

SMITH & STETSON.

Shell-Fuse.

No. 34,788

Patented Mar 25, 1862.

Fig. 2.

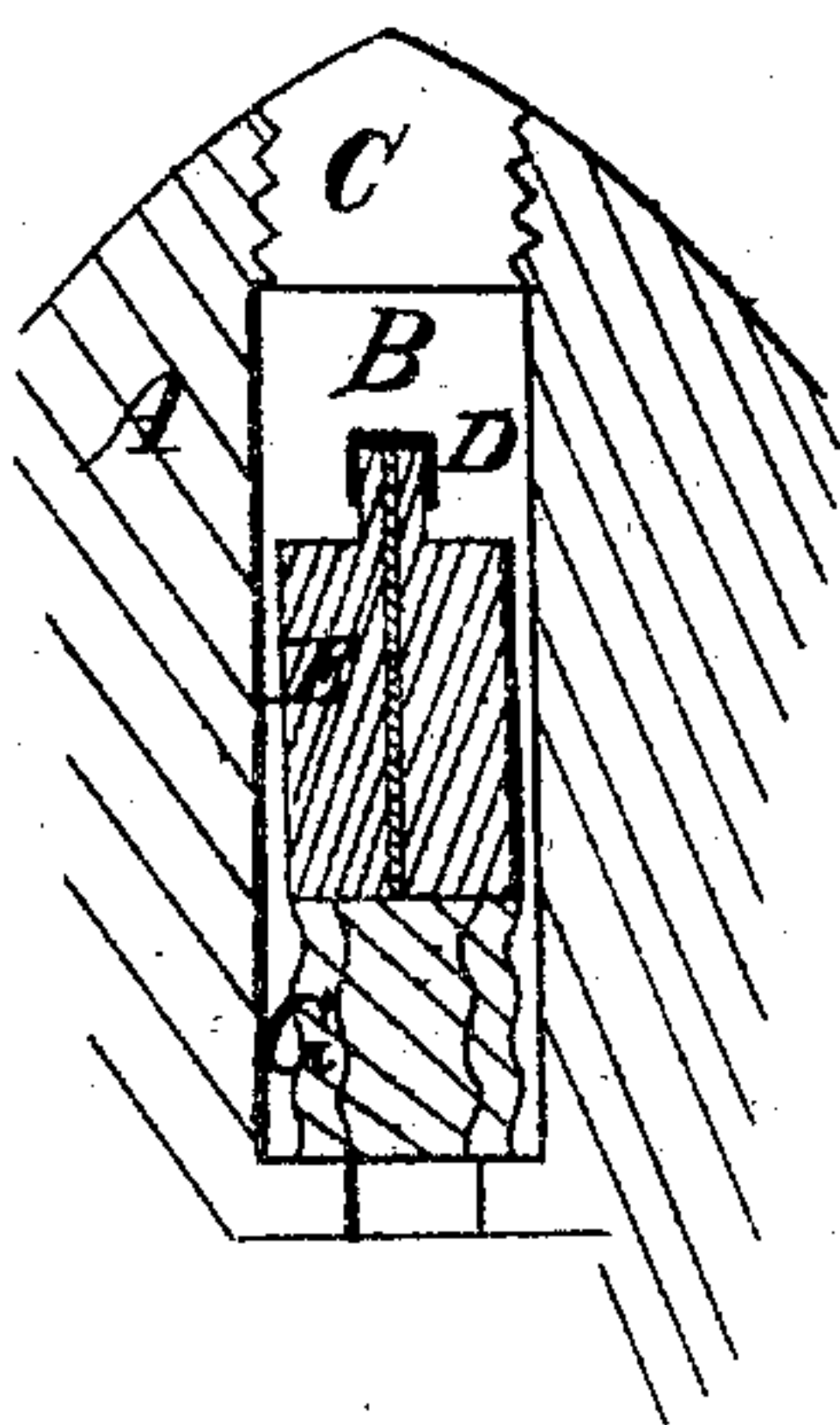


Fig. 1.

