H. B. STRANG.

ARMOR PIERCING PROJECTILE.

APPLICATION FILED MAY 28, 1918.

1,351,498. Patented Aug. 31, 1920.

FIG. 1.

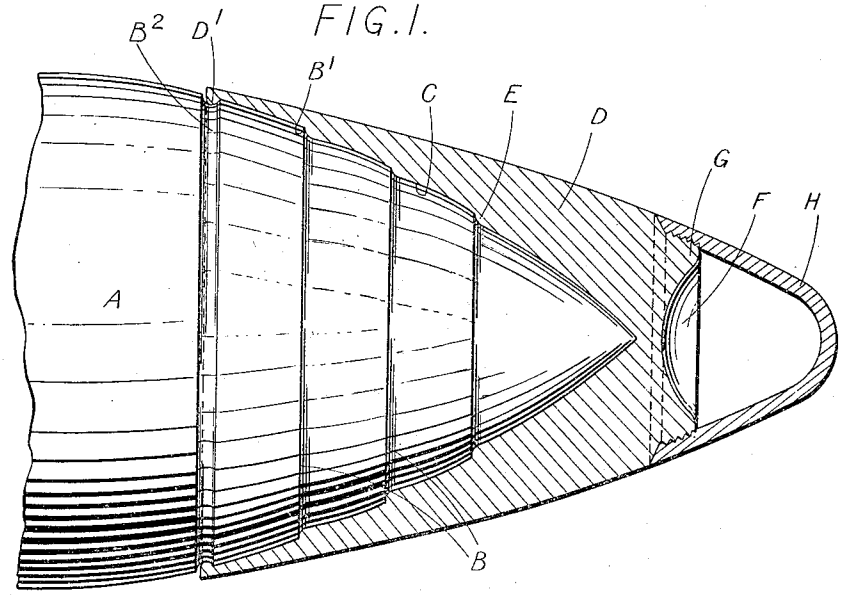
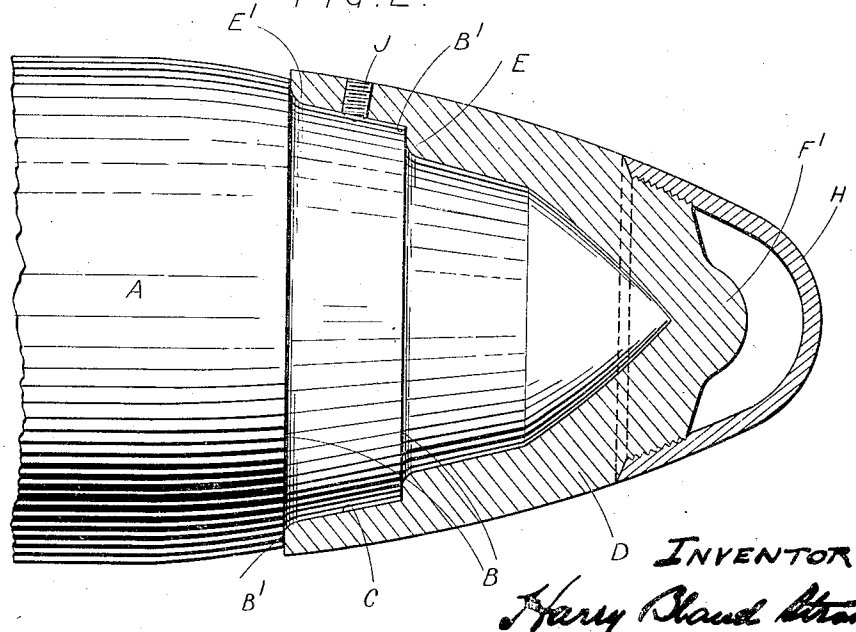


FIG. 2.



INVENTOR

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HARRY BLAND STRANG, OF LONDON, ENGLAND.

ARMOR-PIERCING PROJECTILE.

1,351,498. Specification of Letters Patent. Patented Aug. 31, 1920.

Application filed May 28, 1918. Serial No. 237,078.

To all whom it may concern:

Be it known that I, HARRY BLAND STRANG, subject of the King of England, and residing at London, in England, have invented certain new and useful Improvements in Armor-Piercing Projectiles, of which the following is a specification.

This invention relates to armor piercing projectiles provided with caps and has for its object to effect certain improvements in the head or nose of the projectile and those parts of the cap which are in contact therewith so as to cause the cap to give a heavier blow on the armor plate or other object with which it makes impact.

The present improvements are applicable to various constructions of projectile having an ogival shaped head and nose on which the usual cap closely fits but it is more particularly intended to be employed in conjunction with capped armor piercing projectiles such as those described and illustrated in the specifications of British Patents Nos. 10990 of 1913, 8875 of 1914 and 8876 of 1914. As at present constructed the projectile on impact pierces the cap immediately the latter is in contact with the armor plate the cap having no effect on the plate beyond that resulting from the initial blow. By means of the present improvements the cap is caused to give a heavier blow on the plate as the projectile is not free to force its way through the cap with such readiness as previously.

