CONTROLLED EXPANSION PROJECTILE

Inventor: Albert J. Greenberg, 123 North St., Andover, Mass. 01810

Filed: Apr. 13, 1973

Appl. No.: 350,932

Continuation-in-part of Ser. No. 88,741, Nov. 12, 1970, abandoned.

U.S. Cl. 102/91, 102/92.6, 244/3.1

Int. Cl. F42b 11/10

Field of Search 102/91, 52, 92.1-92.4, 102/38, 92.6; 244/3.1

ABSTRACT

A bullet, for use in a cartridge, is of the type having a body with an axial bore and a pellet in the bore. The body is unjacketed of soft material and the pellet is of hard material. The pellet is freely movable, but captive in the bore by means of integral elements projecting inwardly in the bore mouth. It is at the rear of the bore during flight, this location assisting in starting the expansion of the body. The nose of the body is exposed, soft and flat tipped with a soft annular rim which impacts an object first to further flatten the nose, whereupon the pellet advances freely forwardly in the bore to cause further expansion of the body into mushroom configuration.

15 Claims, 12 Drawing Figures
CONTROLLED EXPANSION PROJECTILE

This application is a continuation, in part, of my application, Ser. No. 88,741, filed Nov. 12, 1970, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to projectiles and more particularly to a bullet, for use in a pistol or rifle cartridge, exhibiting accurately controlled expansion characteristics.

The modern fire arms, either a pistol or a rifle, and especially when used in hunting, all extol the merits of providing stopping power at all hunting ranges. These bullets are designed to combine the high degree of accuracy necessary to score vital hits at long range with the power to crash through the toughest hide and bone. On impact, the bullets are specially designed to mushroom by reason of the fact that the nose, on impact, will spread radially to assume the general form of a mushroom. To add in the mushrooming effect, the bullets are provided with a soft metal jacket that is notched at nose portion so that the final or expanded, size of the bullet is, in effect, regulated by the curling of the edge of the outer jacket. Upon entering any game, the nose flattens causing the jacket to rupture along the sides where the notches are provided. Thereafter, the mushrooming continues aided by the peeling of the notched jacket, until the energy in the bullet is dissipated.

However, there is a serious disadvantage to this type of mushrooming action in that as the projectile progresses deeper into the flesh of the animal the mushrooming portion tends to break away from the bullet. Since the mass of the bullet is radially less, it does not penetrate as deeply as would be required or desired. Thus, the animal may only be wounded and will not be killed.

One attempt to provide a controlled expansion characteristic, mushrooming effect is presented in U.S. Pat. No. 843,017, issued to G. J. Hoxie on Feb. 5, 1907. In that patent, Hoxie provides an impact pellet embedded in the hollow forward portion of his projectile. As the diameter of the pellet is larger than the bore, the projectile will mushroom out as the sides rupture when the bullet is forced back.

In U.S. Pat. No. 896,021 of Aug. 11, 1908, to Hoxie, the patentee discloses a similar projectile in which the bullet is the impact part which is fixed in exposed position in the annular edge, or mouth, of the body, the pellet impacting first and then retreating into a pocket so that the annular edge forms a hollow punch. In another U.S. Pat. No. 911,591 of Feb. 9, 1909, to Hoxie, the forward portion of the projectile has a hollow nose closed by a filler, and the body has an annular cutting edge, the pellet being intended to penetrate beyond the cutting edge to push out filler and cut out disc.

In U.S. Pat. No. 3,485,173 to Morgan of Dec. 23, 1969, a Spritzer type projectile with a jacket includes a rearward axial bore with a free floating pellet therein for causing tumbling of the projectile upon impacting a soft target.

In the first mentioned Hoxie patent, the objective is similar to the objective of the invention of this application, namely to create a large hole in soft material, such as flesh. Hoxie accomplishes the objective by impacting with a hard impact part and splitting the jacket. In the other two Hoxie patents, the objective is penetration and the impact part cooperates with a hard annular edge on the body to form a compound hollow punch, a result not desired in the invention of this application. In the Morgan patent the objective is tumbling only and not mushrooming or penetration.

SUMMARY OF THE INVENTION

This invention provides a bullet, or projectile, for either a center fire or rim fire pistol, or rifle, cartridge, wherein expansion upon striking hard or soft material is the main objective rather than deep piercing penetration. Furthermore, the expansion is controlled by having the body of the projectile expand into a flattened mushroom configuration, rather than having the nose expand and the body split into separate portions, as taught in the prior art.

