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(19) **United States**(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0241524 A1****Garcia**(43) **Pub. Date:****Nov. 3, 2005**(54) **ROTATING, EXPLOSIVE SUB-CALIBRATED PROJECTILE****Publication Classification**(76) Inventor: **Juan Martinez Garcia**, Pozoblanco
(ES)(51) **Int. Cl.⁷** **F42B 14/06**(52) **U.S. Cl.** **102/521**

Correspondence Address:

WENDEROTH, LIND & PONACK, L.L.P.**2033 K STREET N. W.****SUITE 800****WASHINGTON, DC 20006-1021 (US)**

(57)

ABSTRACT(21) Appl. No.: **11/067,654**(22) Filed: **Feb. 28, 2005****Related U.S. Application Data**

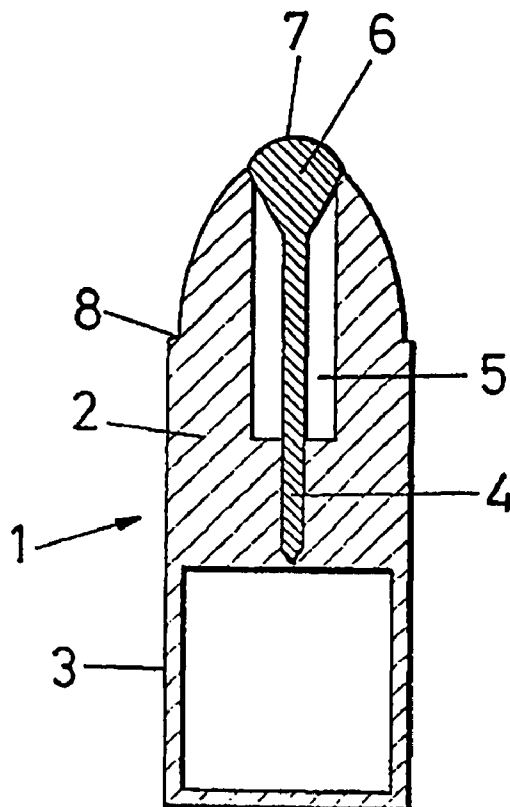
(63) Continuation-in-part of application No. 10/220,339, filed on Dec. 27, 2002, now abandoned, filed as 371 of international application No. PCT/ES01/00502, filed on Dec. 21, 2001.

(30) **Foreign Application Priority Data**

Jan. 3, 2001 (ES) P 200100010

Jul. 3, 2001 (ES) A 200101546

A projectile (1) is composed of a body divided into a front part (2) and a rear part (3), the latter being hollow. An axial rod (4) is embedded and fixed in the front part under pressure. The axial rod (4) terminates in a hard tip (6), which is located towards the front, and which is conical in shape and terminates in the form of a cap (7). The tip (6) closes the front end of an air chamber (5) positioned axially in the front part (2) of the body (1) of the projectile. Upon impact, the tip (6) is displaced towards the inside of the chamber (5), which causes it to be compressed, thus converting the projectile (1) into pellets. The body of the projectile (1) is cylindrical and has helicoidal external grooves. The body is made of lead with high antimony content. The projectile is arranged within a container, which retains it and acts additionally as a shock-absorbing element and stopper for the gases generated upon firing.