According to this invention there are formed on or in the ogival shaped head of the projectile two or more annular ridges or grooves or a series of separate but annularly disposed projections or recesses all of relatively substantial dimensions and formed and positioned along the length of the head portion of the projectile so as to present resistance surfaces toward the nose of the projectile. The cap is shaped internally so as to fit closely on to the whole head of the projectile and engage the projecting or recessed portions thereof. As a result of this engagement between the exterior of the head of the projectile and the interior of the cap the energy stored in the projectile supplements and increases the blow delivered by the cap on the armor plate as compared with the blow that would be delivered by a capped projectile of the usual type having a smooth ogival head. Capped projectiles thus constructed are more particularly adapted for oblique impact with armor plates when the existence of projections on the surface of the nose and head of the projectile will not tend to retard the passage of the projectile through the plate as would be the case in the event of the projectile striking a plate normal to its surface.

The projecting or recessed parts on or in the exterior of the head of the projectile and the interior of the cap may be variously formed. For example, at suitable intervals along the length of the head there are formed a series of annular grooves each groove being a smooth continuation from the next forwardly directed portion of the projectile the curve of the groove being carried outwardly so as to form a shoulder with the next part of the projectile toward the rear. Each part of the head between the grooves has a smooth external contour forming a portion of the general ogival shape to which the head of the projectile as a whole conforms. When viewed in central longitudinal section the head of the projectile thus has a serrated appearance at the edges of the section. It is desirable that these grooves should be so formed as to avoid sharp inwardly directed angles which might tend to cause cracking of the head of the projectile though the edge or edges of each groove may comprise an outwardly directed relatively sharp angle. The interior of the cap is correspondingly shaped with a series of annular rounded shoulders or ridges which are faired off in the forward direction and rounded off outwardly on the rearward side so as to engage the corresponding grooves in the head of the projectile. In this case though a series of ridges are formed on the head of the projectile between the grooves these ridges preferably do not project beyond the normal ogival contour of the head but result from the annular recesses constituting the grooves. Thus while the desired engagement between the head of the projectile and the cap is obtained the formation of the head is such that when it has passed through the cap the head will have a maximum penetrating effect upon the armor plate. By means of this construction the head of the projectile is so connected to the cap that on impact with an armor plate a heavier initial blow is given by the cap and the passage of the nose of the projectile through the cap is retarded the resultant

penetrating effect of the projectile upon the armor plate being improved.

In place of providing annular ridges and grooves on the head and in the interior of the cap a series of separate projections and recesses in these parts may be provided in order to obtain the desired engagement between them.

The cap is preferably shaped externally in the usual way so that it provides a substantially smooth continuation from the shoulders of the projectile. The face or forward end of the cap may be shaped in various known ways and is preferably covered by a hollow nose. Thus following the structure indicated in the specifications of the prior patents above referred to the cap is conveniently provided with either a central or an annular protrusion on its front face which protrusion is hardened and a hollow nose of suitable type is mounted on or over this face. With a cap thus constructed having a hardened central protrusion or annulus on its front face and with the head of the projectile and the interior of the cap formed in accordance with the present invention the penetration effect is materially improved owing to the heavier initial blow that can then be given to the plate by the hardened face of the cap.

The detail construction of the projecting and recessed portions of the head of the projectile and of the cap may vary as found desirable in order to produce the necessary engagement between these parts. The cap may be fixed and held in place on the head of the projectile in various known ways as for instance by forming an annular groove in the rear part or shoulders of the projectile and pressing the rear edge of the cap into this groove.

The accompanying drawings illustrate by way of example two constructions of capped armor piercing projectile according to this invention. In these drawings,

Figure 1 is a longitudinal sectional elevation of the forward part of a projectile, the cap being shown in section while the nose of the projectile appears in elevation, and Fig. 2 is a similar view of a modified construction.

Like letters indicate like parts throughout the drawings.

Referring to Fig. 1 the forward end of the projectile A is given substantially an ogival form but in place of the contour of this ogival head being smooth the head of the projectile has formed in it a series of annular grooves B. Each of these grooves on its forward side is a smooth continuation of the part C which lies in front of the groove. The rearward part of the groove, however, is constituted by a part which extends outward into a more or less sharp angle or ridge B′. Each groove B thus as it were forms a step along the end of the projectile. The bottom of each groove is curved as shown.

The cap D that is fitted over the forward end of the projectile is provided internally with rounded annular ridges E each of which fits into one of the grooves B. Thus by the engagement of the ridges E within the cap with the grooves or steps B in the projectile A, resistance is offered on impact to the forcing back of the cap over the nose of the projectile.

The exterior of the cap D as shown is given an ogival contour such as to practically constitute a smooth continuation of the curve of the projectile from the shoulders thereof. The forward end of the cap in this case is provided with a central hollow F which is surrounded by an annular protrusion G which is preferably hardened. This end of the cap is inclosed by a hollow casing or nose H suitably attached to the cap.

