

(No Model.)

A. NOBEL.
SHELL FUSE.

No. 575,163.

Patented Jan. 12, 1897.

Fig. 1.

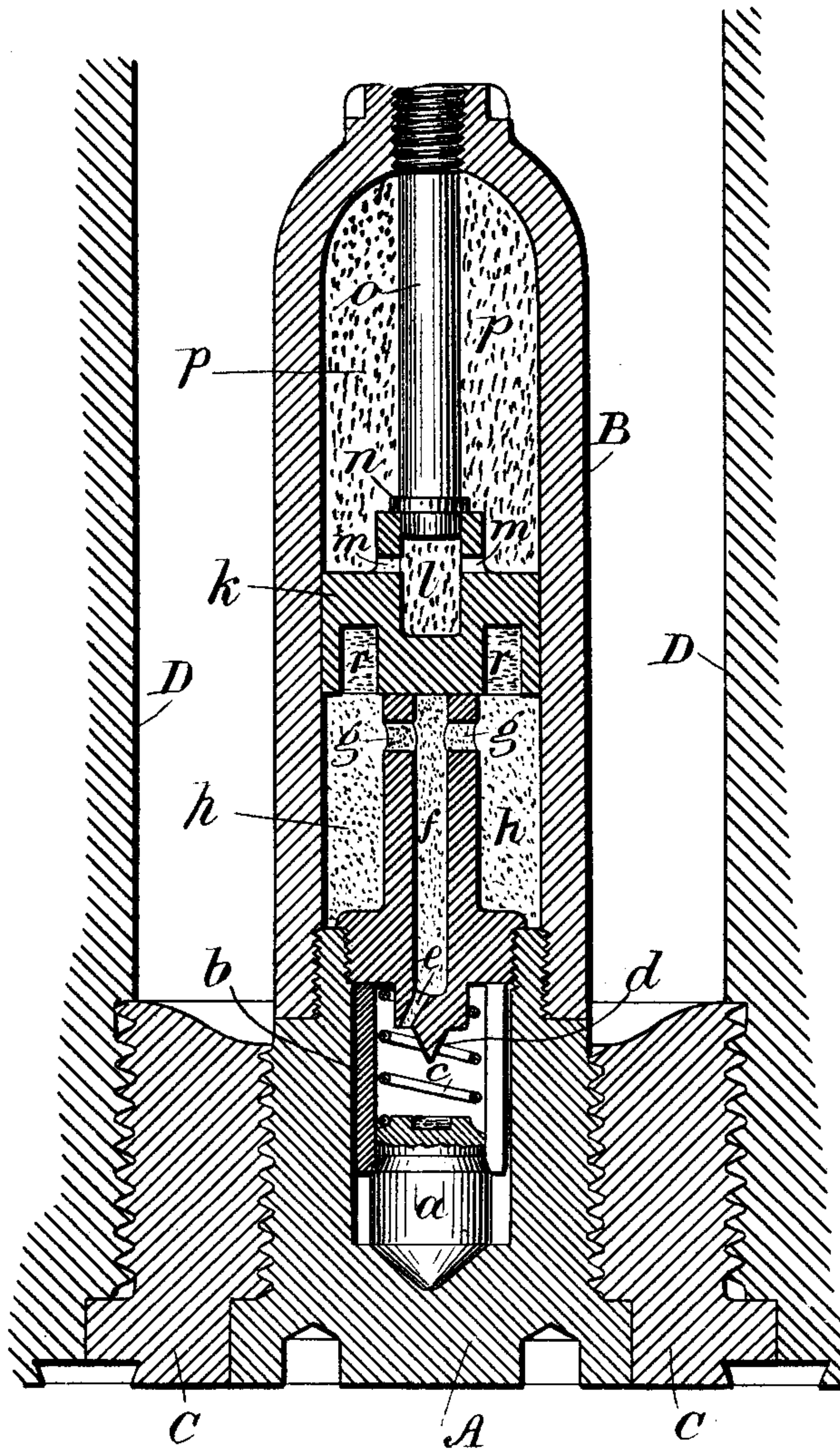
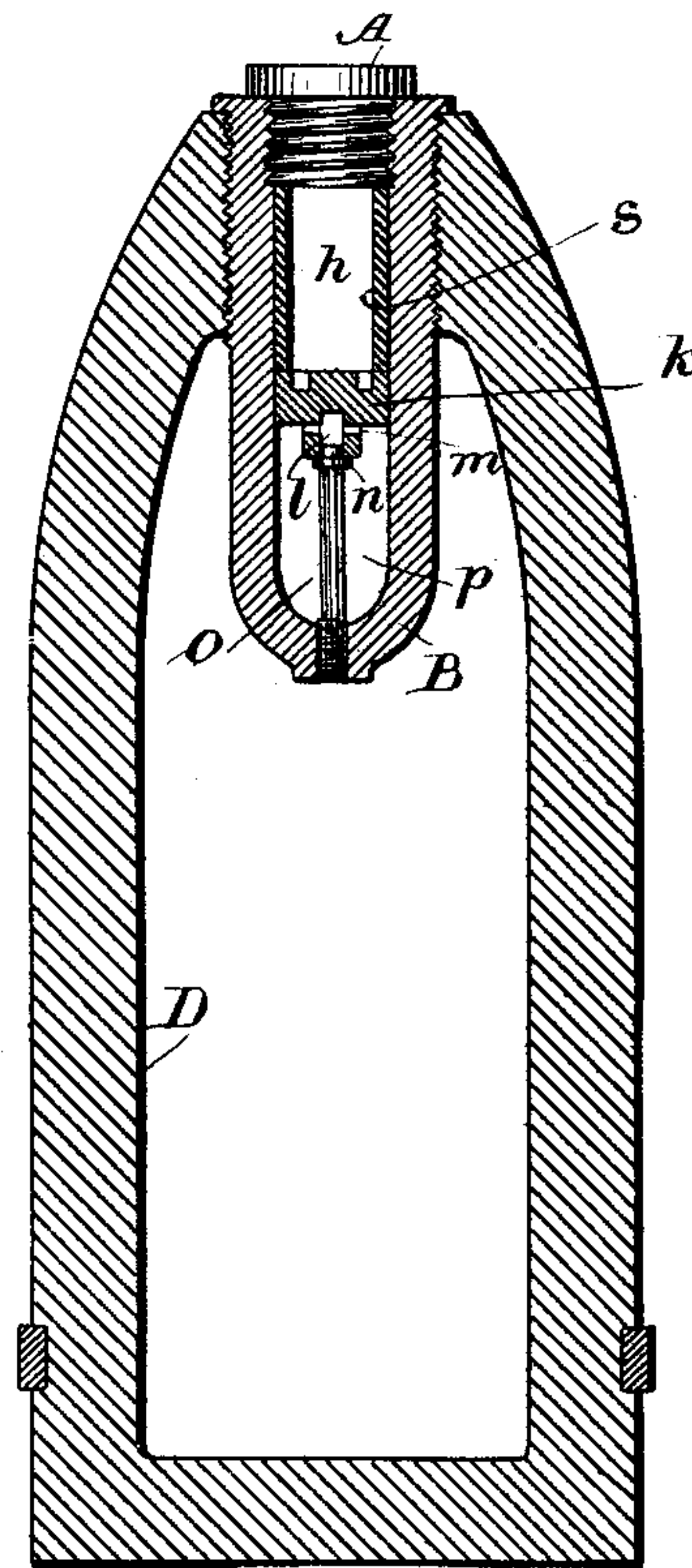