In my device, an unjacketed bullet-shaped body of relatively soft material, such as lead, and having an exposed soft nose, is provided with an axial bore of predetermined dimensions and a pellet of hard material, such as steel, is captive within the bore by a reduced soft annular rim around the mouth of the bore, but freely movable along the bore. Thus, upon impact, the projectile, by inertia and by air pressure when the bore is in the nose, is in the rearward portion of the bore to assist the explosive forces and heat to start expanding the body rather than the nose. Upon impact, because the soft nose strikes the object first, and not the hard pellet, the soft nose tends to flatten and, if the bore is in the nose to close into the bore, the already started lateral expansion of the body continues as the hard pellet moves forward in the bore to force the soft nose material outwardly until the body assumes generally mushroom configuration, but with the forward face flat or dished to expose the pellet. None of the body material tends to split or break off after impact, the pellet perhaps acting as a rearward hammer, rather than a forward wedge.

It is, therefore, one object of the present invention to provide a soft nosed bullet for use with either a rim fire or center fire cartridge that has controlled expansion characteristics.

Another object of the present invention is to provide a soft nosed bullet for use with either a rim fire or center fire cartridge having controlled expansion characteristics and noted by the fact that it will maintain its mass on impact.

Still another object of the present invention is to provide a soft nosed bullet for use with either a rim fire or center fire cartridge and noted by the fact that the bullet does not peel back from the nose on impact.

Yet another object of the present invention is to provide a soft nosed bullet for use with either a rim fire or center fire cartridge noted by the fact that the expansion thereof, on impact, will start at the body portion and not at the nose portion.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description of the various embodiments of my invention taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A-1D are partial cross sectional views of vari-
ous modifications of the embodiment of my invention, showing the axial bore and the pellet in the nose of the projectile;

FIGS. 2A–2C are cross sectional views of various modifications of another embodiment of my invention, showing the axial bore and the pellet in the base of the projectile;

FIGS. 3A and 3B are cross sectional views of various modifications of still another embodiment of my invention, showing an axial bore and a pellet in both the nose portion and in the base portion of the projectile;

FIG. 4A is a cross sectional view of still another embodiment of my invention, showing an axial bore in both the nose and base portions with a pellet in the nose portion;

FIG. 5 is a diagrammatic view showing the various shapes assumed by the projectile of the invention as it leaves a barrel of a weapon, travels in flight, and impacts an object, the projectile having a nose bore; and

FIG. 6 is a view similar to FIG. 5, illustrating a projectile of the invention having a base bore.

DETAILED DESCRIPTION OF THE VARIOUS EMBODIMENTS

In the following description of the various embodiments of my invention it will be noted that similar parts will be similarly numbered.

Referring now to FIGS. 1A–1D, there is shown (FIG. 1A) a short axial bore or opening 12 in my novel projectile 11 and a pellet 14 located within bore 12. It should be noted that the diameter of pellet 14 is essentially the same as the diameter of bore 12. Jacketing material 13 is provided at the base portion of projectile, or bullet, 11, all of which is set into the brass case 18.

The space between the base projectile 11 and the base of case 18 is filled with an appropriate charge of propellant 19 suitable for the bullet 11 and the use for which it is intended. It should be obvious that with center fire cartridges a primer (not shown) will also be provided.

FIG. 1B indicates a modification of FIG. 1A by reason of the application of cannelle 15 and bore 12 extending somewhat deeper than the bore of FIG. 1A.

FIG. 1C modifies the previous FIGS. 1A and 1B by utilizing a bore 12 that is considerably deeper than the bores of FIGS. 1A and 1B and further shows the application of washer 21 located between the base of projectile 11 and propellant 19.

FIG. 1D shows still another modification of the embodiments of FIGS. 1A–1C, wherein axial bore 12 is shaped in the particular configuration shown, together with the application of a base cup portion 23.

Referring now to FIGS. 2A–2C, there is shown an embodiment which utilizes an axial bore and a pellet located in the base of the projectile. In FIG. 2A, axial bore 22 is provided with a pellet 14 in the base of projectile 11. An element 17, in the form of a paper seal 26, is provided between the base of projectile 11 and propellant 19 which, as in all embodiments, fills the inside of case 18 between the paper seal 26 and the base of case 18.

