(No Model.) 2 Sheets—Sheet 1.

H. MAXIM.

GAS CHECK FOR PROJECTILES.

No. 548,883. Patented Oct. 29, 1895.

Fig. 1.

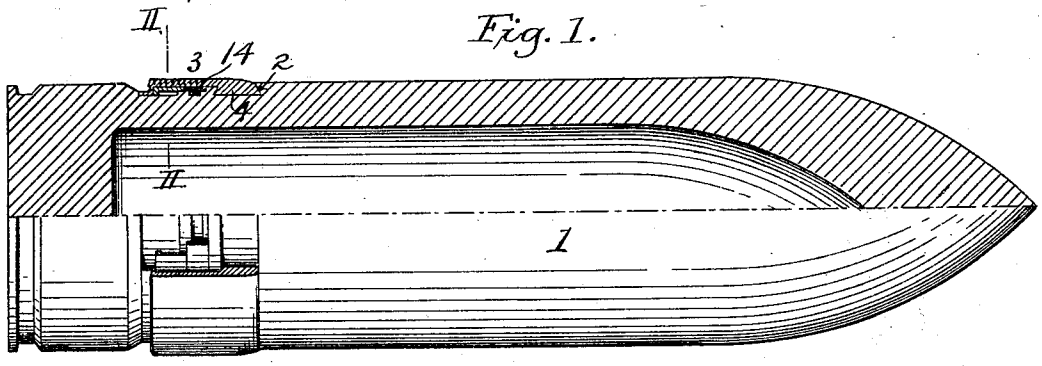


Fig. 2.

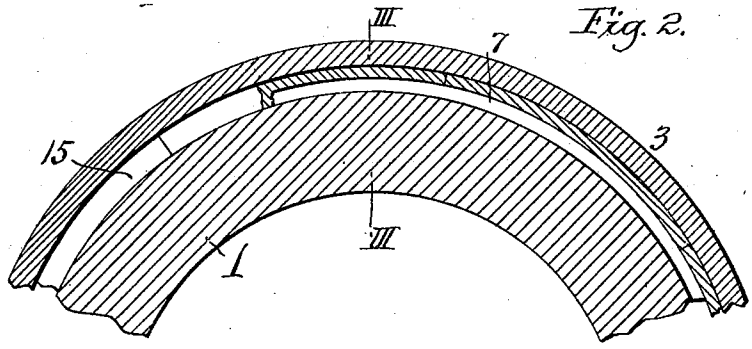


Fig. 3.

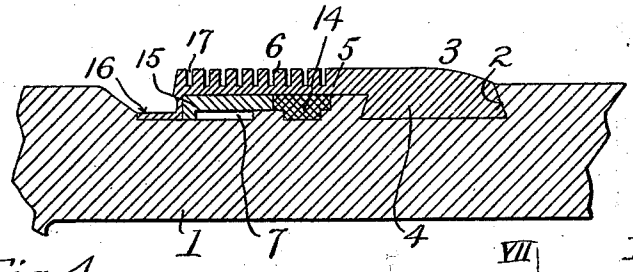


Fig. 4.

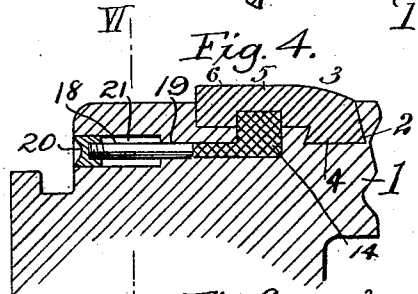


Fig. 5.

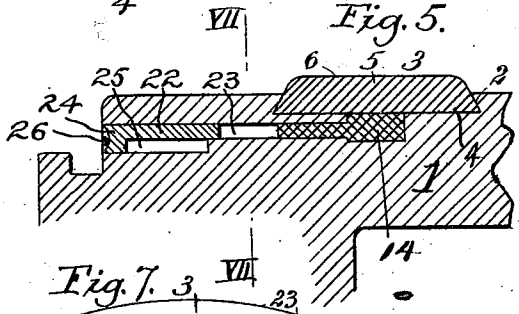


Fig. 6.

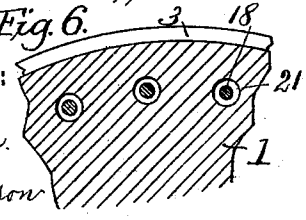
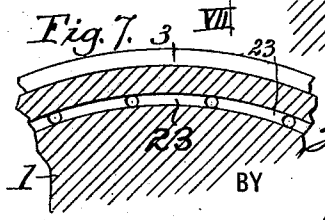


Fig. 7.



WITNESSES:

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(No Model.) 2 Sheets—Sheet 2.

