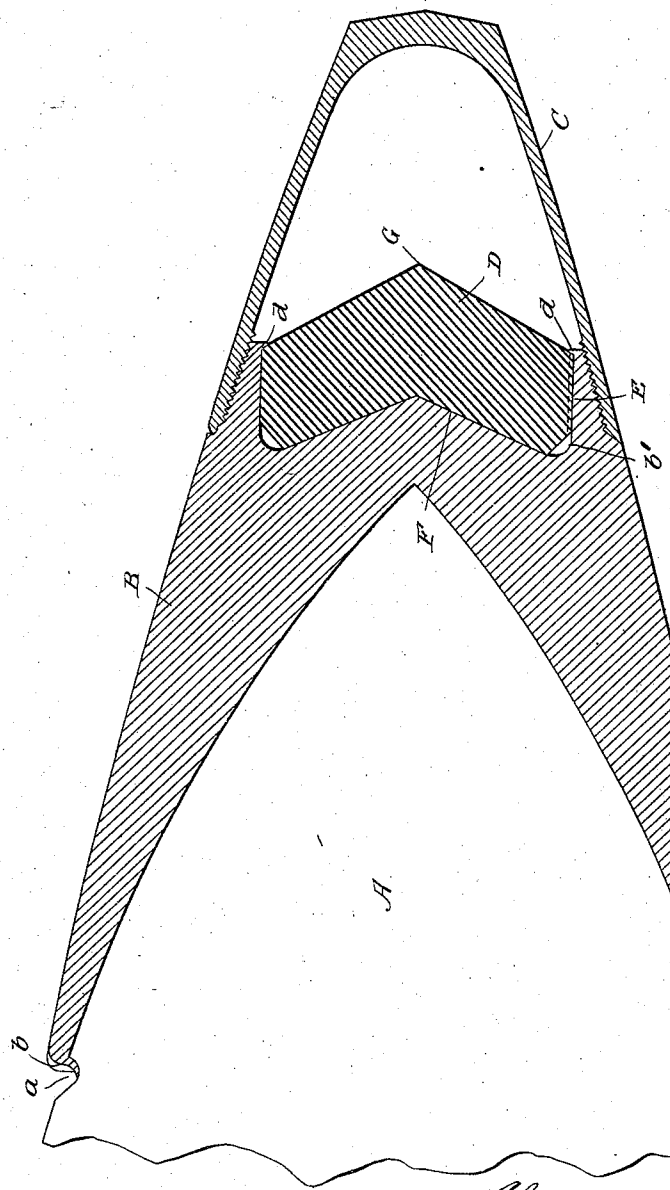
A. G. McKENNA & W. DALTON.

ARMOR PIERCING PROJECTILE.

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Witnesses

Halbert P. Brown

M. G. Crandell

Inventors

Alexander G. McKenna &

William Dalton

By Church & Church

their Attorneys.

UNITED STATES PATENT OFFICE.

ALEXANDER G. McKENNA AND WILLIAM DALTON, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNORS TO WASHINGTON STEEL & ORDNANCE COMPANY, OF WASHINGTON, DISTRICT OF COLUMBIA, A CORPORATION OF WEST VIRGINIA.

ARMOR-PIERCING PROJECTILE.

1,301,860. Specification of Letters Patent. Patented Apr. 29, 1919.

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To all whom it may concern:

Be it known that we, ALEXANDER G. McKENNA and WILLIAM DALTON, citizens of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Armor-Piercing Projectiles; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention relates to armor piercing projectiles and specifically to that part of such projectiles commonly designated as the cap. Caps of the type herein contemplated serve to facilitate the passage of the body of the projectile through resistent protective armor and are commonly made of metal which is tough but soft or ductile as compared with the projectile itself or the nose portion of the projectile, although it has been proposed to form such caps with a hardened striking portion integral with the body of the cap. Practical experience and tests show that the armor piercing qualities are enhanced by the provision of an exceedingly hard nose or striking portion for the cap, and the present invention is designed as an improvement upon this type of device, the object being not only to increase the efficiency but to provide a structure which is capable of being manufactured by known methods and which will give a uniformity in structural characteristics and in ultimate action, not practically attainable when an integral cap is made part hard and part soft, or wherein the hardened part or parts is or are of complicated formation.

In carrying the present invention into practice, the cap may have any approved contour lines, and the contour lines at the forward end of the projectile as a whole may be formed or established by a forwardly extending part commonly designated as a windshield, which latter, however, does not perform any material function in so far as the armor piercing characteristics are concerned. At the forward end of the cap proper there is provided in the present structure an exceedingly hard and tough body section formed separate from but held in place by the body of the cap, the hardened section being of such size and shape that it may embody just the proper quantity of metal to accomplish the desired end and at the same time be susceptible of treatment for shaping and hardening to the best advantage by known shop methods and appliances, whereby difficulties heretofore encountered are practically eliminated.

The accompanying drawing illustrates the front end of an armor piercing projectile in outline and a cap embodying the present invention in section.