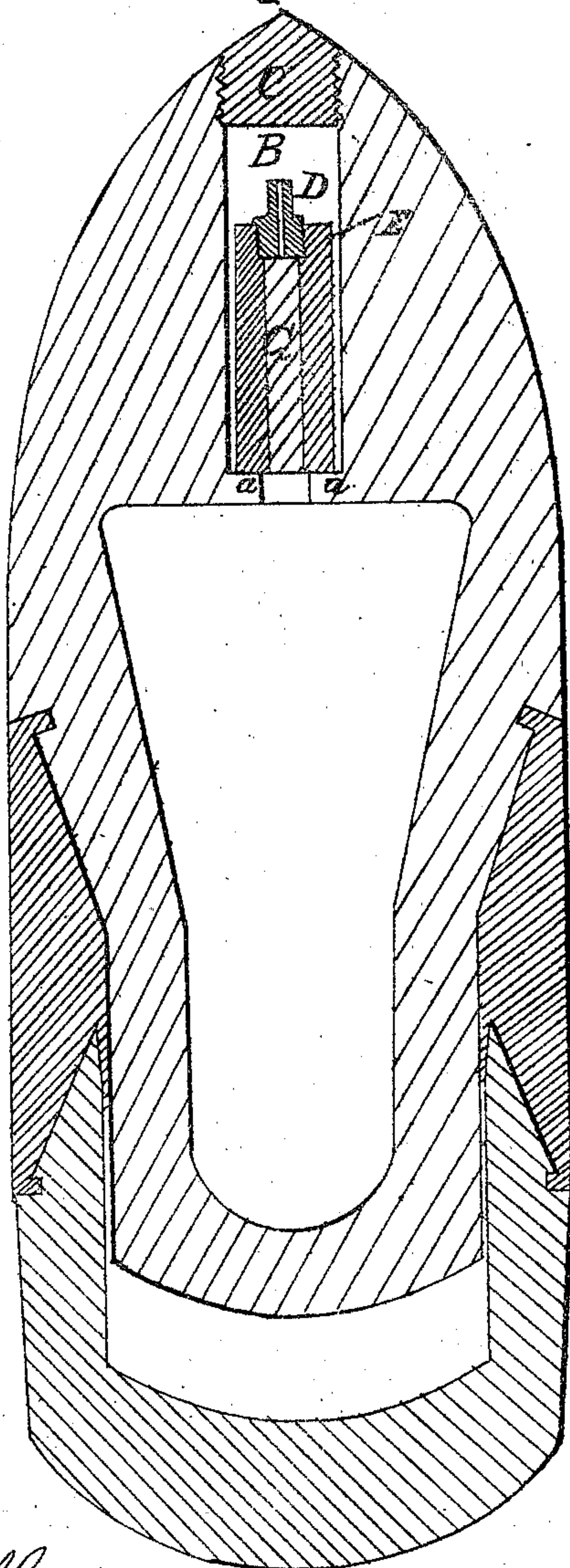
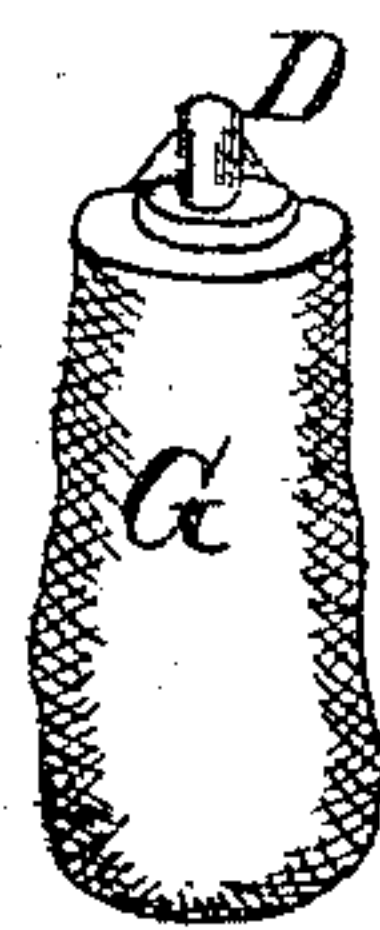


Fig. 3.



Witnesses.

Chas. M. Colby
D. W. Stetson

Signatures.

Chas. M. Colby
Thomas D. Stetson

UNITED STATES PATENT OFFICE.

CHAS. W. SMITH AND THOS. D. STETSON, OF NEW YORK, N. Y.

IMPROVEMENT IN THE PLUNGERS OF CONCUSSION-SHELLS.

Specification forming part of Letters Patent No. 34,788, dated March 25, 1862.

To all whom it may concern:

Be it known that we, CHARLES W. SMITH and THOMAS D. STETSON, both of the city, county, and State of New York, have invented a certain new and Improved Percussion-Fuse; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and the letters of reference marked thereon.

