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SHOTGUN BULLET

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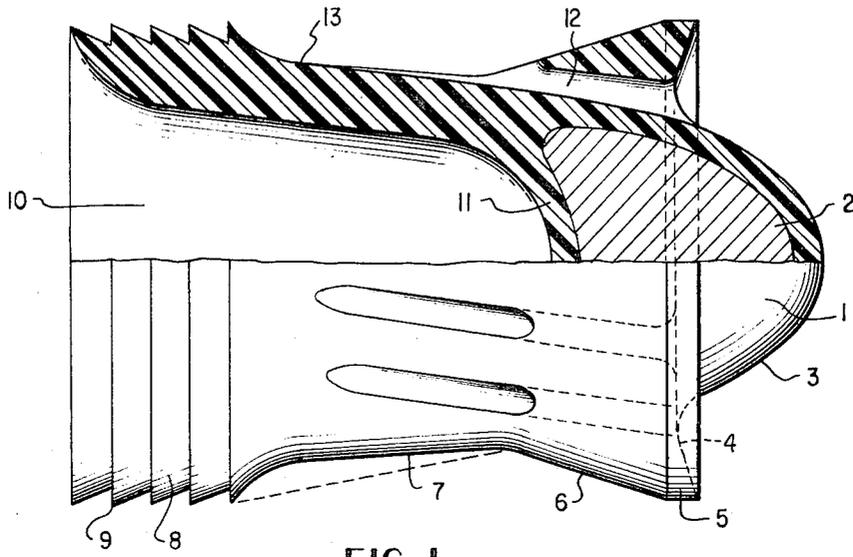


FIG. 1

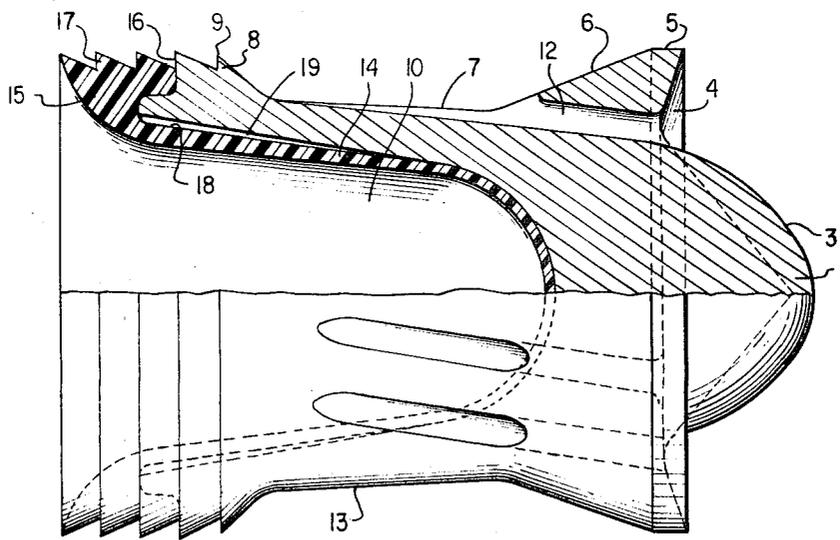


FIG. 2

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SHOTGUN BULLET

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ABSTRACT OF THE DISCLOSURE

A shotgun projectile having a forward bore engaging guide ring closely adjacent to the forward most end and a rear bore engaging sealing and guide ring for engaging the bore of the shotgun closely adjacent to the rearward most end. A central body portion to be spaced from the bore and form an annular gap therewith connects the two rings. The forward guide ring ends in a sharp edge. A plurality of inclined channels extend through the forward ring to spin the projectile during firing. The rear ring includes a plastic ring to be forced outwardly against the bore by the propellant gases and preferably provided integral with a cup-shaped liner spaced from the adjacent walls of the remaining portions of the projectile to provide for free radial expansion of the plastic ring.

Background and description of the invention

Shotgun bullets are known in various constructions, of which especially those have become accepted which are provided with a bullet jacket of lead or lead alloy, constructed essentially hollow and closed off at the forward end by means of a bottom which is conically, spherically, or similarly outwardly curved or protrudes over the entire cross section of the end face, whereby the bullet jacket or casing is provided along its circumference with a number of guide bars or strips extending at uniform distances either parallel or obliquely to the shell axis, which guide bars or strips pass over into a ring-shaped collar constructed or formed at the rear end of the bullet jacket or envelope.

