NON-LETHAL HAND PISTOL

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ABSTRACT

A weapon, such as a semi-automatic gun pistol, is disclosed for discharging high velocity, non-lethal projectiles utilizing pressurized gas. The weapon includes a housing having a handle and a projectile storage cylinder sized and shaped to receive a plurality of substantially spherical-shaped projectiles. A discharge barrel is mounted proximate the projectile storage cylinder and has an open muzzle end and a closed base end, while a projectile loading chamber is disposed at the barrel base end and communicates with the projectile storage cylinder. An enclosure is provided in the housing for receiving a removable pressurized gas storage source. A gas discharge cell communicates with the gas storage source in the enclosure and is adapted to receive compressed gas for selective projectile discharge. The weapon further includes a hammer and striker assembly for selectively releasing a charge of compressed gas from the gas discharge cell into the loading chamber to discharge a projectile through the barrel, and into said hammer and striker assembly to return said weapon to a firing-ready condition. Finally, a trigger assembly selectively operates the hammer and striker assembly.
FIG. 1
NON-LETHAL HAND PISTOL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to hand pistols and, more particularly, to weapons designed for self-defense. Specifically, the present invention relates to hand pistols including semi-automatic pistols which are non-lethal in design yet capable of delivering sufficient impact, chemical retardant, or both, to stop an assailant.

[0003] 2. Description of the Prior Art

[0004] Due to the actual or perceived threat of violence in today's society, firearms are more likely to be the weapon of choice for law enforcement personnel, the military and the public in situations where individuals believe that they must arm themselves in preparation for immediate retaliation or defense as a result of a threat of unknown force. Unfortunately, such firearms are typically weapons such as rifles, semi-automatic handguns and revolvers, all of which are intended to fire lethal projectiles which are intended to maim and/or kill.

[0005] As an alternative to lethal firearms, less lethal projectiles for firearms have been developed such as rubber bullets or fabric bagged bullets containing lead shot or heavy metal powder. Rubber bullets are generally relatively hard, are sometimes contained in a metallic core, and deliver their impact energy over a relatively small area. As a consequence, there is still a high probability of serious injury or even death to persons subjected to the impact of rubber bullets. Other types of non-lethal projectiles have been developed along with weapons for firing the same and are illustrated in U.S. Pat. No. 3,733,727, No. 5,221,809, No. 5,450,795 and No. 5,983,548.

[0006] A number of such non-lethal devices have been developed for use in circumstances that do not require lethal force. However, only a few have been sufficiently successful to be readily accepted. Some of these devices use a shotgun-size or larger caliber dedicated launcher to project a solid, soft projectile, while others use a smaller caliber launcher with variations of the rubber bullet concept to inject a tranquilizer drug or just stun the targeted person. Other defense methods used also include fire hoses, water cannons, mace, pepper spray and a variety of electric shock inducers.

[0007] Another technique for reducing the impact of projectiles involves the use of compressed gas. A variety of air and compressed gas guns are known and are capable of firing a variety of projectiles including BB's, lead pellets and paint balls. One common type of gun uses small cylinders containing compressed carbon dioxide. These metal cylinders have an end that can be punctured in order to release a high pressure gas. Guns of this type have been used for quite some time to fire lead pellets for purposes of game shooting and target shooting and more recently have been developed and adapted to fire paint pellets. These pellets are in the form of spherical gelatin capsules filled with a marking solution or paint. Guns that fire paint pellets are used in mock "war games" where the users of the guns attempt to hit other game participants with a paint color. Protective gear is worn to prevent inadvertent injury during such games. Examples of such compressed gas weapons are illustrated in U.S. Pat. No. 4,986,251, No. 5,349,939, No. 5,363,834, No. 5,634,456, No. 5,704,150 and No. 5,878,736. In addition, U.S. Pat. No. 4,173,211 discloses a pellet-loading device for a pellet gun. Unfortunately, these devices either do not fire with sufficient impact to stop an assailant, or else they utilize small pellets which can in fact be extremely harmful and even lethal at times due to their ability to penetrate the human skin. As a result, there remains a need for the general public as well as specific applications such as airplane pilots, policemen and riot control personnel, for a non-lethal weapon which has the capability of providing sufficient impact or other to temporarily debilitate or otherwise incapacitate an assailant yet is not designed to impart permanent injury or death. The present invention addresses this significant problem.

SUMMARY OF THE INVENTION

[0008] Accordingly, it is one object of the present invention to provide a weapon for discharging high velocity, non-lethal projectiles.

[0009] It is another object of the present invention to provide a weapon for defensive use which avoids the use of deadly force.

[0010] Yet another object of the present invention is to provide a semi-automatic pistol which is capable of stopping an assailant without the use of projectiles designed to penetrate the human body or materials such as aircraft windows or fuselage.

[0011] Still another object of the present invention is to provide an impact weapon and/or chemical retardant delivery system which offers the consumer an alternative to deadly firearms for defensive purposes.

