

(No Model.)

2 Sheets—Sheet 1.

T. R. TEN BROECK.
ELECTRO MEDICAL APPARATUS.

No. 377,872.

Patented Feb. 14, 1888.

Fig. 1

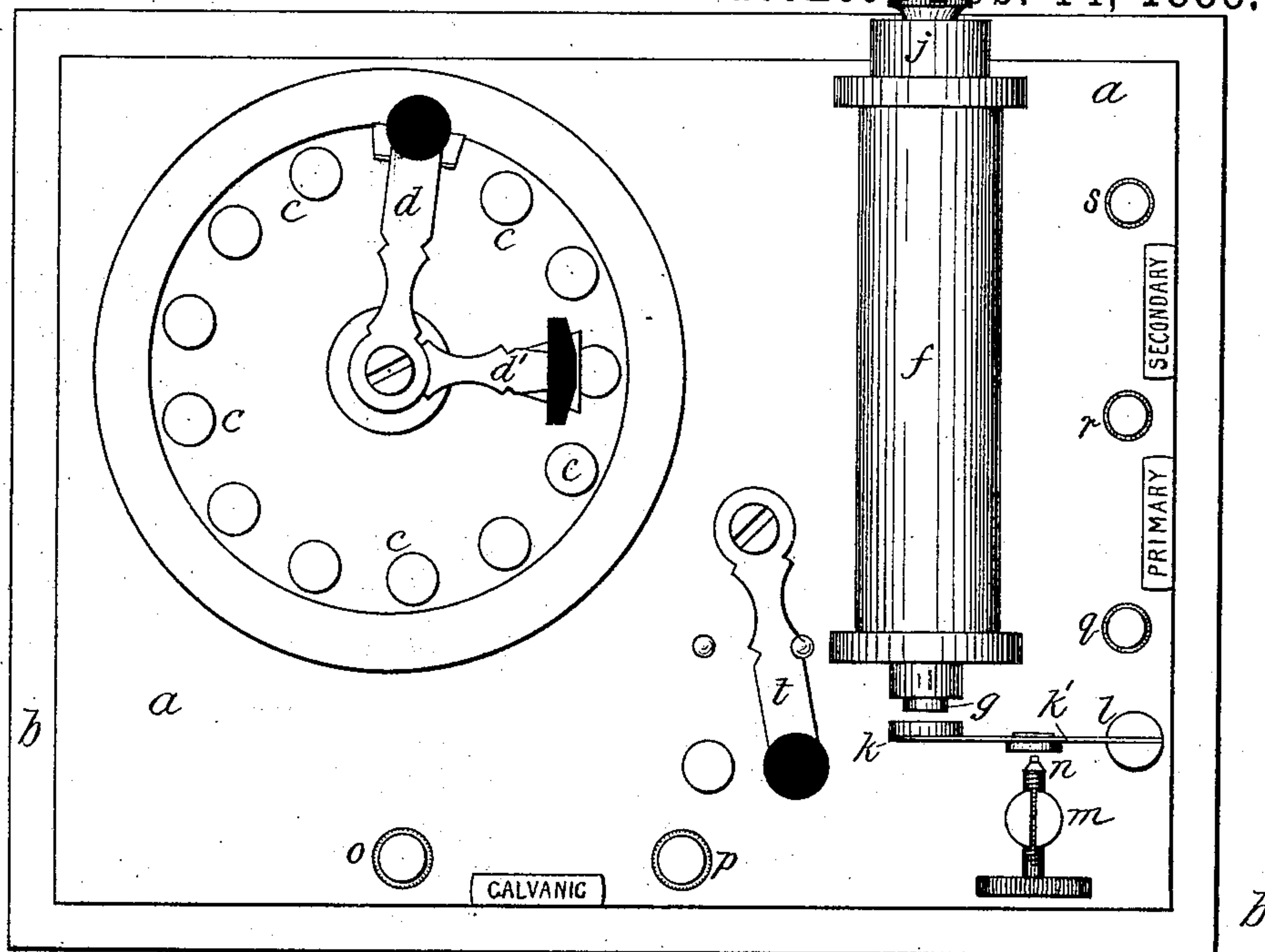
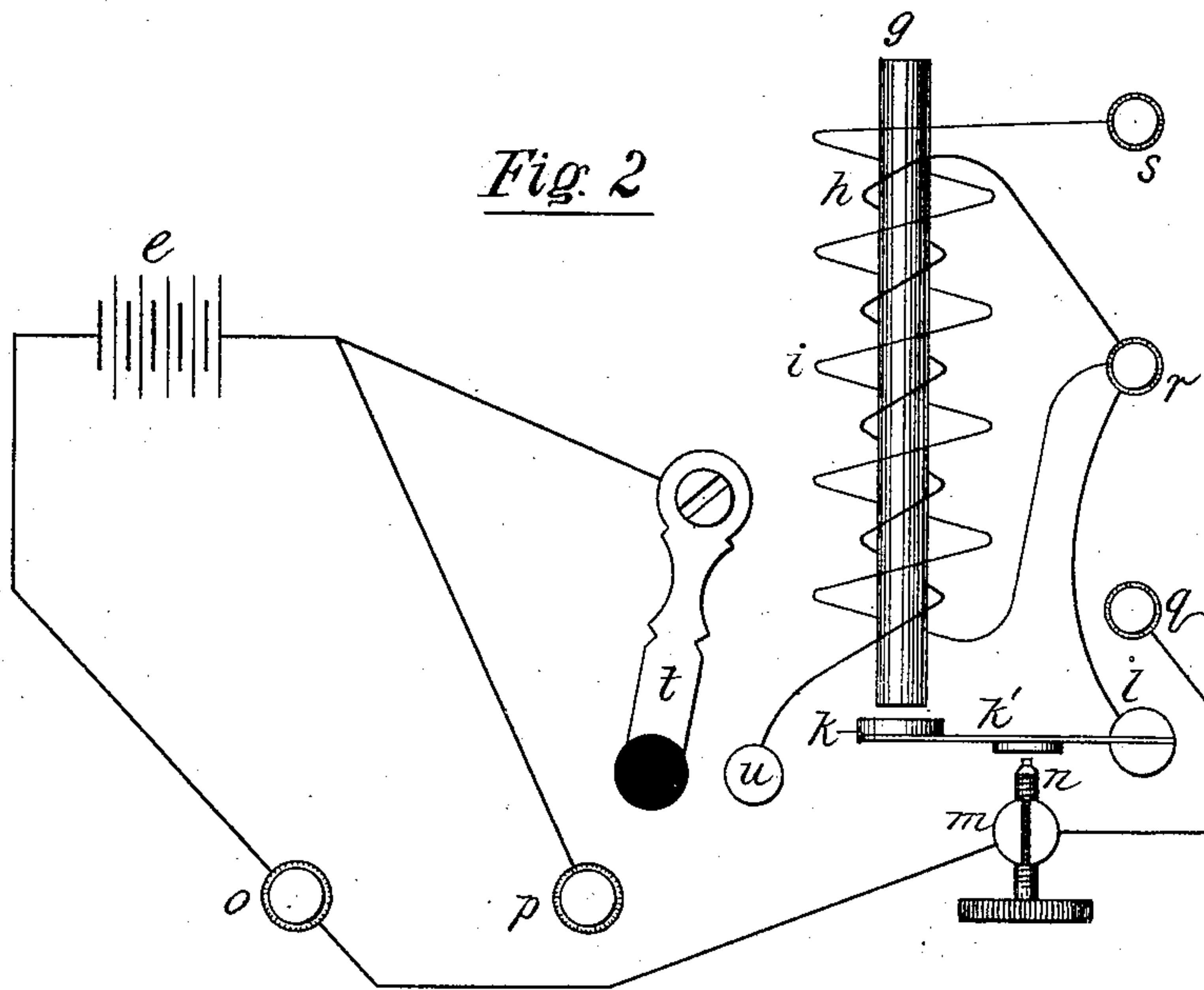


