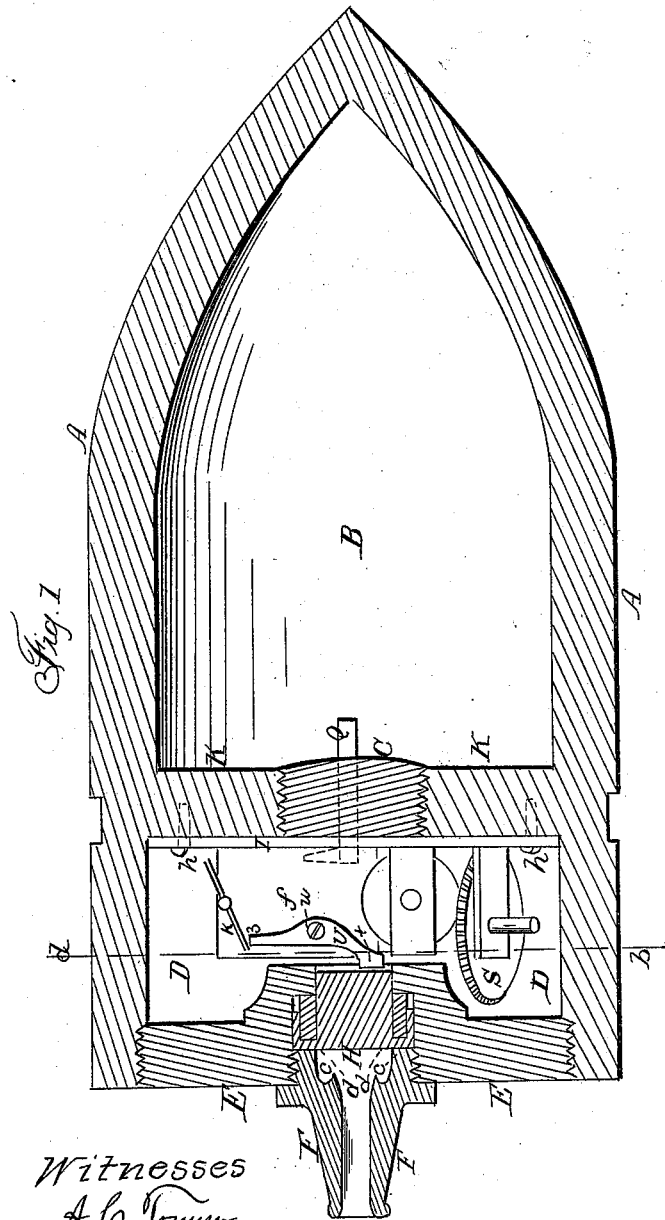


F. TOGGENBURGER.

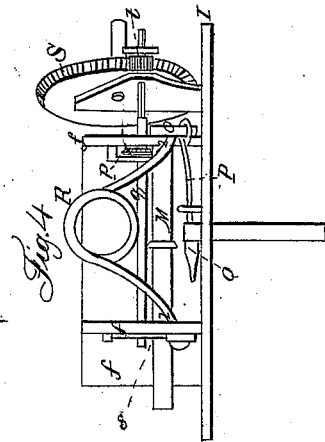
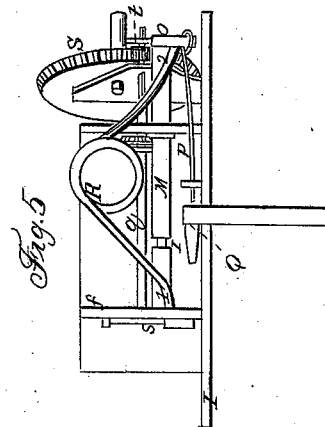
Shell-Fuse.

No. 47,586.

Patented May 2, 1865.