[0012] To achieve the foregoing and other objects and in accordance with the purpose of the present invention, as embodied and broadly described herein, a weapon is disclosed for discharging high velocity, non-lethal projectiles utilizing pressurized gas. The weapon includes a housing having a handle and a projectile storage cylinder sized and shaped to receive a plurality of substantially spherical-shaped projectiles. A discharge barrel is mounted proximate the projectile storage cylinder and has an open muzzle end and a closed base end, while a projectile loading chamber is disposed at the barrel base end and communicates with the projectile storage cylinder. An enclosure is provided in the housing for receiving a removable pressurized gas storage source. A gas discharge cell communicates with the gas storage source in the enclosure and is adapted to receive compressed gas for selective projectile discharge. The weapon further includes a hammer and striker assembly for selectively releasing a charge of compressed gas from the gas discharge cell into the loading chamber to discharge a projectile through the barrel, and into said hammer and striker assembly to return said weapon to a firing-ready condition. Finally, a trigger assembly selectively operates the hammer and striker assembly.

[0013] In one modification of the invention, the pressure of the gas charge released by the gas discharge cell may be varied between 400-800 psig, per charge, while the removable gas storage source may be in the form of a replaceable gas cartridge disposed in the enclosure containing compressed gas of an amount sufficient for up to 20 charges. Additionally, the projectiles are preferably spheres, and the projectile storage chamber may further include a spring bias...
mechanism for urging movement of the spheres into the loading chamber. The spheres may preferably be made of solid or hollow aluminum, stainless steel, nylon or any other dense material, and are approximately 0.5"-0.8" in diameter and 3-5 grams in weight. Alternatively, the spheres are substantially hollow, adapted for breakage upon impact and contain a chemical solution for incapacitating the impact recipient. Moreover, the weapon may preferably be in the form of a semi-automatic pistol.

[0014] In another modification of the invention, the hammer and striker assembly includes a striker recoil element adapted for reciprocal movement between first and second striker positions, and a hammer element is also adapted for reciprocal movement between first and second hammer element positions. A first spring bias member is provided for urging the hammer element in a first direction from the first hammer element position to the second hammer element position to impact the striker recoil element and move it to the second striker position. A gas discharge valve is adapted for releasing a charge of gas from the gas discharge cell to the loading chamber upon movement of the striker recoil element to the second striker position resulting from impact by the hammer element. A secondary gas discharge aperture is adapted to release a portion of the charge of gas from the gas discharge cell within the hammer element to return the hammer element to its first hammer element position while closing the gas discharge valve. Finally, a trigger assembly selectively retains the hammer element in its first hammer element position until release.

[0015] Yet another modification of the invention includes a weapon for discharging high velocity projectiles utilizing pressurized gas wherein the weapon includes a housing having a handle and a projectile storage cylinder sized and shaped to receive a plurality of projectiles. A discharge barrel has an open muzzle end and a closed base end proximate the projectile storage cylinder, and a projectile loading chamber is disposed at the barrel base end and communicates with the projectile storage cylinder. An enclosure is provided and for receives a removable pressurized gas storage cartridge. A gas discharge cell is disposed in the sleeve for communicating with the gas storage cartridge in the enclosure and adapted to receive a charge of compressed gas for selective projectile discharge. A valve assembly is further disposed in the sleeve and associated with the gas discharge cell to control the release of gas into the loading chamber for projectile discharge. A conduit member interconnects the gas discharge cell and the loading chamber. A hammer element is adapted for reciprocal movement along the conduit member between first and second hammer element positions, while a striker recoil element is adapted for reciprocal movement along the conduit member between first and second striker positions. A first spring bias member is provided for urging the hammer element in a first direction from the first hammer element position to the second hammer element position to impact the striker recoil element and move it to the second striker position. A primary gas discharge opening is defined in the distal end of the conduit at the loading chamber. A gas discharge valve is then adapted for releasing a charge of gas from the gas discharge cell through the conduit and said primary gas discharge opening into the loading chamber upon movement of the striker recoil element to the second striker position resulting from impact by the hammer element. A secondary gas discharge aperture is also provided and is adapted to release a portion of the charge of gas from the gas discharge cell within the hammer element to return the hammer element to the first hammer element position while closing the gas discharge valve. Finally, a trigger assembly is provided for selectively operating the hammer element.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings which are incorporated in and form a part of the specification illustrate preferred embodiments of the present invention and, together with a description, serve to explain the principles of the invention. In the drawings:

[0018] FIG. 1 is a side elevation view, with some parts in section and some parts in shadow, of a semi-automatic pistol embodiment constructed in accordance with the present invention;

[0019] FIG. 2 is an enlarged, cross-sectional view, with parts in elevation, of a gas discharge cell and valve assembly embodiment constructed in accordance with the present invention and utilized with the embodiment of FIG. 1;

