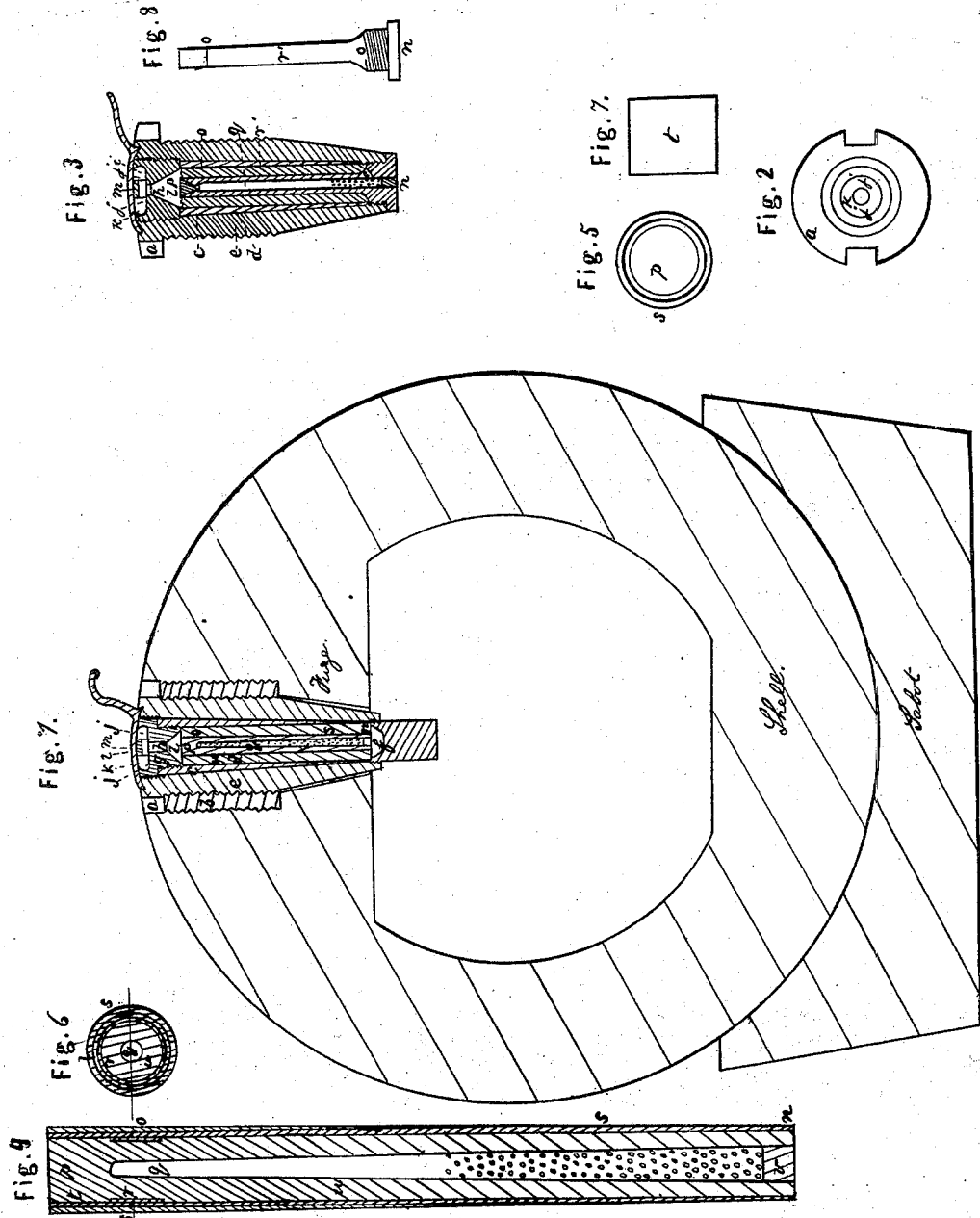


W. W. HUBBELL.
CONCUSSION FUSE FOR SHELLS.

No. 36,566.

Patented Sept. 30, 1862.



Witnesses:

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IMPROVEMENT IN CONCUSSION-FUSES FOR SHELLS.

Specification forming part of Letters Patent No. **36,566**, dated September 30, 1862; antedated July 5, 1861.

To all whom it may concern:

Be it known that I, WILLIAM WHEELER HUBBELL, of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in Fuses for Shells for Ordnance; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, making part hereof, in which like letters of reference designate like parts.

