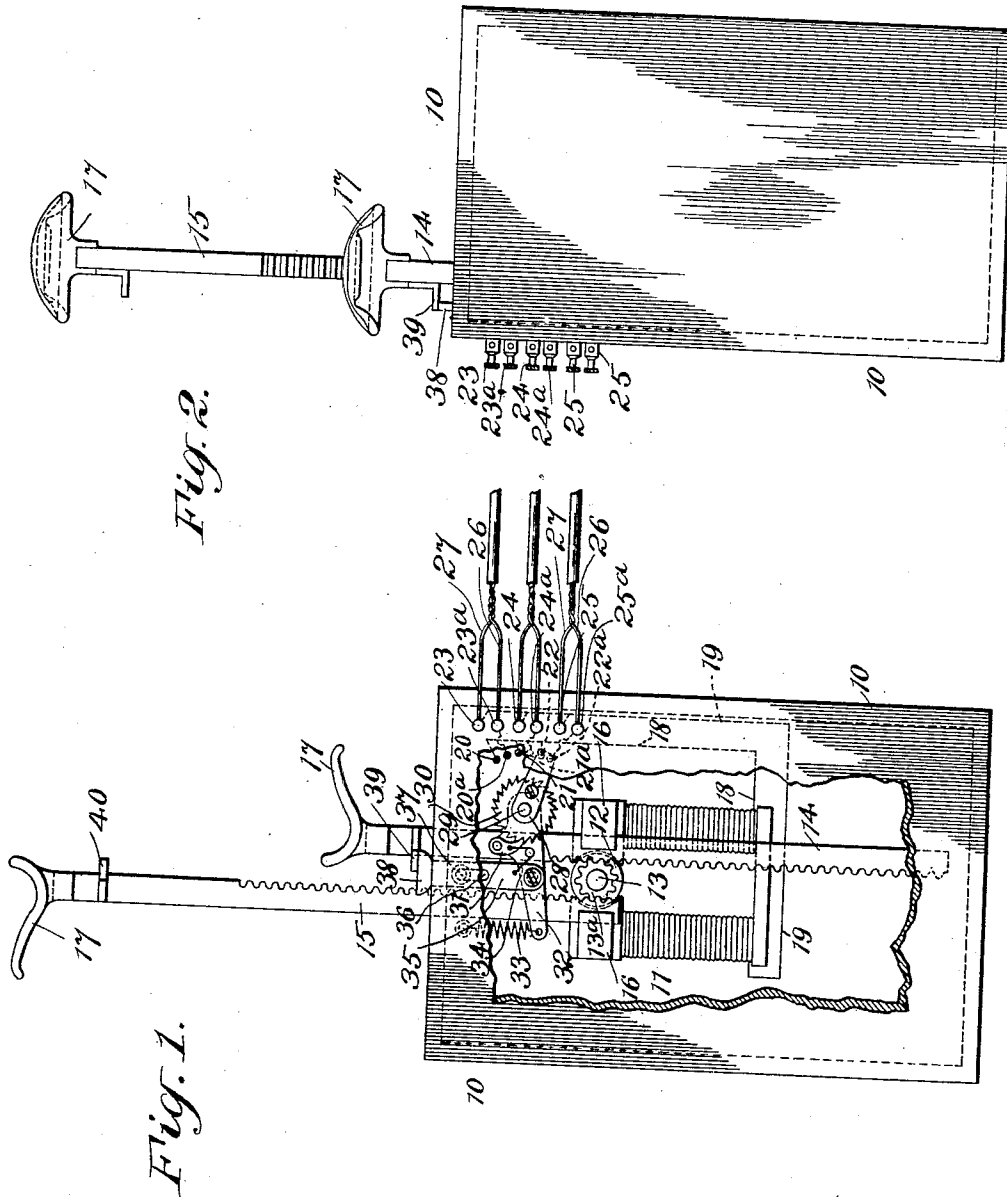


A. E. PORTER & E. P. SEARING.
M. LE F. PORTER, ADMINISTRATRIX OF A. E. PORTER, DEC'D.
FUSE BATTERY.
APPLICATION FILED JAN. 27, 1909.

972,141.

Patented Oct. 4, 1910.
2 SHEETS—SHEET 1.



Witnesses:
Wm. J. Chipman
C. Bartels

Inventor
A. E. Porter
E. P. Searing
By his Attorneys
Criswell & Criswell

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Fig. 3.

