

HIGH-PERFORMANCE PROJECTILE

The invention concerns a projectile with feeble recoil and great stopping power. It applies to any calibre of hand or infantry weapon.

- 5 It is well known that the stopping power of a projectile lies in its ability to lose, as soon it hits the target, a maximum of energy in a minimum of time.

10 It is also known that the kinetic energy of a projectile, at a certain distance, equals the equation

$$15 \quad E_c = \frac{m V_r^2}{2}$$

in which:

- 20 m = mass of the projectile
 V_r = velocity on impact of the projectile at the distance in question.

Thus, E_c is directly proportional to the mass and the square of the velocity on impact of the projectile.

- 25 It is also known that the recoil of a firearm is pernicious as far as the loss of aim is concerned, and thus the precision of the following shot, the possibility to shoot by bursts and the psychological effect on the
30 shooter.

The notion of the recoil is characterized by the recoil impulse

$$35 \quad I_r = V_o (m + 1.75 c)$$

in which:

V_0 = velocity at the muzzle of the firearm

m = mass of the projectile

5 c = powder charge.

Thus, the recoil impulse is directly proportional to the mass and the muzzle speed of the projectile.

10 From the above it is clear that there is a fundamental contradiction between a high E_c and a feeble I_r .

The projectile according to the invention aims to minimize this contradiction,

15 Moreover, the invention aims to provide a projectile with great stopping power whose design is such that there is no deformation or disintegration of the projectile in a soft target.

20 The invention aims a projectile with a light mass which makes it possible to obtain a feeble recoil impulse while increasing the stopping power at any distance at which the firearm is used through a quick loss of its kinetic
25 energy in the target without any deformation or disintegration.

The projectile according to the invention which makes it possible to realize a.o. the above advantages is
30 characterized by its geometry and in particular by the relation l/d (length versus calibre), which is advantageously superior to 3.

A projectile according to the invention is characterized
35 in that the proportions of the lengths of the constituent elements of the projectile are: for the head, between 1.5

and 3 times the dimension of the calibre, for the cylindrical part between 0.7 and 2 times the dimension of the calibre and for the conical rear part between 0 and 1 time the dimension of the calibre, whereby the relation
5 l/d (length versus dimension of the calibre) is situated between 3 and 6 and the centre of gravity of the projectile is situated in said cylindrical part of the projectile.

10 This design of the projectile results in optimum aerodynamics.

Patent FR 1 349 178 describes a projectile containing a metal envelope and a core of synthetic material.

15 However, the dimensions of the projectile are entirely different from those mentioned above and in claim 1.

Patent DE 1 428 692 describes a projectile containing a core of lead and a metal envelope. This implies that the
20 core has a higher density than the envelope. Moreover, the position of the centre of gravity is not specified.

For clarity's sake, an embodiment of the projectile according to the invention is described hereafter, by way
25 of example only and without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows a longitudinal section and an exploded view of the constituent elements of a
30 projectile according to the invention;

figure 2 is also a longitudinal section of a projectile according to the invention;

35 figure 3 represents a variant of figure 2.

As shown in the drawings, the projectile 1 is mainly composed of two elements, the envelope 2 and the core 3 respectively.

- 5 The envelope 2 is hollow and made of a hard material, for example an alloy of copper, steel or similar.

The core 3 is made of a rigid material having a lower density than the envelope, such as high-density plastic, for example polycarbonate, polyamide or such like, possibly filled with fibres, glass balls or such like.

10 The core 3 can be made of one or several pieces, joint together or not.

15 In this manner is obtained a projectile with a feeble m/s relation.

20 The form of the projectile is such that the aerodynamics are optimal, as a result of which high velocities on impact required for the achievements sought for can be maintained.

25 Said aerodynamical optimization of the projectile, as it reduces the loss of speed on the trajectory, makes it possible to use less powder charge to obtain the required velocities on impact and also helps to reduce the recoil impulse.

30 By using a core 3 made of a material as described above, the deformation of the projectile in soft targets is prevented.

35 By combining an envelope 2 made of a hard material and a core 3 made of a material with a lower density than that of the envelope 2, in other words which is lighter, the

bullet will tilt in a soft body, since such a projectile gets very quickly destabilized while maintaining a considerable penetration power due to its high speed and rigid design.

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By way of example and without being limitative in any way, for a type of projectile according to the invention, the characteristics for a 5.56 mm calibre are given below:

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- mass between 1.5 and 2 g
- relation l/d : 4.5 ± 0.5
- the head 4: 2.5 times the calibre ± 0.5 times the calibre;

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- the cylindrical part 5: 1.5 times the calibre ± 0.5 times the calibre;
- the rear cone 6: 0.5 times the calibre ± 0.5 times the calibre to be combined within the limits of l/d .

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The position of the centre of gravity will be situated between 0 and 4 mm within the cylindrical part 5 starting from the connection with the head 4.

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It is clear that the present invention is in no way limited to the embodiments described above and shown in the accompanying drawings. On the contrary, many modifications can be made to it while still remaining within the scope of the invention as described in the claims.

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Thus, the core 3 could be made of two or several pieces mounted one after the other and possibly joint together in one way or the other.

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Claims

1. Projectile with feeble recoil and great stopping power, mainly composed of at least two elements, namely
5 a hollow envelope (2) made of a hard material and a core (3) made of a rigid material with a lower density than that of the envelope, characterized in that the proportions of the lengths of the constituent elements of the projectile are: for the head (4), between 1.5 and 3
10 times the dimension of the calibre, for the cylindrical part (5) between 0.7 and 2 times the dimension of the calibre and for the conical rear part (6) between 0 and 1 time the dimension of the calibre, whereby the relation l/d (length versus dimension of the calibre) is situated
15 between 3 and 6 and the centre of gravity (7) of the projectile is situated in said cylindrical part of the projectile.
2. Projectile according to claim 1, characterized in that
20 the position of the centre of gravity is situated between 0 and 4 mm within said cylindrical part (5) starting from the connection with the head (4).
3. Projectile according to claim 1 or 2, characterized in
25 that the voluminal mass of the envelope (2) is between 20 and 100 N/dm^3 .
4. Projectile according to claim 1 or 2, characterized in
30 that the voluminal mass of the core (3) is between 5 and 20 N/dm^3 .
5. Projectile according to claim 3, characterized in that the envelope (2) is made of metal.
- 35 6. Projectile according to claim 4, characterized in that the core (3) is made of a synthetic material with high



rigidity.

- 5 7. Projectile according to claim 6, characterized in that the core (3) is made of polycarbonate.
8. Projectile according to claim 6, characterized in that the core (3) is made of polyamide.
- 10 9. Projectile according to claim 6, 7 or 8 characterized in that the synthetic material is filled with for example fibres or glass balls.
- 15 10. Projectile according to any of the above claims, characterized in that the core (3) is made in one piece.
11. Projectile according to any of claims 1 to 9, characterized in that the core (3) is made of two or several pieces.
- 20 12. Projectile according to claim 11, characterized in that the constituent elements of the core (3) are joint to one another.