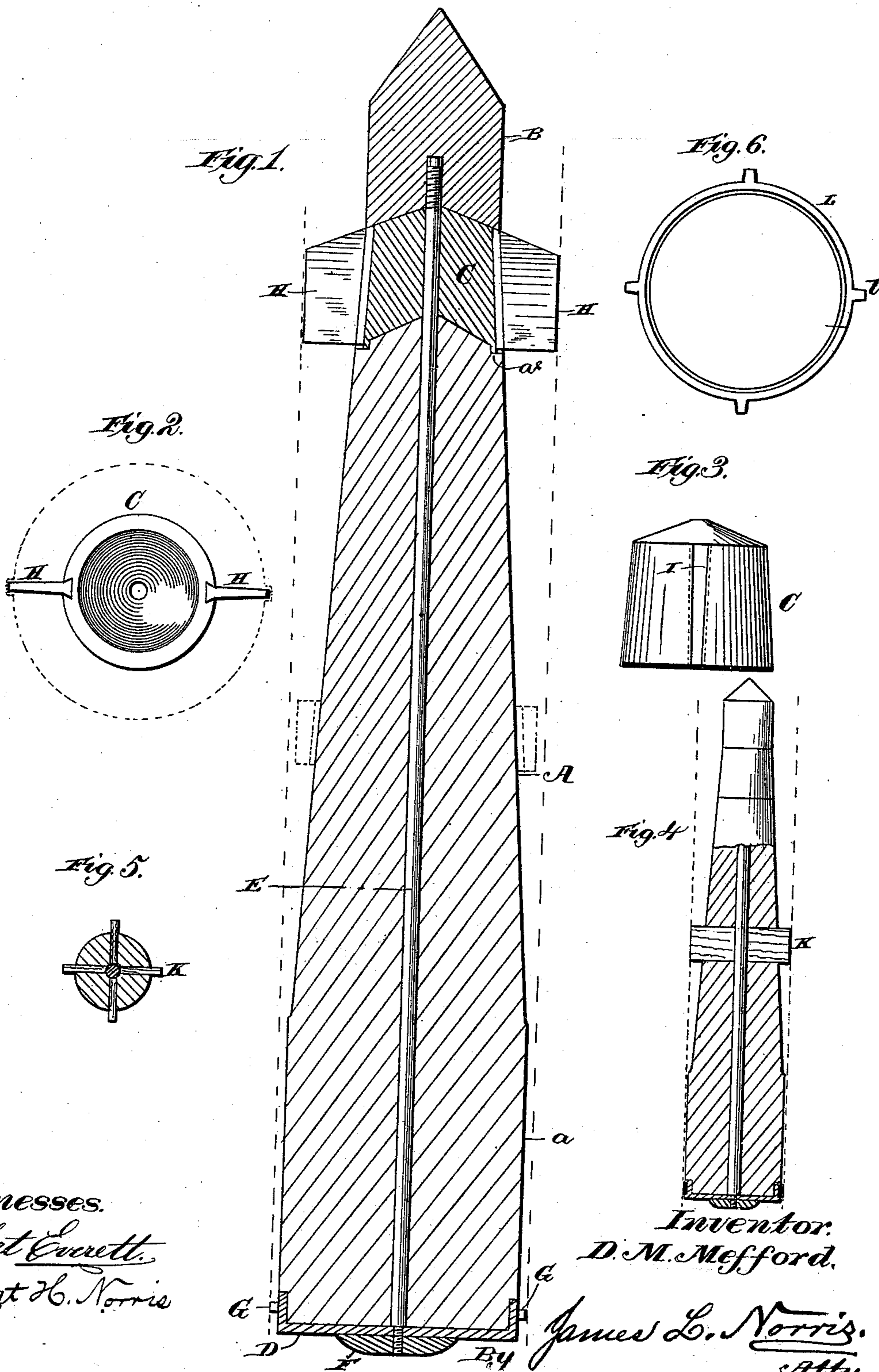


(No Model.)

D. M. MEFFORD.
PROJECTILE.

No. 252,489.

Patented Jan. 17, 1882.



Witnesses.
Robert Everett.
Albert H. Norris

Inventor.
D. M. Mefford.
James L. Norris.
Atty.

UNITED STATES PATENT OFFICE.

DAVID M. MEFFORD, OF TOLEDO, OHIO.

PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 252,489, dated January 17, 1882.

Application filed November 23, 1881. (No model.)

To all whom it may concern:

Be it known that I, DAVID M. MEFFORD, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented new and useful Improvements in Projectiles for Ordnance, of which the following is a specification.

My invention relates to that class of shot which are adapted to be projected from ordnance, and which are known as "elongated projectiles."

