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(54) **SYSTEM AND METHOD FOR ZEROING A WEAPON**

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(57) **ABSTRACT**

A method of zeroing a weapon includes stabilizing a laser mounted weapon, aligning a laser corresponding to the bore path of the weapon to a second aim point and aligning the sights of the weapon to a first aim point.

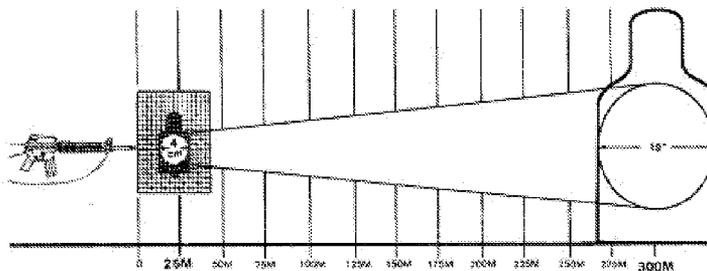
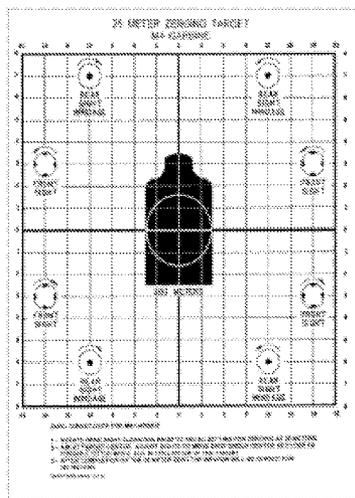


FIG. 1

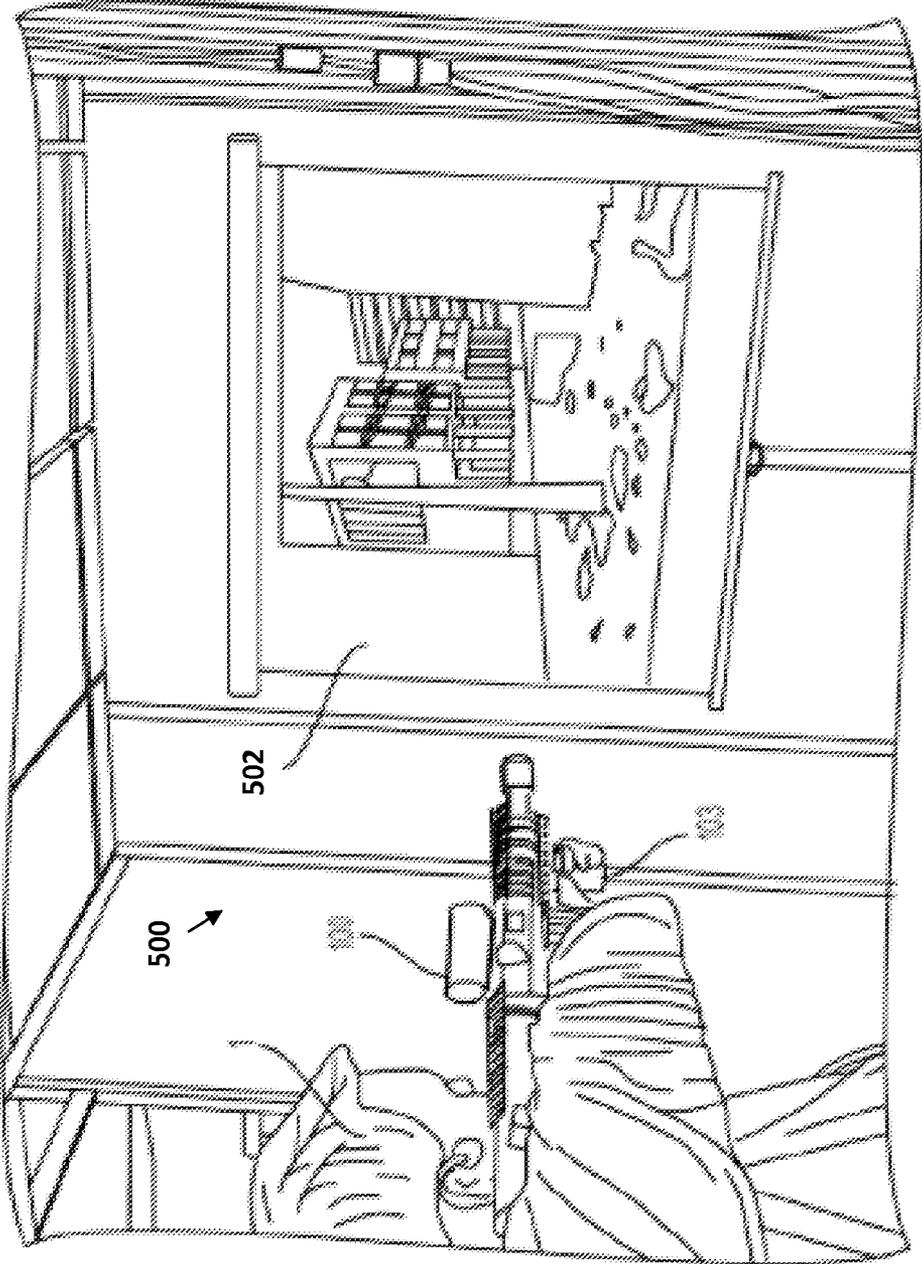
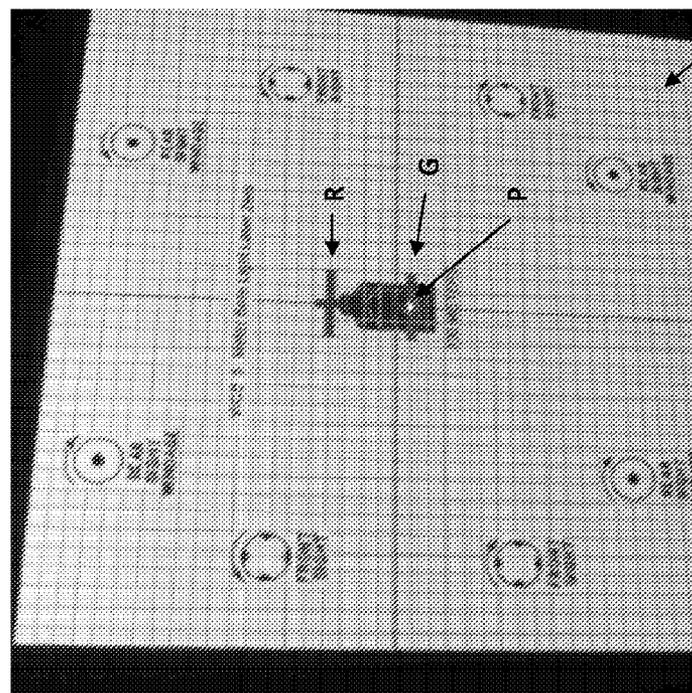


FIG. 2

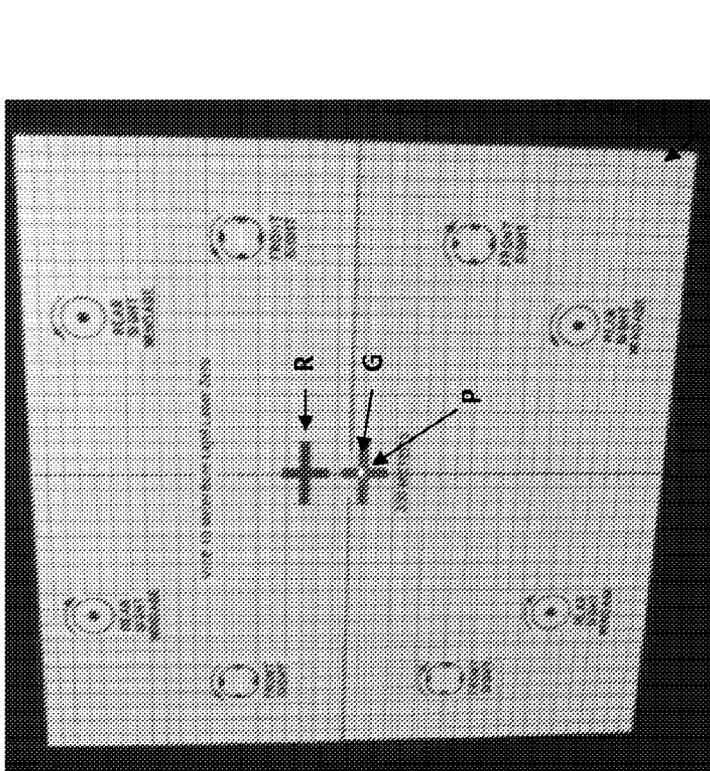


FIG. 3



5 Meter Bore Light Zero

(A)



10 Meter Bore Light Zero

(B)

