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(54) SUBSONIC SMALL-CALIBER AMMUNITION AND BULLET USED IN SAME

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(57) **ABSTRACT**

A bullet comprises a casing engaging segment, a rifling leade mating segment, and a tip segment. The rifling leade mating segment has a frusto-conical shape tapering from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof. The rifling leade mating segment extends from a first end portion of the casing engaging segment. The tip segment extends from the second end portion of the rifling leade mating segment. The first diameter is greater than the second diameter.

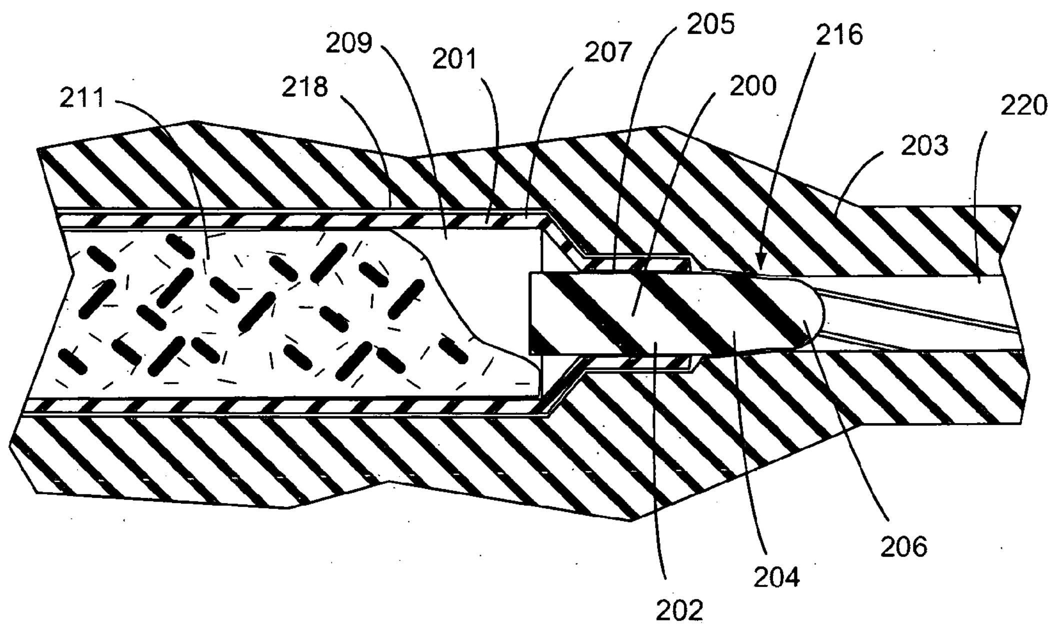
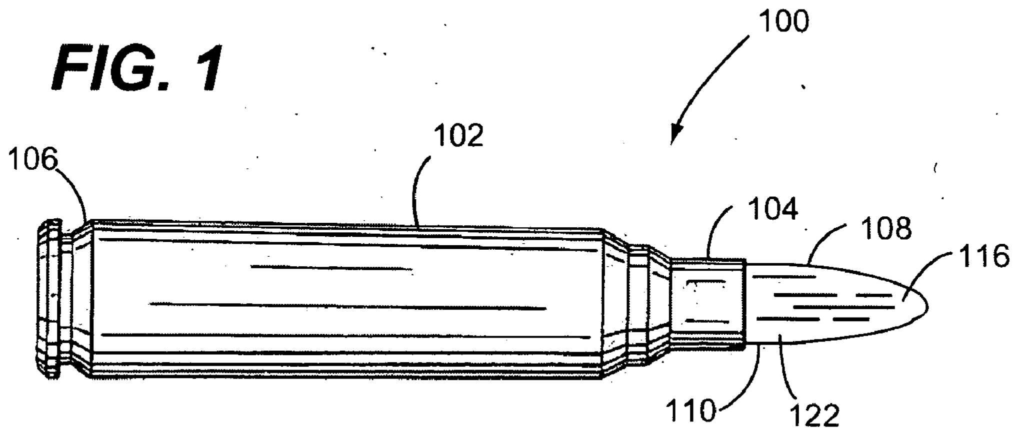