FIG. 2B is another variation of the modification of FIG. 2A, showing the use of a gas check 28 and a somewhat deeper axial bore 22 in projectile 11.

FIG. 2C shows still another variation of the modification of FIGS. 2A and 2B, utilizing a still deeper axial bore 22 and a plurality of gas vent openings 16 for the control of the internal pressure, as well as projectile expansion. In addition, this modification is also provided with an element 17 in the form of a wad, or washer, 27 located between the base of projectile 11 and propellant 19.

Referring now to FIGS. 3A and 3B, there is shown an embodiment which utilizes an axial bore 12 and a pellet 14 in the nose portions of projectiles 11 as well as an axial bore 22, a pellet 14 and a sealing element 17 in the base portion. In FIG. 3A, the pellets 14 and bores 12 and 22 have approximately the same diameters, while in FIG. 3B, pellet 24 and bore 22 have somewhat larger diameters than pellet 14 and bore 12.

Referring now to FIG. 4A, there is shown another embodiment of my invention which utilizes an axial bore 12 having pellet 14 located therein with both the pellet and bore having the same diameters. However, in this instance, the base portion of projectile 11 is provided with a conically shaped, axially disposed bore 22, together with sealing element 17.

The expansion projectiles 11 of the invention all include a bullet-shaped, generally cylindrical body 31 of relatively soft metallic material, such as lead 32, each body 31 having an exposed, unjacketed, soft nose end, or forward portion 33 and a base, base end or rearward portion 34. Each body 31 includes an axial bore 12, which is preferably a surface of revolution and which is of predetermined longitudinal and lateral dimensions. Each axial bore 12 extends from an opening, or mouth, 35 at one end for a predetermined distance toward the other end to terminate in a dead end, or seat, 36, the length, or depth, ranging from about one-third to about two-thirds the overall length of the body.

The soft nose 33 preferably terminates in a flat tip 37, whether it is the soft annular edge 38 of opening 35, or the flat solid tip 39 of the unbored nose of FIGS. 2A–2C, so that there will be no hard pointed or curved impact surface to cause a ricochet.

The pellets, such as 12 or 24, are also of predetermined longitudinal and lateral dimensions and are of hard material, such as steel. Each pellet 14 is preferably spherical and of a diameter nearly equal to, but slightly less than, the diameter of the bore, so that it will move completely freely along the bore and will permit gas, such as air, to pass therearound to float the ball in the rearward portion of a nose bore during flight. Unlike the expanded impact ball of the above mentioned Hoxie patent, the pellet, or ball, of this invention is wholly contained within the bore, and is of such length relative to the bore that there is a space chamber, or pocket, 41 in advance of the ball, and toward the nose, into which the ball freely moves after impact.

In each embodiment of the invention, pellet retaining means 42 is provided at the opening 35 to prevent fallout of the pellet. Preferably, means 42 is an inwardly projecting, integral, soft, annular soft rim 43 reduced diameter around the opening in soft nose 33, although it could be any suitable means, such as inwardly projecting integral elements formed by swaging, crimping or the like, which will make the pellet captive within, but freely movable along the bore.

It will be understood that, in flight, air exerts tremendous pressure in the nose bore 12 which, combined with heat, tends to expand the body 31. On the other hand, the base bore 12 is preferably covered by an attached element 17, such as a washer, wad or the like, so that the products of combustion do not enter the
base bore and so that the pellet therein rides rearwardly until after impact.

In operation, as shown in FIG. 5 illustrating a projectile with a nose bore 12, when the projectile 11 is fired, a time element in the burning of the propellant charge 19 influences the pressure factors and temperatures attained in the casing 18 and in the barrel 45. This time factor also influences the upsetting or expansion of the base 34 of the body 31 of the projectile 11. As the propellant gases expand, they act on the base 34, causing it to move forward, but the nose 33 does not begin to move at the same time. This causes the base 34 to upset, or expand, limited only by the barrel surface surrounding it. After the bullet 11 has passed through the barrel, the nose 33 attains the same velocity as the base 34 and by inertia drives the pellet 14 rearwardly in the axial bore 12. In addition, as shown by the arrows, air entering the opening 35 during flight tends to float the pellet while exerting tremendous forces in a lateral direction to expand the body 31 as shown.