Fig. 2



Witnesses

H. D. Williams
W. H. Mersereau

Theodore R. Ten Broeck
Inventor
per Alfred Sheddock
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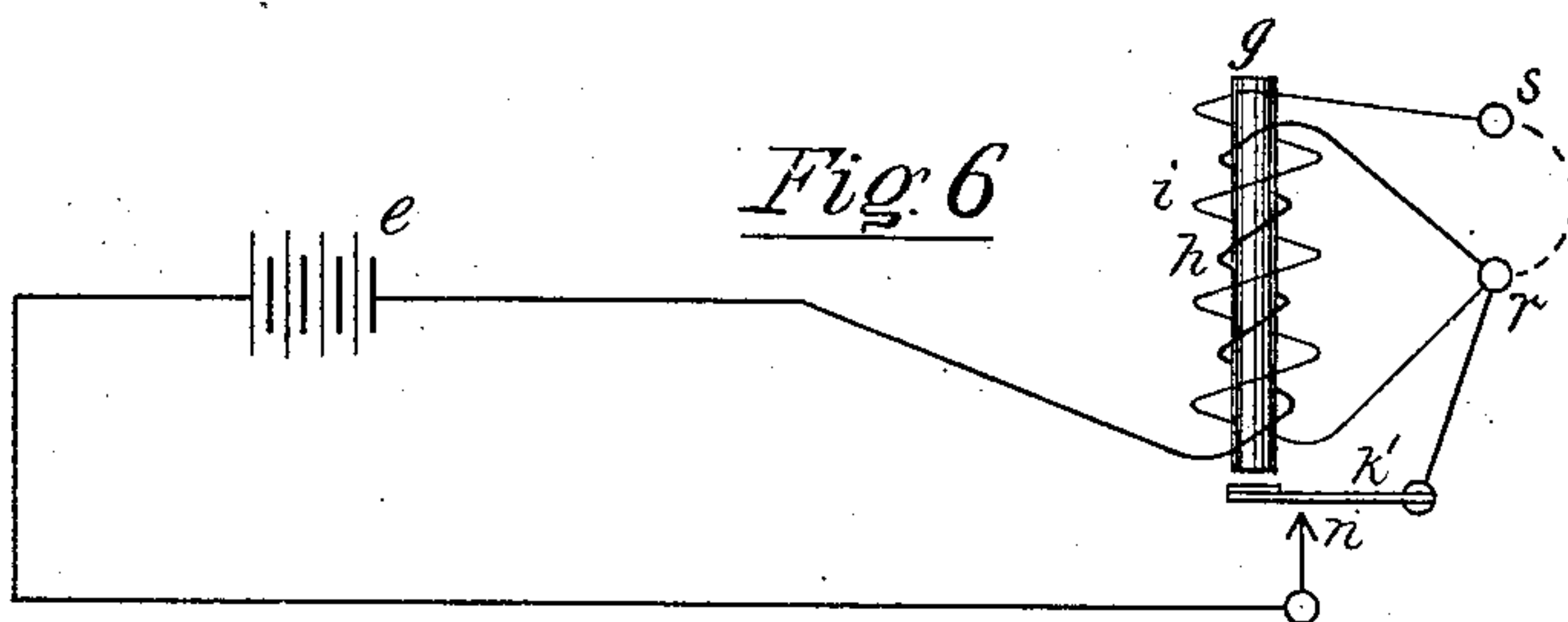
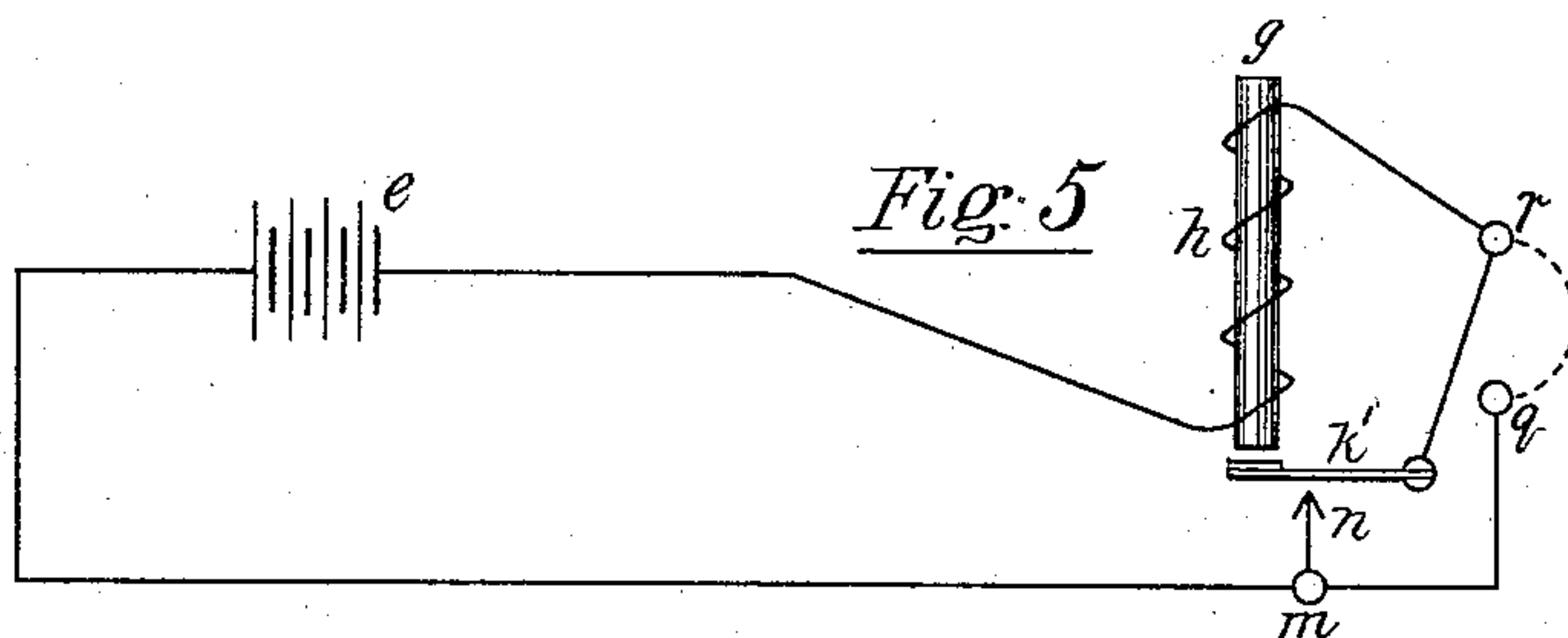
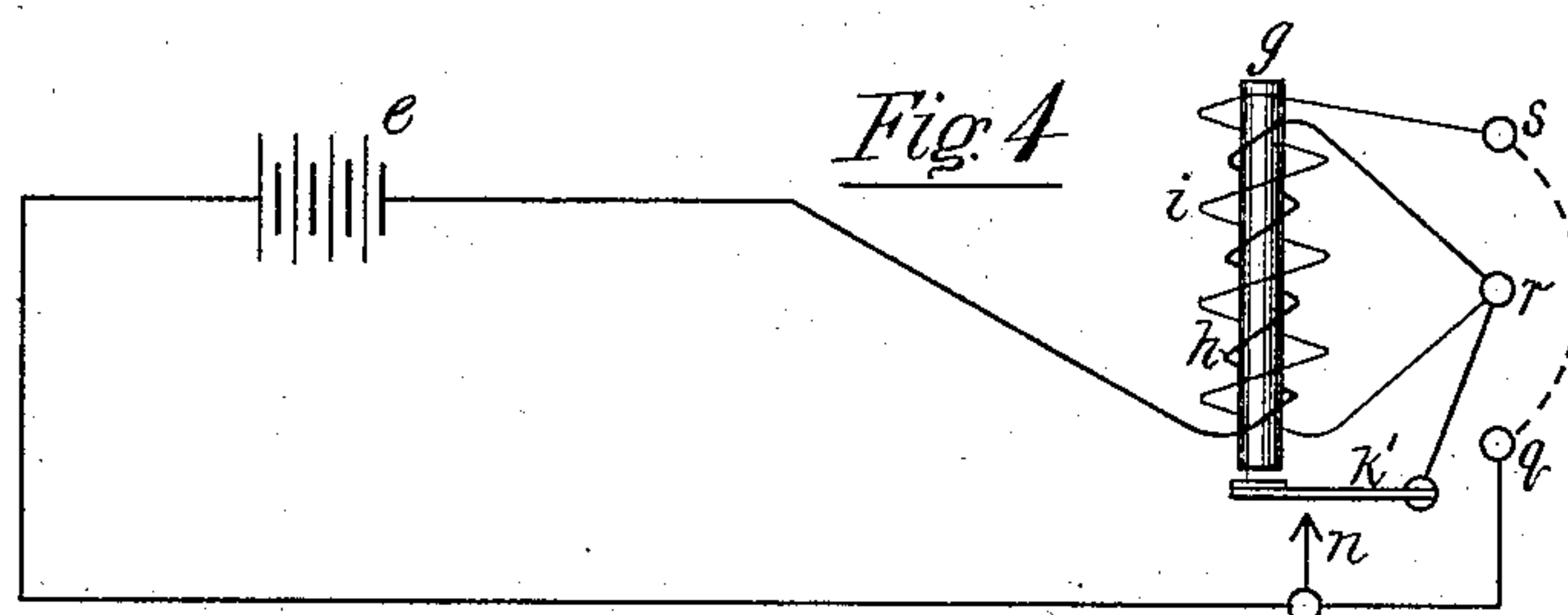
