J. H. STRIEDINGER & A. DOERFLINGER.

MULTIPLE CIRCUIT-CLOSER FOR ELECTRIC CIRCUITS.

No. 185,841. Patented Jan. 2, 1877.

Fig: 1

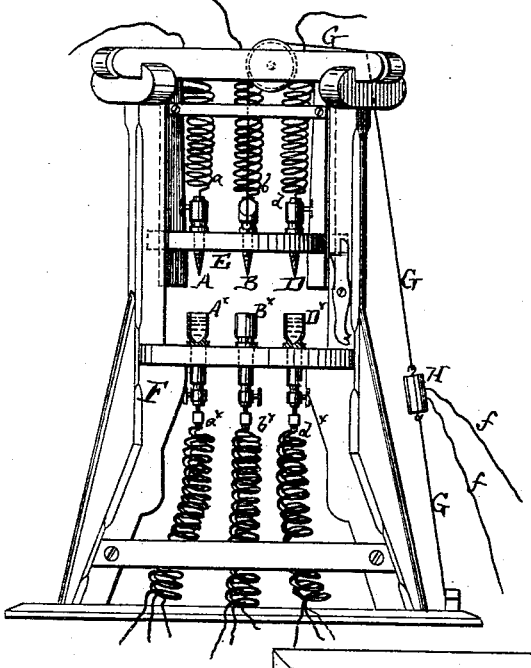


Fig: 2

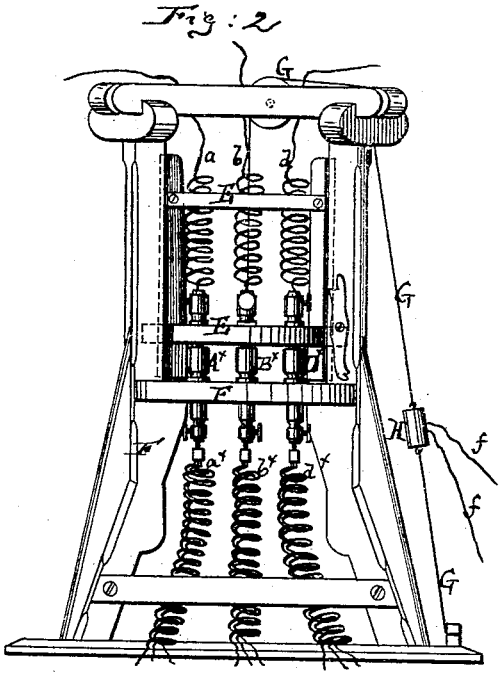


Fig: 3

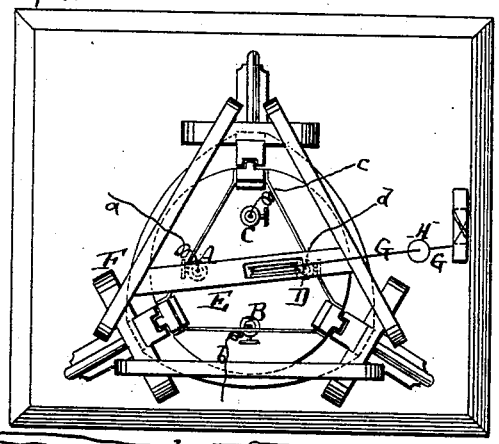
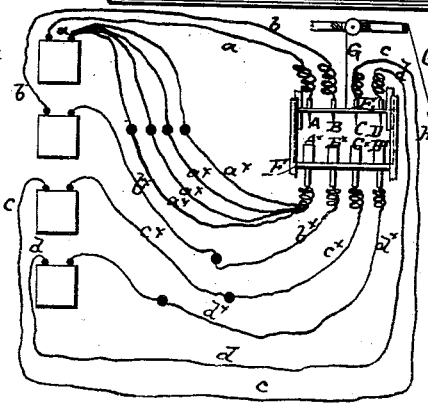


Fig: 4



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UNITED STATES PATENT OFFICE.

JULIUS H. STRIEDINGER, OF NEW YORK, AND AUGUST DOERFLINGER, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN MULTIPLE CIRCUIT-CLOSERS FOR ELECTRIC CIRCUITS.

Specification forming part of Letters Patent No. **185,841**, dated January 2, 1877; application filed November 24, 1876.

To all whom it may concern:

Be it known that we, JULIUS H. STRIEDINGER, of New York city, in the county and State of New York, and AUGUST DOERFLINGER, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Multiple Circuit-Closer for Electric Circuits, of which the following is a specification:

Figure 1 is a side elevation of our improved circuit-closer, showing it opened. Fig. 2 is a similar view thereof, showing it closed. Fig. 3 is a top view thereof. Fig. 4 is a diagram, showing the arrangement of the instrument with reference to the batteries and actuating-circuit.

Similar letters of reference indicate corresponding parts in all the figures.

This invention has for its object to insure the simultaneous closing of a series of electric circuits, and the instantaneous firing of a series of mines that are placed in said circuits.

