No. 811,656. PATENTED FEB. 6, 1906.

C. P. L. NOXON.

SPARK COIL.

APPLICATION FILED SEPT. 26, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

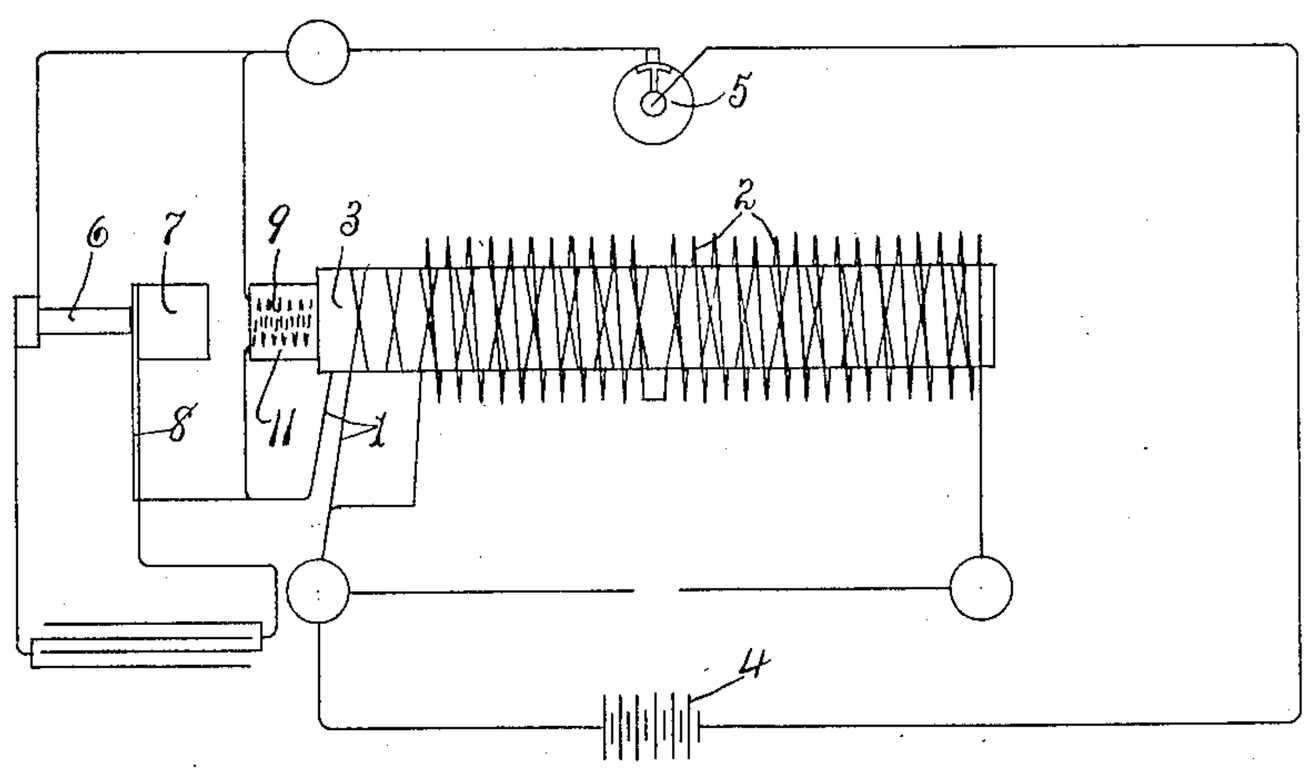
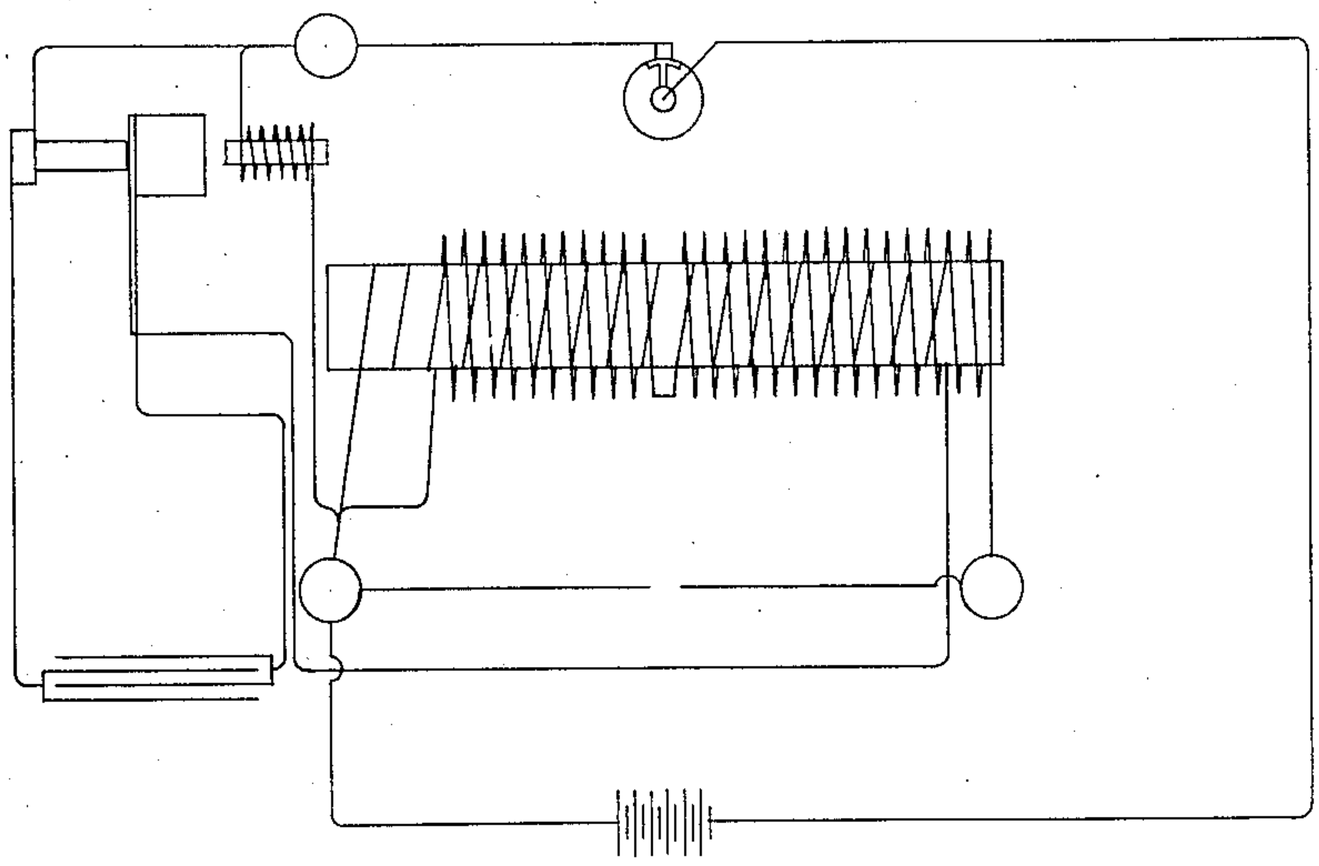