FIG. 1


100
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110
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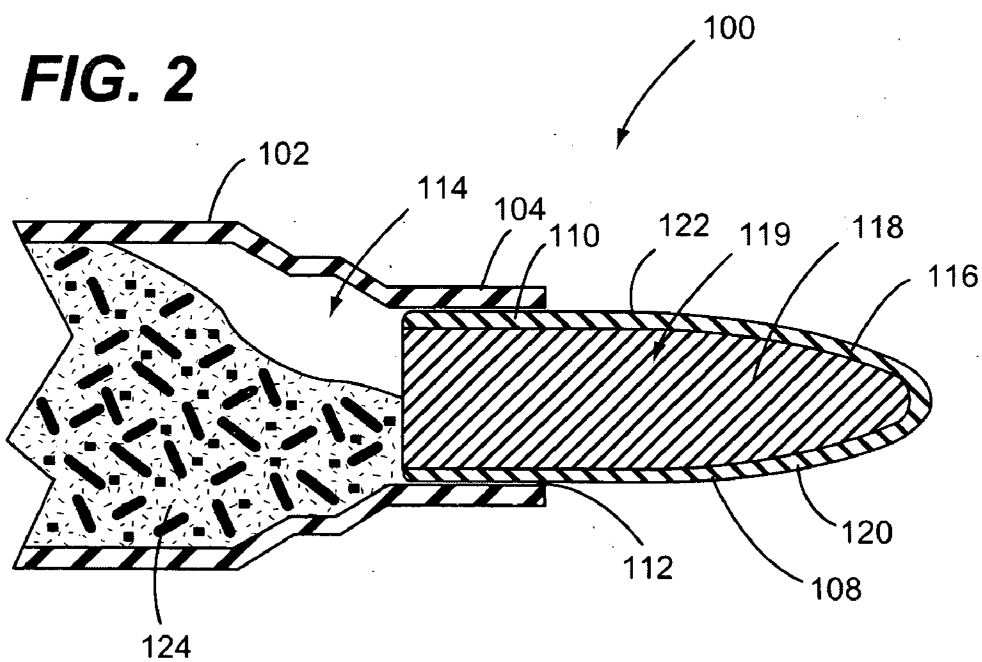
FIG. 2


100
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124

FIG. 3

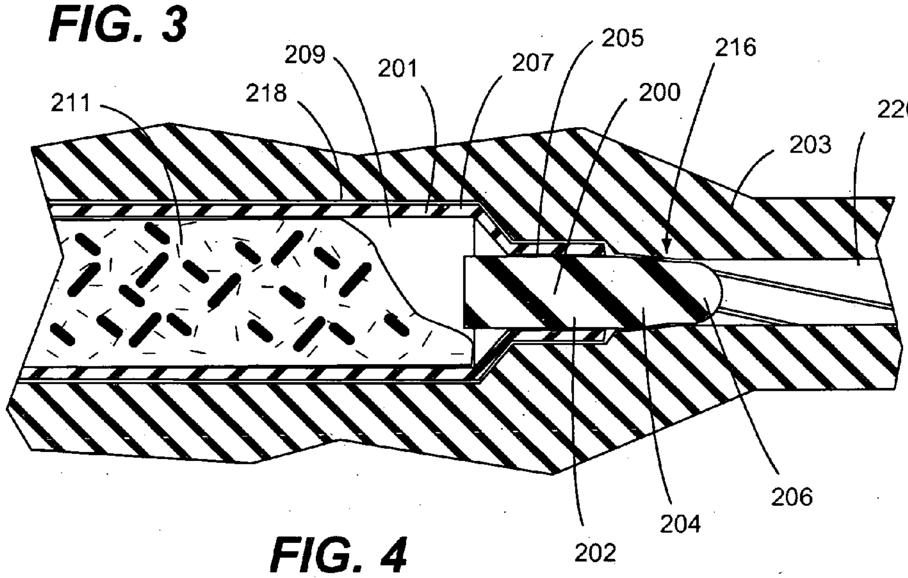


FIG. 4

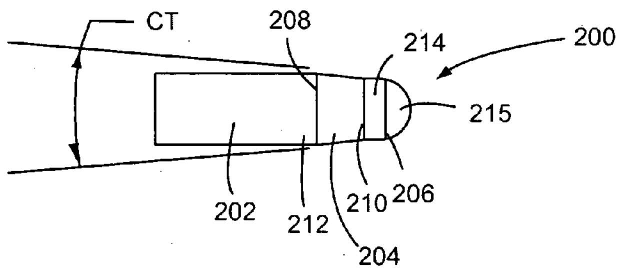
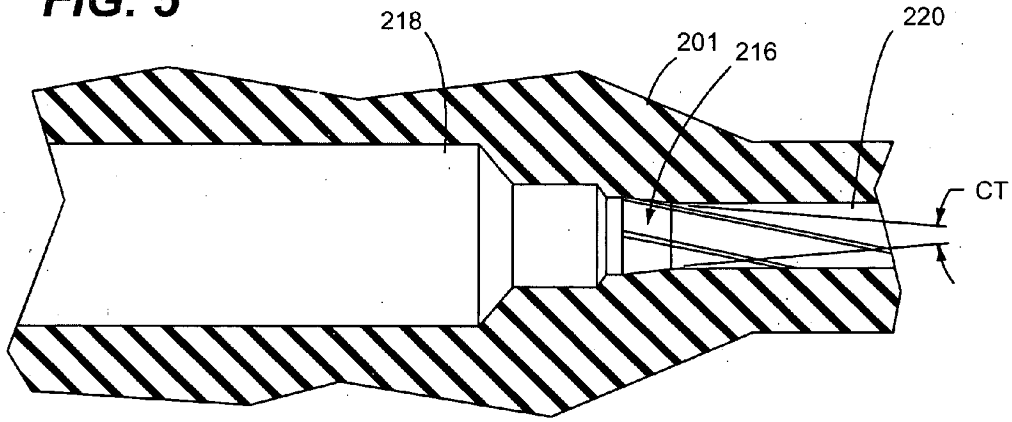


FIG. 5



SUBSONIC SMALL-CALIBER AMMUNITION AND BULLET USED IN SAME

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This continuation-in-part patent application claims priority from co-pending U.S. Non-provisional patent application having Ser. No. 12/800,879, filed May 25, 2010, entitled "Subsonic Small-Caliber Ammunition And Bullet Used In Same", having a common applicant herewith and being incorporated herein in its entirety by reference.

