N. SCHOLFIELD.

Shell-Fuse.

No. 18,866. Patented Dec. 15, 1857

Fig. 9.

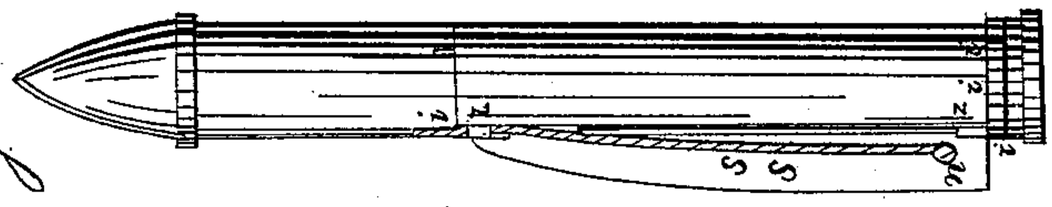


Fig. 8

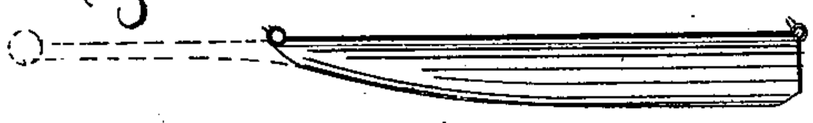


Fig. 7

Fig. 6.

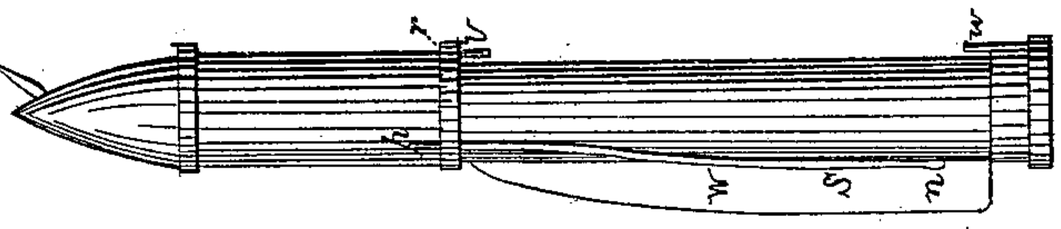


Fig. 4

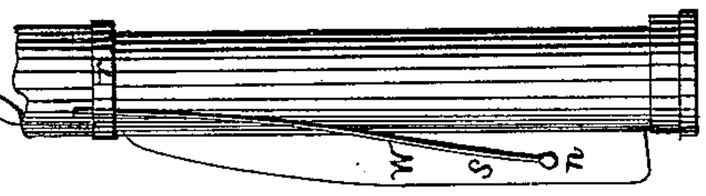


Fig. 5.

Fig. 3.

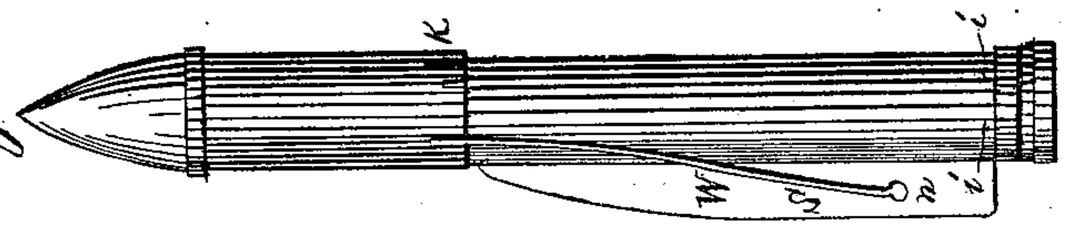
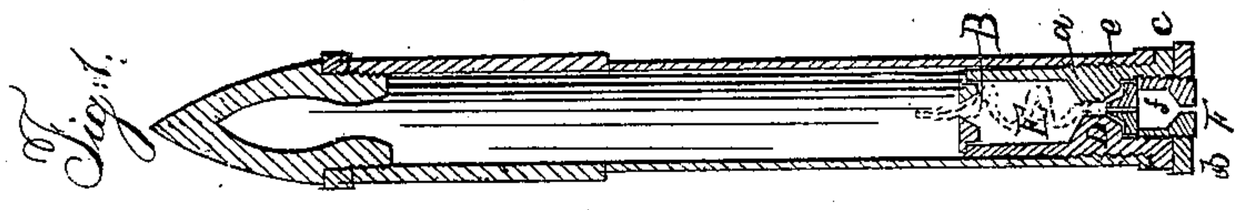


Fig. 2.

Fig. 1.



UNITED STATES PATENT OFFICE.

NATHAN SCHOLFIELD, OF NORWICH, CONNECTICUT.

IMPROVEMENT IN THE FUSES OF SHELLS AND OTHER PROJECTILES.

Specification forming part of Letters Patent No. **18,866,** dated December 15, 1857.

