E. A. L. ROBERTS.

Electric Fuse.

No. 112,850. Patented March 21, 1871.

Fig. 1

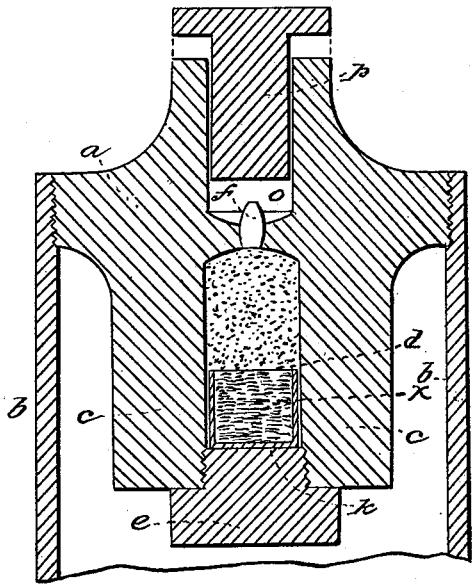


Fig. 3

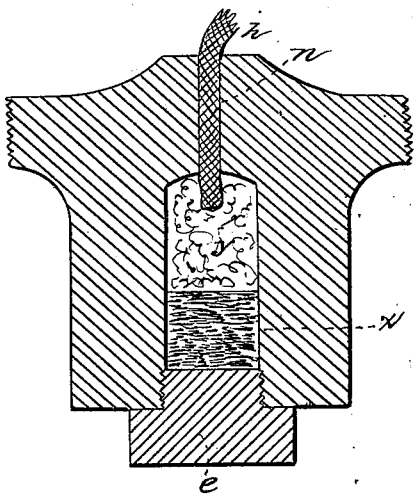
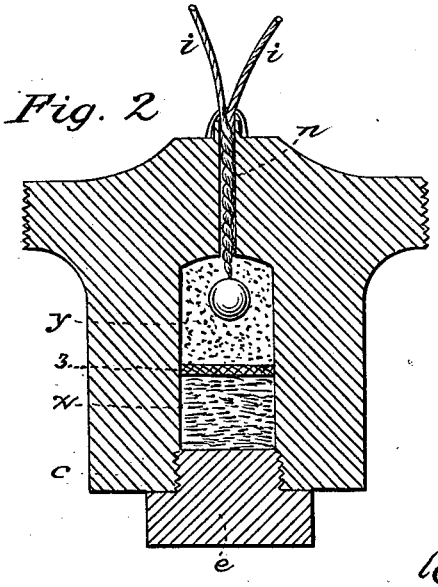


Fig. 2



Witnesses:

T. C. Brecht.

W. Bascewell.

Inventor:

E. A. L. Roberts

UNITED STATES PATENT OFFICE.

EDWARD A. L. ROBERTS, OF TITUSVILLE, PENNSYLVANIA.

IMPROVEMENT IN ELECTRIC AND OTHER FUSE HEADS.

Specification forming part of Letters Patent No. **112,850**, dated March 21, 1871.

To all whom it may concern:

Be it known that I, EDWARD A. L. ROBERTS, of Titusville, in the county of Crawford and State of Pennsylvania, have invented a new and useful Improvement in Electric and other Fuse Heads; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing.

Figure 1 is a sectional representation of my fuse-head adapted to firing with percussion-cap. Fig. 2 represents it as adapted to firing by means of electricity. Fig. 3 represents it as adapted to firing by means of a fuse.

My improvement is designed to facilitate and render more safe and certain the explosion of nitro-glycerine and its compounds, made by mixing therewith gypsum and other substances, granular or fibrous. These substances, although extremely powerful and energetic in their action when fired, are not readily exploded by the means and devices ordinarily used for firing gunpowder or gun-cotton.

The importance of the use of such an apparatus as I am about to describe arises from the fact that nitro-glycerine and its compounds will not, as far as is known, explode unless restrained or confined, and that for this purpose it is necessary to subject them to a high degree of heat and pressure.

The object of my invention is, therefore, to provide suitable means for generating within a small compass the requisite degree of heat and pressure to explode a comparatively minute portion of the explosive to be fired, which being accomplished the whole mass will be immediately involved in the explosion. By this means I avoid the necessity and escape the danger of employing fulminating and detonating substances which ignite so readily as greatly to increase the hazard of using nitro-glycerine and its compounds.

