

No. 707,135.

Patented Aug. 19, 1902.

H. MAXIM.

DEVICE FOR THE PREVENTION OF EROSION IN ORDNANCE.

(Application filed Nov. 19, 1898.)

(No Model.)

Fig. 1.

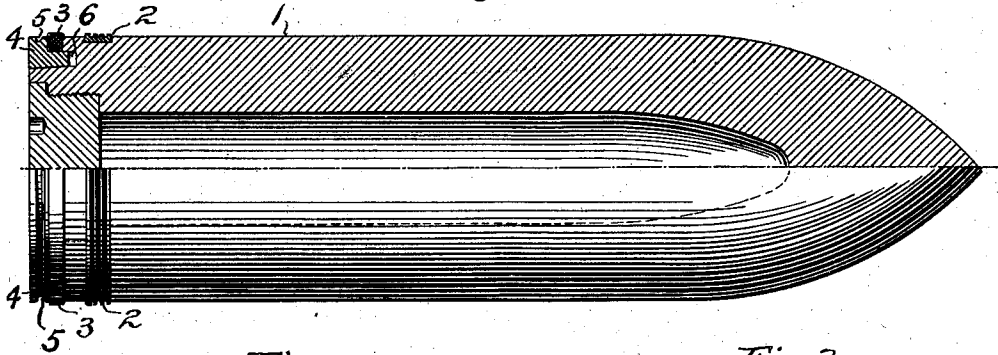


Fig. 2.

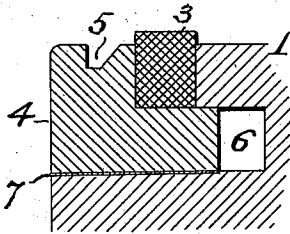


Fig. 3.

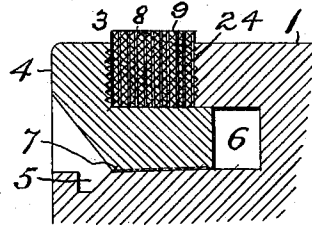
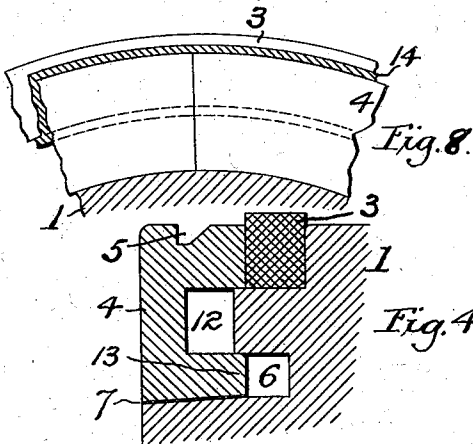


Fig. 4.

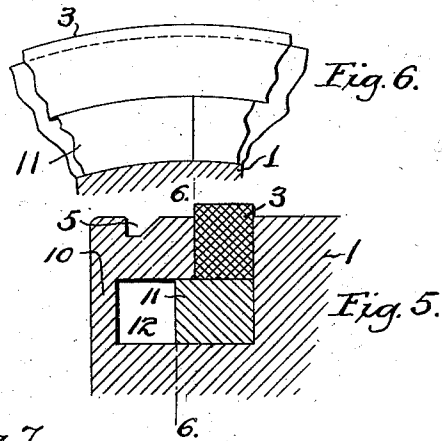
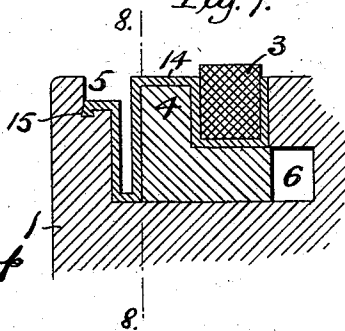


Fig. 6.

Fig. 5.

Fig. 7.



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DEVICE FOR THE PREVENTION OF EROSION IN ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 707,135, dated August 19, 1902.

Application filed November 19, 1898. Serial No. 696,927. (No model.)

To all whom it may concern:

Be it known that I, HUDSON MAXIM, a citizen of the United States, and a resident of the city and State of New York, have invented
5 new and useful Improvements in Devices for Prevention of Erosion in Ordnance, which are fully set forth in the following specification.

The present invention relates mainly to
10 improvements in gas-checks or obturating-rings, and has for its object, chiefly, the prevention of erosion of the bore of the gun by protecting the gun from the scoring or eroding action of the products of combustion of
15 the powder charge.

