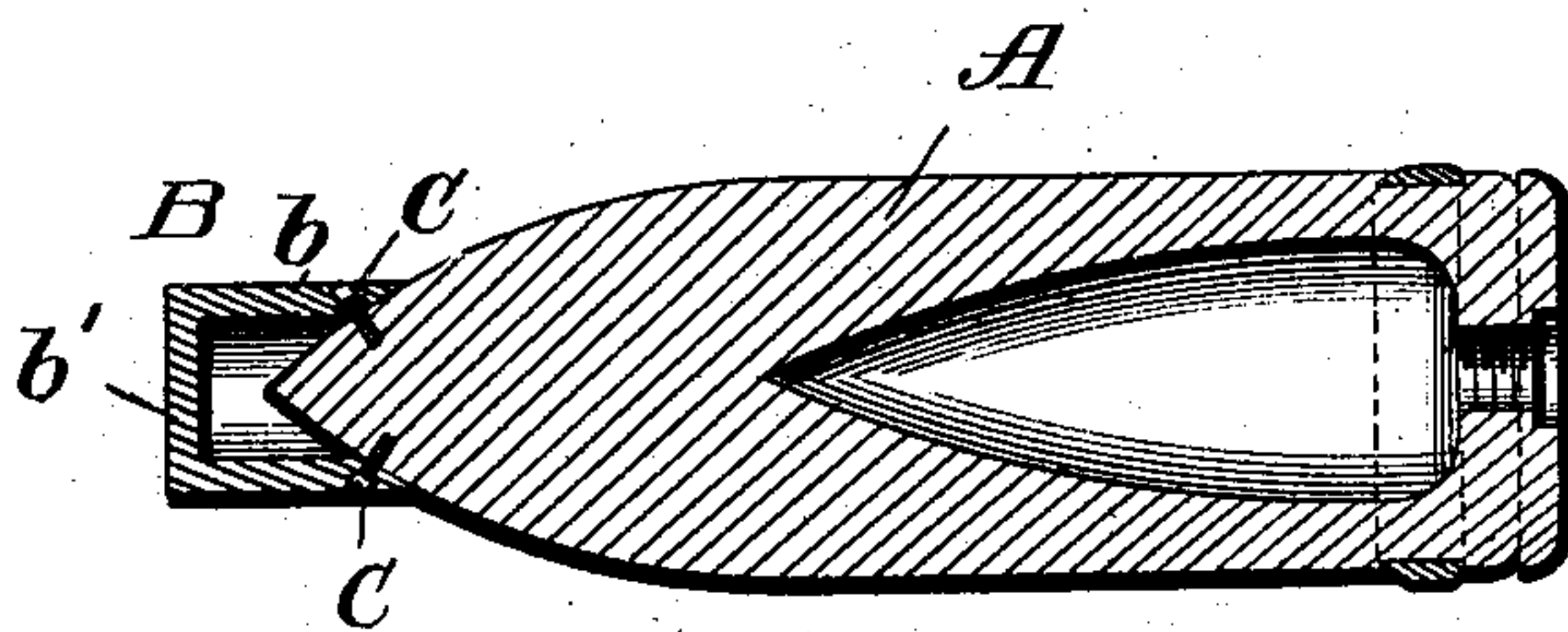


No. 778,225.

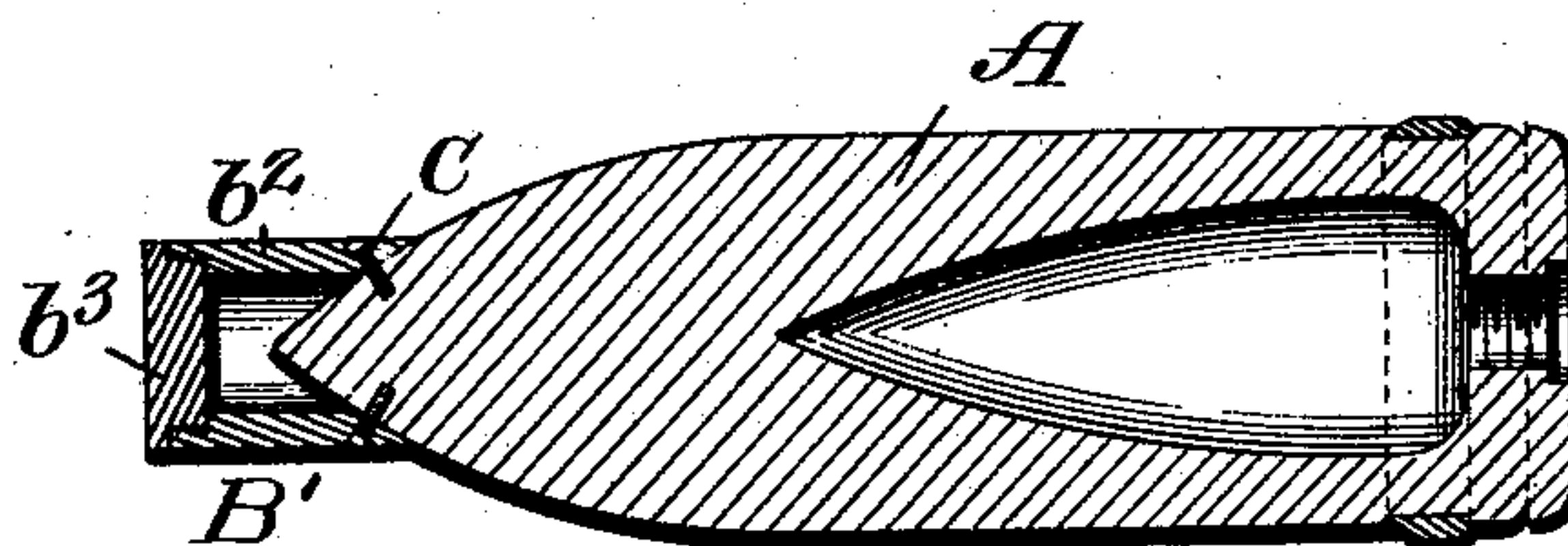
PATENTED DEC. 27, 1904.