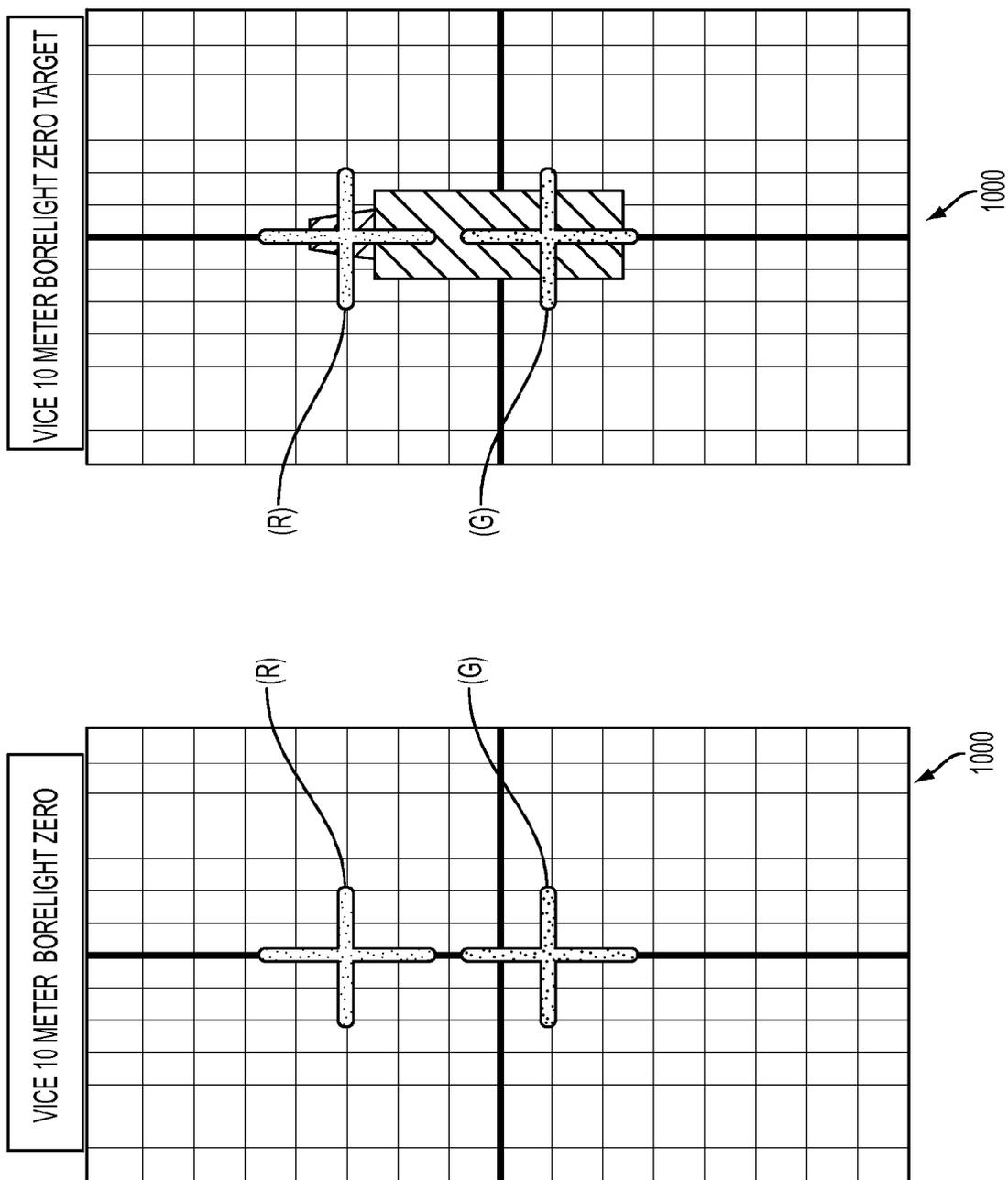


FIG. 4

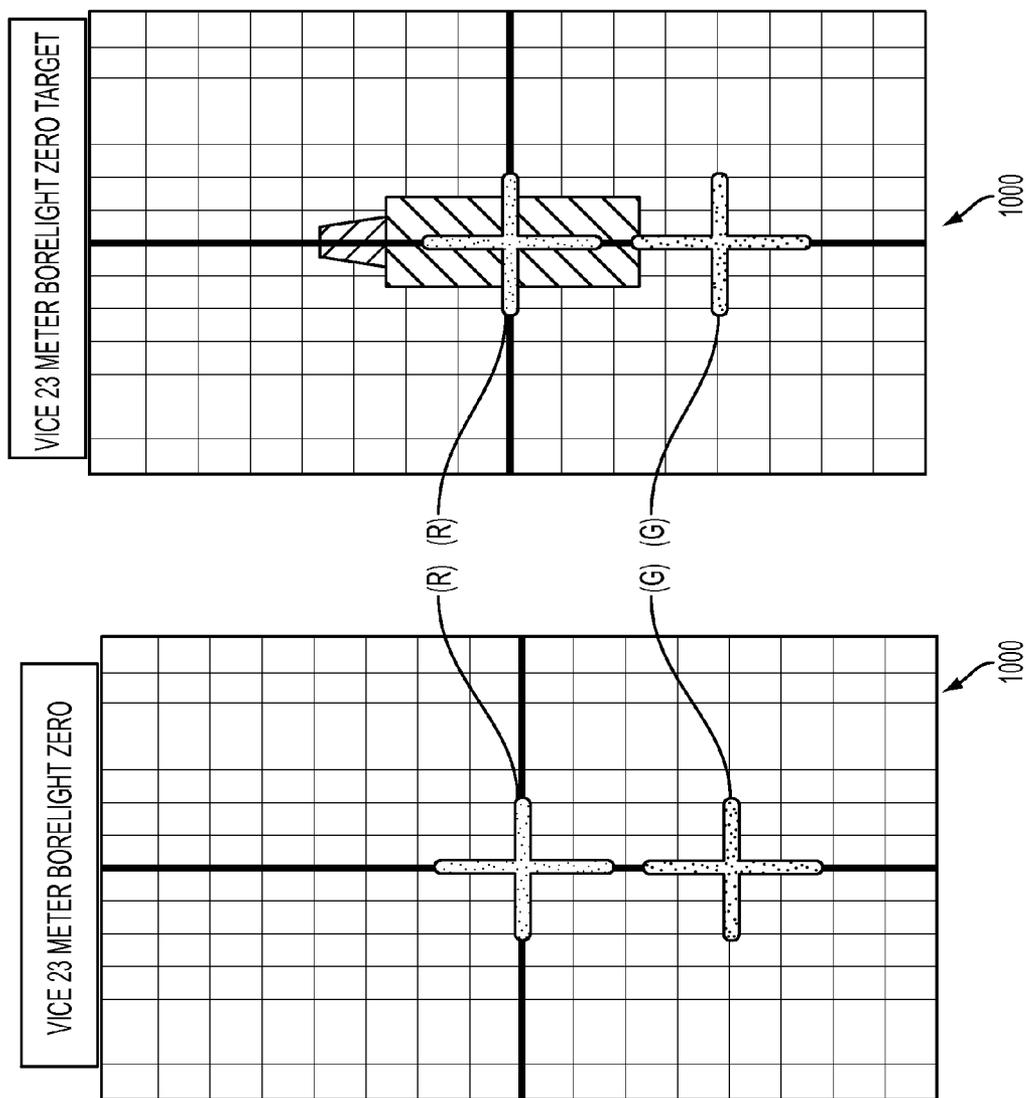
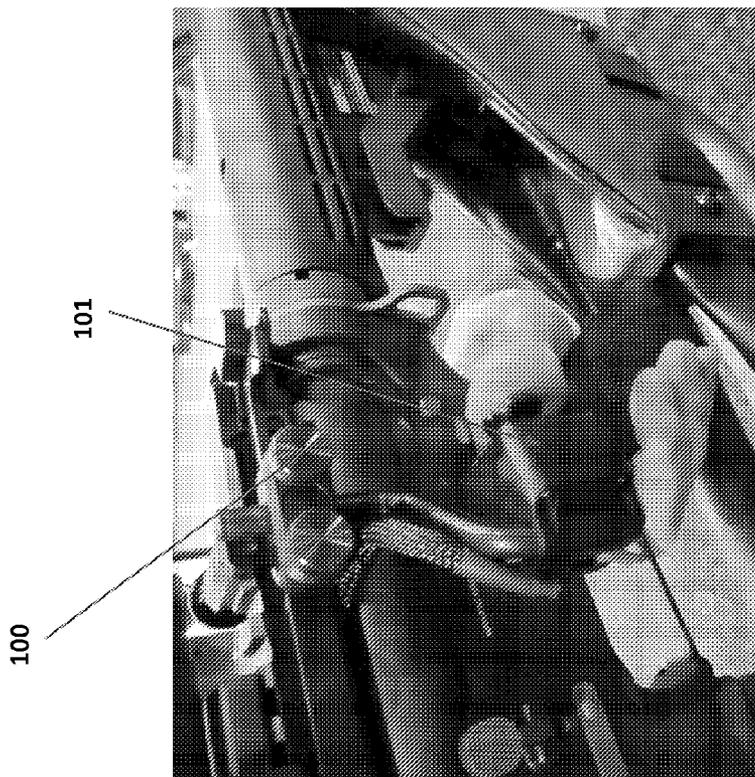
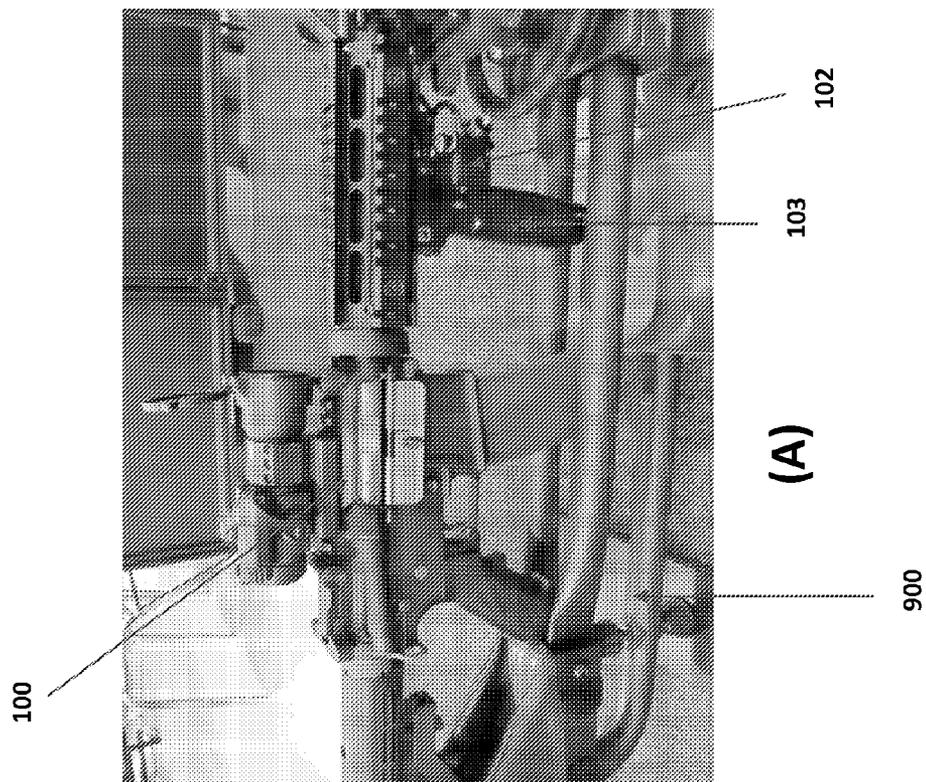


FIG. 5

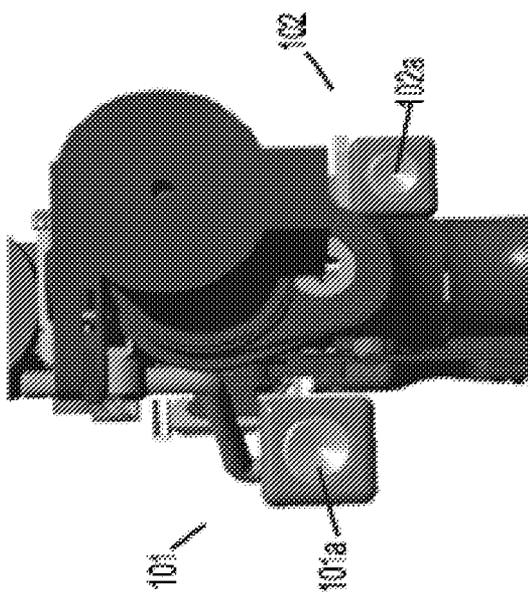
FIG. 7



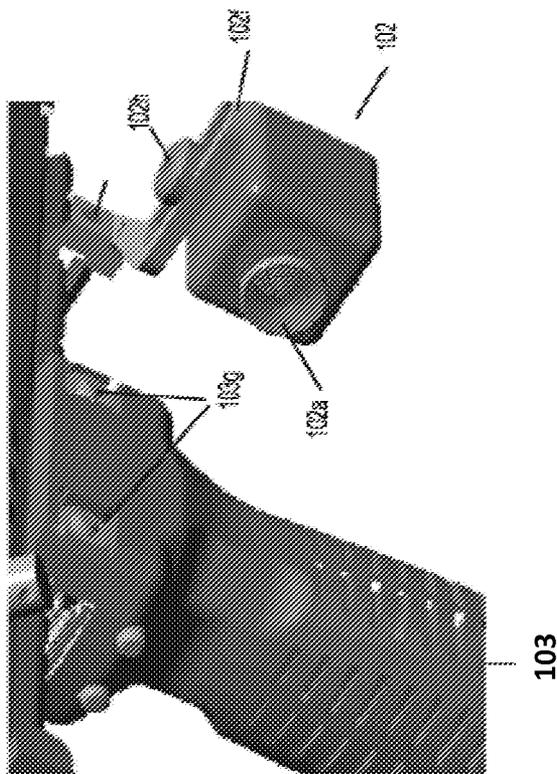
(B)

(A)

FIG. 8

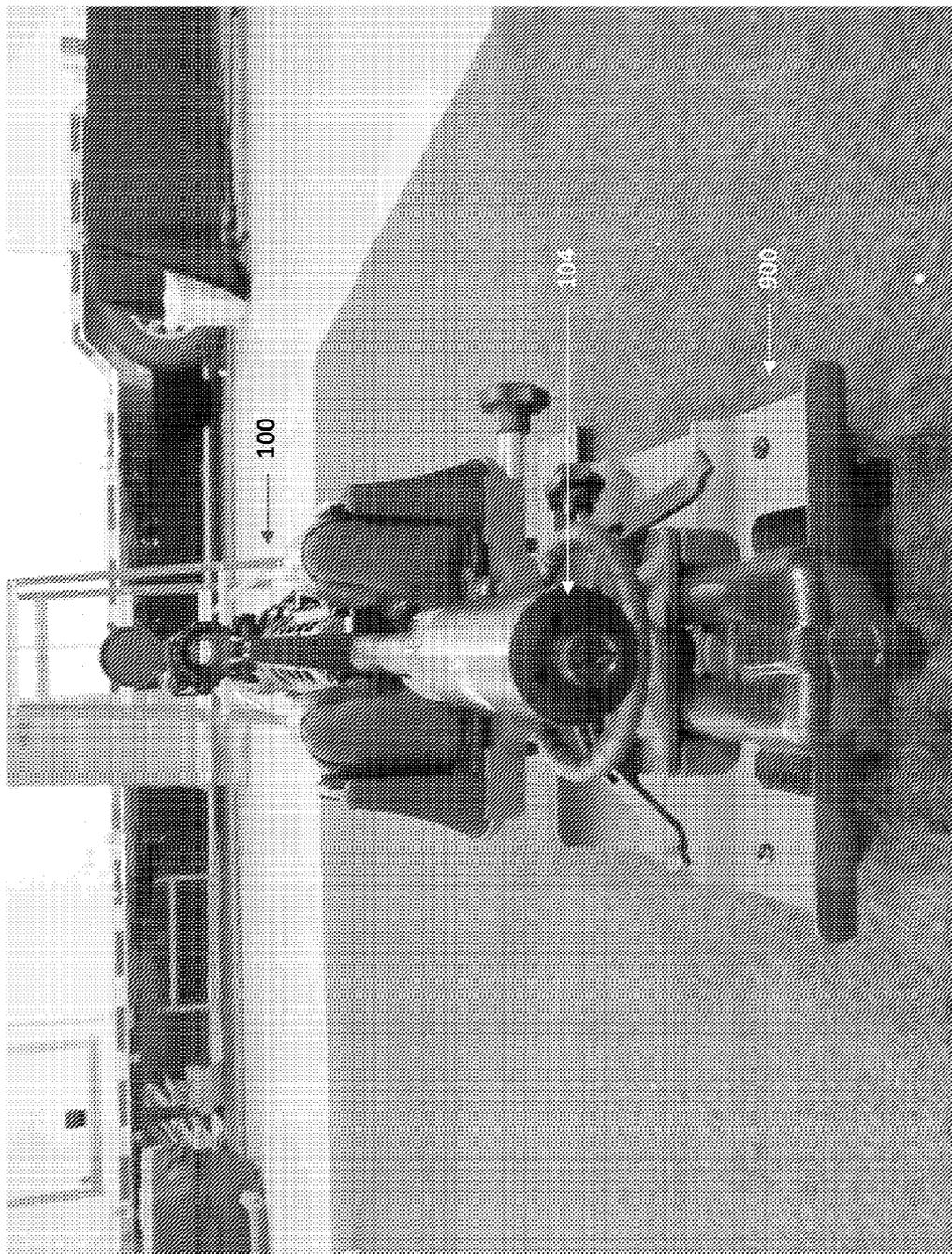


(A)



(B)