Witnesses
A C Tomer
J A McKean



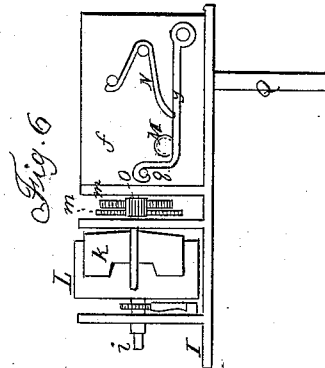
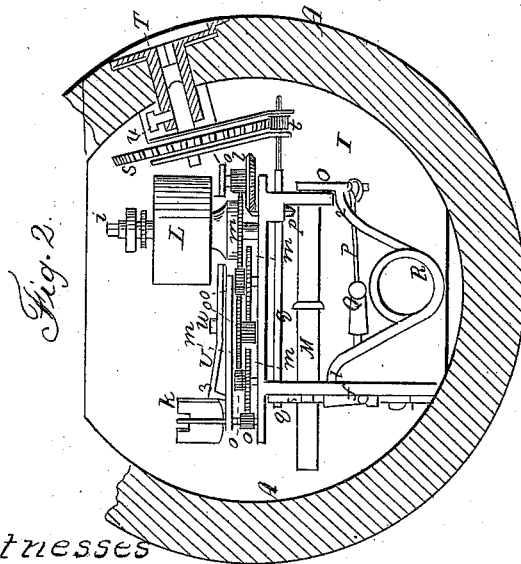
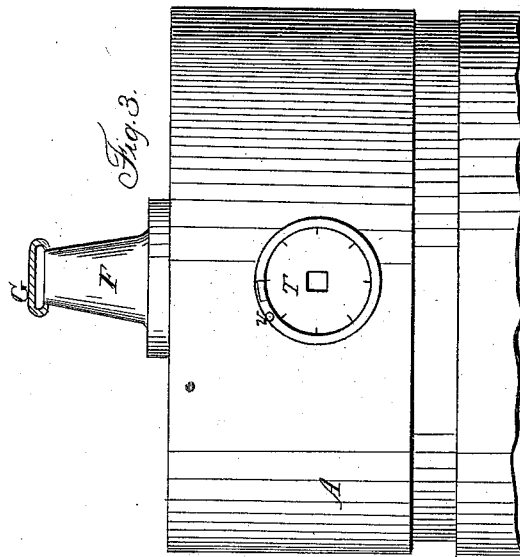
Inventor
Frederic Toggenburger
by his Atty
Gutman & Cohen

F. TOGGENBURGER.

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Witnesses
A. C. Tonner
J. A. McKean

Inventor
Frederic Toggenburger
by his Attys
Gutzmer & Cohen

UNITED STATES PATENT OFFICE.

FREDERIC TOGGENBURGER, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN TIMING EXPLOSIVE SHELLS BY CLOCK-WORK.

Specification forming part of Letters Patent No. 47,586, dated May 2, 1895.

To all whom it may concern:

Be it known that I, FREDERIC TOGGENBURGER, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bomb-Shells; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, in which—

Figure 1 represents a longitudinal central section through said bomb-shell. Fig. 2 represents a cross-section through the line *a b* of Fig. 1. Fig. 3 represents a side view of part of the shell. Figs. 4, 5, and 6 represent end and side views of the apparatus which I use for exploding my shell.

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

A represents the casting of the shell. The cavity B serves for the reception of the powder which is to explode the shell at a certain moment, and this cavity, when properly filled, is closed by means of a screw-plug, C. The cavity D serves for the reception of the mechanism which I use for exploding the shell, and said cavity is closed by means of a screw-top, E. The formation of the latter is represented at Fig. 1. It is provided with a nipple, F, which is filled with powder, and is temporarily closed by a cap, G. Fig. 3, to prevent said powder from falling out. In charging the gun said cap is removed and the powder by which the shell is fired from the gun exerts a pressure upon the yielding plug H within the top E, and the movement of said plug starts the mechanism which fires the powder within the cavity B to explode the shell. The plug H is provided with a flange, *c*, into which an india-rubber packing, *d*, is inserted, which closes the plug H against fire or water, but at the same time permits it to yield to the pressure of the charge to start the exploding mechanism, the construction and operation of which I will now describe.

The exploding mechanism is mounted upon a frame, I, provided with vertical plates *f*, for the reception of the several parts, and is secured to the partition K of the shell by means of a screw or screws, *h*. It consists, substantially, of the parts which compose a clock-work, with the addition of certain devices

which are necessary to set the clock-work so as to cause it to explode the shell at a certain moment and for firing the shell.

