a light source that can be selectively moved closer to and farther from a longitudinal axis of a barrel of the firearm.

Implementation of the present invention takes place in association with a firearm and an extendable light source. While the firearm can comprise any suitable long gun, handgun, or other device that is capable of firing a projectile, in some instances, the firearm includes a customizable gun that is able to perform one or more functions, such as firing a bullet, firing a less-than-lethal projectile, and/or providing light. In such instances, the firearm generally includes a main frame component having an inner cavity, wherein a barrel is slidably received within the cavity so as to selectively slide proximally and distally (or back and forth) within the cavity. In some cases, a proximal end of the barrel comprises a projectile chamber. In such cases, the barrel fires the projectile by carrying the projectile proximally from a distal cocked position and striking the projectile against a stationary firing pin. In other cases, a firing pin is attached to a distal end of the barrel. In some such cases, the barrel discharges the firearm by moving from a proximal cocked position so that the firing pin moves distally to strike a projectile housed in a launching platform at a distal end of the main frame. In some cases, the barrel rotates between a safe and a fire alignment.

With regards to the extendable light source, the light source comprises any suitable light producing object, such as a laser, an LED, an incandescent bulb, an electron stimulated light, an electroluminescent lamp, a high intensity discharge lamp, etc. In some presently preferred implementations, the light producing object comprises a laser aimer.

The light source can also be attached to the firearm in any suitable manner that allows the light source to be selectively moved between a first position and a second position, where the first position is closer than the second position to a longitudinal axis of the firearm's barrel. Indeed, in some implementations, the light source is attached to an extension member that is cable of selectively pivoting, sliding, raising, lowering, twisting, and/or otherwise moving between the first position and the second position. In this manner, the light source can be adjusted for a variety of reasons. For instance, when a gun accessory (such as a launching platform) is attached to the firearm in the path of the light source when the light source is in the first position, the light source can be selectively moved to the second position to allow the light source to shine past that accessory.

While the methods and processes of the present invention can be particularly useful in the area of the described customizable firearm, those skilled in the art can appreciate that the described methods and processes can be used in a variety of different applications and in a variety of different areas of manufacture to yield a variety of different guns, including handguns

(*e.g.*, revolvers, semi-automatic pistols, derringers, pepperboxes, etc.), long guns (*e.g.*, rifles, shotguns, etc.), and other mechanisms that can be used to launch a projectile.

These and other features and advantages of the present invention will be set forth or will become more fully apparent in the description that follows and in the appended claims. The features and advantages may be realized and obtained by means of the instruments and combinations particularly pointed out in the appended claims. Furthermore, the features and advantages of the invention may be learned by the practice of the invention or will be obvious from the description, as set forth hereinafter.

BRIEF DESCRIPTION OF THE DRAWINGS

10 In order that the manner in which the above recited and other features and advantages of the present invention are obtained, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which are illustrated in the appended drawings. Understanding that the drawings depict only typical embodiments of the present invention and are not, therefore, to be considered as limiting the scope of the invention, the present invention
15 will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Figure 1 illustrates a perspective view of a representative embodiment of a firearm comprising a flashlight;

20 Figure 2 illustrates a side, cross-section view of a representative embodiment of the firearm;

Figures 3A-3B each illustrate a top schematic view of a main frame defining an opening;

Figure 4A illustrates a side view of a representative embodiment of an end cap;

Figure 4B illustrates a face view of a representative embodiment of an end cap;

25 Figure 5 illustrates a side, cross-sectional view of a representative embodiment of the firearm;

Figure 6A illustrates a side, cross-sectional view of a representative embodiment of a barrel;

Figure 6B shows a schematic view of a proximal end of a representative embodiment of the barrel;

30 Figure 6C illustrates a side, cross-sectional view of a portion of representative embodiment in which the barrel is caught by a pair of sears;

Figure 7A illustrates a side, cross-sectional view of a representative embodiment of the barrel;

Figure 7B illustrates a side, cross-sectional view of a representative embodiment of the barrel that includes a representative embodiment of a cocking block;

5 Figures 7C-7D each illustrate an end view of the barrel;

Figure 8A illustrates a side, cross-sectional view of a representative embodiment of a portion of the barrel captured at a distal cocked position;

Figure 8B illustrates a side, cross-sectional view of a representative embodiment of a portion of the barrel captured at a proximal cocked position;

10 Figure 9A illustrates a face, schematic view of a representative embodiment of a sear lacking a safety catch, wherein the sear is set in a first layer of a representative embodiment of a trigger block;

Figure 9B illustrates a face, schematic view of a representative embodiment of a sear comprising a safety catch, wherein the barrel is not disposed in a fire alignment position, wherein the sear is disposed in a second layer of a representative embodiment of the trigger block;

15 Figures 9C-9D each illustrate a face, schematic view of a representative embodiment of a sear;

Figure 10 illustrates a side cutaway view of a portion of a representative embodiment of the firearm;

Figure 11 illustrates a top, schematic view of a representative embodiment of an opening in the main frame and a representative embodiment of a cocking block channel having a portion of a representative cocking ring member disposed therein;

25 Figures 12A, 12C, and 12E each illustrate a cross-sectional schematic view of a representative embodiment of the firearm taken through the cocking block;

Figures 12B, 12D, and 12F each illustrate a view showing the relationship between a firing pin and a firing pin groove for the configurations that are respectively set forth in Figures 12A, 12C, and 12E;

30 Figures 13A-13C each illustrate a side, partial cutaway view of an embodiment of the firearm comprising a representative embodiment of a cocking assist mechanism in a different position;

Figure 14 illustrates a side, cross-sectional view of a representative embodiment of the firearm comprising a representative embodiment of the flashlight;

Figures 15A-15B illustrate different views of a representative embodiment of an adaptor;

5 Figures 15C-15D illustrate different views of a representative embodiment of the flashlight;

Figure 16 illustrates a side, cross-sectional view of a representative embodiment of the firearm comprising a representative embodiment of a launching platform;

10 Figure 17 illustrates a side, exploded view of a representative embodiment of some components that are used to modify the firearm and make it able to shoot projectiles from the launching platform;

Figure 18 illustrates a perspective side view of a representative embodiment of the firearm, wherein an extendable light source is attached to the firearm;

15 Figure 19A illustrates a side schematic view of a representative embodiment of a portion of the firearm having a representative embodiment of the extendable light source in the first position;

Figure 19B illustrates a front schematic view of representative embodiment of a light source attachment mechanism, wherein the light source is in the first position;

Figure 19C illustrates a front schematic view of a representative embodiment of a portion of the light attachment mechanism illustrated in Figure 19B;

20 Figure 20A illustrates a side schematic view of a representative embodiment of a portion of the firearm having a representative embodiment of the extendable light source in the second position;

Figure 20B illustrates a front schematic view of representative embodiment of a light source attachment mechanism, wherein the light source is in the second position;

25 Figure 21 illustrates a perspective schematic view of a representative embodiment of an extension member that houses the light source;

Figure 22 illustrates a perspective view of a representative embodiment of the firearm, wherein the firearm is attached as an accessory to a representative embodiment of a conventional weapon; and

30 Figures 23 and 24 illustrate different views of a representative embodiment of a firearm mounting mechanism.

DETAILED DESCRIPTION OF THE INVENTION

The present invention relates to firearms. In particular, the present invention relates to systems and methods for making and using a firearm that includes a light source that can be selectively moved closer to and farther from a longitudinal axis of a barrel of the firearm. In general, this disclosure describes an extendable light source that can be attached to a firearm in such a manner that the light source can be moved between at least a first position and a second position, in which the first position is closer to a longitudinal axis of a barrel of the firearm than the second position. The following disclosure of the present invention is grouped into two subheadings, namely "Providing a Firearm" and "Providing an Extendable Light Source." The utilization of the subheadings is for convenience of the reader only and is not to be construed as limiting in any sense.

Providing a Firearm

The described systems and methods for providing a firearm with an extendable light source can be used with virtually any suitable firearm that that is capable of firing a projectile and that allows the light source to be selectively moved between a first and a second position (as described below). Indeed, some non-limiting examples of suitable firearms include handguns (*e.g.*, revolvers; pistols, such as semi-automatic pistols, single shot pistols, machine pistols; derringers; pepperboxes, etc.). In some non-limiting embodiments, however, the firearm comprises a firearm having a barrel that is able to move distally and/or or proximally within the firearm to cause a projectile to be discharged or be fired therefrom. Additionally, some embodiments of such a firearm comprise a safety mechanism in which the barrel itself is selectively rotatable between a fire alignment and a safe alignment. Figure 1 shows a representative embodiment of such a firearm 10.

The described firearm 10 can be configured to shoot or discharge one or more types of projectiles. In this regard, some examples of suitable projectiles include a bullet, such as a rim-fire cartridge (*e.g.*, a .22 round, a .22 magnum round, a .17 HMR round, a .17 HM2 round, etc.) and/or a center-fire cartridge (*e.g.*, a 9 mm round, a .223 round, a shotgun cartridge, etc.); a blank round; a bean bag; a grappling hook and cord; a net; a cable; a rope; a golf-ball; a flash-bang; a tranquilizer; a flare; a grenade; a cartridge (*e.g.*, a tear gas cartridge, a smoke bomb cartridge, an electroshock weapon cartridge, etc.); confetti; and/or any other object or objects that can be fired, shot, or otherwise discharged from the firearm.

The described firearm 10 can comprise any suitable component that allows it to discharge a projectile. By way of illustration, Figure 2 shows some embodiments in which the firearm 10 comprises a main frame 15, an end cap 20, a barrel 25 that is slidably received within the main frame 15, a sear 30, a trigger block 35, a cocking block 40, a cocking ring 45, a proximal biasing mechanism 50, a cocking assist mechanism 55, and a distal end attachment 60. To better describe the firearm, each of the aforementioned components is discussed below in more detail.

With respect to the main frame 15, the main frame can perform any suitable function, including acting as a sleeve that both houses various parts of the firearm 10 and that serves as a handle for holding the firearm. Furthermore, the main frame can have any suitable shape that allows it to function as intended. Indeed, in some non-limiting examples, the outer surface of the main frame is substantially cylindrical (*e.g.*, so as to resemble some conventional flashlights), rectangular, octagonal, hexagonal, polygonal, irregular, etc. By way of illustration, Figure 2 (and Figure 1) shows some embodiments in which the outer surface 18 of the main frame 15 is cylindrically shaped.

While the main frame 15 can comprise any suitable component or characteristic that allows it to perform the described functions, Figure 2 shows an embodiment in which the main frame 15 comprises a proximal end 65, a distal end 70, and an inner cavity 75 that extends between the two ends. Although the inner cavity 75 can perform any suitable function, Figure 2 shows some embodiments in which it slidably receives the barrel 25, the cocking block 40, and the trigger block 35.

Figure 2 also shows that, in some embodiments, the main frame 15 also comprises one or more main frame openings 80 that allow the cocking ring 45 to mechanically communicate with the cocking block 35 (*e.g.*, via a pin 85). While the opening can have any suitable shape that allows the cocking ring to be used to move the barrel to a cocked position and/or between a fire and safe alignment (described hereinafter), Figure 3A shows an embodiment in which the opening 80 optionally comprises a distal safety recess 90 and a distal fire recess 95 that are each disposed at opposite sides of a distal end 100 of the opening 80. As described hereinafter, the distal safety and fire recesses can allow the barrel 25 to rotate between a safe and a fire alignment when the firearm 10 is configured to fire a projectile through a proximal movement of the barrel. In another embodiment shown in Figure 3B (*e.g.*, an embodiment (not shown) in which the cocking block is configured in an H-shape, as mentioned below), the opening 80 optionally comprises a proximal safety recess 105 and a proximal fire recess 110 that are each

disposed at opposite sides of a proximal end 115 of the opening. As described hereinafter, the proximal safety and fire recesses can allow the barrel to rotate between a safe and a fire alignment when the firearm is configured to fire a projectile through a distal movement of the barrel.

5 Regarding the end cap 20, the end cap can comprise any suitable component or characteristic that allows it to be removed so that a projectile (*e.g.*, a bullet or bullet casing) can be loaded into and/or removed from the firearm 10. In some embodiments, the end cap comprises a connection mechanism that allows it to be selectively attached to and detached from the main frame 15. In this regard, some examples of suitable connection mechanisms include
10 cylindrical threads that correspond to threads on the main frame, a bayonet lock, one or more mechanical fasteners, or any other suitable mechanism. By way of example, Figure 4A shows an embodiment in which the end cap 20 comprises threads 120 that mate with threads (not shown in Figure 4A) disposed in the main frame. While the threads 120 can have any suitable characteristic (*e.g.*, lead, pitch, start, etc.) that allows them to be threaded with corresponding
15 threads on the main frame 15, Figure 4A shows an embodiment in which the threads 120 have a substantially squared profile.

