(No Model.) 2 Sheets—Sheet 1.

A. RECKENZAUN.

ELECTRIC CLOCK MOTOR.

No. 473,960. Patented May 3, 1892.

Fig. 1.

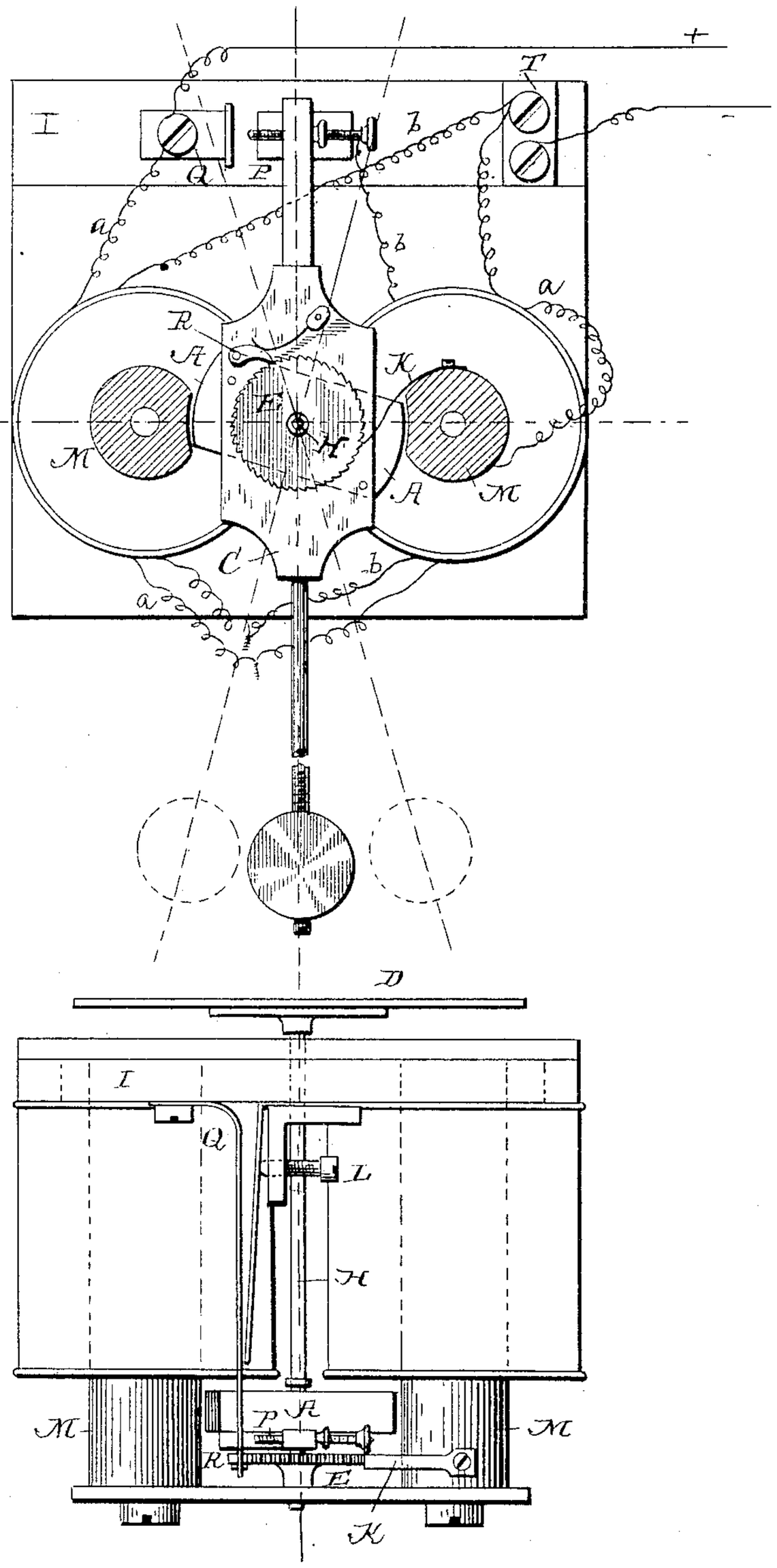

Fig. 2.

