

(Model.)

C. A. RANDALL.

Automatic Tension-Changer for Electric-Circuits.

No. 227,298.

Patented May 4, 1880.

Fig. 1.

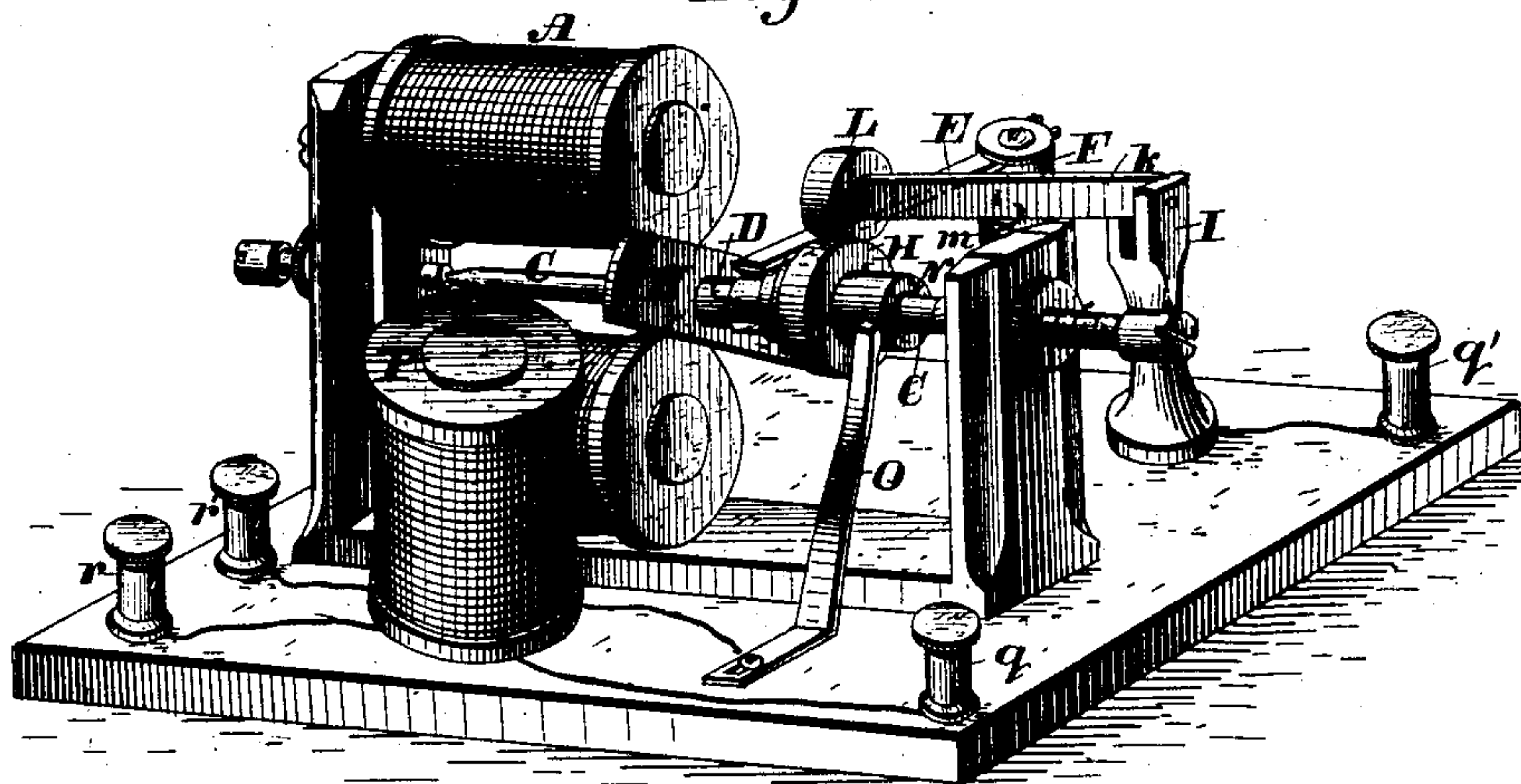
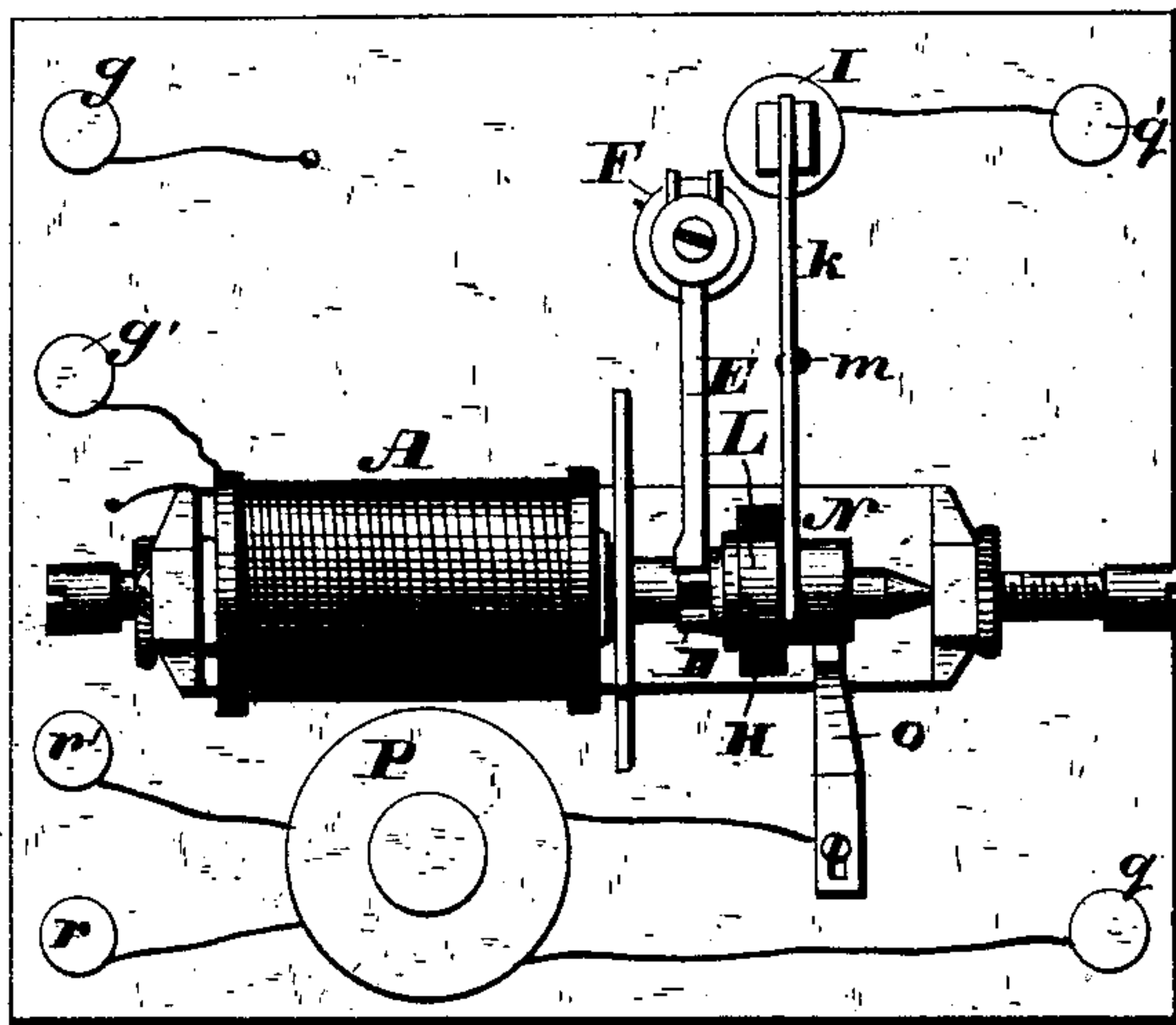