In some embodiments, the end cap 20 comprises one or more firing pins. While the end cap can comprise any suitable number of firing pins, including, 1, 2, 3, 4, or more, Figure 4B shows that, in some embodiments in which the firearm 10 is configured to fire a rim-fire
20 projectile (*e.g.*, a .22 magnum round), the end cap 20 comprises 2 firing pins 125, which can help provide a uniform ignition to the projectile.

The firing pins 125 can have any suitable characteristic that allows firearm 10 to discharge or fire a projectile when the barrel 25 moves proximally to strike a projectile against the firing pins. Indeed, in some embodiments, the firing pins are stationary with respect to the
25 end cap 20 (*e.g.*, via a pin 131, such as an Allen screw, shown in Figure 4B or in any other suitable manner). In other words, unlike some conventional firing pins that move to strike a projectile primer (*e.g.*, a percussion cap, a rim fire, or a primer cap), some embodiments of the described firearm have a firing pin that remains stationary so as to be struck by a primer that is carried to the stationary firing pin (*e.g.*, via the sliding barrel 25, as discussed below).

30 In another example of a suitable characteristic of the firing pins 125, each firing pin can comprise one or more pins, blades, posts, bumps, or other members that allow the pin to function as intended. Indeed, in some embodiments in which the firearm 10 discharges a rim-fire

projectile (*e.g.*, a .22 magnum round), Figure 4B shows the firing pins 125 comprise blades 130 that are sized and shaped to be struck by the rim 135 of a rim-fire bullet 140 (as shown in Figure 5). In other embodiments in which the firearm fires a center-fire projectile (not shown), the firing pin comprises a pin that is configured to be struck by the projectile's primer.

5 The firing pin 125 can be disposed in any suitable location that allows it to fire a projectile when the projectile's primer strikes the pin. For instance, Figure 4B shows an embodiment in which two firing pins 125 are disposed in-line with each other. In another embodiment (not shown), where the firing pin comprises a pin configured to be struck by the primer of a center-fire projectile, the pin is disposed in a position that allows the primer to strike
10 the pin when the barrel moves proximally within the main frame 15.

In some embodiments, the end cap 20 further comprises a biased following pin. In such embodiments, the following pin can perform any suitable function, including acting to hold a projectile (*e.g.*, bullet casing) in the barrel 25 by applying pressure to the proximal end of the projectile and/or acting as a bolt face to retain the projectile (*e.g.*, the projectile's casing) in the
15 barrel when the projectile is fired. Although the following pin can act as a bolt face in any suitable manner, in some embodiments as a projectile is forced proximally against the following pin, the following pin also moves proximally until it bottoms out, or it is otherwise prevented from moving further proximally.

While the following pin can comprise any suitable component that allows it to perform
20 the described functions, Figure 5 shows an embodiment in which the following pin 145 comprises a shaft 150, a following pin projection 155, and a following pin biasing mechanism 160 (*e.g.*, one or more springs) that contacts the following pin projection to bias the following pin. In another embodiment (not illustrated), the shaft surrounds (or is proximate to) a stationary firing pin. In this embodiment, the firing pin extends distally past the following pin when
25 following pin is forced proximally to its fullest extent. Accordingly, the firing pin and following pin in this embodiment allow the firearm 10 to discharge a center-fire round (*e.g.*, a shotgun shell) through the proximal movement of the barrel 25.

The barrel 25 can comprise any suitable component or characteristic that allows it to slide proximally and/or distally in the main frame 15 in order to discharge or fire a projectile. In one
30 example, Figure 5 shows that the barrel 25 comprises a projectile chamber 165 at its proximal end 170 and an elongated cylindrical tube 175 that extends to a distal end 180 of the barrel 25. In this manner, the movement of a projectile disposed within the barrel can be tied to the

movement of the barrel. In other words, when the barrel moves proximally within the main frame 15, a projectile (*e.g.*, .22 round) disposed in the chamber will move likewise.

In some embodiments, the barrel 25 comprises a retention mechanism that allows the barrel to be biased by a proximal biasing mechanism, or a mechanism that biases the barrel in a proximal direction. In this regard, the retention mechanism can comprise any suitable component that allows the proximal biasing mechanism to bias the barrel. By way of non-limiting example, Figure 5 shows an embodiment in which the retention mechanism 185 comprises a retainer (*e.g.*, a C-washer) 190 that mates with a retainer groove 195 in the barrel 25.

The proximal biasing mechanism can comprise any component that allows it to bias the barrel 25 proximally in the main frame 15. Indeed, while the proximal biasing mechanism 200 can comprise one or more springs, Figure 5 shows an embodiment in which the biasing mechanism 200 comprises multiple springs 205 that extend between a proximal spring carrier 210 and a distal spring carrier 215. While the biasing mechanism can comprise any suitable number of springs, including, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, or more, in some embodiments, the biasing mechanism comprises 10 coiled springs that are equally spaced apart (*e.g.*, each within a corresponding depression of the proximal 210 and distal 215 spring carriers) to allow the proximal biasing mechanism to apply a substantially uniform force around a circumference of the barrel.

While the springs 205 in the proximal biasing mechanism 200 can have any suitable characteristic that allows them to bias the barrel 25 to move towards a discharged position, in some embodiments, the springs are configured to apply little to no tension on the barrel when the barrel is in the discharged position (or a position in which the barrel is moved to its proximal-most position, as shown in Figure 5). Thus, when the barrel is moved distally toward a distal cocked position (as described below); the proximal biasing mechanism biases the barrel towards the firing pins 125.

Returning to the barrel 25, Figures 6A and 6B show that, in some embodiments in which the firearm 10 fires rim-fire projectiles, the proximal end 170 of the barrel comprises a firing pin groove 218 that corresponds to each firing pin 125. In such embodiments, the firing pins are only able to strike a projectile's primer 219 when the barrel is rotated so that the groove is in alignment with the firing pins. In other words, when the barrel is rotated so that the groove is out of battery with the firing pins, the barrel will strike firing pins and prevent the projectile's

primer from striking the firing pins. Accordingly, the firing pin groove can act as safety mechanism to prevent the firearm from being accidentally discharged.

In some embodiments, the barrel 25 comprises one or more catches on its external surface. In such embodiments, the barrel can comprise 1, 2, 3, 4, or more catches. By way of illustration, Figures 6A and 6C show some embodiments in which the barrel 25 comprises 2 catches 220, while Figures 7A and 7B show some embodiments in which the barrel 25 comprises 4 catches 220.

Although the catches 220 can serve any suitable function, in some embodiments, one or more catches on the barrel 25 are sized and shaped to be captured by a sear 30 (discussed below) when the barrel is moved to a distal cocked position (shown in Figure 8A) or a proximal cocked position (shown in Figure 8B). In this regard, each catch can have any suitable component or characteristic that allows it to perform the described function. For instance, each catch can comprise a groove, a rib, a stop, and/or a protrusion. By way of illustration, Figures 7A and 7B show some embodiments in which the catches 220 each comprises a sear groove 225 disposed near a raised surface 230. Additionally, Figures 7A and 7B show that the barrel 25 optionally comprises one or more sloped surfaces 235 to help the sear 30 (shown in Figures 8A and 8B) engage the catch when the barrel is moved to a cocked position (*i.e.*, a proximal or a distal cocked position).

In some embodiments, the barrel 25 is configured to be able to slide past a corresponding sear 30 when the barrel has been rotated about its longitudinal axis 240 to a fire alignment and to be captured by the sear when the barrel is rotated from the fire alignment to a safe alignment. While the barrel can be have any suitable characteristic that allows it to function as described, Figures 7C and 7D show an embodiment in which the barrel 25 comprises a flat portion 245 of the raised surface 230 of the catch 220. The manner in which this flat portion functions with the sears is further described below in the discussion regarding the sears 30.

As mentioned, some embodiments of the firearm 10 comprise at least one sear 30. Indeed, while the firearm can comprise any suitable number of sears, including 1, 2, 3, 4, or more, Figures 8A and 8B show some embodiments in which the firearm comprises 2 sears 30. The sears can each function in any suitable manner that allows them to selectively engage and disengage a corresponding catch 220. By way of illustration, Figure 8A shows that when the barrel 25 is moved distally to the distal cocked position, a first sear 250 and second sear 255 respectively slip into a first sear groove 260 and a second sear groove 265. Figure 8B shows that

when the barrel 25 is moved proximally to a proximal cocked position (a further discussion of why the barrel can be placed in a proximal cocked position is provided below in a discussion of a launching platform), the first 250 and second 255 sears respectively slide into a third sear groove 270 and a fourth sear groove 275. Thus, when the sears are forced out of the grooves (*e.g.*, by moving the sears in the direction of arrows 280 and 285), the barrel 25 in Figure 8A is able to move proximally (in the direction of arrow 290) from the distal cocked position towards the firing pins 125, while the barrel 25 in Figure 8B is able to move distally (in the direction of arrow 290) from the proximal cocked position to strike a projectile primer disposed near a distal end of the main frame (as described below).

The sears 30 can comprise any suitable characteristic or component that allows them to function as described. For instance, Figure 9A shows an embodiment in which a sear 30 defines a hole 300 that is sized and shaped to allow the barrel 25 to pass therethrough. Additionally, Figure 9A shows that the sear 30 comprises a catch surface 305. While the catch surface can perform any suitable function, in some instances, when the barrel is moved so that a sear groove 225 aligns with the sear 30, the catch surface slides in a first direction into the groove and contacts the raised surface 230 to prevent the barrel from moving proximally or distally within the main frame 15. In contrast, when the sear is forced in a second direction that is opposite to the first direction, the catch surface is moved out of the groove so that the barrel is able to slide past the sear (*e.g.*, from the cocked position to a discharged position).

In some embodiments, one or more sears 30 optionally comprise a safety catch. While the safety catch can perform any suitable function, in some embodiments, the safety catch is sized and shaped so that once the sear is engaged with a corresponding barrel catch 220, the safety catch will only disengage the catch when the barrel is rotated to its fire alignment position. While the safety catch can have any suitable characteristic that allows it to function as intended, in some embodiments, the safety catch corresponds with the flat portion 245 of the barrel 25. Thus, Figure 9B shows that when a sear 30 is engaged with a barrel catch, and when the barrel 25 is rotated so that its flat portion 245 is not aligned with the safety catch 310, the raised surface 330 is unable to slide past the safety catch, even if the catch surface 305 were disengaged from the raised surface. In contrast, Figure 9C shows that the sear 30 can be released from the barrel catch when the barrel 25 is rotated (as described below) so that its flat portion 245 aligns with the safety catch 310 (*e.g.*, so that the firing pin groove 218 is aligned with the firing pin 125).

The sears 30 can be positioned in any suitable place within the firearm 10 that allows them to capture a corresponding barrel catch 220 when the barrel 25 is moved to a proximal cocked position (shown in Figure 8A) and/or a distal cocked position (shown in Figure 8B). In one example, Figures 9C and 9D show that the sears 30 (*e.g.*, sears 250 and 255) run substantially transverse to the length of the barrel 25. Additionally, while the sears can be disposed in any suitable orientation with respect to each other, Figures 9C through 10 show some embodiments in which the first 250 and second 255 sears are disengaged by moving the sears in substantially opposite release directions (as illustrated by arrows 315 and 320, respectively). Accordingly, as shown in Figure 10, in some embodiments, the sears 250 and 255 are operated by buttons 325 (or triggers) that are disposed on opposite sides of the main frame 15. Thus, where the firearm 10 comprises two sears (*e.g.*, sears 250 and 255), the barrel 25 can be released from its cocked position as both sears and simultaneously disengaged from a corresponding barrel catch 220.

While the sears 30 can be disposed in the firearm 10 in any suitable manner, Figure 10 (as well as Figures 9C and 9D) show some embodiments in which each of the sears 30 is slidably disposed within a slot 330 of the trigger block 35. Additionally, while the sears can be operated in any suitable manner, Figure 10 shows an embodiment in which each sear 30 has a first sear biasing device (*e.g.*, one or more springs) that biases the corresponding sear towards a corresponding button 325. Additionally, Figure 10 shows an embodiment in which each sear 30 has a second sear biasing device (*e.g.*, spring) that is weaker than the first sear biasing device 335, and that serves to bias a corresponding button 225 away from the sear 30. Thus, when the firearm is cocked, the barrel 25 is in fire alignment (where applicable), and as a user pushes the button sufficiently hard, the button forces the corresponding sear (*e.g.*, pin 345) to move and to disengage from any barrel catch 220.

In some cases, in order to adjust how far the buttons 325 must be forced before the sears 30 can be disengaged (and the firearm 10 can be discharged), Figure 10 shows that each button 325 is optionally adjustable. Although the buttons can be adjusted in any suitable manner, Figure 10 shows some embodiments in which each button 325 comprises an adjustable pin (*e.g.*, an Allen screw or other screw) that can be tightened or loosened in order to adjust the stroke of the button that is needed to disengage the corresponding sear.

