

(No Model.)

H. BORCHARDT.
PROJECTILE.

No. 577,183.

Patented Feb. 16, 1897.

Fig. 1.

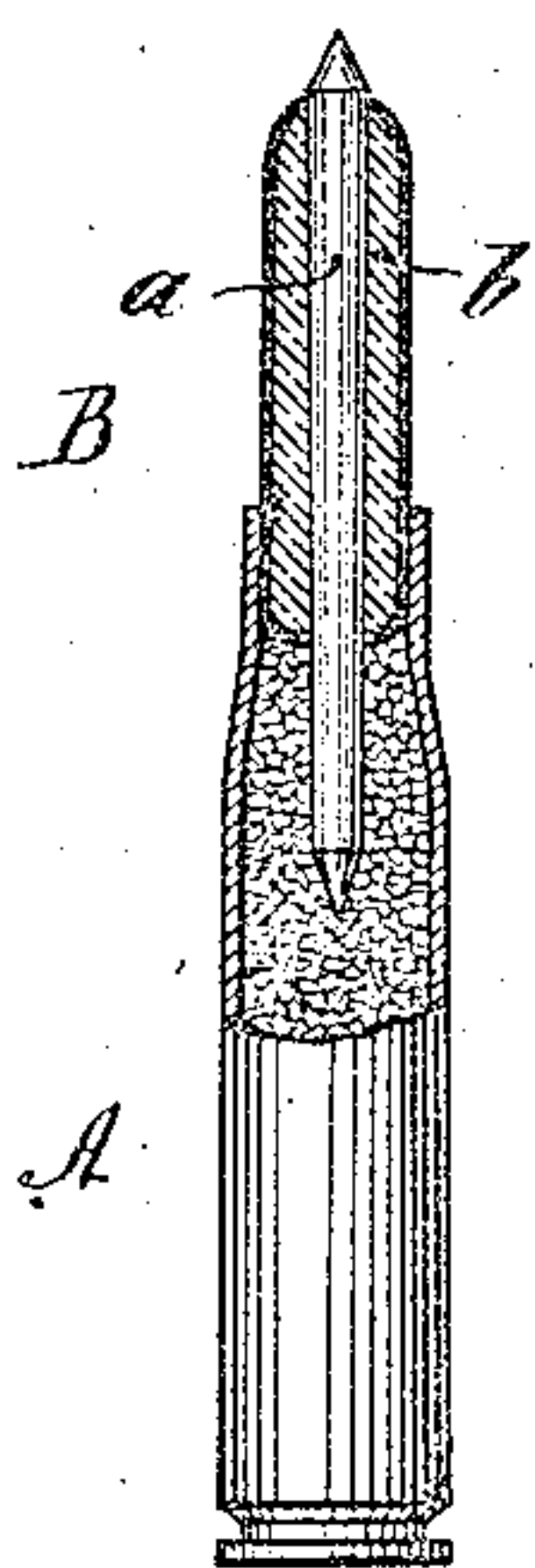


Fig. 3.

