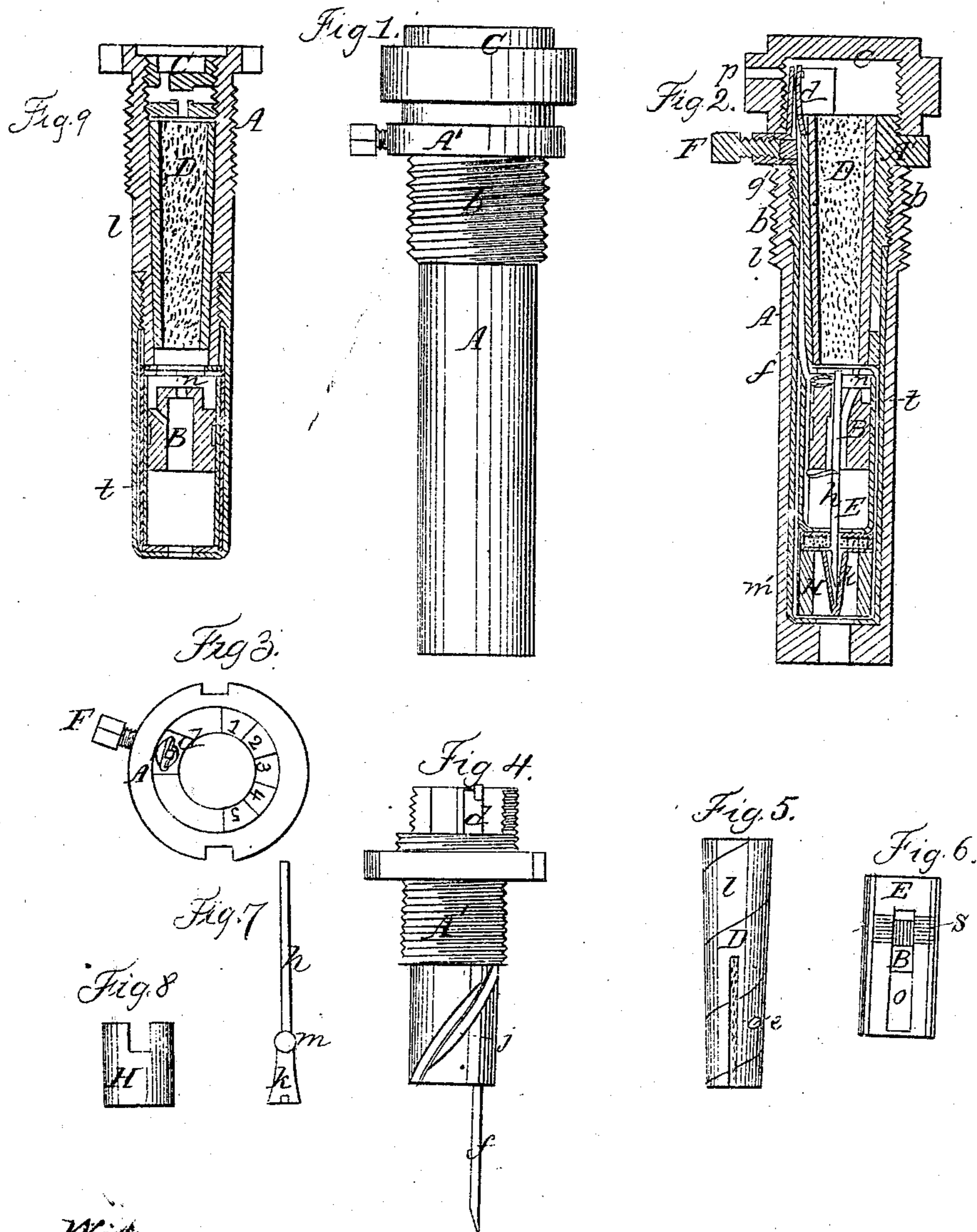


A. MERRYMAN.

Shell-Fuse.

No. 44,546

Patented Oct. 4, 1864.



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN COMBINED TIME, PERCUSSION, AND CONCUSSION FUSE.

Specification forming part of Letters Patent No. 44,546, dated October 4, 1864; antedated April 4, 1864.

*To all whom it may concern:*

Be it known that I, ANSON MERRIMAN, of the city, county, and State of New York, have invented certain new and useful Improvements in Fuses for Projectiles; and I do hereby declare that the following is a full, clear, and exact description of my said invention, reference being had to the accompanying drawings, in which—

Figure 1 represents an elevation of a compound time and contact fuse constructed according to my invention. Fig. 2 represents a vertical longitudinal section of the same. Fig. 3 represents a view of the outer end of the same with the cap removed. Fig. 4 represents a side view of the exterior fuse tube or case. Fig. 5 represents a side view of the inner fuse-tube. Fig. 6 represents a side view of the driver in its case; Fig. 7, a side view of the lower friction-primer, and Fig. 8 a side view of the socket-block of the primer. Fig. 9 represents a vertical section of a fuse embodying certain parts of my invention without others.