The invention was originally devised for and practically used at the destruction of Hallett's Point Reef, in the harbor of New York, September 24, 1876. At this work our circuit-closer was successfully employed to simultaneously close the circuits of all the conductors that led to the cartridges, by which the explosion was effected.

Our invention consists principally in connecting the wires from a series of batteries to a drop bar or plate, which is suspended over a platform containing a series of cups, so that when the bar or plate is dropped it will cause the ends of the upper wires to enter said cups, and thus to simultaneously close all the circuits.

Our invention also consists in holding said drop-bar suspended, or, in other words, in holding the circuits open by means of a cartridge, which is placed into a separate actuating-circuit. When this circuit is closed the said cartridge is exploded, and the drop-bar let down to close the main circuits; but in place of said cartridge, any other contrivance for holding the drop-bar suspended, and letting it down when desired, may be used.

Many advantages are connected with the use of this invention. The circuit-closer can be placed close to the mines, allowing the use of short circuits, and small batteries for exploding the mines, and insuring a satisfactory result in each circuit. The simultaneous discharge of all the mines in all the circuits renders the work to be done positively successful, where heretofore many failures occured, owing to the lack of simultaneousness in the discharge. The subdivision of the whole number of mines into independent groups, instead of using but one single circuit, as heretofore, increases the probability of success. The actuating-circuit may be of convenient length, so that the person closing the circuit therein may be at a safe distance from the mine, while nevertheless the mine-circuits are short and powerful. The division of the circuits into groups is no longer objectionable, but on the contrary advisable, with the use of our invention.

Thus, at the Hell Gate explosion, the mines were divided into twenty-three groups, each group having its own battery of from forty to forty-four cells, of sufficient intensity to discharge about one hundred and sixty primers to a group. In all there were over three thousand six hundred primers simultaneously discharged with the aid of nine hundred and sixty battery-cells, whose circuits were conducted into our improved circuit-closer.

The accompanying drawing illustrates one form in which our invention may be embodied. It represents, for greater simplicity, four main electric circuits, $a\ a^{\times}$, $b\ b^{\times}$, $c\ c^{\times}$, and $d\ d^{\times}$, to be closed by our improved circuit-closer; but any suitable larger or smaller number will be affected by our invention in like manner. The wires a, b, c, and d extend from their respective batteries into metallic contact, respectively, with pins A, B, C, and D, that are secured in a sliding plate or bar, E. The other wires, $a^{\times}$, $b^{\times}$, $c^{\times}$, and $d^{\times}$, extend from the batteries into metallic contact, respectively, with cups $A^{\times}$, $B^{\times}$, $C^{\times}$, and $D^{\times}$, that are fixed in a stationary frame, F. The pins A B C D are respectively in line with the cups $A^{\times}$ $B^{\times}$ $C^{\times}$ $D^{\times}$, so that when the plate E is moved toward said cups, the pins and cups will come into metallic contact, and the circuits will be

closed. The cups we prefer to fill with mercury, for greater certainty of operation. The wires $a^{\times}$ $b^{\times}$ $c^{\times}$ $d^{\times}$ may be arranged singly or in groups, as indicated in Fig. 4.

The plate E is held elevated, and the circuits are held broken by a rope, cord, chain, or device, G, in which a small cartridge, H, is, by preference, secured. This cartridge is placed in an electric circuit, *f*, which can be closed by touching a key, *g*. When this circuit *f g* is closed the cartridge H is exploded and the fastener G severed, allowing the plate E to drop, and to bring the pins A, B, C, and D into contact with the cups $A^{\times}$, $B^{\times}$, $C^{\times}$, and $D^{\times}$ simultaneously. The main circuits *a* $a^{\times}$, *b* $b^{\times}$, *c* $c^{\times}$, and *d* $d^{\times}$ are thereby all closed at the same time, and the cartridges or primers placed in these circuits are exploded simultaneously.

It is evident that the invention may be used for any suitable purpose, in which the simultaneous closing of many circuits is desired.

In place of the cartridge H, any other suitable means for holding the bar E suspended may be used, such as a catch to be withdrawn by a suitable electro-magnet placed in the circuit *f g*. The plate E is shown to operate by gravity, and to slide vertically in the frame F; but its motion may be varied, and springs or weights may be used to move it toward the conductors $a^{\times}$, $b^{\times}$, $c^{\times}$, and $d^{\times}$.

We claim as our invention—

1. In a circuit-closer, the combination of a series of conductors, *a*, *b*, and *c*, terminating in metallic points A, B, and C, with a movable plate, E, and with the cups $A^{\times}$ $B^{\times}$, &c., and conductors $a^{\times}$ $b^{\times}$, &c., all arranged to effect a simultaneous closing of a series of circuits, substantially as specified.

2. The combination of the independent actuating-circuit *f g* with the suspending device H, and circuit-closing plate E, all arranged so that by closing the actuating-circuit *f g* the main circuit or circuits will also be closed, substantially as specified.

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