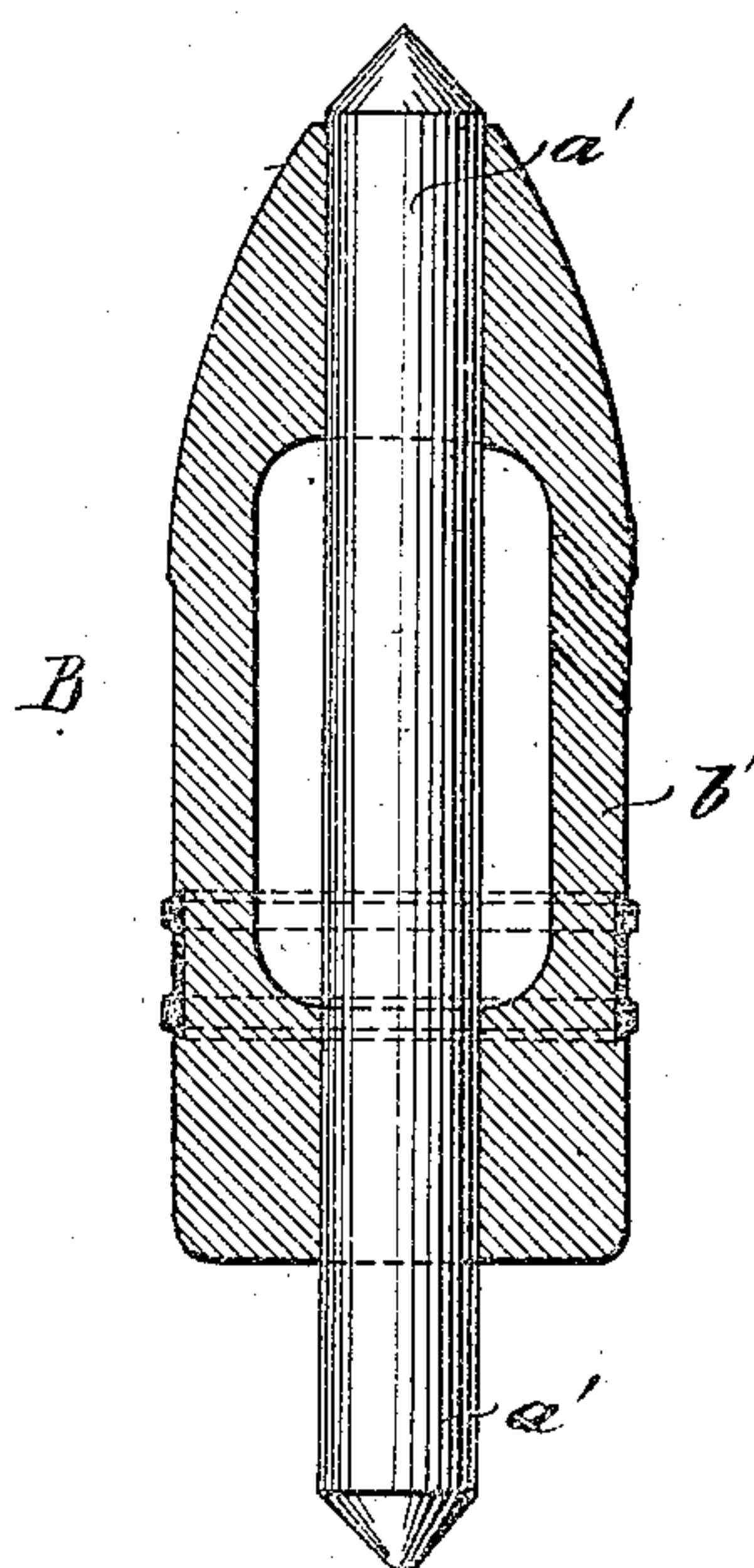
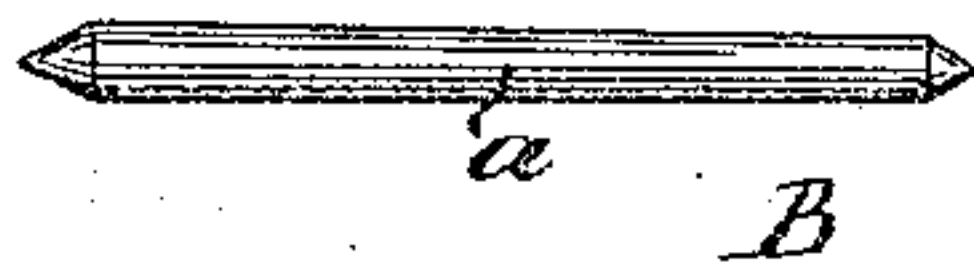


Fig. 2.



WITNESSES:

Fred White
Thomas F. Wallace

INVENTOR:

Hugo Borchardt,
By his Attorneys:
Arthur C. Ormer & Co

UNITED STATES PATENT OFFICE.

HUGO BORCHARDT, OF BERLIN, GERMANY.

PROJECTILE.

SPECIFICATION forming part of Letters Patent No. 577,183, dated February 16, 1897.

Application filed July 19, 1895. Serial No. 556,448. (No model.) Patented in Germany June 19, 1895, No. 85,148; in Switzerland July 5, 1895, No. 10,770; in Belgium July 5, 1895, No. 116,447; in Hungary July 6, 1895, No. 5,180; in England July 8, 1895, No. 13,169; in France July 8, 1895, No. 248,743; in Sweden July 10, 1895, No. 6,887; in Norway July 12, 1895, No. 4,399; in Italy July 30, 1895, No. 39,273/60; in Austria August 22, 1895, No. 45/2,931; in Spain September 10, 1895, No. 17,700, and in Denmark September 17, 1896, No. 747.

To all whom it may concern:

Be it known that I, HUGO BORCHARDT, a citizen of the United States of America, residing in Berlin, in the Empire of Germany, have invented certain new and useful Improvements in Projectiles, of which the following is a specification.

