

(No Model.)

J. H. CARPENTER.
ARMOR PIERCING PROJECTILE.

No. 580,570.

Patented Apr. 13, 1897.

Fig. 1

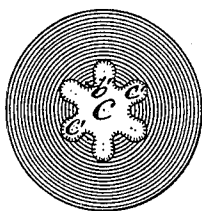
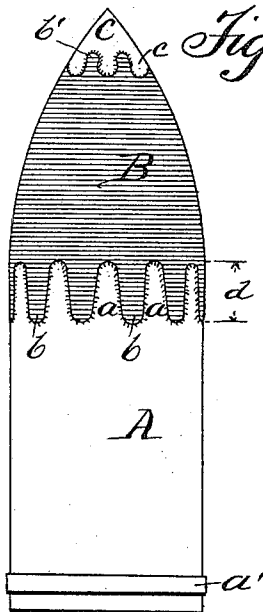


Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES H. CARPENTER, OF READING, PENNSYLVANIA.

ARMOR-PIERCING PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 580,570, dated April 13, 1897.

Application filed January 10, 1895. Serial No. 534,411. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. CARPENTER, a citizen of the United States, residing at Reading, county of Berks, State of Pennsylvania, have invented certain Improvements in Projectiles, of which the following is a specification.

My invention relates more particularly to projectiles which are adapted for such work as the piercing of armor-plates. This class of projectile is ordinarily of cylindrical form with a conical or "ogival" head, the surface metal of which is hardened by chilling, so as to greatly increase its crushing strength. The advantage of thus increasing the crushing strength of the surface metal at the front of the projectile carries with it a resulting disadvantage, due to the tendency of the chilled metal to flake off when subjected to the strain of impact with the hardened surface of armor-plate and also by the further tendency of the head of the projectile to break off entirely from the cylindrical body, the line of fracture tending to start at and approximately follow the junction-line between the chilled and unchilled surface metal.

The object of my invention is to overcome or at least minimize these bad effects resulting from the chilling of the metal, and I accomplish this in the chilling operation by causing the chilled metal to be so blended with the unchilled metal as to give to the combination great tenacity as well as hardness, and so as to avoid any weak junction-line, such as would naturally become a line of fracture.

The invention is fully described in connection with the accompanying drawings and is specifically pointed out in the claims.

Figures 1 and 2 are respectively an end view and an elevation of a projectile in which the approximate lines of junction of hardened and unhardened metal are indicated in a form which embodies my invention.

A represents the cylindrical body, B the conical or ogival head, and C the extreme pointed end of the projectile. The band *d* represents the "shoulder" or "bourillet" of the projectile, being the portion of its surface which is accurately fitted to the bore of the gun, and *a'* indicates the ordinary copper band near the base.

The present approved method of manufacturing these projectiles involves the use of a fine grade of steel, which, after having been roughly formed to shape, is completed by first accurately turning and boring it to size; second, subjecting the head portion to the chilling or hardening operation, and, third, grinding the hardened shoulder-band to an accurate fit in the bore of the gun. The hardening operation consists, ordinarily, in subjecting the whole head and shoulder, while properly heated, to the action of a cooling medium, such as cold water or other liquid, while allowing the connected body portion of the projectile to cool slowly, the chilled surface metal being joined with the unchilled on a plane at right angles to the axis of the projectile. One feature of my invention consists in avoiding this plane of connection, which, as previously stated, is apt to become a line of fracture, and I accomplish this by providing a protecting-cover of asbestos or other suitable material for the body of the projectile, which will protect portions *a a* of the surface from contact with the cooling medium, while exposing adjacent portions *b b*, also lying within the band *d*, thus causing the latter to be made up of alternating hardened and unhardened surfaces and breaking up the line of connection, so that it shall not be liable to become a line of fracture, as heretofore.

The further difficulty referred to as experienced with these chilled-head projectiles is the breaking off of the point C of hardened metal. This I overcome by also protecting the point in the chilling operation, so as to leave it soft, preferably, though not necessarily, extending the unhardened or partially-hardened surface metal, as at *c c*, into the hardened portion of the head, so as to form a broken or uneven connecting-line similar to that at the shoulder *d*. The protection afforded the point C by the asbestos covering during the hardening operation is so complete as to prevent any appreciable chilling or hardening of such point except immediately adjacent to the exposed surface, where the heat is carried off somewhat by conduction, and the effect of impact of the soft-metal point against a hardened armor-plate is to cause a spreading of the soft metal instead of a fracturing of the projectile, as has been

commonly the case heretofore, and to considerably increase the penetration.

The blending-lines may obviously be varied considerably without departing from the spirit of my invention, and I do not desire to limit myself to the particular construction shown; but

What I claim is—

1. A chilled-head projectile having alternating sections of hardened and unhardened surface metal at the band of junction, substantially as and for the purpose set forth.

2. A chilled-head projectile having the hardened surface metal thereof blended into the adjacent unhardened surface metal on a jagged or wave-like junction-line, substantially as and for the purpose set forth.

3. A chilled-head projectile having a relatively soft point formed integral therewith, substantially as set forth.

4. A chilled-head projectile having the

metal forming the point thereof relatively soft, and points or sections of said softer metal extended into the hardened surface metal of the head, substantially as and for the purpose set forth.

5. A chilled-head projectile having the metal forming the point relatively soft, and projections *a a* of unhardened body metal blended into the hardened surface metal, substantially as and for the purpose set forth.

6. An armor-piercing projectile having a soft portion in advance of the rear or body part of the projectile and forming an integral part of the projectile, substantially as and for the purpose specified.

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

JAMES H. CARPENTER.

Witnesses:

CAMERON E. STRAUSS,
W. G. STEWART.