It is additionally known thereby for purposes of an improved seal as regards the powder gases and of a simultaneous cleaning of the gun barrel to arrange a felt plug at the rear end of the bullet whereby in lieu thereof already a plastic plug has been proposed. Furthermore, it has already been proposed in connection with such bullets to reinforce the bottom and possibly also the adjoining part of the bullet jacket with a core of harder material having especially a greater form resistance against impact effect than is represented by lead or a lead alloy, for example, to reinforce the same with brass as well as to taper strongly toward the rear and in the outward direction the end faces of the guide strips or bars and the frontal faces of the areas disposed between the guide strips or bars for purposes of reducing the air resistance.

Though considerable improvements could be achieved with these measures, a completely satisfactory shotgun bullet could not be achieved by such prior art constructions. On the one hand, one does not always succeed to connect the bullet and the plug exactly coaxially with each other. Though this is hardly noticeable in a disturbing manner during the passage of the bullet through the barrel since, in general, the plug will necessarily adapt itself in the correct manner within the gun barrel, this, however, becomes the more disturbingly noticeable after the bullet leaves the barrel in that it leads to an inadequate firing accuracy. On the other hand, the form-deformation work to be realized during the passage of the bullet through the barrel, especially through the choke-bore

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oftentimes present with such barrels, is relatively large because the bullet abuts against the barrel with the relatively large surface of its guide strips or bars and of its rear annular collar and thereby also quite considerable friction forces become effective between the bullet and the barrel walls. Therebeyond, it has been demonstrated in practice that a number of the known shotgun bullets exhibit only an insufficient flight stability corresponding to the shape assigned thereto and the location of the center of gravity.

For eliminating these disadvantages, it is proposed in accordance with the present invention for a shotgun bullet with a conical, spherical, ogival, or similar tip and with a central hollow space extending from the rear end thereof as well as with guide surfaces along the circumference thereof, to construct the guide surfaces as an annular, cylindrical, chamfer at the forward bullet end and to provide at least one, preferably, however, several guide rings of saw-tooth-like, trapezoidal, rectangular, undulated or similar cross section at the rear end of the bullet and to constrict the bullet between the forward guide surface and the rearward guide surface or guide surfaces over its entire circumference, preferably initially conically reduced from in front to the rear and thereupon again conically enlarged. With a good guidance of the bullet at the forward and rearward end with a reduced guide and abutment surface of the bullet within the barrel compared to the known bullets, a considerably reduced friction and therewith a considerably smaller friction work is assured by the measures in accordance with the present invention, which favors especially the bullet energy and therewith indirectly flight velocity of the bullet.

According to an appropriate further development of the present invention, it is proposed to construct the transition from the forward guide surface to the frontal end surface with a sharp edge by constructing the area of the end surface adjoining the guide surface as ring-shaped recess. On the one hand, there is achieved by such a construction that the bullet is able to adapt itself more readily within the area of its forward guide means during the passage through the barrel so that correspondingly a smaller form-deformation work is to be carried out and therewith lesser frictional forces are to be overcome, which becomes noticeable in the form of a higher bullet velocity and bullet energy; on the other hand, this sharp edge produces during impact of the bullet on the animal cut hairs in the desired manner. Therebeyond, it is additionally achieved by this measure that the forward guide surface comes to lie very far forwardly whereby a large distance between the forward and the rear bullet guidance can be achieved so that the bullet is guided within the barrel over a relatively large length and therewith is guided particularly well and accurately.

Shotgun barrels have, as is known, no riflings and no lands so that no angular momentum is imparted to the bullets during the passage through the barrel insofar as special measures are not provided. With the known bullets having guide strips or bars arranged at the circumference, this is oftentimes taken into consideration in that these bars or strips are inclined obliquely to the flight direction in the same sense without, however, achieving thereby any significant success. An improved effect for stabilizing the angular momentum is achieved with the bullet according to the present invention in that air channels are provided in this bullet which lead from the end surface to the constriction between the forward guide surface and the rear guide surface or surfaces and which extend obliquely to the shell axis. In addition thereto, these air channels also reduce the air resistance, which effect is also achieved already if they are arranged in axial planes.