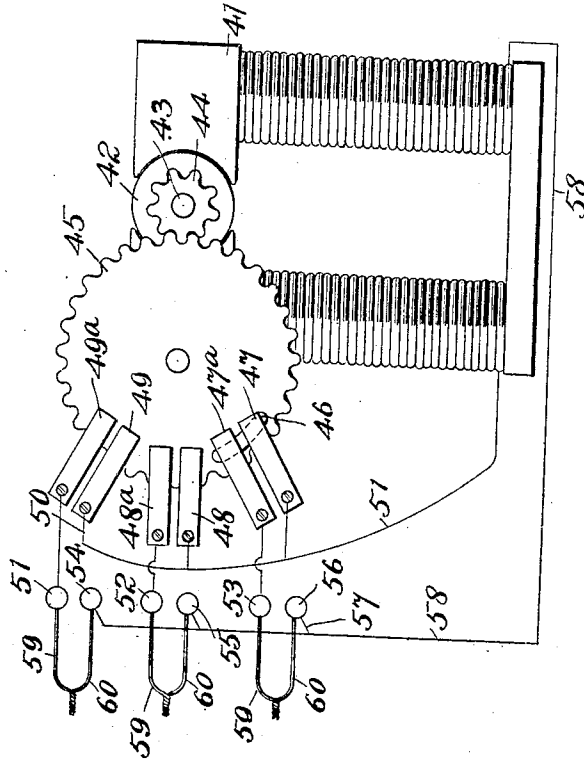


Fig. 4.

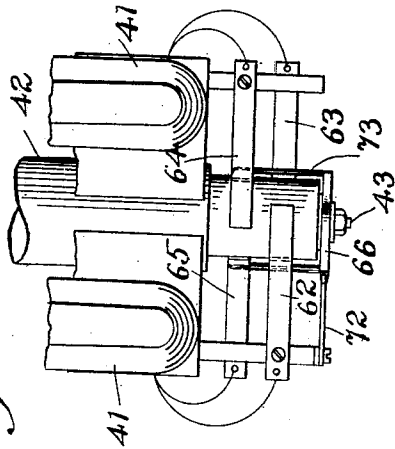
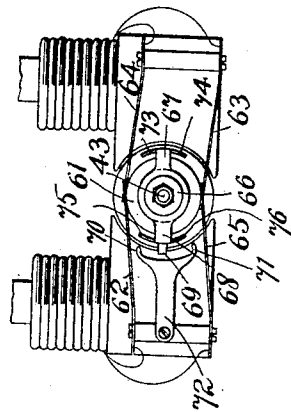


Fig. 5.



Witnesses:
Wm J. Chipman
C. Bartels.

Inventor
A. E. Porter.
E. P. Searing
By his Attorneys
Quiswell & Quiswell.

UNITED STATES PATENT OFFICE.

ALONZO E. PORTER, OF POMPTON LAKES, NEW JERSEY, AND EUGENE P. SEARING, OF NEW YORK, N. Y.; SAID SEARING ASSIGNOR OF ONE-FOURTH TO SAID PORTER; MARY LE FEVRE PORTER ADMINISTRATRIX OF SAID ALONZO E. PORTER, DECEASED.

FUSE-BATTERY.

972,141.

Specification of Letters Patent.

Patented Oct. 4, 1910.

Application filed January 27, 1909. Serial No. 474,559.

To all whom it may concern:

Be it known that we, ALONZO E. PORTER, a citizen of the United States, and a resident of Pompton Lakes, county of Passaic, and State of New Jersey, and EUGENE P. SEARING, a citizen of the United States, and a resident of New York, county and State of New York, have invented certain new and useful Improvements in Fuse-Batteries, of which the following is a full, clear, and exact description.

This invention relates more particularly to a battery adapted to automatically complete the circuit in sequence through a number of fuses to explode the same.

In practice, and particularly for blasting purposes, it is necessary or desirable that the fuses be fired in sequence so that the various explosions may be noted to prevent accident should one of the fuses fail to fire and explode while being examined by the workman or for other reasons. To effect the firing in sequence, it is usual to make the fuses of different lengths and different delay action so that it will take longer for one to be fired than another and in this way prevent two of the same from exploding at the same time. This requires fuses to be differently constructed, and thereby involves additional expense and liability to confusion by reason of the different fuses necessary to produce the firing in sequence.

The primary object of the invention is to avoid the objectionable features referred to and to provide a simple and efficient device which may be employed in connection with standard fuses all similarly constructed, and which may be so connected to the device that the electric circuit may be completed to cause fuses to be fired in sequence and at sufficient intervals apart that each explosion may be noted so that accidents are not likely to result by failure of the firing of one or more fuses.

Another object of the invention is to provide a simple and efficient device which may be located at any desired point away from the fuses to be fired, and which may be so constructed that it will generate sufficient current to fire the fuses.

A further object of the invention is to provide a simple device which may be manually operated, and in which the mechanism

carried thereby may be operated by either or both hands.

With these and other objects in view, the invention will be hereinafter more particularly described with reference to the accompanying drawings, which form a part of this specification, and will then be pointed out in the claims at the end of the description.