My improvement effects the ready explosion of nitro-glycerine and its compounds by placing together, without mixing, in a strong and tightly-closed priming-chamber, a small quantity of the more powerful and less easily-exploding substance, and a priming-charge of the weaker but more easily-exploding substance, (such as gunpowder or gun-cotton,) so that by firing the latter by means of a percussion-cap, fuse, or electric spark, sufficient heat and pressure may be obtained within the priming-chamber to explode the nitro-glycerine or compound, which, bursting the priming-chamber, acts in its turn with greatly-increased heat and pressure on the mass of nitro-glycerine or compound in the cartridge, torpedo, or shell, sufficient to effect an instantaneous and complete explosion thereof.

In the accompanying drawing, Fig. 1, *a* is the fuse-head, made of cast-iron, brass, or other suitable material. This fuse-head is made of any desired exterior shape, to suit the cartridge, shell, torpedo, or other case to or inside of which it is desired to apply it. It should be sufficiently heavy to afford great resistance within the limit of frangibility, and may be screwed or otherwise attached to the case containing the mass of explosive material to be fired, within which it is inserted.

In Fig. 1 it is represented as screwed into a cylindrical torpedo-shell, *b;* but various other modifications of attachment may be employed.

In that part *c* of the fuse-head *a* which enters the shell or case *b* is a priming chamber or cavity, *d*, which is closed at the lower end by a strong plug, *e*, made of iron or other suitable material, screwed into or otherwise securely attached to it.

The upper end of the fuse-head is perforated by a suitable aperture or apertures, *n*, merely sufficient to receive the nipple *f* or the electric wires *i i*, as shown in Fig. 2, or the fuse *h*, as shown in Fig. 3, as the case may be, according to the mode of firing which may be adopted.

In the lower part of the priming-chamber *d*, above the plug *e*, is placed a cup or vessel, *k*, made of tin or other thin metal, occupying about one-half in depth of the interior of the priming-chamber *d*, and nearly filling it diametrically. This cup holds the nitro-glycerine or nitro-glycerine compound *x*.

If fluid nitro-glycerine is used, the top of the cup may be covered by a thin membrane of bladder or other suitable material; or, instead of the cup, a thin glass bottle may be substituted, closed by a cork.

If a non-fluid compound of nitro-glycerine be employed, the cup may be dispensed with,

and a wad, *z*, used to separate the explosive from the powder or gun-cotton, as shown in Fig. 2; but the use of the cup is preferable, in order to prevent premature explosion by friction in screwing in the plug *e*.

Before the nitro-glycerine or nitro-glycerine compound *x* is inserted in the priming-chamber *d* the upper part is charged with gunpowder, gun-cotton, or other easily-explosive substance, *y*, which fills so much of the cavity as is not occupied by the nitro-glycerine or compound *x* and the plug *e*.

If the charge is to be exploded by means of a percussion-cap, the upper part of the priming-chamber has a nipple, *f*, inserted into it in the usual way, and projecting externally into a recess, *o*, in the exterior portion of the fuse-head *a*. In this recess is placed the hammer *p* or other mechanical device used for firing the percussion-cap.

If a fuse is to be used for firing the charge, it is introduced through the hole made for inserting the nipple *f;* or if electricity is to be employed, either static or voltaic, the wires *i i* are inserted, as shown in Fig. 2, into the upper part of the chamber *d* through the aperture *n*.

When the charge of gunpowder *y* in the chamber *d* is fired by any of the means above indicated, the gases generated at a high temperature cause such high degree of pressure and heat as to effect the instantaneous explosion of the nitro-glycerine or nitro-glycerine compound in the lower part of the chamber *d*, which bursts the fuse-head and discharges the heated gases into the explosive contained in the torpedo case or cartridge *b*, resulting in the immediate explosion of the whole mass.

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

The priming-chamber *d* in the fuse-head *a*, charged partly with a violent and not easily-exploding substance, such as nitro-glycerine or its compounds, and partly with gunpowder or other easily-exploding substance, communicating with an electric exploder or other means of firing, substantially as hereinbefore described.

E. A. L. ROBERTS.

Witnesses:
TAL. P. SHAFFNER,
T. C. BRECHT.