

CARTRIDGE PRACTICE ROUND

SCOPE OF THE INVENTION

The invention relates to a cartridge consisting of a projectile and a cartridge shell surrounding this projectile, whereby the cartridge consisting of projectile and cartridge shell is suitable for use in a long-barreled weapon, especially one of medium caliber, e.g., 40 mm. The projectile includes a projectile body with a projectile tip and a projectile base; a charge chamber containing a propulsion charge is provided within the cartridge shell that may be ignited via a pyrotechnic igniter.

The projectile and the cartridge shell are joined mechanically- e.g., threaded, crimped, etc., whereby this connection may also be designed as an intentional break point.

After the propulsive charge is ignited, it burns rapidly, whereby the propulsive gases so developed create high pressure within the propulsion chamber that acts on the base of the projectile; the mechanical connection between cartridge shell and projectile breaks at a pre-determined pressure so that the projectile is driven out of the cartridge shell.

BACKGROUND OF THE INVENTION

In the US 3,645,208 a cartridge round is disclosed which consists of three separate parts, namely a one-piece projectile tip, a one-piece central projectile body and a one-piece basin-shaped cartridge shell. These three parts are connected by crimping the collars of the projectile tip and the cartridge shell. Crimping is an additional manufacture step which requests additional tools for the assembly of the cartridge round.

Moreover, during the propulsion of the cartridge round the gases of the propulsion charge act on the base of the cartridge, so that at least a part of these gases flow backwards out of the barrel and the propulsive force is diminished.

It is an object of the invention to provide a design for a cartridge practice round of the type described above, by means of which the manufacture of rounds is greatly simplified and the manufacturing cost is reduced.

Moreover the design of the cartridge practice round is to be improved, so that the propulsive gases do not leak out backward between the round and the barrel.

It is a further object of the present invention to so configure the design of the cartridge practice round that the firing characteristics and ballistic characteristics of the round during flight are not inferior to the state of the art versions that are more expensive.

DESCRIPTION OF THE INVENTION

According to the invention the cartridge practice round is composed of three one piece elements, namely a central body, a one piece projectile tip and a one piece cartridge shell. The cartridge shell and the projectile tip each are provided with a spring elastic collar with a first engagement element surrounding the outer end and facing inward, so that, when the cartridge shell and the projectile tip are pressed onto the central projectile body, the first engagement element engages a complementary second engagement element located in the central projectile body, so that the three one piece elements are connected by means of simple snap action fittings, which substantially decreases the manufacturing cost.

Furthermore, the spring elastic collar of the cartridge shell tapers along the direction of the second complementary engagement element of the central projectile body and rests in the area of this engagement element within the outer diameter of the central projectile body.

It is admitted that per se a snap-action fitting is known in the state of the art, see for example GB 2389167 A1 (reference number 9) or DE 3835888 A1, claim 3). However, the known documents show only snap-action fittings for a single part of a projectile. It is not disclosed, that the cartridge round is composed only of three one-piece parts which are connected altogether by such snap-action fittings.

According to the additional feature that the spring-elastic collar of the cartridge shell is so shaped that it

does not rest directly on the barrel of the weapon, but rather is at a small distance from it. This has the advantage, that then, when the propulsive gases from the propulsion charge act on the base of the projectile body, the spring-elastic collar is pressed outward against the inner wall of the barrel, beginning at a specific pressure without releasing the projectile. Therefore, when the propulsive gases burn they do not leak out backward between the collar of the cartridge shell and the barrel, thus allowing no loss of gas in this direction.

If the pressure in the propulsion chamber continues to rise, than the engagement bead or element of the cartridge shell is sheared off from the complementary engagement element or slot of the projectile body at a specific pressure, whereby the connection

between engagement bead and surrounding slot is broken and the projectile is released from, and is driven from, the cartridge shell.

Release of the projectile results at an easily-reproducible pressure so that the same release and ballistics characteristics are achieved for the projectile.