With respect to the cocking block 40, the cocking block 40 can be attached to the barrel 25 in any suitable manner. By way of example, the cocking block can be integrally formed with,

welded to, attached with mechanical fasteners, or otherwise attached to the barrel in a manner that enslaves the movement of the cocking block to the movement of the barrel. Indeed, Figure 10 shows an embodiment in which the cocking block 40 includes one or more tabs 350 at its proximal end 355 that mate with corresponding slots 360 in the barrel 25. Additionally, Figure 5 10 shows that, in some implementations, a distal fastener (*e.g.*, a threaded washer 365) is used to secure the cocking block 40 to the barrel 25.

The cocking block 40 can have any suitable characteristic that allows the barrel 25 to be moved proximally and/or distally within the main frame 15 and/or to be rotated between a fire alignment and a safe alignment through distal and/or proximal movement and/or rotation of the 10 cocking ring 45. In this regard, some embodiments of the cocking block include at least one channel that receives a member (*e.g.*, pin 370) extending from the cocking ring. While this channel can have any suitable shape (including a U-shape, an H-shape, a V-shape, etc.), Figure 11 shows an embodiment in which the channel 375 includes a U-shaped portion 380. More specifically, Figure 11 shows an embodiment in which the channel 375 comprises a channel that 15 runs transverse to the length of the barrel 25 (the transverse channel 385) and two channels that run with the length of the barrel (the fire channel 390 and the safety channel 395), wherein the two channels are separated by a tang 400.

The cocking ring 45 can comprise any suitable component that allows its distal, proximal, and/or rotational movement about the main frame 15 to cause the barrel 25 to move 20 distally, proximally, and/or to rotate. In some embodiments, however, the cocking ring comprises an element that is movably attached to the firearm (*e.g.*, a ring 402 (see Figure 10) extending around a circumference of the main frame), wherein the element comprises one or more cocking ring members 370 (*e.g.*, pins, projections, bolts, screws, etc.) that are attached to the member, that extend through the opening 80 in the main frame 15, and that are movably 25 received in the channel 375 of the cocking block 40.

The cocking ring 45 can interact with the cocking block 40 in any suitable manner that allows the cocking ring to move the barrel 25 to a cocked position (*e.g.*, a distal and/or proximal cocked position) and/or between a fire alignment (*e.g.*, an alignment in which the firing pin grooves 218 at the proximal end 170 of the barrel are in battery with the firing pins 125) and a 30 safe alignment (*e.g.*, an alignment in which the grooves at the proximal end of the barrel are not in battery with the firing pins). In one example in which the firearm 10 is cocked by moving the barrel to the distal cocked position (as shown in Figure 8A), the cocking process involves

ensuring that the cocking ring member 370 is disposed within the transverse channel 385 (as shown in Figure 11). Thus, when the cocking ring member is disposed within the fire channel 390 or the safety channel 395, the cocking ring is moved proximally until the cocking ring member is disposed within the transverse channel.

5 Once the in cocking ring member 370 is disposed within the transverse channel 385, the cocking ring 45 can be rotated until the cocking ring member is disposed proximal to the tang 400 (as shown in Figure 12A). At that point, the ring is pushed distally, so that the cocking ring member pushes the tang (and hence the barrel 25) to move distally until the sears 30 engage corresponding catches 220 (*e.g.*, first groove 260 and second groove 265) and the barrel is
10 locked in the distal cocked position.

 Once the barrel 25 is cocked, the cocking ring 45 can further be rotated so the cocking ring member 370 moves in the transverse channel 385 to the proximal end 405 of either the fire channel 390 or the safe channel 395. When the cocking ring member 370 is disposed at the proximal end of the of the safe channel 395 (as shown in Figure 12C), Figure 12D shows that the
15 firing pin grooves 218 and the firing pins 125 are out of battery with each other. Thus, in embodiments in which the sears 30 lack a safety catch 310, when a user disengages all sears, the barrel 25 can slide proximally as the cocking ring member 370 slides through the safe channel. That said, the barrel would protect the projectile's primer from being struck against the firing pins.

20 In contrast, where the cocking ring member 370 is moved to the proximal end of the fire channel 390 (as shown in Figure 12E) and the cocking ring member 370 is pushed into the distal fire recess 95 (where applicable), Figure 12F shows that the firing pin grooves 218 and the firing pins 125 are in battery with each other. Thus, if a user were to release the sears 30, the barrel 25 would be able to slide proximally as the fire channel slides past the cocking ring member and a
25 primer of a projectile in the chamber 165 would be discharged as it strikes the firing pins.

 In another example in which the firearm 10 is cocked by moving the barrel 25 to the proximal cocked position (as shown in Figure 8B and as further discussed below), the cocking process involves moving the cocking ring 45 proximally to ensure the cocking ring member 370 is disposed in the transverse channel 385. Once the cocking ring member is in the transverse
30 channel, the cocking ring can be moved proximally, causing the barrel to move proximally, until one or more sears 30 capture corresponding barrel catches 220 (*e.g.*, third groove 270 and fourth groove 275).

Once the barrel 25 is captured in the proximal cocked position, the cocking ring 45 can be rotated to place the cocking ring member 370 at the proximal end of the safe channel 395 or the fire channel 390. When the cocking ring member is disposed at the proximal end of the safe channel and the cocking ring member is rotated into the proximal fire recess 110 (*e.g.*, so that the firing pin grooves 218 and firing pins 125 are aligned), the sears 30 can be released (*e.g.*, by simultaneously pressing buttons 325) so that a distal biasing mechanism (described below) can cause the barrel to slide distally within the firearm 10.

In some embodiments, the firearm 10 optionally comprises a cocking assist mechanism 55. In such embodiments, the cocking assist mechanism can comprise any suitable component or characteristic that allows it help a user move the cocking ring 45 distally on the main frame 15. In one example (not shown), the cocking assist mechanism comprises a lever that is pivotally connected to the main frame so as dispose a cam head near the cocking ring. In this example, when the lever is rotated from its original position, the cam head moves so the cocking ring can be pulled proximally. Then, when the lever is rotated back to its original position, the cam head forces the cocking ring to be moved (and to remain) distally on the main frame.

In another example of a suitable cocking assist mechanism 55, Figure 13A shows an embodiment in which the cocking assist mechanism 55 comprises lever saddle 410, a lever 415 having a cam action pin 420, a slip pin 425, and a cam-pin biasing member 430 (*e.g.*, one or more springs) that applies force to the slip pin (*e.g.*, a pin 435, flange, protrusion, or other connector on the slip pin) to bias the slip pin proximally. In this example, when the lever 415 is lifted (as shown in Figure 13B), the cam action pin 420 forces the slip pin 425 to move distally. In this manner, the slip pin can force the cocking ring 45 to move distally on the main frame 15 (*e.g.*, to the distal cocked position). Once the cocking ring is moved to a distal position, the lever can be lowered (as shown in Figure 13C) so that a lever face 440 of the lever 415 prevents the cocking ring from moving proximally until the lever is lifted again.

In some embodiments, the firearm 10 optionally includes a distal end attachment 60 that is disposed at the distal end 70 of the main frame 15. Some examples of suitable distal attachments include a cover, a flashlight, a launching platform, a light source attachment mechanism, a grip, a barrel protector, a sight, a scope, a spear attachment, and/or any other suitable component that can be attached (directly or indirectly) to the distal end of the main frame.

Although in some embodiments, the distal attachment 60 is integrally formed with or attached to the main frame 15, in other embodiments, the distal attachment is configured to be selectively coupled to and decoupled from the main frame. In such embodiments, the distal attachment and/or main frame can comprise any suitable attachment mechanism that is capable of attaching a component to the main frame's distal end 70. Some examples of suitable attachment mechanisms include screw threads, a bayonet attachment, an adaptor having threads on one side and a bayonet attachment on the other, one or more mechanical fasteners, clips, an adapter, the extension of the buttons 325 through holes in the distal attachment, and/or any other suitable mechanism.

10 In one example, Figure 14 shows an embodiment in which a cover 445 is attached to the distal end 70 of the main frame 15 through the use of one or more mechanical fasteners 450 (*e.g.*, screws) and/or the buttons 325 extending through holes 455 in the cover. In another example, Figure 14 (as well as Figures 15A through 15D) show some embodiments in which a flashlight 460 attaches to the main frame 15 via an adapter 465 having threads 470 on its proximal side 475 and a bayonet attachment 480 on its distal side 485. In this example, Figure 15
15 14 shows the flashlight 460 comprises a mating bayonet attachment 490 that allows the flashlight to be attached or detached from the adaptor 465 by turning the flashlight a quarter of a turn.

Where a flashlight 460 attaches at the distal end 70 of the firearm 10, the flashlight can have any suitable component or characteristic that allows it to provide light while allowing the
20 firearm to shoot a projectile through the flashlight. Although one or more components (*e.g.*, batteries, switches, wires, electrical connectors, etc.) of the flashlight are disposed in some embodiments of the firearm, in other embodiments, the flashlight is completely self-contained—meaning that the flashlight can provide light without being attached to the firearm. While such a self-contained flashlight can comprise virtually any component that allows it to function as
25 described herein, Figure 14 (and Figure 15C) shows an embodiment in which the flashlight 460 comprises one or more light sources 495 (*e.g.*, high-intensity LEDs, incandescent bulbs, etc.), batteries 500, lenses 505 with a hole 510 that allows a projectile to pass therethrough, and holes 515 that pass through the flashlight.

In addition to the described features and components, the firearm 10 can be modified in
30 any suitable manner that allows it to function as described herein. Indeed, in one example, the firearm comprises a laser aiming system. While the laser and its various components can be disposed in any suitable component of the firearm, including the main frame 15 and/or distal

attachment 60 (*e.g.*, the flashlight 460), Figure 14 shows an embodiment in which the laser aimer 520 and its batteries 525 are disposed near the main frame's distal end 70 and in which the flashlight 460 defines an opening 530 that allows the laser beam (not shown) to shine through the flashlight. While the laser aimer can be turned on and off in any suitable manner, in some 5 embodiments, the laser aimer is operated by a switch associated with one or more of the buttons 325 that control the sears 30.

In another example, the firearm 10 is modified as a launching platform that is attached at the distal end 70 of the main frame 15. In this example, the launching platform can comprise any suitable component that allows the firearm to shoot or discharge a projectile that is disposed 10 near the distal end of the main frame (as opposed to firing a projectile that is disposed at a proximal end 170 of the barrel 25). By way of illustration, Figure 16 shows an embodiment in which the launching platform 535 comprises a chamber 540 and a projectile cavity 545. In this regard, while the chamber can be used to hold any type of projectile (*e.g.*, a lethal round, such as a center-fire round or a rim-fire round), in some embodiments, Figure 16 shows the chamber 540 15 holds a blank round 550 to convert the firearm to a less-lethal or a less-than-lethal device that can launch one or more relatively large objects (such as bean bags, canisters, nets, balls, ropes, or other projectile objects).

The platform 535 can have any suitable component or characteristic that allows a projectile to be launched from it. By way of illustration, Figure 16 shows an embodiment in 20 which the launching platform 535 comprises a wad 555 disposed adjacent to the blank 550 and a seal (*e.g.*, a thick seal 560 and a thin seal 565 on each side of a projectile 570 (*e.g.*, a large bag).

Where the firearm 10 comprises a launching platform 535, the firearm can be configured to discharge a projectile from the platform in any suitable manner that involves releasing the barrel 25 from the proximal cocked position (as described above) and allowing the barrel to slide 25 distally within the main frame 15. In one example, the firearm is modified so it has a distal biasing mechanism that is capable of forcing the barrel distally (or forward) when the barrel is released from the proximal cocked position. For instance, Figure 16 shows an embodiment in which a modified end cap 575 comprising a distal biasing mechanism 580 (*e.g.*, one or more springs) and a hammer 585 is attached to the proximal end 65 of the main frame 15.

30 In another example of how the firearm 10 can be modified to fire projectiles from the launching platform 535, the barrel 25 is configured to comprise one or more firing pins 125 at its distal end 180. While the firing pins can be disposed at the distal end of the barrel in any

suitable manner, Figures 16 and 17 show that, in some embodiments, a rod 590 is inserted into the barrel 25, wherein the rod comprises one or more firing pins 125 at its distal end 590. While the rod can be secured in the barrel in any suitable manner, Figures 16 and 17 show some embodiments in which a proximal flange 595 is attached (*e.g.*, threaded, frictionally engaged, or otherwise coupled to) to a proximal end 600 of the rod. Thus, when the barrel is released from the proximal cocked position, the firing pins move distally to strike the primer of the projectile 550 disposed in the launching platform and thereby shoot the projectile.

Providing an Extendable Light Source

The extendable light source can comprise any suitable light emitting object that can be attached to a firearm (*e.g.*, the customizable firearm 10 or any other suitable firearm) in a manner that allows the light source to be selectively moved between a first and a second position, wherein the first position is closer than the second position to a longitudinal axis of the firearm's barrel (*e.g.*, barrel 25). Some non-limiting examples of suitable light emitting objects include one or more lasers (*e.g.*, a laser aimer, a red and green laser, etc.), dazzlers lights (*e.g.*, LEDs, incandescent bulbs, halogen lamps, high intensity discharge lights, strobe lights, electron stimulated lights, electroluminescent lamps, etc.), and/or other suitable light emitting devices. In some embodiments, however, the light source comprises a laser and/or a light. By way of non-limiting illustration, Figure 18 shows a representative embodiment in which the light source 605 comprises a laser aimer 610.