This action and counteraction of the soft material 32 of the bullet 11 forces upsetting of the central portion of the body 31 so that expansion has begun prior to the soft nose 37 striking any surface. When the bullet 11 strikes the hard-or-soft target material 46, the nose 33 stops before the base 34 and is forced inward into the space 41 of bore 12 by the constantly building up movement of the body 31, thereby causing greater bulging expansion at the central portion of the body 31. This expansion is controlled by the length of the axial bore 12, the length of the body 31, the presence and location of the cannellure 15 and the material of the body 31.

Upon striking a hard target, the soft nose is forced down flat on the pellet 14 and against any cannellure 15, causing the body to expand just above the cannellure and to punch a hole through the surface without break-up of the projectile.

As shown in FIG. 6, a projectile with a solid flat tipped nose of soft metallic material, such as lead, and a base bore 12 has the base bore covered by a suitable element 17. When the projectile is fired, the base moves forward more rapidly than the nose and during flight the base thus starts to expand immediately after leaving the barrel 45. The pellet 14 occupies the rearward portion of the bore 12 until after the soft nose strikes the target 46, whereupon the soft nose is forced down flat against the pellet and cannellure 15, thereby causing the body 31 to expand just above the cannellure. The action of the base expansion and the nose expansion, or flattening against each other, causes the entire projectile to flatten out to the maximum metal capability.

I claim:

1. An expansion projectile comprising:
   a bullet shaped body of relatively soft material having an exposed, unjacketed, soft nose and a base end; said body having an axial bore, of predetermined longitudinal and lateral dimensions, extending from an opening in said soft nose toward said base end:
   a flat tip on said soft nose;
   a pellet of relatively hard material, wholly within said bore, said pellet being nearly equal in lateral dimension to said bore and freely movable thereon;
   and of less length than said bore, to form a pellet receiving space extending toward said nose end from said pellet;
and pellet retaining means comprising an inwardly projecting, soft, annular rim of substantially reduced lateral dimensions relative to said bore and extending around said opening for preventing fall-out of said hard pellet while permitting free axial movement thereof along said bore, whereby said hard metal pellet is captive within but freely movable along said bore, said body collapses inwardly into said space upon impact of the flat tip of said soft nose and said soft nose flattens against said hard metal pellet as said pellet mushrooms said soft nose material.

2. An expansion projectile, as specified in claim 1, wherein:
   said body is of lead, said pellet is a steel ball and said bore has a surface of revolution extending from said soft annular rim of reduced lateral dimensions, around said opening at said soft nose to about one third to two thirds the distance of said base end.

3. An expansion projectile as specified in claim 1 wherein:
   said bore extends from said soft annular rim, of reduced lateral dimensions, around said opening at said nose to about one third to two thirds the distance to said base end.

4. An expansion projectile as specified in claim 1 plus:
   a second axial bore in said body extending from an opening at said base end toward said soft nose, a second said pellet freely movable in said second bore and a second said pellet retaining means associated with the base end of said body for retaining said second pellet.

5. An expansion projectile comprising:
   a bullet shaped body of relatively soft material, having an exposed soft nose free of jacketing and an axial bore forming a surface of revolution of predetermined uniform diameter and depth, said bore extending from an opening or bore mouth in said soft nose encircled by a soft annular rim, inwardly of said body to a pellet seat at the base of said axial bore:
   a flat tip on said soft nose;
   a pellet of relatively hard material having a diameter nearly equal to, but slightly less than, the diameter of said bore and freely movable therealong;
   and pellet retaining means comprising an inwardly projecting, annular element integral with said soft annular rim and reducing the diameter of the mouth of said bore for maintaining said pellet captive within said bore while permitting fluid, or matter, to enter said opening;
   whereby said hard metal pellet is in contact with said seat during flight, to cause soft annular rim and the flat tip soft portion of said body proximate said nose opening to impact an object first and collapse inwardly into said opening, whereupon said pellet leaves said seat and moves forward to mushroom said soft nose.

6. A projectile for use with a cartridge, comprising:
   a cylindrically shaped body of soft metallic material having an exposed soft nose unjacketed forward end portion and a rearward end portion:
   a flat tip on said nose for impacting a target;
   at least one bore extending along the axis of said body from said flat tip, soft nose forward end portion toward said rearward end portion, said bore
having a surface of revolution of a predetermined diameter and predetermined length at said one forward end portion,

a hard, pellet, having a diameter nearly equal to, but slightly less than, said predetermined diameter but of less length than said bore; said pellet being located wholly within said bore rearwardly thereof for completely free movement therealong, forwardly thereof, upon impact, and an inwardly projecting, soft annular integral rim, of less diameter than the diameter of said bore and defining an opening in said soft nose forward end portion for preventing fall-out of said pellet; whereby said pellet travels rearwardly of said bore, said flat tipped soft nose forward end portion impacts first and is then spread out by said pellet.