FIELD OF THE DISCLOSURE

[0002] The disclosures made herein relate generally to ammunition for firearms and, more particularly, to subsonic ammunition for use with semi and fully automatic weapons.

BACKGROUND

[0003] The projectile (i.e., bullet) from a fired weapon, particularly a rifle, typically leaves the muzzle of the weapon at a speed that is greater than the speed of sound, i.e. a muzzle velocity of greater than approximately 1086 ft/sec. at sea level under standard conditions of temperature and pressure. Such a speed is referred to as being supersonic. Causing the bullet to achieve supersonic speed is advantageous because the faster a projectile travels, the flatter is its trajectory to its intended target. Also, faster speeds of projectiles tend to reduce the effects of lateral wind forces upon the path of the projectile to its intended target.

[0004] Due to supersonic speed of a projectile enhancing its accuracy of delivery to an intended target, it can be seen why it is desirable for projectiles to have a supersonic muzzle velocity. However, projectiles travelling at supersonic speeds generate an audible sound during their free flight, which can undesirably be used to locate the source of the weapon from which the projectile was fired. Under certain circumstances of military operations and/or police operations, it is desirable that the source of the weapon firing a projectile not be identifiable by the sound generated by the travelling projectile. Furthermore, for a projectile of a given shape and mass, it is sometimes desirable for muzzle velocity to be used in limiting the potential for the projectile to strike a down-range object in the case with the projectile misses or passes through its intended target.

[0005] In certain situations, one approach for mitigating adverse concerns relating to supersonic muzzle velocity is to restrict the speed of travel of the projectile to a subsonic speed (i.e., a muzzle velocity of less than approximately 1086 ft/sec. at sea level under standard conditions of temperature and pressure). In doing so, the projectile does not generate an audible sound during its free flight, thus limiting the potential for locating the source of the projectile. Additionally, subsonic flight reduces the distance that a projectile can travel, thereby limiting the potential for the projectile to strike down-range objects.

[0006] In semi-automatic and fully automatic weapons, pressure (i.e., energy) generated by firing of a round of ammunition serves to energize the weapon's bolt actuation mechanism. As such, implementing subsonic flight of a projectile in a manner that reduces pressure within a weapon's barrel bore can result in there being insufficient energy generated during combustion of the ammunition to cycle the bolt in a semi-automatic or fully-automatic weapon and/or to lock the bolt in its open position upon the firing of the last round in the weapons' magazine. In some cases, gas pressure provided at a gas port of a weapon can be increased to suitable energizes a bolt-actuation mechanism of the weapon through use of a sound suppressor to sufficient levels. However, removal of the sound suppressor renders such weapon inoperable in its semi-automatic and/or automatic modes of operation when such pressure-deficient rounds of ammunition are used.

[0007] Accordingly, subsonic ammunition that is capable of providing sufficient energy for cycling the bolt actuation mechanism of a semi-automatic or fully automatic weapon without the use of a sound suppressor is advantageous, desirable and useful.

SUMMARY OF THE DISCLOSURE

[0008] Embodiments of the present invention are directed to bullets and rounds of ammunition that are configured for use with small-caliber semi-automatic and automatic weapons. More specifically, small-caliber bullets and rounds of ammunition configured in accordance with embodiments of the present invention provide subsonic flight when discharged in a semi-automatic or fully-automatic weapon and provide sufficient barrel bore pressure characteristics for cycling a gas-energized bolt actuation mechanism of such semi-automatic or fully-automatic weapon without the use of a sound suppressor to augment gas pressure within the barrel bore of the weapon. Ammunition configured in accordance with the present invention is well suited for applications where firepower is more of a consideration than is stealth. Accordingly, embodiments of the present invention advantageously overcome one or more shortcomings associated with some conventional small-caliber subsonic rounds of ammunition.

[0009] In one embodiment of the present invention, a bullet comprises a casing engaging segment, a rifling leade mating segment, and a tip segment. The rifling leade mating segment has a frusto-conical shape tapering from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof. The rifling leade mating segment extends from the first end portion of the casing engaging segment. The tip segment extends from the second end portion of the rifling leade mating segment. The first diameter is greater than the second diameter.