According to a further proposal of the present inven-

tion, provision is made to reinforce the bullet tip with a core of a harder material than that of the bullet body. This measure, by means of which a higher penetrating force is to be imparted to the bullet, may also serve for the purpose of displacing the center of gravity as far forwardly as possible for achieving a so-called fin-stabilized projectile or bullet and therewith to improve and increase the flight stability of the bullet. It is also thinkable in the sense of a pure reinforcement to provide the tip of a bullet made, for example of lead, lead alloy, or also zinc alloy, for instance, with a brass core. In contrast thereto, it would be effective within the sense of a pure displacement of the center of gravity, if the tip of a bullet made of thermoplastic material, for example, of polyethylene, were equipped with a lead core. It would also be feasible both within the sense of a reinforcement as well as a displacement of the center of gravity to provide such a plastic bullet with a metal core, for example, of brass.

Whereas with a bullet of thermoplastic material a relatively good seal as regards the powder gases with relatively low friction is achieved by reason of the springy and elastic properties of the material with the arrangement and construction of a corresponding more or less large number of rear guide surfaces or rings with a relatively small friction, this is, however, not the case or only to a slight extent with a bullet of lead, lead alloy, or zinc alloy because the springy or elastic properties are practically completely missing or lacking with this easily deformable material and thus a deformation that has once taken place, does not automatically form itself back again. Nevertheless, also in this case the seal can be improved as regards the powder gases by the construction of a large number of rear guide surfaces. A considerably more favorable result is, however, achieved if, according to a further feature of the present invention, the hollow space of the bullet is provided with a thin-walled lining of springy, yielding material, for example, of thermoplastic material, and thereby the rear end of the lining is constructed, for instance, as a flange terminating flush with the outer diameter of the bullet guide ring, and overlapping the rear end surface of the bullet toward the outside.

A particularly good effectiveness of this ring flange is achieved, if within the area of the rear end of the bullet, between the wall of the hollow bullet space and the outer surface of the lining, an annular gap is formed which extends over a more or less large axial length. It may thereby be quite sufficient to construct the outer surface of the ring flange as smooth cylindrical surface. It is, however, more advantageous if the ring flange, with a corresponding axial length thereof, is constructed with one or several guide rings corresponding essentially in shape and dimension to the bullet guide rings. Even though the arrangement of such a plastic liner with a ring flange has proved appropriate above all with bullets of lead or zinc alloy, it may also be applied with advantage, of course, to bullets of thermoplastic material, especially as not only an enhanced sealing effect can be achieved in connection therewith but also because with the use of a liner having a ring flange of more or less large axial extent, the over-all length thereof may be varied with bullets of one and the same construction and especially the guided length thereof and therewith can be matched to different conditions.

Accordingly, it is an object of the present invention to provide a shotgun bullet which is simple in construction, yet avoids the aforementioned drawbacks and shortcomings encountered with the prior art constructions.

Another object of the present invention resides in a shotgun bullet which is characterized by increased firing accuracy with reduced frictional resistance during the passage of the bullet through the gun barrel.

A further object of the present invention resides in a

shotgun bullet which offers considerably improved flight stability.

Still another object of the present invention resides in a shotgun bullet which exhibits a larger bullet energy and therewith an improved flight velocity.

Still a further object of the present invention resides in a shotgun bullet which not only entails a reduced frictional resistance but also excels by higher penetrating force and greater flight stability coupled with the possibility of an adaptation of the location of the center of gravity to the most varied conditions.

These and other objects, features, and advantages of the present invention will become more obvious from the following description when taken in connection with the accompanying drawings which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein:

FIGURE 1 is an elevational view, partly in cross section, through a bullet in accordance with the present invention provided with a tip reinforced by means of a core; and

FIGURE 2 is an elevational view, partly in cross section, through a modified embodiment of a bullet in accordance with the present invention provided with a liner for the hollow space of the bullet.

Referring now to the drawing wherein like reference numerals are used throughout the two views to designate like parts, and more particularly to FIGURE 1, reference numeral 1 designates therein the tip of the bullet, made, for example, of thermoplastic material, e.g., of polyethylene. The core 2 consisting, for example, of lead is arranged within the tip 1, which, in the illustrated embodiment, is molded or injected into the tip. The bullet end surface 3 passes over by means of the angularly shaped recess 4 into the cylindrical forward guide means or cylindrical guide surface 5 whose diameter corresponds to the caliber of the bullet. The conical tapered reduction 6 adjoins the rear end of the guide surface 5 and the conical enlargement 7 adjoins the tapered reduction 6. The conical enlargement 7 passes over at the rear end thereof into the saw-tooth-like guide rings 8 whose edge 9 is arranged on a diameter corresponding to the bullet caliber. A central hollow space 10 is closed off against the core 2 by means of the intermediate bottom 11. The bullet end face 3 is connected within the area of the recess 4 with the constriction area 13 by way of the channels 12 distributed over the circumference in a more or less large number which are inclined in the same direction and spaced at uniform distances from one another.