7. A projectile as specified in claim 6 wherein:
said opening is unobstructed and adapted to admit air during flight of said projectile, but to permit collapse thereinto of the material of said nose, upon impact.

8. A projectile as specified in claim 6 plus:
cannelure means extending around said body at a spaced distance therealong proximate said soft nose unjacketed forward end portion for forming a restrictive belt limiting the expansion of said body in a predetermined location relative to the location of said pellet.

9. A projectile comprising:
a bullet shaped body of relatively soft material and predetermined mass having an unjacketed, exposed, soft nose and an elongated axial bore with a surface of revolution of uniform diameter, terminating in an opening in said soft nose;
a flat tip on said soft nose;
a pellet of relatively hard material and of a diameter nearly equal to, but slightly less than, that of said bore and of a different mass, said pellet being contained wholly within said bore and freely movable axially and forwardly within said bore,
and pellet retaining means comprising a soft annular rim having an integral, inwardly projecting annular port of less diameter than the diameter of said bore and extending around said nose opening; whereby inertia and air pressure in said opening during flight urge said pellet rearwardly in said bore so that the flat tip, soft annular rim of the soft nose of said body first encounters an object while said hard pellet is wholly within said bore and said pellet then moves forwardly to further flatten and spread the soft material of said unjacketed nose.

10. A projectile comprising:
a bullet shaped body of soft metal having an unjacketed, exposed, soft metal nose, with a flat tip said body having at least one dead end bore with a surface of revolution of predetermined diameter extending, in parallelism with the central longitudinal axis of said body, rearwardly from said soft nose; a spherical member of hard metal having a diameter nearly equal to, but slightly less than, the diameter of said bore, and an integral, inwardly projecting, annular rim of less diameter than the diameter of said bore, said rim defining a forward nose opening in said body while preventing fall-out of said member, said member during flight, being normal;

wholly contained rearwardly within said bore, captive therein and free of attachment thereto to readily move forwardly therealong, after impact of said flat tip soft nose with an object to mushroom said soft metal.

11. A projectile as specified in claim 10 wherein:
said body is formed of lead, said bore is axial and of uniform diameter, and said impact member is a hard steel ball.

12. A projectile comprising:
a bullet shaped body of soft metal having a soft, unjacketed, metal nose with a flattened tip forming a soft annular integral, inwardly projecting rim defining an opening of predetermined diameter; an elongated bore extending in parallelism with the axis of said body rearwardly from said opening; said bore having a diameter greater than the diameter of said opening;
and a pellet of hard metal wholly within said bore, captive therein and freely movable therealong, said pellet being of greater diameter than said opening and of less diameter than said bore;
said pellet being normally located rearwardly of said bore during flight and adapted to freely move forwardly upon impact of said flattened tip to mushroom said soft metal.

13. A projectile comprising:
a bullet shaped body of soft metal having an exposed soft nose with a flattened tip and a base;
an inwardly projecting, integral, annular rim defining an unobstructed opening in said soft nose, said opening being of predetermined diameter;
at least one elongated bore of greater diameter than said opening extending, in parallelism with the central longitudinal axis of said body, from said unobstructed opening, in said soft nose part way toward said base, and
a pellet of hard metal and predetermined mass, wholly within said bore captive therein by reason of said rim but freely movable therealong,
said pellet being of greater diameter than said rim and of less diameter than said bore, normally located rearwardly of said bore to move forwardly therealong upon impact of said flattened tip of said soft nose to mushroom said soft metal.

14. A projectile comprising:
a cylindrical body of soft metal having a soft forward end as the impact part and having an axially extending bore of uniform diameter terminating in a forward end opening or mouth;
a flattened tip on said soft forward end having an inwardly projecting means of reduced diameter encircling said opening and
a, hard metal pellet normally seated during flight at the rearward end of said bore, but of such diameter as to move freely up to said mouth after impact of said flattened tip of said soft end to mushroom, and expand, said forward end.

15. A projectile as specified in claim 4 wherein:
said body includes at least one gas vent in the forward portion of said second axial bore for relieving gas pressure therein when said second pellet moves forwardly within said second bore after impact.

* * * * *