[0010] In another embodiment of the present invention, a bullet comprises a jacket drawn from a copper alloy material and a lead core provided within the jacket. The jacket has a casing engaging segment, a rifling leade mating segment, and a tip segment. The rifling leade mating segment linearly tapers from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof. The rifling leade mating segment extends from the first end portion of the casing engaging segment. The tip segment extends from the second end portion of the rifling leade mating segment. The first diameter is greater than the second diameter. The casing engagement segment defines a bearing surface portion of the jacket. The bearing surface portion has a nominal thickness less than about 0.010". The copper alloy material of at least the bearing surface portion of the jacket has a nominal hardness that is substantially greater than an as-drawn hardness of the copper alloy material of the bearing surface portion of the jacket.

[0011] In another embodiment of the present invention, a round of ammunition configured for providing sufficient energy for cycling a bolt carrier in a rifle having a gas-energized bolt carrier actuation mechanism comprises a small-caliber cartridge casing configured in accordance with an original equipment manufacturer (OEM) specification for the rifle, a bullet engaged within a bullet receiving opening of the small-caliber cartridge casing thereby forming a propellant-receiving cavity within the small-caliber cartridge casing, and a propellant within the propellant-receiving cavity of the small-caliber cartridge casing. The bullet has a casing engaging segment, a rifling leade mating segment, and a tip segment. The rifling leade mating segment has a frusto-conical shape tapering from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof. The rifling leade mating segment extends from the first end portion of the casing engaging segment. The tip segment extends from the second end portion of the rifling leade mating segment. The first diameter is greater than the second diameter. The casing engagement segment defines a bearing surface portion of the bullet engaged within the bullet receiving opening of the small-caliber cartridge casing. The propellant is configured by a manufacturer thereof for being used in medium caliber ammunition.

[0012] These and other objects, embodiments, advantages and/or distinctions of the present invention will become readily apparent upon further review of the following specification, associated drawings and appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] FIG. **1** is a side view showing a round of ammunition configured in accordance with a first embodiment of the present invention.

[0014] FIG. **2** is a fragmentary cross-sectional view of the round of ammunition of FIG. **1**.

[0015] FIG. **3** is a fragmentary cross-sectional view of a round of ammunition configured in accordance with a second embodiment of the present invention positioned within a mating chamber of a rifle barrel.

[0016] FIG. **4** is a side view showing a bullet of the round of ammunition shown in FIG. **3**.

[0017] FIG. **5** is a fragmentary cross-sectional view of the rifle barrel shown in FIG. **3**.

DETAILED DESCRIPTION OF THE DRAWING FIGURES

[0018] Referring now to FIGS. **1** and **2**, a round of ammunition **100** configured in accordance with the present invention is shown. The round of ammunition **100** is configured for use with small-caliber semi-automatic and automatic weapons (e.g., a rifle). Advantageously, the round of ammunition **100** is configured to provide subsonic flight when discharged in a semi-automatic or fully-automatic weapon and to provide sufficient gas pressure characteristics for cycling a gas-energized bolt actuation mechanism of such semi-automatic or fully-automatic weapon without the use of a sound suppressor to augment gas pressure. In doing so, the round of ammunition **100** advantageously overcomes a key shortcoming associated with some conventional small-caliber subsonic rounds of ammunition.

[0019] The round of ammunition **100** includes a small-caliber cartridge casing **102** configured in accordance with an original equipment manufacturer (OEM) specification for a weapon. The small-caliber cartridge casing **102** includes a first end portion **104** and a second end portion **106**. Typically, a primer is mounted within the second end portion **106** thereby making the second end portion substantially closed. Preferably, but not necessarily, the small-caliber cartridge casing **102** can be made a metal material (e.g., brass) or from a polymeric material (e.g., nylon).

[0020] Standards for the shape and size of a cartridge for a certain weapons of a given caliber have been established and published by one or more various entities and/or organizations. Examples of such entities and/or organizations include, but are not limited to, Sporting Arms and Ammunition Manufacturers Institute (SAAMI), Permanent International Commission for Firearms Testing (CIP), and North Atlantic Treaty Organization (i.e., NATO). A rifle of the M4/M16/AR15 family of carbine rifles is a weapon that is capable of being operated in a semi-automatic mode and/or fully-automatic mode and that utilizes barrel bore pressure resulting from discharge of a round of ammunition to energize a bolt actuation mechanism of the weapon. Thus, in one embodiment, the round of ammunition **100** can be configured for use with a rifle of the M4/M16/AR15 family of carbine rifles. However, in view of the disclosures made herein, it is disclosed that a skilled person will appreciate other weapons for which a round of ammunition configured in accordance with the present invention will be useful and that embodiments of the present invention are not unnecessarily limited to use with any particular weapon (i.e., any particular rifle, piston, or other type of small-caliber firearm).

[0021] The round of ammunition **100** has a bullet **108** (i.e., a projectile) with a bearing surface portion **110** engaged within a bullet receiving opening **112** of the small-caliber cartridge casing **102**. The bullet receiving opening **112** is located at the first end portion **104** of the small-caliber cartridge casing **102**. In this manner, a propellant-receiving cavity **114** is formed within the small-caliber cartridge casing **102** between its first and second end portions **104**, **106**. An ogive portion **116** (i.e., contoured tip portion) of the bullet **108** extends beyond the bullet receiving opening **112** and, optionally, some of the bearing surface portion can also extend beyond the bullet receiving opening **112**.

