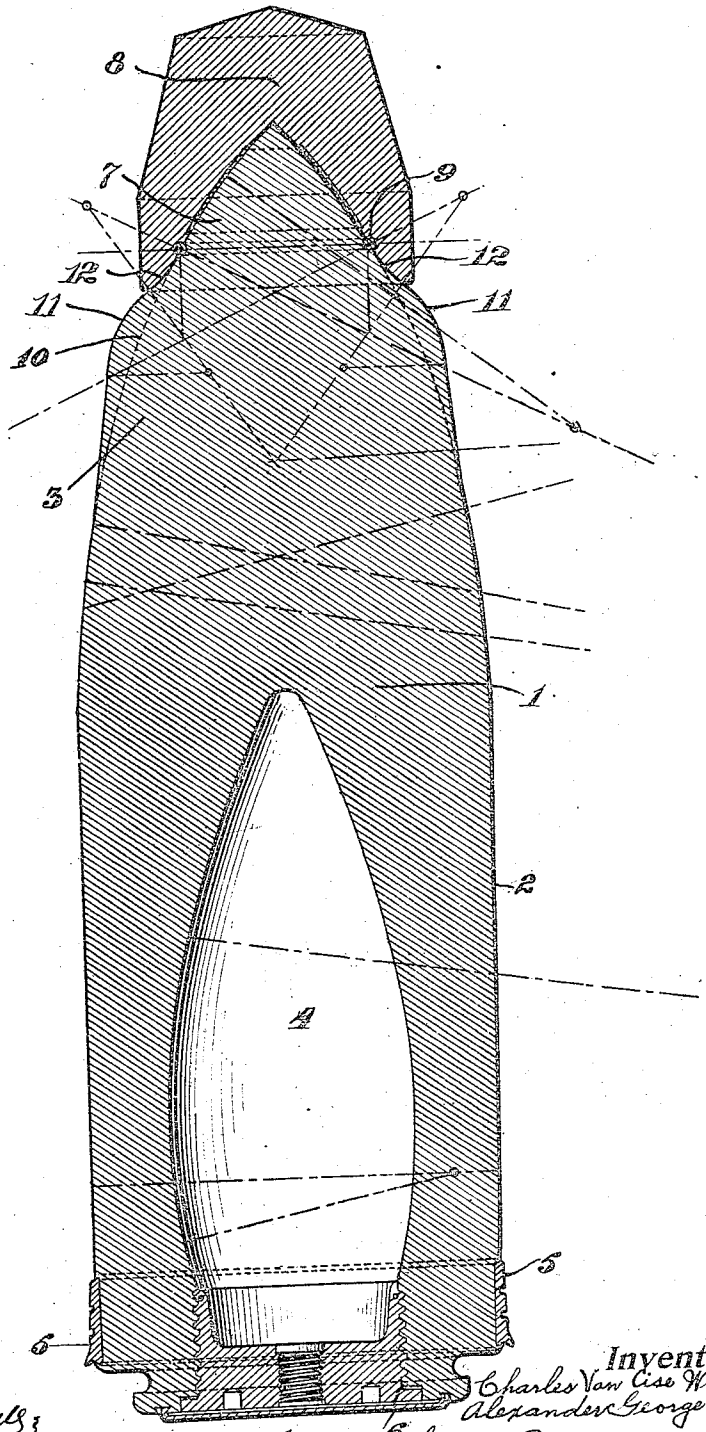
No. 893,963. PATENTED JULY 21, 1908.

C. VAN C. WHEELER & A. G. McKENNA.

PROJECTILE.

APPLICATION FILED JUNE 11, 1906.



Attest:

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UNITED STATES PATENT OFFICE.

CHARLES VAN CISE WHEELER AND ALEXANDER GEORGE McKENNA, OF PITTSBURG, PENNSYLVANIA, ASSIGNORS TO FIRTH STERLING STEEL COMPANY, A CORPORATION OF PENNSYLVANIA.

PROJECTILE.

No. 893,963. Specification of Letters Patent. Patented July 21, 1908.

Application filed June 11, 1906. Serial No. 321,145.

To all whom it may concern:

Be it known that we, CHARLES VAN CISE WHEELER and ALEXANDER GEORGE McKENNA, both citizens of the United States, and residents of Pittsburg, county of Allegheny, and State of Pennsylvania, have invented certain new and useful Improvements in Projectiles, of which the following is a specification.

Our invention relates to projectiles, and more particularly to armor piercing chambered projectiles or shells. Its object is to secure greater penetrative power and to prevent disruption of the shell before penetration. An exhaustive series of firing tests has shown that the tip of a shell usually survives contact with the armor plate, but that the point of the shell at the rear of this tip is frequently broken into fragments, the rupture extending to the forward end of the chamber, the chamber being disrupted without effecting penetration.

The present invention secures greater strength of the point at the rear of the tip by increasing the diameter of the shell at this point and an increased punch-like action of the shell in its movement through the plate.

We have found our improvement most effective when applied to shells of large caliber, say from eight to twelve inch.

We have illustrated in the drawing in vertical section a twelve-inch shell, the scale of course being reduced.

