DESCRIPTION

Projectile, in particular in the medium caliber range

The invention deals with a projectile, in particular PELE® ammunition.

The functional principle of PELE ® ammunition, as known from DE 197 00 349 C2, is based on the fact that materials with lower density than the highly effective terminal-ballistic penetration material (referred to below as the penetrator) at high projectile speeds remain in the target compared to the highly effective terminal ballistic penetrator. The enclosed expansion medium breaks the projectile body open under compression on the impact of the projectile and leads to splinter formation.

DE 10 2004 005 042 B4 discloses a universal KE projectile. This differs from known projectiles of this type in that an outer penetrator is mounted around a central penetrator, the outer penetrator contains spherical and/or cylindrical ductile heavy metals and is implemented in an arched shape. The same design can be seen in the central penetrator.

DE 10 2011 011 478 A1 discloses a frangible projectile, especially for practice purposes. This is based on the ammunition known as PELE® ammunition, which is known from DE 197 00 349 C1. For this it will be stated that the construction of such frangible projectiles, especially in the medium caliber range, places high demands on the production thereof. The segment parts and the core part must be inserted into the outer sleeve area. This must be done precisely in order not to disturb the flight characteristics. In addition, the individual parts must be joined to each other. Said joints are then subject to high demands, for example with regard to launch strength, connectivity to the expansion medium, etc. The basic idea is therefore to make the projectile in one piece. In this case the impact affects the whole projectile. The projectile has recesses for an expansion medium distributed over the cross-section.

Such projectiles are launched from barreled weapons with a spin to stabilize the projectile position on the trajectory. The very high rotation rate imparted by the spin of the projectile also places high demands on the roundness of the projectile body and the penetrator in order to achieve the desired hit accuracy.

Here it is the object of the invention to specify a projectile with a high hit accuracy. Another aspect is to reduce the effort required to produce this projectile.

The object is achieved by the features of claim 1 and claim 6.

A projectile body is advantageously formed as a tube section from very brittle, hardened material. In its rear part there is a penetrator. This compresses an expansion medium on hitting a target. This leads to the break-up of the body of the projectile. Due to the brittleness of the material of the projectile body, the desired splinter formation is achieved. The projectile body, together with a projectile rear, guides the penetrator during the passage thereof through the barrel during firing and during the flight to the target.

This roundness cannot be achieved by simply cutting a long barrel into suitable barrel sections, as the barrel sections warp during the hardening process. However, on the one hand warped sections of barrel lead to poor hit accuracy. On the other hand, completion with a very precisely manufactured penetrator can lead to fractures of the body during production. The consequence may be an increased rejection rate. But also during launch there can be fractures of the projectile, i.e. in the weapon or shortly after leaving the muzzle, which then leads to the premature disintegration of the projectile. The required roundness of the body is therefore usually achieved by reworking, such as fine turning or cylindrical grinding, of the inner and outer diameters. This reworking is carried out outside and inside over the full length of the section of barrel that is produced oversize.

However, the invention is based on the idea of not reworking the body to the required roundness inside and out over its entire length, but on carrying out the reworking of the inner diameter for the accommodation of the penetrator from one side or from both sides at a distance from the center of the body of the projectile. For example, the inner diameter may be reworked from the front or the rear of the body, or from both the front and the rear. This obtains a constriction remaining in the region of the middle of the barrel section.

Said constriction has the advantage that, on the one hand, the penetrator can be set against said constriction during the production of the penetrator instead of resting against the softer expansion medium. On the other hand, it is achieved that when the object is hit, when the body is decelerated, the penetrator safely breaks said projectile body open at the constriction due to its inertia. This safe breakup leads to the desired splinter formation of the body. In addition, due to the longitudinal fixing

of the penetrator, oscillation of the penetrator inside the projectile or the body of the projectile is prevented, which leads to improved precision of the projectile.

Another advantage of a projectile body designed in this way is the relative independence from the mechanical properties of the expansion medium. In addition, all materials and material forms already shown in DE 197 00 349 C1 can be used. In a special version, an expansion medium can also be dispensed with.

The aforementioned versions are adaptable for a projectile in the caliber range of 12 to 76 mm, in particular 12.7 mm.

The invention will be described in more detail using an exemplary embodiment with a drawing.

The single figure shows a projectile 1 (frangible projectile) with a penetrator 2 encased in a projectile body 3. An expansion medium 4 is inserted in front of the penetrator in the projectile body 3. The projectile body 3 is completed by a projectile stern 5 on the rear side. The body 3 has a projectile ogive 6 on the front side. The projectile ogive 6 can preferably be joined to the projectile body 3 by means of a screw connection.

The special feature of the projectile 1 is that a constriction 7 for the penetrator 2 is introduced into the projectile body 3 (or a protrusion when viewed from the perspective of the inner diameter of the projectile body 3), on which the penetrator 2 can be supported within the projectile body 3. The constriction 7 is preferably provided in the central region 8 of the projectile body 3. The constriction 7 can also be present circumferentially in the projectile body 3. However, partial solutions are not excluded.

With the impact of the projectile 1 on an unspecified target, the projectile body 3 is decelerated. The penetrator 2, on the other hand, is moved further due to inertia, compressing the softer expansion medium 4. At the same time, the projectile body 3 breaks open at the constriction 7, resulting in a safe and desired splinter formation by the projectile body 3. If this force is sufficient, in special cases an expansion medium 4 can be dispensed with.

An alternative to the constriction in the middle region 8 of the projectile body 3 forms an off-center constriction (not shown in more detail). The principle of operation is the same as described.

CLAIMS

1. A projectile (1) with a projectile body (3) for accommodating a penetrator (2), with a projectile stern (5) and a projectile ogive (6), **characterized in that** the projectile body (3) is a tube section and that the projectile body (3) has a constriction (7) on which the penetrator (2) can be supported.

2. The projectile (1) as claimed in claim 1, **characterized in that** the constriction (7) is introduced in a central region (8) of the projectile body (3).

3. The projectile (1) as claimed in claim 1, **characterized in that** the constriction (7) is inserted off-center in the projectile body (3).

4. The projectile (1) as claimed in any one of claims 1 to 3, **characterized in that** an expansion medium (4) is incorporated.

5. The projectile (1) as claimed in claim 4, **characterized in that** the expansion medium (4) is arranged in front of the penetrator (2) in the projectile body (3).

6. The projectile (1) as claimed in any one of claims 1 to 3, characterized in that the constriction (7) is circumferentially or partial.

7. The projectile (1) as claimed in claim in any one of claims 1 to 3, characterized in that the projectile is a frangible projectile.

8. A method for the production of a projectile body (3) for a projectile (1) as claimed in any one of claims 1 to 7, **characterized by** the steps:
   - Producing the projectile body (3) as a tube section,
   - Reworking the surface of an inner diameter of the projectile body (3) in such a way that a constriction (7) is obtained in the projectile body (3) or tube section.

9. The method as claimed in claim 8, **characterized in that** the constriction (7) is disposed in a central region (8) of the projectile body (3).

10. The method as claimed in claim 9, **characterized in that** the constriction (7) is disposed off-center in the projectile body (3).

11. The method as claimed in any one of claims 8 to 10, **characterized in that** in order to produce the constriction (7), the inner diameter of the projectile body (3) is reworked from one side, from the front or the rear, or from both sides, from the front and rear.