B. B. HOTCHKISS.

Shell-Fuse.

No. 43,993. Patented Aug. 30, 1864.

Fig. 1.

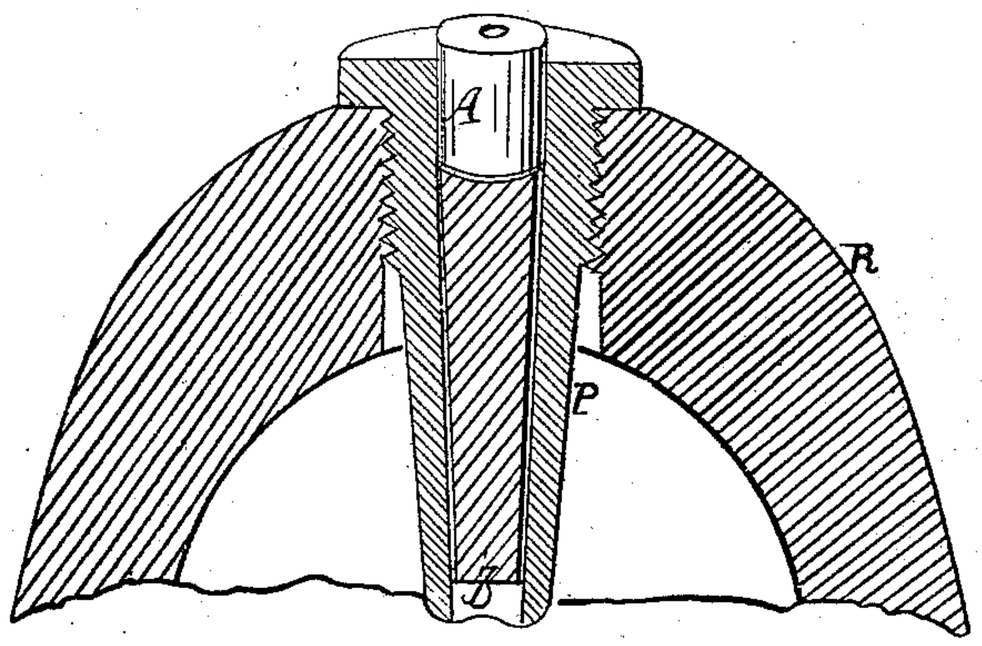


Fig. 2.

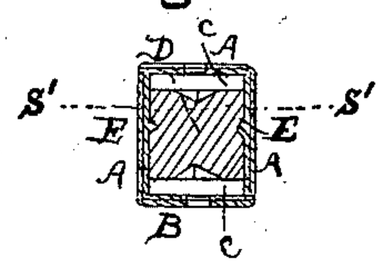


Fig. 3.

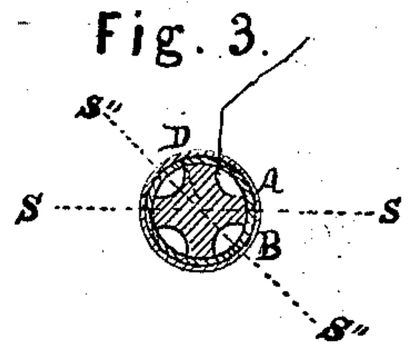
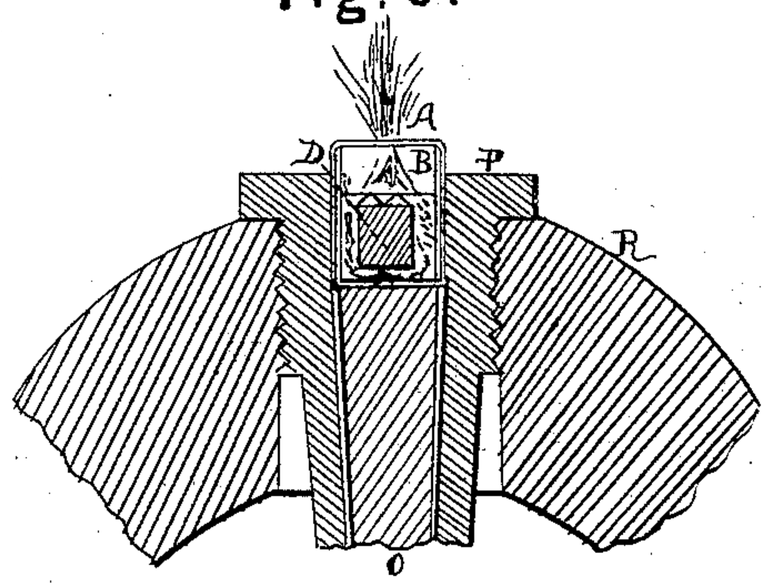


Fig. 4.

