(No Model.)

A. S. LYMAN.

ART OF GUNNERY.

No. 321,043. Patented June 30, 1885.

Fig. 1.

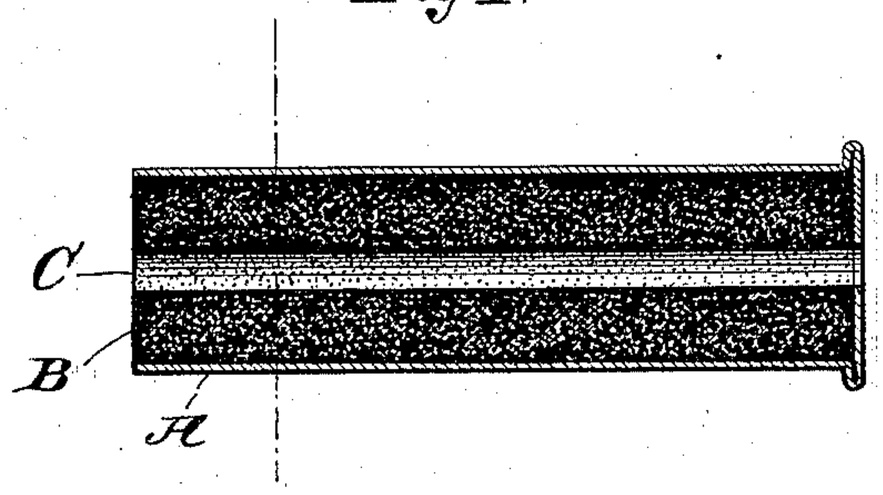
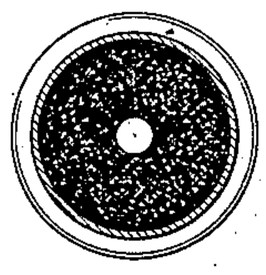


Fig. 2.



Witnesses:
Henry Eichling
R. F. Gaylord

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UNITED STATES PATENT OFFICE.

AZEL STORRS LYMAN, OF NEW YORK, ASSIGNOR TO LIVINGSTON MIDDLEDITCH, OF BROOKLYN, NEW YORK.

ART OF GUNNERY.

SPECIFICATION forming part of Letters Patent No. 321,043, dated June 30, 1885.

Application filed December 29, 1884. (No model.)

To all whom it may concern:

Be it known that I, AZEL S. LYMAN, of the city, county, and State of New York, have invented certain new and useful Improvements in the Art of Gunnery, of which the following is a full, clear, and exact description.

This invention relates to the art of firing projectiles by the use of explosive material consumed behind the projectiles.

The object of the invention is to maintain a uniform pressure upon the projectile, or to gradually increase the pressure during the time the projectile is passing through the barrel of the gun, thereby causing the projectile to be started slowly, and thus with comparatively little strain on the walls of the gun, but giving it continuously-increasing motion during its passage through the barrel. One method of accomplishing this result is to employ explosive material consisting of a hard cylindrical cake of powder pierced longitudinally from end to end by a free unobstructed central hole. This cake of powder is made to fit closely in the chamber of the gun, so that when in position for firing only the walls of the central perforation, or such walls and the forward end of the powder-cake, are exposed to the action of the igniting flame. The igniting flame is thrown along the central perforation, which is thus ignited throughout its whole extent, and the burning then proceeds in a radial direction toward the exterior surface of the cake, thereby gradually and continuously enlarging the burning-surface and the volume of gases, and preserving (according to the special construction of the cartridge) a uniform or increasing pressure upon the projectile while in the bore of the gun. It is intended of course that the size and shape of the powder-cake shall be so proportioned to the ball and the length of the gun-barrel as to develop the most efficient pressure upon the ball—that is, the pressure that will be most efficient in the case of a particular size of gun and projectile, and also so that the powder will be practically all consumed before the ball leaves the gun.

In the drawings accompanying this specification, Figure 1 is a longitudinal, and Fig. 2 a cross section, of one form of cartridge made according to the principle of my invention.

A is the shell of the cartridge. B is the solid cake of powder, and C is the central perforation extending through such cake. The shell may also contain the projectile, and may have a suitable primer or other igniting device attached thereto; but these features are not essential to be considered here.

I do not here claim the cartridge described as embodying the invention, for this cartridge, as adapted to be used in large guns, forms the subject of a pending application filed by me January 26, 1885, No. 153,959, (Case A,) and, as adapted to be used in small-arms, it forms the subject of a pending application filed by me September 8, 1884, No. 142,476, (Case B.) Nor do I propose in this application to claim, broadly, the improvement in the art of firing projectiles that depends upon a continual increase of the fire-surface of the charge during its combustion, as this claim forms the subject of another pending application for Letters Patent filed by me on the 20th day of April, 1885, and numbered 162,758, (Case D.)

What is claimed as new is—

The herein-described improvement in the art of gunnery, which consists in arranging at the rear of a projectile a charge of powder formed into a longitudinally-perforated cake which has its outer surface protected against the fire of primary ignition, so that only the exposed surface of the cake will become at first ignited, whereby the burning area of the charge will continuously increase during the combustion of the charge and a uniform or continuously-increasing pressure will be exerted upon the projectile, substantially as set forth.

AZEL STORRS LYMAN.

Witnesses:
T. J. KEANE,
R. F. GAYLORD.