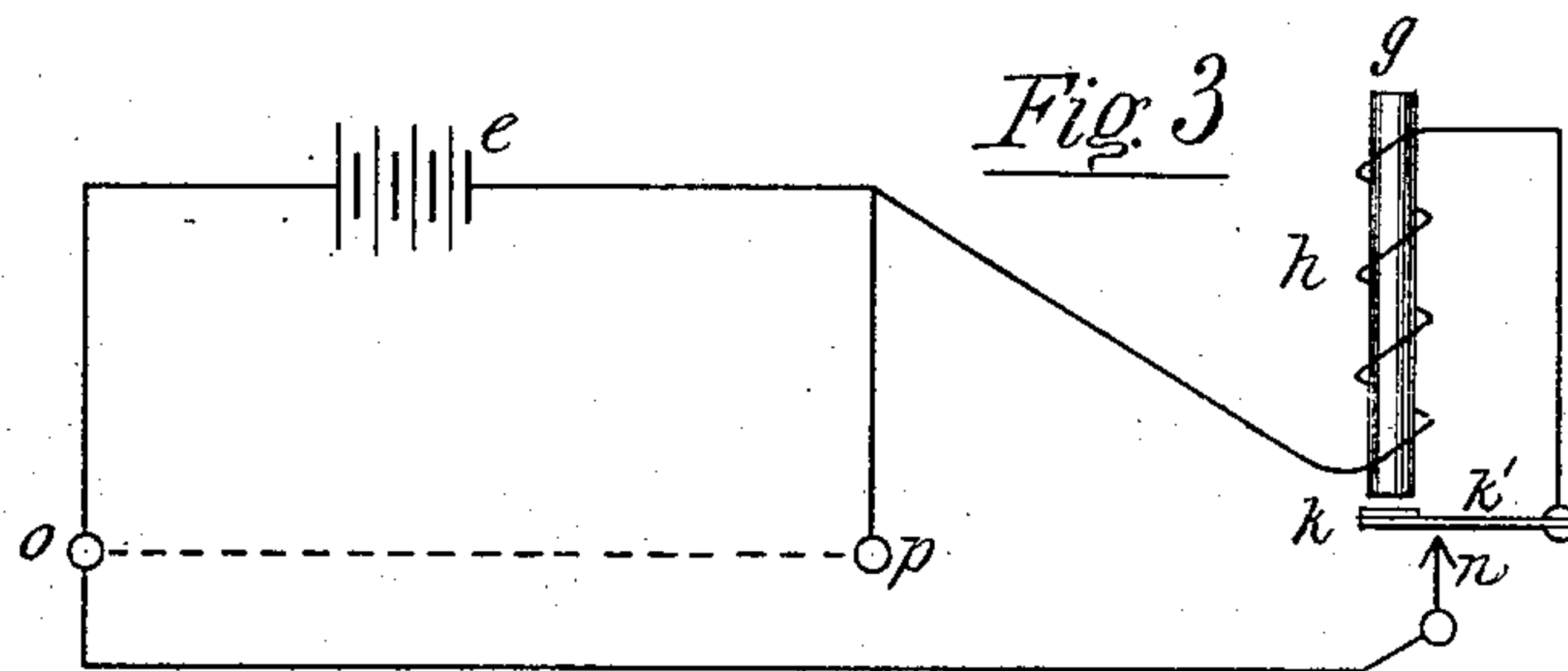
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UNITED STATES PATENT OFFICE.