As previously stated, the light source 605 can be selectively moved between at least a first position and a second position. In this regard, the first position can be virtually any position that is closer to a longitudinal axis 615 of the firearm's barrel (*e.g.*, barrel 25) than is the second position. In some non-limiting embodiments, when the light source is in the first position, the light emitting portion (*e.g.*, the light bulb, the laser light emitting portion, etc.) of the light source is at least partially disposed within (*e.g.*, so as to shine within) a lateral perimeter of the distal end 70 of the firearm (*e.g.*, firearm 10). In this regard, the term lateral perimeter of the distal end of the firearm may refer to an outer perimeter of a distal portion of the firearm (including, without limitation, the main frame 15, a pistol slide, a handle, a platform, etc.) and/or a distal end attachment 60 (*e.g.*, a cover 445, a flashlight 460, a launching platform 535, a grip, a barrel protector, etc.), wherein the outer perimeter extends laterally around at least a portion of the barrel or the barrel's longitudinal axis. By way of non-limiting illustration, Figure 19A shows an

embodiment in which the light source 605 is able to shine a light 620 (*e.g.*, a laser beam) within a lateral perimeter 625 of the firearm's distal end 70 (*e.g.*, via opening 623).

The second position can be any suitable position that is farther (laterally) from the barrel's longitudinal axis 615 than is the first position. Indeed, in some non-limiting
5 embodiments, when the light source 605 is in the second position, the light emitting portion (*e.g.*, the light bulb, the laser light emitting portion, etc.) of the light source is at least partially disposed outside of a lateral perimeter 625 of the distal end 70 of the firearm (*e.g.*, firearm 10). By way of non-limiting illustration, Figure 19B shows an embodiment in which the light source
10 605 is able to shine a light 620 (*e.g.*, a laser beam) outside of the lateral perimeter 625 of the firearm's distal end 70. Accordingly, when a distal end attachment 60 that lacks an opening 623 for the light source is attached to a distal end of the firearm, the light source can be moved to the second position to allow the light source to shine past the distal end attachment.

The light source 605 can move between the first and second positions (and/or any
15 suitable position in between) in any suitable manner, including, without limitation, by sliding, pivoting, raising, lowering, twisting, turning, flipping, and/or otherwise moving closer to or farther from the longitudinal axis 615 of the firearm's barrel (*e.g.*, barrel 25). Indeed, in some
20 embodiments, the light source pivots between the first position and the second position. In one example (not illustrated) of such an embodiment, the light source is attached at a first end of a one or more levers, while a second end of the lever(s) is pivotally attached to the firearm (*e.g.*,
firearm 10) so that the light source can pivot towards the longitudinal axis of the barrel to place
the light source in the first position, and away from the barrels' longitudinal axis to place the
light source in the second position.

In some other embodiments, the light source 605 is able to slide between the first and
25 second position. In this regard, the light source can slide between the two positions in any suitable manner, including, without limitation, through the use of a guide and follower mechanism, a bearing slide, a slide rail, a groove, a piston, and/or another suitable mechanism that allows the light source to move closer to and farther from the longitudinal axis 615 of the
firearm's barrel (*e.g.*, barrel 25). Where the light source uses a guide and follower mechanism,
that mechanism can comprise any suitable components that allows one portion (*e.g.*, one or more
30 grooves, slots, rails, threaded pins, pins, etc.) of the mechanism to act as a guide for another portion (*e.g.*, one or more pins, grooves, slots, rails, etc.) that follows the guide portion. By way of non-limiting illustration, Figures 19B and 20B show some embodiments in which an

extension member 630 that houses the light source 605 comprises a slot 635 that is guided by a plurality of pins 640 that are fixed in position with respect to the firearm 10.

In some embodiments, the light source 605 is optionally selectively maintainable in (and releasable from) one or more positions (*e.g.*, the first position, the second position, and/or one or more positions between the first and second). In this regard, the light source can be selectively maintained in and released from a position through the use of any suitable retention mechanism. Some non-limiting examples of such retention mechanisms include one or more detente mechanisms, clamps, ratchets (*e.g.*, a ratchet that raises and selectively locks into one or more positions and then lowers when the light source is raised past the second position), locking pistons (*e.g.*, a spring loaded piston mechanism in which the light source is released to move from the first position to the second position when the piston is pushed past the first position (closer to the barrel's longitudinal axis 615) and in which the piston is locked back into the first position when the piston is pushed back (a second time) past the first position), screws, frictional engagements, mechanical engagements, pawls and corresponding catches, detente spring and ball mechanisms, spring-loaded ball mechanisms, screws, screw mechanisms, and/or other mechanisms that are capable of selectively maintaining (and releasing) the light source in (and from) a desired position. By way of non-limiting example, Figures 19B, 19C, and 20B each illustrate a representative embodiment in which the light source 605 comprises a detente mechanism 645 that is able to selectively maintain the light source in a desired position (*e.g.*, the first position, the second position, and any position in between) by biasing a member (*e.g.*, a ball and spring 650) into a recess 655 at each desired position.

The light source 605 can be attached to the firearm (*e.g.*, firearm 10 or any other suitable firearm, such as a handgun, a long gun, etc.) at any suitable location and in any suitable manner that allows the light source to function as intended. In some embodiments, the light source attaches to the firearm's frame (*e.g.*, main frame 15), to (or as) a distal end attachment 60, at the firearm's stock (not shown), attached at a slide of the firearm (*e.g.*, a pistol slide, not shown), and/or any other suitable location. In one non-limiting example, Figures 19A and 19B each show an embodiment in which the light source 605 is disposed in the extension member 630, which is attached to a distal end attachment 60 (*e.g.*, cover 445) via a plate 660 that is attached to the firearm. While the plate 660 in this example can attach to the distal end attachment via one or more fasteners (*e.g.*, pins, screws, rivets, etc.) that extend through holes 665 in the plate 660 and attach to the distal end attachment 60, the plate can attach to the distal end attachment in any

other suitable manner, including, without limitation through a threaded attachment mechanism, a clamping mechanism, and/or in any other suitable manner.

In another non-limiting embodiment, the light source 605 is disposed in a light source attachment mechanism (*e.g.*, between two plates, not shown) that can be selectively added to and removed the firearm 10.

In still another non-limiting embodiment, some implementations of the firearm 10 are configured to attach to virtually any suitable object that is capable of supporting the firearm. In one example, the firearm is configured to attach to another weapon, which can include, but is not limited to, any suitable gun (*e.g.*, a tactical weapon, such as an AR-15-style gun, an AR-10 style gun, etc.; a shotgun; a rifle; a black-powder gun; and any other suitable long gun, handgun, and/or other weapon). In this example, the firearm can serve any suitable purpose, such as providing a laser or light pointing/aiming system, providing a high-intensity tactical flashlight, providing a secondary weapon (*e.g.*, in addition to or in place of a bayonet), providing a launching system for launching projectiles (*e.g.*, grenades, teargas canisters, flares, beanbag rounds, animal baton rounds, etc.).

Where the firearm 10 is configured to attach to another object (*e.g.*, another gun), the firearm can attach to the other object in any suitable manner, including, without limitation, through the use of any suitable mounting mechanism that is able to attach the firearm to a portion of the object (*e.g.*, a barrel of a gun, a receiver of a gun, or any other suitable portion of a weapon), a sight or accessory mount (*e.g.*, a WEAVER[®] rail, a Picatinny rail, a riser rail, a scope base, etc.), and/or any other suitable location.

While the firearm mounting mechanism can comprise any suitable component or characteristic that allows it to attach the firearm 10 to another object, Figure 22 illustrates a representative embodiment in which the mounting mechanism comprises a clamp 680 that is capable of attaching the firearm 10 to an accessory rail 710 (*e.g.*, WEAVER[®] rail, a Picatinny rail, a riser rail, etc.) on a tactical weapon (*e.g.*, an AR-16 style gun 700). Although the clamp 680 can comprise any suitable component that allows it to perform its intended purpose, Figures 22 through 24 show that, in some embodiments, the clamp 680 comprises a surface 690 for attaching to the firearm 10 (*e.g.*, for attaching to the firearm's main frame 15 via one or more welds, fasteners, clamping mechanisms, adhesives, and/or other suitable manners). Additionally, Figures 23 and 24 show some embodiments in which the clamp 680 comprises two blades 725 that are disposed substantially opposite to each other. As the two blades 725 each comprise a

groove 755 that corresponds to a ridge on an accessory rail 710, Figures 22 through 24 show that the clamp 680 is able to slidably receive the accessory rail 710, and that one or more fasteners 765 (*e.g.*, screws) can be tightened and/or loosened to respectively attach and/or detach the firearm 10 from the rail 710.

5 The various components of the light source 605 (*e.g.*, one or more batteries, pieces of circuitry, wires, circuit boards, switches, light producing components, and/or other parts) can be disposed in any suitable location that allows the light source to function as intended. In one example, the various components of the light source are disposed at the light source extension member 630. By way of illustration, Figure 21 shows an embodiment in which the extension
10 member 630 comprises a switch 670 and a cavity 675 for containing various portions of the light source (*e.g.*, batteries, circuitry, etc.). In other embodiments (which are not shown), the various components of the light source are disposed in the firearm or in both the firearm and the extension member. Accordingly, in some embodiments, the light source can be activated from the firearm (*e.g.*, by depressing button 325).

15 As shown above, the described extendable light 605 source can have several features. In one non-limiting example, the because the light source can be used in the first or second position, a firearm comprising the light source can be customized in several ways while still allowing the light source to function as intended. For instance, when the firearm (*e.g.*, firearm 10) and/or a distal end attachment 60 (*e.g.*, the flashlight 460) comprise an opening 530 for the
20 light source to shine through, the light source can be used in the first position. In contrast, when the firearm is customized to include a distal end attachment (*e.g.*, the launcher platform 535) that lacks such an opening, the light source can be moved to the second position, where it is able to shine past a lateral perimeter of the distal end attachments. Accordingly, in some embodiments, the light source is able to be used on a firearm while allowing the firearm to be customized with
25 one or more distal end attachments that would block the light source in the first position. In another non-limiting example, some embodiments of the light source are easily concealable within the firearm. Thus, in some embodiments, the light source can be stored out of the way, and in a manner that does not readily identify the firearm as a potential weapon.

30 The extendable light source 605 can be made in any suitable manner that forms the structures described. By way of example, the various components of the light source can be formed through a process involving molding, extruding, casting, cutting, grinding, stamping, bending, drilling, bonding, welding, mechanically connecting, a layering process, etching,

soldering, and/or any other suitable process. Additionally, while the extendable light source can be attached to a firearm before the firearm is sold, in some embodiments, the extendable light source is configured to be retrofitted to the firearm.

Thus, as discussed herein, the embodiments of the present invention embrace firearms.

5 In particular, the present invention relates to systems and methods for making and using a firearm that includes a light source that can be selectively moved closer to and farther from a longitudinal axis of a barrel of the firearm.

10 The present invention may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as illustrative and not restrictive. The scope of the invention is, therefore, indicated by the appended claims rather than by the foregoing description. All changes that come within the meaning and range of equivalency of the claims are to be embraced within their scope.

What is claimed is:

1. A firearm comprising:
 - a main frame component having an inner cavity; and
 - a gun barrel that is slidably received with the inner cavity so as to be able to selectively move back and forth within the cavity,
- 5 wherein the barrel is rotatable about its longitudinal axis within the inner cavity so as to be rotatable between a safe alignment and a fire alignment.
2. The firearm of claim 1, wherein:
 - the barrel comprises a bullet chamber at its proximal end,
 - the firearm further comprises a stationary firing pin disposed near a
 - 10 proximal end of the inner cavity, and
 - the firearm further comprises a proximal biasing mechanism to bias the barrel from a distal cocked position, proximally, toward the firing pin, to move the barrel to a discharged position.
3. The firearm of claim 1, wherein:
 - 15 a firing pin is disposed at a distal end of the barrel; and
 - the firearm further comprises a distal biasing mechanism to bias the barrel from a proximal cocked position, distally, to move the barrel to a discharged position.
4. The firearm of claim 1, wherein:
 - 20 the barrel comprises a first catch; and
 - the firearm further comprises a first sear that runs transversely to the barrel, wherein the first sear is sized and shaped to selectively engage the first catch to lock the barrel in a cocked position and to disengage the first catch to discharge the firearm.
- 25 5. The firearm of claim 2, wherein:
 - the barrel further defines a groove at its proximal end,
 - the groove corresponds to the firing pin, and the groove aligns with the firing pin when the barrel is rotated to its fire alignment position.
- 30 6. The firearm of claim 4, wherein:
 - the barrel further defines a second catch;
 - the firearm further comprises a second sear that runs transversely to the barrel,

the second sear is sized and shaped to selectively engage the second catch to lock the barrel in a cocked position and to disengage the second catch to discharge the firearm.