The invention consists chiefly of an obturating-ring about the projectile, preferably near its base and between the driving-ring proper and the base of the projectile. The obturating-ring is made of some material sufficiently yielding or plastic to flow under great pressure, such as the pressure of the powder-gases exerted upon it, as hereinafter explained. At the rear of the obturating-
25 ring is another peripheral ring about the projectile and made gas-tight therewith. An interior space or groove is provided forward of the last-mentioned peripheral ring, hereinafter referred to as the "pressure-ring,"
30 whereby it is permitted, under the pressure of the powder-gases, to move forward and to exert a greater pressure upon the obturating-ring than the actual pressure of the powder-gases and under which pressure the obturating-
35 ring is compressed and caused to flow outward and to be forced into the lands of the gun with a pressure considerably in excess of the pressure of the powder-gases upon the bore of the gun, whereby a perfect seal is
40 secured against all windage or flow of the powder-gases past the projectile in its flight throughout the entire length of the gun.

It is obvious that the pressure-ring may be made of a great variety of forms without departing from the nature of this invention as
45 hereinafter set forth, and it is further obvious that various means may be adopted for rendering the pressure-ring gas-tight about the base of the projectile or to effect a seal
50 against the admission of the products of combustion of the powder charge into the interior space forward of the pressure-ring in

order that the proper function of the same may not be impeded.

It is obvious, furthermore, that the pressure-ring may be affixed very tightly to the
55 base of the shell or projectile and still be caused to move freely forward under the great pressure of the powder-gases, and the pressure-ring may therefore be forced over
60 and upon the base of the shell by hydraulic pressure or may be heated and shrunk upon the shell or projectile. The usual groove may be cut in the pressure-ring for handling the
65 projectile, and the projectile may be handled by the pressure-ring without danger of causing the same to shift or move from its proper position.

In order to effectually secure a perfect joint or seal between the interior space forward of the pressure-ring and the powder-
70 chamber of the gun, a band or layer of copper or other suitable metal softer than steel or iron is preferably interposed between the pressure-ring and the body of the shell or
75 projectile, and the pressure-ring is shrunk onto the same or forced thereupon with sufficient stress upon the copper to cause the same to flow under the ring and to act as a perfect seal. The copper, furthermore, acts as
80 a lubricant, and by its use less pressure is required to overcome the friction between the pressure-ring and the shell, and a consequently greater pressure is expended upon the obturating-ring.
85

With this general statement of the leading features of the invention I have, in order to make the same more clearly understood, shown in the accompanying drawings means
90 for carrying it into practical effect without thereby limiting the improvements in their useful applications to the particular construction taken for illustration herein.

Figure 1 is a half-elevation and half-longitudinal section of the projectile with the im-
95 proved gas-check. Fig. 2 is one part of an enlarged sectional view of one form of the gas-check. Figs. 3, 4, 5, and 7 are similar enlarged sectional views of modified forms of the gas-check. Fig. 6 is part of a transverse
100 section on the line 6 6 of Fig. 5, showing the obturating-ring in elevation. Fig. 8 is a similar view on the line 8 8 of Fig. 7.

Referring to the drawings in the preferred

form, Figs. 1 and 2, the projectile 1 may be of any usual form, provided with a driving-ring 2 and an obturating-ring 3, rectangular in cross-section and placed in an annular recess 5 in the projectile in contact on its rear side with the pressure-ring 4, securely held on the projectile-base, which is reduced in its diameter for the purpose. A portion of the pressure-ring lies across the inner side of the obturating-ring 3 and longitudinally extends partly into a recess 6 in the projectile. The ring 4 is also pressed with great force upon the obturating-ring, so as to prevent the entrance of the powder-gases between and to the space 6. The seat of the pressure-ring over the projectile-base is preferably slightly conical or tapering toward the rear, and the ring is of such diameter as to pass over the projectile-base with great difficulty and only with the employment of great pressure in order to secure its firm attachment, but not with so great difficulty as to prevent the further forward movement of the said ring under the pressure of the gases when the gun is fired. The seat is provided with a comparatively thin layer or sheet of copper 7, which, owing to its softer nature when the ring is forced into position, forms a very perfect joint between the ring and the shell and when the gun is fired prevents the gases of the fired charge from entering into the recess 6 and creating a pressure therein to resist the forward movement of the said ring. The rear of the ring 4 lies flush with the base of the projectile and is provided on its outer edge or periphery with a draw-hook groove 5.