[0022] As shown in FIG. **2**, the bullet **108** has a core **118** made of a first type of metal disposed within a core-receiving cavity **119** of a jacket **120** made of a second type of metal. A jacket configured in accordance with the present invention can be made by the process of drawing metal (e.g., a sheet of metal) into a given shape and the bearing surface portion **110** can have a thickness of less than about 0.010". In a preferred embodiment, the bearing surface portion **110** has a nominal thickness between about 0.004" and about 0.008". Preferably, but not necessarily, the jacket **120** is made from a copper alloy including about 90% copper (Cu) and up to about 10% zinc (Zn) and the core **118** is made from a metal having lead as its major constituent component. In a preferred embodiment, the jacket **120** is made from a copper alloy having a minimum of about 2% zinc.

[0023] It is disclosed herein that, in an alternate embodiment, the bullet **108** can have a core that is formed to provide the intended exterior profile of the bullet **108** and have a plated jacket provided over the core. In such an alternate embodiment, the core is formed to have precise dimensions and profile of the bullet **108**. The core is then plated using a suitable plating process to form the jacket to have a thickness that provides the bullet with required/intended finished dimensions. For example, the core can be plated to provide the bullet **108** with an outside diameter at the bearing surface portion **110** that is of a required/intended dimension.

[0024] The bearing surface portion **110** and, optionally, the ogive portion **116** have a nominal hardness that is substantially greater than an as-drawn hardness of the jacket **120**. In a preferred embodiment, the jacket **120** is drawn from a copper alloy material having a tensile strength substantially below about 32 ksi. Subsequent to the jacket **120** being drawn and the core **118** being formed within the core-receiving cavity **119** of the jacket **120**, the bearing surface portion **110** and optionally the ogive portion **116** are hardened to have a tensile strength greater than about 32 ksi. In a preferred embodiment, the bearing surface portion **110** and optionally the ogive portion **116** are hardened to have a tensile strength between about 32 ksi and about 44 ksi. Optionally, the finished hardness specification for the copper alloy material can be specified as between about one-eighth hard and about one-half hard with respect to the copper alloy material being “dead soft”. As such, it is disclosed herein that, after forming the core **118** within the core-receiving cavity **119** of the jacket **120**, the bearing surface portion **110** of the jacket **120** and optionally the ogive portion **116** preferably have a nominal hardness that is substantially greater than an as-drawn hardness of the jacket **120**.

[0025] Examples of means for hardening the jacket **120** include, but are not limited to, shot peening, ultrasonic hardening, and the like. In the case where the jacket is shot peened, the jacket **120** and the shot (e.g., steel shot) can optionally be exposed to a friction-reducing material composition during such shot peening so that the shot peening causes at least a portion of an exterior surface **122** of the jacket **120** to become coated with a layer of friction-reducing material composition. Molybdenum disulfide is one example of a friction-reducing material composition (i.e., a lubricant) to which the jacket **120** and the shot (e.g., steel shot) can be exposed during such shot peening for causing the exterior surface of the jacket **120** to become coated with a layer of friction-reducing material composition (i.e., a layer of molybdenum disulfide).

[0026] As shown in FIG. **2**, the round of ammunition **100** has a propellant **124** (e.g., powder) within the propellant-receiving cavity **114**. The propellant **124** can be a relatively slow burning type propellant that provides a rapid peak in pressure build up within the propellant-receiving cavity **114** and that maintains a broader burn duration than relatively fast burning type propellants. In one embodiment, the propellant **124** is configured by a manufacturer thereof for being used as a medium caliber ammunition propellant. One example of such a medium caliber propellant suitable for use with rounds of ammunition configured in accordance with the present invention has been offered from General Dynamics Corporation under propellant no. XPR 47C1. In view of the disclosures made herein, a skilled person will appreciate that other propellants of suitable specification can be used in rounds of ammunition configured in accordance with the present invention.

[0027] During firing of the round of ammunition **100** within a weapon, the propellant **124** in combination with the bullet **108** result in gas pressure characteristics and bullet-bore frictional characteristics that provide for subsonic flight of the bullet **108** and for sufficient gas pressure within a barrel bore of the weapon to cycling a gas-energized bolt actuation mechanism of the weapon. For a given configuration of ammunition (e.g., 5.56 mm NATO ammunition), the bullet **108** will be heavier (e.g., by as much as 12 grains) than a bullet with a standard thickness drawn-metal jacket in view of the relatively thin jacket **120** and greater volume of the core **118**. When this relatively heavy, thin-jacket bullet **108** is subjected to the heat and pressure of discharge of the propellant **108**, the relatively thin jacket **120** and the relatively large core **118** will result in enhanced obturation of the bearing surface portion **110** of the bullet **108** within the barrel bore of the weapon such that sliding friction between the bearing surface portion **110** and barrel bore will be enhanced relative to a comparable bullet of conventional (i.e., prior art) construction.