[0020] FIG. 3A is an enlarged side view of a striker recoil element embodiment utilized in conjunction with the hammer element of the present invention;

[0021] FIG. 3B is an enlarged side view of an alternate striker recoil element embodiment utilized in conjunction with the hammer element of the present invention;

[0022] FIG. 4 is a partial side view of a hammer element and assembly embodiment utilized with the present invention;

[0023] FIG. 5 is a partial side elevation view of the trigger assembly of the embodiment illustrated in FIG. 1; and

[0024] FIG. 6 is an enlarged side elevation view of the trigger and cam components of the trigger assembly of the embodiment illustrated in FIG. 5.
DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0025] Referring to FIG. 1, a non-lethal hand pistol 10 is disclosed and uses compressed gas to fire a lightweight aluminum or similar material projectile or pepper spray ball at sufficient velocity to cause significant pain or incapacity upon impact but not penetrate the human body. This impact or striker gun preferably contains a replaceable gas cartridge as disclosed below and may fire up to six or more projectiles, “bullets” or balls. In preferred form, the spherical bullets are approximately 0.5-0.8 inches in diameter, or about 64-75 caliber, weigh 3-5 grams and are made of hollow spheres containing pepper spray or other chemical solution, are hollow stainless steel, or may be solid spherical rubber or aluminum bullets. Preferably, the projectiles may be made of nylon, plastic or any other appropriate material designed to contain a chemical solution like pepper spray and to break upon impact, thereby releasing the spray into the face of the assailant.

[0026] Moreover, the replaceable gas cartridge may contain compressed carbon dioxide, nitrogen or air and preferably contains sufficient gas to discharge up to 20 bullets before replacement is necessary. However, the preferred design will discharge about 6-7 spheres per gas cartridge. As a result, the spherical bullets are fired at velocities up to approximately 400 fps. This projectile size, shape, weight and velocity combination is sufficient to stop an aggressive attacker at close range without causing fatal wounds. Although this gun is designed to be non-lethal, it is possible to still cause lethal injuries if a bullet were solid metal and were to strike a person at a vulnerable spot under certain limited circumstances. Nonetheless, the difference between the present invention and a typical firearm is that the prior art firearm is designed to fire a high velocity bullet that penetrates the human body and causes severe internal injuries, while this device is not designed to do so.

[0027] The bullets of the invention can be solid or hollow and are preferably held in a straight, horizontal magazine as disclosed below. A spring mechanism as further discussed in greater detail is associated with the magazine to allow semi-automatic firing in several of the embodiments. The velocity of the spherical bullets may allow them to hit the attacker with varying force as a situation requires, because the present invention includes a mechanism for varying the amount of gas released to discharge the projectiles as the circumstances warrant. Moreover, the preferred embodiment utilizes hollow plastic spheres containing pepper spray or mace. These are designed to break upon impact and dissipate the spray in many directions, thereby temporarily incapacitating the assailant or target due to impaired vision and the like.

[0028] Referring again to FIG. 1, the hand pistol 10 of the present invention includes a housing 12 having a handle 14, a barrel 16 and a projectile or bullet storage cylinder or magazine 18. The barrel 16 preferably includes an open muzzle end 20 and a closed base end 22 serving as a projectile loading chamber. A plurality of preferably spherical projectiles 24 are disposed in the magazine 18 in aligned fashion and are maintained under slight compression by a muzzle spring member 26. The spring member 26 provides the force to urge a single projectile 24 into the projectile loading chamber 22 through a loading port 27 after a previously loaded projectile is fired from the barrel 16. In preferred form, a rubber flap or other flexible element 28 is provided in the interior of the barrel 16 downstream from a loaded projectile 24. The flap 28 maintains the projectile 24 in the loading chamber 22 without interfering with the firing of the projectile, since its elasticity simply allows it to fold forward and not impede forceful outward movement of a fired projectile. While the exemplary embodiment is a hand pistol, it should be understood that the present invention is not so limited and that any type of handheld weapon, i.e. rifles, hand pistols and the like, that embodies the inventive concepts disclosed and claimed herein.

[0029] In this particular embodiment, the magazine 18 is mounted over the barrel 16 and the rest of the housing 12. A rear opening 36 is provided in the end of the magazine 18, and a plug element 38 is threadably engageable therewithin. The projectiles 24 are loaded into the magazine 18 through the opening 36, and the spring member 26 is engaged and tightened against the loaded projectiles 24 by the threading action of the plug 38.

[0030] A cylindrical sleeve 40 is formed in the housing 12 coaxial with the barrel 16 and is sized and shaped to contain the operating components of the gun 10, as described below. The handle 14, in preferred form, includes an enclosure 42 which is accessed through an opening 44 and maintained in a closed position by a closure member 46. A removable compressed gas cylinder or cartridge 48 is positioned within the enclosure 42 and provides the firing propellant for the projectiles 24. The operating components of the weapon 10 include a trigger 30, a hammer and striker assembly 50, a gas discharge cell with valve assembly 52, and a cocking bolt 54 adapted to move within a bolt slot 55. A velocity adjustment control 56 may be incorporated if desired, although this is not essential to the invention.

