

No. 651,969.

Patented June 19, 1900.

O. HARTMANN.

METHOD OF SECURING CAPS TO PROJECTILES.

(Application filed Nov. 17, 1899.)

(No Model.)

Fig. 1.

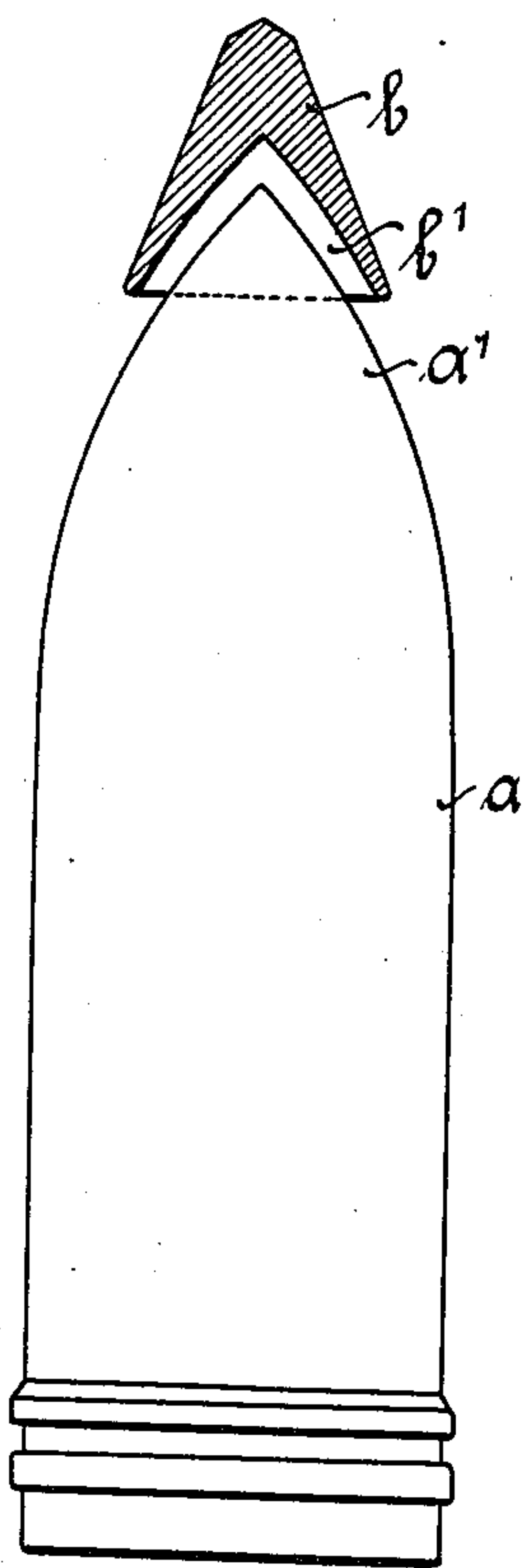


Fig. 3.

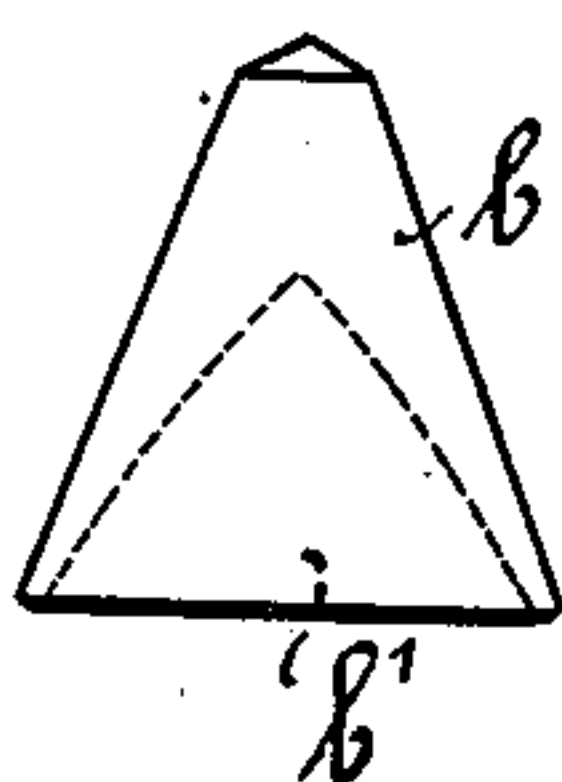
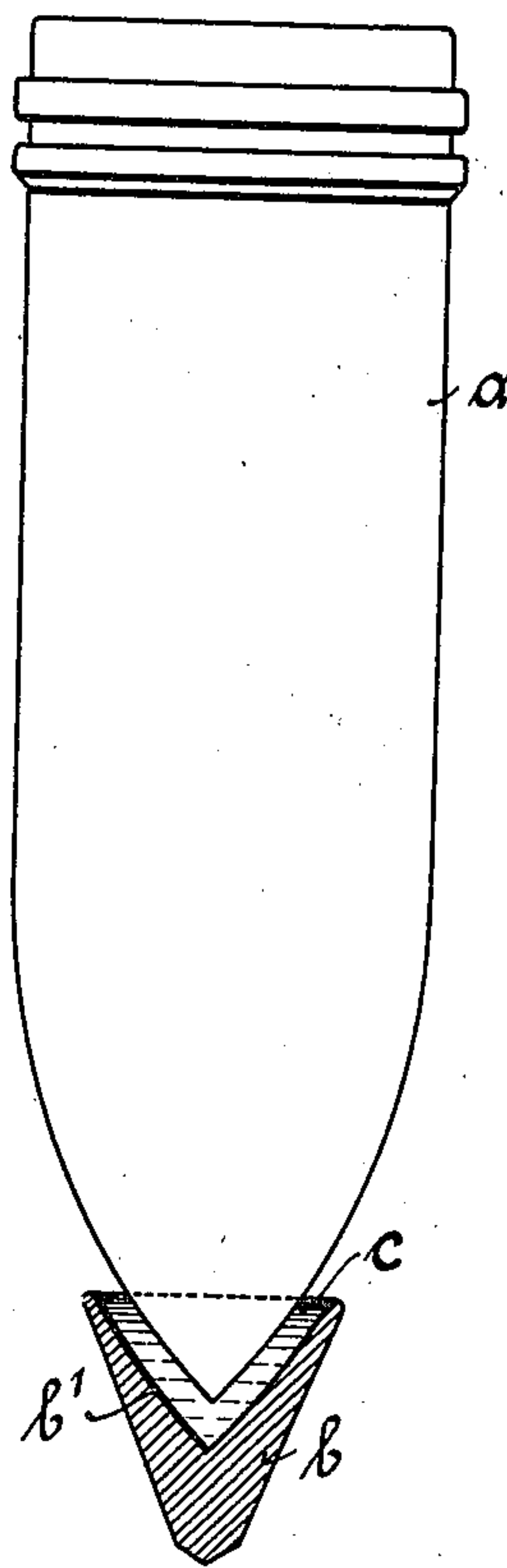


