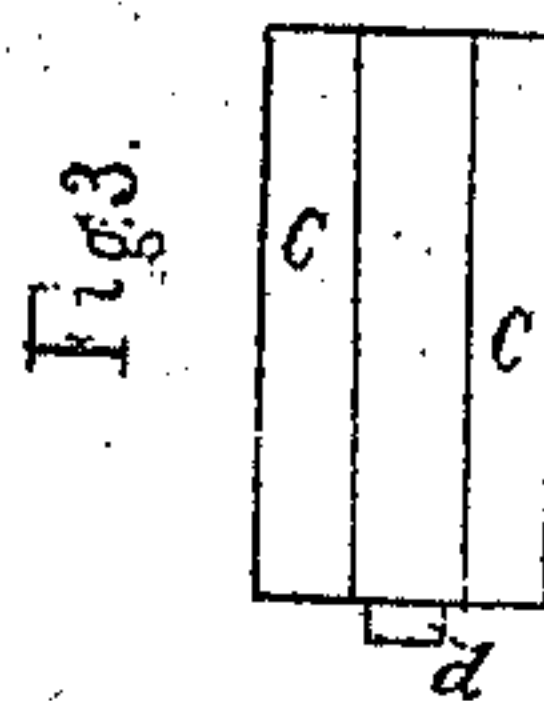
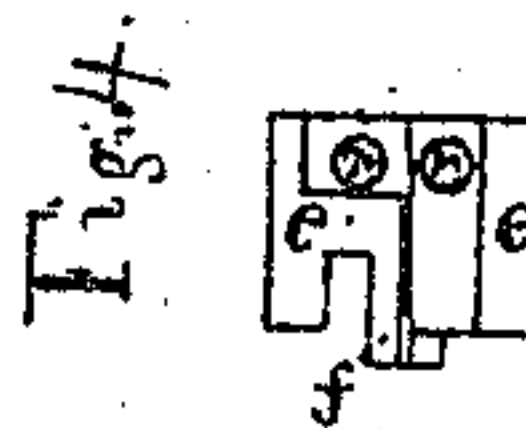
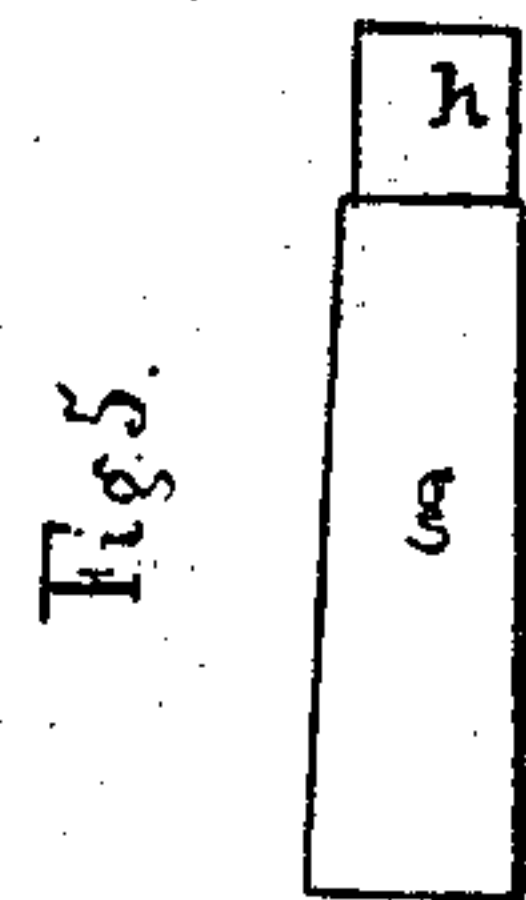