[0031] In preferred form, the gas cartridge 48 is inserted into the enclosure 42 but not activated until needed by twisting the loading closure member or knob 46, which presses the cartridge 48 into place and causes the end 49 of the cartridge 48 to puncture. Appropriate seals 51 may be utilized to hold the gas pressure until needed. The seals 51 may hold the gas pressure for months after the cartridge end 49 is punctured. As previously stated, an integral pressure gauge 54 may indicate the pressure remaining in the cartridge 48. The gauge 54 informs the user that the cartridge end 49 has been punctured and that sufficient gas remains for firing. The gas then passes from the punctured end 49 through a tube 58 into the gas discharge cell 52. A valve assembly 60 is provided in the discharge cell 52 for rapidly delivering a charge of expanding gas, which preferably varies from 400-800 psi, into the loading chamber 22, upon pulling the trigger 30, to propel a projectile 24 out of the barrel 16. The valve assembly 60 is integrally associated with the hammer and striker assembly to accomplish this.

[0032] Referring now with particularity to FIGS. 2-4, a hammer element 62 is maintained in position within the sleeve 40 by a trigger assembly 64, as described in greater detail below. A discharge conduit 66 extends from its open distal end 68 in the loading chamber 22 along the sleeve 40 through the gas discharge cell 52 and terminates in a threaded portion 70 exterior to the housing 12. The hammer element 62 is disposed along the conduit 66 and is adapted to move longitudinally therealong. The hammer element 62
preferably includes a radially notched exterior area 63 sized and shaped to interact with the trigger assembly 64 as described below. In addition, the interior of the hammer element 62 is hollow and includes an inner chamber 65 having an open front end portion 71 and an interior end surface 67. A first O-ring 69 is provided about the exterior of the hammer element proximate the front end portion 71 and is adapted to seal the hammer element 62 against air blow-by as it moves longitudinally along the interior of the sleeve 40.

[0033] A striker recoil element 72 or 72' is threadably secured to the end of the conduit 66 proximate the distal end 68 thereof and is sized and shaped to engage and impact the interior end surface 67 of the hammer element 62 when the hammer element 62 is moved along the conduit 66 through the sleeve 40. The recoil element 72 and 72' each includes a central aperture 73 coaxially aligned with the distal end 68 of the conduit 68 so that air may pass therethrough into the firing chamber 22. Moreover, a second O-ring 75 is provided about the exterior surface of the recoil element 72 and 72' to prevent air blow-by thereof as it travels along the inner chamber 65 of the hammer element 62. A spring member 76 engages the opposite end 74 of the hammer element 62 to provide a bias force against the hammer element 62 to urge it along the conduit 66 toward the striker recoil element 72 or 72', the trigger assembly 64 maintaining the hammer element 62 in its “cocked” or “loaded” condition with the spring member 76 under compression.

[0034] An aperture 78 is provided in the conduit 66 proximate the distal end 68 and is located under the recoil element 72 or 72' when attached thereto. The aperture 78 is in fluid communication with both the interior of the conduit 66 and the interior 65 of the hammer element 62. When the trigger assembly 64 is released by the pulling of the trigger pull 30, the spring member 76 forces the hammer element 62 quickly along the conduit 66 through the sleeve 40 to impact the striker recoil element 72, 72' with the interior surface 67. This action moves the striker recoil element 72, 72' along with the associated conduit 66 longitudinally within the sleeve 40. It also enables the hammer element 62 to move axially into the loading chamber 22 to slightly impact the projectile 24 therein while simultaneously blocking the loading port 27. However, the gas rapidly discharged out through the distal end 68 of the conduit 66 is what propels the projectile 24 out of the barrel 16. Moreover, a small amount of the discharged gas escapes through the aperture 78 into the hammer element chamber 65 and thereby forces the hammer element 62 longitudinally back to its cocked position while compressing the spring 76 and reengaging the hammer element 62 with the trigger assembly 64.

[0035] The gas discharge cell 52 is preferably in the form of a sealed cylinder 80 having a front seal 82 through which the conduit 66 passes, which is further sealed by an O-ring 84, and a rear seal 86 abutting a rear retainer 88, through which the conduit 66 also passes. A valve port 90 is provided in the conduit 66 within the cylinder 80 of the cell 52 proximate the rear seal 86. When the port 90 is open to the interior of the cylinder 80, discharge gas passes therein into the conduit 66 and rapidly along its length until it is discharged primarily out of the distal end 68 to propel the projectile 24 out of the barrel 16. The air is then secondarily discharged through the aperture 78 to reverse the movement of the hammer element 62 and conduit 66 to close the valve port 90. When the valve port 90 is closed by engagement within the rear seal 86, no gas is discharged through the conduit 66. A valve seat 92 is secured to the conduit 66 adjacent the valve port 90, and a spring member 94 engages a front plate 96 at the front seal 82 and the valve seat 92 within the cylinder 80. The spring member 94 is adapted to urge the valve seat axially toward the rear seal 86 so as to normally maintain the valve port 90 in a closed position within the seal 86.