L represents the spring-barrel, which contains the ordinary coiled spring, which is wound up by the application of a key to the square end *i* of its shaft. The spring operates the several gear-wheels, *m* and *o*, (shown in Fig. 2,) and the velocity of the apparatus is regulated by the application of the fly *k*. Thus the bevel-pinions *l* and *p* are operated, and the latter is set upon a screw-shaft, *q*, which is thus moved longitudinally when the bevel-wheel *p* is turned. The screw-shaft *q* is shown in its several positions in Figs. 2, 4, and 5, and its end, passing through plate *f*, is shown at Fig. 6. It serves to lock or to release the rod M, to which the friction-match is secured which is to fire the shell. This rod M is supported by the vertical plates *f f*, and can slide therein longitudinally. It has a groove, *r*, in its circumference, (shown at Fig. 5,) into which the hinged rod *s* is pressed when the apparatus is set, as shown in Fig. 6. In this position the upper end of the hinged rod *s* is supported by the end of the screw-shaft *q*, and when the shell is to be exploded the end of said shaft is withdrawn from the rod *s*, and the latter is disengaged from the rod M by the action of the spring N. The end of the rod M is provided with an arm, O. To this a wire or cord, P, is secured, which extends into the tube or capsule Q, which latter contains the fulminating material, and is exploded by friction, and as the tube-Q extends into the space B of the shell the powder therein is exploded when the former is fired. A spring, R, bears with its end 1 against the vertical plate *f* of the frame, and with its end 2 against the arm O of the rod M, and thus tends to withdraw the latter when it is released from the hinged rod *s*, thereby rapidly withdrawing the wire P from the capsule Q and firing the latter.

It is evident from the above that the time within which the shell is to explode depends upon the length of that part of the rod Q which is to be withdrawn from the hinged clasp-rod *s*, so as to release the rod M. This length can be adjusted with the greatest accuracy by means of the gear-wheel S, which meshes into the pinion *t*, the latter being set upon the square end of the screw-shaft *q*, and when it

is turned the shaft, by the action of its screw within the hub of the wheel *p*, will move it inward or outward, and thus its end can be inserted into or withdrawn from the rod *s*.

To determine the time within which the shell is to explode, I secure a dial, *T*, Figs. 2 and 3, to the shaft of the wheel *S* by means of a set-screw, *u*. The face of this dial is countersunk in the side of the shell, and is divided in a number of parts, each part representing the space of a second. I further apply a fixed pin, *v*, to the shell, so as to mark the number of divisions or revolutions of the dial when it is turned, and thus am enabled to set the work accurately before charging the shell, so as to cause it to explode within a given time.

To prevent the work from starting before the shell is fired, I use a retaining-pawl, *U*, which is pivoted at *w* to one end of the plates *f*. Its end 3 is sprung into a countersink in the plate *f*, and is thus held stationary to prevent the fly *k* from turning, as represented at Figs. 1 and 2, and thus no motion of the clock-work can take place. The other end, *x*, of the pawl *U* is elevated above the plate *f*, and extends near to the plug *H* without touching the latter, but so as to be pressed upon by said plug when the charge of the gun is fired.

The operation of the shell is as follows: The shell being properly charged and the dial-plate having been set to the desired time, the cap *G* is removed from the nipple *F* and the gun is charged. When the gun is fired, the pressure of the charge causes the yielding plug *H* to press upon the arm *x* of the pawl *U*, and thus to disengage its arm 3 from the fly *k*, and the latter being set free, the action of the spring-barrel *L* starts the clock-work while the shell passes through the air, the parts being then in

the position represented in Figs. 2, 4, and 6. This motion of the clock-work continues until the end of the rod *q* has passed inside the hinged clasp-rod *s*, when the spring *N* will release the rod *M* from the rod *s*, and the former, by the action of the spring *R*, is withdrawn with great rapidity, the wire *P* is pulled, and the fulminating capsule *Q* is exploded, bringing the parts into the position represented at Fig. 5 and exploding the shell.

Having thus fully described the nature of my invention, what I claim herein as new, and desire to secure by Letters Patent, is—

1. Exploding a bomb-shell by means of a clock-work applied within said shell, substantially in the manner described.

2. Providing the clock-work used within a bomb-shell for exploding the same with a regulating apparatus, by means of which said clock-work can be set to explode the shell at a given time.

3. Starting the clock-work within a shell, and by which it is to be exploded by the action of the powder-charge which is used in firing the shell from the gun.

4. The combination of the clock-work movement with the rod *M* and the fulminating capsule for exploding the shell, substantially in the manner described.

5. The combination, with the clock-work and the exploding device within the shell, of the yielding plug *H*, by means of which the clock-work is set in motion by the firing of the shell, substantially as herein described.

FREDERIC TOGGENBURGER.

Witnesses:

ANDREW DIEZEL,
JOHANN GEYEN.