To all whom it may concern:

Be it known that I, NATHAN SCHOLFIELD, of Norwich, New London county, and State of Connecticut, have invented certain new and useful Improvements in Shells and other Projectiles to be fired from a Gun; 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.

My improvement consists in a peculiar mode of applying and protecting a fuse to ignite an explosive shell, and also peculiar modes of attaching and operating folding wings or guides to govern the direction of shells or other projectiles.

Figure 1 represents a longitudinal section of a shell containing the improvements. Figs. 3, 4, 6, and 9 are surface views of a projectile, showing the improved modes of attaching and operating guiding-wings thereon. Fig. 5 is a transverse section, showing the relative positions of the wings thereon and their sectional forms. Figs. 7 and 8 are modified forms of guiding-wings.

In the rear end of the shell A, Fig. 1, is screwed a fuse-stock, B C D, which holds the fuse and protects it and the powder within the cavity of the shell from the force and direct action of the explosion of the charge within the gun. Within the fuse-stock is a fuse-chamber, E, and a vent-chamber, F, separated from each other by a diaphragm, D, having a perforation, *d*, with a conical enlargement on the side opening to the vent-chamber; and in this aperture is inserted a protecting-plug, *e*, with a conical point corresponding to the conical cavity, and having a very small perforation through its axis. The rear end of this protecting-plug is of a size corresponding to that of the bore in the rear end of the fuse-stock. In the rear end of this stock is inserted a safety-screw, F, having a cavity, *f*, forming the vent-chamber, and a small perforation in its axis giving it a connection with the charge of powder in the gun which acts thereon.

B is a closing-cap to secure the fuse-chamber from the powder in the shell, and is soldered in its place after the fuse is inserted. This has also a conical cavity opening inward through its axis, for inserting and securing the fuse. The end of the fuse-cord is entered from the fuse-chamber E through the conical orifice of the diaphragm D. This end of the cord is then opened and expanded by inserting the conical point of the holding-plug *e*, which should previously be coated, while warm, with wax or some plastic and adhesive substance, and the outside of the fuse-cord, at and near its junction with the conical plug, should afterward also be coated with the same material, and while in a plastic state the protecting-plug thus connected with the fuse should be pressed into the conical aperture by the safety-screw F, and in this manner the fuse will be held tightly, and no flame from the explosive action of the charge can be forced into the fuse-chamber, except that acting through the small perforation through the axis of the conical protecting-plug, which acts directly on the central grains of fuse-powder of the cord, and is sure to ignite the fuse. The fuse is coiled up within the fuse-chamber, and the end (after an enlargement a little distance therefrom, either by winding it with twine or thread well coated with wax or by coating the cord with wax alone or some adhesive material) is drawn through the orifice in the closing-cap B, bringing the enlargement hard into the conical cavity of the said cap. The cap is then inserted in its place and soldered securely to the fuse-stock, making the chamber perfectly tight and inaccessible both front and rear, except through the center of the fuse-cord, and so that the powder in the shell can be reached only by igniting the fuse. The interstitial space around the fuse-cord within the fuse-chamber should be completely filled with gypsum, molten rosin, pitch, or any substance which may become rigid after having been in a plastic state, while at moderate temperature, or may be filled in like manner with sand or any material which would obstruct the free transmission of flame from one part of the fuse-cord to another, if by possibility it should be forced through the surface of the cord, although its legitimate action is to vent itself while burning by following its coils in the center thereof and to the rear through the perforation in the protecting-plug, into the vent-chamber, and through the safety-screw. If the fuse-cord is sufficiently protected by coating it with some adhesive protecting material, the filling of the interstices in the fuse-chamber may be dispensed with.

b is a ring or collar of leather screwed on the

extension of the safety-screw, and of a size just sufficient to enter the bore of the gun by slight pressure, and supersedes the use of a wad between the powder and the projectile.

The rear portion of the projectile, for about half its length, is turned a little smaller than the bore of the gun in which it is to be fired, to allow thin metallic wings W, Figs. 3, 4, 6, and 9, which consist of thin cylindric segments, to be applied thereon, and yet enter the bore; but a narrow rib or ledge, *l*, is left just at the rear end of nearly the full size of the bore. Across this ledge, and of its full depth, are made three grooves, *i*, parallel to the axis of the projectile, and at equal distances from each other on its circumference, and also corresponding grooves in the surface of the projectile forward of the recess turned for the guiding-wings. These grooves, thus cut, serve as recesses for the journals on which the wings are hung. These wings are made of thin sheets of metal, so curved as to correspond with the cylindric surface of the projectile, and are soldered or otherwise fastened on one of their edges to wires, on which they may turn as journals, which are placed in the grooves *i*, above referred to, and when in place thin metallic collars or rings *r*, Fig. 4, are applied thereon to hold them secure. These rings may both be soldered in their places, allowing the journals to turn freely; or the ring or collar to secure the rear journals may be soldered or otherwise fastened to the flange of the breech-screw, so as to slide on and cover the journals and hold them in place, allowing free action thereto. A spring, S, of wire, (steel or brass is preferred,) is then soldered at one end to the concave surface of the wing, toward the rear, as shown at *n*, and is so formed that when free, and when the wing is extended in a radial position from the surface, the anterior end shall coincide with a groove, *k*, a little distance from the journal and from the concave surface of the ring. The ring *r*, Fig. 4, being then put in place, will secure it therein, and this spring, being forced from its natural position by the folding down of the wing, will, if of proper force and elasticity, always throw the wing up again when left free.