FIG. 9



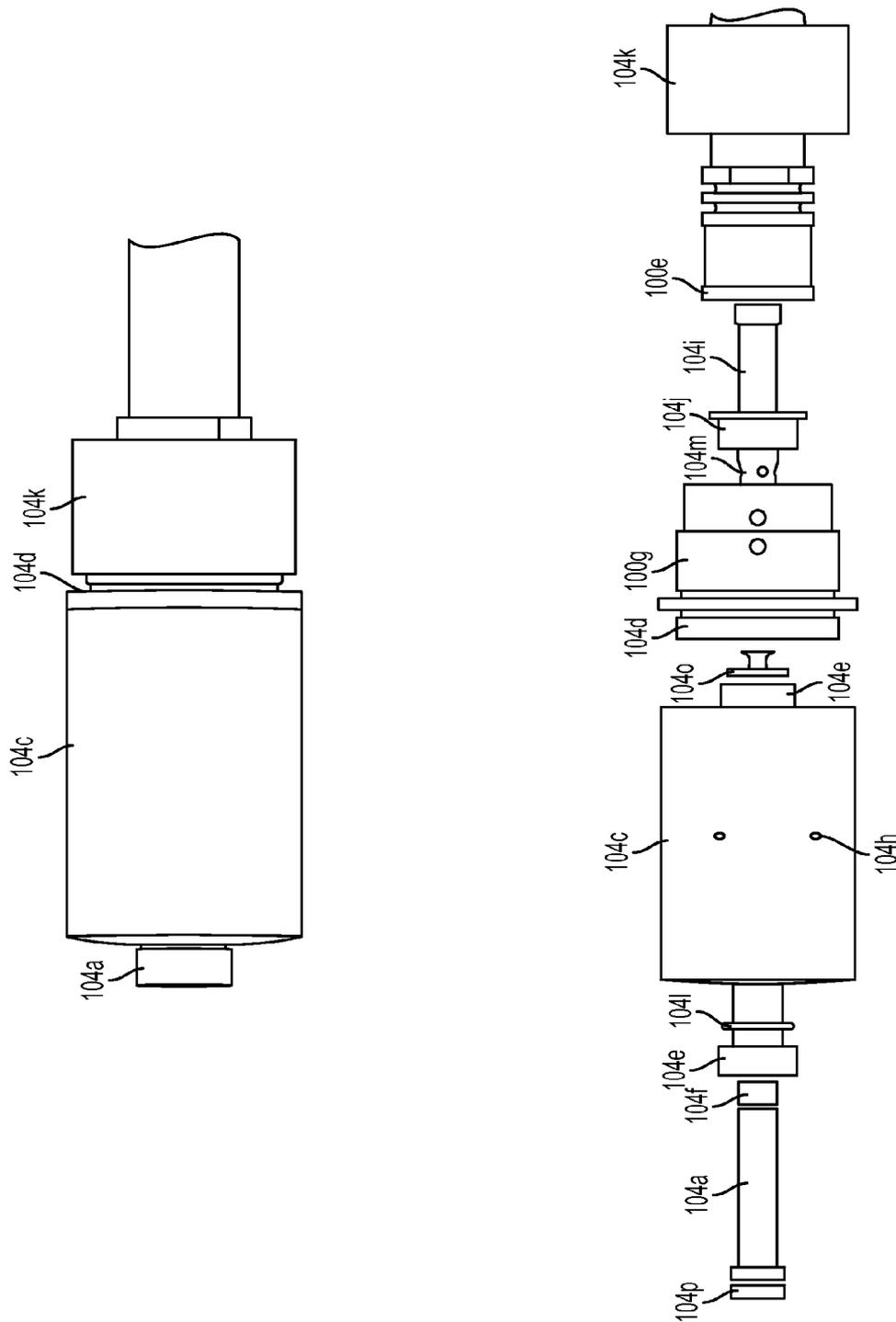


FIG. 10

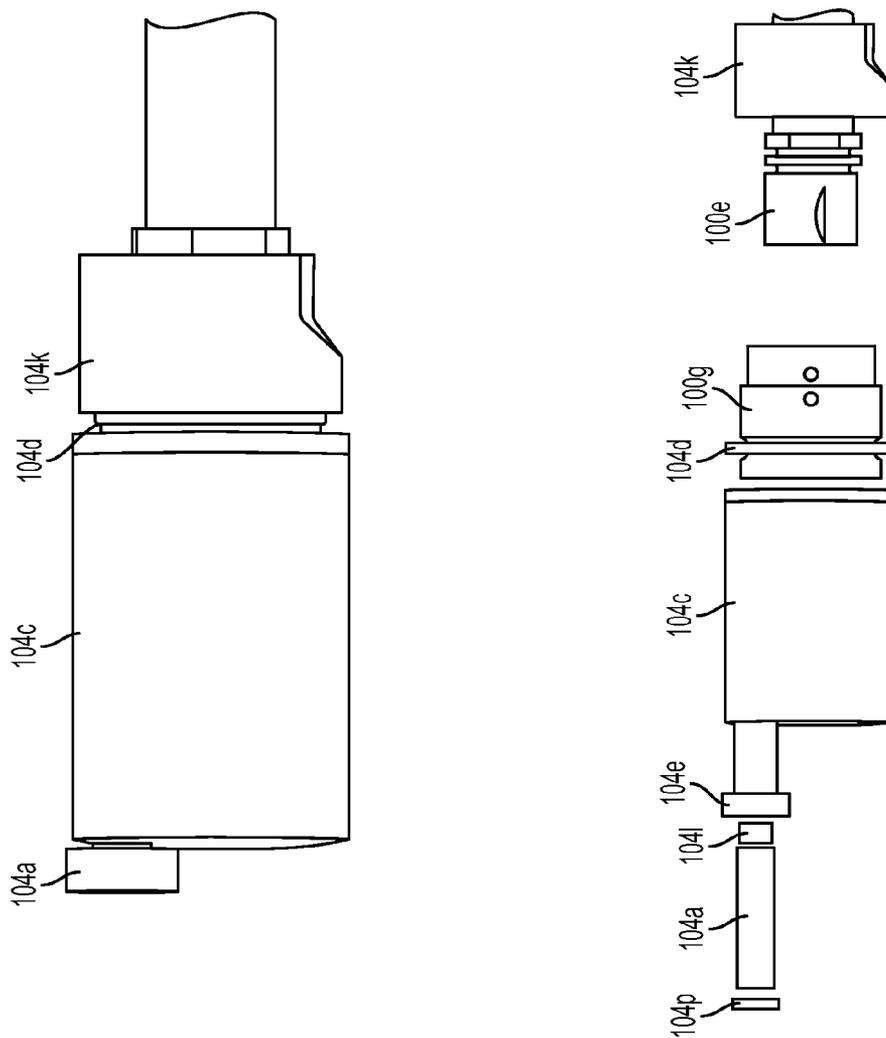


FIG. 11

FIG. 12

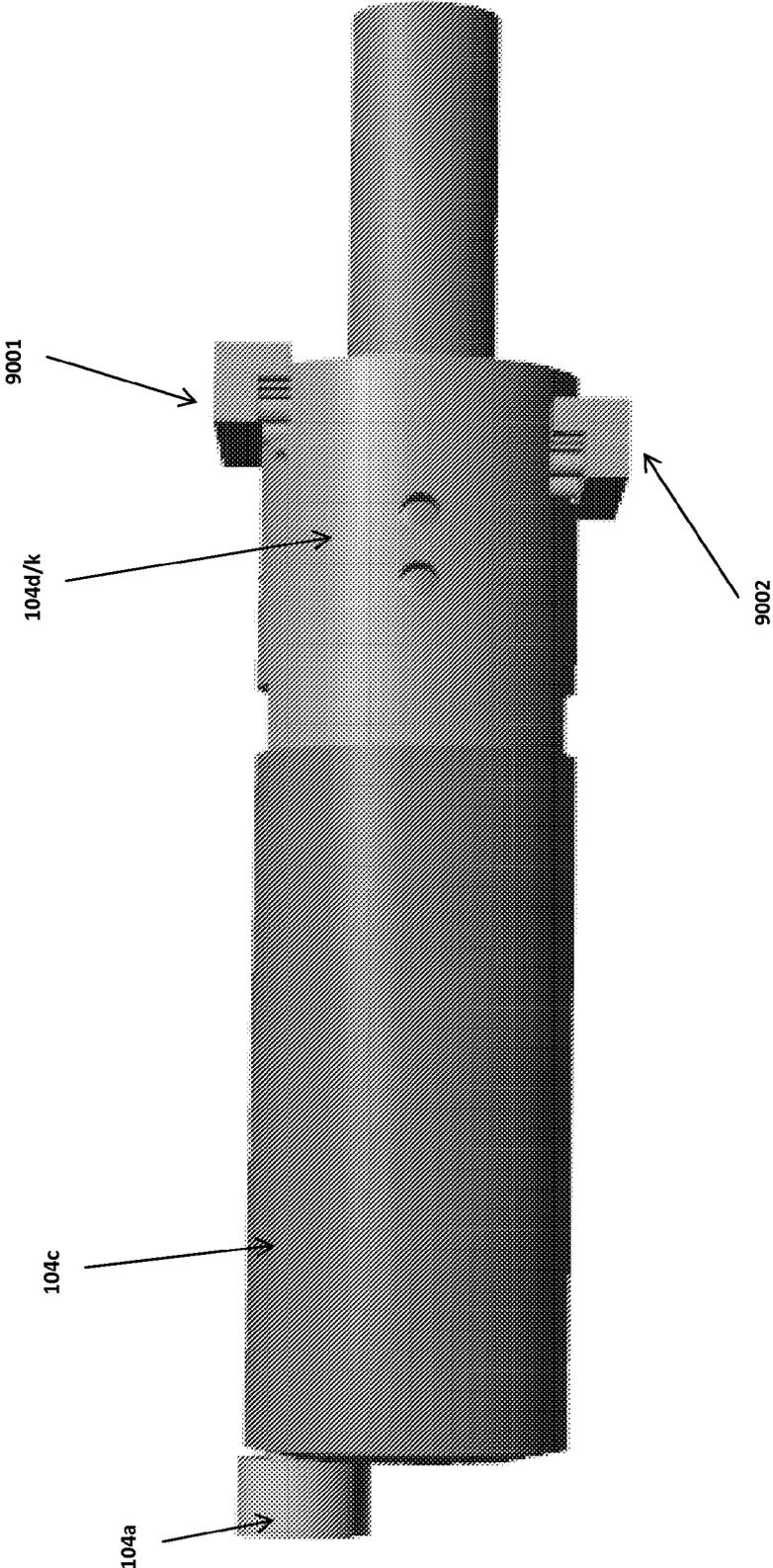


FIG. 13

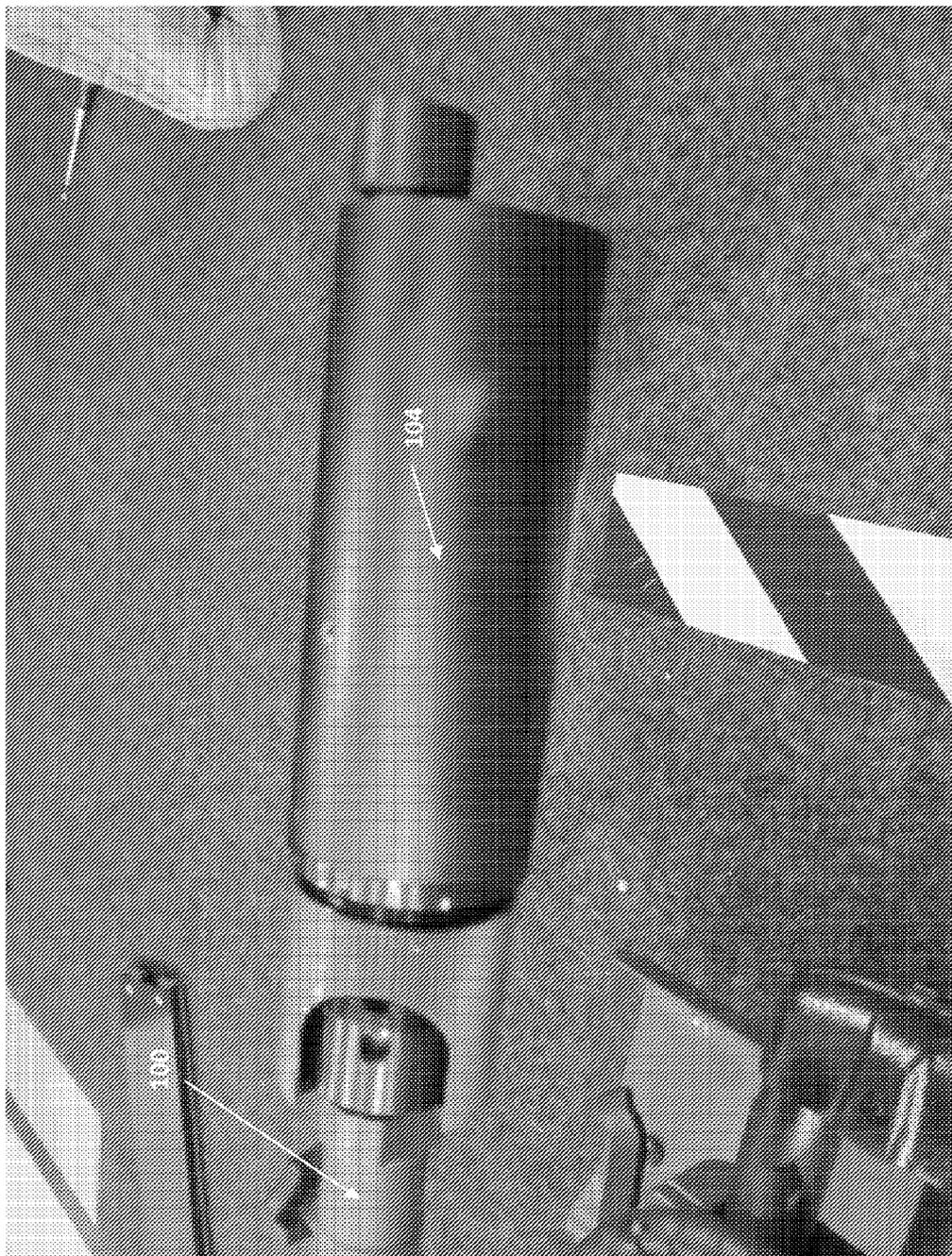


FIG. 14

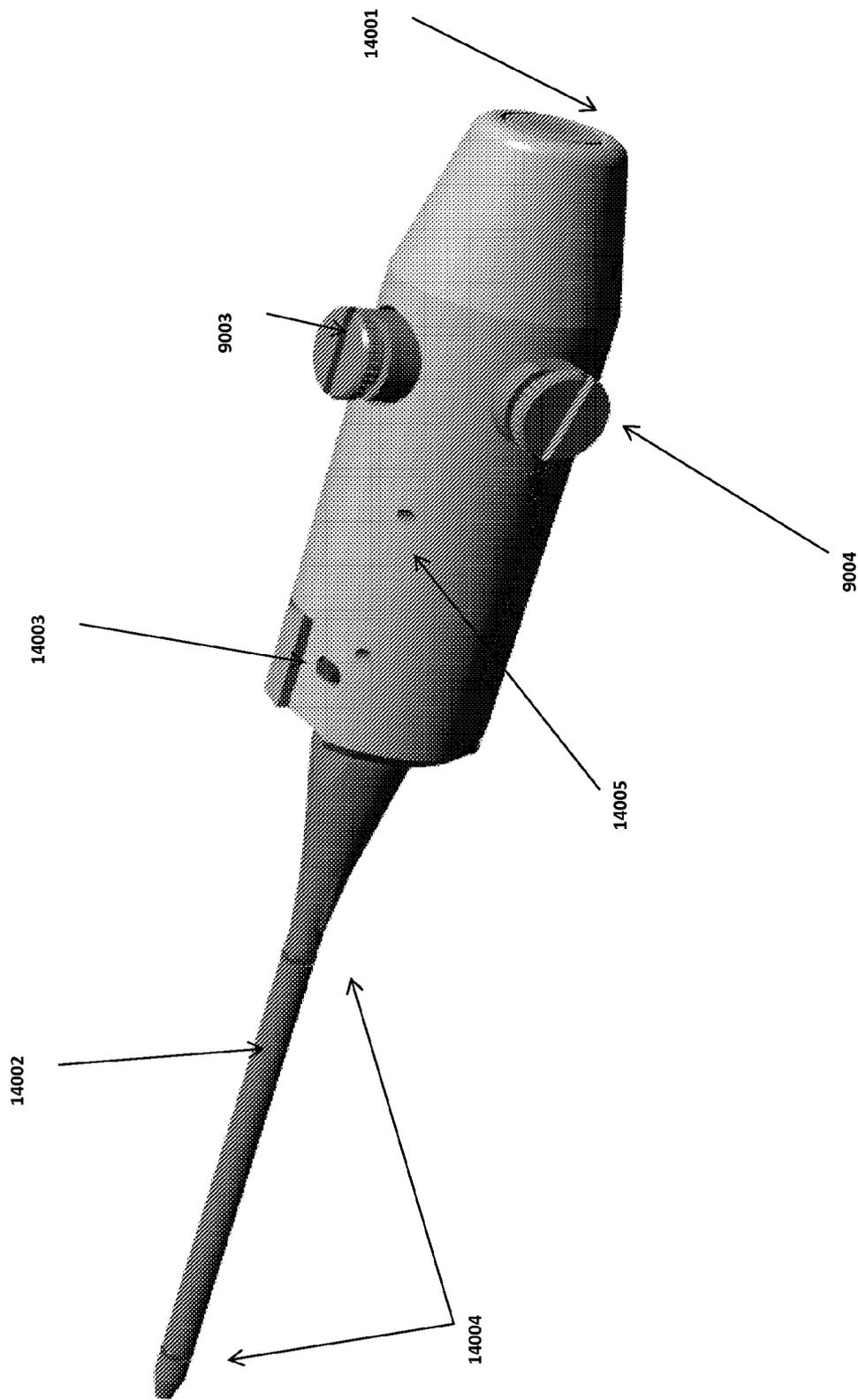


FIG. 15

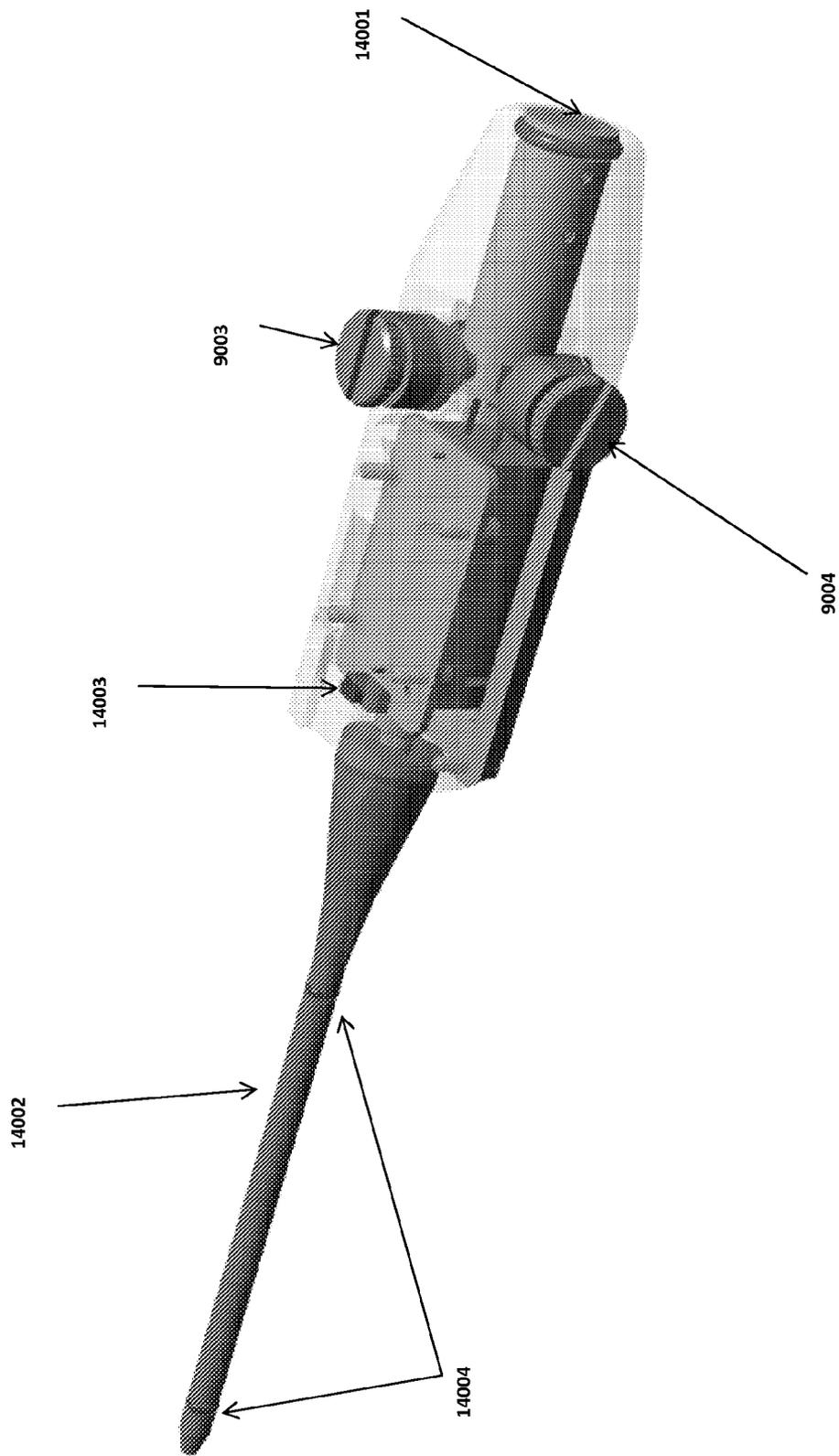