The cap D may be fixed on the head of the projectile A in some suitable known manner as, for example, by forming a groove B^2 in the projectile of such cross-section as can be engaged by the suitably shaped rear edge D′ of the cap when the latter is pressed thereinto or otherwise caused to engage this groove.

Referring to the construction shown in Fig. 2 it will be seen that in this case the grooves or steps B which are formed on the projectile head are more pronounced and fewer in number as also the corresponding ridges formed within the cap D. In this modification the rearmost groove B on the projectile is engaged by the rear edge E′ of the cap D which is formed so as to rest in the groove on the projectile but not engage it as the part D′ engages the groove B^2 in the construction shown in Fig. 1. In the construction shown in Fig. 2 the cap D is kept in place by one or more set screws J which pass through the cap and enter the head of the projectile.

As the grooves B in this construction are deeper and more pronounced the contour of the head of the projectile departs more from the usual smooth ogival form than is the case in the construction shown in Fig. 1. On the other hand the grip or hold which the cap D obtains on the head of the projectile when impact occurs may be greater in the construction shown in Fig. 2 than the construction shown in Fig. 1.

In Fig. 2 the form of each groove is substantially the same as in the construction shown in Fig. 1 each groove being rounded at the bottom and ending on its rear side with a relatively sharp angle or ridge B′. At its forward part each groove is a smooth continuation of a conical or slightly curved part C.

In this instance the forward end of the

cap is provided with a central hardened protrusion F′ and the hollow nose which covers the face of the cap is attached in some suitable manner to the part of the cap which surrounds and lies behind the protrusion F′.

The invention may be carried out in other ways on the lines indicated or by modifying in various ways the constructions more particularly illustrated and described above.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In an armor piercing projectile, the combination of a pointed head, a plurality of forwardly directed resistant surfaces formed on the head and spaced longitudinally thereof, a cap hollowed as to its rear portion and provided with a plurality of rearwardly directed surfaces adapted to abut the resistant surfaces on the head, and means for securing the cap on the head.

2. In an armor piercing projectile, the combination of a pointed head, a plurality of annular, forwardly directed resistant surfaces on the exterior of the head spaced apart longitudinally thereof, a cap hollowed as to its rear part, a plurality of annular, rearwardly directed surfaces on the interior of the cap adapted to abut the forwardly directed resistant surfaces on the head, and means for fixing the cap in place on the head.

3. In an armor piercing projectile, the combination of a pointed head, a plurality of forwardly directed resistant surfaces in and on the head and spaced longitudinally thereof, a cap having a face some part of which is hardened while the rear part of the cap is hollowed, a plurality of rearwardly directed surfaces on the interior of the cap adapted to engage the resistant surfaces on the head, a hollow nose mounted on the fore end of the cap and covering the face thereof, and means for fixing the cap in place on the head.

4. In an armor piercing projectile, the combination of a pointed head, a plurality of annular forwardly directed resistant surfaces on the exterior of the head, spaced apart longitudinally thereof, a cap having a face some part of which is hardened, while the rear part of the cap is hollowed, a plurality of annular rearwardly directed surfaces on the interior of the cap adapted to engage the forwardly directed resistant surfaces on the head, a hollow nose mounted on the fore end of the cap and covering the face thereof, and means for fixing the cap in place on the head.

5. In an armor piercing projectile, the combination of a pointed head, a plurality of forwardly directed resistant surfaces in and on the head and spaced longitudinally thereof, a cap having its forwardly directed face formed with a protruding part which is hardened, the rear part of the cap being hollowed, a plurality of rearwardly directed surfaces on the interior of the cap adapted to abut the resistant faces on the head, and means for fixing the cap in place on the head.

6. In an armor piercing projectile, the combination of a pointed head, a plurality of annular, forwardly directed resistant surfaces on the exterior of the head and spaced apart longitudinally thereof, a cap having in the center of its forwardly directed face a protruding part which is hardened while the rear part of the cap is hollowed, a plurality of annular rearwardly directed surfaces on the interior of the cap adapted to engage the forwardly directed resistant surfaces on the head, and means for fixing the cap in place on the head.

7. In an armor piercing projectile, the combination of a pointed head, a plurality of annular, forwardly directed resistant surfaces on the exterior of the head formed by alternating annular ridges and grooves, said resistant surfaces being spaced apart longitudinally of the head and forming obtuse angles with the exterior surface of the head at their inner and outer edges, a cap hollowed as to its rear part, a plurality of annular rearwardly directed surfaces on the interior of the cap formed by alternating annular ridges and grooves adapted to fit closely on to the head of the projectile and engage the corresponding forwardly directed resistant surfaces on the head, a hollow nose mounted on the fore end of the cap and covering the face thereof, and means for fixing the cap on the head.

In testimony whereof I have signed my name to this specification.

HARRY BLAND STRANG.