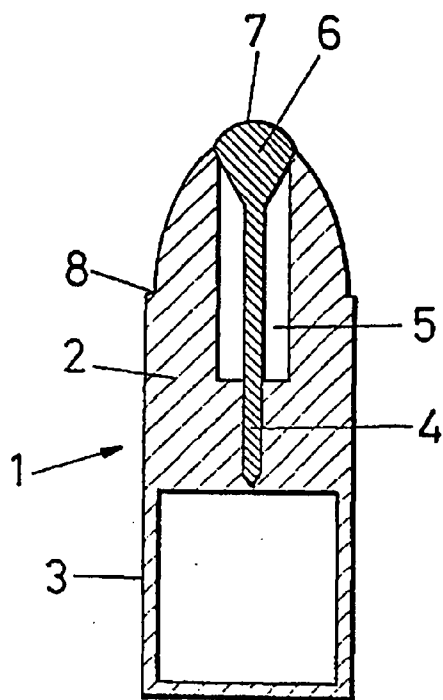


FIG. 1

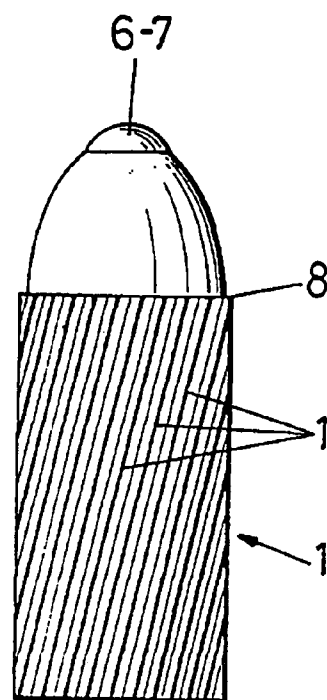


FIG. 2

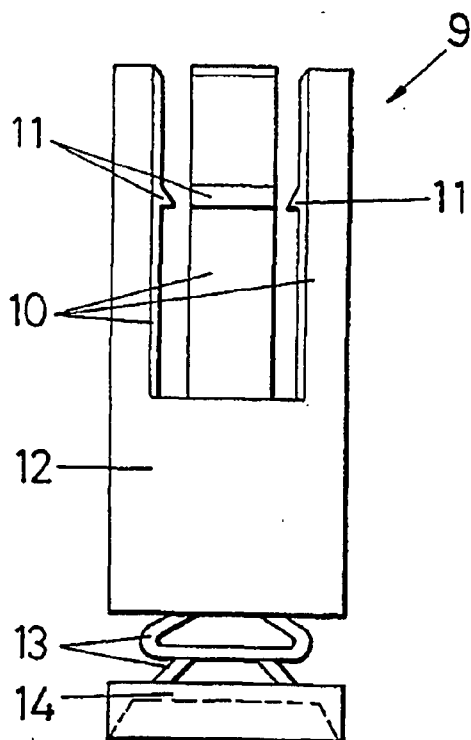


FIG. 3

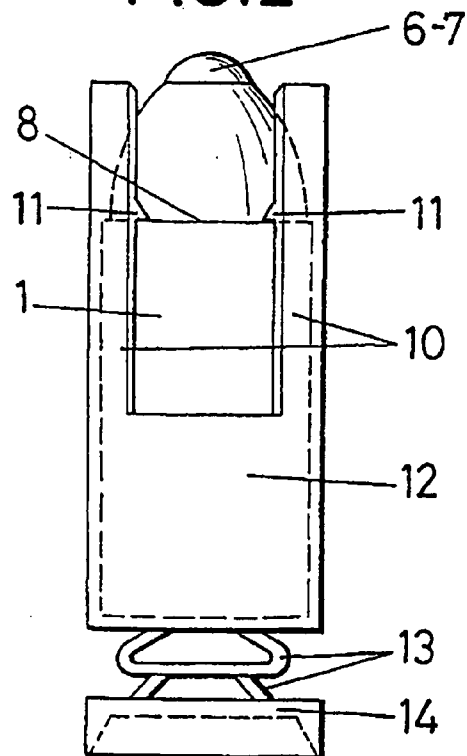


FIG. 4

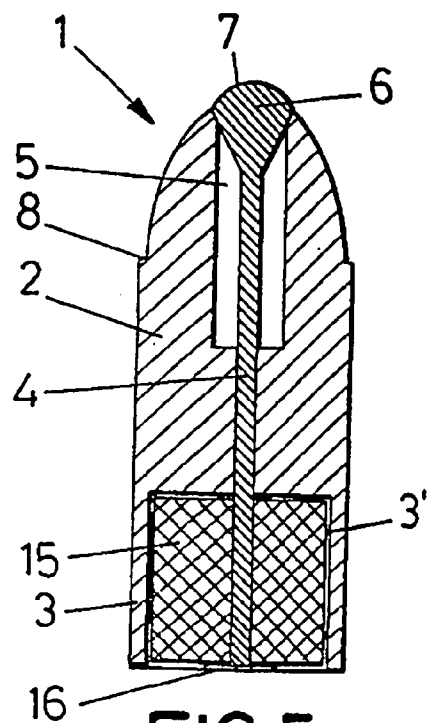


FIG. 5

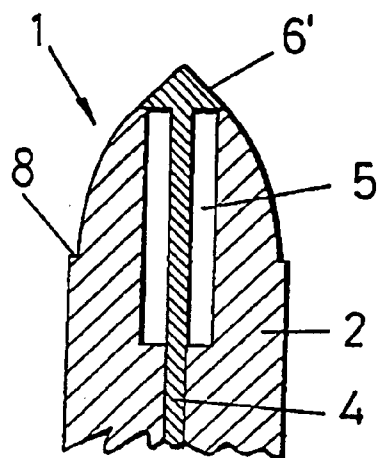


FIG. 6

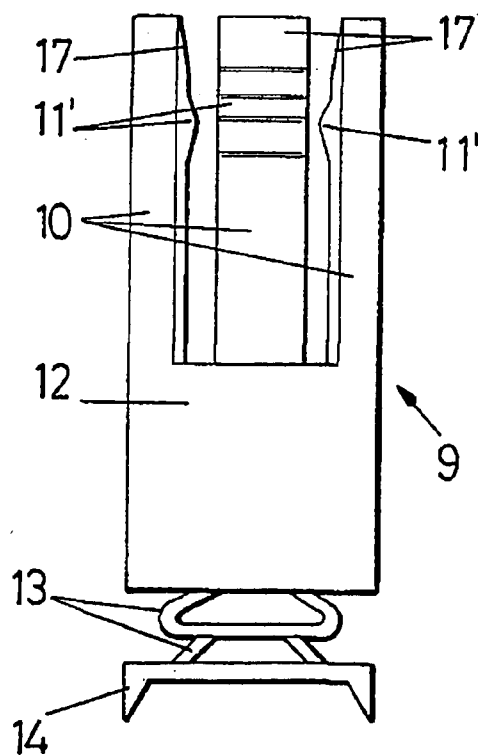


FIG. 7

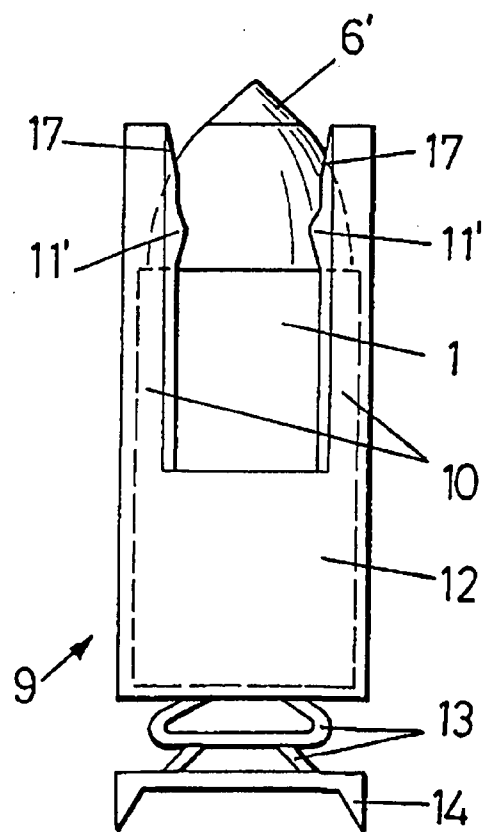


FIG. 8

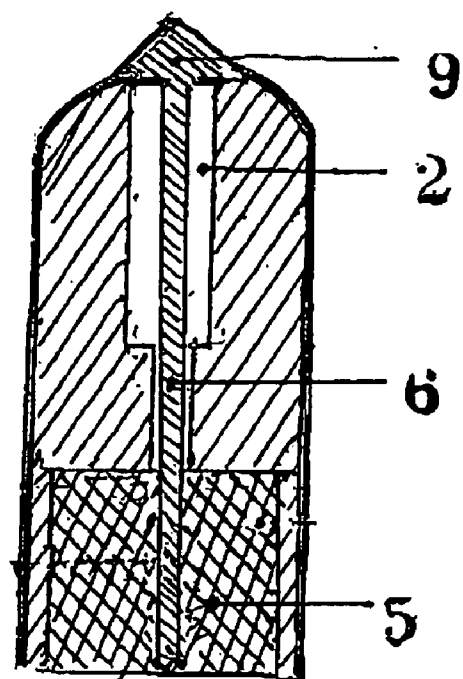


FIG. 9



FIG. 10

ROTATING, EXPLOSIVE SUB-CALIBRATED PROJECTILE

[0001] This is a Continuation-in-Part application of Ser. No. 10/220,339, Dec. 27, 2002, which is the National Stage of International Application No. PCT/ES01/00502, filed Dec. 21, 2001.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a sub-calibrated projectile (as it has a smaller diameter than the barrel of the gun in which it is used), rotating, as it rotates when it is shot at 3000 rpm and compressed air explosive as will be explained hereunder.

[0004] The object of the invention is to provide shooters and hunters with a projectile capable of reaching twice the distance of all known projectiles, due to its gyroscopic stability and being explosive, with exceptional stopping power which has not yet been constructed in any world nation.

[0005] To avoid deformation in the projectile on explosion with pressures of up to 900 kilos cm^2 , it has a lead base to which 2% antimony is added. Its extraordinary scope is due to the projectile rotating and stabilizing itself in flight, partly excepting the attraction to earth and its explosiveness is due to it having an air chamber, which upon being compressed on the choke, is pressurized, thereby converting the projectile to shrapnel.

[0006] The projectile has twelve engraved ribs (it may have more or less), the plane is inclined by 5 degrees, which on inciding in the air layers at a rate of 500 meters per second, causes it to rotate at 3,000 rpm.