My improvement relates to the provision of a metal shaft passing through the axis of the projectile; also, to a re-enforcing plate at the rear end of its body; and, finally, to wings projecting laterally from the projectile in order to center its head in the bore of the gun, as hereinafter fully described.

In carrying out my invention, I construct the projectile so that it will approximate nearer in form to a dart or arrow than the elongated projectiles heretofore made for ordnance, such conformation being due both to the taper and to the great length thereof. In order to attain such an excess of length over the ordinary solid elongated projectile, and at the same time to prevent an excess of weight, I form the main body of the projectile of wood or other suitable light material, which is armed with a pointed metallic head. The diameter of this metallic head will be about one-half the diameter of the butt or rear end of the projectile, and it can be made either of a single piece of cast or wrought iron or steel, or it can have the point formed of steel, and a section of wrought or cast iron be arranged between such steel point and the wooden body, both for weight and for the purpose of re-enforcing said steel point. The wooden body of the projectile has a re-enforcing cap or plate of iron or other metal secured to its rear end, to prevent the wood from being broken and shattered by the shock of the discharge incident to the explosion of the powder within the cannon. This rear metallic cap is connected with the metallic head of the projectile by a stiff shaft of wrought iron or steel, which passes through the axis of the wooden body and is suitably connected with the said two metal ends of the projectile. This not only saves the wooden body of the projectile from being crushed and knocked out of shape by the

shock of discharge, but it also serves to give great momentum to the projectile by reason of its length and weight, thereby giving great penetrative power to the projectile.

It will be found by actual experiment that a projectile of the arrow or dart shape, such as herein shown, will have greater range and greater penetrative force than any other form, the weight of the projectiles and charge of powder being equal in both cases. When the projectile is to be used in rifled cannon I arrange lugs of soft metal—such, for example, as brass or copper—at its rear end, and also at some point on its body nearer the head, or on the head itself, which lugs will fit into the grooves of the bore, so as to support the head of the projectile centrally in the bore when it is loaded into the gun.

In using my projectile for smooth-bore guns I dispense with the soft-metal lugs at the rear end of the projectile, and in lieu thereof provide a metal band, preferably of soft metal. This band will be of such diameter as will admit of the projectile fitting the bore of the gun as closely as possible, due allowance being made in such case for its contraction or expansion by reason of atmospheric changes, so that in either extreme of temperature the diameter of the rear end of the projectile will approximate as closely as possible to the diameter of the bore of the gun. By reason of this metal band a slight space, known as the "windage," will be left between the rear cylindrical portion of the wooden body of the projectile and the wall of the bore, so as to allow for the expansion of the wood by moisture absorbed from the atmosphere. The projectile for a smooth-bore gun will also have a suitable number of laterally-projecting wings for centering the head and maintaining the axis of the projectile coincident with the bore of the gun, as hereinafter more fully described.

In the annexed drawings, Figure 1 is a longitudinal section taken centrally through a projectile constructed in accordance with my invention. Fig. 2 is a rear end view of the metal head. Fig. 3 is a side view of a section of said metal head with the wings removed. Fig. 4 is a part longitudinal section on a reduced scale, taken through a projectile having the lateral projections or wings for steadying

and centering the head in the gun made of wood and attached to the wooden body of the projectile. Fig. 5 is a cross-section taken through the projectile at the point where such wings or projections are secured to it. Fig. 6 is an end view of a metal ring that is provided with outwardly-projecting lugs, and which is adapted to be fitted upon the tapering body of the projectile.

The letter A indicates the long wooden body of the projectile, which for a portion of its length at its rear or butt end is made cylindrical, as at *a*, so as to fit the bore of the gun and thereby aid in maintaining the point of the projectile in the axial line of the caliber. The wooden body of the projectile tapers from this cylindrical rear portion to its forward end, to which latter is applied the metal head. In the present illustration this head is composed of a steel point, B, which consists of a cylindrical, or, if preferred, a slightly-tapering, body having a sharpened forward end. The rear end of this steel cap or point is concaved, so as to receive and fit closely the conical end of the metal re-enforcing section and weighted piece C, which is of wrought or cast iron or other suitable metal. This section C fits upon the end of the wooden body, and is concaved to receive the conical end of the latter. To further secure a firm joint between the two, the wooden body is made with an annular shoulder, *a*², at its forward end, and the metal re-enforced section or weighted piece C is adapted to fit snugly upon the same. The effect of this mode of joining together the two parts of the head and the wooden body will, it is obvious, greatly tend to prevent lateral displacement, and at the same time to afford tight joints.

The letter D indicates the flanged metal re-enforcing plate or cap, which is fitted to the rear end of the wooden body, the flange of the cap fitting in an annular recess in the wood, so that the outer side of such flange will be flush with the cylindrical portion of said wooden body of the projectile.