Fig. 2.



WITNESSES:

Chas. J. Foner.

Chas. Young.

INVENTOR

Charles P. L. Noxon

BY

Hey & Parsons.

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 3.

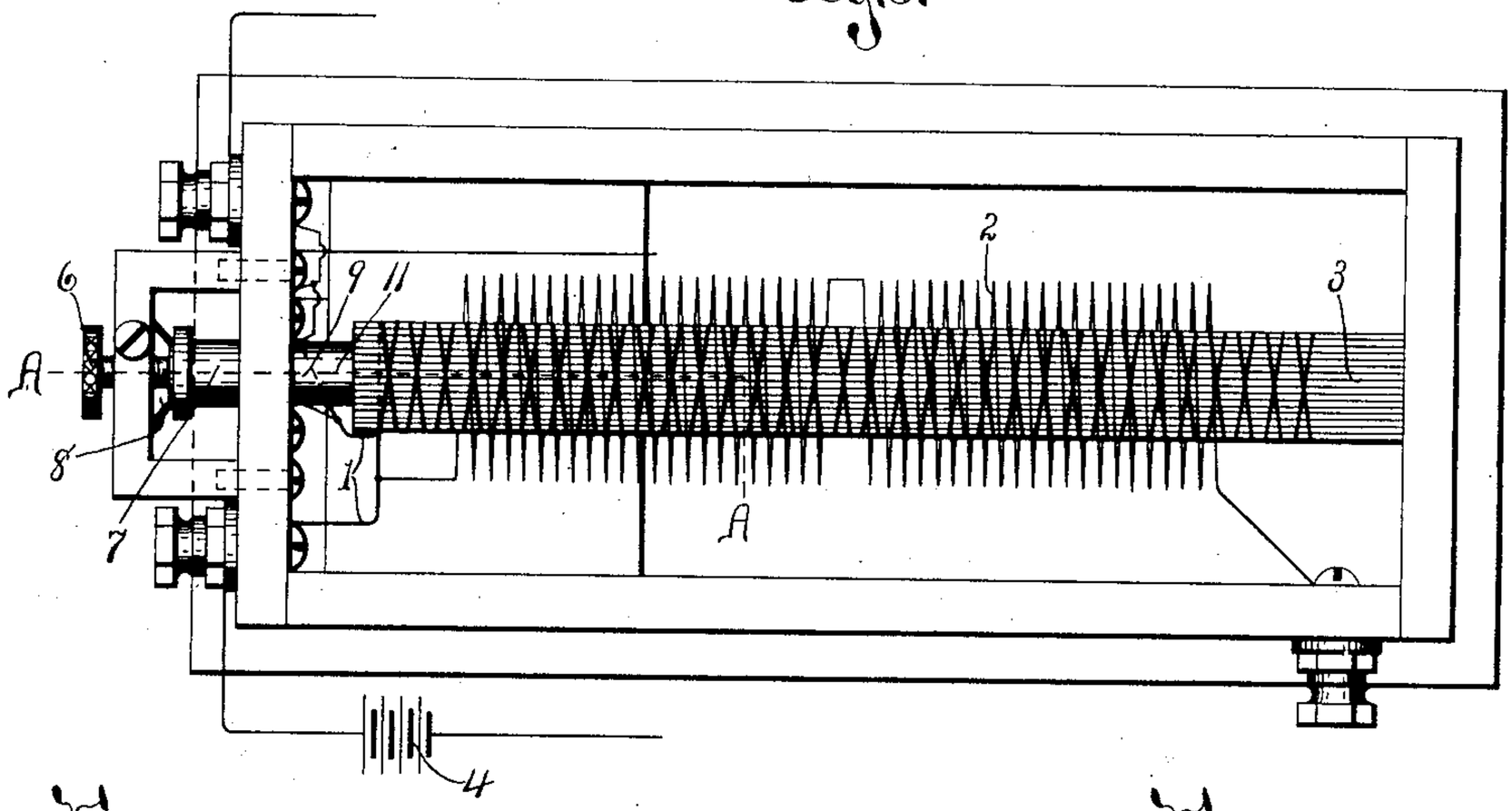


Fig. 5.

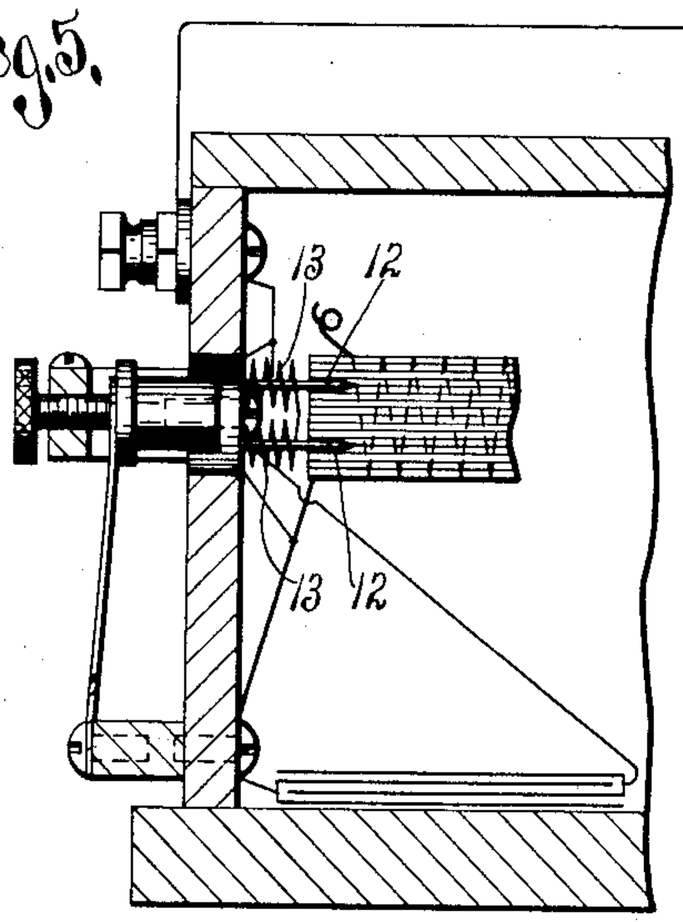


Fig. 4.

