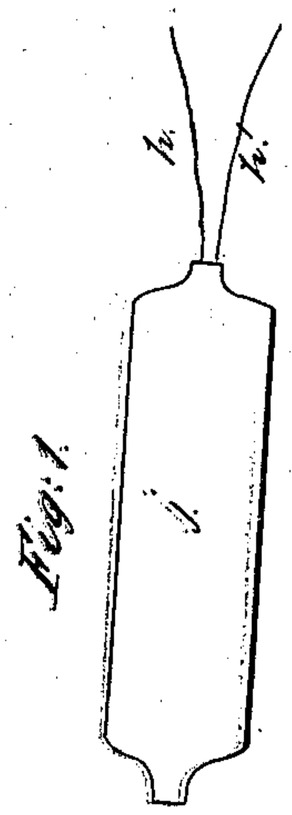
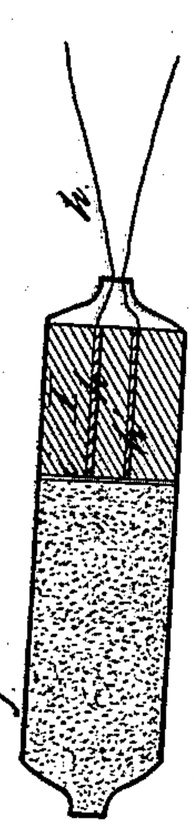
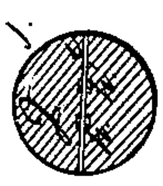
F. E. BEARDSLEE.

FIRING FUSES BY ELECTRICITY.

No. 39,542. Patented Aug. 18, 1863.







Witnesses.
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UNITED STATES PATENT OFFICE.

FREDERICK E. BEARDSLEE, OF COLLEGE POINT, NEW YORK.

IMPROVEMENT IN FIRING FUSES BY ELECTRICITY.

Specification forming part of Letters Patent No. **39,542**, dated August 18, 1863.

To all whom it may concern:

Be it known that I, FREDERICK E. BEARDSLEE, of College Point, Long Island, in the State of New York, have invented a new and useful Method of Firing Charges of Powder; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is an elevation of a fuse on my improved plan; Fig. 2, a longitudinal section, and Fig. 3 a cross-section.

The same letters indicate like parts in all the figures.

My said invention relates to a fuse by which charges of powder, wherever desired, may be fired by a current of electricity.

It is well known that powder and other explosive substances may be and have been exploded by electric currents. The most approved mode heretofore known is by currents of electricity generated by the galvanic battery and transmitted by suitable conductors to the point desired and there united by a very fine short iron or platina wire or foil placed within a cartridge or other case containing powder. By passing such a current of electricity of sufficient volume through the conductors the small wire or foil becomes heated to a sufficient degree to ignite the powder. But to induce in the small connecting wire or foil a degree of heat sufficient to ignite gunpowder considerable time as well as a large volume of electric current are required to produce such an effect, even at so short a distance as one mile. Currents of intensity which could be transmitted by small conductors would not produce sufficient heat to ignite gunpowder. The length of time required to induce the required high degree of heat, as well as the use of a galvanic battery and large conductors, are serious objections.

Magneto-electric currents have been used to explode powder which can be ignited at a low degree of heat, and known as "percussion" or "fulminating" powder; but the use of such powder is attended with great risk. Notwithstanding such danger, however, it is the most approved mode heretofore practiced for war and mining purposes.

Another mode which has been suggested and applied is to use what is called the "Ruhmkorff coil," by which an electric spark is made to jump from the point of one conductor to another within a cartridge to ignite the contained charge of powder; but this method requires insulation of the conductors to such a degree of thickness that in practice it has not succeeded well.

With the fuse which constitutes my said invention I avoid all the above objection, as with it I am enabled instantly to ignite gunpowder by slightly-intense currents induced by a magneto-electric machine or battery, preferring the former for obvious reasons. I have discovered, however, that if the extremities of two metallic conductors be connected by what may be termed a "feeble conductor," composed of fine particles in close proximity—such, for instance, as a mark made with a good plumbago pencil on a block of wood, and extending from one of the metallic conductors to the other—the passage of a slightly-intense current through such feeble conductor will be attended with an instantaneous emission of intense heat or flash which will ignite gunpowder.

In view of this, my invention consists in forming a fuse for igniting powder by connecting the ends of two metallic conductors by means of a feeble conductor composed of fine particles of some conducting substance in contact, or nearly in contact, with the charge of powder, or separated therefrom by some equally combustible substance.

In the accompanying drawings, *g* represents a block of wood, which I term the "holder," and into which are inserted two copper wires, *h h'*, of about No. 16 wire gage, and about three-sixteenths of an inch apart from center to center. The edges of the extreme ends of the wires should be completely in contact with the wood. The other end of the wires are left to project from the block to a sufficient length for the purpose of forming a connection with a magneto-electric machine or battery.

The feeble conductor connecting the extreme end of the two copper wires *h h'* I prefer to make by a mark, *i*, on the end of the holder extending from one wire to the other, and made with a pencil of the softest and purest plumbago.

The holder is surrounded with paper extending sufficiently beyond the end of the

holder to form a small case, *j*, to hold a small charge of powder in contact with the feeble conductor, preferring for this purpose meal-powder. When a current of electricity is induced in passing through the plumbago mark or equivalent feeble conductor, it will produce a flash of intense heat, which will instantly ignite the contained charge of powder.

To protect the ends of the conducting-wires *h h'* and the plumbago line from oxidation and injury, they may be coated with collodion or other equivalent substance. Fuses made on this plan may be used for firing torpedoes and mines, charges for blasting rocks, and charges of powder in general.

When but one fuse is required to be fired at a time I have found bass-wood and the substance known as the "hard compound of vulcanized india-rubber" to answer a good purpose for making the holder; but when it is desired to fire several at the same, or nearly the same, instant of time, and all connected in one electric circuit, it will be best to make the holders of some non-conducting substance which is not combustible, such as glass, ivory, bone, &c.

As for the feeble conductor connecting the two conducting-wires *h h'*, I have found a mark made with a plumbago pencil best adapted to the purpose; but I do not wish to be understood as limiting my claim of invention to the use thereof, as other substances may be substituted to make the feeble conductor—such, for instance, as a conducting substance in a fine pulverized state—and so connected as to form a line extending from one of the conducting-wires to the other, or a mark made upon some non-conducting substance by any conducting material which will disintegrate in marking.

What I claim as my invention in fuses for igniting charges of powder by currents of electricity is—

Connecting the two conducting-wires by a feeble conductor, substantially such as herein described, and placed in contact with or in close proximity to the powder, substantially as set forth.

F. E. BEARDSLEE.

Witnesses:
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