June 5, 1945. C. W. DAKE 2,377,839

PROJECTILE FOR GUNS

Filed April 5, 1943

Fig. 1.

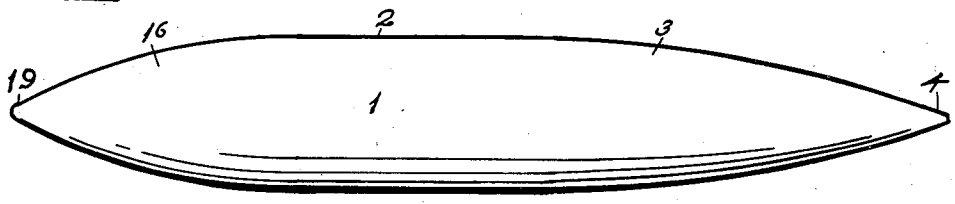


Fig. 2.

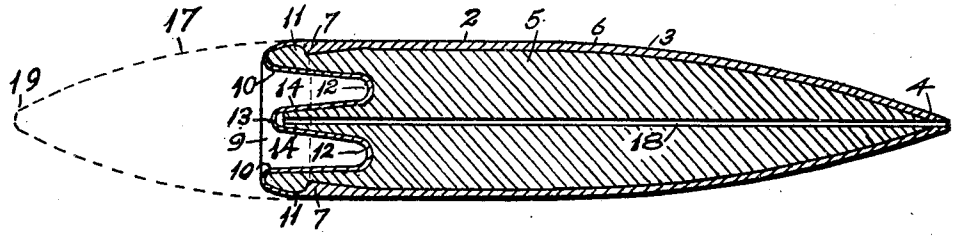


Fig. 3.

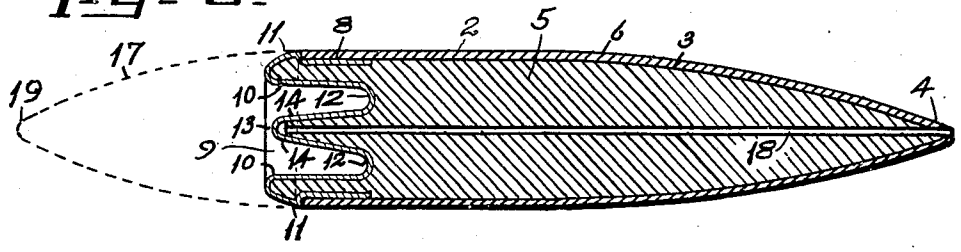
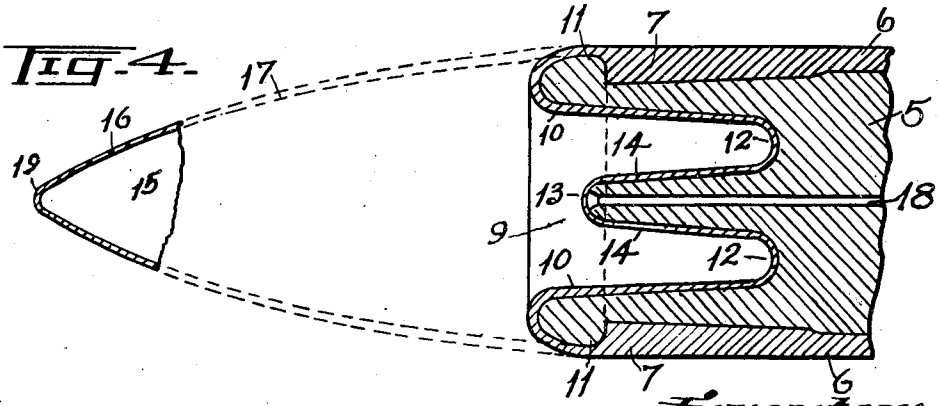


Fig. 4.