FIG. 16

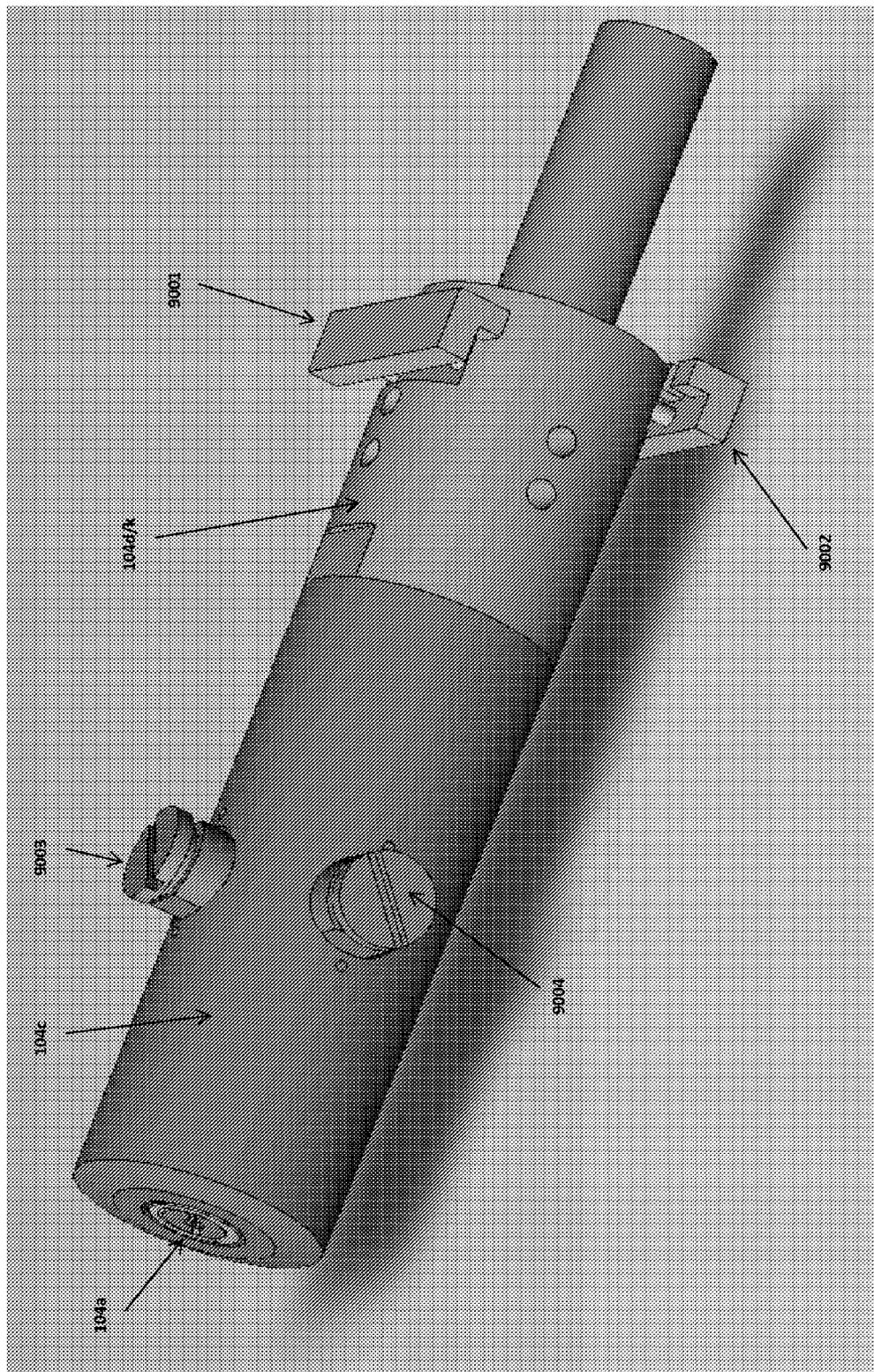


FIG. 17

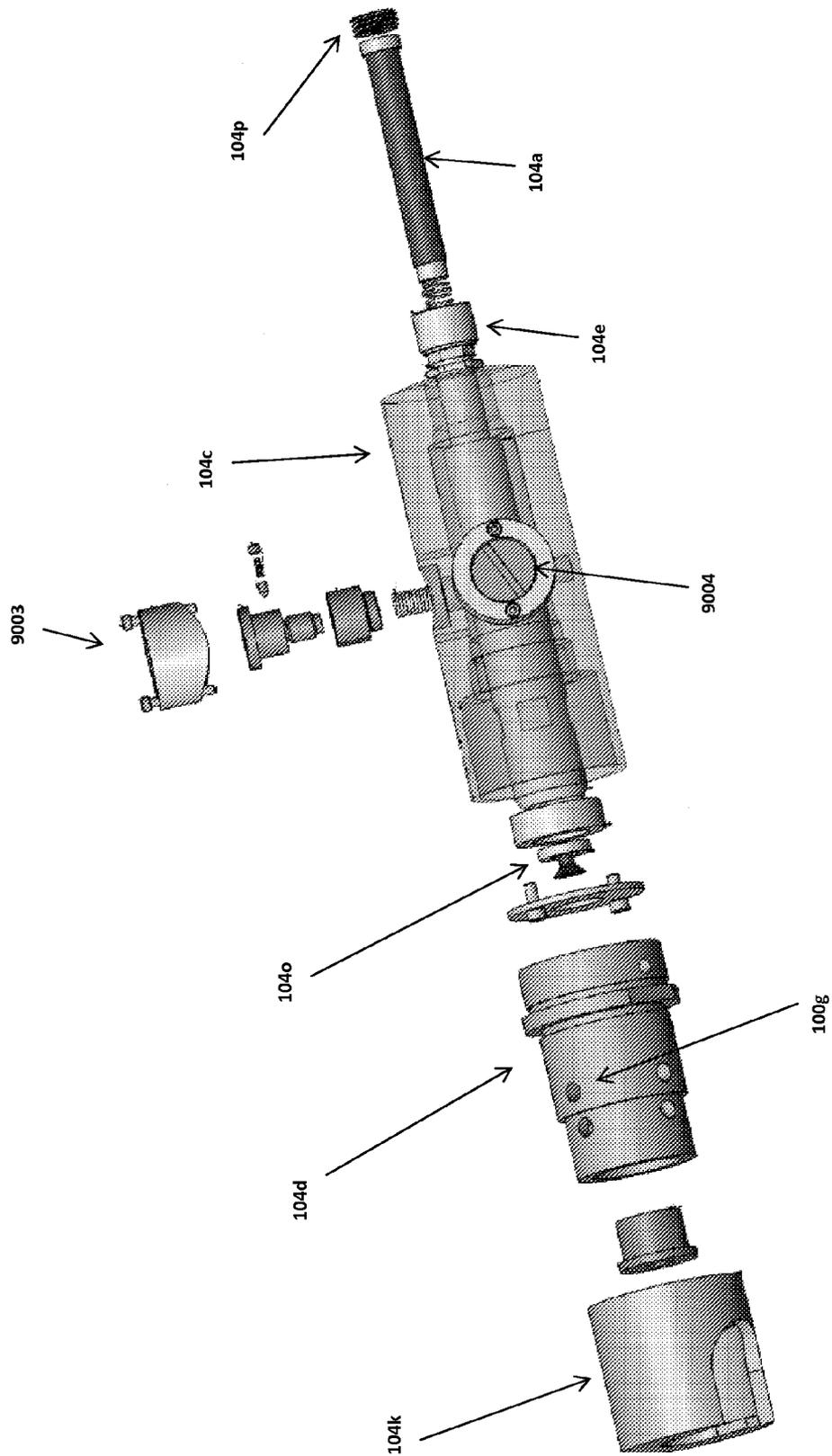


FIG. 18

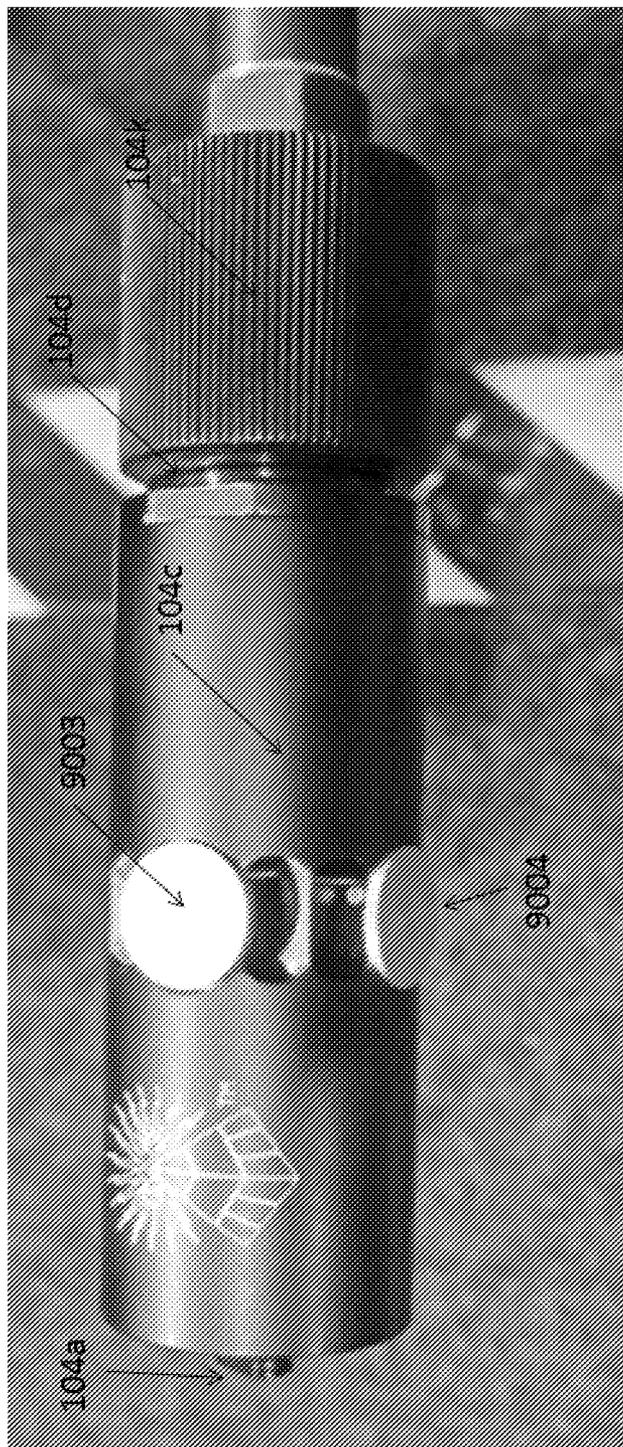


FIG. 19

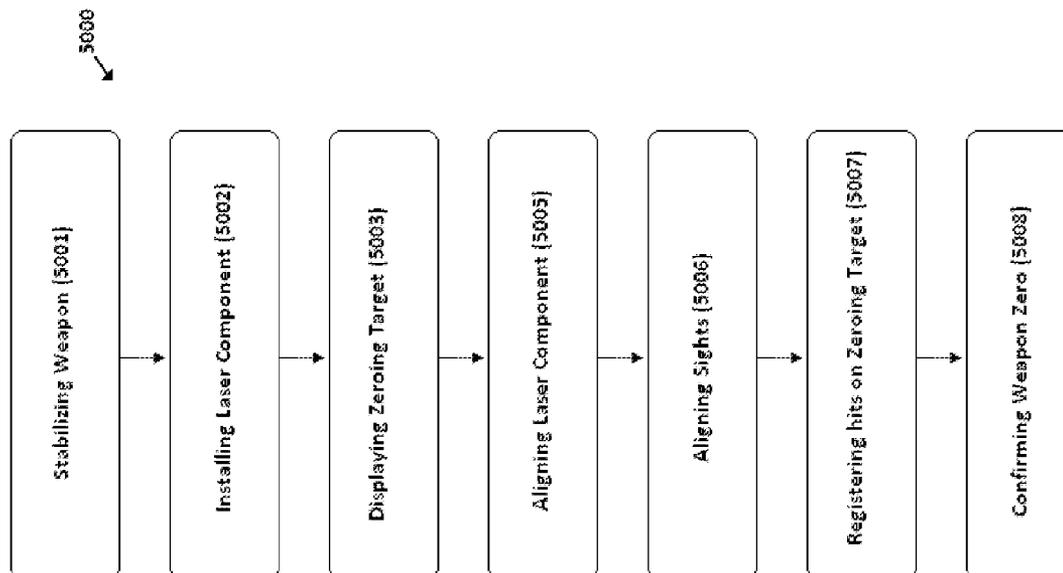
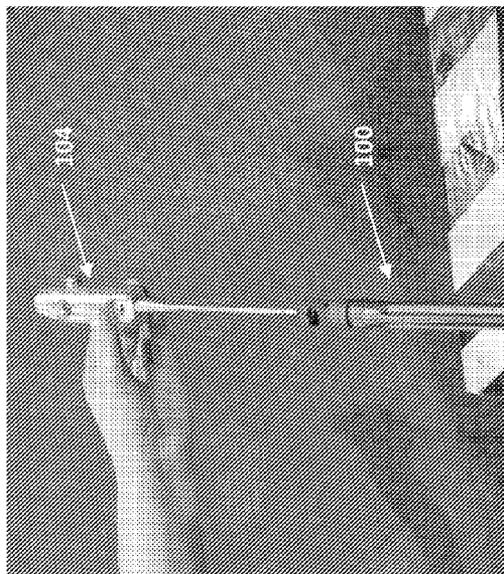
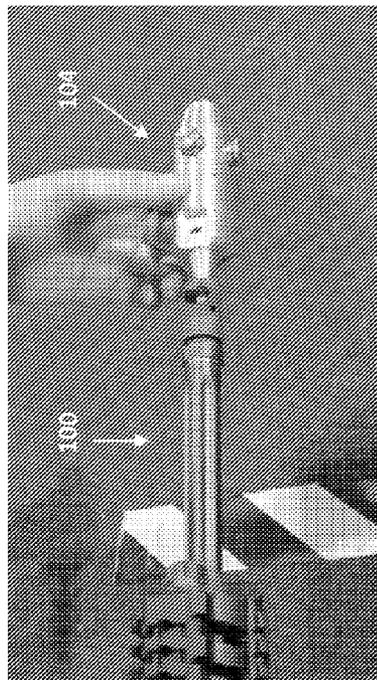