The nature of my invention consists, first, in constructing and applying a metallic stem or metallic fracturing-tube, in combination with a burning composition, so that the metal of the stem shall withstand the heat and ricochet, and shall part at a fracturing-point on concussion of the shell against an object after having been fired from a gun, to admit fire to explode the shell; also, in making the metallic stem cylindrical, or else tapering larger toward the front end than at the inner end, so as to bear upon or against the burning composition which surrounds the stem in starting, to overcome its inertia in acquiring initial velocity with the shell in the gun; also, in constructing a head or valve circular or conical in form, and sitting or carried in the front end of the metallic stem covering the central hole in the stem, to exclude the fire, and to fly out on concussion and expose this central hole to the action of the fire generated by the surrounding burning composition; also, in lining the inside of the metallic fracturing-stem with plaster-of-paris, to protect the central hole and the powder or priming it contains from excessive heat until the metallic stem fractures or parts on concussion; also, in combining horizontal and vertical vents in a water-cap, so as to exclude water from the vertical or central vent, and thereby prevent extinguishment of the fire of the burning composition; also, in securing the water-capping to the paper case of the fuse, so as to insert the fuse composition and capping into the stock of the fuse or into the shell-casting most quickly in action; also, in surrounding the metallic fracturing-stem with a paper facing or wrapping of paper, to strengthen it at the fracturing-point and prevent corrosion from the saltpeter, sulphur, and charcoal, or burning composition, and allow the paper to burn away with the composition and expose the metallic stem, so as to fracture and admit the fire to explode the

shell; also, in constructing the fracturing-stem of sections of metal originally separate, with a neck or flange to connect them, or of the metal to break or fracture and separate and yet withstand the concussion on ricochet, but fracture from concussion on penetration, and explode the shell, and capable of graduation to explode the shell on striking the ground on ricochet.

Figure 1 represents the "sabot" of wood, the shell, and the fuse, being a vertical section of the same. Fig. 2 is a top view of the fuse with its lead patch removed. Fig. 3 is a vertical section of a modified construction of the fuse, and Fig. 8 is a perspective view of the cast-iron fracturing-tube in Fig. 3. Fig. 4 is an enlarged view of the fracturing-tube shown in place in Fig. 1. Fig. 5 is a top view of this enlarged tube. Fig. 6 is a cross-section of this enlarged tube at the point *o*, and Fig. 7 is a side view of the short or upper metallic section of this enlarged tube.

This fuse is adapted to spherical shells, to rifle or elongated shells, and to shrapnel-shells: The fuse may have a gun-metal or other metal stock, *e*, screwed by a flange, *a*, into a gun-metal bush, *b*, or may have a wooden stock adapted to receive the paper fuse. The paper case *c* contains the cylindrical column of burning composition *d*. The inside open end, *f*, of the paper case or the stock may be fitted with a lead or soft-metal safety-stopper, the same as described in my patent dated January 7, 1862. The front or outer end of the column of composition and of the fuse-stock are provided with a capping, *g*, which screws into the front end of the central portion of the stock or of the paper case, or held to it by two pins, and has a small central vent, *h*, leading from the composition into the horizontal vent *i*, which opens on opposite sides, *j j*, into a circular recess, *k*. This horizontal vent is bored through a center-piece in the middle of the circular recess *k*. A lead patch and handle, *m*, covers the water-cap and its priming, and is pulled off when the fuse is about to be loaded with the shell into the gun. This water-cap is recessed conically on the inside *l*, which cone-recess, terminating in the central vent, *h*, accelerates the flow or escape of gas through this central vent, *h*, which is about fifteen-hundredths of an inch in diameter, and the horizontal vent is about one-tenth of an inch in diameter, and is bored through the

center piece, and opens into the circular recess *k*, which holds the priming of quick-match and meal-powder. The accelerating principle of discharge of the gas relieves the column of composition of excessive pressure during the flight of the shell, and the comparative smallness of the mouth of the vent *h* and the accelerated force of the gas through it exclude the water on ricochet of the shell on the sea or water, and exclude the earth in the ricochet on land or penetration of fortifications, and thus prevent the water and earth from interfering with the burning of the fuse composition. The central piece or horizontal vent, *i*, prevents the water and earth from acting direct on the vent *h*, and this horizontal vent *i* may take in water at one side, and it will pass out at the opposite side and not extinguish the fuse. The burning composition may be driven in a paper case held in a steel die, and consists of saltpeter, sulphur, and charcoal, in any well-known or any proportions to suit any desired time, several proportions being given in my patent of January 7, 1862. Any of the other well-known compounds for burning composition may be used.

