

(No Model.)

D. McF. MOORE.  
INTERRUPTER FOR ELECTRIC LIGHTING SYSTEMS.

No. 604,681.

Patented May 24, 1898.

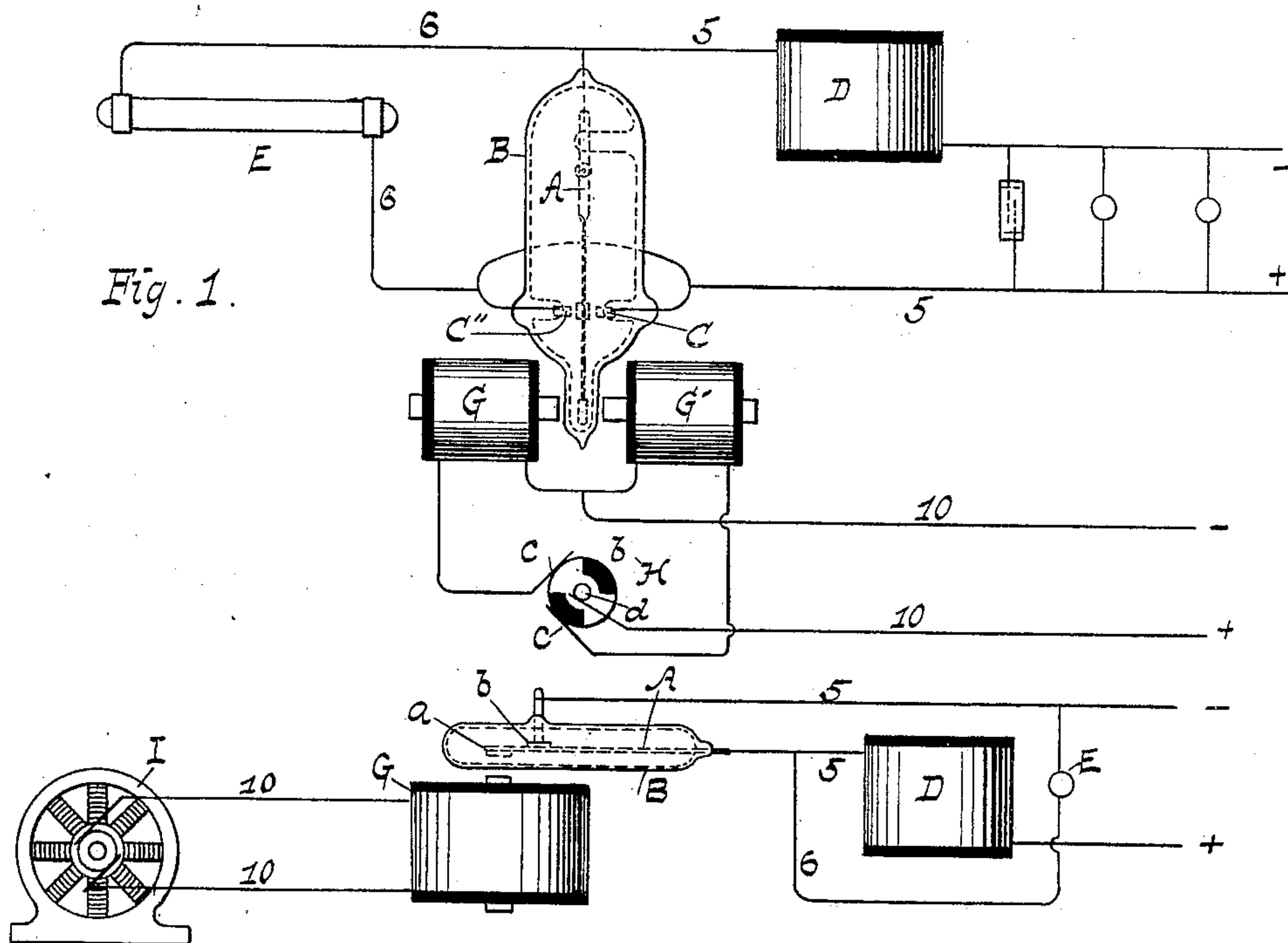


Fig. 2.