5 7. The firearm of claim 1, wherein a self-contained flashlight is disposed at a distal end of the main frame, and wherein the flashlight comprises a hole that allows a projectile to pass through the barrel and through the hole.

8. The firearm of claim 3, wherein a projectile launching platform is attached to a distal end of the main frame.

10 9. The firearm of claim 1, wherein the barrel further comprises a second catch, a third catch, and a fourth catch.

10. A firearm comprising:
a main frame component having an inner cavity;
a gun barrel that is slidably received within the inner cavity so as to selectively move proximally and distally within the cavity, wherein the barrel comprises a first catch
15 on its outer surface; and

a first sear that runs transversely to the barrel, wherein the first sear is sized and shaped to selectively engage the first catch to lock the barrel in a cocked position and to disengage the first catch to fire the firearm.

20 11. The firearm of claim 10, wherein:
the barrel comprises a bullet chamber at its proximal end,
the firearm further comprises a stationary firing pin disposed near a proximal end of the inner cavity, and
the firearm further comprises a proximal biasing mechanism to force the barrel to move toward proximally towards the firing pin.

25 12. The firearm of claim 10, wherein the barrel is rotatable within the inner cavity so as to rotate between a safe alignment and a fire alignment.

13. The firearm of claim 10, wherein the barrel further comprises a firing pin disposed on a distal end of the barrel.

30 14. The firearm of claim 10, wherein:
the barrel further comprises a second catch,
the firearm further comprises a second sear that runs transversely to the barrel,

the second sear is sized and shaped to selectively engage the second catch to lock the barrel in a cocked position and to disengage the second catch to fire the firearm.

15. The firearm of claim 14, wherein the first sear and the second sear are offset with respect to each other within the firearm so that the first sear and the second sear slide in
5 different directions to release the barrel from the cocked position.

16. The firearm of claim 10, further comprising a spring-loaded pin disposed near a proximal end of the inner cavity, wherein the pin is attached to the firearm to hold a casing in the barrel and to function as a bolt face when the firearm is discharged.

17. The firearm of claim 12, further comprising a cocking ring rotatably disposed
10 around an outer surface of the main frame, wherein the cocking ring is connected to the barrel such that rotation of the cocking ring causes rotation of the barrel.

18. The firearm of claim 12, further comprising a cocking assist mechanism.

19. A firearm comprising:

a main frame component having an inner cavity;

15 a gun barrel that is slidably received within the inner cavity so as to selectively move proximally and distally within the cavity, wherein the barrel comprises a first catch and a second catch on an outer surface of the barrel, and wherein the barrel is rotatable about its longitudinal axis within the inner cavity so as to rotate between a safe alignment and a fire alignment; and

20 a first sear and a second sear that each run transversely to the barrel, wherein the first sear is sized and shaped to selectively engage and disengage the first catch and the second sear is sized and shaped to selectively engage and disengage the second catch to respectively lock the barrel in a firing position and to release the barrel to fire the firearm.

20. The firearm of claim 19, wherein a projectile launching platform is attached to a
25 distal end of the main frame, and wherein the firearm is assembled to discharge a projectile in the launching platform through a distal movement of the barrel.

21. A firearm comprising:

a barrel; and

30 a light source, wherein the light source slidably attaches to the firearm so as to be selectively movable between a first position and a second position, wherein the first position is closer to a longitudinal axis of the barrel than the second position.

22. The firearm of claim 21, further comprising a main frame component that receives the barrel, wherein a light emitting portion of the light source is disposed within an outer perimeter of the main frame component when the light source is in the first position.
- 5 23. The firearm of claim 21, wherein the light source comprises a laser.
24. The firearm of claim 21, further comprising a retention mechanism to selectively maintain the light source in and release the light source from a location selected from the first position and the second position.
- 10 25. The firearm of claim 21, further comprising a distal end attachment, wherein the light source is able to shine past a lateral perimeter of the distal end attachment when the light source is in the second position.
26. The firearm of claim 21, further comprising a distal end attachment, wherein the light source is able to shine within a lateral perimeter of the distal end attachment when the light source is in the first position.
- 15 27. The firearm of claim 25, wherein the distal end attachment comprises a launching platform.
28. A firearm comprising:
a main frame component;
a gun barrel that is received by the main frame component; and
20 a light source that is attached to the main frame so as to be selectively movable between a first position and a second position, wherein the first position is closer to a longitudinal axis of the barrel than the second position, and wherein the light source extends past an outer perimeter of a distal end of the firearm when the light source is in the second position.
- 25 29. The firearm of claim 28, wherein the light source is able to shine within the outer perimeter of the distal end of the firearm when the light source is in the first position.
30. The firearm of claim 28, wherein the firearm comprises a flashlight.
31. The firearm of claim 28, wherein the light source comprises a laser.
32. The firearm of claim 28, wherein the light source is slidable between the first
30 position and the second position.
33. The firearm of claim 28, wherein the distal end of the firearm comprises a launching platform.

34. The firearm of claim 28, further comprising a retention mechanism to selectively maintain the light source in and release the light source from a location selected from the first position and the second position.

35. The firearm of claim 33, wherein the retention mechanism comprises a detente mechanism.

36. A firearm comprising:

a gun barrel; and

a light source that is attached to the firearm so as to be selectively movable between a first position and a second position, wherein the first position is closer to a longitudinal axis of the barrel than the second position, wherein the light source extends past an outer perimeter of a distal end of the firearm when the light source is in the second position, and wherein the light source is disposed within the outer perimeter when the light source is in the first position.

37. The firearm of claim 36, wherein the light source is selected from a laser, an LED, and an incandescent bulb.

38. The firearm of claim 36, wherein the distal end of the firearm comprises a launching platform.

39. The firearm of claim 36, wherein the light source is slidable between the first position and the second position.

40. The firearm of claim 36, further comprising a retention mechanism to selectively maintain the light source in and release the light source from a location selected from the first position and the second position.

41. The firearm of claim 36, wherein the distal end of the firearm further comprises a flashlight, and wherein the light source is able to shine a light beam within a lateral perimeter of the flashlight when the light source is in the first position.

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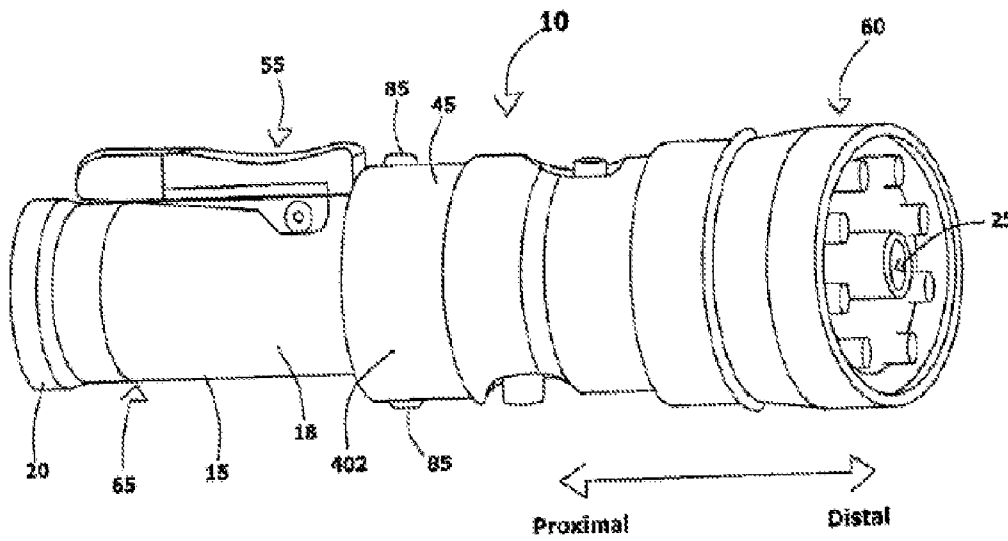


Fig. 1

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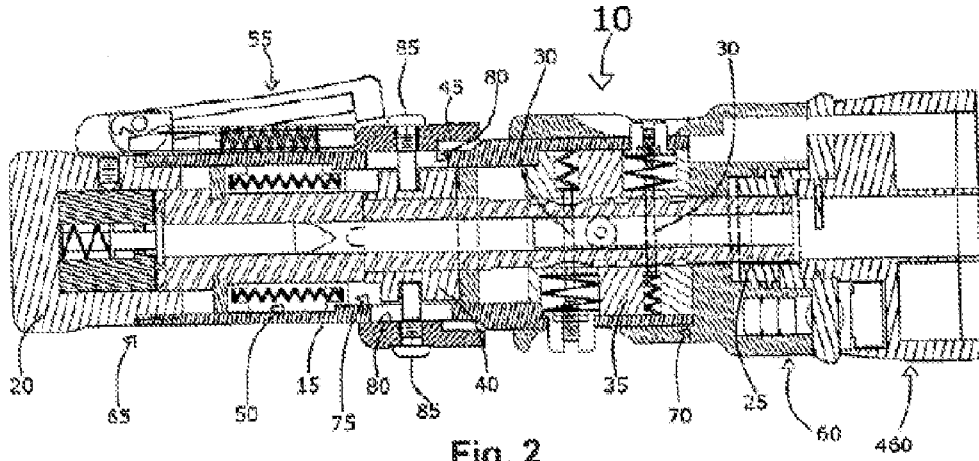


Fig. 2

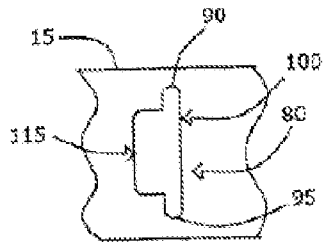


Fig. 3A

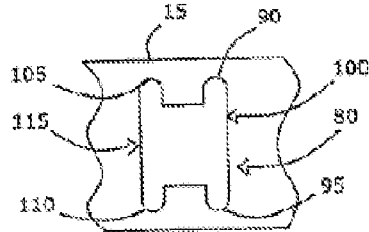


Fig. 3B

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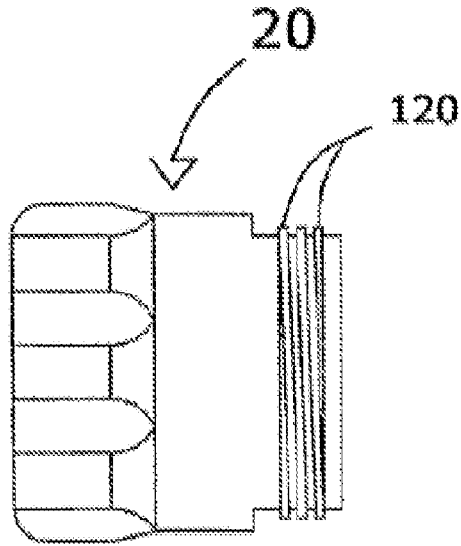


Fig. 4A

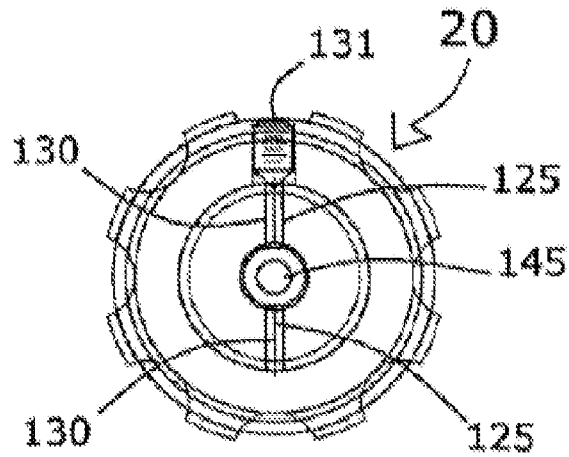


Fig. 4B

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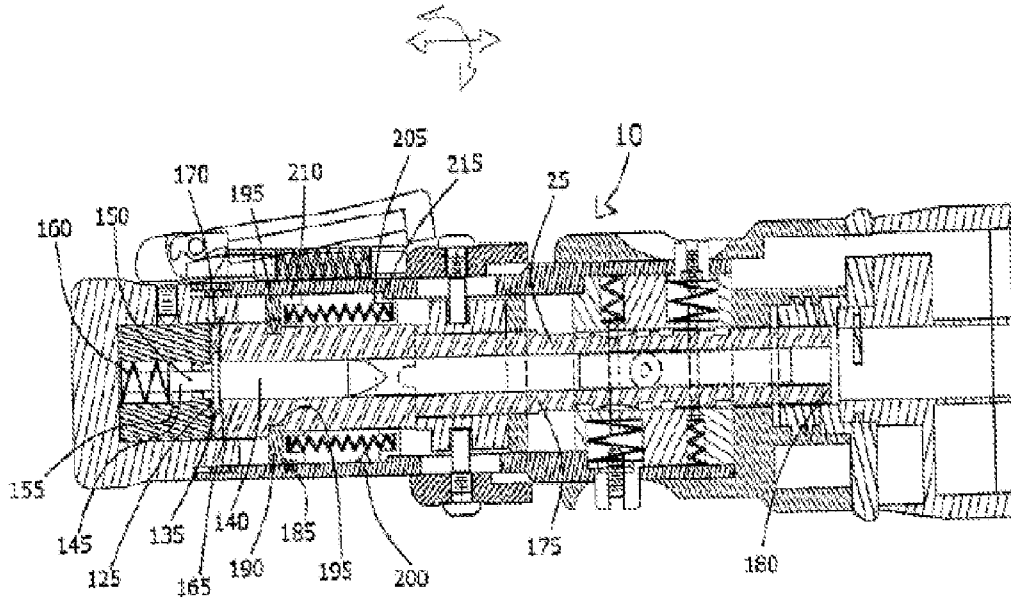