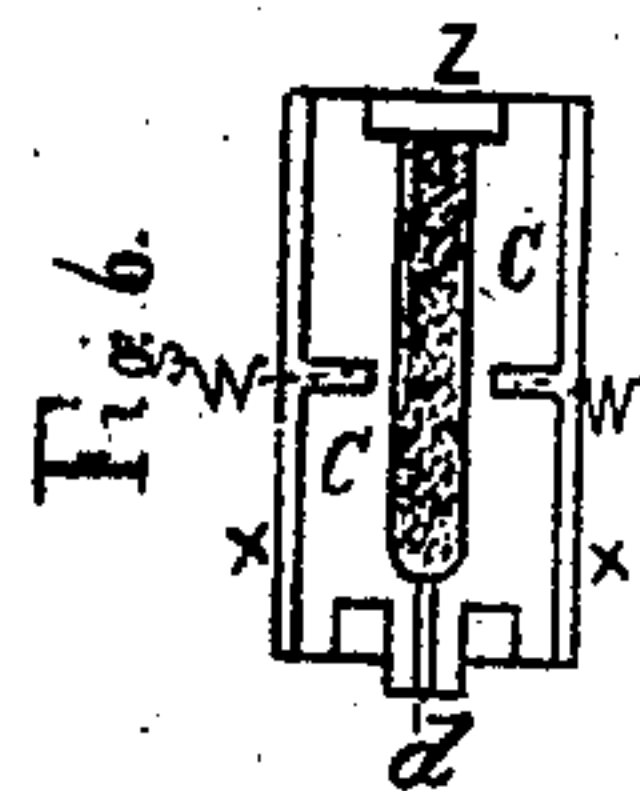
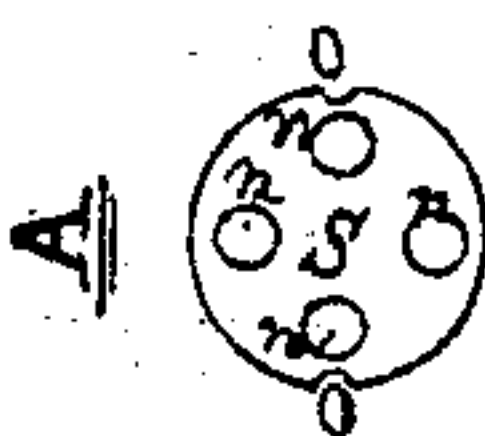
