No. 713,412. Patented Nov. 11, 1902.

A. W. ERDMAN.

HOLLOW PROJECTILE.

(Application filed Sept. 11, 1900.)

(No Model.)

FIG. 1.

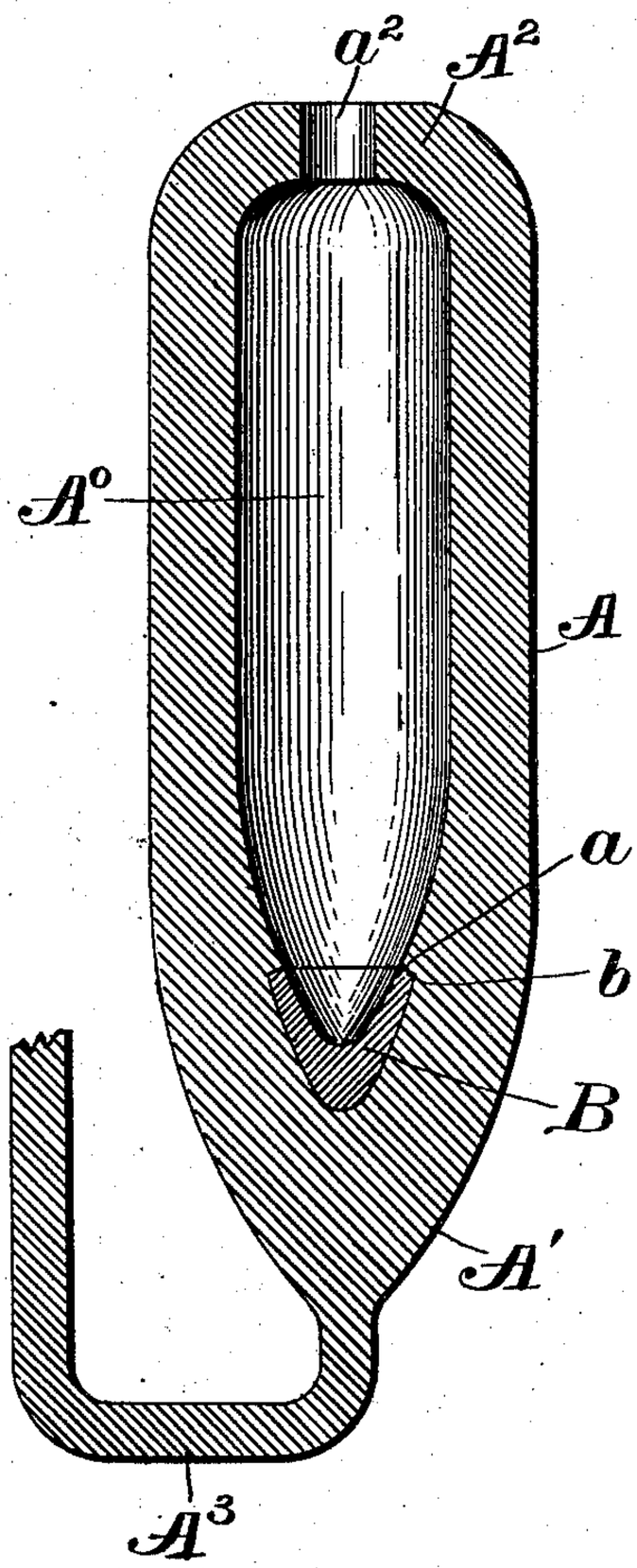
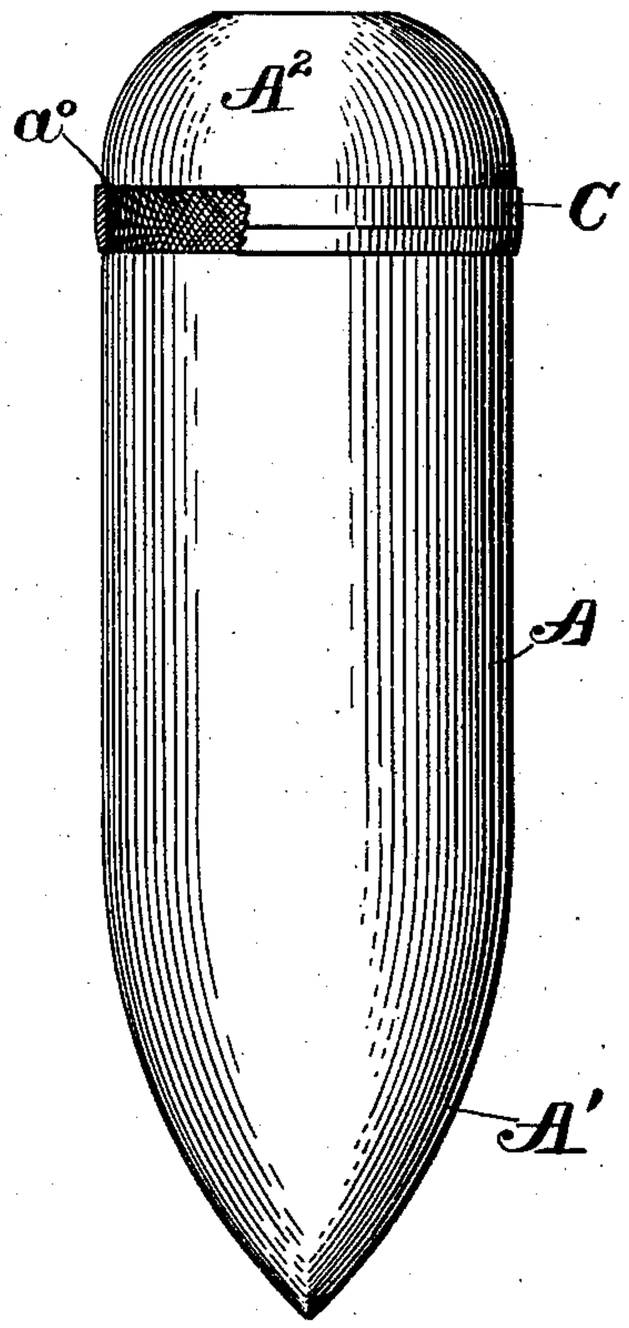


FIG. 2.