Fig. 5

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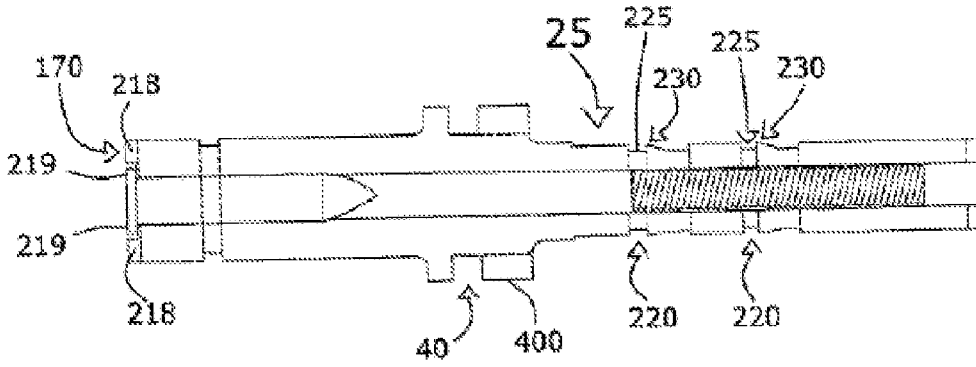


Fig. 6A

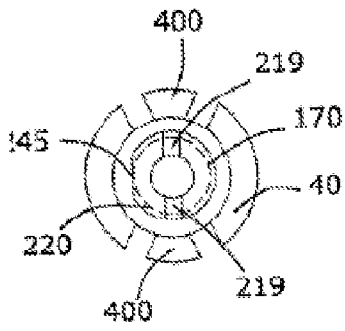


Fig. 6B

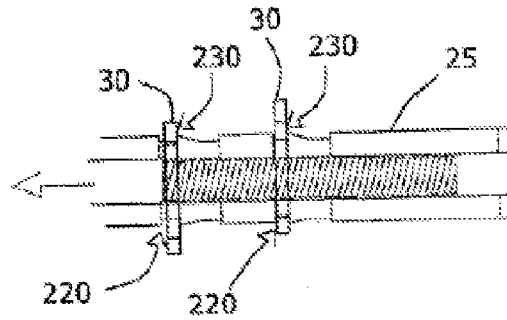


Fig. 6C

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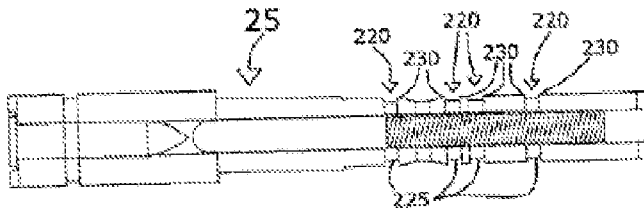


Fig. 7A

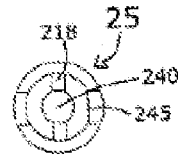


Fig. 7C

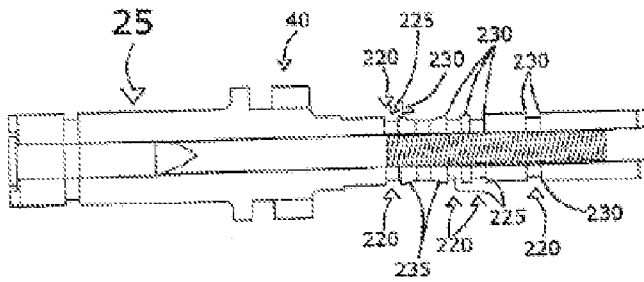


Fig. 7B

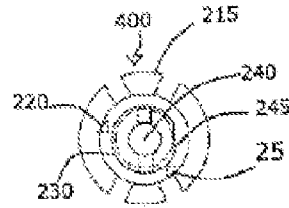


Fig. 7D

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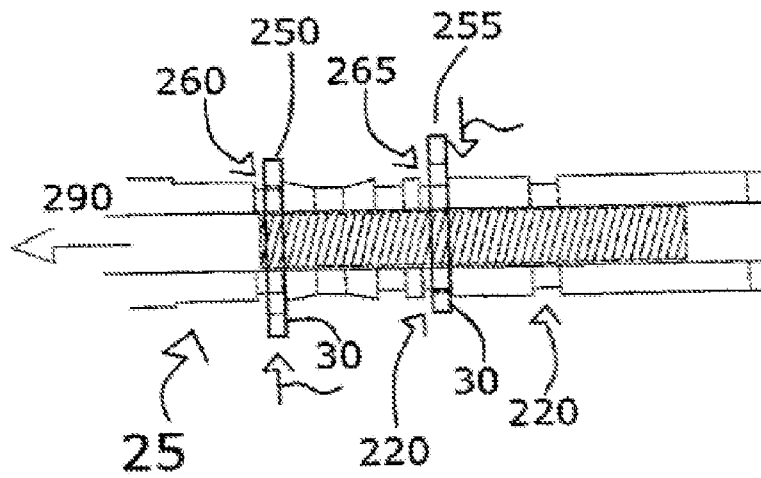


Fig. 8A

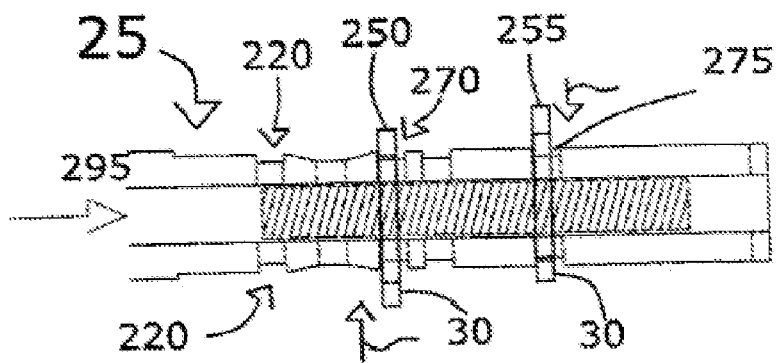


Fig. 8B

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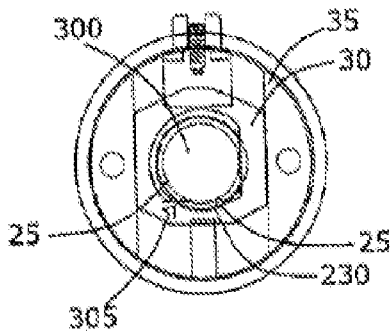


Fig. 9A

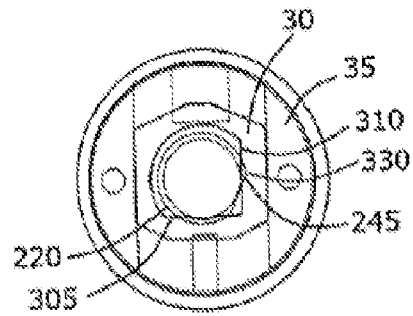


Fig. 9B

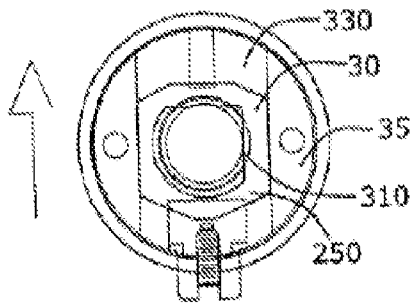


Fig. 9C

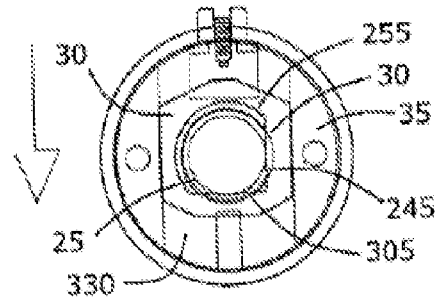


Fig. 9D

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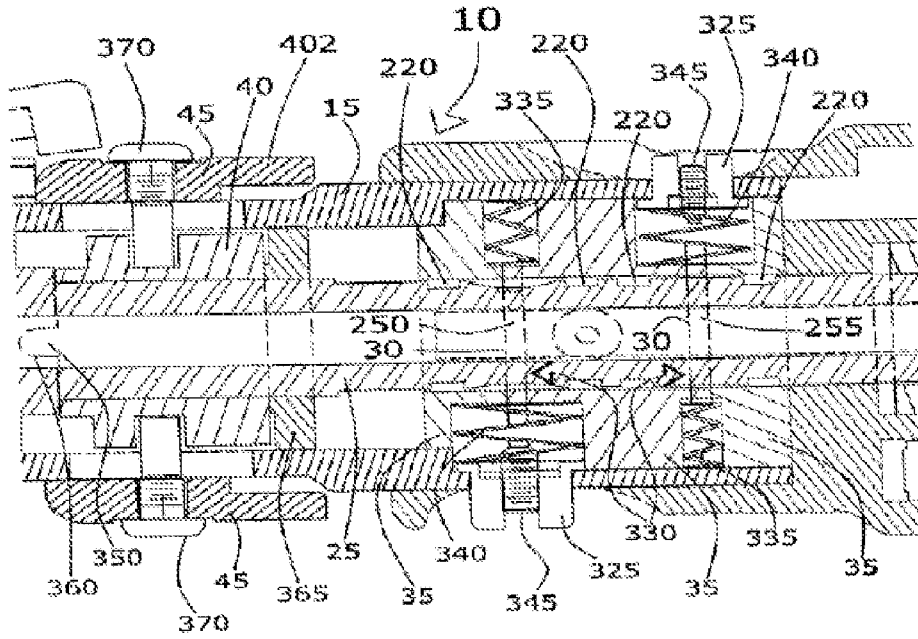


Fig. 10

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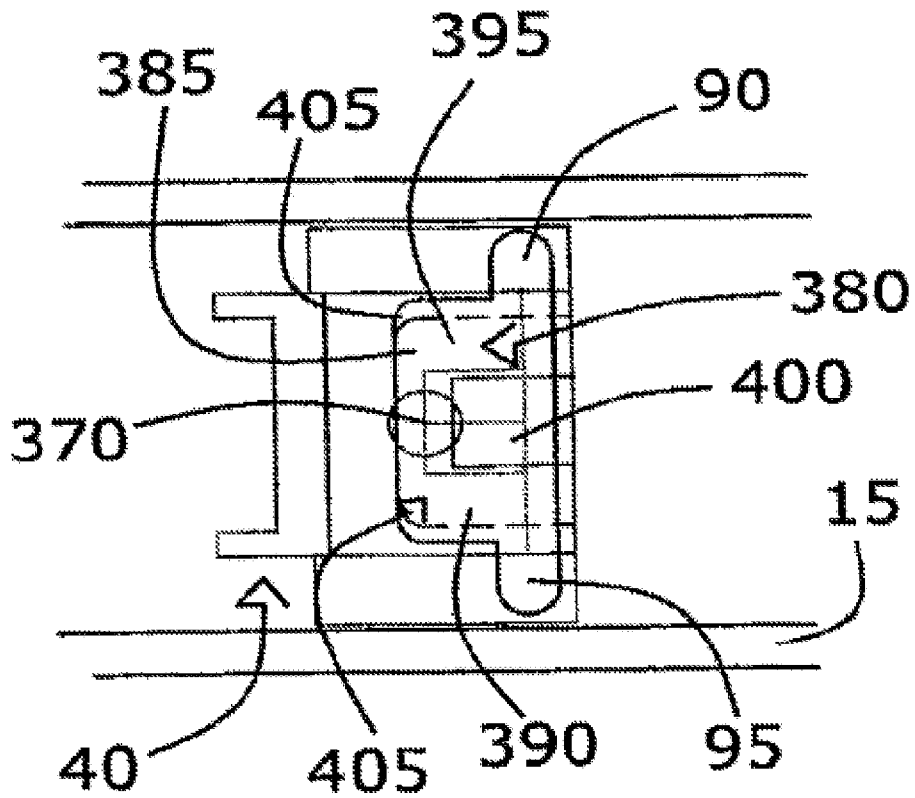