According to FIGURE 2, in which parts corresponding to those of FIGURE 1 are designated by the same reference numerals, the hollow space or recess 10 of the bullet is provided with the cup-shaped liner 14 made of springy, yielding material, for example, of thermoplastic material such as polyethylene or the like. With its reinforced rear end or sealing ring 15 constructed approximately as annular flange, the lining 14 overlaps and engages over the ring-shaped rear end surface 16 of the bullet. The lining end 15 is provided along the outer circumference with guide rings 17 of a saw-tooth-like shape constructed in the same manner as the rear guide rings 8 of the bullet. The annular gap 19, which conically tapers in the forward direction, is left within the rear area of the bullet body between the wall of the hollow space 10 of the shell and the outer surface 18 of the liner 14 so that within this area the possibility exists for the lining 14 to abut against the wall of the hollow space 10 of the bullet by the utilization of the play or lost motion provided by the annular gap 19 whereby the guide rings 17 may abut or press correspondingly firmly against the wall of the gun barrel (not shown).

While I have shown and described hereinabove two specific embodiments in accordance with the present invention, it is understood that the same is not limited thereto but is susceptible of numerous changes and modi-

fications as known to a person skilled in the art. For example, within the scope of the present invention, numerous variations as regards shape, dimensions, and construction of the bullet are possible. As indicated in the right half of FIGURE 1 by the dash lines, the conical enlargement 7 of the bullet body may also, for example, be so constructed that it extends rectilinearly up to the diameter corresponding to the bullet caliber. As also indicated in dash lines in FIGURE 2, the bullet tip 1 may also be constructed as a cone. Similarly, within the scope of the present invention are also: other arrangements and securing possibilities for a more or less large and possibly differently shaped core 2; other constructions and arrangements as well as securing means of the lining 14; and the number, arrangement, and construction of the guide surfaces 8, etc. Furthermore, in addition to polyethylene, other thermoplastic materials may be used for the present invention. Thus, it is obvious that the present invention is not limited to the details shown and described herein but is susceptible of numerous changes and modifications as known to a person skilled in the art; and I, therefore, do not wish to be limited to these details as shown and described herein but intend to cover all such changes and modifications as are encompassed by the scope of the appended claims.

I claim:

1. A projectile for firing from the bore of a shotgun and having a longitudinal axis generally aligned with the intended flight path, comprising: a projectile body having a forward end and a rearward end, with respect to the intended flight direction, and a rearwardly opening recess at the rear end; said projectile body including a forward body portion and an annular sealing ring means at the rearward end; said ring means having a radially inwardly facing propellant pressure receiving surface at least partially defining said recess; and said ring means being of a substantially more resilient material than said forward body portion and being mounted on said forward body portion for relative free lost motion movement radially outward with respect to said longitudinal axis under the force exerted by the propellant pressure acting on said surface.

2. The projectile according to claim 1, including a rearwardly opening cup-shaped member integral with said ring means and extending forwardly therefrom; said forward body portion having an annular wall portion forward of said ring means and radially outward of said recess; said cup-shaped member at least partially defining said recess and being radially spaced inwardly from said annular wall portion directly adjacent to said ring means defining a free annular expansion gap therebetween, in the unstressed condition of the projectile.

3. The projectile according to claim 2, wherein said gap extends axially over the major portion of said cup-shaped member and decreases in radial extent in the forward direction, in the unstressed condition of the projectile.

4. The projectile according to claim 3, wherein said forward body portion includes a rear guide and sealing ring forwardly of and abutting against said ring means for relative sliding engagement during the lost motion.

5. The projectile according to claim 1, wherein said forward body portion includes a rear guide and sealing ring forwardly of and abutting against said ring means for relative sliding engagement during the lost motion.

6. The projectile according to claim 1, wherein said forward body portion includes a forward guide ring at the forward end and has an outer annular surface extending between and being radially spaced inwardly with respect to said forward guide ring and said ring means.