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Patented June 5, 1945 2,377,839

UNITED STATES PATENT OFFICE

2,377,839

PROJECTILE FOR GUNS

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Application April 5, 1943, Serial No. 481,837

4 Claims. (Cl. 102—50)

My present invention relates to improvements in projectiles for guns, and particularly to projectiles adapted to extremely high velocity; and the objects of improvement are: first, to provide a projectile that will have improved flight characteristics over the present high velocity projectiles; second, to provide a projectile that will have less atmospheric resistance in flight than like projectiles heretofor employed; third, to provide a projectile that will have less atmospheric drag at the base of the projectile than like projectiles heretofore employed; fourth, to provide a projectile having a rear portion convertible to substantially a parabola having an apex in spaced apart relation to the body of the projectile and produced by atmospheric pressure generated within the rear portion of the projectile while in flight; fifth, to provide a projectile having a rear portion of substantially parabolic shape formed on the projectile by internal pressure during its flight through the atmosphere; sixth, to provide a projectile that will have a rear portion tapering inward to an apex from the projectile body when the projectile is in flight but not when the projectile is in the chamber and bore of the gun; seventh, to provide a projectile having a so-called boat tail formed by combined atmospheric pressure and drag while the projectile is in flight.

I attain these above named objects and such other objects as may appear from a perusal of the description of my projectile taken with the assistance of the accompanying drawing, in which:

Figure 1 is a longitudinal exterior view of the projectile during its flight after leaving the bore of the gun.

Figure 2 is a longitudinal cross-sectional view of the projectile as it appears in the preferred form before being expelled from the gun bore.

Figure 3 is a longitudinal cross-sectional view of the projectile as it appears in modified form before being expelled from the gun bore.

Figure 4 is an enlarged cross-sectional view of the rear end of the projectile illustrating the so-called boat tail of substantially parabola form by broken lines with the apex portion of the boat tail in cross-section.

Throughout the several views of the drawing, similar numerals refer to similar parts or portions of the projectile, and referring thereto:

Numeral 1 refers to the projectile as a whole, 2 the substantially straight cylindrical portion that engages the lands of the gun bore, 3 the ogival or conical forward portion extending forward from the portion 2 to the forward apex 4 of the projectile. Numeral 5 refers to the core of the projectile and which may be of lead, lead alloy or ferrous metal, which, in the latter case the jacket 6 can be dispensed with. Numeral 7 of Figures 2 and 4, illustrates a thick re-inforcing band for the jacket 6 and whereby the jacket is prevented from expanding and causing undue friction between the projectile and the wall of the gun bore during combustion of the explosive charge; this reinforcement is shown in Figure 3 as a separate annular band member 8 forced into the jacket 6, and forming a part of the thin shell of the so-called boat tail which is preferably made of copper when of the form shown in Figure 3, or of alloyed copper when of the form shown in Figures 2 and 4, or of low carbon steel having a carbon content of .010 or less. In order that sufficient material to form the said boat tail will be had, annular channeled pocket 9 is provided in the base of the core or body core 5, in which the thin metal for forming the boat tail is folded against the outwardly curved wall 10 which has connection with the projectile jacket 6 at 11. The concave portion 12, convex portion 13, with annular wall portion 14 joining the said concave and convex portions form the annular channel of the pocket 9. Numeral 15 refers to the cavity of the boat tail within the projectile, and 16 the hollow boat tail which is of parabolic or conical shape, which consists of the wall 17, preferably diminishing in thickness from its connection with the jacket 6 at 11, to the apex of the boat tail when extended, where the wall 17 is only sufficiently thick to withstand the pressure generated within the boat tail by the atmosphere entering the cavity through elongated port 18, while the projectile is in flight, or by a metal rod loosely inserted in the said port if preferred, for guiding the thin metal folded in the pocket 9 from the pocket with the concave portion 13 first to the apex 19 of the boat tail, should there be a tendency of the boat tail not being extended concentric with the axis of the projectile, which concentricity is also brought about by the gradual thinning of the wall 17 from its joinder at 11 with the jacket 2 to the apex 19, and which can be of such graduated thinning as to compel the wall 17 to assume the contour desired, or as shown in the drawing.

