resulting in loss of life in situations such as during police use and battlefield operations. It is desirable to assure that the gas pressure in the chamber is sufficiently low to allow the locking lugs to rotate fully when the bolt is being unlocked.

[0013] These reliability shortcomings of such contemporary firearms can result in the failure thereof. The failure of the firearm, particularly during critical police use and battlefield operations, can result in loss of life. Therefore, it is desirable to provide firearms that do not suffer from these reliability shortcomings.

BRIEF SUMMARY

[0013a] According to a first aspect, there is provided a firearm comprising: a bolt having a plurality of locking lugs; a piston formed on the bolt and having a plurality of rings configured to cooperate with the piston to mitigate gas leakage past the piston, each of the rings having a key formed thereon and a gap formed completely therethrough such that the gap of one ring is configured to receive at least a portion of the key of another ring; a bolt carrier to which the bolt is movably attached, the bolt carrier having a double cut cam; a weight movably disposed within the bolt carrier, the weight being configured to inhibit rearward and forward bouncing of the bolt carrier; first and second springs that centrally bias the weight; a carrier key attached to the bolt; a tube configured to provide gas from a barrel of the firearm to the piston via the carrier key, the tube having a heat radiator formed on at least a portion of the tube; a gas metering plug having a gas metering hole configured to meter gas from the barrel of a firearm to the bolt carrier of the firearm, wherein the gas metering hole is located away from a gas port of the firearm; and a front sight block having a rear band and a front band for attaching the sight block to the barrel and having a gas passage formed in the front band for facilitating gas flow from the barrel to a gas tube of the firearm.

[0013b] According to a second aspect, there is provided a bolt group for a firearm comprising: a bolt having a plurality of locking lugs; a piston formed on the bolt and having a plurality of rings configured to cooperate with the piston to mitigate gas leakage past the piston, each of the rings having a key formed thereon and a gap formed completely therethrough such that the gap of one ring is configured to receive at least a portion of the

key of another ring; a bolt carrier to which the bolt is movably attached, the bolt carrier having a double cut cam; a weight movably disposed within the bolt carrier, the weight being configured to inhibit rearward and forward bouncing of the bolt carrier; first and second springs that centrally bias the weight; and a carrier key attached to the bolt carrier.

[0013c] According to a third aspect, there is provided a method comprising: mitigating gas leakage past a piston of a firearm using a plurality of rings, each one of the rings having a key formed thereon and a gap formed therein; wherein the gap of one of the rings is formed completely therethrough and receives at least a portion of the key of another of the rings; and inhibiting rearward and forward bouncing of a bolt carrier with a weight that is movably disposed within the bolt carrier and first and second springs that centrally bias the weight.

[0013d] According to a fourth aspect, there is provided a firearm comprising: a barrel; a gas port formed in the barrel; a gas tube; a bolt carrier; a weight movably disposed within the bolt carrier, the weight being configured to inhibit rearward and forward bouncing of the bolt carrier; first and second springs that centrally bias the weight; a front sight block having a rear band and a front band for attaching the sight block to the barrel and having a gas passage for facilitating gas flow from the barrel to the gas tube; and a gas metering plug having a gas metering hole configured to meter gas from the barrel the bolt carrier, wherein the gas metering hole is located away from the gas port.

[0013e] According to a fifth aspect, there is provided a firearm comprising: a bolt carrier; a weight movably disposed within the bolt carrier, the weight being configured to inhibit rearward and forward bouncing of the bolt carrier; and first and second springs that centrally bias the weight.

[0013f] According to a sixth aspect, there is provided a method of assembling a firearm comprising: providing a bolt carrier; movably disposing a weight within the bolt carrier; providing first and second springs that centrally bias the weight; and wherein the weight is configured to inhibit rearward and forward bouncing of the bolt carrier.

[0014] In accordance with embodiments further described herein, methods and systems are provided for enhancing the reliability of firearms, such as firearms in the M16/M4 family of firearms. For example, an embodiment can comprise a firearm having a bolt with a plurality of locking lugs that are configured to have a shear area that is at least approximately 1.3 times that of a standard M16/M4. A piston can be formed on the bolt and can have a plurality of rings that are configured to cooperate with the piston to mitigate gas leakage past the piston. Each of the rings can have a key formed thereon and a gap formed therein such that the gap of one ring is configured to receive at least a portion of the key of another ring. A bolt carrier can have the bolt movably attached thereto. The bolt carrier can have a double cut cam. The double cut cam can have a starting point in an unlocked position of the bolt that is substantially the same as the standard M16 cam and can have an unlocking cam surface that has sufficient dwell to increase to delay a start of unlocking when the bolt carrier is used in an M4 carbine. Thus, the dwell can be increased with respect to an M4 carbine lacking a double cut cam. A weight can be movably disposed within the bolt carrier. The weight can be configured to inhibit rearward and forward bouncing of the bolt carrier. A long stroke carrier key can be attached to the bolt carrier and can be configured to facilitate a stroke of the bolt carrier that is approximately 0.360 inch longer than that of a standard M16/M4. A gas tube can be configured to provide gas from a barrel of the firearm to the piston via the carrier key. The gas tube can have a heat radiator formed on at least a portion of the gas tube. A gas metering plug can have a gas metering hole configured to meter gas from the barrel of the firearm to the bolt carrier of the firearm. The gas metering hole can be located away from a gas port of the

cooperate to make the gas system of the firearm more robust. As a further example, the anti-bounce weight, the gas metering plug, the gas passage in the forward sight band and double cut cam can cooperate to reduce the cyclic rate and to mitigate undesirable wear on the firearm.

[0024] ~~The scope of the disclosure is defined by the claims, which are incorporated into this section by reference.~~ A more complete understanding of embodiments will be afforded to those skilled in the art, as well as a realization of additional advantages thereof, by a consideration of the following detailed description of one or more embodiments. Reference will be made to the appended sheets of drawings that will first be described briefly.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] Figure 1 is a perspective view of a bolt, such as for an M16/M4, showing keyed piston rings exploded therefrom, according to an embodiment.

[0026] Figure 2 is an enlarged side view of a piston of Figure 1 having one keyed piston ring installed thereon and one keyed piston ring partially installed thereon, according to an embodiment.

[0027] Figure 3 is an enlarged perspective view of the piston of Figure 1 having two keyed piston rings installed thereon, according to an embodiment.

[0028] Figure 4 is a perspective view of a piston, such as for a HK416, showing keyed piston rings exploded therefrom, according to an embodiment.

[0029] Figure 5 is an enlarged side view of the piston of Figure 4 having one keyed piston ring installed thereon and one keyed piston ring partially installed thereon, according to an embodiment.

[0030] Figure 6 is an enlarged perspective view of the piston of Figure 4 having two keyed piston rings installed thereon, according to an embodiment.