Our invention relates to that class of explosive projectiles moving point foremost, like those commonly known as "percussion-shells;" and it consists in certain means for preventing the premature explosions to which such projectiles have hitherto been peculiarly liable.

Figure 1 is a full-sized sectional view of a Hotchkiss percussion-shell with our invention attached. Fig. 2 represents a modified form of our invention. Fig. 3 represents the plunger in Fig. 1 after the shell has been fired.

A, Figs. 1 and 2, is the cast-iron body of the shell. B is a cylindrical cavity in the front end of said shell closed with a brass screw, C, and communicating in the rear by means of a narrower aperture, with the powder-cavity in the center of the shell.

The plunger G, Fig. 1, is constructed in a cylindrical form, of a diameter somewhat less than that of the cavity in which it is placed, and it is made of lead, or, what is better, a mixture of lead and tin in about equal parts. On the front end of the plunger is screwed a metallic nipple, E, bearing a percussion-cap, D.

Projectiles having percussive mechanism of a form similar to ours are well known; but the material employed in ours is novel, and the effect differs widely in one important particular from that of any before known. Previous to the date of our invention plungers were made wholly of iron or brass, and the theory of their action was as follows: At the moment of discharge from the gun they were expected to slide back to the rear of the cavity, if they were not already there, and remain in this position until the time of impact. At this moment, the forward motion of the ball being retarded suddenly, they were free to fly forward of their own inertia, and thus explode the cap by striking it against the screw. The hot gases generated by the explosion of the cap would rush backward through the aperture in the center of the plunger, igniting the powder in

the shell; but in practice it was found that these shells would frequently explode at the moment of discharge. The cause of this may be explained as follows: There are few, if any, substances which do not possess a certain amount of elasticity, and when two elastic bodies are brought into violent contact they will recoil with a force varying directly in proportion to the violence of the impact and the elasticity of the material of which they are composed. Iron and brass possess this property in a high degree. When, therefore, the shock of the explosive is communicated to the body of the projectile, this, in turn, strikes against the plunger, producing a recoil which throws it forward within the cavity with a velocity which exceeds that of the shell, and causes it immediately to strike against the screw with a force often sufficient to explode the cap; but, although all bodies are to a certain extent elastic, there is a class of substances of considerable tenacity, whose elasticity is so feeble as to be almost inappreciable. Such are lead and various alloys known in the arts as "soft metal." These are found, when tested by their power of resistance to a blow as violent as that imparted by the explosion of gunpowder, almost devoid of this property. When the plunger, therefore, is made of plastic or soft material, like lead, or an alloy such as we have described, the effect of the shock is to upset it, imparting to it a form resembling that shown in Fig. 3, and if it dart forward at all, if the material be sufficiently soft, it will never be with force enough to explode the percussion-cap, and thus our invention fulfills the conditions of exploding the shell at the right moment and avoiding the liability of premature discharge. The action of a plunger made like Fig. 2 is similar in its nature. There the body of the plunger E is of cast-iron or brass, bearing a nipple and cap upon its front, and resting at the rear upon a short lead or other soft-metal tube, G, cast with corrugations in its longitudinal section, as represented in the figure. When the shell is fired, the corrugations are deepened, the tube G becoming shorter, and the shock is thus cushioned or deadened before it reaches the plunger.

Many other modifications of this invention will readily occur to a skillful mechanic. The plunger may be made of iron, with a collar resting upon the shoulders *a a*, at the rear of the

aperture, the body of the plunger passing through the narrow aperture into the interior of the shell. One or more washers of lead may be then slipped upon the plunger, and thus interposed between its collar and the shoulders *aa*, thus serving to deaden the shock. Another method is to line the cavity B with lead, either throughout its whole extent or simply in the rear, making the plunger of any convenient material; and if by any means a cushion of inelastic or soft material be so interposed between the inertia of the plunger and the transmitted shock of the explosion as to deaden the shock by yielding to a permanent change of form, it is a mere modification of our invention.

What we claim, therefore, as our invention, and desire to secure by Letters Patent, is—

The use of soft material—such as lead or its equivalent—in the percussive mechanism of shells, substantially in the manner, and so as to produce the effect herein set forth.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

CHAS. W. SMITH.
THOMAS D. STETSON.

Witnesses:

HARRY M. COLLYER,
D. W. STETSON.