ABSTRACT

A liquid-filled bullet has a bullet cap and a bullet base with a cavity therebetween, the cavity containing a liquid. The bullet base has a chamfer and an extension above the chamfer where the base mates with the bullet cap. The bullet cap is deformed and the cavity content released inside a target by pressure of the chamfered portion of the bullet base deforming the bullet cap.
The present disclosure relates generally to ammunition and in particular the present disclosure relates to composition and structure of cartridges and bullets.

BACKGROUND

Cartridges, or rounds, for firearms contain a small list of components. Typical cartridges include a casing designed to fit a specific firing chamber of a firearm. A bullet, the projectile portion of the round, is seated into the casing. The casing contains a primer and gunpowder to propel the bullet from the cartridge through the barrel of a firearm. A firing pin of the firearm strikes the primer in the casing, igniting the primer, which in turn ignites the gunpowder in the sealed firing chamber of the cartridge. The casing is open at the end where the bullet is seated, and the explosion of the gunpowder ejects the bullet from the casing through the barrel of the firearm.

There are many different types of bullets, such as balls, jacketed bullets, hollow point bullets, tracers, and the like. Bullets have different purposes. For example, ball bullets are used by treaty in nearly all military operations. Hollow point bullets, which tend to expand upon impact, are often used as stopping bullets for police or self-defense purposes.

Bullets carrying liquid, such as marking rounds and the like, are designed for a burst on a surface of a target, to impart dye or the like for the purposes of identifying a target, or illuminating a target, or the like. Marking rounds are not designed for penetration, and indeed, would not be suited for their purpose were they to be penetrating rounds. For at least these reasons, marking rounds are non-lethal rounds.

For the reasons stated above, and for other reasons stated below which will become apparent to those skilled in the art upon reading and understanding the present specification, there is a need in the art for improved penetrating rounds.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a side elevation view of a cartridge according to one embodiment of the present disclosure;

FIG. 2 is an exploded view of a bullet according to another embodiment of the present disclosure;

FIG. 3 is a view of a partially penetrated bullet such as the bullet of FIG. 2;

FIG. 4 is a view of one type of expansion of a bullet such as the bullet of FIG. 2 during penetration of a target;

FIG. 5 is a view of another type of expansion of a bullet such as the bullet of FIG. 3 during penetration of a target; and

FIG. 6 is a view of a bullet cap according to another embodiment of the present disclosure.

DETAILED DESCRIPTION

In the following detailed description of the embodiments, reference is made to the accompanying drawings that form a part hereof. In the drawings, like numerals describe substantially similar components throughout the several views. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized and structural, logical, and electrical changes may be made without departing from the scope of the present invention.

The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present disclosure is defined only by the appended claims, along with the full scope of equivalents to which such claims are entitled.

Embodiments of the present invention provide a cartridge having a bullet designed to contain a liquid component, and to have a structure to induce deformation of the bullet only after penetration into a soft target, to release the liquid after penetration and upon deformation.

The bullets of the present embodiments are designed for delivery to non-armed/non-defended types of soft targets, that is, targets such as organic materials, i.e., wood and/or materials, substances, or objects having an average matter density of less than approximately 1,800 kilograms per cubic meter, that are subject to being damaged or destroyed by typical ordnance. The bullets are designed to penetrate before deformation and/or dispersal of a liquid within the bullet. In order to provide such a characteristic, the bullet design includes in one embodiment a deformable bullet cap and a bullet base defining a liquid filled cavity therebetween. The bullet and the cartridge may be designed with specific bullet and cartridge dimensions to induce deformation upon penetration into a target, such as by adjusting the dimensions of the bullet base and bullet cap, and depending as well upon the caliber and load of the cartridge.

A cartridge according to an embodiment of the present disclosure is shown in FIG. 1. Cartridge 100 comprises casing 102 and bullet 104. Bullet 104 is seated in casing 102, which also houses a primer and powder, not shown. Bullet 104 comprises a bullet base 106 mated to a bullet cap 108, the base 106 and cap 108 defining a cavity or chamber 110 therebetween.

Referring also to FIG. 2, a bullet 104 is shown in a more detailed exploded view. Bullet 104 comprises the bullet base 106 and bullet cap 108, with the bullet base 106 and the bullet cap 108 mated together, defining (FIG. 1) a cavity 110 therebetween. Base 106 in one embodiment comprises a chamfered construction with a chamfered end 202 and a non-chamfered end 204. The chamfered end 202 has a chamfer 206 between base body 208 and an extension (e.g., projection) 210, the extension 210 having a height 216. Between the extension 210 and the chamfer 206 is a shoulder 207. When the bullet base and bullet cap are joined, the base 212 of the cap 108 is abutted to the shoulder 207, and the extension 210 extends into an opening 114 in the cap 108, as shown in FIG. 1.

The extension 210 may be sized in length to extend into the opening 114 in the bullet cap 108 by an amount equal to its height 216, to induce penetration of the bullet into a target prior to deformation of the bullet, in one embodiment from pressure of the bullet cap 108 on the chamfered portion 206, as described below. The characteristics of the deformation may be modified by modifying the extension 210 length 216, the bullet cap 108 length and/or thickness, the shoulder width 218, the chamfer width 220, or any combination thereof.

The bullet base and cap define between them the cavity 110 shown in FIG. 1. The size of the cavity 110 may be determined by sizing of the cap 108 and the extension 210. The cavity may be liquid filled in one embodiment, and the choice of liquid may be from any number of liquids without departing from the scope of the disclosure.