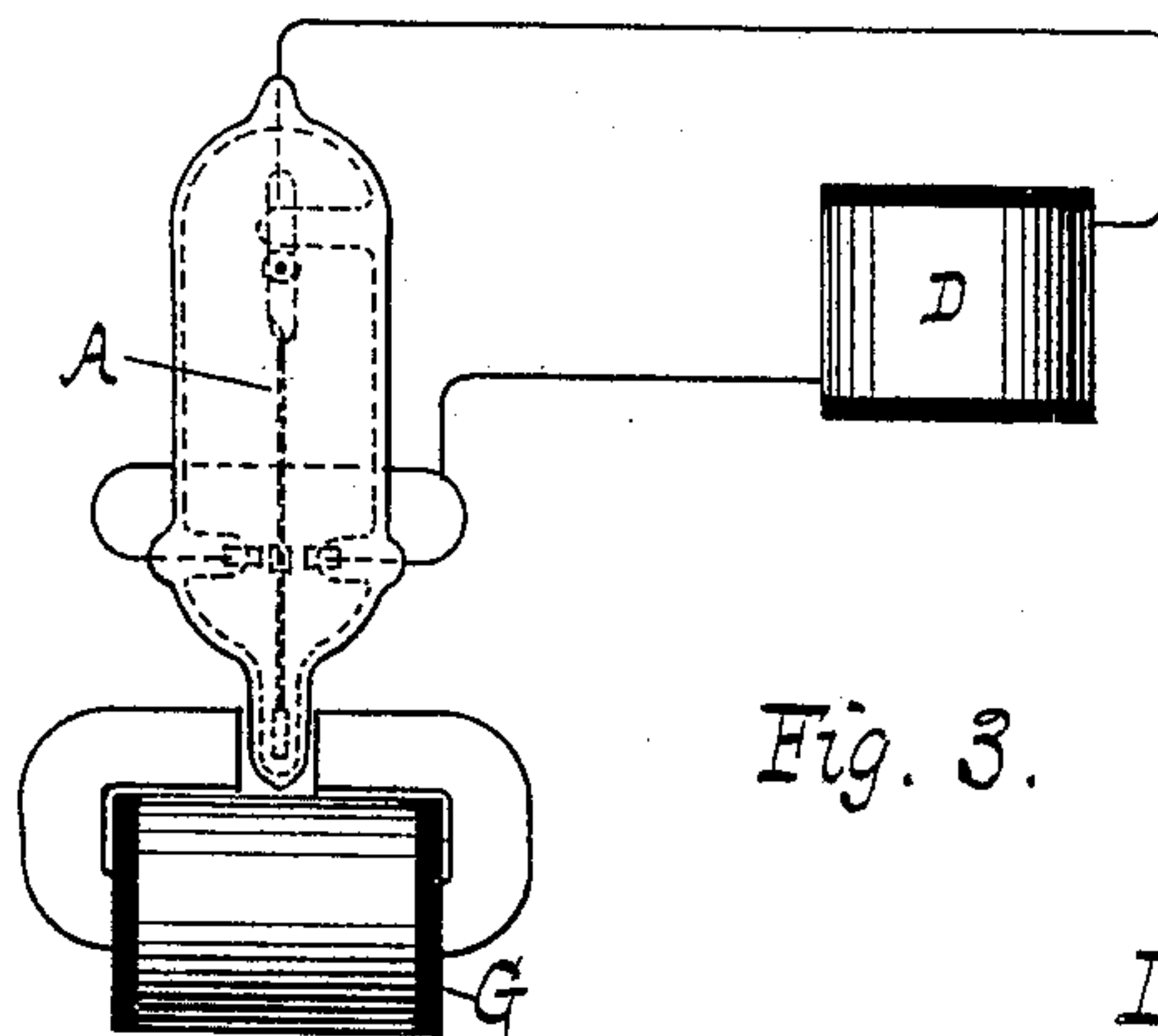


Fig. 3.

Witnesses:

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# UNITED STATES PATENT OFFICE.

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## INTERRUPTER FOR ELECTRIC-LIGHTING SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 604,681, dated May 24, 1898.

Application filed December 3, 1895. Serial No. 570,872. (No model.)

*To all whom it may concern:*

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a certain new and useful Interrupter, of which the following is a specification.

My invention relates to magnetically-actuated circuit-interrupters operated in a vacuum and in a circuit of induction for the purpose of generating electric waves, disturbances, or discharges suitable for producing luminous or other effects.

The invention is primarily designed for use with vibratory interrupters, but may also be used with rotary interrupters. The power of the magnet or magnets may be varied by varying the power of the current in a circuit through them, as by interrupting the circuit and (in the preferred form of my invention) by alternately charging the two magnets which move the interrupter in opposite directions, or the same effect may be produced by the use of an alternating current, the interrupter being in such case preferably polarized.

The invention consists in the construction, combination, and arrangement of parts and circuits hereinafter fully described, and set forth in the claims.