Fig. 2.



Witnesses:  
Geo. W. Eisenbraun  
Eugenie P. Hendrickson.

Inventor:  
Oscar Hartmann  
by *Alfred duRoi*  
Att'y.

# UNITED STATES PATENT OFFICE.

OSCAR HARTMANN, OF ESSEN, GERMANY, ASSIGNOR TO FRIED. KRUPP,  
OF SAME PLACE.

## METHOD OF SECURING CAPS TO PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 651,969, dated June 19, 1900.

Application filed November 17, 1899. Serial No. 737,371. (No model.)

*To all whom it may concern:*

Be it known that I, OSCAR HARTMANN, engineer, a citizen of the German Empire, residing at Essen, Germany, have invented certain  
5 new and useful Improvements in Methods of Securing Caps to Armor-Piercing Projectiles, of which the following is a specification.

My invention has reference to armor-piercing projectiles which usually have their points  
10 covered by caps of a soft tough material; and it consists in an improved method of securing the cap to the projectile.

The caps were heretofore secured to the projectiles by means of hard solder, which  
15 method, however, has been abandoned, because the degree of heat to which the point of the projectile had necessarily to be raised seriously affected the hardness of the same. Lately the practice has been to secure the  
20 cap by forcing the material of the same into an annular groove in the projectile. The objection to this last method of securing the cap is that owing to the groove turned into the point the latter is apt to break on striking the armor-plate. My improved method  
25 neither requires heating of the point to a degree capable of reducing the hardness of the point nor is it necessary to turn the grooves into the projectiles, while, as demonstrated  
30 by experiments, it effects a perfect union of the cap and projectile. My method consists in turning the inner end of the cap to the shape of the point of the projectile and grinding it upon the point and then uniting the  
35 two parts by soft solder.

My invention will be best understood by reference to the annexed drawings, in which—

Figure 1 shows the projectile in elevation and the cap in vertical section a short distance above the point. Fig. 2 shows the projectile and cap in their relative positions when soldering. Fig. 3 is an elevation of the cap.

The cap *b*, Fig. 1, which is bored out to the  
45 cup-shaped form *b'*, corresponding to the form of the point *a'* of the projectile, is ground on

this point *a'* to a perfect fit, so that the subsequent soldering should, as far as possible, extend over the whole of the contact-surfaces of the two parts.

For soldering I use, by preference, a solder having a comparatively-low melting-point, less than 200° centigrade. The cap *b* and the point *a'* of the projectile are immersed into the molten solder until both parts are heated  
55 to its temperature and are coated with solder. Finally the point *a'* of the projectile, turned downward, as in Fig. 2, is pressed into the cup *b'* of the cap *b*, which is filled with molten solder, forcing the surplus solder out.

What I claim is—

1. The herein-described method of securing the caps to armor-piercing projectiles, which consists in turning the interior of the cap to the shape of the point of the projectile,  
65 grinding the cap upon the point and then uniting the two parts by soft solder.

2. The herein-described method of securing caps to armor-piercing projectiles, which consists in first turning the inner end of the  
70 cap to the shape of the point of the projectile, then grinding the two parts together, then immersing the cap and the point of the projectile into molten soft solder until heated to the temperature of the solder and finally  
75 pressing them together after the interposition of soft solder.

3. The herein-described method of securing caps to armor-piercing projectiles which consists in turning the point of the cap to the  
80 shape of the projectile, grinding the two parts together, heating the point and the cap approximately to the melting-point of the solder, covering the contact-surfaces with molten solder, and pressing them together.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

OSCAR HARTMANN.

Witnesses:

WILLIAM ESSENWEIN,  
GEO. P. PETTIT.