In order to prevent an interknit constituent structural joinder of the portion of the casing extending into and forming the pocket 9, with the core 5, when the core is of ferrous metal and cast into the casing or jacket 6, I preferably elec-

tro-plate the surface of the casing adapted to be engaged by the core, heavily with chromium before casting the core into the casing or jacket; or I may apply a very thin sheet or layer of chromium to the said surface of the casing, and thereby prevent a permanent joinder of the casing and core, which would prevent the folded portion of the casing being forced to the form of the boat-tail for the projectile.

Applicant is aware that subsequent to his present invention, so-called boat tail projectiles for guns of many calibers have been proposed, made and used, all of which had certain objections, in that when they were of their standard length they did not have sufficient land engaging length to stabilize the projectile and rotate it to the pitch of the lands, and when made with sufficient land engaging length to stabilize and rotate the projectile in its flight and to keep it from turning end for end, there was not sufficient space in the cartridge case back of the projectile to hold the full charge of propellent explosive, therefore, what was gained by providing the boat tail was lost by the necessity of reducing the explosive charge.

In my projectile, there is sufficient substantially straight cylindrical length at numeral 2, where the projectile engages the lands of the gun bore to rotate the projectile in accordance with the pitch of the lands and stabilize the projectile in its flight; also, as the boat tail of my projectile does not extend backward from the projectile until the propelling force exerted against the base of the projectile is expanded, it is not necessary to reduce the size of the explosive propelling charge, but contrary thereto, a greater charge of explosive can be employed for a given weight projectile; this is due to the longer permissible land engaging length of the projectile, and the pocket 9 into which the thin metal for forming the boat tail is folded in order to provide sufficient thin metal to form the boat tail.

I am aware that prior to my present invention, projectiles have been made with soft metal cores or body enclosed by a metal jacket, and that some of such projectiles had their rear or base end tapered inwardly to a small diameter to form what is termed a boat tail. I therefore do not claim such a projectile broadly, but I claim:

1. The combination, in a projectile for guns, of a metal body having an apex at its front end and a rear end having a pocket extending therein with a boss-like projection extending axially from the bottom of the pocket; a metal jacket enclosing the major portion of the body and having a plurality of thicknesses, with one of its thinner portions extending into the said pocket with a hole extending from the pocket to the atmosphere for conducting air into the pocket for forcing the portion of the jacket in the pocket from the pocket to form a continuous uninterrupted longitudinally curved exterior surface boat tail for the projectile during the flight of the projectile in the atmosphere exterior of the gun.

2. The combination, in a projectile for guns, of a metal body having an apex at its front end and a rear end having a pocket extending therein with a boss-like projection extending axially from the bottom of the pocket; a metal jacket having a plurality of thicknesses with a thick portion forming a reinforcing portion at the rear of the body with a thin portion, extending into the said pocket with a hole extending from the pocket to the atmosphere for conducting air to the pocket for forcing the portion of the jacket in the pocket from the pocket during the flight of the projectile in the atmosphere.

3. The combination, in a projectile for guns, of a metal body having a front end and a rear end having a pocket extending therein; a metal jacket enclosing the body, and having a reinforcing band portion encircling the body in radially spaced-apart relation to the pocket, with a portion of the jacket diminishing in thickness from adjacent the reinforcing band portion toward the axis of the projectile and extending into the pocket, and means for causing the portion of the jacket within the pocket from the pocket to form a boat tail for the projectile, while the projectile is in flight.

4. The combination, in a projectile for guns, of a metal body having a front end and a rear end having a pocket extending therein; a metal jacket enclosing the body, and having a reinforcing band portion encircling the body in radially spaced-apart relation to the pocket, with a portion of the jacket folded into the pocket, and means for causing the portion of the jacket within the pocket from the pocket to form a boat tail for the projectile, while the projectile is in flight.

CHARLES W. DAKE.