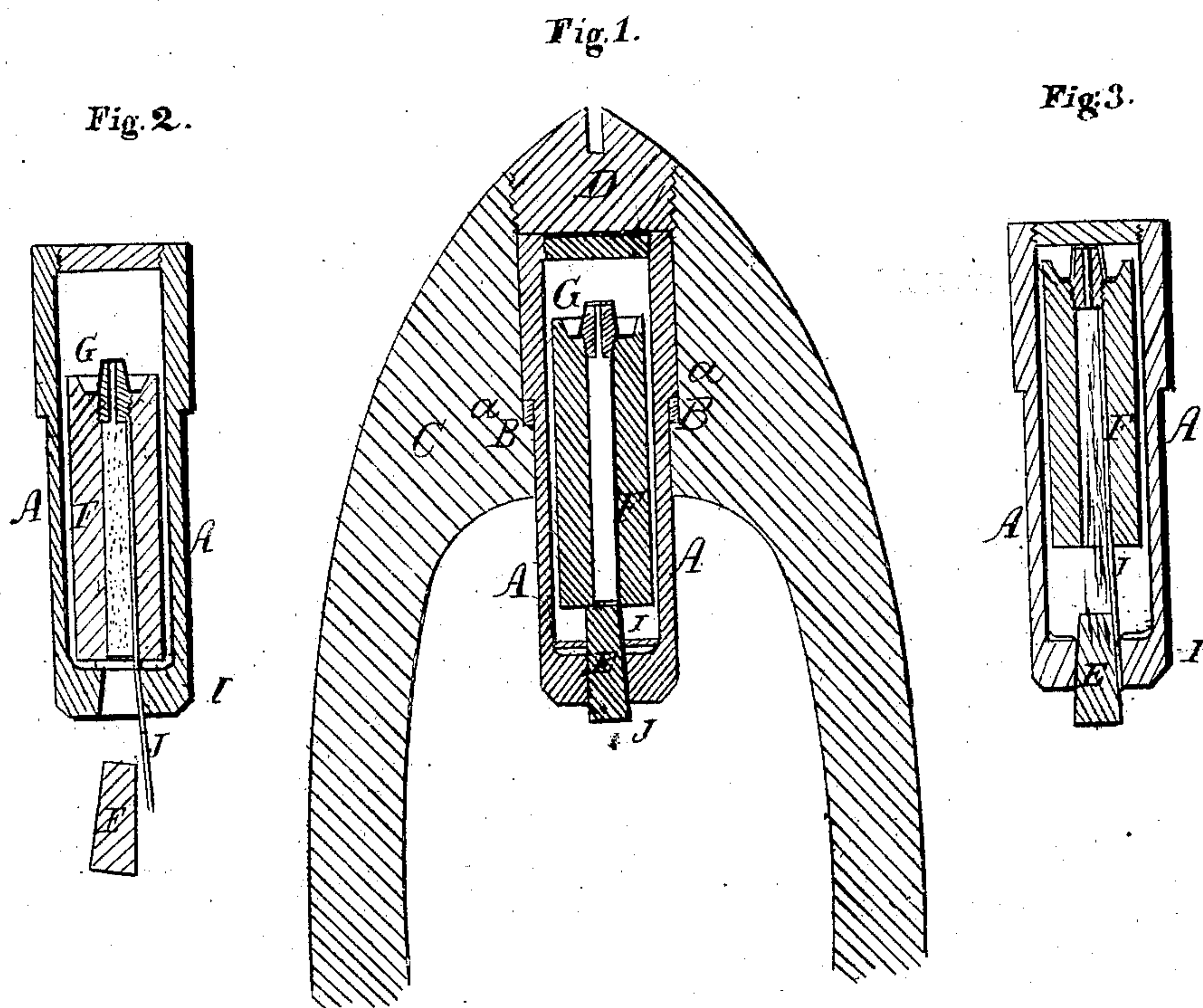


B. B. HOTCHKISS.  
Shell-Fuse.

No. 35,611.

Patented June 17, 1862.



Witnesses.

Thomas S. Nelson.

Wm. H. L. L.

Signature.

B B Hotchkiss



# UNITED STATES PATENT OFFICE.

B. B. HOTCHKISS, OF SHARON, CONNECTICUT.

## IMPROVEMENT IN CONCUSSION-FUSE FOR EXPLOSIVE SHELLS.

Specification forming part of Letters Patent No. 35,611, dated June 17, 1862.

*To all whom it may concern:*

Be it known that I, B. B. HOTCHKISS, of Sharon, in the county of Litchfield, in the State of Connecticut, have invented certain new and important Improvements in the Percussive Mechanism of Explosive Shells; and I do hereby declare that the following is a full and exact description of the same, prepared with a view to the obtaining of Letters Patent therefor.

My improvement is intended for use in connection with rifled ordnance, or with some other means of throwing the shell in such manner that the point which will strike the object first can be determined. Its purpose is to cause the shell to explode with certainty at the instant of striking any object, and to avoid all danger of explosion at other periods.

The accompanying drawings form a part of this specification, and similar letters refer to like parts in all the figures.

Figure 1 is a longitudinal section of my percussive mechanism as inserted in a shell ready for use. Fig. 2 is a similar section of the same as it exists after the shell in which it is introduced is discharged from the cannon, and while all the parts are flying with equal velocity through the air; and Fig. 3 is a similar section of the same as it exists after the shell has struck an object or while it is in the act of striking and before it has exploded.

Fig. 1, it will be observed, represents, in addition to my percussive mechanism, a section of a portion of a conical rifled-cannon projectile in which it is supposed to be used. I prefer to use it in such a projectile; but the latter forms no part of my present invention.