In said drawing the letter A indicates the front end or nose of an armor piercing projectile of any usual or preferred type and B the body of a so-called soft metal cap which is fitted to the front end of the projectile and held thereon by approved fastening means, such, for example, as the groove *a* formed around the projectile and into which the lower edge or skirt of the cap is peened as at *b*. The cap B may, if desired, carry at its forward end, as a prolongation thereof, a windshield C, as has heretofore been proposed, said windshield giving the proper or desired continuation of the contour lines of the projectile and cap. It performs but slight, if any function in connection with the armor piercing function of the projectile as a whole.

In accordance with the present invention the cap is provided at its forward end with a separately formed exceedingly hard striking portion, the said striking portion and body of the cap, being interlocked in such wise as to afford mutual support in resisting the strains incident to impact and to perform the dual function, however, of supporting the nose of the projectile and administering the greatest punishment to the target at the moment of impact. There is some diversity of opinion in regard to just what does occur in producing the highly efficient armor piercing effect with a structure of this character, although the results attained are demonstrable and well recognized by those familiar with the action of this type of projectile.

In the preferred construction illustrated in the accompanying drawing, the exceedingly hard and tough striking portion of the cap indicated generally at D is seated in a recess *b'* in the front end of the body of the cap B and is retained therein by having the

edge of the body peened inwardly at the margin of the striking portion, as indicated at *d*. There may, in addition, be provided a longitudinal groove and projection, or other appropriate form of irregularity, as indicated at E, whereby the body of the cap and striking portion will be held against angular movement about the longitudinal axis of the projectile, whereby the parts will be held and accurately positioned when being assembled.

A considerable body of the relatively soft but tough metal of the cap is preferably located between the point of the projectile and the hardened striking part of the cap, and in addition, the cap is preferably so formed that the lateral flow of the relatively soft metal back of the striking portion will be resisted by the conformation of the striking portion itself. This can be conveniently accomplished by forming the hardened striking portion of the cap with its rear face concave or with walls inclining toward the axis of the projectile, as indicated by the conical formation at F. The forward face of the hardened striking portion may conform to any of the contour lines of approved form and may be, for example, of substantially the same formation as the rear or inner face, *i. e.*, conical and terminating in a central point G. The inner and outer faces, however, are preferably not precisely parallel as it is thought to be advantageous to form the hardened portion of greater thickness along the axial line of the projectile than at the periphery of the hardened portion, and therefore the angle of the two conical faces is slightly different.

A cap with a disk-like hardened striking portion such as described may be accurately and easily formed and the metal of the two portions may be hardened and tempered with an exactness unattainable where a complicated structure is involved, or where the structure is integral and made part hard and part soft. The hardened striking portion may be made of the exact proportions necessary to attain the highest efficiency with a projectile of given weight and presents no difficulty in its manufacture which cannot be readily overcome, even when made of the most refractory metal which does not lend itself to ordinary machine shop manipulation. For example, it may be a simple casting requiring no machine work whatsoever and may, therefore, be made of a metal which cannot be subjected to machining operations.

The present invention permits of a manufacturing procedure which corresponds to the procedure commonly followed in the hardening of the body of the projectile, the application of the cap thereto, and the finishing of the assembled cap and projectile. It overcomes difficulties encountered in the manufacture of projectiles having caps with integral hardened nose portions and materially reduces the cost of production while maintaining the efficiency of the product.

What is claimed is:

1. A cap for armor piercing projectiles comprising a body portion of relatively soft metal formed to inclose the hardened point of the projectile and having incorporated therein at its forward end a separately formed striking portion of exceedingly hard and tough metal, the contacting faces of the soft and hard metal of the cap being formed to mutually support each other in resisting lateral deformation at the moment of impact.

2. A cap for armor piercing projectiles embodying a body portion of relatively soft but tough metal formed at its rear portion to receive and surround the hardened point of the projectile and having a chamber in its forward end, and a striking portion of exceedingly hard and tough metal mounted in said chamber, said hardened striking portion and body of the cap mutually supporting each other against deformation at the moment of impact.

3. A cap for armor piercing projectiles formed of a body of relatively soft but tough metal adapted to surround and support the hardened point of the projectile, and a separately formed disk-like striking portion of hardened metal mounted in the forward end of said cap body and having a forwardly recessed rear face in substantially the axial line of the projectile.

4. A cap for armor piercing projectiles embodying a body of relatively soft and tough metal adapted to surround and support the hardened point of the projectile, the body of said cap having a chamber-like recess at its forward end, with a forwardly projecting conical face, and a striking portion of exceedingly hard and tough metal of disk-like formation, with its rear face of recessed conical formation, to fit the corresponding face of the cap and seated in said chamber-like recess.

5. A cap for armor piercing projectiles embodying a body of relatively soft and tough metal adapted to surround and support the hardened point of the projectile, and a disk-like striking portion of exceedingly hard and tough metal forming the forward end of said cap, said striking portion having its front and rear faces of conical formation, whereby the body of the cap and striking portion mutually support each other at the moment of impact.

ALEXANDER G. McKENNA.
WILLIAM DALTON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."