[0036] When the conduit 66 and all of the components attached thereto or associated therewith, i.e. the striker recoil element 72, the aperture 78 and the valve seat 92, are moved axially within the sleeve 40 toward the loading and firing chamber upon impact of the hammer element surface 67 against the striker recoil element 72, 72', the valve port 90 is momentarily opened and exposed to the interior of the cylinder 80. At this moment, compressed gas within the cell 52 rushes into the valve port 90 down along the length of the conduit 66 and out of the distal end 68 to propel the projectile 24 in the loading chamber 22 out of the barrel 16 along with a slight impact provided by the hammer element 62. However, the primary propellant is the compressed gas discharged out of the distal end 68. As previously indicated, residual compressed gas escapes through the aperture 78 to return the hammer element 62 and conduit 66 to their initial position along with action by the spring member 94. Therefore, the force imposed on the projectile 24 and the resulting impact provided by the projectile against its target is directly dependent on the amount and resulting force of gas discharged at the distal end 68. This, in turn, is then directly dependent on the amount of time the valve port 90 is open and exposed to the interior of the cell 52.

[0037] As previously stated, a threaded adjustment portion 70 of the conduit 66 may be disposed exterior to the housing 12 to permit adjustment of the gas discharge into the opening 90 by adjusting the exposure of the port 90 to the interior of the chamber 82. It should be understood, however, that this adjustment feature is optional to the present invention. In this adjustment embodiment, the velocity adjustment knob 56 is threadably engaged over the adjustment portion 70 so that the inner adjustment plate 98 of the knob 56 is designed to impact the rear retainer 88 when the conduit 66 is moved longitudinally by the hammer element 62 and thereby terminate the longitudinal travel of the conduit 66 and the components attached thereto. Thus, the greater the distance between the rear retainer plate 88 and the inner adjustment plate 98, the greater the distance traveled by the conduit 66, which in turn means the longer the valve port 90 remains in an open position and the greater the amount of gas in the gas charge imposed on the projectile 24. Likewise, if the distance between the rear retainer plate 88 and the inner adjustment plate 98 is decreased, the time the valve port will be in open in a position is also decreased thereby decreasing the gas discharge volume and resulting projectile impact force. Consequently, the force of the fired projectiles may be readily varied from shot to shot by simply turning the velocity adjustment knob 56.

[0038] It should also be noted that as the spring member 94 within the cell 52 urges the valve seat 92 against the rear seal 86 and thereby closes the valve port 90, the aperture 78 directs the gas into the interior chamber 65 of the hammer element 62. This expands and acts to return the hammer element 62 to its initial “loaded” position. When this occurs,
the trigger assembly engages the hammer element 62 to retain it in this position until the trigger pull 30 is pulled once again. Moreover, when the hammer element 62 returns to its initial position, the striker recoil element 72, 72' also returns to its respective initial position. This action resets the striker recoil element 72, 72' for another impact by the hammer element 62, and the return movement of the hammer element 62 opens the loading port 27. This return action by the hammer element 62 in turns enables the spring member 26 in the magazine 18 to urge another projectile 24 from the magazine 18 automatically into the loading chamber 22, to ready the gun 10 for another firing. In addition, the cocking bolt 54 is attached to the hammer element 62 and moves therewith. Since the bolt 54 projects out of the slot 55, the hammer element 62 may be manually cocked to engage the trigger assembly 64 therewith by pulling the bolt 54 rearwardly.

[0039] Referring now to FIGS. 1, 5 and 6, one preferred form of the trigger assembly 64 is disclosed. In this embodiment, the assembly 64 includes a trigger pull 30 which is pivotally attached to the housing 12 by a pivot pin 100. The trigger pull 30 includes a forward extension arm 102 and a rearwardly extending cam 104 which includes a cam surface 106. A trigger control arm 108 is mounted on a slide pin 110 and includes a cam pin 112 extending from a first end thereof to engage the cam surface 106 of the trigger pull 30. The second control end 114 of the trigger control arm 108 is adapted to selectively engage a catch 116 formed in the notch 63 of the hammer element 62 to maintain the hammer element 62 in its loaded position in opposition to the bias force of the spring member 76. When the trigger pull 30 is moved rearwardly in the direction of the arrow 118, the cam surface 106 rotates the cam pin 112 and disengages the control end 114 from the hammer catch 116, thereby releasing the hammer element 62 to move forward within the sleeve 40 as described above. When the hammer element 62 returns to its starting position, the catch 116 reengages the control end 114 to retain the hammer in its loaded position until the trigger pull is again moved rearwardly.

