

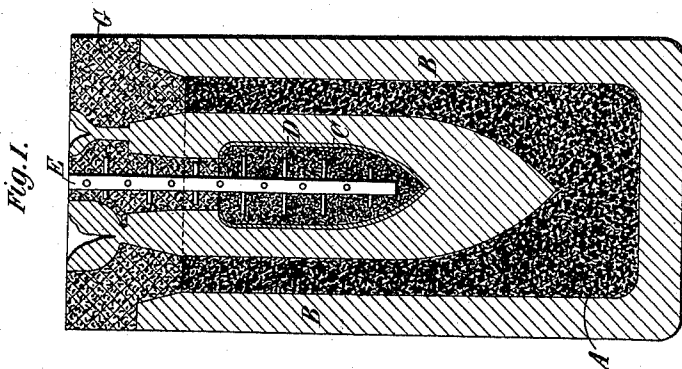
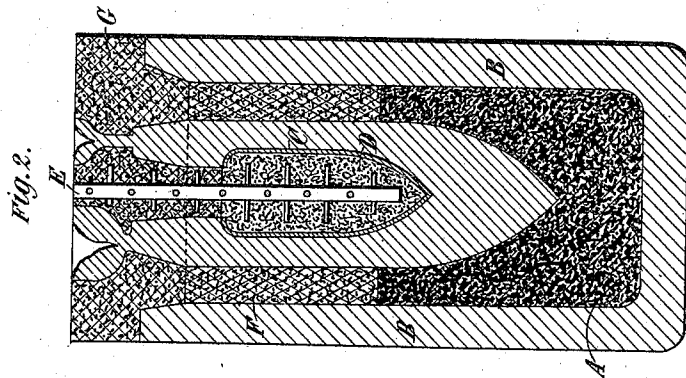
(No Model.)

R. LOW.

HOLLOW PROJECTILE OR SHELL FOR ORDNANCE.

No. 580,285.

Patented Apr. 6, 1897.



Witnesses
Thos. A. Brown
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Atty

UNITED STATES PATENT OFFICE.

ROBERT LOW, OF LONDON, ENGLAND.

HOLLOW PROJECTILE OR SHELL FOR ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 580,285, dated April 6, 1897.

Application filed April 27, 1896. Serial No. 589,312. (No model.) Patented in England March 7, 1893, No. 4,966; in Belgium January 31, 1894, No. 108,128, and in France April 10, 1894, No. 235,616.

To all whom it may concern:

Be it known that I, ROBERT LOW, consulting engineer, a subject of the Queen of Great Britain, residing at 11 Queen Victoria Street, in the city of London, England, have invented certain new and useful Improvements in Hollow Projectiles or Shells for Ordnance, (for which I have obtained patents in France, No. 235,616, bearing date April 10, 1894; in Belgium, No. 108,128, bearing date January 31, 1894, and in Great Britain, No. 4,966, bearing date March 7, 1893,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to improvements in hollow projectiles or shells for ordnance.

The object of my said invention is to produce from cast-steel, (with or without nickel or chromium,) containing from 0.5 per cent. to 0.8 per cent. of carbon and not more than 0.3 per cent. of manganese, an improved armor-piercing hollow projectile of a high quality, the metal of which is specially treated according to this invention to make it hard at the exterior of the projectile and tough at the interior thereof. By such treatment the penetrative power of the said projectile is greatly increased and the possibility of the occurrence of breakage or of deformation is diminished.

By my invention I am enabled to obtain a high-class projectile at a moderate cost, as I employ a material less expensive than that which is usually employed for like articles, and I avoid the use of expensive and in some cases uncertain processes, such as have hitherto been commonly employed in the manufacture, for instance, of armor-piercing shells from high-class chrome-steel or from steel containing a considerable percentage of carbon.

In the accompanying drawings, Figure 1 is a central longitudinal section of a mold employed for the manufacture of shells in accordance with my invention, and Fig. 2 indicates a slightly-modified construction thereof.

In carrying my said invention into practice I provide a mold A, Fig. 1, of the proper shape, composed of compressed carbonaceous material contained, preferably, in a fireproof cylinder B. Into the said mold I place a core D, consisting of oxid of iron or manganese, or

a mixture of both these substances, inclosed in an iron or steel casing C.

E is the core-spindle, by means of which the core is suspended in the mold.

G is a block of steel-molders' composition for closing the upper end of the mold.

I pour into the mold the molten steel to form the shell, and as soon as the steel is set I place the mold and its contents in a suitable furnace heated to the required temperature, say about 3,000° Fahrenheit, and allow it to remain therein until the outer portions of the shell have been carburized to the desired degree (say until they contain two per cent. of carbon) by contact with the carbonaceous mold. While the hardening of the exterior of the shell is proceeding the interior thereof is undergoing a toughening process by contact with the core. By this process I make a good armor-piercing shell without the expense of forging.

In some cases I use a mold the lower part of which—viz., that which incloses the point of the shell—is composed of carbonaceous material and the upper part of which is composed of steel-molders' composition or other refractory material, and so produce a shell with a hard head and tough body. Such a mold is indicated in Fig. 2, F representing the steel-molders' composition.

To complete the hardening process, the shell after having cooled down to a cherry-red is lifted out of the mold and allowed to cool down in the atmosphere, the air imparting to it the required hardness. This hardening in the air is rendered possible by reason of the high degree of carburization to which the outer surface of the shell has been subjected.

When the shell is cold, I place it in a suitable grinding-lathe fitted with a radial rest and I polish the outer surface thereof by any suitable means—for example, by means of an emery-wheel.

What I claim is—

1. A method of producing an armor-piercing hollow steel projectile or shell of self-hardening steel, which consists in casting the shell in a carbonaceous mold, then heating the mold and its contents in a furnace, and then hardening the exterior surface of the

shell by removing it from the mold and cooling it in the atmosphere without contact with a liquid, substantially as described.

2. A method of producing an armor-piercing projectile or shell of self-hardening steel which consists in casting the shell in a mold composed partly of carbonaceous material and partly of steel-molders' composition, then heating the mold and its contents in a furnace until the casting is sufficiently carburized, and then hardening the exterior surface of the shell by removing it from the mold and cooling it in the atmosphere without contact with a liquid, substantially as described.

3. A method of producing an armor-piercing hollow steel projectile or shell externally hard and internally tough which consists in casting the shell in a carbonaceous mold having a core made of manganese oxid inclosed in a metal casing, and then heating the mold and its contents in a furnace, substantially as described.

In testimony whereof I have hereunto set my hand this 9th day of April, 1896.

ROBERT LOW.

Witnesses:

ARTHUR A. BERGIN,
ARTHUR A. WILLIAMS.