(No Model.)

H. P. BROWN.

DEVICE FOR MAKING AND BREAKING ELECTRIC CIRCUITS.

No. 330,466. Patented Nov. 17, 1885.

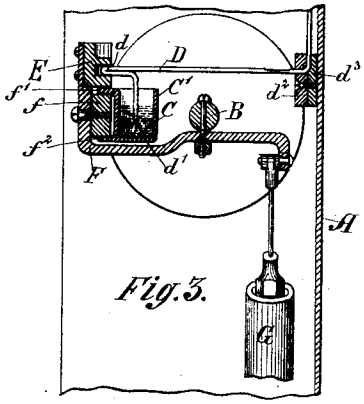


Fig. 3.

Fig. 1.

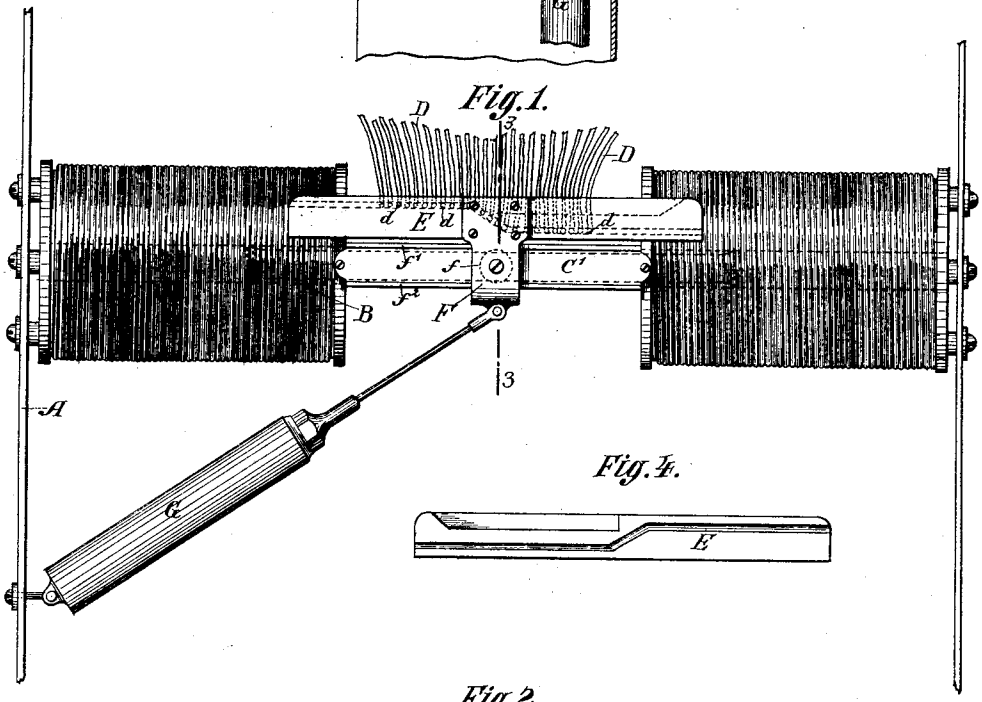
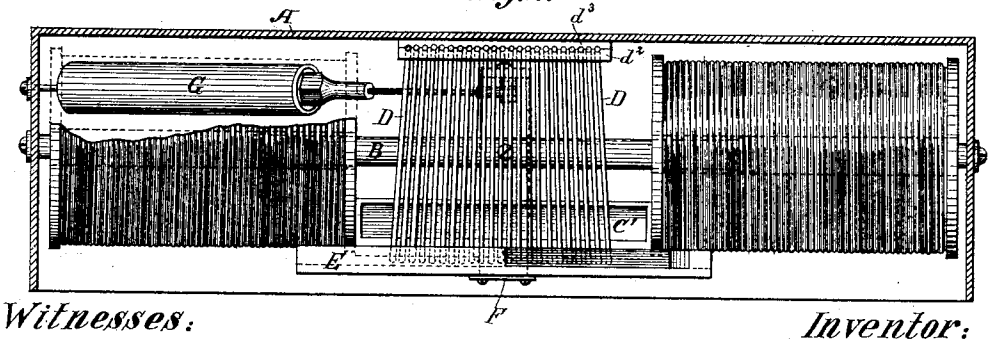


Fig. 4.

Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

HAROLD P. BROWN, OF CHICAGO, ILLINOIS.

DEVICE FOR MAKING AND BREAKING ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 330,466, dated November 17, 1885.

Application filed August 7, 1885. Serial No. 173,839. (No model.)

To all whom it may concern:

Be it known that I, HAROLD P. BROWN, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Electric-Circuit Making and Breaking Apparatus, of which the following is a specification.

The object of the present invention is to provide an automatic apparatus for making and breaking a number or series of electric contacts, which will offer practically a constant friction or resistance to its motive power at all times.

The invention consists in a series of movable contact-pieces, one or more fixed or mercury contacts, into connection with which said movable contact-pieces may be brought, a cam or grooved slide for operating said movable pieces, and an electro-magnet or solenoid for actuating said cam or slide; and, also, in combining therewith a dash-pot to regulate the motion of the movable core or armature of the solenoid or magnet.