[0040] A safety pin 120 is preferably positioned forward of the trigger pull 30 and is adapted to move laterally relative to the longitudinal axis of the housing 12 and includes a thick portion 122 and a thin portion 124, as illustrated. The forward extension arm 102 is sized so that it will strike the pin 120 when the trigger pull 30 is pulled rearwardly in the direction of the arrow 118. In this manner, when the pin 120 is in its safety position, the thicker portion 122 of the pin 120 engages the forward extension arm 102 so that the trigger pull is incapable of being moved rearwardly a sufficient distance to disengage the control end 114 from the catch 116. When the pin 120 is moved laterally to present the thin portion 124 for engagement with the forward extension arm 102, the control end 114 disengages from the catch 116 permitting the hammer element 62 to move.

[0041] As described above with respect to the embodiment of FIGS. 1 and 2, the projectile 24 velocity may be controlled by adjusting the amount of compressed gas released from the discharge cell 52 into the loading chamber 22 by changing the position of the velocity adjustment control 56 on the conduit adjustment portion 70. Another manner of controlling the velocity of the projectiles 24 is by providing the same gas pressure in each gas charge transferred from the cell 52 into the loading chamber 22, and then venting varying portions of the discharged gas in the loading chamber to thereby adjust the total gas pressure pushing the projectile 24 out of the barrel 16.

[0042] As can be seen from the above, a non-lethal hand pistol is disclosed which utilizes compressed gas to fire a lightweight aluminum or similar metal bullet at sufficient velocity to cause severe pain but not to penetrate the human body. Moreover, rubber spheres as well as plastic spheres containing pepper spray or other chemical incapacitating solution contained therein may be used with the device of the present invention. Additionally, paint balls may be adapted for use with the device of the invention for play. As discussed above, the projectiles can be solid or hollow and are fired at velocities generated by gas pressures of from 400-800 psi per firing. The variable velocity setting capability of one embodiment of the present invention allows the bullets to hit the attacker with mild to severe force as the situation may require. Moreover, sufficient force to break spherical chemical projectiles may be used.

[0043] Manually pulling back the cocking bolt of the present invention places the gun in an armed position by pulling back the hammer, loading the first bullet and then allowing gas to enter the valve assembly. Pulling the trigger activates the hammer, opens the valve and allows gas to enter the bolt assembly, thereby discharging a bullet. The trigger is spring-loaded, and the return hammer action loads the next bullet and refills the valve with gas for the next firing, allowing for semi-automatic firing of the bullets in several of the embodiments.

[0044] Load noise is also an important factor in deterring an attacker. Because of this, the weapon of the present invention may incorporate a valve/hammer/bolt and barrel design that maximizes the “bang” sound produced by the expanding gas when firing the gun. Also, the surface profile of the bullets themselves can be shaped in such a way as to produce a sound in flight that can be heard by the attacker as the projectiles speed by, letting the attacker know that he is being shot at.

[0045] Prior art firearms utilize levers and springs to accomplish loading of bullets into the firing chamber, firing the bullets, discharging the spent shells, and the like. Having gas pressure available with the present invention allows the invention to use pneumatics to accomplish all of these functions and more. The pneumatics of the invention allow the weapon to control the exit velocity of the projectiles, which cannot be done with a typical firearm. Moreover, in a typical firearm the amount of gun powder is pre-loaded in the shell of a bullet. The pneumatics of the present invention, however, allows one to control functions away from the trigger providing more design freedom and configuration options. Moreover, prior art firearm bullets are dangerous in and of themselves since they contain gun powder and can explode when struck or overheated. The present invention permits projectiles to be loaded and be completely safe until the gas cartridge is activated. It is also equipped with a safety button that locks the trigger and keeps it from moving.

[0046] The energy contained in compressed gas is considerable. The energy contained in liquefied compressed gas such as carbon dioxide is even more powerful. A standard 12-gram carbon dioxide gas cartridge, as disclosed above, has sufficient power to fire up to 20 of the solid aluminum projectiles at a mild velocity setting or 6-7 projectiles at a
severe impact velocity. Since there is generally more gas available in one gas cartridge than needed to fire an entire projectile magazine, some of the excess gas can be utilized to maximize the “bang” sound as discussed above. Moreover, some of the gas is also used to re-cock the weapon. Because there is no gun powder involved in the weapon of the present invention, a non-lethal gun constructed in accordance with the present invention can be completely wet yet still fired successfully. It can even be submerged and then used successfully.