My invention is applicable to any and all characters of explosive missiles which can be made to strike with any given point or side against the object to be destroyed.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings.

A is a case or barrel of the form represented. Its shoulder *a* rests, through the intervention of a soft ring, B, upon a corresponding shoulder in the fuse-cavity in the shell C, as represented. It is inserted in the cavity and secured by the screw D in the manner which is obvious, and may be introduced and so secured either immediately before the act of loading the can-

non or a long time earlier, as may be most convenient. In the base of the barrel A is a conical hole provided with a conical plug, E, as represented. In the interior of the case A is a heavy plunger of any suitable material and of the form represented by F. Its upper end is fitted with a cone or nipple, G, as represented, and its interior is filled with powder H. The cone G is provided with a common percussion-cap, and the lower end of the powder-cavity in F is closed by sealing it slightly with shellac varnish. In the base of the case A is laid a washer of soft material, I, as represented. A wire, J, is so introduced between the plug E and its seat as to hold it with sufficient force to resist the concussions occasioned by ordinary handling, or by dropping it from the hands or from a wagon upon the ground. The other end of this wire is secured to the plunger F, and so long as the plug E remains in the position shown in Fig. 1 the plunger is held by this wire in the position indicated, so that the nipple G cannot strike its cap against the top plate of the case to effect its discharge, except under the action of a force sufficient to violently pull out the wire from its hold on one or the other part.

When the shell C is fired from the cannon, the violence with which it is suddenly urged forward by the discharge causes all the loose parts to tend backward within the shell with great force by their inertia. The tapering form of the plug E renders it extremely liable to yield to this force by its own inertia, and the inertia of the whole of the heavy plunger F, pressing against its point, makes it certain thus to yield and to escape backward from the cavity in A, while the plunger F follows it so far as it is allowed by the structure of the parts.

Fig. 2 shows the position of the parts at this period, and shows the plug E slightly turned around, as it is very likely to move after it has become entirely free from A. After the shell C, with its contents, has been discharged and the parts E F, &c., have acquired the same velocity as the shell, no tendency to change their relative positions exists until the instant of striking. In the act of stopping the shell, the resistance being felt by the outside first, the tendency of all the loose parts is to move forward within the shell, with a violence proportioned to the suddenness with which the motion is stopped. This tends to induce the



parts to assume the position shown in Fig. 3, unless the plug E is so far disturbed in its axial position that its point fails to enter again in the hole from which it escaped, and in either case the heavy plunger A is projected by its entire inertia, minus the friction, if any, on the wire J, and is thrown against the front with such violence as to insure the firing of the cap and explosion of the powder H. This powder H drives through the aperture in the base, forcing the plug E a second time backward, if it has chanced to seat itself in the opening, and fires the contents of the shell proper, which are not represented, but may be of any character desired—that is to say, may be powder alone, loose or solid, or may be powder arranged in any manner desired relatively to shot or other destructive or offensive material.

The several parts of my apparatus or mechanism may be of various forms and proportions; but I have tried the forms and sizes indicated and found them highly successful. I prefer for some reasons to make the case A of wrought or cast iron, the plunger F of like material, and the ring B, washer I, and plug E of lead or some soft and heavy alloy, while the wire J may be of copper or any other desired material. I can unite my wire J to the plunger F by soldering or otherwise, if desired; but I have found it sufficient to simply compress it tightly between the screw-threads of the nipple G and the interior of the plunger. It is thus so slightly held that if by any chance the other extremity of the wire should be entangled or nipped so firmly as to positively retain it, the connection of the wire to the plunger would then yield and release the latter, so as to allow the same action as before described.

The junction of the rear end of the wire J with the base of the tube A, or with the plug E, may be made strong or slight by a simple adjustment before putting the case A and its contents within the shell C. The adjustment may be made in many ways, which will readily occur to any skilled mechanic, as the end of the wire and the plug are both freely accessible; but one of the simplest methods is by allowing the wire to remain straight and partially loosening the plug to make the shell explode easily, and by cutting off the point of the plug and driving it very tight, and then bending the end of the wire either over upon the plug across its rear end or over upon the base

of A, to make the shell explode only on striking a very hard object or a very severe resistance. The latter end may be often desirable in firing ricochet shots, either on land or water, and by shortening the inner or front end of E, and bending the wire across its base, so as to partially tie it, the plug may be made to stand with its point in the hole during the flight of the shell, and to be pretty certain to again seat itself and hold the wire with considerable force, so as not to allow the nipple to meet the front of the case during the ricochets, but only on the impact against the object desired.

Excepting for the chance of liberating the plunger by the means described, it is not important that the wire be attached to F by pressure between it and the nipple, or that it be any other than an extension of the plunger F itself. It is also not essential that it possess any rigidity.

My invention may be operated with success if the part J be a wire, a strip of metal, or even a flexible cord of silk or other material.

The plug E, in addition to its holding the wire J or its equivalent, performs a very important function by excluding the powder or other contents of the shell from the interior of the case A. In my invention it will be observed the interior of the case A is never open to the interior of the shell C until after the shell has commenced its flight or is in the act of commencing it.

The wire J, in addition to its sustaining the plunger while handling the shell and in ricochets, also prevents the premature explosion of the shell by the elastic rebound of the parts which occurs when the shell starts on its flight.

The soft ring B prevents the friction or percussion of A within C from striking fire, and reduces the elasticity of the parts.

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

The plug E and wire J, or their respective equivalents, arranged to operate in the percussive mechanism of explosive projectiles, substantially as herein set forth.

B. B. HOTCHKISS.

Witnesses:

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