In the drawings, Figure 1 is a front elevation, partly broken away, of one form of device embodying our invention. Fig. 2 is a side elevation of the device. Fig. 3 shows an elevation, partly diagrammatic, of different means for firing the fuses in sequence. Fig. 4 is a fragmentary plan view of a part of the generator shown in Fig. 5; and Fig. 5 is a fragmentary front elevation of the form of generator shown in Fig. 4.

The casing 10 may be of any suitable material and of any desired form, and mounted within the casing in any desired way is a suitable generator 11. This generator may be of the usual form of magneto in which sufficient current is generated to fire a fuse or similar device, and said generator may have either a permanent magnetic field or an induced magnetic field. As shown the generator 11 has an armature 12, and on the shaft 13 of said armature is a pinion 13^a, and this pinion is adapted to engage rack bars or devices 14 and 15, though instead of there being two rack bars or devices only one may be employed if desired. Each rack bar or device has its teeth in mesh with the pinion 12 and is guided at one end in a bracket 16, and extends outwardly through the casing 10 and is provided on the outer end thereof with a suitable handle 17 by which each bar or device may be reciprocated. By this means the shaft 13 is doubly driven and is moved first in one direction and then in the opposite direction, and by providing two devices 14 and 15 a quick and powerful movement may be imparted to the shaft 13 as one arm will serve to push and the other pull on said devices.

A wire or connection 18 leads from one side of the generator, and a second wire 19 leads from the other side of the generator, and the wire 18 connects with the contacts 20, 21, and 22. The contacts 20^a, 21^a, and 22^a respectively are electrically connected to

the binding posts 23^a, 24^a, and 25^a, while the binding posts 23, 24, and 25 are connected to the wire 19. The contacts and binding posts are arranged in pairs so that when the circuit is completed through any pair of contacts, as will be presently described, the circuit will also be completed through its corresponding set of binding posts. A wire 26 leads from one of each pair of binding posts, and a wire 27 from the other binding post of each pair, and these wires 26 and 27 are so connected to a fuse that when the circuit is completed, the fuse will be fired and an explosion take place, there being as many pairs of binding posts and corresponding pairs of contacts as desired according to the number of fuses which are to be fired in sequence by the battery.

To complete the circuit through each pair of contacts, we arrange said contacts in the arc of a circle and provide an arm or contact maker 28 which is adapted to successively move and engage the contacts and bridge the space between the contacts of each pair. The arm 28 is held to a shaft 29, and on said shaft is a ratchet wheel 30 which is adapted to be engaged by a pawl 31 carried by an independently movable arm or lever 32. This lever 32 is pivotally held on the shaft 29, and is normally forced in one direction by a spring 33, the said pawl being normally forced into engagement with the teeth of the ratchet wheel 30 by means of a spring 34. A bar or device 35 is pivoted at one end to the lever 32, and said arm has a slot, as at 36, through which passes a pin or bolt 37 to guide said bar, and on the outer end of said bar is an engaging part 38 which is adapted to be engaged successively by a lug or projection 39 on the rack bar or device 14, and by a lug or projection 40 carried by the rack bar or device 15. As will be seen when the device 14 is forced in one direction, the device 15 will be forced in the opposite direction, and at each inward movement of said devices 14 and 15 the shaft 13 of the generator will be rotated to generate sufficient current to fire the fuses, and the lugs or projections will engage the bar 35 and force the same downward thereby causing the pawl 31 to engage the teeth of the ratchet wheel 30 and intermittently rotate the arm 28 to complete the circuit through the next set of contacts and so on through the series, the bar 35 being forced into engaging position by means of the spring 33, thus each fuse will be properly fired and the fuses of the entire set or series will be fired in sequence.

In Figs. 3 to 5 different means are shown for completing the circuit through the contacts, and in this case a generator with an induced magnetic field is provided, though, of course, any form of magneto may be employed and any suitable source of electric

current may be used instead of forming the generator as a part of the device. As shown the generator has the magnets 41 and an armature 42 which may be rotated by a crank or by a rack as desired, and on the shaft 43 of the armature is a pinion 44 which meshes with the gear 45. The gear 45 is provided with a contact brush or device 46 which is adapted to successively span and complete the circuit between the pairs of contacts 47, 47^a, 48, 48^a, 49 and 49^a. The contacts 47, 48 and 49 may be connected to a wire or connection 50 leading to the generator, and the contact members 47^a, 48^a and 49^a, of each pair may be connected to the binding posts 51, 52 and 53 respectively. The binding posts 54, 55 and 56 are connected by the wires 57 to a wire or connection 58 leading to the generator. Each pair of binding posts has wires 59 and 60 leading therefrom and which are so connected to the fuse that when the circuit is completed therethrough the fuse will be properly fired. As will be seen when the shaft 43 is rotated either by the mechanism shown in Figs. 1 and 2, or by a crank or otherwise the contact 46 carried by the gear 45 will successively complete the circuit through each pair or set of contacts, and will successively fire the fuses connected therewith.