C. DAVIS.  
CAP FOR ARMOR PIERCING PROJECTILES.  
APPLICATION FILED MAY 9, 1903.

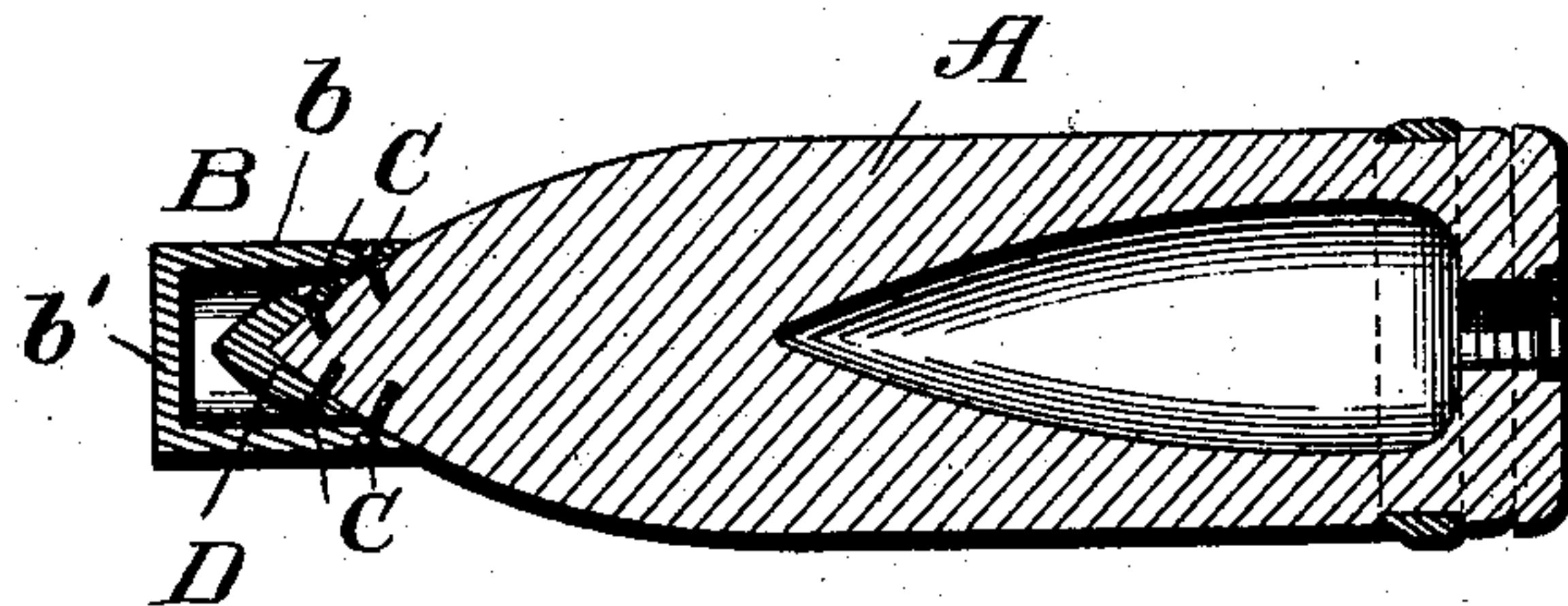
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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## UNITED STATES PATENT OFFICE.

CLELAND DAVIS, OF THE UNITED STATES NAVY.

## CAP FOR ARMOR-PIERCING PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 778,225, dated December 27, 1904.

Application filed May 9, 1903. Serial No. 156,455.

*To all whom it may concern:*

Be it known that I, CLELAND DAVIS, a lieutenant in the United States Navy, stationed on the United States steamship *Columbia*, Navy-Yard, New York, State of New York, have invented certain new and useful Improvements in Caps for Armor-Piercing Projectiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to improvements in armor-piercing projectiles; and it consists in providing for the projectile a cap which breaks down progressively and by means of which the shock of impact of the projectile is distributed through a longer time interval, with consequent reduction of maximum strain, than where a shell alone without a cap is used or than where the ordinary cap is used.