[0007] The present invention refers to a subcalibrated projectile intended to be mounted in a container, in which it is suitably retained, in order to achieve the total immobilization of the projectile inside the cartridge and subsequently in the barrel of the firearm. The container serves as a means for absorbing pressure and as a stopper for the firing gases. The subcalibrated projectile is materialized in a single-piece body which is complemented with an axial rod which is embedded under pressure inside the body of the projectile. The rod terminates in a conical point which projects beyond the fore-end of the projectile and also is grooved heliocoically on the outside in a markedly inclined plane, which provides a high gyroscopic velocity and exceptional spin precision.

[0008] The projectile of this invention is intended to be fired by firearms, to be more precise, shotguns used for hunting game.

[0009] The object of the invention is to provide the world of hunting with a projectile which, in addition to offering great range on account of its particular characteristics, and together with its great shooting speed and precision, is transformed into pellets upon impact with the animal, thus bringing about maximum efficiency in the use of the projectile itself.

[0010] 2. Description of Related Art

[0011] The projectiles used in hunting shotguns usually have a smooth external surface which gives rise to a lack of

stability upon being fired and a modest range. Although it should be said that there exist some projectiles composed of two bodies fixed to each other and complemented with a rod which, in addition to there being a bushing through the bodies and comprising the means by which the two are fixed together, is terminated in a point which is harder than the aforementioned bodies, conical in shape and forms the frontal medium which has to impact first upon the target, generally upon an animal.