THEODORE R. TEN BROECK, OF NEW YORK, N. Y., ASSIGNOR TO THE GALVANO-FARADIC MANUFACTURING COMPANY, OF SAME PLACE.

ELECTRO-MEDICAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 377,872, dated February 14, 1888.

Application filed July 23, 1887. Serial No. 245,041. (No model.)

To all whom it may concern:

Be it known that I, THEODORE R. TEN BROECK, a citizen of the United States, residing at New York, county and State of New York, have invented certain new and useful Improvements in Electro-Medical Apparatus, of which the following is a specification.

In electro-medical apparatus capable of producing either a continuous galvanic current, an interrupted galvanic current, or an induced to-and-fro current, a separate helix actuating a make-and-break device has been employed to cause the interruptions in the galvanic current, said extra helix being energized by an auxiliary battery. By my invention this is accomplished without the use of the extra automatic circuit-breaker and auxiliary battery, my said invention consisting of novel connections made between the battery, the primary and secondary coils of the usual electro-magnetic make-and-break device or inductorium, and the various binding-posts to which the body electrodes are attached, as will be fully hereinafter described in referring to the accompanying drawings.

Besides being able to produce continuous galvanic, interrupted galvanic, and induced to-and-fro currents at pleasure, simply by the rearrangement of the connections of apparatus heretofore used for the production of induced to-and-fro currents only, I am enabled with the same apparatus to produce an electric current of different conditions or having different properties from any electric current heretofore used for medical purposes—viz., a remittent galvanic current—that is, a current flowing continuously in one direction, but periodically increasing and decreasing in quantity.

In the accompanying drawings, Figure 1 represents a top view of the apparatus complete. Fig. 2 is a diagram view showing the various parts of the apparatus and connections, and Figs. 3 to 6 are diagrams showing the different sources of currents and combinations of currents obtainable.

To the top plate, *a*, of insulating material, are secured the various parts of the apparatus. This plate forms the cover of the box *b*, which contains a battery of twelve cells, more or less, joined together in series, the plugs *c c* of the

circular switch being the terminals of the connections of adjoining cells, any one or any number of which may be included in circuit with the apparatus by means of the contact-keys *d* and *d'*. This universal circular switch and arrangement of battery-cells therewith, by which the strength of the electric current may be varied at pleasure, is old and well understood, so that it is unnecessary here to enter further into the details of the same, the battery in all of the diagram views being represented by lines *e*, in the usual manner.

The electro-magnetic make-and-break device or inductorium *f* is of the usual construction, consisting of an iron core, *g*, primary wire *h*, secondary wire *i*, tubular metal shield *j*, placed between the coils of wire *h* and *i*, and by means of which, according to its position in relation to the coils, the intensity of induction effects in the secondary coil *i* is varied. The spring-acting armature *k* is carried by the post *l*, and the post *m* is provided with a screw, *n*, with which the spring *k'* of the armature makes contact when the armature is relieved of the influence of the magnetism of the core *g*.

There are five binding-posts, *o*, *p*, *q*, *r*, and *s*, to which the hand or body terminals may be attached. The post *o* is connected to one terminal of the battery *e* or one end of the cells contained between the keys *d* and *d'* of the circular switch, the other terminal of the battery or other end of said cells being joined to the post *p* and to one end of the primary coil *h* through the medium of the key *t* and contact-plug *u*. The other end of the primary coil *h* is joined to the binding post *r*, which in turn is joined to the armature-carrying post *l*. The contact-screw *n*, through the medium of the post *m*, is connected to the binding-posts *o* and *q*. The ends of the secondary coil *i* are connected to the binding-posts *r* and *s*, respectively.