The spring S, instead of being soldered to the wing, may be made fast to the surface of the projectile at *r*, and pass through a small loop or bracket, *t*, Fig. 3, on the concave surface of the wing, with like result; or the spring, being thus fastened to the projectile, may act on the concave surface of the wing only by contact, without any fixed connection thereto, in which case the wing should be so soldered to the axis on its concave side as to bring its back edge in contact with the surface of the projectile when extended, so as to form a positive limit to its action, and so that in expanding it cannot pass beyond radial positions on on the surface, as shown at Fig. 5, which is a transverse section thereof. The springs may also be attached by soldering or otherwise fastening them firmly both to the wing and surface of the projectile, as at Fig. 6, where the spring S is soldered to the wing at *n*, near its axis, and to the surface of the projectile at *p*, which is also as near the axis as practicable. If this connection is made when the spring is in a free state, and while the wing is extended in a radial position, it will always return to that position, when left free, after the wing has been folded down.

Instead of fastening journals to the wings and applying them in sockets, wire studs or loops *w* may be fastened firmly to the surface at the rear and forward extremities of the recess for wings, and corresponding loops, *y*, on the edge of the wing, formed either by folding a lip or projection of the sheet, as in *z z*, Fig. 7, or by forming a loop in the end of the wires constituting the axis, or any other small wires soldered or otherwise fastened to the wing, so as thereby to form connections with the studs or loops on the projectile, on which they may act as joints; and for this purpose those on the surface of the projectile may consist of pieces of wire *w'*, made secure in the grooves, which have been described above, and projecting therefrom over the recess for the wings, and either with or without being turned down and soldered to the surface at their projected extremities; or, instead of the studs *w*, a wire, *x*, Fig. 9, may extend across the recess on which to suspend the wings.

The wings, Figs. 7 and 8, may also be applied, as at Fig. 9, by applying springs S and S', of wire, soldered to the concave surface of the wing at *n* and *n*, and each passing through the opposite loop *z* and into the grooves or recesses *i*, where they are firmly fastened, by which means the wings are connected securely to the projectile and act freely thereon. These springs may, if preferred, consist of a cord of extremely fine wires twisted together, by which means they will be more pliable and elastic, and will sustain greater tension and force.

Instead of wire springs for actuating the wings, the anterior portion of the wing may be made very narrow and extend forward at or nearly to the extreme anterior portion of the cylindric part of the shell, and fastened firmly thereto at that point by soldering or otherwise securing it flat on the surface. This anterior portion may then be twisted, so that the broad or rear portion of the wing shall stand nearly upright, or radial to the surface when in a free state, and if the metal composing the anterior or twisted portion of the wing is sufficiently elastic it will yield to force, so as to allow the wing to be folded down on the surface, and will again elevate it therefrom when free.

Fig. 8, with the dotted-line extension, represents a wing of this description in proper condition to be applied, requiring to be connected by a loop, *w*, in the middle and a loop or a journal at the rear end.

The position of the springs, Figs. 3, 4, 6, may be reversed from the position there shown by

connecting them to the anterior portion of the wing and at the rear end of the projectile; but the plan as shown is greatly preferred.

Having thus at length described my invention and its several modes of application, I wish it understood that I do not in this claim the construction or application of guiding-wings, in any of their varieties, to a projectile.

What I claim as my invention, and for which I solicit Letters Patent, is—

1. The application of a perforated conical protecting-plug, *e*, Fig. 1, penetrating the end of the fuse-cord, and the connecting it thereto by some plastic and adhesive substance, and also inserting this, with the fuse-cord, in place in the conical cavity opening from the fuse to the vent-chamber, for the purpose of securing more perfectly the ignition of the fuse, while the flame from the discharge of the gun is prevented from passing in outside the fuse, or of forcing the fuse inward, substantially as described.

2. Opening and expanding the end of the fuse-cord and applying it under the seat of a protecting-plug, *e*, Fig. 2, and causing the plug to be pressed firmly thereon, so as to secure it from being forced through the aperture by the discharge.

NATHAN SCHOLFIELD.

Witnesses:
H. M. SCHOFIELD,
J. I. WILSON.