In spite of the simple design of this practice round, it possesses the same characteristics of a much more expensive round.

BRIEF DESCRIPTION OF THE FIGURES

The invention is described in greater detail by means of illustrations of an embodiment, which shows:

Figure 1 a longitudinal cross-section through a cartridge practice round consisting of a projectile and a cartridge shell; and

Figure 2 a longitudinal cross-section through a detail in the area of the connection between cartridge shell and projectile.

A cartridge practice round 1 includes a central body 2 that is shaped as a filled cylinder consisting of heavy plastic,

particularly one reinforced with bronze, with a high specific weight. The central body is shaped as a filled cylinder, and possesses two faces whereby the lower face in the Figure 1 is equipped with a central, relatively wide cylindrical recess 3 but the upper face is flat. A surrounding projection 4 is located approximately in the center of the central body 2 that possesses the function of a guide or twist band.

A projectile tip 5 is positioned on the central body 2 that is preferably a one-piece deep-drawn plastic part with the shape of a thin-walled hollow cylinder that transforms into a spherical cap with almost hemispherical shape. The projectile tip 5 transforms into a spring-elastic collar 6 at its lower end facing the central body 2 whose lower end includes a surrounding engagement bead 7 that, when one presses the projectile tip 5 onto the circumference in the upper part of the central body 2, engages into a surrounding engagement slot 8 of the central body, whereby this engagement slot is provided, for example, directly on the upper edge of the guide band 4.

The space between the upper face of the central body and the hood is filled with a carrier plate 9 resting against the upper face that includes a central container 10 within which an inner container 11 is provided. Materials 12 and 13 are placed into the inner container, and the space between the inner container

11 and outer container 10, respectively, whereby the two materials react with chemoluminescence when combined together when the containers burst, thus creating light.

The remaining space between the carrier plate 9, the container 10, and the projectile tip is filled with a marking material 14, e.g., a red powder dye.

The carrier plate 9 and the container 10 or 11 may also be of plastic.

The described projectile is inserted into a cartridge shell 20 that consists preferably also of plastic and an injection-molded part. The cartridge shell 20 is shaped like a basin, whereby the wall thickness at the open end of the basin is reduced to the point that it forms a spring-elastic collar 21. The upper end of the spring-elastic collar 21, like the projectile tip 5, includes a circumferential engagement bead 22 that, when one presses the cartridge shell with its collar 21 over the lower end of the central body 2, snaps into a circumferential slot 23 of the central body 2. The circumferential slot 23 is positioned directly below the guide band 4.

The cartridge shell 20 includes an approximately cylindrical central projection 24 from its base that includes a central,

essentially cylindrical receiver space 25 projecting from the base that penetrates the upper wall of the projection 24 to which an exhaust opening 26, narrowed with respect to the receiver space 25, is connected that ends barely under the end of the recess 3 on the base of the central body 2.

A matching housing 27 in which a pyrotechnic propulsive charge 28 and a pyrotechnic igniter cap 29 are provided may be pressed into the receiver space 25 and attached there. The housing 27 includes apertures 30 on its end facing the exhaust opening 26 that communicates directly with the exhaust opening.

The illustrated cartridge practice round is manufactured as follows:

The projectile tip 5 rests on a carrier with its hollowed cavity so that the open end with the collar 6 is pointing upward. The dye powder 14 is placed into the projectile tip and the plate 9 is inserted with its container 10 attached (or made of one piece) into the projectile tip, where it rests against a flange. Subsequently, the projectile tip 5 thus prepared is placed on the central body 2, and is locked by means of the engagement bead 7 and the engagement slot 8.

Next, the housing 27 with the propulsive charge 28 and the igniter cap 29 are inserted into the receiver space 25 of the cartridge shell 20 and properly secured, e.g., using a locking mechanism, adhesive, etc. The cartridge shell 20 with its elastic collar 21 is then pressed from below onto the central body 2 until the engagement bead 22 engages with the engagement slot 23.