FIG. 20

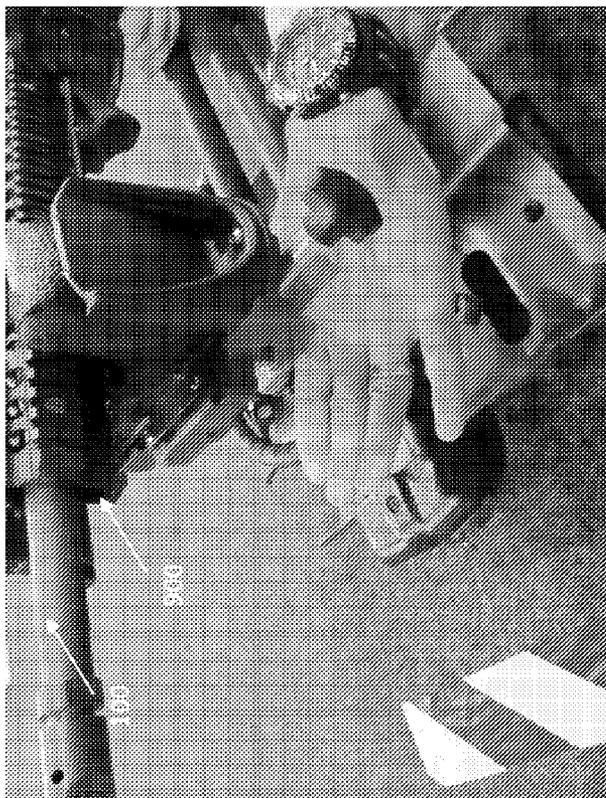


(A)

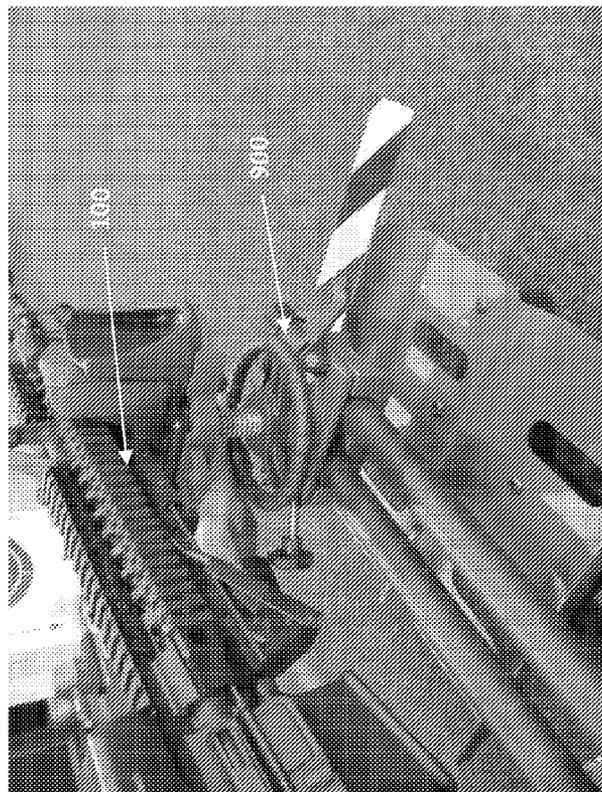


(B)

FIG. 21

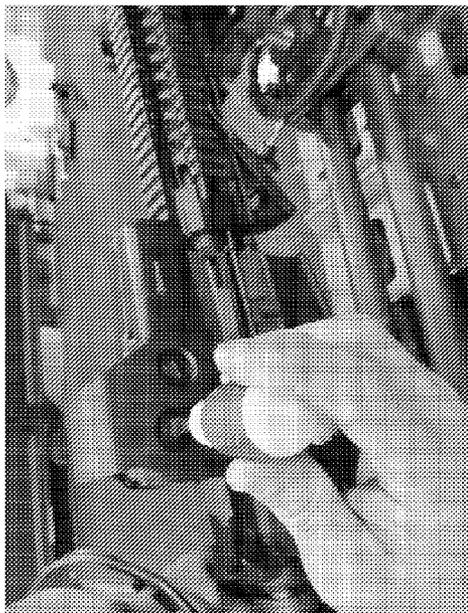


A)

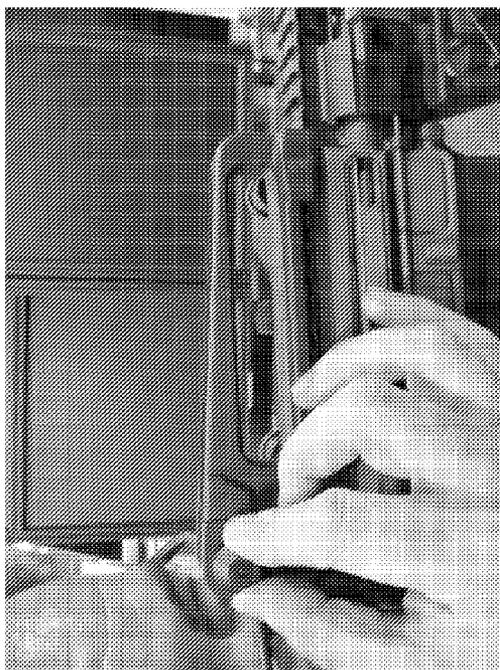


(B)

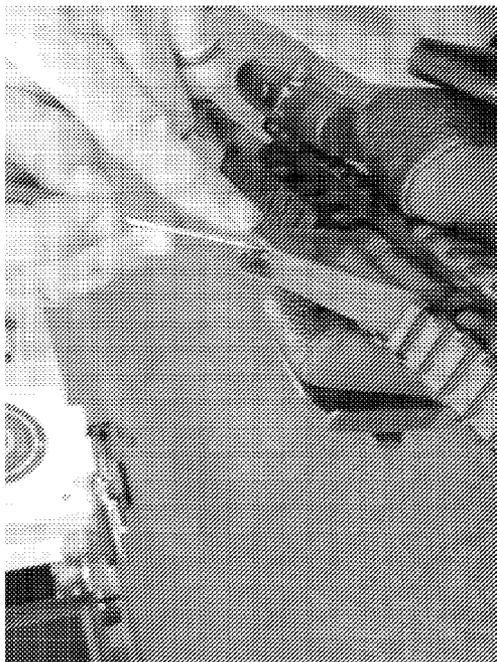
FIG. 22



(a)

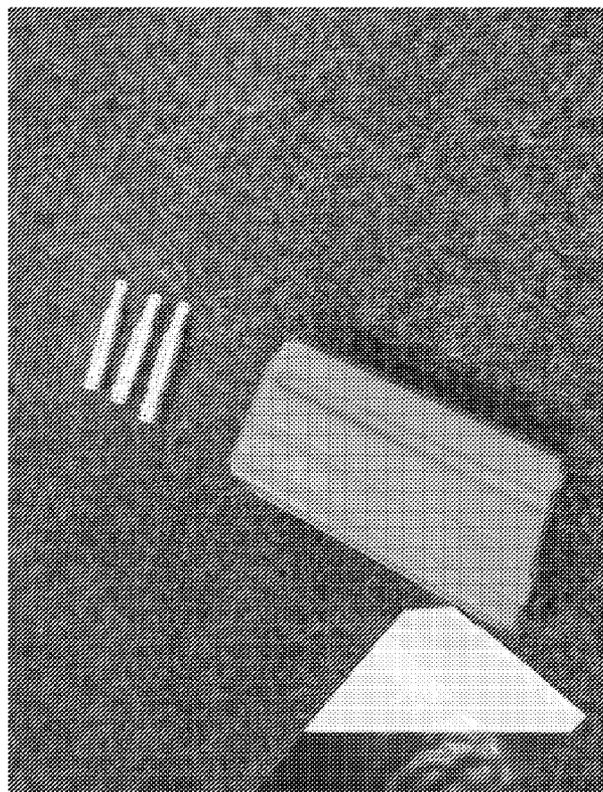


(B)

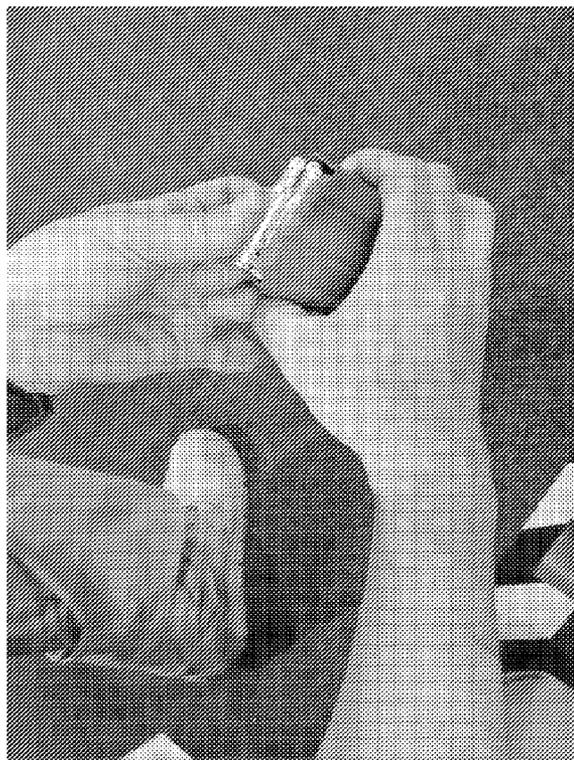


(C)

FIG. 23



(A)



(B)

FIG. 24

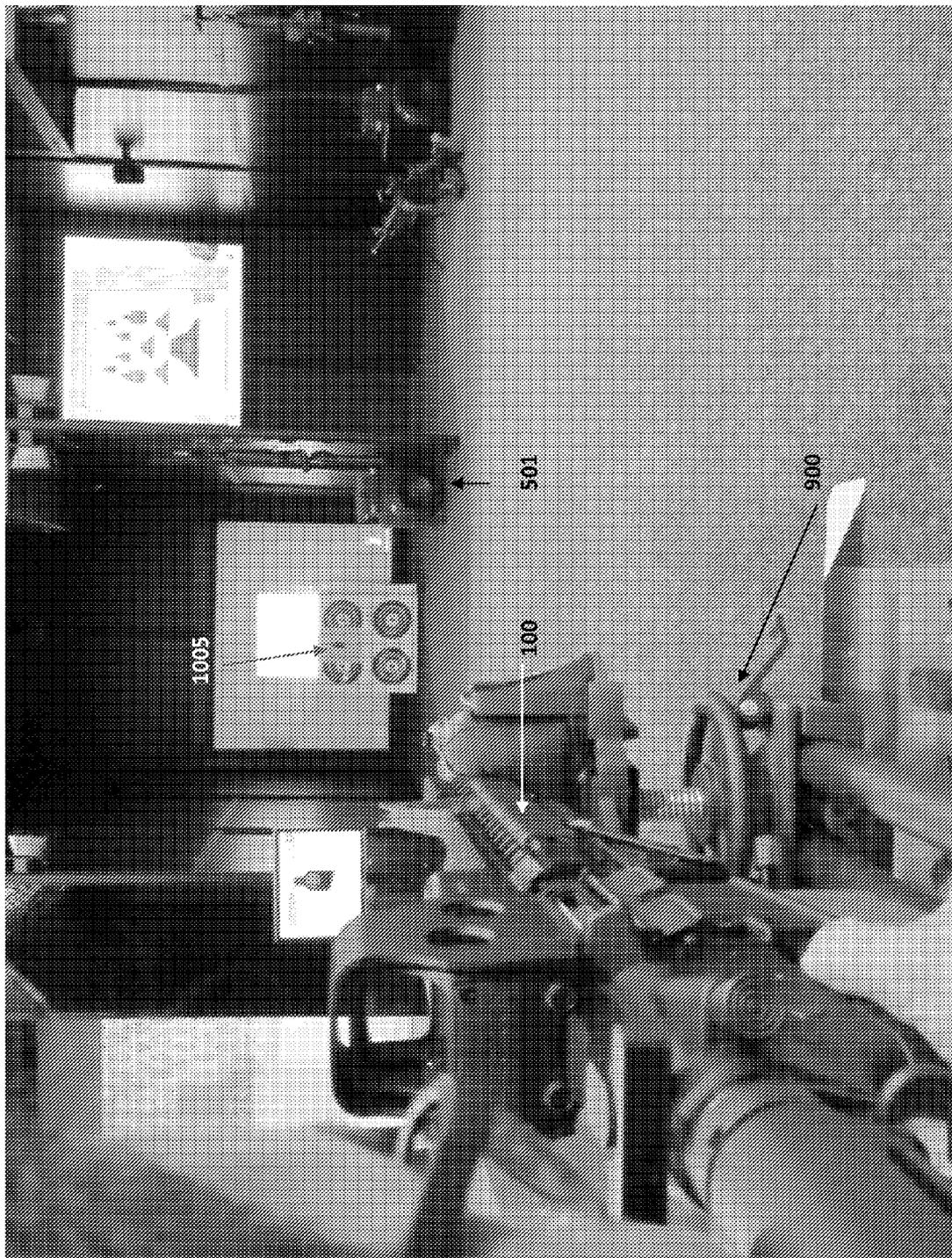
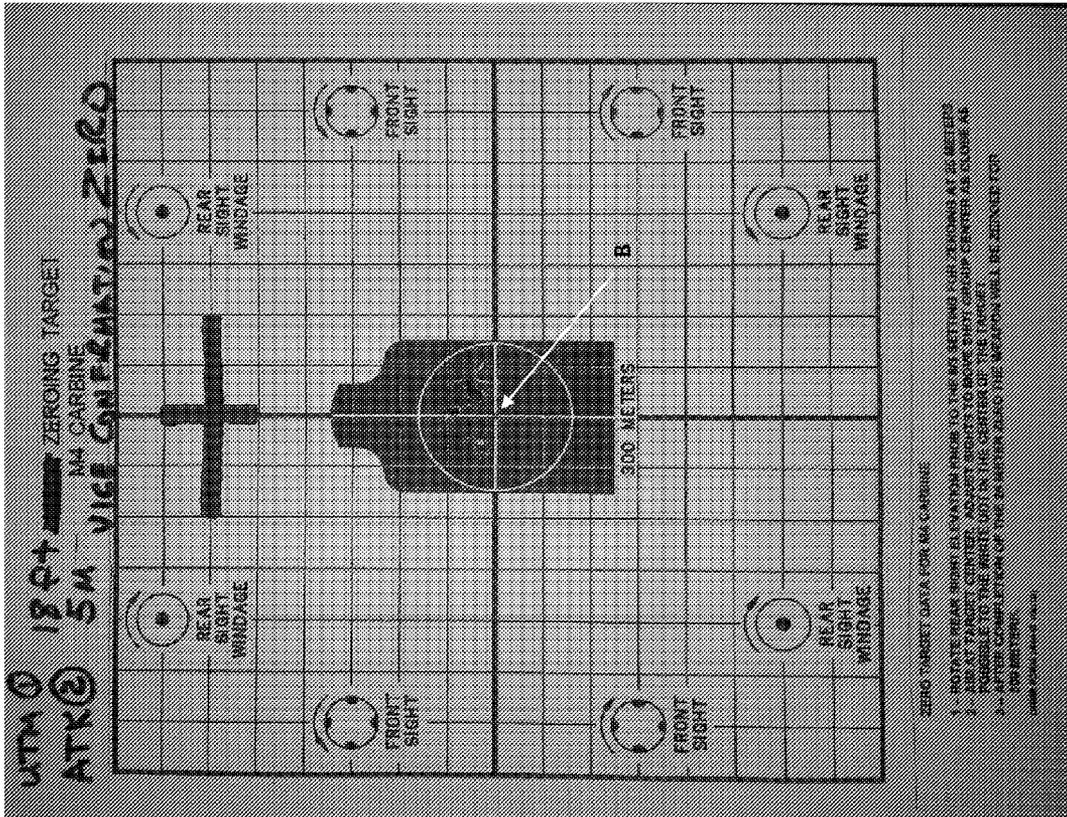


FIG. 25



SYSTEM AND METHOD FOR ZEROING A WEAPON

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to and is a non-provisional of U.S. provisional patent application Ser. No. 61/799,380, filed Mar. 15, 2013, and is a continuation-in-part of co-pending U.S. patent application Ser. No. 13/459,020, filed Apr. 27, 2012, entitled "Proper Grip Controllers," and U.S. patent application Ser. No. 14/094,090, filed Dec. 2, 2013, entitled "Proper Grip Controllers," the disclosures of which are herein incorporated by reference in their entirety for all purposes.