H. MAXIM.

GAS CHECK FOR PROJECTILES.

No. 548,883. Patented Oct. 29, 1895.

Fig. 8.

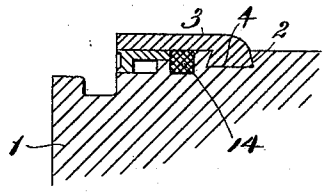


Fig. 9.

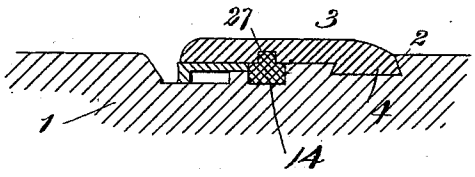


Fig. 10.

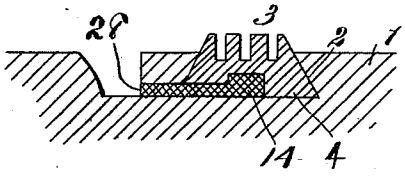


Fig. 11.

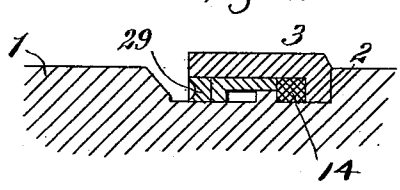


Fig. 12

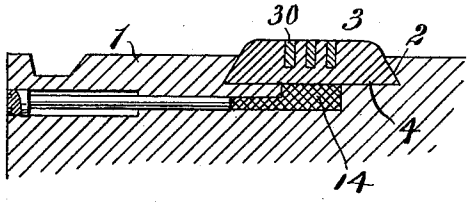


Fig. 13.

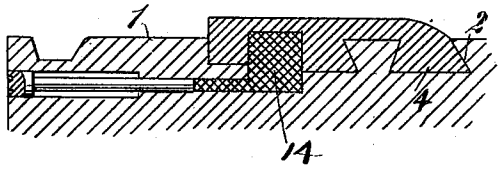


Fig. 14.

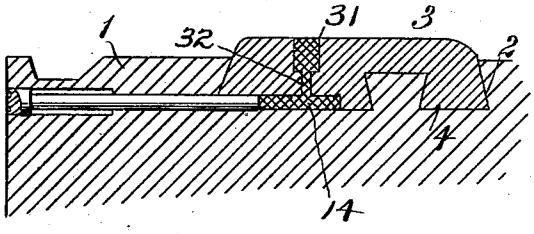


Fig. 15.

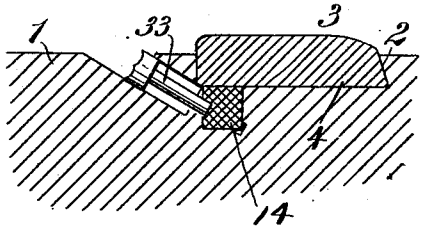
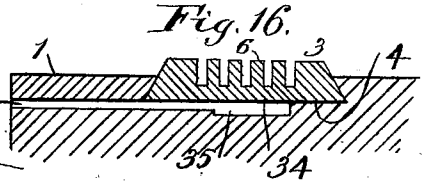


Fig. 16.



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UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF NEW YORK, N. Y.

GAS-CHECK FOR PROJECTILES.

SPECIFICATION forming part of Letters Patent No. 548,883, dated October 29, 1895.

Application filed May 4, 1895. Serial No. 548,147. (No model.)

To all whom it may concern:

Be it known that I, HUDSON MAXIM, a citizen of the United States of America, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Gas-Checks, of which the following is a specification.

My present improvements relate to gas-checks for ordnance-projectiles, having for their object to more promptly and effectually close the space or windage between the shell or other projectile and the walls of the bore of the gun, thereby preventing erosion of the bore by the rushing of the gases past the projectile. To this end I provide a gas-check which will, upon firing, be forced against and between the lands of the gun with a pressure of greater degree than that of the propelling explosive charge. In order that the gas-check may have this mode of operation, I construct and arrange it relative to the projectile, so that the gas-pressure of the propelling-charge is in the course of transmission to that external area of the gas-check which engages the bore of the gun multiplied or increased. The gas-pressure may be applied directly to the inner surface or area of the check or it may be applied through the medium of another body—such, for instance, as a body of lead or other soft substance capable of flowing under pressure. In case of the said direct application of the gas-pressure the inner surface of the gas-check which is presented to the propelling-gases of the explosive charge receives an unbalanced outward pressure over an area which is greater than that external area of the gas-check which engages the lands of the gun. Said external area, the contact of which with the bore of the gun forms the barrier to the passage and erosive action of the gases is thus forced and held against the walls of the bore with very great pressure and rendered most effective for the purpose. In case of the indirect application of the gas-pressure to the inner surface of the check, I arrange beneath the latter a confined body or ring of lead or other soft substance and provide means whereby the gases of explosion may compress said soft body or ring and cause the same to press outward against the inner side of the gas-check with great force.