[0028] Sliding friction between the bore and the bullet **108** creates heat in the jacket **120**. The lead of the core **118** has relatively low heat conductivity and the copper alloy of the jacket **120** has relatively high heat conductivity. Heat produced within the jacket **120** will penetrate the full thickness of the jacket **120** within the time it takes for the bullet **108** to pass down a length of the barrel bore of the weapon. When this heat reaches the core **118**, the core **118** serves as an effective insulator thereby causing more heat to building the jacket **120** and, thus, soften the jacket **120** further to provide for more sliding friction. Roughly speaking, given identical frictional heating, a jacket that is three times as thick as a thinner jacket will heat up about one-third of the amount that the thinner jacket will heat up. The friction coefficient of copper is a strong function of the surface hardness and hardness is a strong function of temperature. In this manner, the jacket **120** being relatively thin further enhances sliding friction between the bearing surface portion **110** and the barrel bore. In combination with these frictional and obturation considerations of the bullet **108**, the propellant **124** provides gas pressure characteristics (e.g., peak gas pressure, percent dwell around peak gas pressure, and average gas pressures) within the barrel bore of the weapon to generate sufficient gas-pressure derived energy at a gas port of the weapon for cycling its bolt carrier when the round of ammunition **100** is discharged. These gas pressure characteristics in combination with weight of the bullet **108** and frictional forces exerted on the bullet **108** causes the bullet **108** to decelerate from a supersonic speed (e.g., at a barrel position where the gas port is located) to a subsonic speed prior to exiting the barrel bore.

[0029] It is disclosed herein that the use of a layer of friction reducing material on the bearing surface portion **110** of the bullet **108** can be used to influence gas pressure characteristics and/or resulting velocity profile of the bullet **108**. For example, as disclosed above, molybdenum disulfide is one example of a friction-reducing material composition to which the jacket **120** and the shot (e.g., steel shot) can be exposed during such shot peening for causing the exterior surface of the jacket **120** to become coated with a layer of molybdenum disulfide. Coating the bearing surface portion **110** with a layer of molybdenum disulfide or other suitable friction reducing material composition can result in the bullet exhibiting reduced initial friction in the barrel bore, with diminishing effect as velocity of the bullet **108** increases (e.g., provides negligible effect with suitable velocity). Thus, its application to the bearing surface portion **110** of the bullet **108** can result in lower initial gas pressure, which moderates and broadens the initial gas pressure spike produced by combustion of the propellant **120**. In effect, such a layer of friction reducing material can delay onset of heating of the jacket and thus influence sliding friction as a function of time.

[0030] Referring now to FIGS. **3-5**, various aspects of a round of ammunition **201** configured in accordance with a second embodiment of the present invention for use with a barrel **203** of a rifle (i.e., a firearm) are shown. It is disclosed herein that the round of ammunition can be constructed in a similar manner or the same manner as is described above with respect to the round to ammunition **100** discussed in reference to FIGS. **1** and **2**. The round of ammunition **201** has a bullet **200** (i.e., a projectile) engaged within a bullet receiving opening **205** of a small-caliber cartridge casing **207** thereby forming a propellant-receiving cavity **209** within the small-caliber cartridge casing **207**. A propellant **211** is provided within the propellant-receiving cavity **209**. The propellant **211** can be a relatively slow burning type propellant that provides a rapid peak in pressure build up within the propellant-receiving cavity **209** and that maintains a broader burn duration than relatively fast burning type propellants.

[0031] The bullet **200** includes a casing engaging segment **202**, a rifling leade mating segment **204**, and a tip segment **206**. The rifling leade mating segment **204** has a frusto-conical shape tapering from a first diameter at its first end portion **208** to a second diameter at its second end portion **210**. Frusto-conical refers to a cone whose tip has been truncated by a plane parallel to its base. The rifling leade mating segment **204** extends from a first end portion **212** of the casing engaging segment **202**. The tip segment **206** extends from the second end portion **210** of the rifling leade mating segment **204**. The first diameter is greater than the second diameter.

[0032] It is disclosed herein that the bullet **200** can be constructed and/or manufactured in the same or similar manner as the bullet **108**. Accordingly, the bullet **200** can be constructed of a drawn jacket with a core therein, can be constructed of a preformed core having a plated jacket, or any other suitably configured construction.