Witnesses
Ira R. Steward
Alfred T. Gage

Inventor
Anthony Reckenzaun
By his Attorney
A. D. Henderson

(No Model.)

2 Sheets—Sheet 2.

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Fig. 3.

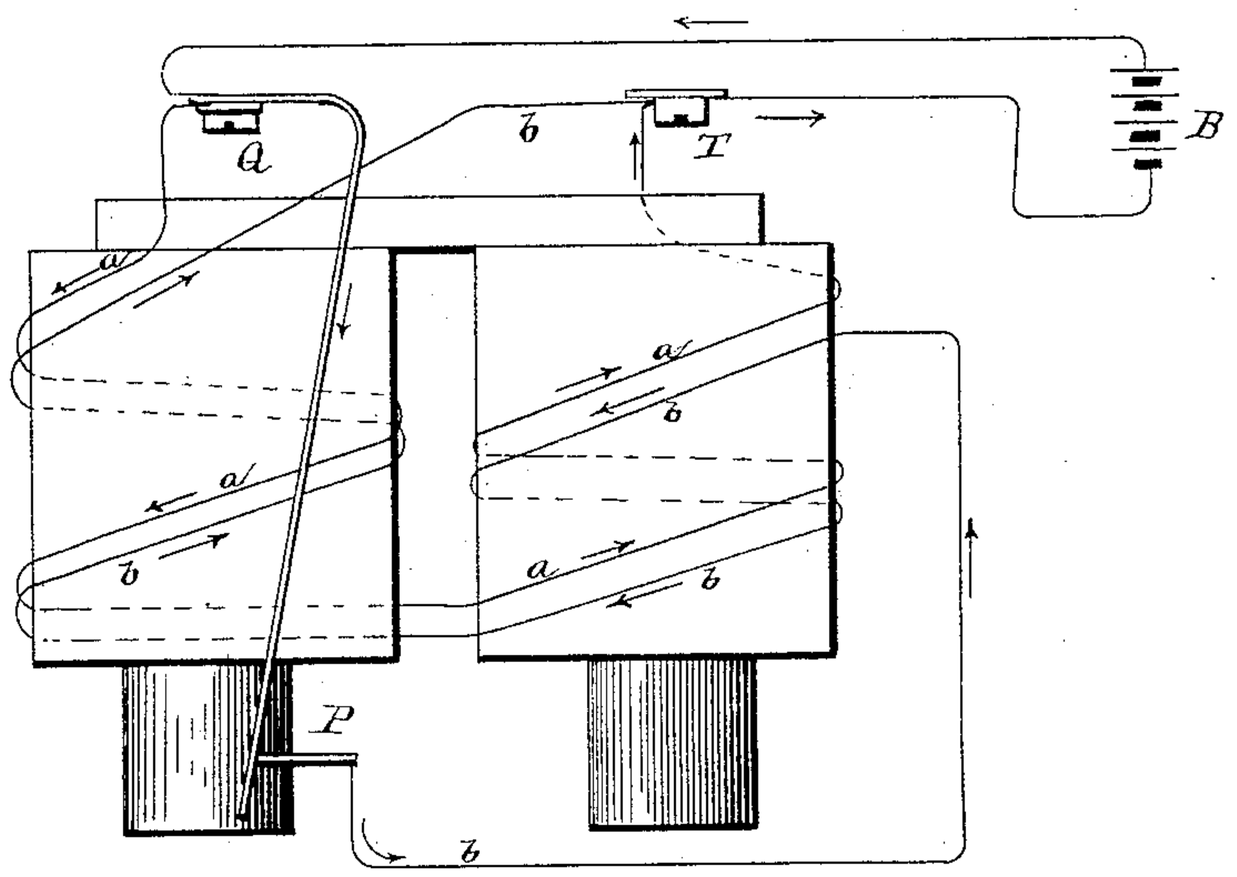
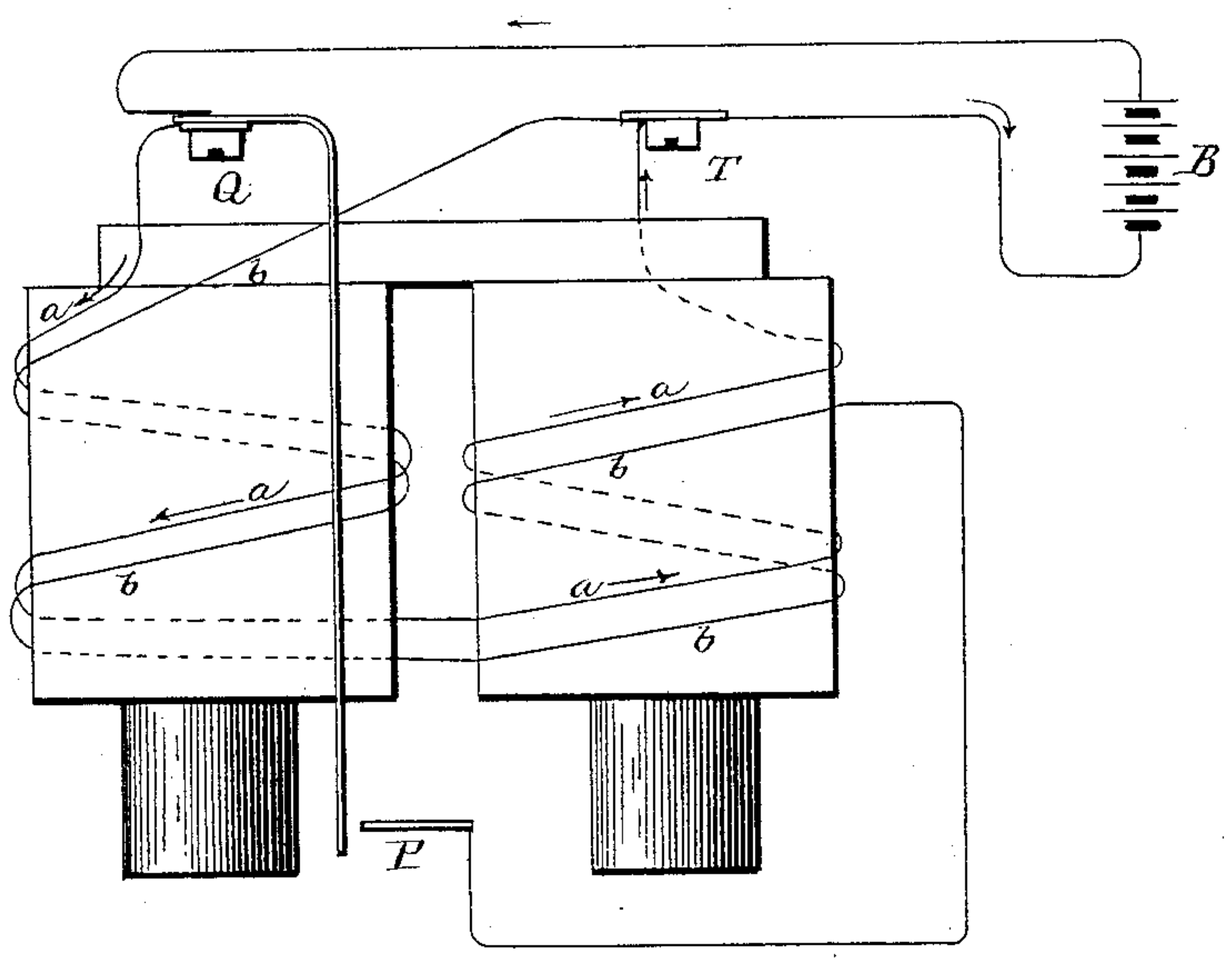