With such object in view and having the mode of operation above briefly described my invention consists in the parts and combinations thereof hereinafter set forth and claimed.

In order to make the invention more clearly understood, I have shown in the accompanying drawings means for carrying it into practical effect, without limiting my improvements in their useful applications to the particular constructions which, for the sake of illustration, I have delineated.

In said drawings, Figure 1 is a side view, partly in section, of a projectile having a gas-check embodying my invention. Fig. 2 is a transverse sectional view of a portion of the same on a larger scale on line II II, Fig. 1. Fig. 3 is a sectional view on line III III, Fig. 2. Figs. 4 and 5 are similar views showing other slightly-different forms of gas-checks also embodying my invention. Figs. 6 and 7 are sectional views on line VI VI, Fig. 4, and line VII VII, Fig. 5, respectively. Figs. 7 to 16 are longitudinal sectional views of other forms of check also embodying the invention.

Referring to the drawings, 1 indicates the body of the projectile, that illustrated being a shell of ordinary form. At or near its rear end said projectile is formed with a peripheral groove 2, which is undercut or dovetailed, as shown.

The gas-check is indicated at 3, consisting of an annulus of metal, such as copper, and formed on its inner surface with a ring 4, which is shaped to fit the groove 2, and through which the forward or driving gas-pressure on the gas-check is communicated to the projectile. Formed with the driving-ring 4 is the outwardly-movable part 5 of the gas-check, having an outer surface 6, adapted for contact with the lands of the gun and to be forced into the grooves thereof. The driving-ring thus acted upon by said groove also serves to impart to the projectile the usual rotary motion.

In that form of invention illustrated in Figs. 1 to 15 the gas-check is indirectly acted upon by the gases of explosion, as above referred to.

14 is a body of lead or other soft metal or alloy or other substance situated in a confined annular space or chamber formed for its reception in the body of the projectile.

This body of soft metal 14 is adapted to flow under sufficient pressure, and if confined so that it cannot flow forward, inward, or backward it will press outward upon the inner face of the gas-check. The pressure for this purpose is caused by the explosion of the powder charge behind the projectile and may be applied to the body 14 in various ways, the means or present device for this purpose, however, acting upon the body 14 through or over an area less than that which the said means or device presents to the propelling-gases.

In Figs. 1, 2, and 3 the pressure device adapted to act upon the body 14 consists of a ring 15, composed of two or more sections and situated in a groove around the projectile at the rear of the body 14 and beneath the gas-check. The forward edge of the pressure device 15 is preferably reduced in thickness, so that it will act upon a comparatively small area of the body 14. The free forward movement of the thicker rear part of the said device is permitted by leaving beneath the ring a clear space 7. At its rear end the pressure device 15 is preferably inclosed by a thin portion or flange 16 of the gas-check, which thus forms a gas-tight covering through which the gas-pressure is communicated to the ring 15.

The gas-check is composed of copper or equivalent metal, and at that point where it is forced outward against the lands of the gun, as above described, it is formed with grooves or spaces 17 for the purpose of allowing the gas-check to yield forward or be compressed forward by the propelling-gases, the added material between said grooves 17 serving at the same time to strengthen the gas-check and relieve the pressure device 15 of a portion of the inward pressure, which might tend to crush or confine it and prevent its forward movement.

Referring to Figs. 4 and 6, the pressure devices consist of a series of individual pins or plungers 18, which pass through bearing-apertures 19 against the rear surface of the ring 14. When said pins are forced forward by the gases of explosion, the substance of the ring 14 will be compressed, and, being otherwise confined, will be caused to flow outward against the inner surface of the gas-check and force the latter against the lands of the gun. The rear ends or heads 20 of the pins 18 are of considerably greater area than the forward ends, which bear against the ring 14 and are adapted to slide forward in bearings or cylinders 21, formed in the projectile. The degree of pressure is thus multiplied or increased in the course of its transmission to the inner surface of the gas-check.

In the construction shown in Figs. 5 and 7 there is provided a series of individual pins or plungers 22, adapted to act through bearings 23 upon the ring 14, which pins are carried or actuated by a continuous pressure-ring 24, secured to their outer ends, adapted to play in an annular recess 25, formed in the rear end of the projectile and serving to transmit to said pins and thence to the ring 14 the entire pressure which it receives from the gases of explosion upon its entire and continuous rear face. The said rear face may be slightly concave, as indicated at 26, in order that the gas-pressure may cause the ring 24 to pack the recess 25 and prevent the passage of the gases. A similar formation may be given to the heads 20 of the pins 19 already described.