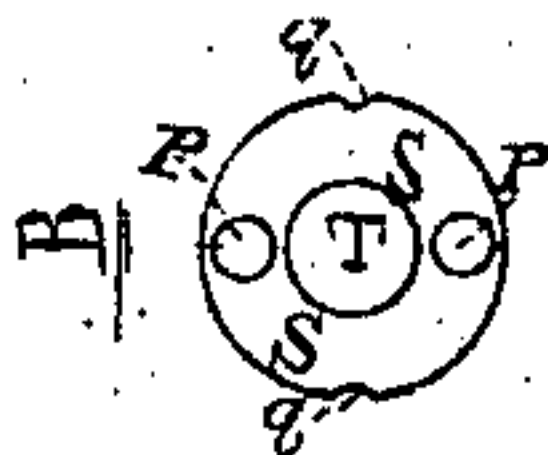
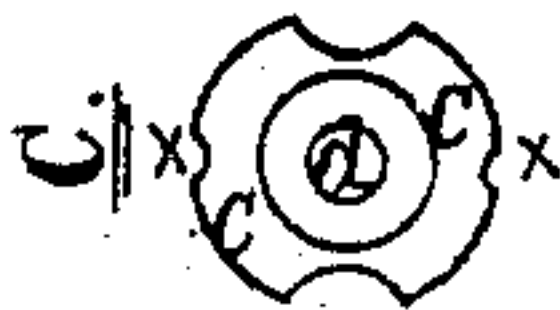
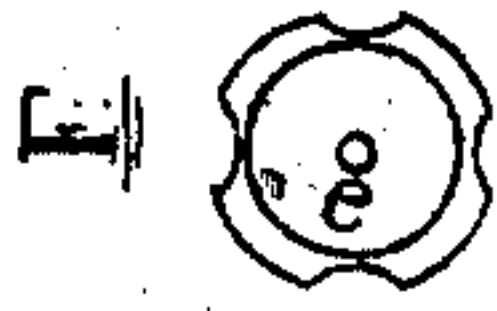