[0047] While the present invention does not have the deadly stopping power of a high velocity bullet fired from a prior art firearm, such deadly force is generally not necessary to deter many typical crimes. Moreover, there are many situations where deadly force is either not needed, wanted or even permitted by law. In fact, many states prohibit the use of deadly force unless one’s own life or the lives of one’s family are at stake. Many crimes do not involve this type of situation, such as burglaries, vandalism, robberies and the like where your own life is clearly not in danger. As a result, severe bruises inflicted on a criminal utilizing a weapon constructed in accordance with the present invention would very likely stop the crime in progress or at least provide a temporary time break, permitting one to flee in safety. Alternatively, chemical spray, such as mace or pepper spray, dispersed by broken projectiles upon impact can readily temporarily incapacitate a person committing a crime.

[0048] The present invention is especially useful since it does have the capability of varying the force with which a projectile is shot. None of the prior references provide such accommodation features in a non-lethal weapon which is specifically designed to deter crime, rather than to provide entertainment.

[0049] The foregoing description and the illustrative embodiments of the present invention have been described in detail in varying modifications and alternate embodiments. It should be understood, however, that the foregoing description of the present invention is exemplary only, and that the scope of the present invention is to be limited to the claims as interpreted in view of the prior art. Moreover, the invention illustratively disclosed herein suitably may be practiced in the absence of any element which is not specifically disclosed herein.

I claim:

1. A weapon for discharging high velocity, non-lethal projectiles utilizing pressurized gas, said weapon comprising:
   a housing including a handle and a projectile storage cylinder sized and shaped to receive a plurality of substantially spherical-shaped projectiles;
   a discharge barrel having an open muzzle end and a closed base end proximate said projectile storage cylinder;
   a projectile loading chamber disposed at said barrel base end and communicating with said projectile storage cylinder;
   an enclosure for receiving a removable pressurized gas storage source;
   a gas discharge cell communicating with a gas storage source in said enclosure and adapted to receive compressed gas for selective projectile discharge;
   a hammer and striker assembly for selectively releasing a charge of compressed gas from said gas discharge cell into said loading chamber to discharge a projectile through said barrel and into said hammer and striker assembly to return said weapon to a firing-ready condition; and
   a trigger assembly for selectively operating said hammer and striker assembly.

2. The weapon as claimed in claim 1, wherein the pressure of said gas charge released by said gas discharge cell may be varied between 400-800 psig. per charge.

3. The weapon as claimed in claim 2, wherein said removable gas storage source comprises a replaceable gas cartridge disposed in said enclosure and containing compressed gas of an amount sufficient for up to 20 charges.

4. The weapon as claimed in claim 1, wherein said hammer and striker assembly comprises a hammer element and a striker recoil element, both adapted for reciprocal movement within said housing to control loading of a projectile from said projectile storage cylinder to said loading chamber while simultaneously controlling the return of said hammer element to an armed position.

5. The weapon as claimed in claim 1, wherein said projectiles comprise spheres, and wherein said projectile storage chamber further includes a spring bias mechanism for urging movement of said spheres into said loading chamber.

6. The weapon as claimed in claim 5, wherein said spheres are approximately 0.5“-0.8” in diameter and 5-10 grams in weight.

7. The weapon as claimed in claim 6, wherein said spheres are substantially hollow, adapted for breakage upon impact and contain a chemical solution for incapacitating the impact recipient.

8. The weapon as claimed in claim 6, wherein said spheres are constructed from material selected from the group consisting of aluminum, stainless steel, nylon, and other dense solid materials.

9. The weapon as claimed in claim 1, wherein said weapon comprises a semi-automatic pistol.

10. The weapon as claimed in claim 1, wherein said weapon further comprises a valve assembly associated with said gas discharge cell adapted to permit selective variance of the compressed gas charge pressure released by said hammer assembly to correspondingly vary the velocity and impact of the discharged projectile.

11. The weapon as claimed in claim 10, wherein said valve assembly comprises a projectile velocity adjustment knob for selectively varying the volume of gas discharged by said gas discharge cell into said loading chamber in any one single charge.

12. The weapon as claimed in claim 1, wherein said hammer and striker assembly comprises a striker recoil element adapted for reciprocal movement between first and second striker positions, a hammer element adapted for reciprocal movement between first and second hammer element positions, a first spring bias member for urging said hammer element in a first direction from said first hammer element position to said second hammer element position to impact said striker recoil element and move it to said second striker position, a gas discharge valve adapted for releasing a charge of gas from said gas discharge cell to said loading chamber upon movement of said striker recoil element to said second striker position resulting from impact by said
hammer element, a secondary gas discharge aperture adapted to release a portion of said charge of gas from said gas discharge cell within said hammer element to return said hammer element to its first hammer element position while closing said gas discharge valve, said trigger assembly selectively retaining said hammer element in its first hammer element position until release.

13. The weapon as claimed in claim 12, wherein said weapon further comprises a conduit member interconnecting said gas discharge cell and said loading chamber, said gas discharge valve being disposed in said conduit within said gas discharge cell and including a valve seat for opening and closing said valve.