Fig. 2.



Witnesses

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SHELL-FUSE.

SPECIFICATION forming part of Letters Patent No. 575,163, dated January 12, 1897.

Application filed September 15, 1896. Serial No. 605,880. (No model.) Patented in England August 14, 1895, No. 15,294, and in Italy June 30, 1896, XXI, 41,725.

To all whom it may concern:

Be it known that I, ALFRED NOBEL, doctor of philosophy, a subject of the King of Sweden and Norway, and a resident of 59 Avenue Malakoff, Paris, in the Republic of France, have invented certain new and useful Improvements in Priming-Tubes for Projectiles, (for which I have received the following foreign patents: In Italy, 31/82, 41,725, dated June 30, 1896, and in Great Britain, No. 15,294, dated August 14, 1895,) of which the following is a specification, reference being had therein to the accompanying drawings.

The present invention is designed to provide a safe and effective means for priming explosive charges in projectiles.

In using high explosives, such as wet gun-cotton, picric acid, &c., it has hitherto been necessary to employ either a strong priming of fulminate or an intermediate detonating charge of a comparatively sensitive nature inclosed in a tube and primed by the fulminate. The one, as well as the other, constitutes a source of danger on account of the possibility of premature explosion from the shock in firing the cannon or from any uneven motion in the grooves.

In the improved priming system to be presently explained this deficiency is overcome by causing the striking impulse of a piston or hammer, to which is imparted a great velocity through the action of powder-gases of high pressure, to set off detonatively a powerful but safe priming charge.