The theories as to why the soft-metal cap insures better penetration for the shell are not altogether consistent, nor have they been entirely proven; but that theory most generally accepted is as follows: First, when the hard inextensible face of the plate is struck by the point of an uncapped projectile the metal in the face of the plate does not immediately give way, but there occurs an elastic dishing, in diameter equal to about three times the caliber of the projectile. The stress of impact is thus distributed over a considerable area, and the concentrated resistance works to suddenly stop the projectile and causes it to break up through its own inertia. Now in the case of a capped projectile when the mass consisting of the cap and projectile strikes the plate there occurs the same elastic dishing as previously described, but the strain on the projectile is much reduced, due to the fact that it is not stopped suddenly, as in the previous case, but continues to advance through the cap, its passage through the soft metal of that attachment being comparatively easy, so that when the point of the projectile proper reaches the face of the plate the resistance becomes localized and the projectile effects a comparatively easy entrance.

It was originally thought that the projectile was smashed on the hard face, disruption occurring progressively from the point, and with the idea of protecting the point the so-called "cap" was devised. It will not be pertinent here to discuss the mechanics of the operation; but I am of the opinion that the function of the cap is not to protect the point of the shell, but to smash in the hard face and prepare it for the entrance of the projectile, the maximum strain on the shell being at the same time considerably reduced.

Now there are limitations to the efficiency of the cap as at present employed. It is not efficient at oblique impact when the angle from the normal is considerable. Improvement in armor giving a greater depth of hard face has so increased the maximum strain on the projectile as to make it difficult to get through the plate whole even at comparatively high velocities.

The object of my invention is to increase the efficiency of the projectile at oblique angles of impact and also to so distribute the shock of impact as to reduce the maximum strain on the projectile, and thus enable it to get through the plate with its integrity maintained.

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

Figure 1 represents a central vertical section through an armor-piercing shell fitted with the improved cap. Fig. 2 is a similar section showing a modified form of the cap, and Fig. 3 is a similar section showing still another form of cap constructed according to my invention.

A represents the main body of the projectile in all the views.

Referring now to Fig. 1, the cap B is attached to the projectile A in any convenient way, as by means of the screws C. This cap is provided with a hollow cylindrical shell *b* and a plate or head *b'*, inclosing the front end of the cylinder. This head *b'* may be made of metal of a different degree of hardness than the cylindrical portion of the cap, if desired.

In the device shown in Fig. 2 the cap B' consists of a hollow cylinder *b'*, secured to the



shell, as before, with the head  $b^3$  screwed into the forward end of the cylinder.

In the form of device shown in Fig. 3 an intermediate cap D is provided, which is made  
5 of harder metal than the head  $b'$  of the cap B.

The operation of the device is as follows: Referring first to Fig. 1, when the projectile strikes the armor-plate the cylindrical walls of the cap collapse as a result of the blow struck  
10 on the face of the plate. Further forward progress of the shell causes it to strike the head  $b'$  of this cylindrical cap, and the point of the projectile bores through this head before it reaches the armor-plate. This produces a second  
15 distinct blow on the face of the plate and so weakens the hard face as to effect a comparatively easy entrance for the projectile.

The operation of the device shown in Fig. 2 is substantially the same as that described with  
20 reference to Fig. 1. By having the head  $b^3$  of metal of a different degree of hardness from the cylindrical portion of the cap the relative force of the two blows (the first when the cylinder is crushed and the second when the head  
25  $b^3$  is penetrated) may be more readily adjusted. Thus for different qualities of armor-plate it may be desirable to make the head  $b^3$  thicker or thinner or of harder or softer metal, as may be desired.

30 In the form of device shown in Fig. 3 the two actions described are supplemented by a third action, by means of which the cap D is demolished before the nose of the projectile reaches the armor-plate.

35 Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A cap for armor-piercing projectiles,

comprising a hollow cylinder secured over the point of the projectile, a plate secured to or  
40 integral with the forward end of said cylinder and closing the same, and a hood of metal mounted over the point of the projectile inside said hollow cylinder, substantially as and for the purposes described.

2. A cap for armor-piercing projectiles, comprising a hollow cylinder secured over the point of the projectile, a plate secured to or  
45 integral with the forward end of said cylinder and closing the same, and a hood of harder metal than said plate mounted over the point of the projectile inside said hollow cylinder, substantially as and for the purposes described.

3. A cap for armor-piercing projectiles, comprising a mass of metal in a form of a hollow cylinder mounted over the point of the projectile, and a plate of metal softer than the  
55 metal of the projectile closing the forward end of said cylinder, substantially as described.

4. A cap for armor-piercing projectiles, comprising a hollow cylinder secured over the point of the projectile, a plate of softer metal secured to or integral with the forward end  
60 of said cylinder, and closing the same, and a hood of harder metal than said plate mounted over the point of the projectile inside said hollow cylinder, substantially as and for the purposes described.

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

CLELAND DAVIS.

Witnesses:

E. H. McCrum,  
T. M. Bleakley.