14. The weapon as claimed in claim 13, wherein said conduit further comprises a primary gas discharge opening disposed in the distal end of said conduit at said firing chamber to release gas therein and fire said projectile, said secondary gas discharge aperture being disposed in said conduit proximate said distal end and covered by said striker recoil element to divert gas into said hammer element to return it to its first position.

15. In a weapon for discharging high velocity projectiles utilizing pressurized gas, said weapon including a housing having a handle and a projectile storage cylinder sized and shaped to receive a plurality of projectiles, a discharge barrel having an open muzzle end and a closed base end proximate the projectile storage cylinder, a projectile loading chamber disposed at the barrel base end and communicating with the projectile storage cylinder, an enclosure for receiving a removable pressurized gas storage cartridge, a hammer assembly for selectively releasing a charge of compressed gas from the pressurized gas storage cartridge into the loading chamber to discharge a projectile through the barrel, and a trigger assembly for selectively operating the hammer assembly, the improvement wherein said weapon is adapted for discharging high velocity, non-lethal projectiles and further comprises a gas discharge cell communicating with said gas storage cartridge and adapted to receive a charge of compressed gas therefrom for selective release into said projectile loading chamber for projectile discharge, and a valve assembly associated with said gas discharge cell adapted to control the release of gas into said loading chamber for projectile discharge.

16. The weapon improvement of claim 15, wherein said projectile storage cylinder comprises a spring loaded magazine having a spring bias member for urging the non-lethal projectiles into said projectile loading chamber.

17. The weapon improvement of claim 15, wherein said hammer assembly comprises a striker recoil element adapted for reciprocal movement between first and second striker positions, a hammer element adapted for reciprocal movement between first and second hammer element positions, a first spring bias member for urging said hammer element in a first direction from said first hammer element position to said second hammer element position to impact said striker recoil element and move it to said second striker position, a gas discharge valve adapted for releasing a charge of gas from said gas discharge cell through a primary gas discharge opening into said loading chamber upon movement of said striker recoil element to said second striker position resulting from impact by said hammer element, a secondary gas discharge aperture adapted to release a portion of said charge of gas from said gas discharge cell within said hammer element to return said hammer element to its first hammer element position while closing said gas discharge valve, said trigger assembly selectively retaining said hammer element in its first hammer element position until release.

18. The weapon improvement of claim 17, wherein said weapon further comprises a conduit member interconnecting said gas discharge cell and said loading chamber, said gas discharge valve being disposed in said conduit within said gas discharge cell and including a valve seat for opening and closing said valve, said primary gas discharge opening being disposed in the distal end of said conduit at said firing chamber.

19. The weapon as claimed in claim 18, wherein said secondary gas discharge aperture is disposed in said conduit proximate said distal end and covered by said striker recoil element to divert gas into said hammer element to return it to its first position.

20. The weapon as claimed in claim 18, wherein said valve assembly further comprises a projectile velocity adjustment knob for selectively varying the amount of gas discharged into said gas discharge cell from said gas storage cartridge to vary the volume of gas in any one single charge for release into said loading chamber.

21. A semi-automatic pistol for discharging high velocity, non-lethal projectiles utilizing pressurized gas, said pistol comprising:

- a housing including a handle, a discharge barrel having an open muzzle end and a closed base end, a projectile storage cylinder sized and shaped to receive a plurality of aligned and substantially spherical-shaped projectiles and positioned adjacent and substantially parallel to said discharge barrel, and a sleeve for containing pistol operating elements;
- a projectile loading chamber disposed at said barrel base end and communicating with said projectile storage cylinder;
- an enclosure for receiving a removable pressurized gas storage cartridge;
- a gas discharge cell disposed in said sleeve for communicating with the gas storage cartridge in said enclosure and adapted to receive a charge of compressed gas for selective projectile discharge;
- a valve assembly disposed in said sleeve and associated with said gas discharge cell to control the release of gas into said loading chamber for projectile discharge;
- a conduit member interconnecting said gas discharge cell and said loading chamber;
- a hammer element adapted for reciprocal movement along said conduit member between first and second hammer element positions;
- a striker recoil element adapted for reciprocal movement along said conduit member between first and second striker positions;
- a first spring bias member for urging said hammer element in a first direction from said first hammer element position to said second hammer element position to impact said striker recoil element and move it to said second striker position;
- a primary gas discharge opening defined in the distal end of said conduit at said loading chamber;
a gas discharge valve adapted for releasing a charge of gas from said gas discharge cell through said conduit and said primary gas discharge opening into said loading chamber upon movement of said striker recoil element to said second striker position resulting from impact by said hammer element;

a secondary gas discharge aperture adapted to release a portion of said charge of gas from said gas discharge cell within said hammer element to return said hammer element to said first hammer element position while closing said gas discharge valve; and

a trigger assembly for selectively operating said hammer element.

22. The semi-automatic pistol as claimed in claim 21, wherein said sleeve is positioned coaxially with said barrel.

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