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[0002] This application includes material which is subject to copyright protection. The copyright owner has no objection to the facsimile reproduction by anyone of the patent disclosure, as it appears in the Patent and Trademark Office files or records, but otherwise reserves all copyright rights whatsoever.

BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention
[0004] Embodiments of the present invention relate to a system and method to zero a weapon.
[0005] 2. Description of the Related Art
[0006] Marksmanship training commonly starts with learning how to "zero" a weapon. That is, how to adjust the iron or optical sights of a weapon to ensure hitting the desired target. Conventional methods of zeroing a weapon are often expensive and time consuming. For example, when training with live ammunition, zeroing a weapon often requires the firing of anywhere from 10 to 30 rounds of ammunition and the adjustment of the sights between each group of three to five rounds fired, requiring extended periods of instruction time when training large groups of soldiers, police, or other armed personnel. In addition, live fire training requires the expense of arranging and paying for adequate live-round range training time.
[0007] As computer simulations are increasingly used to train armed personnel, there is an increasing need for weapon simulators and controllers that allow the trainees to interact with the computer simulations for all training aspects, including the zeroing of weapons.

SUMMARY OF THE INVENTION

[0008] The present invention provides a system and method to zero a weapon.
[0009] The foregoing and/or other aspects and utilities of the present invention may be achieved by providing a method to zero a weapon, including stabilizing a weapon, wherein the weapon includes sights, providing a laser component on the weapon, the laser component on the weapon configured to project a laser beam corresponding to the bore of the weapon, displaying a target including a first aim point and a second aim point, wherein the position of the first aim point with respect to the second aim point on the target corresponds to a type of weapon, a zero distance, and at least one of a zeroing caliber, a distance between the weapon and the target, and a type of laser component, aligning the sights to the first aim point, and aligning the laser beam to the second aim point.

[0010] In another embodiment, the distance between the weapon and the target is less than the zero distance and the position of the first aim point with respect to the second aim point corresponds to a live bullet trajectory offset according to the distance between the weapon and the target.

[0011] In another embodiment, the laser component is a bore-mounted laser component configured to align a laser beam projected by the laser component with a bore-path of the weapon;

[0012] In another embodiment, the bore-mounted laser component includes a bore rod configured to align the laser beam projected by the laser with the bore-path of the weapon;

[0013] In another embodiment, the laser component is one of an off-set laser component and a pass-through laser component, and the position of the first and second aim points is adjusted for the offset between the bore-path of the weapon and the laser beam projected by the laser component.

[0014] In another embodiment, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 10 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

[0015] In another embodiment, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 4 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

[0016] The foregoing and/or other aspects and utilities of the present invention may be achieved by providing a zeroing system including a laser component, provided on a weapon to be zeroed, and a display configured to display a zeroing target, the zeroing target including a first aim point and a second aim point, wherein the position of the first and second aim point on the target corresponds to a type of weapon to be zeroed, a zero distance, and at least one of a zeroing caliber, a distance between the weapon and the zeroing target, and a type of laser component.

[0017] In another embodiment, the laser component is a bore-mounted laser component configured to align a laser beam projected by the laser component with a bore-path of the weapon when the laser component is provided on the weapon.

[0018] In another embodiment, the bore-mounted laser component includes a bore rod configured to align the laser beam projected by the laser with the bore-path of the weapon.

[0019] In another embodiment, the laser component is one of an off-set laser component and a pass-through laser component, and the position of the first and second aim points is adjusted for the offset between the bore-path of the weapon and the laser beam projected by the laser component when the laser component is provided on the weapon.

[0020] In another embodiment, a weapon is zeroed when sights of the weapon are aligned with the first aim point and the laser beam projected by the laser component provided on the weapon is aligned with the second aim point simultaneously.

[0021] In another embodiment, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 10 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

[0022] In another embodiment, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 4 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

[0023] In another embodiment, the distance between the weapon and the target is less than the zero distance and the position of the first aim point with respect to the second aim point corresponds to a live bullet trajectory offset according to the distance between the weapon and the target.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] These and/or other aspects and advantages of the present invention will become apparent and more readily appreciated from the following description of the various embodiments, taken in conjunction with the accompanying drawings of which:

[0025] FIG. 1 illustrates a computer generated training simulation system according to an embodiment of the present invention.

[0026] FIG. 2 illustrates a computer generated training simulation system according to an embodiment of the present invention.

[0027] FIG. 3 illustrates zeroing targets according to embodiments of the present invention.

[0028] FIG. 4 illustrates zeroing targets according to embodiments of the present invention.

[0029] FIG. 5 illustrates zeroing targets according to embodiments of the present invention.

[0030] FIG. 6 illustrates a zeroing target.

[0031] FIG. 7 illustrates weapon controllers according to an embodiment of the present invention.

[0032] FIG. 8 illustrates weapon controllers according to an embodiment of the present invention.

[0033] FIG. 9 illustrates a weapon and laser component according to an embodiment of the present invention.

[0034] FIG. 10 illustrates another view of the laser component of FIG. 9.

[0035] FIG. 11 illustrates a laser component according to an embodiment of the present invention.

[0036] FIG. 12 illustrates a laser component according to an embodiment of the present invention.

[0037] FIG. 13 illustrates the laser component of FIG. 11 mounted on a weapon,

[0038] FIG. 14 illustrates a laser component according to an embodiment of the present invention.

[0039] FIG. 15 illustrates an interior view of the laser component of FIG. 14.

[0040] FIG. 16 illustrates a laser component according to an embodiment of the present invention.

[0041] FIG. 17 illustrates an interior view of the laser component of FIG. 16.

[0042] FIG. 18 illustrates the laser component of FIG. 17 mounted on a weapon,

[0043] FIG. 19 illustrates a zeroing method according to an embodiment of the present invention.

[0044] FIG. 20 illustrates installing a laser component on a weapon according to an embodiment of the present invention.

[0045] FIG. 21 illustrates mounting a weapon on a rest according to an embodiment of the present invention.

[0046] FIG. 22 illustrates adjusting the sights of a weapon according to an embodiment of the present invention.

[0047] FIG. 23 illustrates using pellet ammunition according to an embodiment of the present invention.

[0048] FIG. 24 illustrates zeroing confirmation using pellet ammunition according to an embodiment of the present invention.

[0049] FIG. 25 illustrates zeroing confirmation using pellet ammunition according to an embodiment of the present invention.

[0050] The drawings above are not necessarily to scale, with emphasis instead generally being placed upon illustrating the principles of the present invention. Further, some features may be exaggerated to show details of particular components. These figures are intended to be explanatory and not restrictive of the invention.

DETAILED DESCRIPTION

[0051] Reference will now be made in detail to the various embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below to provide a more complete understanding of the components, processes and apparatuses of the present invention by referring to the figures. These figures are merely illustrative representations based on convenience and the ease of demonstrating the present invention, and are, therefore, not intended to indicate relative size and dimensions of the devices or components thereof or to define or limit the scope of the embodiments.

[0052] Throughout the specification and claims, the following terms take the meanings explicitly associated herein, unless the context clearly dictates otherwise. The phrases "In some embodiments" and "in an embodiment" as used herein do not necessarily refer to the same embodiment(s), though they may. Furthermore, the phrases "in another embodiment," "in one embodiment," and "in some other embodiments" as used herein do not necessarily refer to a different embodiment, although they may. Thus, as described below, various embodiments of the invention may be readily combined, without departing from the scope or spirit of the invention. In addition, as used herein, the term "or" is an inclusive operator, and is equivalent to the term "and/or," unless the context clearly dictates otherwise. The term "based on" is not exclusive and allows for being based on additional factors not described, unless the context clearly dictates otherwise. In addition, throughout the specification, the meaning of "a," "an," and "the" include plural references. The meaning of "in" includes "in" and "on."

[0053] As illustrated in FIG. 1, one embodiment of the present invention provides a computer generated training simulation system (500) in which a trainee (1) can be trained and become familiar with various weapons, techniques, and tactics. In one embodiment, the computer generated training simulation (500) is a collaborative immersive training environment. In some embodiments, the computer generated training simulation (500) supports a variety of exterior terrain types, as well as various building interior and exterior types, and specific custom-built interiors. In other embodiments, the computer generated training simulation (500) includes marksmanship and zeroing target displays. In some embodiments of the present invention, the computer generated training simulation (500) is displayed on a display system (502) and the display system (502) allows a trainee (1) to view the virtual environment in a static or moving mode. For example, in a collaborative immersive training environment, a moving

viewpoint simulates walking, running, driving, or other movement within the computer generated training simulation (500), and can be controlled directly by the trainee (1), scripted in a scenario, or controlled by a secondary user. While walking or running through the environment, interior of buildings can be explored by moving through doorways from room-to-room, around corners, climbing up and down stairs, ropes, ladders, or the like.

[0054] In one embodiment, the computer generated training simulation (500) displays a variety of marksmanship and zeroing target images. For example, as illustrated in FIGS. 2-4, the computer generated training simulation (500) may display a zeroing target (1000). However, the present invention is not limited thereto, and other types of zeroing and marksmanship images may be displayed that incorporate aspects of the present invention. For example, the computer generated training simulation (500) may also generate a 5-meter (FIG. 3(a)), a 10-meter (FIG. 3(b)), and/or 25-meter targets for a 25-meter zero similar to those of FIGS. 4-5 or zeroing targets equivalent to the standard 25-meter M4 zeroing target illustrated in FIG. 6.

[0055] As illustrated in FIGS. 1-2 and 7-9, in some embodiment of the invention, navigation of and interaction with the computer generated training simulation (500) is facilitated via one or more controllers. In one embodiment, the controllers are communicatively coupled to the computer generated training simulation (500) such that inputs from at least one controller modify the computer generated training simulation (500) displayed on the display system (502) according to the inputs. In one embodiment, the one or more controllers are mounted to a weapon, such as a rifle, carbine, machine gun, pistol, etc. In one embodiment, at least one of the controllers is detachably coupled to the weapon. In another embodiment, at least one of the controllers is integrally formed on the weapon. In one embodiment, the controllers are not physically tethered to the computer generated training simulation (500), but communicate wirelessly. For example, as illustrated in FIGS. 1-2 and 7-9, a rifle controller (100) may be embodied as an M4 carbine with a first controller (101), a second controller (102), a third controller (103), a laser component (104), and a weapon controller (105) (not illustrated) mounted on the M4 carbine. While some embodiments of a rifle controller (100) under the present invention are illustrated as a M4 carbine with various controllers and components (101-105) mounted thereon, the present invention is not limited thereto. In some embodiments, the rifle controller (100) is manufactured or otherwise provided with lasers that function as the laser controller (104). Other embodiments of the present invention include one or more of the various controllers and components (101-105) used with other weapons, such as an M4, M16, or SCAR, any weapon with a flash suppressor, or replica weapons firing airsoft projectiles, BBs, paint, or laser and/or electric weapons. Other embodiments of the invention may be realized with weapons firing conventional, blank, or simunition type ammunition.

[0056] According to some embodiments of the present invention, the various controllers and components (101-105) of a rifle controller (100) may be located in positions designed to be convenient and comfortable to the trainee (1) while also training the trainee (1) on the proper grip of the weapon and preventing the formation of dangerous habits. As illustrated in FIGS. 7-8, in some embodiments, the location of the various controllers and components (101-105) may be adjusted in

consideration of the trainee's (1) arm length, hand size, thumb length, etc. to ensure proper grip of the weapon.

[0057] In some embodiments, the laser component (104) includes a laser (104a) and a laser controller (104b). In some embodiments, the weapon controller (105) includes a battery (105a) to power the electronic components of the rifle controller (100). In some embodiments, the weapon controller (105) includes a wireless transmitter (105b) and a wireless controller (105c) to communicate inputs made on the rifle controller (100) to the computer generated training simulation (500).

[0058] In some embodiments, the first controller (101), the second controller (102), and the third controller (103) control the navigation of the trainee (1) within the computer generated training simulation (500). In some embodiments, the first controller (101), the second controller (102), and/or the third controller (103) can be used to adjust the point of view or view angle of the trainee (1) within the computer generated training simulation (500). In some embodiments, the first controller (101), the second controller (102), and the third controller (103) can also be used to simulate other functions within the computer generated training simulation (500). For example, the first controller (101), the second controller (102), and the third controller (103) can be used to throw a simulated grenade, jump, unjam a weapon, switch weapons, etc. In other embodiments, the first controller (101), the second controller (102), and the third controller (103) may control menu functions and operational commands for the computer generated training simulation (500). For example, the first controller (101), the second controller (102), and/or the third controller (103) may be used to select a zeroing target and/or input zeroing characteristics.

[0059] While in some embodiments the weapon (100) includes controllers (101-103) to interact with the computer generated training simulation (500), in some embodiments, where the weapon (100) is used only for marksmanship or zeroing training, the weapon (100) may include only the laser component (104).

[0060] In some embodiments, the trainee (1) interacts with the computer generated training simulation (500) through a computer (501) generating the computer generated training simulation (500). For example, interactions may include selecting zeroing targets according to at least one of the type of weapon (100), the zeroing distance, and a caliber of the projectiles to be fired by the weapon (100).

[0061] The purpose of zeroing a weapon is to align the sights of the weapon with the barrel of the weapon at a specific distance. When a weapon is properly zeroed, the point of impact of a projectile fired by the weapon will correspond to the point of aim through the sights at the specific distance. For example, the United States Army's current process instructs its personnel to zero the M4 carbine to 25 meters. Accordingly, when zeroed to 25 meters, a projectile of a specific caliber and grain weight fired from the bore of the M4 carbine will impact at the aim point of the zeroed sights at 25 meters. A weapon should be zeroed before it can be used to teach the user of the weapon the four fundamentals of marksmanship training (steady position, aiming, breath control, trigger squeeze). Generally, aside from a few subtle factors of a weapon's particular user, a weapon correctly zeroed by one person will be very close to zero for any other user of the weapon. However, every user will have a specific zero based upon the physical characteristics and positioning of the user when looking through a weapon's sights.

[0062] In various embodiments of the present invention, the present invention provides systems and methods to zero a weapon without requiring the firing of live rounds. For example, as illustrated in FIG. 2, a system to zero a weapon may include a computer generated training simulation (500), a weapon (100), or a rifle rest (900).

[0063] As illustrated in FIG. 2, in one embodiment, the computer generated training simulation (500) includes one or more computers (501) to generate the computer generated training simulation (500) and a display system (502) to display the computer generated training simulation (500).