1 designates the shell, having the usual cylindric portion 2 and point 3. The shell is shown as provided with a chamber 4, band score and band 5 and rear closure 6. The tip 7 of the shell is provided with a cap 8, secured in the present instance to the shell by means of a steel rod 9. This method of securing the cap to the shell is shown in our United States Patent No. 748,827, granted January 5th, 1904. The usual ogival curve of the shell is shown by a dotted line 10. In the present instance we depart from this by forming a shoulder 11, in the present instance immediately in the rear of the cap 8 and having its forward end preferably extending within the rear end of the cap so that the cap abuts thereagainst. The shoulder, as shown, has at its forward end a reëntrant curve 12, the radius of which is for a twelve inch shell preferably three inches. It will be seen that the forward end of the shoulder or swell 11 is placed less than one-half diameter or caliber of the shell from the tip of the shell and that the entire shoulder is located between the tip of the shell and the forward end of the chamber 4 and relatively near the tip.

It is required in Government tests that a shell shall pass through a Krupp steel armor plate of one diameter thickness, that is, that a twelve-inch shell shall be capable of passing through a steel plate twelve inches in thickness and having a hardened face, the chamber to pass through intact. While it is impossible to determine precisely all the effects either on the shell or the plate caused by impact, we may, for purposes of discussion, divide the armor plate into three layers, first, the hardened and frangible face; second, the tough and semi-hardened mid layer; and third, the soft backing, which comprises the major part of the thickness of the plate. Without discussing the action of the cap, or rather, considering it as effective to protect the tip of the shell during impact, the effect of the tip is to break up a certain area of the hard frangible face of the armor plate into flakes or fragments which fly off in all directions. We believe that, theoretically, the body of the shell should then act to carry with it and in front of it a button or punching of the hard mid section through the soft backing. The ogival point of the shell, as commonly made and as shown in dotted lines in our drawing, tends instead to split apart this punching into irregular sectors, which, becoming wedged between the point of the shell and the soft backing, have a tendency to disrupt the shell, and to interfere very seriously with penetration by setting up opposing lines of resistance at considerable angles with the line of penetration.

The improved blunted portion of the point of our shell seems to act to prevent this breaking up of this button or punching, tending to punch it out and carry it back less broken, and to very much lessen the wedging action. We may summarize its advantages as follows: First, increased strength of certain cross sectional segments of the point of the shell. Second, producing a blow secondary to that produced by the tip and of more distributed effect on the hard face of the plate, thereby increasing the area of flaking by which the resistance of the plate is diminished. Third, approximating in the larger diameters of shell point itself more to a punch shape, and decreasing the wedging

effect of the fractured mid ring by increasing the tendency to impart to the mid ring the forward motion of the projectile. Fourth, decreasing the tendency of the sectors of the mid ring to wedge against the shell which prevents serious scoring and perhaps breaking of the shell. Fifth, prompt starting of the punching action by the pushing of the mid ring portion against and through the soft back. Sixth, giving support to the base of the point tip by the rapidly increased cross sectional area at its rear. Seventh, by reason of the extra metal in the shoulder decreasing shell weight at the rear of the critical planes and consequent lessening of crushing stresses by which the walls adjacent the forward end of the chamber are disrupted. Eighth, suddenly increasing the cross sectional area of the shell brings the maximum pressure against the plate earlier and so relieves this maximum pressure prior to the final forcing through of the bourrellet. Ninth, approximately giving to the face and mid ring of the plate three distinct blows of the shell proper aside from the impact of the cap, first, the impact of the point tip, second, the blow caused by the raised shoulder, and third, the final blow caused by the increase in diameter up to the bourrellet.

We find that the flight or trajectory of the shell is in no wise diminished by the change in form so that all the advantages named are gained without any impact loss due to lessened speed.

What we claim is:—

1. A pointed projectile having a solid cap on its point and a bulge or shoulder surrounding the point in the rear of the cap and against which shoulder the base of the cap is seated, said bulge or shoulder being of a size slightly less than the caliber of the projectile and exposed in the rear of the cap for effecting a punch-like action following the impact of the cap and tip.

2. A pointed projectile having a solid cap on its point and a bulge or shoulder surrounding the point in the rear of the cap and constituting an exposed shoulder for following the cap and tip of the shell and acting like a punch, on impact.

3. A projectile having a capped point which is modified from the ogival form by having an enlargement or shoulder in the rear of the cap and of nearly the same diameter as the maximum diameter of the shell for acting like a punch after the cap and the sharp tip of the shell have attacked the plate to be penetrated.

4. A capped projectile having a shoulder abutting against the rear end of the cap and forming a punch-like portion in the rear of and of greater diameter than the cap, for substantially the purposes set forth.

5. A projectile having a point modified from an approximately ogival form by a swell or shoulder lying outside the ogival curve and presenting a relatively blunt punch-like portion the maximum divergence of which outside the ogival form lies approximately one half caliber from the tip of the shell, whereby in penetrating a plate of one caliber thickness the punch-like action on the surface of the plate will occur approximately when the tip reaches the relatively soft center of the plate.

6. A shell having a point modified from ogival form by a swell which presents a relatively blunt shoulder to the armor plate after the tip and forward portion of the point in advance of the shoulder have commenced the penetration of the plate the diameter through said swell being slightly less than the caliber of the shell and the said swell or shoulder lying outside of the true ogival curve.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

CHARLES VAN CISE WHEELER.
ALEXANDER GEORGE McKENNA

Witnesses:
JAMES E. PORTER,
FRANK G. HARRISON.