

R. K. BOYLE.  
Electric Telegraph Apparatus.

No. 153,309.

Patented July 21, 1874.

Fig: 1.

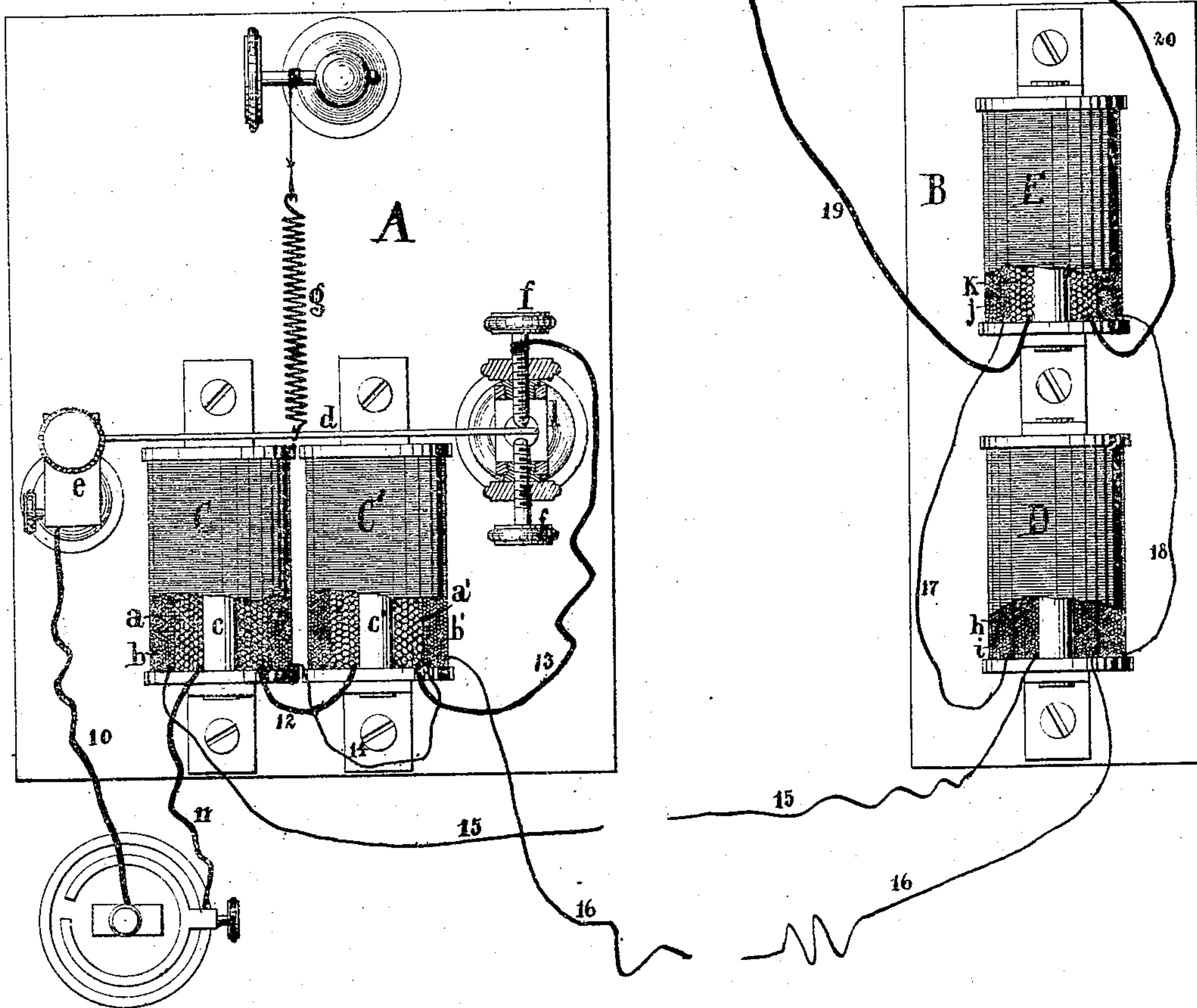
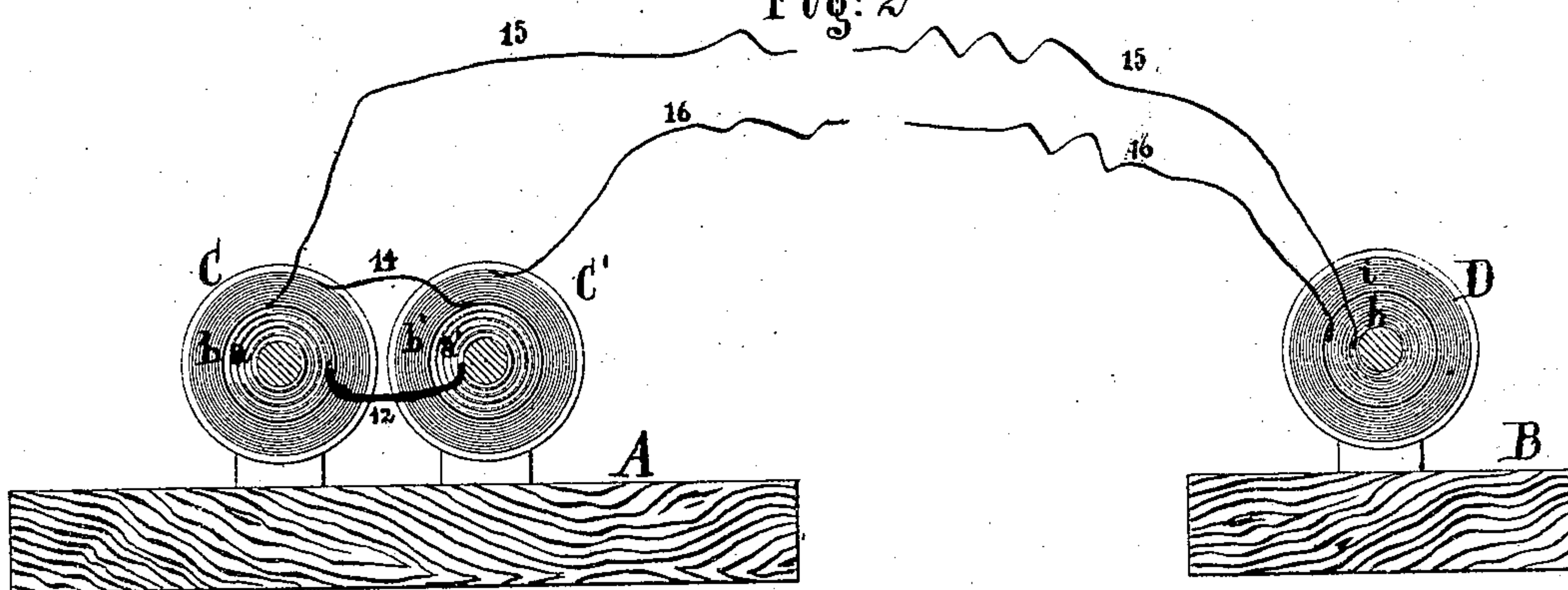