The invention also consists, in connection with a mercury or other fixed contact and a slide for operating the movable contacts, in the particular construction and arrangement of the movable contact-pieces—that is to say, in making them of spring-wires arranged in the same plane with the middle line of the cam or grooved slide—so that each of said movable contacts will offer, approximately, the same degree of friction or resistance to the movement of the grooved slide, whether said movable contact-pieces be pressed into or raised out of the mercury.

It also consists in providing the grooved slide with a friction-roller and an upper and lower track for the same, in connection with the inclined dash-pot, so that the upward or downward push or pull of the dash-pot on the grooved slide will not materially affect its horizontal movement.

The invention also consists in the novel devices and combinations, as more particularly pointed out in the claims.

In the accompanying drawings, which form a part of this specification, and in which similar letters indicate like parts, Figure 1 is a side elevation of an apparatus embodying my invention. Fig. 2 is a plan view; Fig. 3, a cross-section on line 3 3 of Fig. 1; and Fig. 4 is a detail view of the grooved slide or cam.

In said drawings, A represents a box or frame, on which the apparatus may be mounted.

B is the movable core or armature of an electro-magnet or solenoid, preferably a double solenoid, or one having two helices. The helix or helices of this magnet or solenoid is or are included in the circuit or circuits by which the apparatus is operated.

C is a fixed contact, preferably mercury, which may be contained in a trough or vessel, as C'.

D D are movable contact-pieces, preferably each consisting of a spring-wire having a projecting knee or bend, *d*, near its outer end, and a depending end, *d'*, adapted to project into the mercury in the trough C'. These wires are preferably arranged in the same horizontal plane, and supported by an insulating-block, d^2, through which they project. A second block, d^3, affords an insulating-back for the wires and means of attachment to the frame A.

E represents a grooved slide or cam, in or upon which the projections *d* of the movable contacts D fit, and by which they and each of them are operated to make and break connection with the mercury or fixed contact C. It will of course be understood that any number of fixed contacts desired may be employed.

In the drawings I have, for convenience, shown only one fixed contact, as the apparatus shown is specially designed for use in a rheostat or device for varying the resistance of a variable-resistance circuit or shunt, in which case the mercury-contact is included in said circuit, and the different movable contact-pieces D lead to different parts or divisions of the resistance included in said circuit.

The slide E is connected to the core B by a bent arm, F, rigidly secured to said core and slide. This bent arm is provided with a friction-wheel, *f*, which travels upon or against an upper and lower track, f' f^2. Each of the tracks f' f^2 preferably consist of a flange cast on the side of the mercury-trough.

G is a dash-pot, pivoted at its lower end to the frame A at a sufficiently low point to prevent the liquid therein from spilling by the

change in the inclination of said dash-pot, due to the movement of the core B or arm F, to which the piston *g* of said dash-pot is pivoted.

The slide E may be provided with one or more cam surfaces or grooves, to give different movements to different contact-pieces or to operate the same at different times. In the drawings I have shown it as provided with two separate grooves or cam-surfaces.

In the drawings I have not indicated the arrangement of circuits, as that will of course vary with the different uses to which the apparatus may be applied. The operating-magnet is included or adapted to be included in the circuit by which the apparatus is controlled or operated, and the fixed and movable contact-pieces may of course be included in any circuit or series of circuits which it is desired to open and close.

The slide or cam E, instead of being operated by an electro-magnet or solenoid, may also be actuated by other means or forces, and the cam need not necessarily be a reciprocating cam.

The spring-wires should be flattened or thinned near the block d^2, as indicated in the drawings, so that the same may be easily moved up and down, and thus offer little resistance to the slide E.

The mercury in the trough C should be covered with glycerine or a hydrocarbon oil, to prevent sparking and poisonous fumes from being generated and arising. The depending ends of the movable contact-pieces D should also be pointed.

I claim—

1. The combination, with a mercury-contact, of a series of movable contact-pieces and a slide or cam, substantially as specified.

2. The combination, with a mercury-contact, of a series of spring contact-pieces, each provided with a projection, as *d*, and a depending end, as *d'*, and a grooved slide or cam, substantially as specified.

3. The combination, with a mercury-contact, of a number of movable contact-pieces consisting of spring-wires lying in the same plane and a slide having a cam or groove the median point or line of which is in the plane of said wires, so that the friction of said wires against the walls of said groove will remain approximately the same, whatever the position of said slide, substantially as specified.

4. The combination of a mercury-contact with a number of movable contact-pieces, a slide having a groove or cam, a double solenoid having a sliding core, a dash-pot, and a friction-wheel and a track therefor, substantially as specified.

5. The combination of a mercury-contact vessel provided with flanges or tracks with a number of movable contact-pieces, a slide having a groove, double solenoid having sliding core, arm connecting said core and slide, friction-wheel, and dash-pot, substantially as specified.

6. The combination of a double solenoid having a movable core, a dash-pot, a slide having a cam or groove, and a number of movable contact-pieces operated thereby, substantially as specified.

7. The combination, with the movable core of a solenoid, of a grooved slide or cam and a number of movable contact-pieces operated thereby, substantially as specified.

8. The combination, with a number of movable contact-pieces, of a grooved slide, substantially as specified.

9. The combination, with a slide having a cam or groove, of contact-pieces having knees or folds and depending ends, substantially as specified.

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Witnesses:
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