Fig. 5.



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IMPROVEMENT IN PERCUSSION IGNITORS OF TIME-FUSES FOR EXPLOSIVE SHELLS.

Specification forming part of Letters Patent No. **43,993**, dated August 30, 1864.

To all whom it may concern:

Be it known that I, B. B. HOTCHKISS, of Sharon, in the county of Litchfield and State of Connecticut, have invented a certain new and valuable Improvement in the Means of Igniting Time-Fuses in Explosive Projectiles by Percussion; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of my improved fuse-lighter, with a portion of a shell in section to show the manner of its application. Fig. 2 is a vertical section of the lighter, taken in the plane indicated by the red line *s s* in Fig. 3. Fig. 3 is a cross-section of the same, taken in the plane indicated by the line S′ S′ in Fig. 2. Fig. 4 is a perspective view of the hammer or percussion-barrel; and Fig. 5 is a vertical section taken in the plane indicated by the line S″ S″ in Fig. 3, showing the parts as they appear after the expulsion of the shell from the gun and the direction of the flame from the burning fuse.

Similar letters of reference indicate like parts in all the figures.

My invention relates to means for protecting or capping the striker so as to protect the fulminate in being handled, means for duplicating the protection, and means for allowing the device to be used either end foremost.

To enable others skilled in the art to which my invention is related to make and use my improved ignitor, I will proceed to describe the construction and operation thereof by the aid of the drawings and the letters of reference thereon.

The drawings are made of the full size of the apparatus as constructed to use in connection with the paper-case time-fuses used by the army and navy of the United States.

Two parts A and B are struck up from sheet metal, with the side and end in one piece. The part B is to be forced tightly within A, and is provided with a shoulder, as represented, to prevent it from entering too far. A small hole is made in the center of the base of each part, as represented, and a thin layer of fulminate, C, is placed within each in the manner of a percussion-cap. D is the striker. It is a piece of metal in the form represented in Fig. 4, with grooves or channels across each base and along the sides, and adapted to lie within B, as shown in Figs. 2 and 3, so that the channels in the ends and along the sides shall form open channels leading circuitously from the hole in the center of A to the hole in the center of B. The length of D is a little less than the length of the interior of the case A B, so that when placed in the center it will not come in contact with the fulminate C at either end. The several parts having been properly prepared, D is placed within B, as represented, and by means of a proper instrument, acting in the manner of a pick-punch a portion of the case B is caused to indent the substance of D at one or more points, E E, so as to retain it in such position under all the ordinary concussions due to handling and transportation, but not holding it with sufficient force to resist the inertia of D at the moment of firing. There is a very wide margin between the force due to the roughest handling, and induced by the powerful concussion due to the discharge of the gun. As a general direction, it may be said that the case B may be indented to any extent desired or even corrugated in dies to provide against injury in ordinary agitation or pouring out of one vessel into another without preventing the proper effect of the force developed in the discharge of the gun.

All the parts above described are put together as shown in Figs. 1, 2, and 3, forming a small and convenient apparatus of a size to fit in the ordinary fuze-plugs of all sizes of projectiles, and which may be sold and transported entirely distinct from the shells. When wanted for use, it is pushed in the plug over the slow composition or fuse proper in the position shown in Fig. 1, where O is the fuse, P the fuse-plug, and R the shell, shown in section. It is better to put the end B next the fuse, as here shown; but it will operate with either end next the fuse, little care or attention being required to place it in the right position.