Witnesses
Percy C. Bowen.
A. D. Wilkinson

Inventor
A. W. Erdman,
by Wilkinson & Fisher,
Attorneys.

UNITED STATES PATENT OFFICE.

ALBERT W. ERDMAN, OF DERBY, CONNECTICUT, ASSIGNOR TO DRIGGS-SEABURY GUN & AMMUNITION COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

HOLLOW PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 713,412, dated November 11, 1902.

Application filed September 11, 1900. Serial No. 29,699. (No model.)

To all whom it may concern:

Be it known that I, ALBERT W. ERDMAN, a citizen of the United States, residing at Derby, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Hollow Projectiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to improvements in the manufacture of hollow projectiles.

Said invention relates more especially to shells of cast-steel or alloys of steel or cast-iron.

It is well known that cavities or, at least, spongy regions are apt to exist in those portions of the projectile where the walls are thickest—thus, for instance, in the center of the nose of the projectile and also in the region of the base.

My present invention is to devise a method by which it is possible to cast shells nearly, if not quite, free of unequal shrinkage and as near to the finished size and shape as possible—that is to say, to do away with these spongy regions or cavities in the metal of the shell, also to dispense with the use of risers or sink-heads, which are generally a necessity in the present methods of casting shells.

My invention will be understood by reference to the accompanying drawings, in which—

Figure 1 represents a section of a shell after it has been removed from the mold and before it is finished; and Fig. 2 represents an elevation of the finished shell banded but with the fuse omitted, parts being broken away.

A represents the shell, which is cast on a core, as usual, and the core leaves the chamber A^0 for the explosive and the opening a^2, caused by the core-stem in the base A^2. This opening a^2 is subsequently bored out and screw-threaded or otherwise adapted for the insertion of the fuse. (Not shown.)

The base of the shell is rounded, as shown, so that the walls of the rear portion of the shell may be of equal or approximately equal thickness, and thus any tendency to unequal shrinkage in the base of the shell will be avoided.

In order that the best metal may be in the nose of the shell, it is preferable to arrange the molds with the points of the shells down and to supply the metal from the bottom, as by the gate A^3. (Shown in Fig. 1.)

To further insure the strength of the nose of the shell where the maximum strength is required and to prevent the occurrence of spongy regions in this the thickest part of the walls of the shell, I provide a cup-shaped chill-piece B, which is secured to the tip of the core by cement or in any other convenient way, and which may be provided with shoulders *b*, projecting from the core, which shoulders *b* engage shoulders *a* in the walls of the shell after the mold has been cooled, and thus this cup-shaped chill-piece remains in the shell as an integral part thereof after the core has been removed. This chill-piece may be made either of such a metal or alloy and of such size as to entirely or partially fuse and unite with the molten steel or iron during the process of casting; or the chill-piece, either on account of the metal or alloy of which it is made or on account of its size, may not fuse sufficiently to unite with the molten metal of which the shell is cast or may not unite because of the nature of the metal used in the chill.

From experiments made by me I believe the best form of chill to be one which is made of a metal or alloy which will chemically unite with steel under fusion, preferably being a little more fusible than the steel used in the shell and of such a size and weight as to do the required chilling of the point in taking from the point the heat necessary to fuse the chill, or, in other words, the size of the chill should be so proportioned to the steel in the point of the shell as to sufficiently chill the same to prevent internal shrinkage occurring in the act of its own fusion; but I do not confine my invention to this form. In constructing a shell in this manner it may be desirable to use in the chill a very tough metal or alloy, which serves as a backing to the harder steel tip of the shell which has been chilled by this latter backing, as just de-

scribed. In this way the shell would have sufficient hardness for penetration and at the same time great toughness to resist shattering and breaking up of the nose of the shell.

In Fig. 2 I have shown the band C as fitted in the knurled seat a^0 near the base of the shell, which would be a suitable place when loose ammunition is used; but if desired to use the shell with fixed ammunition the band C should be placed farther forward thereon.

As an additional advantage of the curved base of the shell A^2, besides homogeneity of the metal secured by this construction, the shape of the shell would probably diminish the resistance of the air to the flight of the shell, just as rounding the stern of a boat diminishes the drag of the boat in the water.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. An elongated cast projectile having the walls of the rear half thereof substantially uniform in thickness, with a thickened nose and a chill-piece secured in said nose by the molten metal, substantially as described.

2. An elongated cast projectile provided with a chill-piece fused in its nose, substantially as and for the purposes described.

3. An elongated cast projectile provided with a cup-shaped chill-piece fused in the inner wall of the nose of said projectile, substantially as and for the purposes described.

4. An elongated cast projectile having the walls of the rear portion thereof of a substantially uniform thickness, with thickened walls toward the nose of the projectile, and provided with a cup-shaped chill-piece fused into the inner face of the nose of the projectile, substantially as and for the purposes described.

5. An elongated cast projectile having the walls of the rear half thereof substantially uniform in thickness, with a thickened nose and a chill-piece shouldered as shown and secured in said nose by the molten metal, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

A. W. ERDMAN.

Witnesses:

H. B. POCK,

ALFRED C. BALDWIN.