Fig: 2



Witnesses:  
*Chas. Wahlers.*  
*Henry Gentner.*

Inventor:  
*Robert K. Boyle*  
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attys



# UNITED STATES PATENT OFFICE.

ROBERT K. BOYLE, OF BROOKLYN, NEW YORK.

## IMPROVEMENT IN ELECTRIC-TELEGRAPH APPARATUS.

Specification forming part of Letters Patent No. **153,399**, dated July 21, 1874; application filed June 27, 1874.

*To all whom it may concern:*

Be it known that I, ROBERT K. BOYLE, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Electric Telegraphs, of which the following is a specification:

This invention is illustrated in the accompanying drawing, in which—

Figure 1 represents a sectional plan. Fig. 2 is a transverse section in the plane *xx*, Fig. 1.

Similar letters indicate corresponding parts.

This invention consists in combining one or more induction-coils and a circuit-breaking armature at the transmitting-station with an induction-coil at the receiving-station, the outer helices of the transmitting coil or coils being connected by the line-wires with the outer helix of the receiving-coil, while the inner helix or helices of the transmitting coil or coils are connected to a galvanic battery in such a manner that induced currents are sent over the line-wires, which produce secondary induced currents in the receiving-coil suitable for chemical writing or other purposes. One or more induction-coils are connected with the outer helix of the receiving-coil for the purpose of adapting the induced current obtained from the last coil for writing on chemically-prepared moist paper.