[0033] Preferably, but not necessarily, the tip segment **206** includes a barrel bore engaging portion **214** extending from the second end portion **210** of the rifling leade mating segment **204**. The barrel bore engaging portion **214** has a substantially cylindrical shape. A diameter of the barrel bore engaging portion **214** is substantially the same as the second diameter. The tip segment can also include a nose portion **215** having a substantially hemi-spherical shape. However, a bullet configured in accordance with the present invention is not limited to having a nose portion of any particular shape

[0034] A bullet in accordance with the present invention can be configured as a 5.56 mm round of ammunition that is commonly used in a rifle such as an M4 carbine. Such a round of ammunition can be configured to have a second diameter that is about 0.2 inches. In the case of such round of ammunition having a bullet configured in accordance with the bullet **200** shown in FIGS. **4** and **5**, the rifling leade mating segment of the bullet of that round of ammunition can have a conical taper CT, shown in FIG. **4**, of about 2.4 degrees and a rifling leade mating segment having a length of about 0.2 inches. In an embodiment specific to a standard as provided by SAAMI, a rifling leade segment can have a conical taper of about 3.2 degrees. Accordingly, in view of the disclosures made herein, a skill ed person will understand that the present invention is directed to substantially or approximately mating the rifling leade segment of a bullet to a rifling leade segment of a mating firearm's chamber and that the present invention is not unnecessarily limited to any particular conical taper of a rifling leade.

[0035] As shown in FIGS. **3** and **5**, a rifling leade region **216** of the barrel **203** preferably has substantially the same profile and dimensions as the bullet **200**. Advantageously, such a mating interface between the rifling leade mating segment **204** of the bullet **200** and the rifling leade region **216** of the barrel **203** limits a rate at which combustion gas can escape from a chamber **218** of the barrel **203** into its rifled bore **220**. For cartridges with relatively low average and/or peak combustion gas pressure (e.g., subsonic cartridges), limiting the rate at which combustion gas can escape from a chamber **218** of the barrel **203** into its rifled bore **220** prior to the bullet **200** entering the rifled bore **220** increases a magnitude of combustion gas pressure in the chamber **218** and subsequently in the rifled bore **220** as the bullet **200** travels down the rifled bore **220**. In this manner, a higher level of combustion gas pressure is available to a gas-energized cartridge cycling mechanism of the rifle for enabling operation in semi-automatic and fully-automatic modes of operation without a sound suppressor. In one such embodiment, a bullet/rifling leade interface precludes or substantially inhibits combustion gas from escaping from the, chamber **218** of the barrel **203** into its rifled bore **220** prior to the bullet **200** entering the rifled bore **220**. In contrast, in prior art implementations of bullet/rifling leade interfaces, the bullet has had a non-mating profile with respect to the rifling leade such that significant portions of combustion gas pressure is permitted to escape into the rifled bore of the barrel prior to the bullet entering the rifled bore of the barrel. As such, such prior art bullet/rifling leade interfaces have lead to unreliable if not unacceptable firearm performance in semi-automatic and fully-automatic modes of operation without a sound suppressor.

[0036] It is disclosed herein that configuring a round of ammunition in accordance with the present invention can include manipulating ammunition-specific parameters including, but not limited to, jacket thickness, jacket material composition, jacket hardness, bearing surface length, core material composition, propellant type, propellant quantity, and jacket surface coating presence/type. All or a portion of these ammunition-specific parameters can be manipulated in view of weapon-specific parameters including, but not limited to, barrel bore diameter, barrel bore length, gas port position/size, required bolt actuation mechanism energy, barrel bore material, etc. In view of the disclosures made herein, a skilled person will be able to specify ammunition-specific parameters for ammunition configured in accordance with the present invention for a particular configuration of weapon (e.g., a rifle) by experience and/or with minimal experimentation.

[0037] In the preceding detailed description, reference has been made to the accompanying drawings that form a part hereof, and in which are shown by way of illustration specific embodiments in which the present invention may be practiced. These embodiments, and certain variants thereof, have been described in sufficient detail to enable those skilled in the art to practice embodiments of the present invention. It is to be understood that other suitable embodiments may be utilized and that logical, mechanical, chemical and electrical changes may be made without departing from the spirit or scope of such inventive disclosures. To avoid unnecessary detail, the description omits certain information known to those skilled in the art. The preceding detailed description is, therefore, not intended to be limited to the specific forms set forth herein, but on the contrary, it is intended to cover such alternatives, modifications, and equivalents, as can be reasonably included within the spirit and scope of the appended claims.

What is claimed is:

1. A bullet, comprising:

a casing engaging segment;

a rifling leade mating segment extending from a first end portion of the casing engaging segment, wherein the rifling leade mating segment has a frusto-conical shape tapering from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof and wherein the first diameter is greater than the second diameter; and

a tip segment extending from the second end portion of the rifling leade mating segment.

2. The bullet of claim **1** wherein:

the tip segment includes a barrel bore engaging portion extending from the second end portion of the rifling leade mating segment; and

the barrel bore engaging portion having a substantially cylindrical shape.

3. The bullet of claim **2** wherein a diameter of the barrel bore engaging portion is substantially the same as the second diameter.

4. The bullet of claim **2** wherein:

the tip segment includes a nose portion and a barrel bore engaging portion extending between the tip portion and the second end portion of the rifling leade mating segment;

the barrel bore engaging portion has a substantially cylindrical shape; and

the nose portion has a substantially hemi-spherical shape.