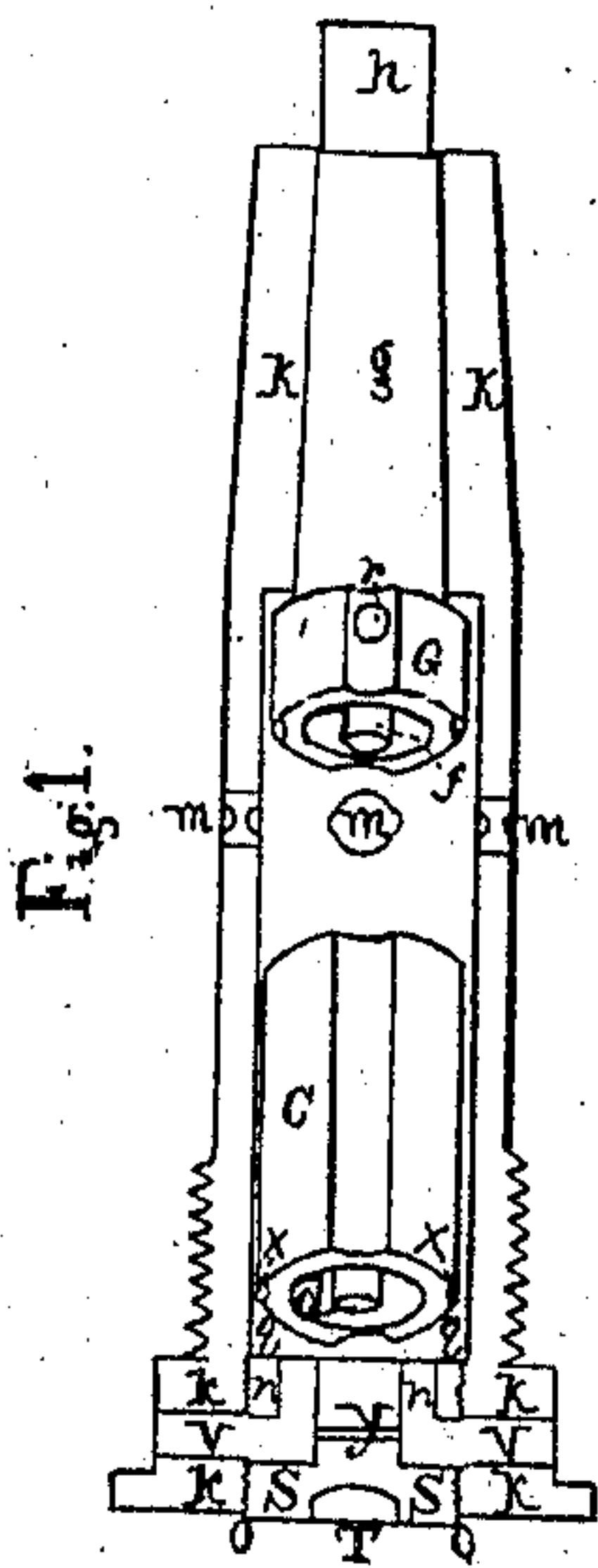
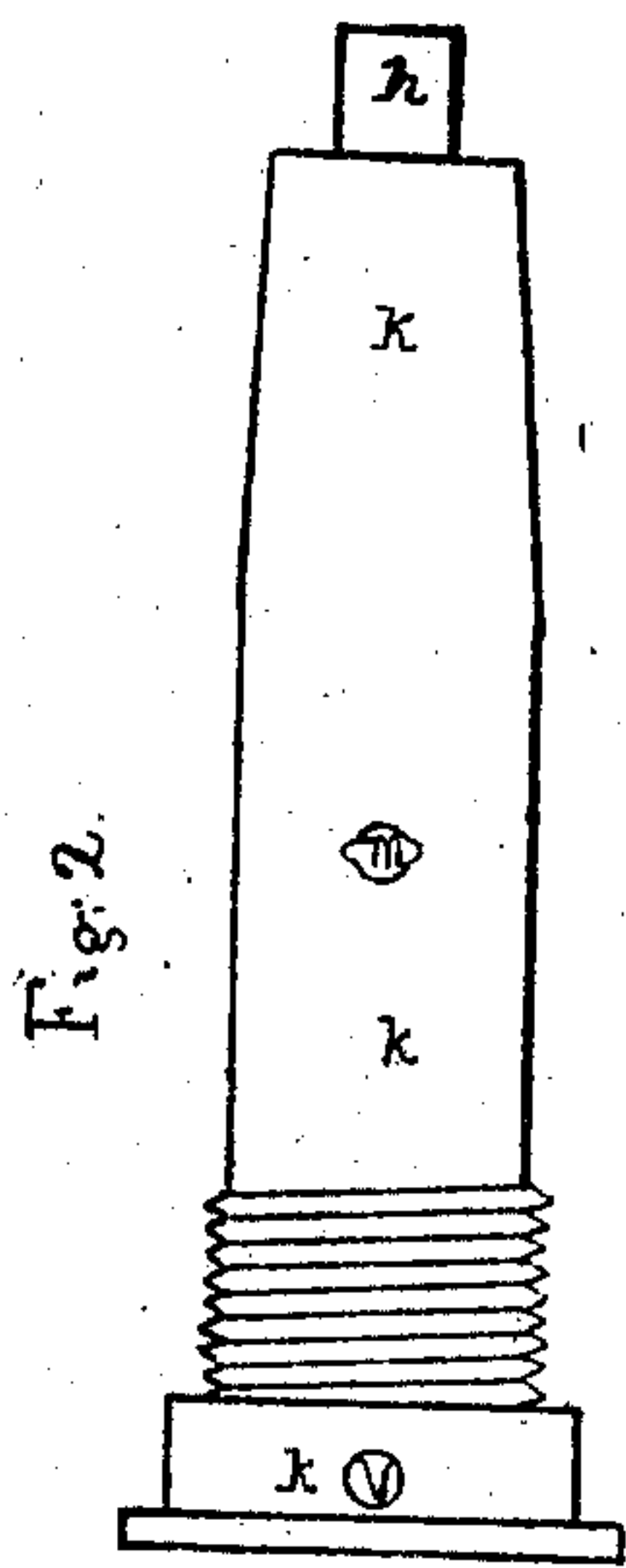