[0012] In relation to this type of projectile, worth mentioning is the one claimed in the Spanish Utility Model 9902957 of the same applicant, in which the end of the frontal tip is truncated, forming a tapered body, in such a way that the two basic bodies of the projectile have complementary means of axial connection. The bodies are fixed by means of a nut that screws into the rear end of the rod corresponding to the tapered body or tip mentioned above. The rear body is complemented with a back board to conceal the nut for tightening and fixing, while in the front body there is an air chamber which is closed by the base of the tapered body or the aforementioned tip. The shape of the body comprising the two aforementioned bodies and the front body tapers slightly, and is grooved longitudinally, though with a slight inclination, and is endowed towards the rear with a smooth band which adapts to the corresponding bore of the firearm in order to avoid the escape of gases that originate in the explosion, thus achieving greater firing effectiveness.

[0013] At present, there are no gun projectiles with an efficient gyroscopic rate, or explosiveness.

[0014] Nevertheless, there is a projectile having these rotational and explosive characteristics, which is that claimed in U.S. Pat. No. 6,349,651 B1 issued to the same applicant.

SUMMARY OF THE INVENTION

[0015] The proposed projectile, is based on that disclosed in the aforementioned Spanish Utility Model 9902957 presents a series of improvements or new features which give rise to some new performance qualities in the behavior of the projectile.