In Figs. 8 and 9 the rear side of the pressure device is not covered by any portion of the gas-check, and it is exposed directly to the gas-pressure. In Fig. 9 a portion of the ring 14 enters a corresponding recess in the inner face of the gas-check, as indicated at 27, thus somewhat weakening the latter and localizing the interior pressure upon it and its outward movement.

Referring to Fig. 10, it will be seen that the ring 14 may be arranged to be directly acted upon by the gases of the propelling-charge. The rear face 28 of the ring which thus receives said pressure is preferably made, as illustrated, of less area than the area over which the ring presses upon the inner face of the gas-check.

In Fig. 11 a pressure device or devices is employed, bearing on the ring 14 and actuated by a separate gas-packing ring 29, lying beneath the gas-check.

In Fig. 12 a series of presser pins or plungers is employed to cause the flow of the ring 14, said plungers entering directly through and having their heads exposed at the base of the shell. In this construction the outer face of the gas-check may be grooved, as shown, and said grooves charged with a soft metal 30, adapted, together with portions of the gas-check, to be forced into the grooves of the gun and more perfectly occlude all spaces between the projectile and the bore.

In Fig. 13 the pressure-pins are arranged as in Fig. 12 and the ring 14 enters an annular recess in the inner face of the gas-check, as already described in connection with Fig. 9.

In Fig. 14 the pressure-pins are arranged as last above described, but the ring 14 is situated entirely within the body of the gas-check, and the latter is formed with openings 31 in its outer surface, through which portions of said ring may be caused to flow into the space between the gas-check and the bore of the gun, operating, together with the expanded gas-check, to more perfectly fill said space. The passages which lead outward through the gas-check from the main body of the ring 14 to the openings 31 are preferably choked or contracted, as shown at 32, in order that the outward flow of the substance of the ring may not be too free and may not fail to cause upon the inner surface of the gas-check the desired outward pressure which will expand the latter against the

bore of the gun. It will be understood that the areas of the openings 31 may be larger in proportion than indicated in the said figure.

In Fig. 15 the pressure-pins are arranged, as shown at 33, to move and enter the body of the ring 14 at an angle to the axis of the projectile.

In Fig. 16 I have illustrated a form of gas-check in which the outward gas-pressure upon it is applied directly without intervention of any other body or pressure device. In this form of the invention the inner face or area 34 of the gas-check is adapted to receive the direct pressure of the propelling-gases, which enter the chamber 35 beneath the check through passages 36. That surface 6 of the gas-check which is adapted to engage the lands of the gun being of less area than the inner face 34, said difference being effected by removing a portion of the surface 6 (whether the resulting spaces or grooves be filled with a soft substance or be left empty) or being effected in any other equivalent way, the surface pressure of the gas-check upon the bore of the gun will be of greater degree than the degree of pressure of the propelling-gases.

What is claimed is—

1. A gas check having an inner surface for receiving outward pressure from the propelling gases, and a surface for engaging the bore of the gun, and means independent of and movable relative to the projectile base causing the latter surface to engage the bore of the gun with a pressure of greater degree than that of the propelling gases, substantially as set forth.

2. A gas check for projectiles having an internal area for receiving pressure, and means independent of and movable relative to the projectile base causing said surface to receive a pressure of greater degree than that of the propelling gases, substantially as set forth.

3. A gas check for projectiles having an internal area for receiving pressure, and means independent of and movable relative to the projectile base transmitting to said area in an increased or multiplied degree the pressure of the propelling gases, substantially as set forth.

4. A gas check for projectiles having an internal area for receiving outward pressure, a pressure device adapted to receive the forward pressure of the propelling gases, and a continuous and yielding body transmitting said forward pressure to the entire internal area of the gas check, substantially as set forth.

5. A gas check for projectiles having confined beneath it a soft material, and a pressure device normally independent of and movable relative to the projectile base to be actuated by the propelling gases to cause the outward movement or flow of said material, substantially as set forth.

6. A gas check for projectiles having beneath it a soft material bearing upon a certain area of the inner surface of the check, and a pressure device normally independent of and movable relative to the projectile base engaging an area of said soft material less than said area of the gas check, substantially as set forth.

7. A gas check for projectiles having beneath it a soft material, and a series of pins or plungers independent of and movable relative to the projectile base engaging the latter and adapted to receive the pressure of the propelling gases, substantially as set forth.

8. A gas check for projectiles having beneath it a soft material, a series of pins or plungers independent of and movable relative to the projectile base engaging the latter, and an outer ring for receiving the pressure of the propelling gases and transmitting the same to said pins, substantially as set forth.

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

HUDSON MAXIM.

Witnesses:
GEO. H. GRAHAM,
E. L. TODD.