F. Alger, Shell Fuse.

No. 36553

Patented Sep. 30. 1862.



Causton & Brown
J. E. Maynard

Witnesses

Francis Alger

UNITED STATES PATENT OFFICE.

FRANCIS ALGER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN COMBINED TIME AND PERCUSSION FUSES FOR SHELLS.

Specification forming part of Letters Patent No. 36,553, dated September 30, 1862.

To all whom it may concern:

Be it known that I, FRANCIS ALGER, of Boston, in the county of Suffolk and State of Massachusetts, have invented a new and Improved Fuse for Shells, which I call "Alger's Time and Percussion Combination-Fuse;" and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, of which—

Figure 1 is a longitudinal section of the fuse-case *k* and its stopper *s*, showing the charged plunger *c* and the time-fuse *e g h* in perspective. Fig. 2 is a side view of the fuse complete; Fig. 3, a side view of the charged plunger *c*; Fig. 4, a side view, partly in section, of the head of the time-fuse, of which fuse Fig. 5 is a side view. Fig. 6 is a longitudinal section of the charged plunger. Figs. A and B are end views of the fuse-stopper *s*; Figs. C and D, views of the upper and lower ends of the charged plunger *c*; Figs. E and F, views of the upper and lower ends of the head of the time-fuse.

The same letters refer to like parts in the several figures.

My invention relates, first, to the use of a time-fuse in a percussion-shell, so as to combine the advantages of a shell exploded in a given time and one exploded by percussion. The best method of embodying this part of my invention I now proceed to describe.

I make my fuse-case as represented in Figs. 1 and 2, *k*, with a cylindrical bore the greater part of its length and a smaller conical bore the remainder. The fuse-case is closed by the stopper *s*, to be described more fully hereinafter. Below this stopper in the cylindrical bore of the fuse-case I place the charged plunger *c*, which I make small enough to move freely in the fuse-case. Below this plunger, its head in the cylindrical bore of the case, the remainder of it in the conical bore made to fit it, I place the time-fuse *e g h*, Figs. 1, 2, and 5. The charged plunger is held up near or in contact with the stopper by any suitable interior connection strong enough for the purpose, and not too strong to prevent its proper action on the discharge of the shell. When the shell is to be discharged, the stopper *s* must be secured in so that its plane surface, Fig. A, may be presented to the cap *d* of the plunger. The plunger will then be disconnected from the stopper, and its lower end will rest on the cap

f of the time-fuse, unless (as I prefer) the connection between the stopper and plunger is such that the plunger will retain its former situation; but whether it is connected or not, its inertia will, on the start of the shell, cause it to strike and explode the cap *f* of the time-fuse either by breaking or stretching its connection with the stopper or by a sudden pressure equivalent to a blow, if not so connected but in contact with the cap *f*. The explosion of this cap ignites the time-fuse. During the flight of the shell the charged plunger remains in contact with the cap of the time-fuse, or (perhaps) if an elastic connection is used, it returns again to its original position, and if the shell strikes before its time-fuse explodes it the inertia of the plunger causes its cap to strike the plane surface of the stopper *s* and thus be exploded. The plunger is charged with powder, which is exploded by the cap *d*, (see Fig. 6,) which explosion forces out the metallic cores *m m*, which fill small apertures bored in any suitable place in the fuse-case, leaving a passage for the flame through the fuse-case into the shell.

Having thus described the operation of my combination time and percussion fuse, I will now give a more particular description of the various parts.

The difference between the form of my fuse-case and that in ordinary use will be readily seen from the drawings, Figs. 1 and 2. The apertures *m m*, I prefer to make about an eighth of an inch below the lower end of the plunger, when its cap rests against the stopper, though the place shown in the drawings answers well; and it is of very little consequence where they are made, provided they are not so placed as to prevent the blowing out of their cores. The size of these apertures is not material. An eighth of an inch in diameter is perhaps the best. I prefer to make the outer and inner orifices of these apertures larger than their middle portions, in order that their cores may be securely held. The cores should be made of some metal that will not be loosened by the start of the shell, and should be so tight that no fire from the burning time-fuse can enter the shell through the apertures.

The time-fuse shown is the well-known "Alger's safety-fuse," with the addition of the head *e*, Figs. 4, E, and F. The lower surface of this head, Fig. F is bored out to receive

the larger end of the fuse, on which it is secured. I cut a number of longitudinal grooves (four in the drawings) on this head as passages for the escape of the fumes from the burning fuse composition, and as a further provision for this escape I bore holes *r r* in the lower part of the head. The best place for these holes is in the lower part of the grooves. This I regard as the simplest way of providing for this escape, though many other ways are obvious. On the upper surface of this head I put a nipple and cap *f*. Priming may be used, though I do not find it necessary.