The object of my invention is to produce a fuse which may fire the bursting-charge at the end of a definite period, or will fire the charge when the projectile comes in contact with an obstacle.

The special object of the first part of my invention is to enable a friction-primer to be used to fire a time-fuse; and it consists in the combination of a friction-primer located at the outer extremity of a fuse-tube with a driver located at the inner extremity thereof, so that, although the driver has a sufficient space to move in, it does not interfere with the insertion and withdrawal of the time-fuse, or form a projection at the outer end of the fuse tube or case.

The special object of the second part of my invention is to enable a friction-primer to be used to fire the bursting-charge when the projectile strikes; and it consists of the combination of a friction-primer located at the inner end of a fuse-tube with a driver (to draw the wire of the primer) located nearer the outer end of the fuse tube or case.

The special object of the third part of my invention is to insure the firing of the bursting-charge upon the contact of the projectile with an obstacle, in case a friction or percus-

sion primer should not operate the firing of the bursting-charge; and it consists in combining the fuse-tube with a driver so formed and arranged that when it is moved outward in the fuse-tube by the jar incident to contact it will strike and displace the time-fuse, thereby permitting fire to pass round the time-fuse to the bursting-charge.

The special object of the fourth part of my invention is to afford an additional chance for the explosion of the bursting-charge of the projectile; and it consists in combining the fuse-tube with a driver and friction-primer, (or a driver operating to displace a time-fuse, or with a driver performing both of these functions,) and with a percussion-primer so arranged as to be struck by the movement of the driver in performing its primary function.

The special object of the fifth part of my invention is to increase the friction of a driver in its casing, so that the chance of its movement during the handling of the projectile previous to firing it will be diminished, if not wholly prevented. It consists of the combination of a grooved driver with a casing perforated at its side, so that the casing can be slightly indented opposite the groove of the driver to form a species of spring, and thereby oppose a greater resistance to the movement of the driver.

The fuse-case A, Figs. 1, 2, and 3 in the accompanying drawings, contains all the parts constituting the fuse. It is constructed with a screwed collar, *b*, to screw into the fuse-hole of the projectile, and with a screw-cap, C, which is perforated, as seen at *p*, to permit the gas generated by the burning of the fuse to escape.

The time-fuse D consists of a slow-burning composition contained in a case, *l*, which in this instance is supposed to be made of paper. As the fuse represented at Figs. 1 and 2 is a variable time-fuse, the time-fuse D is perforated at its side, and is surrounded by an outer tube or casing, also perforated.

In order that the fuse may embody the first part of my invention, a socket is formed in the outer end of the fuse-tube A', to receive a friction-primer, *d*, and the tube is perforated longitudinally to permit the wire *f* of this primer to pass inward to the driver B, which is arranged at the inner end of the time-fuse

D. The driver is perforated to permit the wire of the primer to pass through it, and before the projectile is fired the end of the wire projecting through the driver is bent down upon the inner end of the driver, as shown in red lines in Fig. 2, so that when the driver moves inward, it will drag the wire of the primer along with it. The driver is contained in a friction sleeve or case, E, which permits it to be moved by sufficient force in either direction, so that when the projectile is fired from the gun the inertia of the driver causes it to move back in its friction-sleeve and draw back the wire of the friction-primer *d*, thereby exploding the latter and firing the outer end of the time-fuse. As fire might possibly communicate from the outer end of the fuse D to the bursting-charge through the hole in the fuse-tube A' for the wire *f* of the primer, it is expedient to pack the wire, which is done in the present case by a piece of india-rubber, *g*, pressed into close contact with the wire by a screw, F.

In order that the fuse may embody the second part of my invention, a socket-block, H, is arranged at the inner end of the fuse-tube A' to receive a friction-primer, *k*, and the wire *h* of this primer is passed through a perforation in the driver B, (which is nearer the outer end of the fuse-tube,) and, before firing, the projecting end of this wire is bent down upon the outer end of the driver, as shown in red lines in Fig. 2; hence when the projectile strikes an object the momentum of the driver causes it to move forward in its friction-sleeve and drag the wire of the friction-primer *k* through it, thereby exploding the primer. The fire from this primer passes directly through a hole at the inner end of the fuse-case A into the cavity containing the bursting-charge of the projectile; and in order that there may be a surplus of fire generated by the primer, it is formed with a head, *m*, which is loaded with ordinary gunpowder. The socket-block H, surrounding the friction-primer, protects it from being injured by the backward movement of the driver B when the projectile starts in the gun.