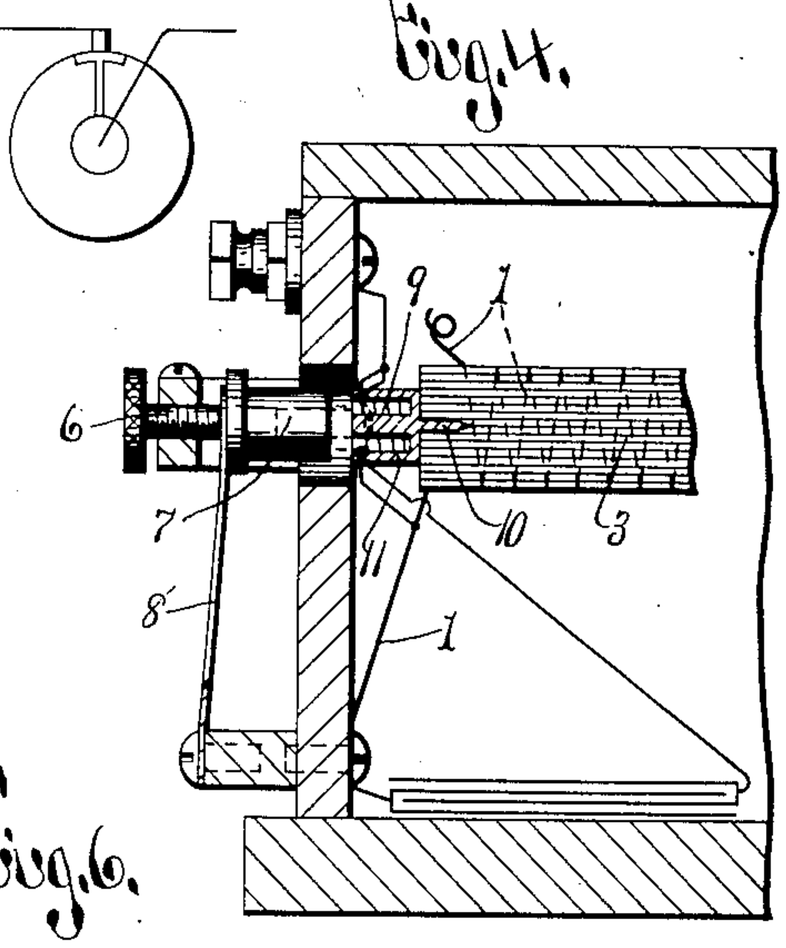
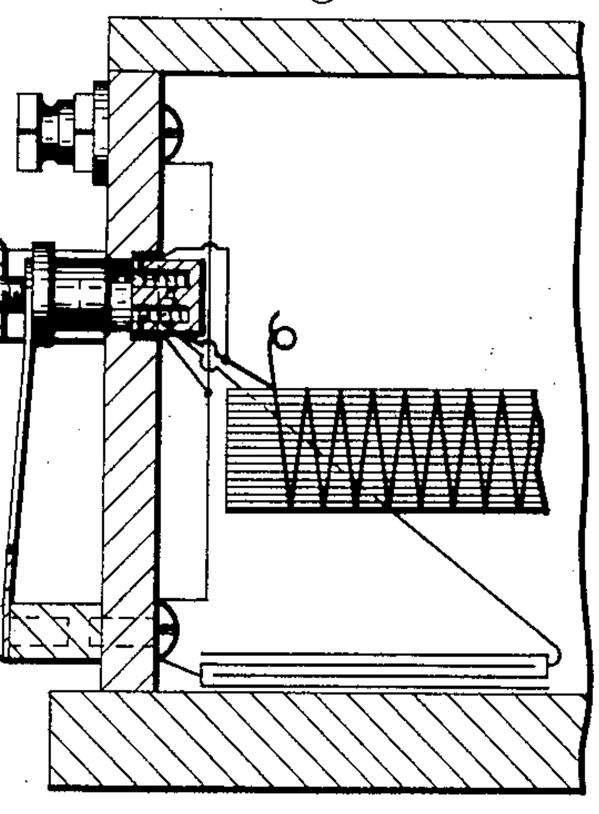


Fig. 6.