[0064] In one embodiment of the invention, the display system (502) includes an electronic visual display, such as a liquid crystal display (LCD), a plasma display, or cathode ray tube (CRT) display. In another embodiment of the invention, the display system (502) may include an image projector (503) and a projection screen (504) to display the computer generated training simulation (500). In one embodiment, the image projector (503) is a rear or forward projector projecting the computer generated training simulation (500) onto the projection screen (504).

[0065] In one embodiment of the present invention, the computer generated training simulation (500) includes a zeroing target (1000) displayed on the display system (502). As illustrated in FIG. 3, in one embodiment, the zeroing target (1000) is a 5-meter zeroing target and includes a red crosshairs (R) and a green crosshairs (G). In other embodiments, the zeroing target (1000), the zeroing target (1000) is a 10-meter zeroing target or a 25-meter zeroing target (FIGS. 4-5).

[0066] In another embodiment, the display system (502) includes an image projector (503) and a surface (504), such as a paper target or wall, capable of displaying the zeroing target (1000) generated by the computer generated training simulation (500). In another embodiment, the display system (502) includes a paper target (2000) generated by the computer generated training simulation (500) and printed with a red crosshairs (R) and a green crosshairs (G) positioned and distanced according to at least one of the type of weapon forming the weapon (100), a zeroing caliber, and the zeroing distance selected.

[0067] In an embodiment of the present invention, the weapon rest (900) stabilizes the weapon (100) during a zeroing operation. In another embodiment, the weapon rest (900) stabilizes the weapon (100) during a zeroing confirmation operation while firing live rounds. In one embodiment, three or more bullets fired from a stabilized weapon (100) will land within a 2.5 cm circle. In one embodiment, three or more bullets fired from a stabilized weapon (100) will land within a 2 cm circle. In one embodiment, three or more bullets fired from a stabilized weapon (100) will land within a 1 cm circle. In one embodiment, the weapon rest (900) is adjustable to adjust the direction or elevation of the weapon (100) while on the weapon rest (900). For example, the weapon rest (900) may be a recoil reducing weapon rest (900) such as the CALDWELL Lead Sled Plus; a vise rifle rest (900) such as the SAN ANGELO Shooting Vise Bench Rest; a shooting bag rifle rest (900), such as the CALDWELL Deadshot Shooting Bag, or other similar devices designed to stabilize and/or lock the weapon (100) in place during the zeroing operation while adjusting the height, elevation, and positioning of the weapon. However, the present invention is not limited thereto and other devices and methods to stabilize the weapon (100) during a zeroing operation may be used. For example, the

weapon (100) may be stabilized using sandbags or specific body positioning to stabilize the weapon (100) during a zeroing operation.

[0068] As illustrated in FIG. 9, in some embodiments, the weapon (100) includes a laser component (104). In one embodiment, the purpose of the laser component (104) is to indicate a path of a projectile fired through the bore of the weapon (100). In some embodiments, the laser component (104) is embodied as a bore-mounted (FIGS. 14-15) or muzzle-mounted (FIGS. 9-10 and 16-18) laser component (104), an offset laser component (104), or a pass-through laser component (104) (FIGS. 11-13). For example, when embodied as a bore-mounted laser component (104), the laser component (104) is positioned inside the bore of the weapon (100), such that a path of a projectile fired by the weapon is indicated by a path of the laser light projected by the bore-mounted laser component (104). That is, the laser is aligned with the bore of the weapon (100). In other embodiments, when the laser component (104) is embodied as a pass-through or off-set laser component (104), the laser component (104) is aligned with the direction of the bore, but the computer generated training simulation must account for an off-set distance between the path of the laser light and the path of a projectile fired by the weapon (100) along the bore.

[0069] In one embodiment, the laser (104a) is an infrared (IR) laser (104a). In another embodiment, the laser (104a) is a vibration activated laser (104a). In one embodiment, vibration of the weapon (100) activates the vibration activated laser (104a). For example, the vibration activated laser (104a) may be set to activate upon the pulling of the trigger ("dry firing") of the weapon (100). In another embodiment, wherein the weapon (100) is capable of firing ammunition, the vibration activated laser (104a) may be set to activate upon the firing of a blank round of ammunition or a regular round of ammunition by the weapon (100). In another embodiment, wherein the weapon (100) is capable of firing gas-powered projectiles, the vibration activated laser (104a) may be set to activate upon the firing of a gas-fire projectile or the discharge of a predetermined amount of gas propellant by the weapon (100). In other embodiments, the threshold vibration to trigger the vibration activated laser (104a) may correspond to dry firing, electric blow back-firing, and gas blow back-firing of the weapon (100). However, the present invention is not limited thereto, and other ways of activating the laser may be contemplated in other embodiments of the invention. For example, the laser may be connected to a trigger sensor, and the laser (104a) may be activated upon sensing of the pulling of trigger (100b). In another embodiment, the laser on and off nut (104p) controls the laser mode. For example, the laser on and off nut (104p) may allow a user to set the laser (104a) to emit a continuous laser light, to activate upon vibration, to activate upon trigger input, or to power off.

[0070] As illustrated in FIGS. 9-10, in one embodiment, the laser component (104) is embodied as a muzzle-mounted laser component (104) and includes at least one of a laser (104a), a laser controller (104b), a laser housing (104c), a coupling base (104d), a laser sleeve (104e), a laser battery (104f), and a laser on and off nut (104p).

[0071] In one embodiment, the laser housing (104c) houses at least one of the laser (104a), the laser sleeve (104e), the laser controller (104b), and the laser battery (104f).

[0072] In one embodiment, the coupling base (104d) attaches to a muzzle (100e) of the weapon forming the weapon (100). For example, the coupling base (104d) may be

embodied as a suppressor clip-on base (104d) which attaches to a flash suppressor (100g) or other muzzle mounted device of a rifle-type weapon, such as an M4 carbine, used to form the weapon (100). In one embodiment, the muzzle (100e) of the weapon is a threaded muzzle (100e) and the flash suppressor (100g) has a threaded end to connect to the threaded muzzle (100e). In another embodiment, the coupling base (104d) is threaded to thread directly onto the threaded muzzle (100e). In another embodiment, the coupling base (104d) may be embodied as a suppressor twist-on base that fastens to the muzzle (100e). In another embodiment, the laser housing (104c) couples to the coupling base (104d) to install the laser component (104) to the muzzle of the weapon (100). In another embodiment, the coupling base (104d) is integrally formed with the laser housing (104c).

[0073] As illustrated in FIG. 10, in one embodiment of the invention, the laser (104a) is disposed inside the laser sleeve (104e) and then inserted into the laser housing (104c). In one embodiment, the laser sleeve (104e) is made of a resilient substance to insulate the laser (104a) from accidental triggering. For example, the laser sleeve (104e) may be made of an elastic substance, such as latex rubber, silicone rubber, polyurethane, Buna-N rubber, and polyethylene, chosen to dampen the vibration of the vibration activated laser (104a) to vibrations above a threshold. In one embodiment, the laser sleeve (104e) is a tube material with a Shore value of 50 or less. In another embodiment, the laser sleeve (104e) is a tube material with a Shore value of about 45. In another embodiment, the laser sleeve (104e) secures the laser (104a) in line with the bore of the weapon (100) such that the laser light replicates the bore path of a projectile that could be fired by the weapon (100). In one embodiment of the invention, the laser sleeve (104e) is fastened to the laser housing (104c) with micro adjustment screws (104h). In one embodiment, adjustment of the micro adjustment screws (104h) can center the laser (104a) inside the bore of the weapon (100) to align the laser with the path of the bore.

[0074] As illustrated in FIG. 10, in one embodiment of the invention, the suppressor clip-on base (104d) is coupled to the flash suppressor (100g) of the trainee's (1) weapon forming the weapon (100). The vibration activated laser (104a) is placed within the laser sleeve (104e), and the laser sleeve (104e) is installed within the laser housing (104c). The laser housing (104c) is then coupled to the suppressor clip-on base (104d). In one embodiment, a locking nut (104k) connects to the clip-on base (104d) to secure the housing (104c). In one embodiment, the laser controller (104b) and the laser battery (104f) are also installed within the laser housing (104c).

[0075] As illustrated in FIG. 10, in another embodiment of the present invention, the laser component (104) may also include a barrel plug (104i) and/or a barrel plug blank adaptor (104j). In one embodiment, the barrel plug (104i) couples to a muzzle (100e) of the weapon (100). For example, in one embodiment, the barrel plug (104i) is held in place by the pressure produced when it is tightened into the bore of the barrel (100c). In another embodiment, the barrel plug (104i) includes a barrel plug blank adaptor (104j) to allow coupling with the coupling base (104d) and/or the flash suppressor (100g). In another embodiment, a locking nut (104k) screws to the coupling base (104d) to further secure the laser component (104).

[0076] In another embodiment, the barrel plug (104i) includes gas vents (104m) to discharge firing gas discharge. For example, when the weapon (100) fires blank ammunition

or gas-powered projectiles, the barrel plug (104i) impedes the path of any projectile or debris through the barrel and cycles the weapon, while allowing excess pressure to vent through gas vents (104m). In one embodiment, the barrel plug (104i) is made of a strong, rigid material such as a metal.

[0077] In another embodiment, the weapon (100) includes a barrel plug blank adaptor (104j). In one embodiment, the a barrel plug blank adaptor (104j) is made of a resilient material to securely fix the barrel plug (104i) within the bore of the weapon (100)

[0078] As illustrated in FIG. 10, in one embodiment of the invention, the barrel plug (104i) is inserted into the barrel plug blank adaptor (104j), and installed within the bore of the weapon (100). In one embodiment, the blank adaptor (104j) with barrel plug blank adaptor (104j) can be inserted into any M4/M16 rifle used to form the weapon (100) and utilized to fire blank-type ammunition when training with the computer generated training simulation (500) with or without additional controllers (101-103). The coupling base (104d), embodied as a suppressor twist-on base (104d) in FIG. 10, is then coupled directly to the to the barrel plug (104i) and/or to the suppressor (100g). The vibration activated laser (104a) is placed within the laser sleeve (104e), and the laser sleeve (104e) is installed within the laser housing (104c). In one embodiment, O-rings (104l) may be used to further secure the laser sleeve (104e) within the laser housing (104c). The laser housing (104c) is then secured to the suppressor twist-on base (104d). In one embodiment, the laser housing (104c) is secured to the flash suppressor (1.00g) with a captive washer and screw assembly (104o)

[0079] In another embodiment of the invention, the weapon (100) may include an offset or pass-through laser component (104). For example, as illustrated in FIGS. 11-13, the laser component (104) is mounted to the barrel (100c) of the weapon. In one embodiment, the offset laser component (104) includes a laser (104a) and a laser controller (104b). The laser component (104) may be embodied as a pass-through laser component (104) to accommodate a forward moving projectile, i.e. a fired shot, going through the bore of the weapon (100) and out of the laser housing (104c). For example, as illustrated in FIGS. 11-13, the pass-through laser component (104) includes at least one of a vibration activated laser (104a), an off-set laser housing (104c), a coupling base (104d), a laser sleeve (104e), a laser battery (104f), a locking nut (104k), and laser on and off nut (104p).

[0080] In one embodiment, the weapon (100) has a flash suppressor (100g) or other muzzle mounted attachment installed, and the laser component (104) attaches and securely fastens to the flash suppressor (100g) with the locking nut (104k). The laser locking nut (104k) is then aligned with the front sight post of the weapon (100).

[0081] In embodiments where the weapon (100) is set to fire projectiles, the laser component (104) does not include a barrel plug (104i), such that when the trigger (100b) is pulled, a projectile is fired through the bore of the weapon (100) and out of the laser component (104). For example, the fired projectile may be an air powered metal BB, a chalk marker BB, a paint marker BB, Simunition, Paint Maker Simunition, Live Rounds, Airsoft ammunition, or blank-type rounds. In one embodiment, the vibration of the projectile firing triggers the vibration activated laser (104a), which fires a laser into the computer generated training simulation (500). The training simulation (500) calculates and reproduces the trajectory of the projectile within the training simulation (500). In one

embodiment, the projectile simultaneously leaves the barrel and strikes a target displayed by the training simulation (500).

[0082] In one embodiment, the position of the vibration activated laser (104a) is offset with respect to the bore, such that the vibration activated laser (104a) is securely fixed in line with the bore of the weapon (100) while the laser component (104) allows the projectile to freely pass through the flash suppressor.

[0083] For example, as illustrated in FIGS. 11-13, in one embodiment of the invention, the coupling base (104d) is coupled to the flash suppressor (100g). In one embodiment, the locking nut (104k) is used to further secure the coupling base (104d) to the flash suppressor (100g). The vibration activated laser (104a) and laser battery (104l) are placed within the laser sleeve (104e), and the laser sleeve (104e) is installed within the laser housing (104c) in an offset position. The laser housing (104c) is then coupled to the coupling base (104d). In one embodiment, the laser component (104) includes a laser on-off nut (104-p) to control turning on/off of the laser (104a).

[0084] As illustrated in FIGS. 14-15, in some embodiments of the invention, a bore-mounted laser component (104) may be mounted within the bore of the weapon (100) and an alignment of the laser projected by the bore-mounted laser component (104) to the bore of the weapon (100) may be adjusted using micro-adjustment knobs (9003 and 9004). In some embodiments, the micro-adjustment knobs (9003 and 9004) adjust the alignment of the bore-mounted laser component (104) within the bore of the weapon (100). In some embodiments, the micro-adjustment knobs (9003 and 9004) adjust a horizontal and vertical alignment of the laser beam path projected by the laser component (104) within the bore of the weapon (100), allowing a laser component (104) aligned to a zeroed first weapon (100) to be transferred to and used to zero a second weapon (100) of the same type and/or with the same optics. In one embodiment, the bore-mounted laser component (104) includes an external on/off switch (14003) to control the laser, and the laser light projected may be a green persistent laser. In some embodiments, activation of the on/off switch (14003) does not affect the alignment of the laser component (104) within the bore of the laser when installed. In other embodiments, the bore-mounted laser component (104) includes a bore rod (14002), and a thickness of the bore rod (14002) corresponds to the bore of the weapon (100) to enhance a fit of the bore-mounted laser component (104) within the bore of the weapon (100) and/or minimize movement of the bore-mounted laser component (104) within the bore of the weapon (100). In one embodiment, the bore rod (14002) minimizes movement of the laser component (104) within the bore of the weapon (100). In some embodiments, the bore-mounted laser component (104) includes O-rings (14004) to improve a fit and minimize a movement of the bore-mounted laser component (104) within the bore of the weapon (100). However, the present invention is not limited thereto, and other methods and mechanisms may be used to align the path of the laser beam projected by the laser component with the bore-path of the weapon.

[0085] FIGS. 16-18 illustrate an embodiment of the muzzle-mounted laser component (104) of FIG. 10 which includes micro-adjustment knobs (9003-9004).

[0086] In one embodiment, the present invention provides a method to zero a weapon using a computer generated training simulation. For example, as illustrated in FIG. 19, in one embodiment a method to zero a weapon includes stabilizing a

weapon; installing a laser component on the weapon; displaying a zeroing target; aligning the laser component with the zeroing target; and aligning the sights of the weapon with the zeroing target.

[0087] As illustrated in FIGS. 6, 9, and 21, in one embodiment of the present invention, stabilizing the weapon (100) includes mounting the weapon (100) on a weapon rest (900) and locking the weapon in place to stabilize the weapon (100) vertically (FIG. 21(a)) and/or horizontally (FIG. 21(b)) during the zeroing operation (operation 5001). In one embodiment, stabilizing the weapon (100) reduces the potential for human-error during a zeroing operation, especially with novice shooters. For example, when the weapon (100) is a M4 carbine, the weapon rest (900) may be a locking rifle rest (900). However, the present invention is not limited thereto, and in other embodiments the weapon may be stabilized by other means. For example, the weapon may be a pistol and use a pistol rest or the weapon may be secured using weights, sandbags, and the like.