Fig. 11

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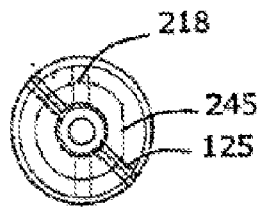


Fig. 12B

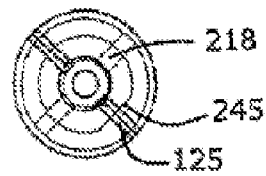


Fig. 12D

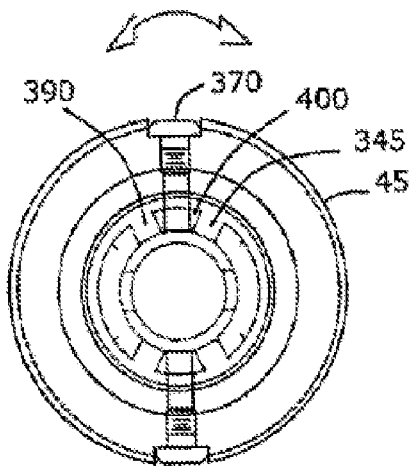


Fig. 12A

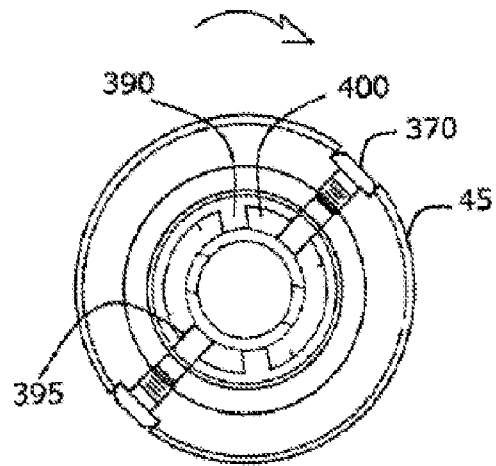


Fig. 12C

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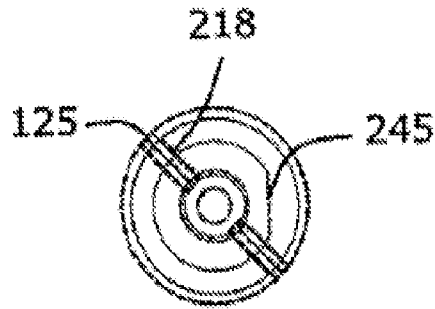


Fig. 12F

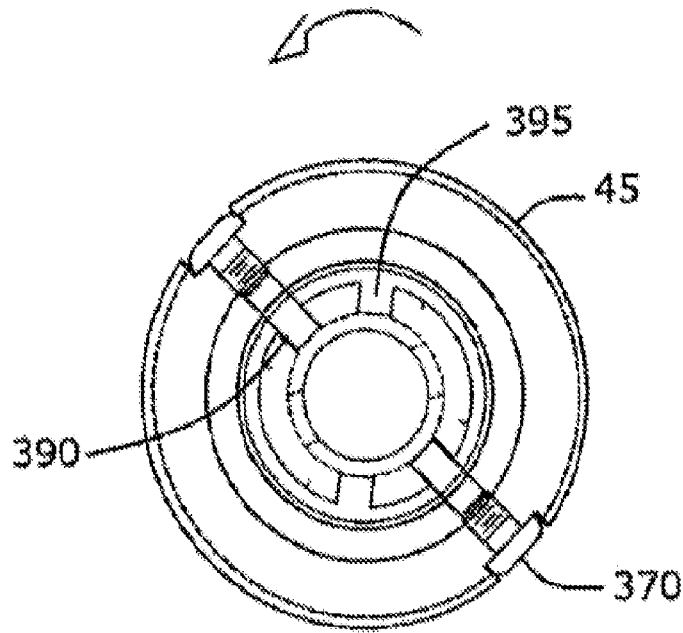


Fig. 12E

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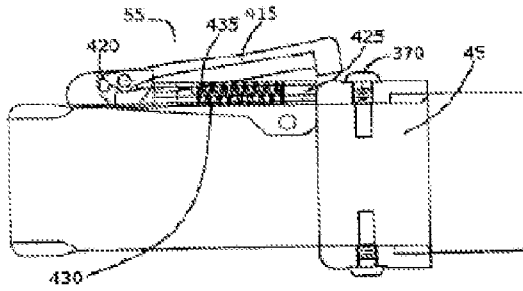


Fig. 13A

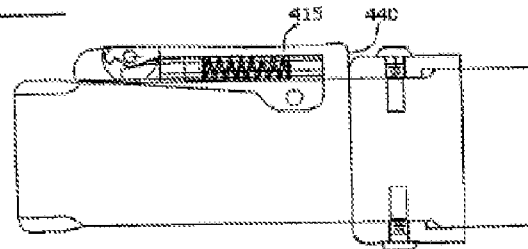


Fig. 13C

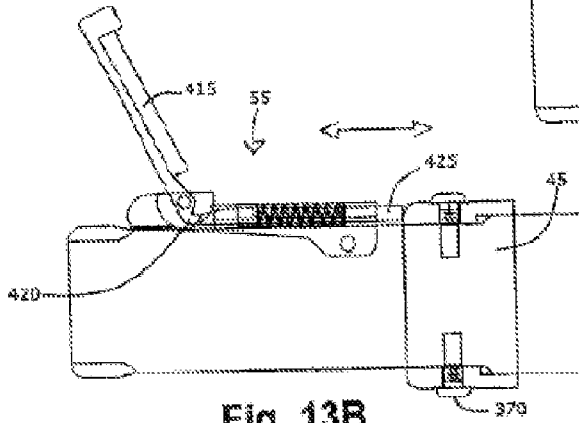


Fig. 13B

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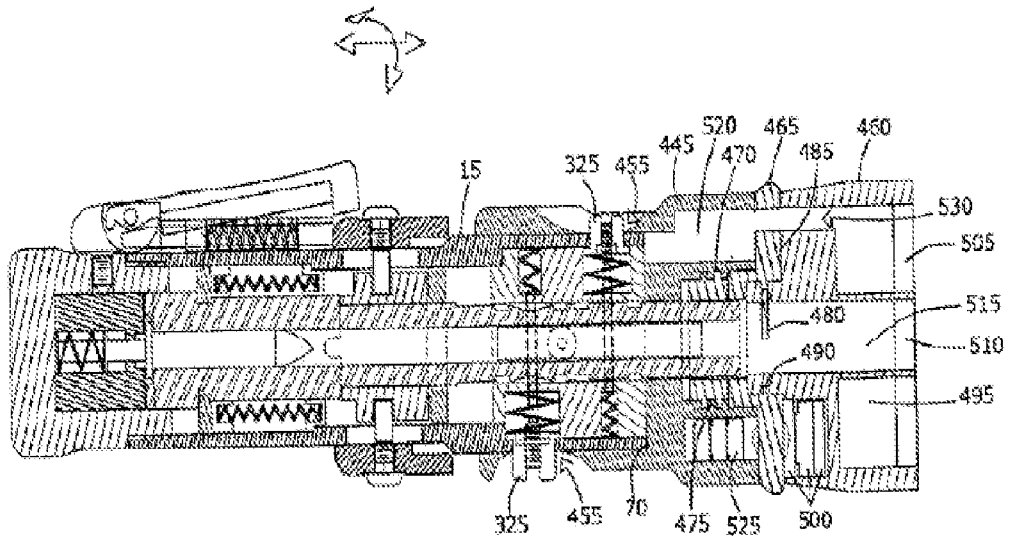


Fig. 14

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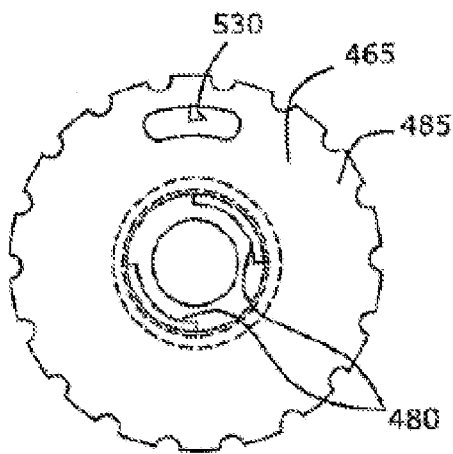


Fig. 15B

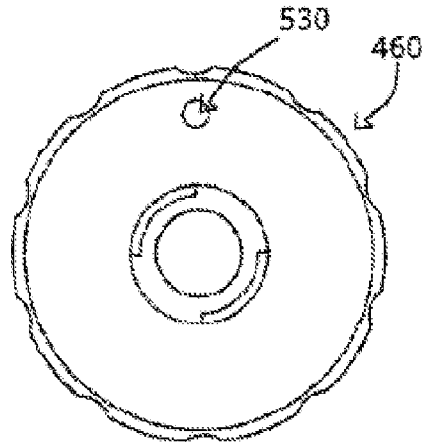


Fig. 15D

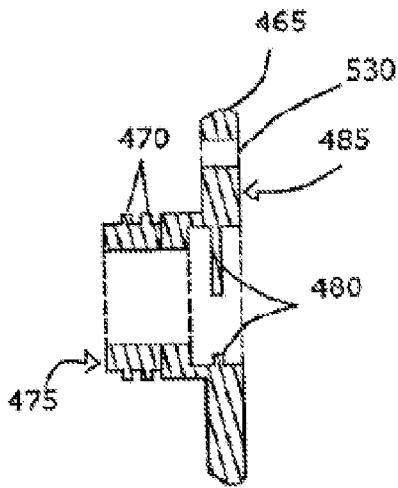


Fig. 15A

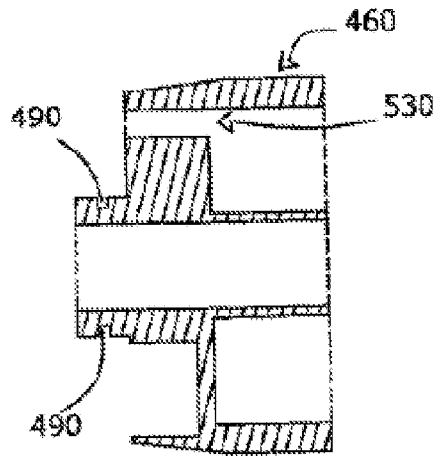


Fig. 15C

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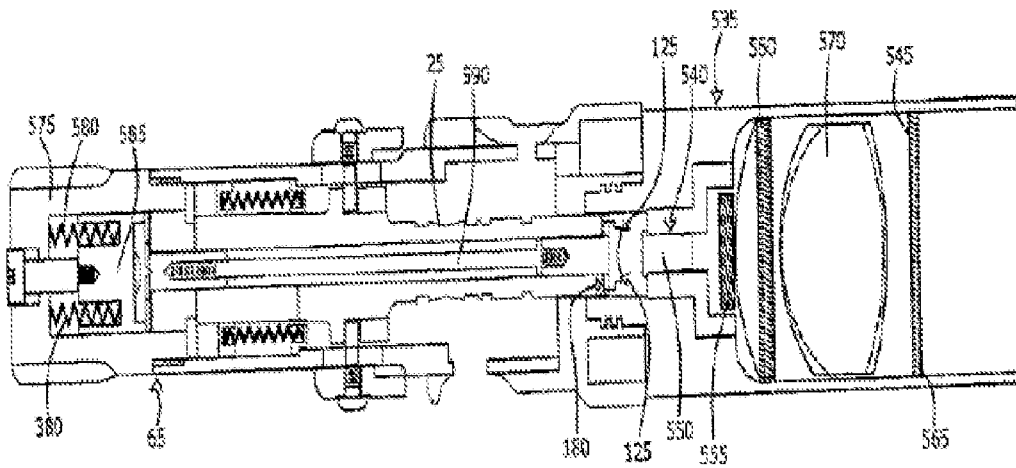


Fig. 16

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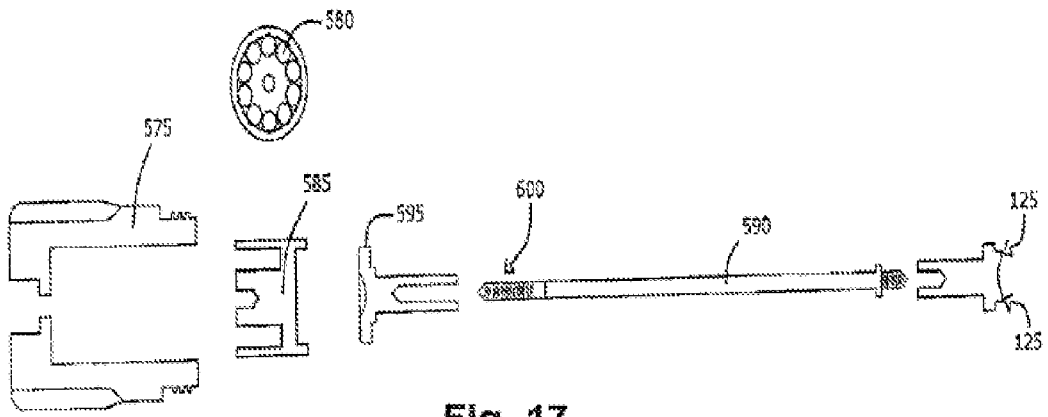