Fig. 4.



Witnesses
Ira R. Steward.
Alfred T. Gage

Inventor
Anthony Reckenzaun,
By his Attorney
H. C. Hudson

UNITED STATES PATENT OFFICE.

ANTHONY RECKENZAUN, OF STOCKWELL, ENGLAND, ASSIGNOR OF ONE-HALF TO JAMES A. PENTZ, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRIC CLOCK-MOTOR.

SPECIFICATION forming part of Letters Patent No. 473,960, dated May 3, 1892.

Application filed December 16, 1889. Serial No. 333,964. (No model.)

To all whom it may concern:

Be it known that I, ANTHONY RECKENZAUN, a subject of Her Majesty the Queen of England, residing at Hemberton Road, Stockwell, in the county of Surrey, England, have invented certain new and useful Improvements in Electric Clock-Motors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to clocks, motors, or other moving devices which are actuated by a current or currents of electricity; and it has for its objects to produce constant motion upon a spindle and any mechanism connected therewith.

It further has for its object to entirely eliminate sparking at points of contact when the same are separated—an object which has hitherto been difficult of accomplishment without complicated devices.

To the accomplishment of the above and such other objects as may herein appear, the invention will be hereinafter particularly described, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a front elevation with parts in section; Fig. 2, a plan of same. Figs. 3 and 4 represent, diagrammatically, the combination of those parts relating to the electrical circuits.

The instrument consists, essentially, of an electro-magnet M, capable of exerting a force upon an armature A. These parts may be of any well-known suitable shape. This armature A is attached to a pendulum C, and both together are loosely suspended upon a spindle H. The shape of this pendulum may be varied or a balance-wheel substituted therefor. Pendulum C also carries a pawl R, which presses against the teeth of a ratchet-wheel E. This ratchet-wheel is fixed to the spindle H. Another pawl or spring K, attached to some external object, acts as a stop to the ratchet-wheel. This is the simplest form of ratchet-wheel. When desired, a double pawl may be used in order to obtain motion of the spindle for the forward as well as the return swing of the pendulum, or an escapement-wheel and anchor may be substituted. I have merely shown the most elementary form of such movement, which is old and well known.

The pendulum is prolonged and carries at its upper end an adjustable screw P, which makes periodical contact with a spring Q. This spring is insulated from the rest of the mechanism by a strip I, which also carries terminals T. There is also a small bracket carrying an adjusting-screw L, which serves the purpose of a buffer to spring Q through some elastic or other medium. In the drawings it is a strip of metal. By means of L the length of swing in the pendulum can be determined and varied. The length of the pendulum itself is also adjustable, and the motion can also be varied by lengthening or shortening screw P, and thus a wide range of adjustment is provided. This is valuable in case this clock is intended to work an electric meter, such as described in my patents, Nos. 394,880 and 394,881, both of December 18, 1888, where for convenience sake and to save calculations the speed of the meter is calibrated to give a constant without fractions.

The coils of the electro-magnet M are wound and connected in a peculiar manner. Each bobbin is wound simultaneously (by which I mean winding the wires together so that they will lie side by side) with a pair of insulated wires *a* and *b* in Figs. 3 and 4, constituting a large number of turns and layers, although for clearness sake in the diagrams only few turns are shown. The source of supply of electricity is indicated by B B. Arrows indicate the direction of the flow of current. Thus in Fig. 4 it will be observed that owing to contact being broken between Q and P the current can only flow through coils *a a*, which have the effect of setting up equal and opposite poles N S in the iron cores of the magnet.

Fig. 3 gives the flow of current when circuit is made between Q and P. The currents in *a* and *b* flow in opposite directions and the poles at the free ends of the magnet are de-

stroyed. By winding the magnet-bobbins with a pair of equal wires (not two bobbins side by side or one upon the other, as has been often suggested) I obtain, first, absolute equilibrium when all the wires are in circuit; secondly, practically the same resistance in each wire, they being of exactly the same length and diameter, and, thirdly, no self-induction when circuit is broken in one pair of coils.

The spark which is observed in an ordinary electro-magnet when its circuit is opened is due to the electro-motive force of self-induction set up in the coils of the electro-magnet. This effect I destroy in the manner described and produce a perfectly-sparkless break.

Referring again to Fig. 1, it will be seen that pendulum C hangs in a vertical position, due to gravity. This position can only be maintained when no current circulates through the magnet-coils. With the pendulum in this position Q and P cannot touch. As soon, however, as a current is made to flow through the terminals T and Q the coils *a* will be instantly energized and opposite polarity set up in the magnet M. The armature A is thereby attracted to assume a straight position relatively to its center line with the center line of the magnet-poles. Thus it pulls the pendulum, being connected with the armature, along with it; but as soon as the pendulum begins to swing it causes contact between P and Q, with the result of demagnetizing the magnet-cores and releasing the armature. The momentum acquired by the pendulum allows the same to complete its first swing in one direction, with the effect of bending spring Q, thus keeping contact and giving time for the more or less perfect magnetic change in the iron cores. Gravity will bring the pendulum back to its original position and the momentum again acquired will send it beyond the vertical center line. During a great part of this movement Q and P are separated. Therefore remagnetization takes place in the iron cores, the armature receives a fresh impulse, and regular motion must continue as long as there is a constant supply of electricity to the instrument. With sufficient weight at the end of the pendulum, or in lieu of this a balance-wheel and spring, it is almost immaterial whether the armature is attracted when the pawl R pushes the ratchet-wheel E or this work is done by gravity in the return-spring, and the whole combination can be reversed from that shown in the drawings with similar effects.