The chamfer width 220 and shoulder width 218 are determined, in one embodiment, so as to maintain integrity of
the bullet 104 upon firing, by absorbing at least some of the deforming pressure of firing the bullet 104 on the shoulder 207 without releasing the liquid that may be contained within cavity 110. Upon striking the soft target, the pressure of the shoulder 207 against the base 212 of the cap 108 in one direction, as well as the pressure of the target on the cap 108 pressing the base 212 into the shoulder 207, begins a process of fragmentation or deformation of the cap 108 as described below.

[0021] Referring now also to FIG. 3, as the bullet begins to penetrate its target 302, traveling in the direction of arrow 304, the cap 108 begins to deform as the chamfer 206 and shoulder 207 press against the cap end 212, or slip past the cap end and begins to force the chamfer 206 against the inner wall of the bullet cap, as shown at 306. As the bullet continues to penetrate further into the target, as shown in FIGS. 4 and 5, the cap 108 is deformed, once penetration has occurred, to a point at which the liquid in the cavity 110 is released, as shown by arrows 402, into a cavity 404 formed in the target 302 by the impact and penetration of the bullet 100 into the interior of the target. Depending on the composition of the bullet cap 108 versus the bullet base 106, the cap 108 may, as shown in FIG. 5, tear or break apart from impact and/or pressure on the cap end 212 from the bullet base 106, allowing the liquid in the cavity 110 to be injected into the cavity 404 along paths including those shown by arrows 502.

[0022] In one embodiment, the height 216 of the extension 210 determines how far the bullet 100 will penetrate into a target such as target 302 shown in FIGS. 3-5 before deforming and allowing release of the liquid in cavity 110 into the interior of the target. In another embodiment, shown in top and side elevation view in FIG. 6, the bullet cap 108 has grooves 602 formed therein to induce deformation of the cap 108 upon penetration into a target such as target 302.

[0023] In another embodiment, a ratio of the shoulder width 218 to the chamfer width 220 is chosen, based, for example, on the caliber of the bullet 104, the powder used in the bullet, the bullet weight, and the like. The shoulder width 218 to chamfer width 220 ratio allows for the maintenance of balance between stability of the round during firing and the deformation and/or fragmentation of the bullet 104 upon contact and entry into the soft target.

CONCLUSION

[0024] A liquid-filled bullet for a cartridge has been described that includes a bullet base and a bullet cap mated together to define a cavity therebetween. The cavity may contain the liquid. A chamfered portion of the bullet base induces deformation of the bullet cap to release the liquid upon penetration of the bullet into a target.

[0025] Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement, which is calculated to achieve the same purpose, may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the present invention. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.

1. A liquid-filled bullet, comprising:
   a bullet base, the bullet base having a chamfered construction with a chamfered end and a non-chamfered end;
   a bullet cap, the bullet base mated with the bullet cap at the chamfered end;
   wherein the bullet cap and the bullet base define a cavity within the bullet; and
   a liquid contained within the cavity.

2. The bullet of claim 1, wherein the chamfered end has a chamfered portion between the bullet body and a smaller diameter extension, the extension fitting an opening in the bullet cap.

3. The bullet of claim 2, wherein a smaller diameter extension is sized in length to extend into the opening in the bullet cap by an amount to induce penetration of the bullet into a target prior to deformation of the bullet from pressure of the bullet cap on the chamfered portion.

4. The bullet of claim 2, wherein the chamfered portion and the smaller diameter extension are separated by a shoulder.

5. The bullet of claim 4, wherein a width of the shoulder and a width of the chamfered portion are configurable for controlling deformation of the bullet cap upon penetration of a target.

6. The bullet of claim 4, wherein the bullet cap is a rounded cap, and wherein an open end of the cap fits around the smaller diameter extension at the shoulder.

7. The bullet of claim 6, wherein a length of the smaller diameter extension is sized to extend into the bullet cap a distance sufficient to ensure penetration of the bullet into a target prior to deformation of the bullet.

8. The bullet of claim 1, wherein the bullet cap is grooved to induce deformation of the bullet cap upon penetration of a target.

9. A method of delivering a liquid into a target with a bullet, the method comprising:
   firing a bullet into the target, the bullet configured to release a liquid into the target only upon penetration of the bullet into the target.

10. The method of claim 9, wherein the bullet comprises a bullet cap mated to a chamfered bullet base, and defining a liquid-filled cavity therebetween, the chamfer of the bullet base inducing deformation of the bullet cap only upon penetration of the bullet into the target.

11. A firearm cartridge, comprising:
   a casing containing a primer and powder ignitable by striking the primer; and
   a bullet seated in the casing, the bullet comprising:
   a bullet base, the bullet base having a chamfered construction with a chamfered end and a non-chamfered end;
   a bullet cap, the bullet base mated with the bullet cap at the chamfered end;
   wherein the bullet cap and the bullet base define a cavity within the bullet; and
   a liquid contained within the cavity.

12. The firearm cartridge of claim 11, wherein the chamfered end of the bullet base has a chamfered portion between the bullet body and a smaller diameter extension, the extension fitting an opening in the bullet cap.

13. The cartridge of claim 12, wherein the smaller diameter extension is sized in length to extend into the opening in the bullet cap by an amount to induce penetration of the bullet into a target prior to deformation of the bullet from pressure of the bullet cap on the chamfered portion.

14. The cartridge of claim 12, wherein the bullet cap is a rounded cap, and wherein an open end of the cap fits around the smaller diameter extension.

15. The cartridge of claim 14, wherein a length of the smaller diameter extension is sized to extend into the bullet
cap a distance sufficient to ensure penetration of the bullet into a target prior to deformation of the bullet.

16. The cartridge of claim 11, wherein the bullet cap is grooved to induce deformation of the bullet cap upon penetration of a target.

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