[0016] To be more precise, the projectile of the present invention has a single body, which is cylindrical in shape, with a totally hollow rear part to lighten the weight and a front part where the corresponding rod is located axially, terminating in the projectile's hard front tip. The tip is conical in shape but for its external base in the shape of a spherical cap which allows the hard point of the projectile's rod to fit perfectly in the mouth of the air chamber, while the rest of the rod is fitted into the rear part of the body under pressure in order to be bonded to it perfectly.

[0017] At the same time, it has been planned for the number of grooves set into the lateral surface of the projectile's body to be several, and markedly inclined, which enables the projectile to be endowed with a gyroscopic speed which is practically the same as that achieved by means of a rifle.

[0018] The hollow rear part of the body, as well as lightening its weight, allows the trajectory to be equilibrated in flight, thus avoiding pitching or deviations on account of the front part's being much heavier than its rear part or tail.

[0019] The nature or material of the body of the projectile is by preference lead, with high antimony content, thus avoiding possible deformation within the firearm's barrel, even when the pressure to which it is subjected is the maximum, approximately 900 Kg/cm², so that, since it suffers no deformation within the barrel, its precision increases as its grooves will remain intact.

[0020] At the same time, the subcalibrated projectile of the invention offers the great advantage of causing absolutely no damage to the firearm's necking, since its diameter is two millimeters less than that of the barrel of the firearm or shotgun which fires it.

[0021] The aforementioned projectile also offers the advantage that when the tip, in the form of a cap, impacts against the animal, it sinks back and enters the air chamber, which is found in the rear part of the projectile's body where it is transformed into pellets and provokes a shock wave within the animal.

[0022] This projectile, as mentioned above, is complemented with a container formed by some rectangular tabs set at equal angles to each other and provided on their inside face with a claw to fix the projectile, by means of a ring-step in the projectile in which these claws lodge. The tabs emerge from a rear part, which is closed to serve as a base coupled to some means of shock-absorption. This container acts to immobilize the projectile in the cartridge and in the barrel of the firearm, as well as absorbing pressure and serving as a stopper for the firing gases, and is preferably made of dense polythene.

[0023] In an alternative embodiment, the hollow rear part of the projectile is filled with some material, preferably highly pressurized polythene, through which passes the axial rod as it reaches towards the rear part as far as the very lower base of the body of the projectile, where it is fixed under pressure with a special nut.

[0024] In another alternative embodiment, the conical tip forming the front end of the rod takes, instead of the form of a cap, the shape of a perfect cone, resting at its base on the flat end, which terminates at the rear part of the body of the projectile.

[0025] In another alternative embodiment, the container's tabs are endowed with some arching projections, instead of with locking claws on its inside face, from which and as far as the free end of the tabs come into being sloping sections or surfaces which, on exposure to the pressurized air, assist in the opening of the tabs in order to set the projectile free, thus making its exit or departure from the container easier.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] In order to complement the current description and with the aim of assisting in the better understanding of the invention's features in accordance with a preferred example of its practical embodiment, a set of drawings is attached, forming an integral part of said description, where for illustrative but not restrictive purposes the following is shown:

[0027] FIG. 1 shows a longitudinal cross-sectional view of a subcalibrated projectile embodied in accordance with the object of the present invention;

[0028] FIG. 2 shows a side view of the projectile represented in the previous figure;

[0029] FIG. 3 shows a cross-sectional view of a container for the positioning of the projectile represented in the previous figures;

[0030] FIG. 4 shows a side elevational view of the projectile positioned inside the container represented in the previous figure;

[0031] FIG. 5 shows a longitudinal cross-sectional view of the projectile, as represented in FIG. 1, in the alternative embodiment whereby the hollow upper part is filled with a material through which passes the rod itself;

[0032] FIG. 6 shows a cross-sectional view of the front end of the projectile, where the tip of the rod as it emerges out of the front end of the projectile is conical in shape;

[0033] FIG. 7 shows a side view of an alternative embodiment of the container, in which the internal projections of the tab are rounded, and from them, and as far as the free end of those tabs, sloping surfaces come into being; and

[0034] FIG. 8 shows, finally, a side elevational view of the projectile as a whole, situated inside the container corresponding to the previous figure, and where the projectile's rod has a conical end or tip.