The generator may have its commutator 61 engaged by brushes 62, 63, 64, and 65. A device 66 is frictionally held to the armature shaft 43, and this device is provided with outwardly extending arms 67 and 68, one arm of which is provided with a lug 69 and is adapted to engage the ends 70 and 71 of a fixed device or bracket 72. This device 66 has brush-lifting means, as projections 73 and 74 on the arm 67, and projections 75 and 76 on the arm 68. This device 66 is adapted to move with the shaft of the armature a certain distance according to the distance between the ends or stops 70 and 71, and when moved in one direction with the armature, the brushes 62 and 63 will be forced from the commutator by the projections 74 and 75 and when the armature is moved in the opposite direction, the brushes 64 and 65 will be forced from the commutator by means of the projections 73 and 76 carried by the device 66, thus causing the current to flow in the same direction as is common in this class of generator in which the said generator is provided with an induced magnetic field.

The term "fuse" or "fuze" is used in its broadest sense to include any device which may cause an explosive substance to be fired.

From the foregoing it will be seen that a simple and efficient device is provided whereby a plurality of standard fuses may be fired in sequence; that said means is adapted to generate its own current; that simple means are provided for completing

the circuit leading to the different fuses, and that simple operating mechanism is provided whereby the desired speed and a powerful action may be obtained to generate the necessary current and to operate the circuit completing means.

Having thus described our invention, we claim as new and desire to secure by Letters Patent:—

1. A device of the character described, comprising a casing, a generator supported within the said casing, a plurality of contacts arranged in pairs, each pair adapted to be connected to a fuse, an electric circuit including the generator and contacts, an arm to complete the circuit through each pair of contacts in sequence, and means for operating the arm with a step-by-step movement and for operating the generator to produce the current.

2. A device of the character described, comprising a casing, a plurality of contacts arranged in pairs, an electric circuit, means whereby connections may be made from each pair of contacts to a fuse, an arm adapted to successively engage and complete the circuit through each pair of contacts, a ratchet wheel carrying the arm, a pawl engaging the ratchet wheel, a lever carrying said pawl, a spring for holding the pawl against the teeth of the ratchet wheel, a spring for normally forcing the lever in one direction, a bar pivotally held to the lever at one end and having engaging means at the other end, and two vertically movable devices having handles at one end and provided with means adapted to engage the bar at each inward movement to move the lever and rotate the ratchet wheel and arm carried thereby.

3. A device of the character described, comprising a casing, a plurality of contacts arranged in pairs, an electric circuit, means whereby connections may be made from each pair of contacts to a fuse, an arm adapted to successively engage and complete the circuit through each pair of contacts, a ratchet wheel for moving the arm, two oppositely movable devices, and means coöperating with said devices to rotate the ratchet wheel.

4. A device of the character described, comprising a plurality of contacts, an electric circuit, means whereby independent connections may be made from the contacts to independent fuses, means adapted to successively engage and complete the circuit through the contacts, two reciprocatory de-

vices, and means coöperating therewith to operate the circuit completing means.

5. A device of the character described, comprising a casing, a plurality of contacts arranged in pairs, an electric circuit, means whereby connections may be made from each pair of contacts to a fuse, an arm adapted to successively engage and complete the circuit through each pair of contacts, a ratchet wheel carrying the arm, a pawl engaging the ratchet wheel, a lever carrying said pawl, a spring normally forcing the lever in one direction, and two oppositely movable devices having handles at one end, and means operated by said devices at each inward movement to move the lever and rotate the ratchet wheel and arm carried thereby.

6. A device of the character described, comprising a plurality of contacts, an electric circuit, means whereby connections may be made from the contacts to independent fuses, an arm adapted to successively engage and complete the circuit through the contacts, a lever, means coöperating with the lever to move the arm, a bar pivotally held to the lever at one end and having engaging means at the other end, and two oppositely and vertically movable devices having handles at one end and provided with means adapted to engage the bar at each inward movement to move the lever and arm carried thereby.

7. A device of the character described, comprising a casing, a plurality of contacts arranged in pairs, an electric circuit, means whereby connections may be made from each pair of contacts to a fuse, an arm adapted to successively engage and complete the circuit through each pair of contacts, a lever, a spring normally forcing the lever in one direction, means coöperating with the lever to move the arm, a bar pivotally held to the lever at one end and having engaging means at the other end, and two oppositely movable devices provided with means adapted to engage the bar at each inward movement to move the lever and rotate the ratchet wheel and arm carried thereby.

This specification signed and witnessed this 23rd day of January A. D. 1909.

ALONZO E. PORTER.
EUGENE P. SEARING.

Witnesses:

W. A. TOWNER, Jr.,
M. COOKE.