5. The bullet of claim **4** wherein a diameter of the barrel bore engaging portion is substantially the same as the second diameter.

6. The bullet of claim **1** wherein the rifling leade mating segment has a conical taper of between about 2.4 degrees and 3.2 degrees.

7. The bullet of claim **6** wherein:

the rifling leade mating segment has a length of about 0.2 inches; and

the second diameter is about 0.2 inches.

8. A bullet, comprising:

a jacket drawn from a copper alloy material, wherein the jacket has a casing engaging segment, a rifling leade mating segment, and a tip segment, wherein the rifling leade mating segment linearly tapers from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof, wherein the rifling leade mating segment extends from the first end portion of the casing engaging segment, wherein the tip segment extends from the second end portion of the rifling leade mating segment, wherein the first diameter is greater than the second diameter, wherein the casing engagement segment defines a bearing surface portion of the jacket, wherein the bearing surface portion has a nominal thickness less than about 0.010", and wherein the copper alloy material of at least the bearing surface portion of the jacket has a nominal hardness that is substantially greater than an as-drawn hardness of the copper alloy material of the bearing surface portion of the jacket; and

a lead core provided within the jacket

9. The bullet of claim **8** wherein:

the tip segment includes a barrel bore engaging portion extending from the second end portion of the rifling leade mating segment;

the barrel bore engaging portion having a substantially cylindrical shape; and

a diameter of the barrel bore engaging portion is substantially the same as the second diameter.

10. The bullet of claim **9** wherein:

the tip segment includes a nose portion and a barrel bore engaging portion extending between the tip portion and the second end portion of the rifling leade mating segment;

the barrel bore engaging portion has a substantially cylindrical shape; and

the nose portion has a substantially hemi-spherical shape.

11. The bullet of claim **10** wherein:

the rifling leade mating segment has a taper of between about 2.4 degrees and 3.2 degrees

12. The bullet of claim **8** wherein the bearing surface portion of the jacket is at least partially coated with a friction-reducing material composition.

13. The bullet of claim **12** wherein the friction-reducing material composition is molybdenum disulfide.

14. The bullet of claim **13** wherein the bearing surface portion is coated in its entirety with the friction-reducing material composition.

15. The bullet of claim **8** wherein:

the nominal hardness of the copper alloy material of at least bearing surface portion corresponds to a tensile strength of between about 32 ksi and about 44 ksi;

the bearing surface portion of the jacket is at least partially coated with a friction-reducing material composition; and

the bearing surface portion of the jacket has a thickness between about 0.004" and about 0.008".

16. A round of ammunition configured for providing sufficient energy for cycling a bolt carrier in a rifle having a gas-energized bolt carrier actuation mechanism, comprising:

a small-caliber cartridge casing configured in accordance with an original equipment manufacturer (OEM) specification for the rifle;

a bullet having a casing engaging segment, a rifling leade mating segment, and a tip segment, wherein the rifling leade mating segment has a frusto-conical shape tapering from a first diameter at a first end portion thereof to a second diameter at a second end portion thereof, wherein the rifling leade mating segment extends from the first end portion of the casing engaging segment, wherein the tip segment extends from the second end portion of the rifling leade mating segment, wherein the first diameter is greater than the second diameter, wherein the casing engagement segment defines a bearing surface portion of the bullet engaged within a bullet receiving opening of the small-caliber cartridge casing thereby forming a propellant-receiving cavity within the small-caliber cartridge casing; and

a propellant within the propellant-receiving cavity of the small-caliber cartridge casing, wherein the propellant is configured by a manufacturer thereof for being used in medium caliber ammunition.

17. The round of ammunition of claim **16** wherein:

the bullet has a core made of a metal having lead as its major constituent component and a jacket drawn from metal having copper as its major constituent component;

the bearing surface portion has a nominal thickness less than about 0.010"; and

the copper alloy material of at least the bearing surface portion of the jacket has a nominal hardness that is substantially greater than an as-drawn hardness of the copper alloy material of the bearing surface portion of the jacket

18. The round of ammunition of claim **16** wherein:

the bullet has a core made of a metal having lead as its major constituent component and a jacket drawn from metal having copper as its major constituent component;

a nominal thickness of the jacket is less than about 0.010"; and

at least the bearing surface portion of the jacket has a nominal hardness that is substantially greater than an as-drawn hardness of the jacket.

19. The round of ammunition of claim **16** wherein:

the tip segment includes a barrel bore engaging portion extending from the second end portion of the rifling leade mating segment;

the barrel bore engaging portion having a substantially cylindrical shape; and

a diameter of the barrel bore engaging portion is substantially the same as the second diameter.

20. The round of ammunition of claim **16** wherein:

the nominal hardness of the copper alloy material of at least bearing surface portion corresponds to a tensile strength of between about 32 ksi and about 44 ksi;

the bearing surface portion of the jacket is at least partially coated with a friction-reducing material composition; and

the bearing surface portion of the jacket has a thickness between about 0.004" and about 0.008".

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