WITNESSES:

Chas. F. Jones.

Chas. Young.

INVENTOR

Charles P. L. Noxon

BY

Hey & Parsons

ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES P. L. NOXON, OF SYRACUSE, NEW YORK.

SPARK-COIL.

No. 811,656. Specification of Letters Patent. Patented Feb. 6, 1906.

Application filed September 26, 1904. Serial No. 225,930.

To all whom it may concern:

Be it known that I, CHARLES P. L. NOXON, of Syracuse, in the county of Onondaga and State of New York, have invented a certain new and useful Spark-Coil, of which the following is a specification.

My invention relates to induction-coils which are particularly efficient in use; and it consists in the combinations and means hereinafter set forth and claimed.

In describing this invention reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a diagrammatic view of a preferable construction of an induction-coil embodying my invention, shown as operatively connected in a circuit. Fig. 2 is a similar diagrammatic view illustrating a modified construction embodying said invention. Fig. 3 is a top plan of an induction-coil arranged in a case, the cover of the case being removed. Fig. 4 is a vertical sectional view on line A A, Fig. 3. Figs. 5 and 6 are views similar to Fig. 4, illustrating modified constructions of induction-coils, a mechanical means for making and breaking the circuit being shown in Fig. 5.

1 is a primary conductor, 2 a secondary conductor, and 3 a core, all of which parts may be of any desirable form, size, and construction suitable for use in induction-coils. The conductors 1 2 are respectively connected in the ordinary manner in a primary circuit and a secondary circuit, and a suitable source of electric energy 4, mechanical means 5 for making and breaking a circuit, and a current-interrupting means are connected in the primary circuit, the means 5 being usually the ignition-controlling mechanism of the internal-combustion engine to which my induction-coil is connected and the current-interrupting means comprising a terminal 6. An armature 7, which is normally in electrical contact with the terminal 6, is moved from the terminal for breaking the primary circuit and is engaged with said terminal for completing the circuit by any suitable means, as a spring 8.

9 is an electromagnetic means for attracting the armature 7 when the primary circuit is broken by the current-interruping means and for preventing such armature from returning into engagement with the terminal 6 to complete the circuit. Said electromagnetic means 9 is preferably arranged with its core extending longitudinally between the armature 7 and the core 3 and forming, essentially, a continuation of said core 3 and with its coil or conductor connected in shunt in the primary circuit. It thus follows that the electromagnetic means 9 bridges the gap formed in the primary circuit when the armature 7 is separated from the terminal 6.

The conductor or coil of the electromagnetic means 9 is of high resistance relatively to the portion of the primary circuit through which no current passes when the circuit is broken at the terminal 6 in order that the major part of the current may pass through the terminal 6 instead of through such means 9, and said electromagnetic means is insufficient in power to attract the armature 7 when engaged with the terminal 6; but when the armature 7 is attracted by the core 3 the means 9 is of sufficient strength to prevent the return of the armature until the mechanical means 5 breaks the primary circuit, whereupon the means 9 loses its power and ceases to attract the armature 7, which then returns into contact with the terminal 6. The electrical resistance of the electromagnetic means 9 is sufficient to reduce the amperage of the current flowing over the primary circuit when the armature 7 is separated from the terminal 6, so that the core 3 is prevented from performing its necessary function of causing a magnetic field capable of making the induction-coil operative and also has no perceptible influence on the armature to prevent the return thereof.

As preferably constructed the electromagnetic means 9 is provided with a spur 10, inserted into the opposing end of the core 3, and is also provided with an external electric conducting-case 11, which encircles the coil or conductor of said means and is arranged with one end face in substantially the same plane as the face of the core of said means engaged with the armature 7.

In Fig. 5 I have shown a modified construction of the electromagnetic means for preventing the return of the armature, the same comprising two cores 12, driven into the core of the induction-coil, and coils 13, wound around the projecting ends of said cores.

The electromagnetic means 9 for preventing the return of the armature when the current is interrupted is not necessarily arranged end to end with the core 3 of the induction-coil; but, as shown in Figs. 2 and 6, said means may be disposed out of longitudinal

alinement with the core 3, in which event the armature of the current-interrupting means is not attracted by the core 3. In this form of my invention the current does not flow through the primary conductor of the induction-coil when the armature is out of contact with the terminal engaged by said armature to complete the primary circuit.