In order that the fuse may embody the third part of my invention, the time-fuse case *l* is made conical, so that when it is moved outward in the fuse-tube A' a space will be left for the passage of fire between it and the surface of the cavity in which it is placed. Moreover, the outer end or head of the driver B is so formed that it can enter the lower end of the cavity in which the fuse is held and push it forward before the driver strikes the end of the cavity in which it moves; hence when the projectile comes in contact with an object whereby its motion is arrested, and the momentum of the driver causes it to move outward, the head of the driver strikes the inner end of the time-fuse and displaces it, thereby permitting the fire to pass from its outer end down its exterior to the bursting-charge within the cavity of the projectile and insuring the

firing of the bursting-charge in case the primer provided for that purpose fails to act.

In order that the fuse may embody the fourth part of my invention, a percussion-primer, *n*, in the form of a ring is arranged in the driver-cavity of the fuse in a position to be struck by the driver B when it is caused to move forward, so that there will be a probability of the bursting-charge being fired by the percussion-primer in case the friction-primer provided should fail to act, or in case fire should not pass round the fuse-tube when it is displaced.

In order that the fuse may embody the fifth part of my invention, the driver B has a groove formed in its periphery, and the friction-sleeve E is perforated, as shown at *o*, and indented, as at *s*, so that the indented portions act as springs, which oppose the movement of the driver sufficiently to obviate any risk of its movement by the handling to which projectiles are subjected before firing. Instead of grooving the driver, the friction-sleeve may be formed with one indentation at the outer end of the driver and another at its inner end, although I do not consider this so good a mode as the one represented of embodying this part of my invention. The friction-sleeve is maintained in its place by an outer casing, *t*, formed in two parts, which are slipped over it endwise in opposite directions, the one nearer the head of the fuse-tube forming the socket for the percussion-primer *n*.

The time-fuse case *l* is perforated with a slot, *e*, and the outer tube, A', is perforated with a helical slot, *j*; hence in whatever position the time fuse be set, by turning it within the range of its variation the two slots will always cross and afford a through communication at the point of crossing, and no particular care is required to set the time-fuse in an exact position. In order to enable the fuse to be set for time, the upper end of the case *l* is notched opposite the slot *e*, and the head to the fuse-tube A' is divided to form a dial, which is numbered with figures corresponding with the number of seconds the fuse must burn before the fire reaches the crossing-point of the two slots. In order that fire may pass from the time-fuse D or from the percussion-primer *n* to the bursting-charge, the driver B and the ends of the case in which its friction-sleeve is held are perforated, as shown at Fig. 2. The cavity in the socket-block H is also sufficiently large to permit the fire to pass around the friction-primer.

I have thus described a fuse embodying all parts of my invention, and such a fuse has three channels of firing the bursting-charge when the projectile strikes its object: first, by means of the friction-primer at its inner end; second, by the displacement of the time-fuse, and the consequent communication of fire from the outer end thereof; and, third, by the percussion primer. When the high cost of a large rifled projectile is considered, and the fact that it might wholly fail to injure an enemy if it did not explode upon striking

its object, the advantage of combining several distinct means of exploding it upon contact in a single fuse will be apparent, particularly as the cost of making such a combined fuse is but a trifle greater than the cost of a simple fuse when compared with the cost of a projectile. If, however, it be deemed expedient, one or more parts of my invention may be used without the others. An example of such a use is exhibited at Fig. 9, which represents a fuse embodying the third, fourth, and fifth parts of my invention. In this example the cap C of the fuse is constructed to screw into the fuse-tube, instead of upon it, as in Figs. 1 and 2.

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

1. The combination and arrangement, in a fuse, of a friction-primer (to fire the time-fuse composition) located at the outer end of the fuse-case, with a driver located at the inner end of said case, so that the former is outside of the time-fuse (when it is in place) and the latter is inside of it, substantially as set forth.

2. The combination and arrangement of a friction-primer located at the inner end of the

fuse-case (to fire the bursting-charge of the projectile) with a driver located nearer the outer end of the fuse-case, substantially as set forth.

3. The combination of the fuse-tube with a driver so constructed and arranged that it can displace the time-fuse when moved outward in the fuse tube or case.

4. The combination of the driver for operating a friction-primer (or for displacing the time-fuse) with a percussion-primer so arranged relatively to the driver that said percussion-primer may be exploded by the movement of the driver in performing its other function, substantially as set forth.

5. The combination of the driver with a friction casing or sleeve perforated and indented, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

ANSON MERRIMAN.

Witnesses:

THOMAS J. TINDALL,  
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