Manufacture of the cartridge practice round is thus complete.

The cartridge 1 may now be loaded into a long-barreled weapon and the projectile may be fired. The condition at the moment of firing is shown in Figure 2 at the area of the connection between the cartridge shell 20 or its collar 21 and a barrel 40 (indicated). In unloaded condition, i.e., before firing, a small split is provided between the outer wall of the collar 21 and the inner wall of the barrel 40 that slightly increases toward the upper end of the collar 21.

If the propulsive charge 28 is ignited using the igniter cap 29, then the propulsive gases from the propulsive charge 28 stream through the apertures 30 and the exhaust aperture 26 into the propulsion chamber and act on the base of the central body 2 and the recess 3 in its lower face. As the pressure continues to increase, propulsive gases also enter the space between the

central body 2 and the collar 21 and bend the collar (as shown by the small arrow P) toward the inner wall of the barrel 40 until the collar is fully seated against this inner wall. If the pressure continues to rise, the surrounding engagement bead 22 is sheared off, whereby the projectile is released and driven from the barrel. An advantage here is the fact that no gas can leak backward between the collar 21 and the inner wall of the barrel 40 during firing since the collar 21 is pressed against the inner wall of the barrel 40 during the entire propulsion process. There is thus no gas loss backward toward the base of the cartridge shell.

Moreover, it has been shown that the shearing force between the surrounding engagement bead 22 and the surrounding engagement slot 23 may be reproduced very accurately so that the projectiles are propelled from the cartridge shell at the same pressure for every shot, providing easily-reproducible shot patterns.

Although this description concerns advantageous embodiments of the invention, it will be apparent to any specialist that alterations and modifications of the embodiments are possible without deviating from the object of the invention.

Claims

1. Practice cartridge round, consisting of a projectile including a one-piece cylindrical central projectile body and a one-piece basin-shaped projectile tip, and a one-piece basin-shaped cartridge shell, into which the projectile is inserted and that possesses a propulsion chamber, a pyrotechnic propulsive charge in the propulsion chamber, and a pyrotechnic igniter for the propulsive charge, whereby the propulsion chamber is provided with an exhaust aperture that ends beneath the base of the central projectile body, characterized in that the cartridge shell and the projectile tip each are provided with a spring-elastic collar with a first engagement element surrounding the outer end and facing inward, so that, when the cartridge shell and the projectile tip are pressed onto the central projectile body, the first engagement element engages a complementary second engagement element located in the central projectile body, so that the projectile tip and the cartridge shell are connected with the central projectile body by means of a snap-action fitting and characterized in that the spring-elastic collar of the cartridge shell tapers along the direction of the second complementary engagement element of the central projectile body and rests in the area of this engagement element within the outer diameter of the central projectile body.

2. Practice cartridge round as in Claim 1, characterized in that the one-piece projectile tip (5) and the one-piece cartridge shell (20) are each made of plastic material.

3. Practice cartridge round as in Claim 1, characterized in that the central body (2) is made of a plastic composite material with high specific weight.

4. Practice cartridge round as in Claim 3, characterized in that the composite material is a mixture of plastic and bronze.

5. Practice cartridge round as in Claim 1, characterized in that the central projectile body (2) includes a circumferential projection (4) that serves as guide or twist band when the projectile is fired from a drawn barrel (40).

6. Practice cartridge round as in Claim 5, characterized in that the complementary second circumferential elements of the projectile body for locking the projectile tip and the cartridge shell, respectively with the central projectile body, are positioned directly above and below the guide band, respectively.

7. Practice cartridge round as in Claim 1, characterized in that marking material (14, 12, 13) is provided within the projectile tip in order to mark the strike point of the projectile on a target.

8. Practice cartridge round as in Claim 7, characterized in that the marking material are a dye powder (14) and/or chemoluminescent components (12, 13).