The charged plunger *c* is bored out to contain a small quantity of powder. (I use six or ten grains for a shell for a six or twelve pounder.) This powder I confine by a core of metal, *z*, Fig. 6, which must be so closely fixed that the charge cannot be exploded by the flame from the time-fuse. The upper end of this plunger is made with a nipple and cap like the head *e*. I cut two longitudinal grooves on this plunger for the same purpose as the grooves on the head *e*, and two smaller grooves to receive the elastic cord with which I connect the stopper and plunger. (See figures.) At a suitable place in these smaller grooves I bore a hole of little depth to receive the ends of the elastic cord, which I prefer as a means of connecting the stopper and plunger.

The stopper *s* is a short cylinder of metal with a thread cut on its outer surface, so as to screw into and close the upper end of the fuse-case. It has a deep groove turned in it near the middle of its length, thus making it two disks of metal united by a core. Through one of these disks, the outer surface of which is left plane, holes *n n* are drilled, opening on the groove. (See Figs. 1 and A.) I cut small longitudinal grooves on the sides of this stopper to receive the cord which connects it with the plunger; and for the same purpose I bore a hole, *y*, through the center of the core which connects the two disks. A recess, *t*, is cut in the other face of the stopper deep enough and wide enough to prevent the cap *d* from striking its bottom or sides when that surface of the stopper rests against the upper surface of the plunger. The holes *p p* in this face of the stopper (see Fig. B) do not extend through to the groove in the stopper, but are bored deep enough to receive the ends of a piece of wire bent into a U shape, used for screwing and unscrewing the stopper. The elastic cord, holding the plunger up to the stopper, passes from the hole *w*, bored in the shallow groove *x* in the plunger, Fig. 6, up that groove into the groove, *q*, through the hole *y*, and down the other groove, *q*, (all in the stopper,) into and down the other shallow groove, *x*, in the plunger, and into the other hole, *w*, I secure the ends of this cord by a wedge of soft metal or wood. When the shell is to be transported,

some soft substance, such as paper or rubber, should be interposed between the time-fuse cap and plunger, and the recessed or safety surface of the stopper, Fig. B, should be presented to the plunger.

My invention relates, secondly, to freeing the fuse-case from the gases produced by the burning of the time-fuse. To effect this, I provide a free passage for those gases (by means of the holes and grooves in the head and plunger, as described) to the upper part of the fuse-case. Here they have free passage through the holes in the inner disk of the stopper, Figs. 1 and A, into the space between the disks. Holes *v v* are drilled through the upper rim of the fuse-case opening into this space. These holes are drilled on the side of this upper rim, and have a lip projecting over them, so that the passage of the shell through the atmosphere will make a partial vacuum around the mouths of the holes *v v*, and thus exhaust the interior of the fuse-case and free it from the greater part of the gases as fast as they are produced, so that the pressure of these gases on the burning fuse will never be greater than the ordinary atmospheric pressure. The arrangement shown is probably the best method of embodying this part of my invention, though it is plain that the number and place of the holes may be varied and the projecting lip dispensed with, and yet the same result be secured, though in a less degree than by the arrangement shown. The apertures, for instance, may be made through the upper part of the shell itself, or, if the stopper were lengthened so as to project above the rim of the fuse-case, through that.

I do not claim the combination of a time and percussion fuse in one fuse-plug as I am aware that this is not new. Nor do I claim constructing the rear end of the plunger-case or fuse-case in such manner that such rear end shall separate the plunger-chamber from the powder-charge of the shell, and on explosion of the charge of the plunger be broken away thereby, as that, I am aware, is not my invention; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in one fuse case or stock, of a charged plunger and a time percussion-fuse.

2. The apertures *v v*, substantially as and for the purpose specified.

3. The plugged holes *m m* through the sides of the fuse-case, for the purpose of transmitting fire to the interior of the shell, substantially as described.

FRANCIS ALGER.

Witnesses:

CONSTENT BROWNE,
J. E. MAYNADIER.