[0088] In one embodiment, installing a laser on the weapon includes installing a laser component (104) on the weapon (100) (operation 5002). The laser component (104) may be mounted on the weapon before or after the weapon (100) is stabilized. For example, as illustrated in FIG. 20, in one embodiment, the M4 carbine is mounted on a rifle rest (900), and a laser component (104) is then installed on the stabilized M4 carbine to form the weapon (100). In one embodiment, the laser component (104) is a bore-mounted laser component (104). In another embodiment, the laser component (104) is an offset or pass-through laser component (104). In some embodiments, the laser beam projected by the laser component (104) represents the bore path of a projectile fired by the weapon (100), accordingly the laser component (104) is aligned to the bore path when installed on the weapon (100). In one embodiment, when the laser component (104) is embodied as a bore or muzzle mounted laser, the laser projected by the laser component (104) directly represents the bore path. In other embodiments, when the laser component (104) is embodied as a pass-through or offset laser component (104), the offset distance between the path of the laser projection and the bore path must be accounted for.

[0089] In one embodiment of the invention, a proper alignment of a bore-mounted laser component (104) to the bore of the weapon (100) can be realized by installing the bore-mounted laser component (104) to a first weapon (100) that has been previously zeroed, and transferring the bore-mounted laser component (104) to a second weapon (100) to be zeroed, of the same type, taking care to install the bore-mounted laser component (104) in the same position or in alignment to the same markers as when installed on the first weapon (100). For example, in one embodiment, a bore-mounted laser component (104) is installed within the bore of a weapon which has been zeroed to a predetermined distance using conventional methods. The micro-adjustment knobs (9003 and 9004) can then be used to calibrate the laser of the bore-mounted laser component (104) mounted within the bore of the previously zeroed weapon (100) such that a laser pulse (p) targets the bull's-eye of a zeroing target (1000) at the predetermined distance. This bore-mounted laser component (104) can then be transferred to a similar weapon (100) to have a different user of the similar weapon (100) align the sights of the similar weapon (100) to their own personal zero using the zeroing process described below.

[0090] In one embodiment, the computer generated training simulation (500) generates a zeroing target (1000) to be displayed at a set zeroing distance from the weapon (100) in operation (5003). For example, as illustrated in FIGS. 2-3, in one embodiment, the computer generated training simulation (500) generates a 5-meter target for a 25-meter zero as the zeroing target (1000), and the zeroing target (1000) is displayed on a display system (502) set at a 5-meter distance from the rifle rest (900) or the weapon (100).

[0091] As illustrated in FIGS. 2-5, in one embodiment, the zeroing target (1000) includes a red crosshairs (R) and a green crosshairs (G). The red crosshairs (R) are set a predetermined distance above the green crosshairs (G). The computer generated training simulation (500) establishes the position of the red crosshairs (R) and green crosshairs (G) and the distance between the red crosshairs (R) and green crosshairs (G) on the zeroing target (1000) according to characteristics of the weapon or the distance at which the weapon is being zeroed to. For example, in embodiments where the zeroing target (1000) is embodied as a 25-meter zeroing target, and the weapon (100) is a M4 carbine, the distance and position of the red crosshairs (R) and green crosshairs (G) are determined by the zeroing distance (25-meters), the type of weapon (100) (M4 Carbine), a caliber or grain weight of the projectiles to be fired by the weapon (100), and the distance between the zeroing target (1000) and the weapon (100) during the zeroing operation. In one embodiment, the position of the green crosshairs (G) corresponds to a live bullet trajectory offset according to at least the distance between the zeroing target (1000) and the weapon (100). In other embodiment, where the laser component (104) is embodied as a pass through or off set laser component (104), the distance and position of the red crosshairs (R) and green crosshairs (G) also depends on the offset distance between the laser projection and the bore path of the weapon (100). However, the present invention is not limited thereto, and the position and separation of the red crosshairs (R) and green crosshairs (G) may be adjusted using different, less, or additional data. One advantage of the present invention is the ability to adjust the zeroing target (1000) according to a variety of factors that may affect the zeroing process of the weapon, including the type of weapon, the distance the weapon is zeroed to, attachments, such as grenade launchers, flash or noise suppressors, type of ammunition used, and whether the laser component (104) is set up as a bore-mounted laser component, a pass-through laser component, or an off-set laser component.

[0092] As illustrated in FIGS. 2-3, in one embodiment, after the weapon (100) is stabilized on the weapon rest (900) and the appropriate zeroing target (1000) is displayed by the computer generated training simulation (500), the laser component (104) is turned on and the weapon (100) is aligned with the zeroing target. For example, as illustrated in FIG. 3, in operation (5005), the laser component (104) is turned on and set to project a continuous laser pulse (P), and the rifle rest (900) or weapon (100) is adjusted such that the laser light aligns with the green crosshairs (G) in the zeroing target (1000).

[0093] In one embodiment, when the laser component (104) is a bore-mounted laser component (104), the laser light corresponds to the bore path of the weapon (100), and aligning the laser light projected by the bore-mounted laser component (104) to the green crosshairs (G) directly aligns the bore of the weapon (100) with the green crosshairs (G). In another embodiment, when the laser component (104) is an

off-set or pass through laser component (104), the computer generated training simulation (500) adjusts the position and separation of the red crosshairs (R) and the green crosshairs (G) to account for the offset distance between the bore path and the laser pulse trajectory.

[0094] In another embodiment, after the laser pulse (P) generated by the laser component (104) is aligned with the green crosshairs (G), the sights of the weapon (100) are aligned. For example, as illustrated in FIGS. 3 and 22, in one embodiment, the sights of the weapon (100) are aligned with the red crosshairs (R) while the laser pulse (P) projected by the laser component (104) is in alignment with the green crosshairs (G) in operation (5006).

[0095] The sights of the weapon (100) may be optical sights, iron sights, laser dots, or other types of weapon sights aligned with the red crosshairs (R). For example, as illustrated in FIG. 22(a), when the sights are optical sights, the adjustment mechanisms of the optical sights are used to align the optical sights with the red crosshairs (R). In another embodiment, when the weapon (100) has iron sights, the iron sights are set to correspond to the zeroing distance and adjusted to align with the red crosshairs (R) (FIGS. 24b-c). For example, if the weapon (100) is being zeroed to 25 meters, the iron sights are first set to 25 meters and then aligned to the red crosshairs (R). In another embodiment, when the sights are a laser dot, the laser dot sight is adjusted to align the laser dot with the red crosshairs (R).

[0096] In one embodiment of the invention, the weapon (100) is zeroed when the laser projected by the laser component (104) is in alignment with the green crosshairs (G) and the sights of the weapon (100) are simultaneously aligned with the red crosshairs (R). For example, in one embodiment, when the weapon (100) is an M4 carbine to be zeroed to 25 meters for standard M855 ammunition, the computer generated simulation (500) generates a 25-meter zeroing target (1000), and the position and separation of the red crosshairs (R) and the green crosshairs (G) on the zeroing target (1000) are determined by the type of weapon (M4), the zeroing distance (25 meters), the zeroing caliber (M855), the distance (5-meter, 10-meter, 25-meter targets) between the weapon (100) and the zeroing target (1000), and the offset distance if the laser component (104) is an offset or pass-through laser. Aligning the laser projected by the laser component (104) to the green crosshairs (G) and the sights of the weapon (100) to the red crosshairs (R) serves to zero the weapon (1000) for that specific distance and ammunition. In one embodiment, a weapon (100) can be zeroed without firing live ammunition.

[0097] In some embodiments of the present invention, the zero of the weapon (100) can be confirmed by a variety of methods. For example, the zero of the weapon (100) can be confirmed via simulated laser firing, simulated pellet firing, or live ammunition firing.

[0098] In one embodiment, once the laser pulse projected by the laser component (104) is aligned with the green crosshairs (G) and the sights of the weapon (100) are aligned with red crosshairs (R), the zero of the weapon (100) can be confirmed by simulated laser firing. That is, the laser component (104) is set to firing mode and the weapon is (100) "fired" three times to register 3 hits on the zeroing target (1000) in operation (5007). Depending on the setup of the weapon (100) and/or the computer generated training simulation (500), the "firing" of the weapon may take various forms, and may be actual or simulated. For example, in one embodiment, the laser component (104) is a vibration activated laser com-

ponent (104) set to activate upon the pulling of the trigger (“dry firing”) of the weapon (100) or upon the firing of blank, simulation pellets, or live rounds of ammunition by the weapon (100). In others embodiments, the vibration activated laser (104a) may correspond to electric blow back-firing and gas blow back-firing of the weapon (100). In another embodiment, the laser component (104) may be coupled to a trigger sensor, and the laser component (104) may be set to activate upon the pulling of the trigger (100b). However, the present invention is not limited thereto, and other ways of activating the laser to simulate firing of the weapon may be used.

[0099] In one embodiment, the computer generated training simulation (500) includes a hit detection system (505). Upon activation of the laser component (104), the hit detection system (505) identifies the position of the laser pulse with relation to the zeroing target (1000). The hit detection system (505) may differentiate laser signatures from different laser components (104) to identify laser pulses from multiple weapons (100) on the same zeroing target (1000). In one embodiment, when the laser component (104) includes an infrared (IR) laser (104a), the hit detection system (505) may include IR tracking cameras to detect the position of the laser pulse relative to the zeroing target (1000).

[0100] In one embodiment, the zero of the weapon (100) is confirmed when the computer generated training simulation (100) registered three laser pulses or “hits” within a predetermined area in the zeroing target (1000). For example, when the zeroing target (1000) is a 25-meter zeroing target (1000), the weapon (100) is considered as properly zeroed when it registers 3 laser pulses within a 10 cm circle centered on the aim point of the sights of the weapon (100). In other embodiments, the weapon (100) is considered as properly zeroed when it registers 3 laser pulses within a 4 cm centered on the aim point of the sights of the weapon (100).

[0101] In another embodiment, the zero of the weapon (100) is confirmed via firing of ammunition simulation pellets. For example, as illustrated in FIGS. 23-25, when the weapon (100) is an M4 carbine zeroed for standard M855 ammunition, the zero of the weapon (100) can be confirmed as follows: if the laser component (104) is a bore mounted laser component (104), the laser component (104) is removed and the weapon (100) is loaded with pellet ammunition that simulates standard M855. If the laser component (104) is a pass-through laser component (104), the laser component (104) may remain in place as the weapon (100) is loaded with pellet ammunition that simulates standard M855. As illustrated in FIGS. 24-25, a physical marksmanship target (1005) corresponding to the type of pellet ammunition and the distance between the weapon (100) and the marksmanship target (1005) is placed instead of the zeroing target (1000). The sights of the weapon (100) are then trained on the bull’s-eye (B) of the marksmanship target (1005) and the weapon (100) is fired three times while maintained aim of the sights on the bull’s-eye (B). The weapon (100) is considered as properly zeroed when it registers 3 hits within a 10 cm circle of the bull’s-eye (B) (see FIG. 25). In other embodiments, the weapon (100) is considered as properly zeroed when it registers 3 hits within a 4 cm centered on the bull’s-eye (B).

[0102] In another embodiment, after the weapon has been zeroed using the computer generated training simulation (500) and/or the zeroing target (1000) (operations 5001-5007), the weapon is taken to a live fire range and the weapon’s zero is confirmed in operation (5008). For example, in one embodiment, the weapon (100) is taken to a live fire range

and stabilized. In one embodiment, the weapon (100) is stabilized using the same weapon rest (900) or same stabilizing device or method used in operation (5001).

[0103] The weapon is then aimed at the bull’s-eye or center of mass of a target set at the appropriate distance (25-meter target if the weapon was zeroed to 25-meters in operations (5001-5007), and for the appropriate weapon type and ammunition. For example, by use of a standard 25-meter zeroing target such as that illustrated in FIG. 6 if the weapon (100) is a M4 carbine. Three shots of the corresponding zeroed ammunition are fired from the stabilized weapon at the target. The weapon’s zero will be confirmed if the three shots fall within a 10-centimeter area centered at the bull’s-eye or center of mass of the target. In other embodiments, the weapon’s zero will be confirmed if the three shots fall within a 4-centimeter area centered at the bull’s-eye or center of mass of the target.

[0104] In another embodiment, the weapon (100) is subsequently aimed and fired at a 300-meter target, such as that illustrated in FIG. 6 if the weapon (100) is an M4 carbine, and a 300 m target zero is confirmed if the three shots fall within a 19 cm area centered at the bull’s-eye or center of mass of the target on the 300-meter target.

[0105] Although a few embodiments of the present invention have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the present invention, the scope of which is defined in the appended claims and their equivalents.

What is claimed is:

1. A method to zero a weapon, comprising: stabilizing a weapon, wherein the weapon comprises sights; providing a laser component on the weapon, the laser component on the weapon configured to project a laser beam corresponding to the bore of the weapon; displaying a target comprising a first aim point and a second aim point, wherein the position of the first aim point with respect to the second aim point on the target corresponds to a type of weapon, a zero distance, and at least one of a zeroing caliber, a distance between the weapon and the target, and a type of laser component; aligning the sights to the first aim point; and aligning the laser beam to the second aim point.
2. The method of claim 1, wherein the distance between the weapon and the target is less than the zero distance and the position of the first aim point with respect to the second aim point corresponds to a live bullet trajectory offset according to the distance between the weapon and the target.
3. The method of claim 1, wherein the laser component is a bore-mounted laser component configured to align a laser beam projected by the laser component with a bore-path of the weapon.
4. The method of claim 3, wherein the bore-mounted laser component comprises a bore rod configured to align the laser beam projected by the laser with the bore-path of the weapon.
5. The method of claim 1, wherein the laser component is one of an off-set laser component and a pass-through laser component, and the position of the first and second aim points is adjusted for the offset between the bore-path of the weapon and the laser beam projected by the laser component.
6. The method of claim 1, wherein, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 10 cm circle of a bull’s-eye

of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

7. The method of claim 6, wherein, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 4 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

8. A zeroing system comprising:
a laser component, provided on a weapon to be zeroed; and
a display configured to display a zeroing target, the zeroing target comprising a first aim point and a second aim point, wherein the position of the first and second aim point on the target corresponds to a type of weapon to be zeroed, a zero distance, and at least one of a zeroing caliber, a distance between the weapon and the zeroing target, and a type of laser component.

9. The zeroing system of claim 8, wherein the laser component is a bore-mounted laser component configured to align a laser beam projected by the laser component with a bore-path of the weapon when the laser component is provided on the weapon.

10. The zeroing system of claim 9, wherein the bore-mounted laser component comprises a bore rod configured to align the laser beam projected by the laser with the bore-path of the weapon.

11. The zeroing system of claim 8, wherein the laser component is one of an off-set laser component and a pass-through laser component, and the position of the first and second aim points is adjusted for the offset between the bore-path of the weapon and the laser beam projected by the laser component when the laser component is provided on the weapon.

12. The zeroing system of claim 8, wherein a weapon is zeroed when sights of the weapon are aligned with the first aim point and the laser beam projected by the laser component provided on the weapon is aligned with the second aim point simultaneously.

13. The zeroing system of claim 12, wherein, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 10 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

14. The zeroing system of claim 13, wherein, when tested with live ammunition corresponding to the zeroing caliber, the weapon registers 3 out of 5 shots within a 4 cm circle of a bull's-eye of a target set at the zeroing distance when the sights of the weapon are aimed at the bull's-eye and the weapon is stabilized.

15. The zeroing system of claim 8, wherein the distance between the weapon and the target is less than the zero distance and the position of the first aim point with respect to the second aim point corresponds to a live bullet trajectory offset according to the distance between the weapon and the target.

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