(No Model.)

M. VON FÖRSTER.

SHELL.

No. 385,332. Patented June 26, 1888.

Fig. 2.

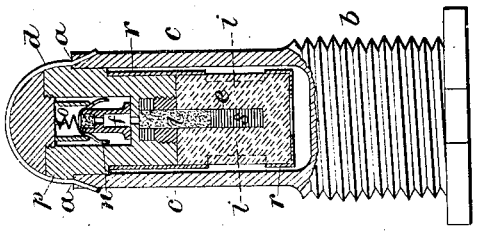
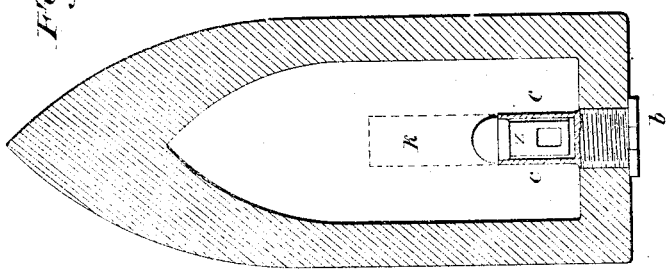


Fig. 1.



Witnesses:
Wm. A. Gaston

Inventor:
Max von Förster
by Marcellus Bailey
Attorney.

UNITED STATES PATENT OFFICE.

MAX VON FÖRSTER, OF BERLIN, GERMANY.

SHELL.

SPECIFICATION forming part of Letters Patent No. 385,332, dated June 26, 1888.

Application filed March 8, 1888. Serial No. 266,629. (No model.)

To all whom it may concern:

Be it known that I, MAX VON FÖRSTER, a subject of the King of Prussia, residing at Berlin, Prussia, Germany, have invented new and useful Improvements in Shells, whereof the following is a specification.

My invention relates to shells charged with a high explosive—such as humid gun-cotton, which for its detonation requires the detonation of an initial cartridge—the said shells being provided with a percussion-fuse; and its object is to prevent the shell from prematurely exploding during the handling and transporting and in the gun while being projected therefrom, and also to avoid an explosion of the shell from taking place by the mere impact of the same against its mark and before its having penetrated into the same. For this purpose the shell is provided inside with a tube rigidly connected therewith and open at its forward end. The fuse is lodged within this tube in such position that its initial cartridge is separated from the charge of the shell by the walls of the said tube, which are made of considerable strength. The fuse is secured in the tube by a fastening adapted to give way when, upon the shell striking against its mark, the fuse is impelled forward within the shell by its inertia, and a channel is provided in the charge of the shell opposite to the mouth of the tube, into which the fuse, after having broken its fastening, can fly, so that the initial cartridge on exploding will be in the requisite immediate contact with the charge. By these means the initial cartridge is prevented from causing the charge of the shell to explode in case it should itself accidentally explode within the said tube; moreover, the fuse is not immediately affected by the impact of the shell against a very hard mark, and the premature explosion of its detonating-cap (often produced by the said impact with the present constructions) is avoided. The fuse will, on the contrary, operate in a regular manner, any means contained therein for retarding the detonation of the cartridge will come duly into action, and the bursting-charge will be exploded with certainty at the proper moment.

On the annexed sheet of drawings, Figure 1 represents in sectional view a shell comprising my improvements, the tube *c*, containing the fuse, being inserted into the bottom of the shell. Fig. 2 is a section of the fuse and of the tube *c*, drawn to a larger scale.

The complete fuse employed in this case, and marked in Fig. 1 by the letter *z*, consists in the percussion-fuse *p f n o*, the detonating-cap *e*, containing, in addition to a fulminating compound, *s*, the column of gunpowder, *l*, serving to retard the explosion, and in the initial cartridge *i*, inclosed in the tube *r*, which is fixed to an extension of the case *p* of the percussion-fuse by means of screws, and which thus holds together the parts of the fuse *z*. The percussion-fuse comprises, in addition to the said case *p*, the piece *f*, containing the primer, the ring *o*, and the guard *n*, the latter being a small perforated disk having two resilient arms extending downward therefrom and flaring outward, the said guard being placed between the piece *f* and the ring *o*, and the parts being so arranged that normally the piece *f* will be kept down by the guard *n* and the ring *o*, whereas when the piece *f* is impelled forward, in consequence of the impact of the shell, it will draw the arms of the guard *n* into the ring *o* and strike with its primer against the pin at the top of the case *p*, whereby the primer is caused to detonate. In addition to the said guard, the drawings show a spiral spring placed on top of the piece *f*. The entire fuse, as described, does not, however, in itself, form any part of the invention which I claim, and fuses of different construction may be employed. Upon its portion containing the initial cartridge *i* the tube *r* is provided with apertures, through which the cartridge, on exploding at the proper time—*i. e.*, after the fuse has flown forward—may act with certainty on the charge of the shell. This complete fuse is inserted into the protecting tube *c*, integral with the screw-plug *b*, and it is placed therein in such position that the initial cartridge, instead of being turned toward the bursting-charge, as heretofore usual in all bottom fuses, is turned away from the said charge and completely separated from the same, on one hand by the walls of the tube *c*, and on the other hand by the case *p* of the percussion-fuse, the bursting-charge being thus secured against an accidental explosion if the cartridge should detonate within the tube *c*.

The fuse *z* is maintained in the tube *c* by means of a thin wire, *d*, having only such

strength that it will prevent a dislocation of the fuse during the transporting and the handling of the shell. The wire *d* is preferably detachably connected to the tube *c*, and extends over the fuse-head for retaining it normally in the said tube.

When the shell is fired from the gun, the fuse has, relatively to the driving-power of the powder-gases, under all circumstances the tendency to remain in the tube *c*, the same bearing with the offset *a* of its head against the upper edge of the tube. As soon, however, as the shell strikes against a sufficiently-resistant mark the fuse breaks the wire *d* and flies forward into the channel *k*, formed in the bursting-charge. Supposing that the material composing the charge has a certain degree of elasticity, as is the case with gun-cotton, the concussion produced by the fuse striking at the end of the channel *k* against the said material will be moderated, so that the detonating-cap *s* does not explode at once, whereas the percussion-fuse comes into action and by the flame of its primer ignites the column of powder, *l*, contained in the detonating-cap, the powder thereupon bringing about the explosion of the said cap and of the initial cartridge *i*, and the cartridge in its turn operating to detonate the bursting-charge, with which it is at the time in close communication. During the period in which the fuse *z* flies forward in the shell and the column of powder, *l*, burns down the shell has time to penetrate into its mark.

I claim as my invention—

1. In a shell, the combination, with the body of the shell and its bursting-charge, of the tube *c*, a percussion-fuse with initial cartridge *i*, inserted into the tube *c*, and means for fastening the fuse in the tube and adapted to give way when the fuse flies forward in consequence of the impact of the shell against its mark, the bursting-charge being provided on the prolongation of the tube *c* with a channel, *k*, substantially as and for the purpose specified.

2. In a shell, the combination, with the body of the shell and its bursting-charge, of the tube *c*, a percussion-fuse with initial cartridge *i*, inserted into the tube *c*, and the wire *d*, detachably connected to the tube *c* and extending over the fuse-head for retaining it normally in said tube, the bursting-charge being provided on the prolongation of the tube *c* with a channel, *k*, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

MAX VON FÖRSTER.

Witnesses:

HENRY SPRINGMAN,

B. ROI.