I make the fuse with a metallic fracturing tube to explode the shell or shrapnel on concussion in the following manner: Make a thin tube of brass or copper, by drawing it out or otherwise, similar to the tubes used for friction-primers, and about two-tenths of an inch in diameter outside. The tube for each fuse is in two sections. The longest section extends from *n*—the inner end—to the point *o*, where the fracturing-joint is formed, Figs. 1 and 4. The forward end, *o*, of this long tube is fitted with an inside collar, *r*, projecting about five-hundredths of an inch forward, and over this collar is fitted a small section, *t*, of the tube, of the same diameter as the diameter of the long section, and about a quarter of an inch in length. Dip the tube in a solution of shellac and dry it to seal the short onto the long section. Set the tube in a die with the short section uppermost, and a needle similar in length and form to the central hole, *g*, extending up the center, and pour in plaster-of-paris paste until it fills the tube. Draw out the needle when the plaster has set, and it will leave a coating of plaster-of-paris, *u*, inside of the tube, with a head, *p*, closing the forward end and the joint *o* of the small section *t* of the tube. When the plaster is perfectly dry, wrap paper around the tube, forming it thickest or largest at the front end and tapering smaller at the inner end. *ss* is this paper covering, and only three or four thicknesses so as to burn off from the tube readily. The paper may be previously saturated with saltpeter. Place some fine gunpowder in the central hole, *g*, and seal it there with a cork, *v*. After having driven the burning composition *d* in the paper case *c* on a tapering steel spindle, set the paper case in a holder and rive it out with a half-round river, to receive the fracturing-stem, Fig. 4, as shown in Fig. 1, with the larg-

est end forward, and so that the outer paper facing shall bear against the burning composition to support it, in which it should be sealed by a coating of a solution of shellac put on the paper to support the fracturing-tube when the shell starts in the gun. The paper may also be wound spirally around the metal tube, and the composition be driven around the tube, with a hollow steel drift to fit over tube, and thus firmly secure the tube in the center of the burning composition. When the shell is fired with this concussion-fuse, the composition is ignited by quick-match, which extends from the recess *k* through the vents into the chamber *l* on the composition *d*, and the composition burns away as the shell flies, burning off the paper *s* and exposing the fracturing-joint *o*, so that when the shell strikes the concussion of penetration either drives out the head *p* by its *vis inertia* or breaks off the tube at the point *o* and uncovers the central hole, *g*, exposing its gunpowder, which the fire explodes and drives in the cork *v*, or discharges the fire into the bursting-charge of the shell, which explodes it on the concussion. By reducing the projecting end of the collar *r* to about three-hundredths of an inch and increasing the length of the short section *t* of the tube to four-tenths of an inch, the fuse will be more delicate to act on concussion, and will explode shrapnel-shells on their striking the ground. In this case the composition used should be meal powder down to the joint *o*, to burn to it quickly, and then a piece of quick-match be set on the slower composition beneath it in driving it, to make it ignite when the meal-powder has burned down to it.

In the Figs. 3 and 8 the metallic fracturing-stem is made of cast-iron *r'*, and a slight cut around at *o* to form the point of fracture. It also is wapped with paper, and may be faced inside with shellac and plaster-of-paris. The head *p* is made of lead or soft brass, coned, and clinched or driven in to secure it, and to fly out, the same as the plaster-of-paris head; or the head may be solid, of cast-iron, and the stem fractured at the point *o* by the shock of concussion or penetration. The burning composition *d* is driven around it with a hollow drift, sustains it in starting the shell and fuse in the gun. The principles of its action are the same as the metallic stem in Fig. 1. This cast-iron stem, Figs. 3 and 8, is provided with a flange and screw on the inner end, and is screwed into the inner end of the stock, to secure it centrally in position. The paper case *c* is set in and the composition driven between it and the fracturing-stem from the forward end of the stock, and the stock for this stem is best when made of brass or gun-metal.

I do not claim a central stem of plaster-of-paris cast into the composition and enlarged toward the inner end, as in Splingard's fuse, although the central fracturing-stem of metal was invented by me as early as 1848, as said Splingard's will not ricochet, is too large, and necessarily so, and is liable to premature frac-

ture both in making and in flight, as it is formed in the composition, and consists of nothing but plaster-of-paris; nor a friable metallic fuse-stock, such as is exhibited in the Snoeck fuse.

What I claim as my invention is—

1. The central metallic stem or fracturing-tube surrounded by the burning composition, so that it shall withstand the heat and part at the fracturing-point on concussion.

2. The head *p*, set in the top or front of the metallic stem or tube, so as to fly out of it and expose the central hole in the stem on concussion to explode the shell.

3. The plaster-of-paris lining inside of the metallic stem, for the purpose described.

4. The combined horizontal and vertical vents in the capping, and these also in combination with the conical or accelerating chamber.

5. Securing the capping by screwing it or otherwise to the front end of the paper-case fuse, so as to set the fuse readily into any stock already capped for service when in action.

6. The paper facing surrounding the metallic fracturing-stem, to support it and burn away and release it, substantially as described.

7. The fracturing-stem, when constructed of sections of metal put together and operating in the manner and for the purpose substantially as described.

8. The conical or accelerating chamber inside of the water-capping, as described.

WM. WHEELER HUBBELL.

Witnesses:

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