It will be seen from the foregoing that when the gun is fired the pressure upon the rear of the ring 4, being unbalanced by the space 6 and the resistance of the obturating-ring and the pressure on that portion of the obturating-ring exposed outside the projectile, forces the pressure-ring into the space 6 and into part of the space occupied by the obturating-ring, causing the latter to be pressed out of its normal position into the space behind the driving-ring 2 and into the lands of the gun as the projectile moves through the bore.

In Fig. 3 the ring 4 is beveled on its rear inner edge in order to expose a portion of the side of the projectile-base, which is provided with a draw-hook groove 5. Although in Figs. 1 and 2 the pressure with which the ring 4 binds onto the rear of the projectile will prevent its being pulled away by any accident or ordinary force, yet for further surety in this respect the form shown in Fig. 3 may be used, in which the draw-hook groove is constructed in the base of the projectile proper. I have shown in the said figure an improved obturating-ring, preferably consisting of linen, cotton, or asbestos fabric or any other suitable fibrous material or a mixture of them interwoven with any suitable metallic wire or gauze, preferably of copper, and impregnated with oil, paraffin, plumbago,

or other suitable plastic and lubricating material. The ring may be divided up into sections 9, having interposed between them laminae 8 of any suitable metal, such as copper. The forward side of the pressure-ring and the surface of the projectile opposite in contact with the obturating-ring are serrated or notched, 24, to prevent the ring 3 from being dislodged or moved from its position.

In Fig. 4 the pressure-ring 4 does not extend within the obturating-ring, as in Figs. 2 and 3, but is held in position by its portion 13 projecting over the usual conical seat and copper sheet 7 into the space 6, which in this case is separated from the obturating-ring by a portion of the projectile that extends into a corresponding space or groove 12 in the pressure-ring.

In Figs. 5 and 6 the pressure-ring is constructed integrally on the projectile-base and is united thereto by a thin portion or web 10, which allows the ring 4 to be sprung back and the split ring 11 to be placed in position beneath the space occupied by the obturating-ring 3. When the gun is fired, the web is sprung forward or even disrupted or sheared longitudinally and the pressure-ring 4 caused to act upon the obturating-ring in the usual manner.

The modification in Figs. 7 and 8 shows a split pressure-ring 4, similar in cross-section to that in Figs. 1 and 2, but placed in a groove immediately forward of the projectile-base. In this case before the obturating-ring is placed in position a layer or band 14, of softer metal than iron or steel, preferably copper, is forced over the ring 4 into the space to be occupied by the obturating-ring between the rear of the pressure-ring and the base of the projectile and in the draw-hook groove 5, where it tightly fits or locks into a small dovetailed-shaped groove 15, which prevents any premature movement of the copper band or pressure-ring and keeps the band from flying or fraying out when the projectile is fired.

What is claimed is—

1. The combination of a projectile having a peripheral shoulder and a conical rearwardly-tapering rear portion, a pressure-ring surrounding and capable of longitudinal movement on said rear portion, and an obturating-ring of plastic material between the pressure-ring and said shoulder on the projectile.

2. The combination of a projectile having a peripheral shoulder near its base and a conical rearwardly-tapering rear portion, a pressure-ring surrounding and capable of longitudinal movement on said rear portion, a gas-check ring or seal between said pressure-ring and rear portion and an obturating-ring of plastic material between the pressure-ring and said shoulder on the projectile.

3. The combination of a projectile having a peripheral shoulder and a draw-hook groove formed in an integral portion of the projec-

tile, and also having a conical rearwardly-tapering rear portion with a pressure-ring surrounding and capable of longitudinal movement on said tapering rear portion but
5 leaving said groove exposed, and a plastic obturating-ring between said pressure-ring and the shoulder of the projectile.

4. The combination of a projectile having a reduced rear portion with a draw-hook
10 groove formed thereon, a peripheral shoulder on the projectile, a pressure-ring surrounding said reduced rear portion and cut away so as to expose said draw-hook groove and an obturating-ring between said pressure-ring
15 and peripheral shoulder.

5. The combination with a projectile of an

obturator composed of fibrous material interwoven with metallic wire or gauze and impregnated with a plastic material.

6. The combination with a projectile of an
20 obturator composed of a plurality of rings of fibrous material interwoven with metallic wire or gauze and impregnated with a plastic material, said rings having laminæ of soft
25 metal interposed between them.

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

HUDSON MAXIM.

Witnesses:

PHILIP MAURO,
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