In the drawing, the letter A designates the transmitting-instrument, and the letter B the receiving-instrument, of an electric telegraph. Said transmitting-instrument contains two induction-coils, C C', each of which is composed of an inner helix, *a a'*, of coarse wire, and of an outer helix, *b b'*, of fine wire, the inner helices *a a'* being wound on the cores *c c'*. With these two coils is combined an armature-lever, *d*, which has its fulcrum in a standard, *e*, and the free end of which vibrates between two screws, *f f'*, being brought in contact with the point of the screw *f* by the action of a spring, *g*, when the circuit through the coils C C' is broken. The screws *f f'* are secured in a standard, *l*, and the screw *f* is insulated from this standard. The receiving-instrument contains two induction-coils, D E, the coil D being composed of two distinct helices, *h i*, both of fine wire, while the coil E is composed of an outer helix, *j*, of fine wire, and an inner helix, *k*, of coarse wire.

The connection of the several parts of my instrument is as follows: The standard *e* of the armature-lever connects, by a wire, 10, with one pole of the battery F, a suitable key being interposed between this wire, so that the circuit can be opened or closed at the will of the operator. The other pole of the battery F connects, by a wire, 11, with the inner end of the helix *a*, (coil C,) and the outer end of the helix *a* connects, by a wire, 12, with the inner end of helix *a'*, (coil C'.) The outer end of this helix *a'* connects, by a wire, 13, with the insulated screw *f*. The outer end of the helix *b* (coil C) connects, by a wire, 14, with the inner end of a helix, *b'*, (coil C',) while the inner end of helix *b* connects, by the line-wire 15, with the inner end of helix *h*, (coil D,) and the outer end of the helix *b'* connects, by the line-wire 16, with the outer end of helix *h*, (coil D.) The inner end of helix *i* (coil D) connects, by wire 17, with the inner end of helix *j*, (coil E,) and the outer end of helix *i* connects, by wire 18, with the outer end of helix *j*. The ends of the inner helix *k* of coil E connect, by wires 19 and 20, with a pen or other device to produce marks on chemically-prepared paper, either by heat or by chemical action, or to operate any desired signal apparatus.

When the circuit through wire 10 is closed by the key a current passes through wire 11, helix *a*, wire 12, helix *a'*, wire 13, screw *f*, armature-lever *d*, standard *e*, and wire 10, back to the battery, the cores *c c'* are rendered magnetic, the armature-lever *d* is attracted, and as the end of said armature-lever is thrown out of contact with the screw *f* the circuit is broken, the armature-lever falls back, and so on, as long as the circuit through wire 10 remains closed. By these means intermittent currents are caused to pass through the helices *a a'*, and thereby an induced current is produced in the helices *b b'*, which passes over the line-wires 15 and 16 to the helix *h* of coil D. By the waves of this induced current passing through the helix *h* another induced current is produced in the helix *i* of coil D, which passes over wires 17 and 18 to helix *j* of coil E, whereby an induced current is produced in the helix *k*.

It must be remarked that the line-wires 15 and 16 might be connected directly to the ends



of the helix *j* of coil E; but in this case the induced current produced in the helix *k* could only be used for writing on prepared dry paper; but it will not work successfully for writing on prepared moistened paper.

By interposing the reducing-coil D the waves of the induced current produced in the helix *k* of coil E are made to follow each other with such rapidity that the current is, practically speaking, continuous, and fit for writing on prepared moistened paper. If desired, two or more such reducing-coils may be used. The current produced may be used for other kinds of telegraphic purposes besides chemical writing.

It may be remarked that the induction coil or coils C C', instead of being connected to a galvanic battery, might be charged by any other known method for producing a current.

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

1. In an electric telegraphing-instrument, the combination of one or two induction-coils, C C', and their circuit-breaking armature-lever *d* with line-wires 15 and 16, and with an induction-coil, E, the inner helix of which connects with a pen or other device for producing marks or signs, substantially as shown and described.

2. The combination of an additional induction coil, D, with the induction-coil E, line-wires 15 and 16, and with the induction-coils C C' and their circuit-breaking armature-levers *d*, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand and seal.

R. K. BOYLE. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.