The letter E refers to the metal shaft passing through the axis of the wooden body. It also passes through the section C of the head, and has its forward screw-threaded end secured in a screw socket formed centrally in the steel point B of the head. The shaft at its rear end is also screw-threaded and passes through the metal cap at the rear of the projectile, a suitable flat nut, F, being secured upon said shaft and tightened up against the cap. That portion of the shaft which passes through the metal re-enforcing plate D is, by preference, not screw-threaded, and the screw-thread upon the end of the shaft for receiving nut F is made very slight, so as to allow the momentive force of the shaft to strip the slight screw-thread and accompany the head in penetrating the object fired at, leaving the wooden body behind at the point of contact.

The letters G G indicate the soft-metal lugs with which the re-enforcing cap or plate at the

rear end of the projectile will be provided when it is to be used in a rifled gun. The laterally-projecting wings H H at its forward end are necessarily considerably wider than the lugs at the rear end of the projectile, the dotted lines indicating the extent to which they should project in order to enter the grooves of the bore. The section C will in this instance have dovetailed grooves I in opposite sides to receive tongues upon said ways, these grooves being wedge-shaped or tapering from front to rear, and the tongues having a like conformation, so that at the discharge there will be no liability of the wings being driven back upon the wooden body.

In Figs. 4 and 5, in place of the wings H for the rifled bore, I can employ wings suitable for smooth-bore cannon. These wings K consist of pieces of wood with the grain running coincident with their length, and they are fitted in mortises formed through the wooden body of the projectile, and abut against the central shaft. These wooden pieces extend out laterally from the projectile, and serve to steady and support the point of the projectile centrally in the bore. If desired, a circular metal band can be secured to the ends of the wings K, to further strengthen the same, although such will hardly be found necessary.

I do not limit myself to the precise number of these wings in any instance, or to the precise material of which they are made. For a smooth-bore gun at least three should be employed. For a rifled gun two can be used with good effect. It is evident that these wings could be connected with the head of the projectile in other ways, or that provision could be made for connecting them with the wooden body back of the head—as, for example, by metal strips or plates extending back from the head and sunk into the wood, or by means of a metal band. This latter method—that is to say, the employment of a metal band fitted upon the tapering wooden body—is, however, the one which I prefer. This metal band L (indicated in Fig. 6) may be from three to eight inches long, the inside surface made tapering to conform with the taper of the wooden stock. The front of the band should be thin, so as to offer no obstruction to the air, and the raised beads *l* on said head be either coincident with the axis of the projectile, or they may be slightly spiral, so as to cause a rotation in the flight of the projectile. The extreme diameter of these beads or flanges should fit the caliber nicely. This device is only for smooth-bore guns, and when it is employed of course the wings attached to the head are dispensed with.

In conclusion I would remark that to be fully effective the length of the projectile should be at least equal to five diameters of the bore of the gun in which they are intended to be used.

In forming the projectile for smooth-bore cannon, if it should be desired that the pro-

jectile shall twist or revolve in its flight, the forward ends or edges of the wings can be beveled, so that the resistance of the air will cause the projectile to rotate about its axis.

5 What I claim is—

1. An elongated projectile for ordnance, composed of a tapering wooden stock or body, provided with a metal head of smaller diameter than the said body, and a metal shaft passing through the axis of the body and secured to the metal head, substantially as described, the metal shaft being adapted to give additional momentum and penetrative force to the projectile, and the wooden stock being constructed to strip off from the shaft at the point of impact while the head and the shaft pass on through the object fired at.

2. The combination, in an elongated projectile, of the body composed of wood or other light material, having a metal head of smaller diameter than the body, with the metal reinforcing plate at the rear end of the wooden body, and the central metal shaft passing through said body and connecting the plate with the head, substantially as described.

3. An elongated projectile for ordnance, composed of a wooden stock made cylindrical at its rear end, and having a taper from said cylindrical portion to its forward end, a metal

head secured to its forward end, and having a diameter less than the diameter of the said wooden body, and the central supporting-shaft passing through the body and secured to the head, substantially as described.

4. An elongated projectile for ordnance, having a metallic head smaller in diameter than the caliber of the gun for which the projectile is made, with a tapering wooden stock or body, a central metal supporting-shaft, and laterally-projecting wings connected with the tapering stock of the projectile, substantially as described.

5. The combination, in an elongated projectile for ordnance, of the tapering wooden stock or body A, with the metal head, the metal supporting-shaft passing through the axis of the stock, and the metal ring L, fitted upon the tapering stock, and provided with laterally-projecting beads, said members being constructed and organized substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DAVID M. MEFFORD.

Witnesses:

JAMES L. NORRIS,

JAMES A. RUTHERFORD.