In the accompanying drawings, Figure 1 shows in section a form of the improved priming-tube adapted for armor-piercing projectiles, and Fig. 2 is a section of a modification of the same.

A is the usual percussion-fuse, while *a* is the detonating pellet provided with a cylindrical recess for reception of the fulminate. *b* is a split ring, *c* a retarding-spring, and *d* the detonating-needle.

B is a tube containing two chambers *h* and *p*, separated by the piston *k*. The chamber *h* contains a charge of ordinary black powder or smokeless powder, the kind of powder and the size of the grains being chosen in accordance with the desired amount of retardation in the action of the priming. The chamber *p*

contains a strong charge of comparatively insensitive explosive, such as picric acid, or perchlorate of ammonium, or nitrate of ammonium, mixed with some hydrocarbon or other suitable combustible substance.

The piston *k* has a recess *l* communicating with the chamber *p* through the holes *m* and closed by the end of the rod *o*, which is provided with a shoulder *n* to prevent the piston from moving forward in impact. The small chamber or recess *l* contains a charge not over sensitive, such as nitromannite or picric acid. The piston *k* is also provided in rear with an annular groove *r*, which may be charged with a quick powder to act laterally on the piston and expand it against the wall of the tube B to form a gas-check, thereby preventing the entrance of powder-gases from the chamber *h* into the chamber *p*. The whole tube is screwed into the bottom C of the projectile D.

The aforesaid mechanism operates as follows: On striking an armor-plate or a resisting-surface the fuse in the usual way communicates fire, through the passages *e*, *f*, and *g*, which contain mealed gunpowder, to the powder charge in the chamber *h*. The pressure developed by the ignition of the powder in the chamber *h* acts as a propeller of the piston *k* and causes it to shear off the shoulder *n* on the rod *o* and strike it with great force. This advance of the piston will cause the charge in the chamber *l* to detonate and fire the explosive in the chamber *p*, which, bursting the tube B, explodes the main charge of the projectile.

The time between the firing of the fuse and the bursting of the tube may be varied by modifying the quickness of the powder charge in *h*, as well as by compressing more or less the mealed powder in the passage *f*, which operates as a fuse. Preliminary trials have given a retardation between the firing of the aforesaid fuse and the explosion of the main charge amply sufficient for preventing the danger of a shell exploding prematurely in the bore of the gun, as well as allowing time for its penetrating or passing through an armor-plate.

Fig. 2 shows the application of the improved priming-tube to a common shell. D is the body of the projectile. B is the tube screwed

into the fore end of the shell; *A*, the outside of the common time or percussion fuse. *k* is the piston, which is kept from moving backward on firing the projectile by the shoulder *n* on the rod *o*. The cylinder *s* prevents any forward motion of the piston on impact. *h* is the powder-chamber. The chamber *p* contains the priming composition aforementioned, and the chamber *l* the small charge set off by blows, as before described.

The action of the tube is the same as in the previous case.

The advantages possessed by this improved system of priming are, first, safety from premature explosion inside the cannon and on striking; second, the possibility of using very insensitive explosive charges without the employment of strong primers of fulminate or similar dangerous substance; third, retarding at will the explosion of the main charge in a projectile, which is of great importance, especially for projectiles of the armor-piercing class.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a projectile, a priming-tube comprising a tube *B* and a piston *k* within said tube and dividing the same into two chambers and a rod or anvil in the second chamber, a propulsive powder in the first chamber *h* for imparting great velocity to the piston, a charge of detonating material between the piston and the rod or anvil ignited by the movement

of the piston and a main bursting charge in the second chamber and exploded by the detonating material, and firing the main charge in the projectile, substantially as specified.

2. In a projectile, a priming-tube comprising a tube *B*, a piston having a recess *l* within said tube and dividing the same in two compartments *h* and *p*, and a rod or anvil in the second chamber, a propulsive powder in the compartment or chamber *h* for imparting great velocity to the piston, a charge of high explosive or detonating material in the recess *l* of the piston and ignited by its movement, and a main bursting charge in the compartment or chamber *p*, exploded by said high explosive and firing the main charge in the projectile, substantially as specified.

3. The combination with the projectile and the priming-tube *B*, of a piston within said tube having recesses *l* and *r* on opposite sides, a rod *o* having a collar against which the piston is seated and a tubular stem having passages *e f* and *g*, there being explosive materials in the chambers and recesses at the opposite sides of the piston, substantially as specified.

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

ALFRED NOBEL.

Witnesses:

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