[0035] FIG. 9 is a longitudinal sectional view of the sub-calibrated projectile and its internal parts, letting the configuration corresponding to the axial rod 6 be observed, with its point 9 in truncated-cone shape, which acts as a fuse.

[0036] FIG. 10 shows a view of the projectile with the upper end of the rod-fuse. This projectile is provided with twelve helicoidal ribs—which may equally function with more or less—, at 5 degrees inclination, 1.5 mm thick, with a depth of 1 mm in its lower part and 2.5 mm in its upper part.

PREFERRED EMBODIMENTS OF THE INVENTION

[0037] This projectile is called sub-calibrated as it has a diameter less than that of the barrel it is shot from, with the aim of not damaging the weapon's barrel, reducing the diameter so that it incides in the air layers it traverses more easily. This projectile is situated within a plastic block which makes it better fit in the barrel and avoid the projectile from rubbing against the weapon's walls.

[0038] As may be seen in the aforementioned figures, the projectile (1) of the invention comprises a body with a front part (2), a totally hollow rear part (3), a rod (4) mounted in the front part which is held in place under pressure and passes axially and continuously through a chamber (5) located in the front part (2). The rod (4) terminates in a conically shaped tip (6). The external face of the tip has the form of a cap (7) or convex curve. Due to the tip's (6) taper, it fits into the mouth of the chamber (5), as shown clearly in FIG. 1. The body (1) of the projectile is cylindrical and is provided with an annular step (8), which is close to the front end, and more precisely, behind the tapered part of the body (1) that terminates towards its front end. The body is made of lead with antimony, while the rod (4), together with its tip (6), is made of steel and the tip constitutes a fuse. The lateral surface of the projectile's body (1) is provided with various

helicoidal grooves (1'), both on the front part (2) and on the rear, hollow part (3), as shown in FIG. 2.

[0039] The aforementioned projectile (1) is designed to be housed and completely immobilized within a container (9), formed with various tabs (10) set at equal angular intervals to each other in a circular trajectory in order to house the cylindrical body (1) of the projectile properly, as shown in FIG. 4. These tabs (10) are each provided with claws (11) which lock onto the step (8) of the body (1) of the projectile, thus providing a means for interlocking the body and the container (9). The rear part of the container is formed by a base (12) from which extends an appropriate means of shock-absorption (13). A stopper ring (14) extends from the shock absorbing means (13) and over the corresponding gunpowder of the cartridge wherein will be situated the combination of container (9) and projectile (1).

[0040] In this way, it is the container (9), which holds the projectile (1) inside the firearm's barrel, and serves as a shock absorber and stopper for the gases generated by the firing itself.

[0041] The hollow rear part (3) of the projectile (1), in addition to lightening the latter's weight, is intended to balance the trajectory of the projectile in flight, thereby avoiding pitching or deviations since it is much lighter than the front part (2) of the same projectile.

[0042] As for the air chamber (5) in the front part (2) of the projectile, when compressed on impact by the tip (6) of the rod (4), it converts the projectile (1) into pellets, as a result of which the efficacy is optimal.

[0043] It should also be mentioned that the projectile is a subcalibrated projectile provided with helicoidal grooves (1') which provide the projectile with a gyroscopic speed as if it were fired by a rifle, thus achieving exceptional precision.

[0044] In an alternative embodiment shown in FIG. 5, the hollow (3') of the rear part (3) is filled with some material (15), preferably high-pressure polythene. The rod (4) passes through the material, and the rod extends backwards before being fixed at its rear end by means of a special pressurized nut (16).

[0045] It is also worth mentioning that the rod (4), instead of having the end (6) of the outer surface rounded or in the form of a cap, is conical in form (6') and rests at its base on the end of the front part (2) of the projectile's body (1).

[0046] In another alternative embodiment, the tabs (10) of the container (9), instead of being provided with the claws (11), have some rounded and internal projections (11'). The projections (11') are each formed sections with a sloping surface (17) which assists the departure of the projectile (1) from the container (9), since these sloping planes of surfaces (17) enable the tabs (10) to open better when exposed to the pressurized air.