Fig. 2.



Attest:

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AUTOMATIC TENSION-CHANGER FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 227,298, dated May 4, 1880

Application filed March 2, 1880. (Model.)

To all whom it may concern:

Be it known that I, CHARLES A. RANDALL, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented new and useful Improvements in Automatic Circuit-Breakers for Induction-Coils, of which the following is a specification.

This invention relates to an apparatus for interrupting or varying the flow of an electrical current, its object being mainly to effect the required variation of current through the primary coil of an induction-coil, the secondary coil of which is included in a telephone-circuit, as described in application for patent filed by me December 27, 1879, for an improvement in telephone systems.

It consists, first, in the combination, with an electrical-circuit interrupter, of automatic mechanism connected therewith and arranged to operate the same; second, in the combination, with a circuit-interrupter connected with the primary circuit of an induction-coil, the secondary coil of which is included in a telephone-circuit, of an electrical engine connected with said interrupter and arranged to operate the same for causing an intermittent current in the said telephone-circuit when the primary circuit of the induction-coil is connected with a battery; third, in an electric-circuit interrupter composed of two rotary wheels or rollers of conducting material in rotary frictional contact with each other, in combination with mechanism for causing a variation of the contact-pressure between said wheels.

In the accompanying drawings, Figure 1 is a perspective view of my improved apparatus, and Fig. 2 is a plan view of same.

The motive device of the apparatus is an electrical engine constructed in a well-known manner, the letter A designating the stationary electro-magnet, and B its revolving armature, fixed upon an arbor, C, mounted in the usual adjustable bearings. Upon this shaft is also secured an oblong "make-and-break" plate, D, having convexly-curved ends, and lying in the same direction with the armature and projecting on opposite sides of the arbor. A contact-spring, E, fixed to a standard, F, extends over the plate D, and comes in contact with the ends thereof alternately when the arbor

is rotated, but does not make contact with the sides of said plate, contact between the spring E and plate D being thus made and broken twice in each complete rotation of the arbor. When said plate and spring are in contact a current flows from a battery connected with screw-post *g* over a connecting-wire to standard F, thence over spring E, plate D, arbor C, and intermediate connections to screw-post *g'*, the adjustment of plate D and spring E being such as to break the battery-circuit just before the armature has been brought by attraction directly opposite the iron cores of the magnet, the circuit remaining broken during the first quarter of the revolution of the armature after passing the cores.