Fig. 17

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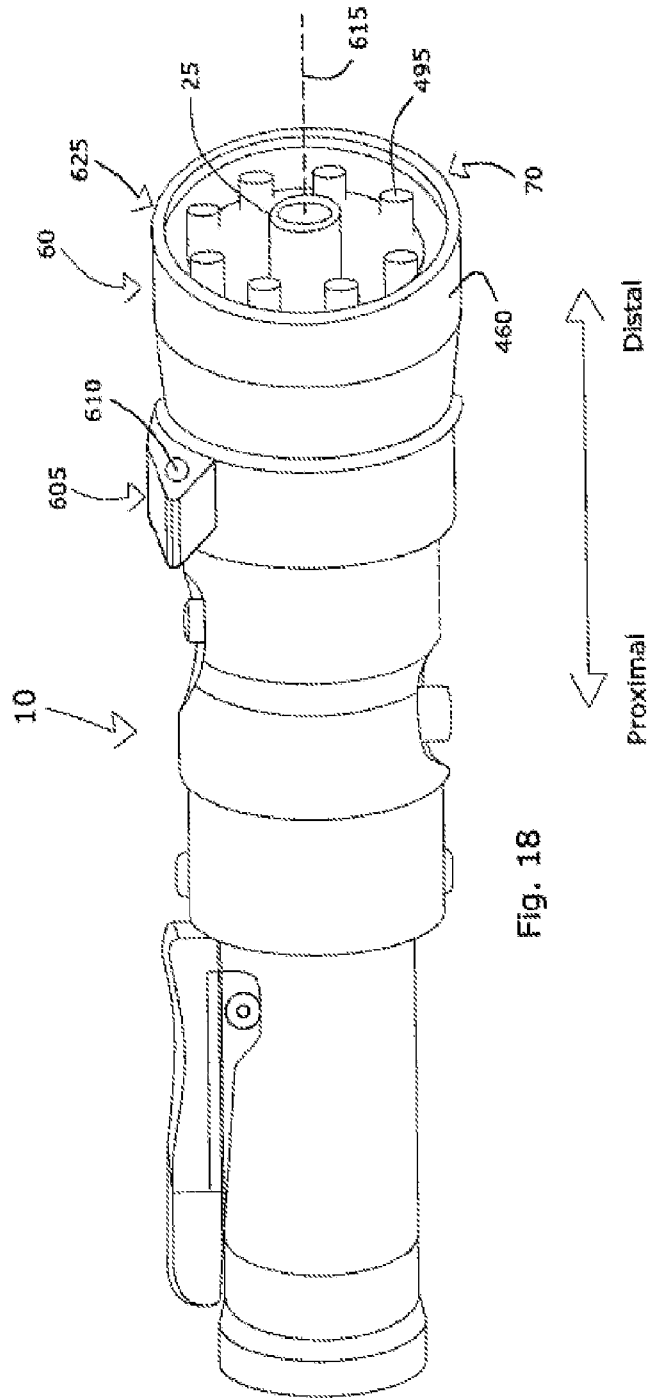


Fig. 18

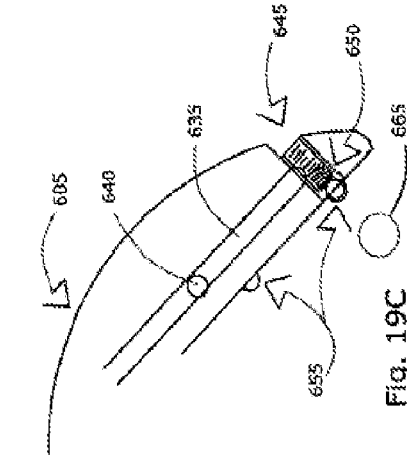


Fig. 19C

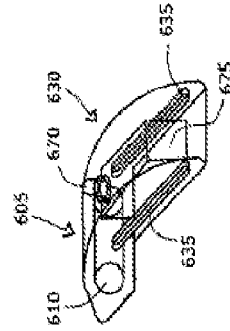


Fig. 21

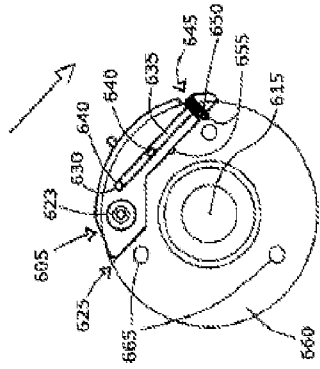


Fig. 19B

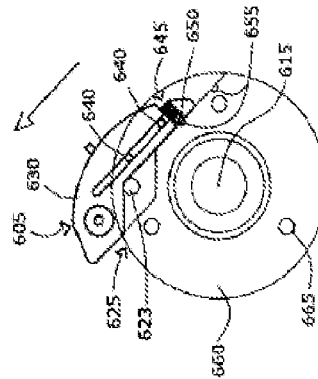


Fig. 20B

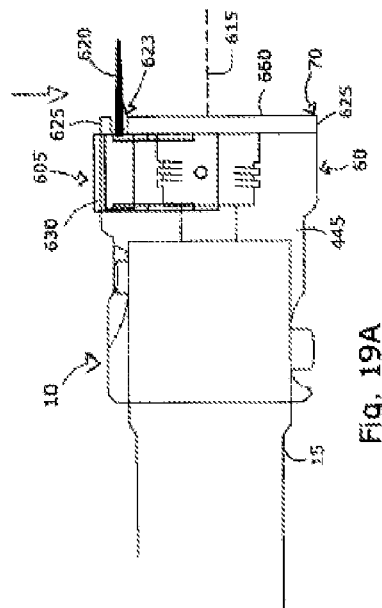


Fig. 19A

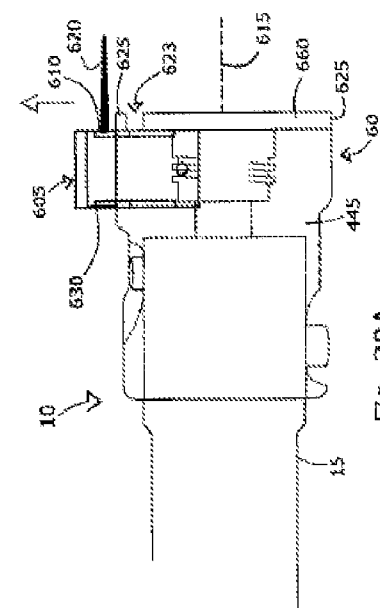


Fig. 20A

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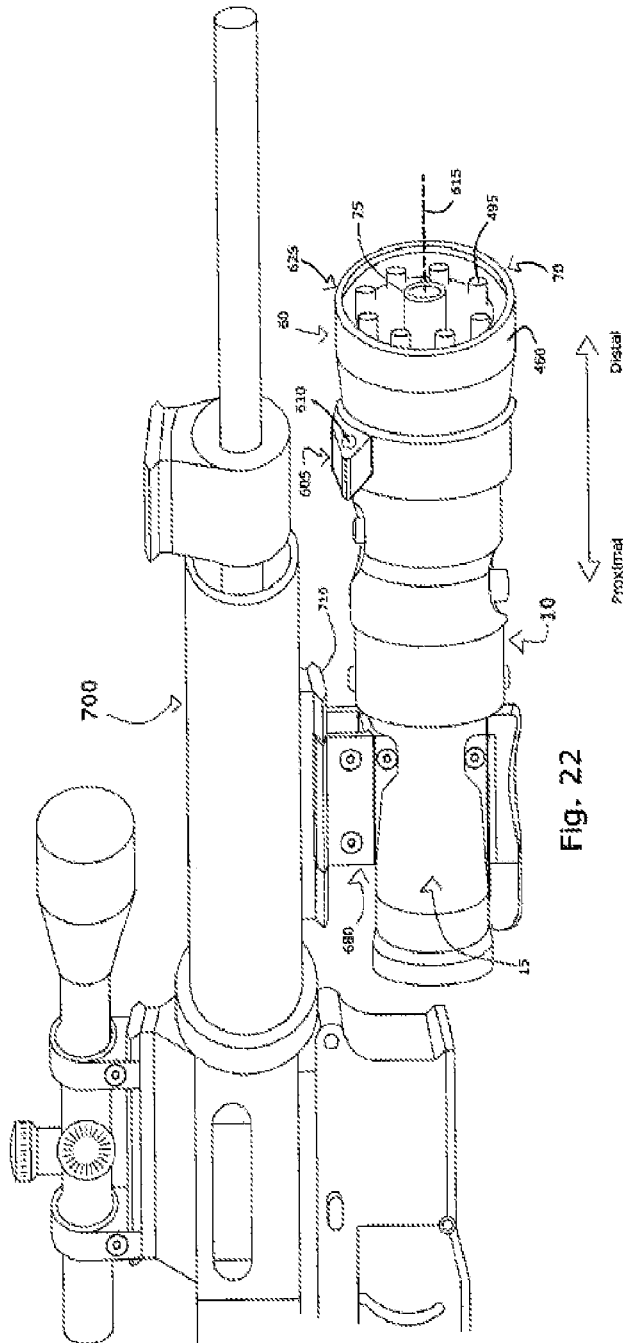


Fig. 22

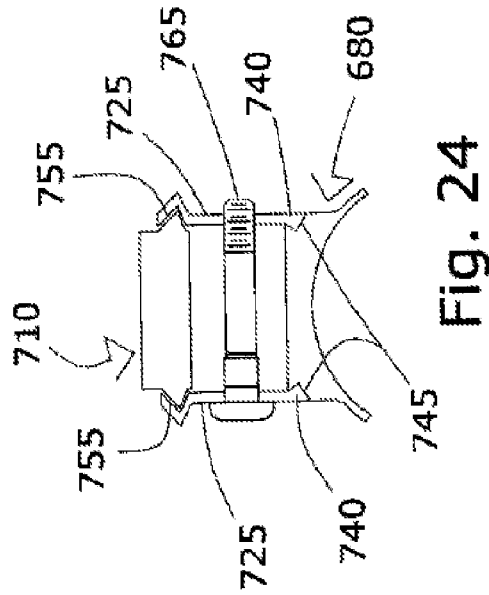


Fig. 24

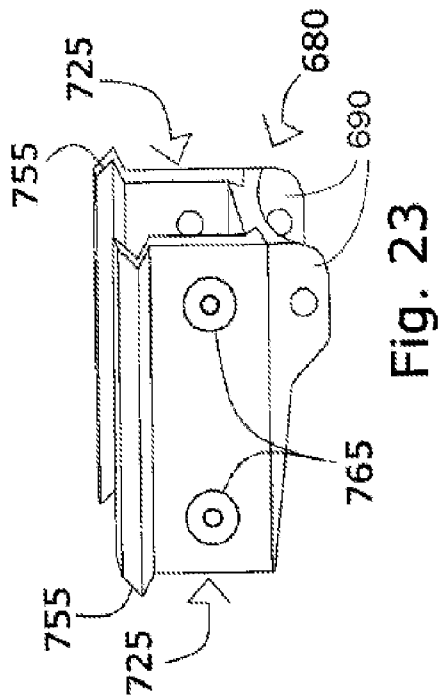


Fig. 23

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/067451**A. CLASSIFICATION OF SUBJECT MATTER****F41G 1/387(2006.01)i, F41G 1/34(2006.01)1**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F41G 1/387; F41G 3/06; F41G 11/00; F41C 27/06; F41A 3/40; F41G 1/34; F41A 21/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: firearm, gun, barrel, firing, catch, flashlight, laser, projectile, clamp, cavity, magazine and cartridge

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2006-0027091 A1 (RATTI, ANDRES) 09 February 2006 See abstract; paragraphs 52-60 and figures 1-2,8.	1-6,9-16,19 7-8,17-18,20 21-41
X Y	US 3938262 A (DYE et al.) 17 February 1976 See abstract; column 3, lines 24-68 and figures 1-3.	21-41 7-8,20
Y	US 4533980 A (HAYES, LAWRENCE S.) 06 August 1985 See abstract; column 5, lines 17-59 and figures 1-5.	17-18
A	W0 2009-057175 A1 (FREDDARA, FABIO) 07 May 2009 See abstract; page 4, line 19-23 and figures 1-3.	1-41
A	US 6295751 A1 (PIWONSKI, CHARLES J.) 02 October 2001 See abstract; column 2, lines 28-64 and figures 1-3.	1-41

 Further documents are listed in the continuation of Box C. See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

24 April 2013 (24.04.2013)

Date of mailing of the international search report

25 April 2013 (25.04.2013)

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/067451

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006-002709 1 A1	09 .02 .2006	US 723 1864 B2	19 .06 .2007
US 03938262 A	17 .02 .1976	None	
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