On discharging the gun, the sudden motion imparted to the shell causes the part D to break itself loose by its inertia from the slight fastenings E E and strike the fulminate C with

sufficient force to ignite it, which in its turn ignites the fuse through the hole in the base. The gases from the burning fuse O escape through the hole in B, around D, and through the hole in A. The force with which D strikes the fulminate, and the inertia of the case itself, would be liable to force the base of B into the fuse, and thus destroy and cause a premature explosion were not the base and sides of B made in one piece of sufficient strength to resist such action aided by the friction of B against the fuse-plug or the case A, which friction is greatly increased at the proper time by the explosion of the fulminate forcing B into tight contact with A or the sides of the plug. For the same reason the part A is prevented from being blown away, the expansive gases finding vent through the hole in the base thereof. The parts are now in the position shown in Fig. 5. The tortuous passage for the flame and the smallness of the hole in A prevent to any great extent the entrance of water when the shell ricochets on the surface thereof, thus serving the purpose of a water-cap. The channels in the base of D also serve to reduce the surface acting on the fulminate, and thus secures greater certainty of ignition.

It is not necessary to the success of my invention that the ends should be interchangeable, as it will do very good service if fulminate be placed at one end only, and the exterior so marked as to indicate the proper end to place next the fuse; but it is highly advantageous, particularly in hasty firing, or in the night, to so construct the apparatus that it cannot be placed wrongly in the shell. This may be attained in various ways, such as making one end much too large to enter the hole in the plug; but I prefer the way I have represented as simpler and as insuring that its fitting into place shall not be delayed from any cause. The construction represented also possesses the advantage of further certainty in igniting the fuse from the burning of both charges of fulminate, because if the first is exploded, but fails to ignite the fuse, the burning of the second prolongs the time and increases the intensity of the flame, the fulminate in the outer end being ignited by the burning of that in the inner end.

My ignitor may be made water-proof in the same manner as common percussion-caps.

Other means than that herein indicated may be used to support the hammer D out of contact with the fulminate C without affecting the other parts of my invention; but I prefer the means described, for the reason that it is simple, cheap, and efficient, while the form of the projecting parts of B is such that they give way to the force of the explosion, tending to tear B from its position more readily than a pin-screw or other device, while D is held with ample security against all the percussions incident to handling and transportation.

I have thoroughly and practically tested my improved lighter, and have found it to be more convenient for use and more certain in its action than any means of igniting fuses heretofore known to me, particularly in elongated shells for rifled ordnance, a majority of such projectiles being of too small a size to allow of the use of large and expensive apparatus for igniting.

When an ordinary time-fuse is used on a projectile fired from a rifle-cannon, it is liable to be extinguished on striking water or earth. This is due to the fact that the projectile flies with its fuse presented at the face of the projectile, and with the front end open, so that on striking there is nothing but the pressure of the issuing gases to prevent the water or earth being received into the mouth and crowded into direct contact with the burning composition. This has been remedied by the addition, in some instances, of a hood or "water-cap" outside of the shell, which serves to deflect the water or earth; but the addition is always more or less cumbrous and troublesome. My invention requires no addition of the kind, but involves within itself a water-cap.

Some of the advantages due to certain features of my invention may be separately enumerated, as follows:

First. By reason of the fact that my case B incloses and is weakly attached to the striker D in the manner shown, with the fulminate C protected in the space between them, I am able to transport these parts separately from the other parts of the fuse, and to handle them, either singly or in quantities, as roughly as may be desired, without danger of causing friction or percussion upon the fulminate.

Second. By reason of the fact that my casing A B is made in two parts adapted to slide tightly one within the other, and applied together in the manner represented, I am able to make the case easily and cheaply by striking up the parts and simply pressing them together, and to put the parts together without danger of igniting or injuring the fulminate.

Third. By reason of the fact that the fulminate C is introduced in a space at each end of the case, as represented, instead of at one end alone, I am able, when operating in the dark or in haste, to introduce the ignitor either end foremost, with a certainty that it will operate as desired and ignite the slow composition.

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

1. Inclosing the striker D within a thin protecting-case, B, and securing the parts B and D together, as herein shown, so that the striker and its case may be transported and handled, with the fulminate between them protected from friction or abrasion, substantially as and for the purposes herein set forth.

2. Constructing the case of a fuse-ignitor in two parts, A and B, with the base and sides

of each part formed in one piece, and one part fitted within the other nearly the whole length of each, substantially as and for the purpose above described.

3. In connection with the above, providing both ends of the device with fulminate C, so as to adapt it to operate equally well with either end forward, substantially in the manner herein set forth.

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Witnesses:
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