Having described my invention and set forth its merits, what I claim is—

1. In an electric clock or motor, the combination, with power-transmitting mechanism and an electro-magnetic device for maintaining movement of said mechanism from the supply-circuit so long as there is a current in said circuit, of a pair of insulated wires in circuit with the supply-circuit and wound side by side about said electro-magnetic device, and a make-and-break device in the circuit of one of said wires for automatically breaking the circuit of said wire without disconnecting the other wire from the supply-circuit, said make-and-break device being operated on by the electro-magnetic device to close the circuit, whereby polar and non-polar effects are set up in alternation in the electro-magnetic device without disconnecting the supply-circuit and the power-transmitting mechanism thus kept in motion, substantially as described.

2. In an electric clock or motor, the combination, with power-transmitting mechanism and an electro-magnetic device for maintaining movement of said mechanism from the supply-circuit so long as there is a current in the supply-circuit, said electro-magnetic device comprising two electro-magnet bobbins and their cores and an armature, of a pair of insulated wires wound side by side upon each bobbin and oppositely connected in circuit to produce alternately polar and non-polar effects as the current passes through only one or both of said wires, and a make-and-break contact in the circuit of one of said wires, said contact being rendered sparkless by one of the wires remaining in circuit with the supply-circuit and acted on by said electro-magnet through said armature to close the circuit in which it is located, substantially as and for the purposes described.

3. The combination, with a rotatable spindle for transmitting power, of an armature and mechanism deriving momentum therefrom and imparting it to said spindle, and an electro-magnetic device for influencing said armature, said device having a pair of insulated wires, one of which has a make-and-break contact controlled by the movement of said armature, said wires being wound side by side into coils, through one of which the current flows until the circuit is established in the other, after which it flows through each one in a direction opposite to the other, whereby said device is magnetized and then demagnetized without sparking at the make-and-break contact, substantially as described.

4. The combination of a rotatable spindle for transmitting power, an armature and mechanism deriving power therefrom and imparting it to said spindle, an electro-magnetic device for influencing said armature, and a contact device for establishing a circuit in a portion of said electro-magnetic device, said contact device comprising a spring and a contact-point, one of said elements being moved to meet the other to close the circuit by said above-mentioned mechanism, substantially as described.

5. The combination of a rotatable spindle for transmitting power, an armature and mechanism deriving power from said armature and imparting it to said spindle, an electro-magnetic device for influencing said armature, a contact device for establishing a circuit in a portion of the coils of said electro-magnetic device, said contact device com-

prising a spring and a contact-point adjustable to control the movement of said mentioned mechanism, a buffer for said contact device, and an adjustable stop to move said buffer to limit the movement of said before-referred-to mechanism, substantially as described.

6. The combination of the electro-magnet bobbins, the wires wound side by side upon the same and connected with a supply-circuit, the shaft for transmitting power, the armature and swinging member carrying a circuit-closer connected together and turning loosely upon said shaft, means for transmitting motion from the armature to the shaft, the elastic contact-point in circuit with the wires, and the point carried by said moving member and in circuit, said points constituting a make-and-break device to close the circuit in one set of wires, substantially as and for the purposes set forth.

7. The combination, with the magnet-bobbins each having wires wound side by side, a swinging member actuating a circuit-closer, an armature actuating said swinging member, and a make-and-break device comprising the elastic plate and the circuit-closer point carried by said swinging member, of the buffer for the make-and-break device composed of the spring-plate, and the set-screw for adjusting it, substantially as and for the purposes set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

ANTHONY RECKENZAUN.

Witnesses:

E. COURTNEY WALKER,

GERALD F. BIRD.