For convenience of use, the binding-posts *o* and *p* are indicated by the word "Galvanic" placed between them, *q* and *r* by the word "Primary," and *r* and *s* by the word "Secondary." When it is desired to treat a patient with a continuous electric current, the electrodes or body terminals are connected to the posts *o* and *p*, the inductorium-circuit being then broken by moving the key *t* away

from the plug *u*, as shown at Fig. 2. This is one of the five conditions under which my apparatus is adapted to be used. In all of the other four the key *t* is placed on the plug *u*, as shown in Fig. 1. Said key is omitted from the diagram views 3 to 6, as are also all parts not in use or required, thereby avoiding confusion in describing the operations of the apparatus illustrated by these views.

The second condition of the apparatus, or the one by which a remittent galvanic current is produced, is when the patient is included between the binding-posts *o* and *p*, and the primary coil *h*, spring *k'*, and screw *n* form a circuit around the posts *o* and *p*, as shown at Fig. 3. In this case the current is momentarily divided between the working-circuit and primary-coil circuit, the quantity flowing through each circuit being inversely as their respective resistances. As soon as the armature *k* is attracted toward the core *g* the primary-coil circuit is broken at *k' n*, the whole of the current then flowing through the working-circuit. These actions take place periodically as the primary-coil circuit is opened and closed at *k' n*. As far as I am aware, this is entirely a new form or condition of electric current applied for therapeutic purposes, and cannot be produced by any other electro-medical apparatus, and is believed to produce in certain cases beneficial effects unattainable by other means, while at the same time retaining all of the advantages derivable from an interrupted galvanic current. Another effect is had when the patient is included between the binding-posts *q* and *s*, as shown at Fig. 4, the current then being alternately divided between the working-circuit comprising the primary coil *h*, the secondary coil *i*, and the patient, and the circuit comprising the primary coil *h*, spring *k*, and screw *n*, or wholly passing through the working-circuit.

To treat the patient as with an interrupted galvanic current, the connections are made with the binding-posts *q* and *r*, as shown at Fig. 5, the patient then being periodically virtually cut out of the circuit by the shunting of the current through the short circuit from *r* to *m* when the spring *k'* touches the screw *n*.

The secondary or induced to-and-fro current is had when the patient is placed between the posts *r* and *s*, as shown in Fig. 6, the battery-circuit, with the primary coil *h* included therein, being opened and closed at *k' n*. High-tension currents are induced in the secondary coil *i* and act on the patient included therein.

From the foregoing it will be seen that all

of the effects obtainable from apparatus of this class heretofore made, and in which are used two batteries, two circuit-breakers, and an induction-coil, can be obtained by the use of my improved electric medical apparatus, which embodies one battery and one inductorium only, and that other new and useful effects are produced not before attainable by apparatus of this class.

What I claim, and desire to secure by Letters Patent, is—

1. In an electro-medical apparatus, in combination, a source of electricity, connections for forming a closed working-circuit therewith, and an electro-magnetic make-and-break device included in a shunt-circuit around the closed circuit, whereby a remittent galvanic current is caused to flow through said closed circuit.

2. In an electro-medical apparatus, in combination, a source of electricity, a closed circuit, including the primary coil of an inductorium and the working-circuit, and a shunt-circuit around the working-circuit, including the make-and-break device.

3. In an electro-medical apparatus, in combination, the battery *e*, the contact-point *n* of the make-and-break device connected to one terminal of the battery, the armature *k*, connected to the post *r*, the primary coil *h* of the inductorium *g*, connected at one end to the post *r* and at the other end to the battery, the secondary coil *i*, connected to the posts *r* and *s*, the post *q*, joined to the contact-point *n*, and the working-circuit connected to the posts *s* and *q*, substantially as set forth.

4. In an electro-medical apparatus, in combination, the battery *e*, binding-posts *p* and *o*, connected thereto, switch *t*, connected to one end of the battery, the contact-point *n* of the make-and-break device connected to the other end of the battery, the armature-spring *k'*, connected to the post *r*, the primary coil *h* of the inductorium *f*, connected at one end to the post *r*, the contact-plug *u*, joined to the other end of the primary coil, the secondary coil of the inductorium connected at one end to the post *r*, the post *s*, joined to the other end of the secondary coil, and the post *q*, connected to the contact-point *n*, substantially as set forth.

Signed at New York, county and State of New York, this 13th day of July, 1887.

THEODORE R. TEN BROECK.

In presence of—

JAMES A. HUDSON,
JOS. S. MICHAEL.