Several magnets may be used and arranged in a circle, or otherwise, in connection with suitably-arranged circuit-breakers.

Upon the arbor C, and insulated therefrom by a hard-rubber collar, is fixed a wheel, H, formed of carbon, and from a metal standard, I, extends a pivoted metallic arm, *k*, carrying at its free end an eccentrically-pivoted carbon roller, L, in electrical connection with said arm and having its periphery pressed upon that of the wheel H by means of a spring, *m*, connected with the arm and base-plate.

It will be seen that when the wheel H is caused to rotate the roller L is also rotated by friction therewith, and when the portion of the periphery of the roller L which is at the greatest distance from its pivot bears upon wheel H there is obviously a greater tension of spring *m*, and consequently a greater pressure of said roller upon said wheel than when any other portion of its periphery is in contact therewith, and at this time a current of electricity flowing through the arm *k* passes freely and fully from the roller L to wheel H; but when that portion of the periphery of the eccentric-roller L which is at the least radial distance from its pivot bears upon wheel H, the tension of spring *m* is so adjusted that the pressure of the roller upon the wheel is very slight, and therefore an imperfect electrical contact is formed between said roller and wheel, and but a small portion of a current can be transmitted from the former to the latter.

Mounted upon but insulated from the arbor C by an intermediate hard-rubber sleeve, is a

metallic sleeve, N, in electrical contact with wheel H, and O is a contact-spring projecting from the base and bearing upon said metallic sleeve at its upper end, while its lower end is
 5 connected with one terminal of the primary coil (the outer coil, as shown in the drawings) of an induction-coil, P, the other terminal of said primary coil being connected with a screw-post, *q*. The standard I is connected with
 10 screw-post *q'*.

The terminals of the secondary coil of the induction-coil P are respectively connected with the screw-posts *r* and *r'*, one of which should be connected with the main line, say
 15 of a telephone-circuit, and the other with the ground.

A suitable battery should be connected with the posts *g* and *g'* to drive the electrical engine or motive device, and another battery,
 20 the current of which is to traverse the primary coil of the induction-coil P, should be connected with the posts *q* *q'*. Thus it will be seen that the carbon wheel and its variable pressure-roller are in circuit with the primary coil.

When the batteries are connected as described the arbor C and its attachments are caused to rotate, the office of the carbon wheel and pressure-roller being to interrupt and virtually make and break the primary circuit of
 25 the induction-coil, thus causing in the secondary coil and its connections an intermittent current, the rapidity of the pulsations of which depends upon the speed at which the interrupter rotates. Were the contact-pressure between the carbon wheel and roller L unvarying, there would, of course, be no flow of induced current in the secondary circuit of the
 30 induction-coil; but the contact being varied from poor to positive, the primary circuit is practically made and broken.

I have described the contact-wheel H and the roller L as both made of carbon, but either or both may be formed of metal or other suitable conducting material. The wheel H may
 35 be secured eccentrically to the arbor C, and the roller L may be mounted centrally on its pivot.

It will also be understood that the arbor carrying the wheel H may be driven by any
 40 other suitable mechanism without departing from the principle of my invention.

The apparatus as now described has obviously a great range of utility in the application of electricity for producing intermittent or varying currents; but, as before stated, is
 55 intended mainly for use in producing upon a telephone-line a rapidly-intermittent current, the electro-motive force of which may be increased and decreased by suitable devices connected with a telephonic transmitter. 60

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with an electrical-circuit interrupter controlled by variations of
 65 pressure between its contact-points, of automatic mechanism connected therewith and arranged to operate the same to cause said variations of pressure, substantially as described.

2. The combination, with a circuit-interrupter connected with the primary circuit of
 70 an induction-coil, the secondary coil of which is included in a telephone-circuit, of an electrical engine connected with said circuit-interrupter and arranged to operate the same for
 75 causing an intermittent current in the said telephone-line when the primary circuit of the induction-coil is connected with a battery, substantially as described.

3. An electric-circuit interrupter composed
 80 of two rotary wheels or rollers of conducting material in rotary frictional contact with each other, in combination with mechanism for causing a variation of the contact-pressure between said wheels, substantially as described. 85

4. The combination, with the arbor C of the electro-magnetic engine, of the conducting carbon wheel H, the roller L, of same material,
 90 bearing with varying pressure upon said wheel, and induction-coil having one terminal of its primary coil connected with said wheel H, and the other terminal with one pole of a battery, the opposite pole of which is connected electrically with the roller L, substantially as described. 95

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

C. A. RANDALL.

Witnesses:

HENRY HESSE,
 P. G. RANDALL.