[0047] The body of the projectile (1) may be formed without the grooves (11), that is to say, it may present a smooth external surface, which would enable it to be used in rifle-barrelled shotguns and in smooth-bore shotguns.

[0048] In the embodiment illustrated in FIGS. 9 and 10, the rotating, explosive projectile is comprised of a single-part body, plus a 2.7 mm ϕ steel top-to-bottom through-rod

with a 9.5 mm diameter head and 4 mm high, intended to obstruct the explosion chamber 2 with which it is provided. Indeed, as seen in FIG. 9, the chamber 2 is 7 mm diameter by 12 mm high, the steel rod 6 traverses it and is fixed to the body of the projectile at its pitch which is 0.25 mm narrower than its thickness which is 2.7 mm. This rod acts as a fuse, when the projectile hits anything, even water, the compressed air contained in the explosion chamber is pressurized and the whole projectile becomes shrapnel. As shown in FIG. 9, the lower part of this projectile has a cavity 5 that is filled with a block of cork, to lighten the weight of this rear part and avoid pitching, thereby achieving perfect flight. This cavity has a 9.5 mm diameter and is 11 mm high.

1. A rotating, compressed air-explosive, sub-calibrated projectile, formed as a single body that is 31 mm high by 15 mm diameter, said single body having two cavities, one cavity being formed in an upper part and being 7 mm diameter by 12 mm high and forming an explosion cavity, and the other cavity being formed in a lower part of the projectile and being 9.5 mm diameter by 11 mm high, to lighten the weight and avoid pitching which endangers the projectile's trajectory when it is shot.

2. The sub-calibrated projectile for guns, according to claim 1, wherein the projectile has longitudinally engraved on its periphery, in a plane inclined by 5 degrees, twelve helicoidal ribs intended to incise in the air layers when shot, wherein the projectile is rotatable at 3000 rpm which stabilizes it in flight and partly, excepting the attraction to earth, achieving a scope of double to triple that of all known gun bullets.

3. The sub-calibrated projectile for guns, according to claim 1, further comprising a steel rod-fuse axially running through the body of the projectile which, in its front part, has a 9.5 mm diameter truncated-cone at its base and is 4 mm high, said front part acting as a fuse and covering the explosion chamber such that, when shot and on impact, air in the explosion chamber is pressurized thereby pressurizing the air causing said projectile to explode.

4. The sub-calibrated projectile according to claim 1, wherein the other cavity is filled with cork.

5. A subcalibrated projectile for a shotgun, said projectile comprising:

a single projectile body having a forward section defining an air chamber, and a rear section defining a rear chamber, wherein said forward section has an annular step formed on an exterior peripheral surface; and

an axial rod fixed under pressure in said projectile body so as to extend through and close said air chamber, said rod terminating in a tip positioned at the forward end of said projectile body,

wherein said tip has a conical surface that is engaged with the forward end of said projectile body, and a convex external peripheral surface,

wherein, upon impact, the air chamber is compressed by the tip of said rod.

6. The subcalibrated projectile as claimed in claim 5, wherein said projectile body has a plurality of helicoidal grooves formed in an outer surface of said projectile body.

7. The subcalibrated projectile as claimed in claim 6, further comprising a filler material provided in the rear

chamber of said rear section, wherein a rear portion of said rod extends through the filler material and a terminal end of said rear portion of said rod is fixed to said projectile body by means of a pressurized nut.

8. The subcalibrated projectile as claimed in claim 7, wherein said filler material comprises a high-pressure polythene.

9. A subcalibrated projectile for a shotgun, said projectile comprising:

a single projectile body having a forward section defining an air chamber, a hollow rear section, and a plurality of helicoidal grooves formed on an outer surface of said projectile body, wherein said forward section has an annular step formed on an exterior peripheral surface; and

a rod axially fixed under pressure in said projectile body so as to extend through and close said air chamber, said rod terminating in a tip positioned at the forward terminal end of said projectile body, wherein said tip has a conical exterior surface, and a flat base supported on a complementary surface at the forward terminal end of said projectile body,

wherein upon impact, the air chamber is compressed by the tip of said steel rod to transform said projectile body into pellets.

10. The combination as claimed in claim 9, wherein said projectile body has a plurality of helicoidal grooves formed in an outer surface of said projectile body.

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