This invention is patented in Germany, No. 85,148, dated June 19, 1895; in Great Britain, No. 13,169, dated July 8, 1895; in Belgium, No. 116,447, dated July 5, 1895; in France, No. 248,743, dated July 8, 1895; in Italy, No. 39,273/60, dated July 30, 1895; in Denmark, No. 747, dated September 17, 1896; in Norway, No. 4,399, dated July 12, 1895; in Hungary, No. 5,180, dated July 6, 1895; in Austria, No. 45/2,931, dated August 22, 1895; in Sweden, No. 6,887, dated July 10, 1895; in Spain, No. 17,700, dated September 10, 1895, and in Switzerland, No. 10,770, dated July 5, 1895.

This invention relates to improvements in the construction of projectiles whereby their efficiency is materially increased.

The capability of piercing thick armor-plates of steel or iron with projectiles as at present constructed (irrespective of the material of which they are formed) can only be obtained by strictly adhering to the rules and conditions relating to moving bodies and of two projectiles moving with equal velocities, (that is to say, the product of mass multiplied by speed being alike in the two projectiles, the one having the smaller caliber will pierce through the thickest armor-plate.) It will be readily understood that, for a certain caliber an increased weight of the mass can only be obtained by increasing the length of the projectile, which hitherto could only be carried to rather narrow limits in order to insure the requisite stability of the projectile in its flight and to keep its axis within the trajectory tangent, so that its point must always strike home first. In consequence of the limits just mentioned the length given to projectiles has hitherto been confined practically to three or four diameters, and in order to increase the efficiency the general tendency has been to increase the initial velocity. The advantage derived from such practice is, however, com-

paratively very small, as the velocity of the moving projectile decreases in direct ratio to its initial velocity, which latter could only be raised by a large increase in the cost of the arm from which it was to be fired, to secure safety, and this could not be carried beyond certain limits.

The present invention enables projectiles having a length equal to ten to fifteen or more diameters, that is to say, projectiles having a ratio of mass relatively to the cross-section far beyond anything heretofore known or possible, to be fired with complete safety to any distance and without having to alter existing weapons. The efficiency of the projectiles, that is to say, their penetrating power, in relation to existing projectiles, is thus greatly increased, so that with the improved projectile an armor-plate having a thickness equal to five diameters of the projectile has been pierced.

The manner of carrying the invention into effect is illustrated in the accompanying drawings, in which the invention is shown applied, by way of examples, to a small-arm cartridge and to an artillery-projectile. It may here be mentioned that the arrangement shown in connection with small projectiles may be adapted to the largest calibers with much greater effect and facility.

Figure 1 shows a section of a complete cartridge for infantry use furnished with my improvements. Fig. 2 shows the core or bolt of the projectile. Fig. 3 shows an armor-piercing projectile with my invention applied thereto.

Referring to the drawings, let A indicate a cartridge and B a projectile. In Figs. 1 and 2 let *a* indicate the core and *b* the covering or casing of the projectile, and in Fig. 3 let *a'* and *b'* indicate like parts of a modified construction.

By examining the drawings the nature of the present invention will be readily understood, bearing in mind that the leading idea is to enable projectiles with a relatively small diameter and the greatest possible weight to be fired safely and to be got home with the greatest precision. As will be seen, the outer

form and construction of the various projectiles hitherto in use may be retained and a core or bolt *a* or *a'* introduced, which is kept in position in the outer shell *b* or *b'* of the projectile by pressing, shrinking, or screwing therein in such a manner and to such an extent that its relative position cannot be affected by the pressure of gases of explosion, but that the parts can be separated at the desired time in any suitable manner, either by a separable connection between them or by bursting or exploding the shell. The object is to fire the whole projectile as a single piece till it strikes home, at which moment the outer shell *b* becomes separated from the core or bolt *a* either by exploding the shell or by slipping off therefrom, thereby enabling the latter to penetrate with full energy and pierce the object struck.

It is scarcely necessary to add that the material for the outer shell will depend on the purpose for which the projectile is to be used, and in some cases special means will be required for holding or guiding the core or bolt *a* in its shell *b*, which, however, do not affect the nature of the present invention.

The main purpose of the present invention is to afford means whereby it is possible to fire projectiles of any desired length in relation to their diameter with the same accu-

racy and safety as can be done with projectiles of the construction hitherto in use and thereby materially to increase the penetrating action of the projectile on armor-plates.

Although the drawings show examples of the application of the invention to only two different forms of projectile, it is not intended to limit its application to these two kinds, but rather to illustrate the manner in which it can be adapted to projectiles of various kinds and diameters.

What I claim is—

An armor-piercing projectile, consisting of an outer cylindrical or similarly-shaped shell of heavy metal and an externally-smooth central core separably connected to and extending through the said shell, whereby the core can get free of the body of the shell at the moment of impact of the projectile and thereby then act with its full momentum independently of the shell, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HUGO BORCHARDT.

Witnesses:

H. G. SQUIRES,
R. H. KORN.