7. The projectile according to claim 6, including a rearwardly opening cup-shaped member integral with said ring means and extending forwardly therefrom; said forward body portion having an annular wall portion forward of said ring means and radially outward of said

recess; said cup-shaped member at least partially defining said recess and being radially spaced inwardly from said annular wall portion directly adjacent to said ring means defining a free annular expansion gap therebetween in the unstressed condition of the projectile.

8. The projectile according to claim 7, wherein said gap extends axially over the major portion of said cup-shaped member and decreases in radial extent in the forward direction, in the unstressed condition of the projectile.

9. The projectile according to claim 8, including means for spinning said projectile about the axis during firing, having a plurality of channels through said forward guide ring inclined with respect to a plane passing through the longitudinal axis and providing communication between the space forward of said forward guide ring and the space between said ring means and said forward guide ring.

10. A projectile for firing from the bore of a shotgun, having a longitudinal axis generally aligned with the intended flight path, a forwardmost axial end and a rearwardmost axial end, comprising: annular rear guide means closely adjacent to the rearwardmost end; annular forward guide means closely adjacent to the forwardmost end; central body means for rigidly and securely holding said guide means together during firing and until the projectile strikes a target, and being generally spaced radially inward with respect to said guide means; a tip, defining the forwardmost end, being rigidly and securely connected to said forward guide means for travel therewith to the target; means for spinning said projectile about the longitudinal axis during firing, having a plurality of channels through said forward guide means inclined with respect to a plane passing through the longitudinal axis and providing communication between the space forward of said forward guide means and the space between said guide means.

11. The projectile according to claim 10, wherein said rear guide means and said central body means form a central rearwardly opening recess, and said tip continuously increases in diameter rearwardly from the forwardmost axial end at all portions forward of said forward guide means.

12. The projectile according to claim 11, wherein said central body means conically tapers inwardly and rearwardly continuously from said forward guide means to an annular transition line and rearwardly increases in diameter from the transition line to said rear guide means, and said rear guide means includes a plurality of annular substantially identical rings uniformly spaced axially with respect to each other.

13. A projectile for firing from the bore of a shotgun, having a longitudinal axis generally aligned with the intended flight path, a forwardmost axial end and a rearwardmost axial end, comprising: annular rear guide means closely adjacent to the rearwardmost end; annular forward guide means closely adjacent to the forwardmost end; central body means for rigidly and securely holding said guide means together during firing and until the projectile strikes a target, and being generally spaced radially inward with respect to said guide means; a tip defining the forwardmost end and being rigidly and securely connected to said forward guide means for travel therewith to the target; said rear guide means and said central body means forming a central rearwardly opening recess; said forward guide means including an annular forwardly opening recess and a cylindrical outermost surface forming therebetween, in axial cross section, an acute angle.

14. A projectile for firing from the bore of a shotgun, having a longitudinal axis generally aligned with the intended flight path, a forwardmost axial end and a rearwardmost axial end, comprising: annular rear guide means closely adjacent to the rearwardmost end; annular forward guide means closely adjacent to the forward-

most end; central body means for rigidly and securely holding said guide means together during firing and until the projectile strikes a target, and being generally spaced radially inward with respect to said guide means; a tip defining the forwardmost end and being rigidly and securely connected to said forward guide means for travel therewith to the target; said rear guide means and said central body means forming a central rearwardly opening recess; said rear guide means, forward guide means, and central body means being integrally constructed of synthetic plastic; said tip comprising an inner relatively heavy core and an outer synthetic plastic enclosure integral with said central body means.

15 15. A projectile for firing from the bore of a shotgun and having a longitudinal axis generally aligned with the intended flight path, comprising: a projectile body having a forward end and a rearward end, with respect to the intended flight direction, and a rearwardly opening recess at the rearward end; said projectile body including a forward body portion and an annular sealing ring means at the rearward end; said ring means having a radially inwardly facing propellant pressure receiving surface at least partially defining said recess; a rearwardly opening cup-shaped member integral with said ring means and extending forwardly therefrom mounting said ring means on said forward body portion for relative free lost mo-

tion movement radially outwardly with respect to said longitudinal axis under the force exerted by the propellant pressure acting on said surface; said forward body portion having an annular wall portion forward of said ring means and radially outward of said recess; said cup-shaped member at least partially defining said recess and being radially spaced inwardly from said annular wall portion directly adjacent to said ring means defining a free annular expansion gap therebetween, in the unstressed condition of the projectile.

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25 ROBERT F. STAHL, *Primary Examiner.*