To those skilled in the art it will be understood that by preventing the return of the armature of the current-interrupting means immediately after the current is broken the production of more than one spark is avoided, and the current passes through the mechanical means 5 uninterruptedly and with maximum power and with minimum wear of the separable contacting surfaces of the current-interrupting means, owing to the elimination of unnecessary makes and breaks of the circuit. Moreover, when the mechanical means 5 operates to break the circuit a small current is passing over the same, and a minimum amount of sparking and wear of the separable contacting surfaces of the primary circuit results. My invention is therefore particularly practical and efficient, especially when used with internal-combustion engines, in which great difficulty is experienced by undue corroding and burning of the terminals for igniting the charges, and as my induction-coil is excited but once for each explosion it is therefore especially economical in connection with engines which are run at varying speeds.

The construction and operation of my induction-coil will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be apparent to those skilled in the art that more or less change may be made therein without departing from the spirit of my invention.

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

1. The combination of a primary circuit, a secondary circuit, means for interrupting the current in the primary circuit, means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose described.

2. The combination of a primary circuit, a secondary circuit, means actuated by the current in the primary circuit for interrupting the current in said primary circuit, electromagnetic means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose specified.

3. The combination of a primary circuit, a secondary circuit, means for breaking the primary circuit to interrupt the current therein, electromagnetic means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, said electromagnetic means being connected in the primary circuit to bridge the gap formed in the primary circuit by the first-mentioned means to interrupt the current therein, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose set forth.

4. The combination of a primary circuit, a secondary circuit, means actuated by the current in the primary circuit for breaking the primary circuit to interrupt the current therein, electromagnetic means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, said electromagnetic means being connected in the primary circuit to bridge the gap formed in the primary circuit by the first-mentioned means to interrupt the current therein and being of greater resistance than the part of the primary circuit through which no current passes when the first-mentioned means has interrupted the current, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose described.

5. The combination of a primary circuit, a secondary circuit, means for interrupting the current in the primary circuit comprising a terminal in the primary circuit, an armature movable relatively to the terminal for making and breaking the primary circuit at the terminal, electromagnetic means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose specified.

6. The combination of a primary circuit, a secondary circuit, electromagnetic means having a core, and conductors connected respectively in said circuits, means for interrupting the current in the primary circuit, the operation of said means for interrupting the current being effected by the magnetic action of the core, means for causing the second-mentioned means to return to its position assumed before the operation thereof to interrupt the current in the primary circuit, means for holding the second-mentioned means in its position assumed when the current is interrupted thereby, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose set forth.

7. The combination of a primary circuit, a secondary circuit, means for interrupting the current in the primary circuit, said means including an armature, and a plurality of means connected in the primary circuit for attracting the armature, one of said means continuing to attract the armature after the other

has lost its power to prevent the return of the armature, substantially as and for the purpose described.

8. The combination of a primary circuit, a secondary circuit, electromagnetic means having a core, and conductors connected respectively in said circuits, means for interrupting the current in the primary circuit, the operation of said means for interrupting the current being effected by the magnetic action of the core, means for causing the second-mentioned means to return to its position assumed before the operation thereof to interrupt the current in the primary circuit, electromagnetic means for holding the first-mentioned means in its position assumed when the current is interrupted thereby, said electromagnetic means having a core arranged endwise relatively to the first-mentioned core and forming essentially a continuation thereof, and mechanical means for making and breaking the primary circuit, substantially as and for the purpose specified.

9. The combination with an induction-coil, of means for making and breaking the primary circuit of the induction-coil, and means for breaking and holding open the primary circuit during the time the first-mentioned means is in its position assumed when making the primary circuit.

10. In an induction-coil, a core, a primary conductor, and electromagnetic means having a conductor connected in circuit with the primary conductor, and a core fixed to the first-mentioned core, substantially as and for the purpose set forth.

11. In combination, an armature, the primary conductor of an induction-coil and means for attracting the armature independently of the primary conductor, said means being in electrical connection with the primary conductor when the circuit therethrough is complete, substantially as and for the purpose specified.

12. In an induction-coil, a core, a primary conductor, electromagnetic means arranged end to end relatively to the core and having a conductor connected in circuit with the primary conductor when the circuit through said primary conductor is complete, a core forming essentially a continuation of the first-mentioned core, and a conducting-shield encircling the conductor of the electromagnetic means, substantially as and for the purpose described.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 24th day of September, 1904.

CHARLES P. L. NOXON.

Witnesses:
D. LAVINE,
F. G. BODELL.