In the accompanying drawings, Figure 1 shows in a general diagrammatic form an arrangement of apparatus embodying my invention. Fig. 2 illustrates the invention as carried out by the use of an alternating electric current. Fig. 3 shows a modification.

In Fig. 1, A indicates the vibratory interrupter hermetically sealed in a receptacle B, of glass or other suitable material, in which there is a vacuum carried, preferably, to a very high degree of exhaustion. The interrupter A works between two contacts C C', which are supported within the receptacle and connected by wires sealed in the walls of the receptacle with one pole of the circuit, while the interrupter A is connected through said walls with the other pole in any suitable manner.

The circuit which is interrupted is indicated by the numeral 5 and includes a coil of self-induction B, preferably wound, with no core to lessen the magnetic lag. The inter-

ruption of this circuit of induction at the points C C' produces electric waves, disturbances, or undulations, which are conveyed off by wires 6 to the device E, which may be an electric lamp or other device upon which such electric disturbances may operate. The lamp here shown is what I term a "phosphorescent electric lamp"—such, for instance, as described in my prior patent, No. 548,127, but might be of any other form. The device E might be connected in any other way to the circuit to be affected by the electric disturbances set up by the action of the interrupter. The circuit 5 is supplied with energy from any desired source—as, for instance, from a wire feeding ordinary incandescent lamps or other translating devices.

The interrupter A might be mounted as a spring in the receptacle, but is preferably pivoted to vibrate freely from the fixed support *a* within the receptacle. It is provided with an armature F, working in a narrow space at one end of the receptacle and opposite the poles of the electromagnets G G', which are alternately energized through the operation of a circuit-changer H, driven by any suitable motive power and placed in a circuit 10, including the magnets G G'. The circuit 10, which is independent of 5, is supplied from any suitable source and might be taken from the same source or mains which supply the circuit 5. The poles of the electromagnets are brought close to the armature F, so as to operate powerfully upon the same. The interrupter H is a power-driven interrupter, operated by a spring or other mechanical power or by an electric motor; but as the manner of driving the same forms no part of my present invention the motive device itself is not here indicated.

The circuit-changer is here typified by a rotary disk of metal *b*, interrupted at its periphery by insulating-spaces and provided with springs *c*, which bear upon the periphery and connect, respectively, with magnets G G', while a third spring *d*, bearing upon the hub of the disk, preserves the connection with one pole of circuit 10, the other pole of which is connected to the return of the magnets G G'. The operation of the device, obviously, is to cause the current to pass first through



G and then through G', and so on in alternation, thereby producing positive vibration of the interrupter A, the rate of which may be adjusted by adjusting the speed of the driving power by any suitable means.

It will be obvious that the invention is capable of being carried out by any form of circuit-changer adapted to energize the magnets G G' in alternation, and that as the action is a positive one and independent of the condition of the contacts C C' the device is much more certain and steady in action than those interrupters heretofore employed, wherein the action of the magnet which operates the interrupter is dependent upon the condition of circuit at the contacts of said interrupter within the receptacle.

I do not limit myself to loosely pivoting the interrupter, but might, as indicated in Fig. 2, construct the same as a spring, though it is preferable to pivot it loosely, since in such case its action may be more readily controlled, not being affected by the natural rate of vibration of the spring. In Fig. 2 the interrupter is shown as a spring-interrupter, working in a receptacle of any ordinary character and serving to break the circuit of induction, including a coil D, the extra current of which is carried to the light E by the branch wires 6. The interrupter A carries an armature placed opposite the poles of an electromagnet G. The armature may be of soft iron or may be polarized. The variations of power in the magnet G are produced by the action of an alternating current circulating in the coils of said magnet and derived from any alternating-current source, as indicated at I. The circuit of the coil G is independent of that through the interrupter, as already described, and the rate of interruption may be readily controlled by the rate of alternation, and the action will be quite independent of any condition of the interrupter-contacts. In this form of the invention the movement of the interrupter in one direction is produced by the action of the spring at every change of polarity of the alternating current, and its movement in the other direction is produced by the power of the actuating-magnet.

To secure a positive action in both directions, as is the case in the arrangement shown in Fig. 1, the armature on the interrupter should be polarized. When so polarized, it is preferable to arrange it between the poles of an electromagnet or magnets which are placed in the alternating-current circuit. For simplicity I prefer to arrange it, as shown in Fig. 3, between the opposite poles of the same magnet. As will be obvious, the movement of the interrupter is a positive one in both directions, being produced by the combined push

and pull of the magnetic poles, which reverse their action with the reversal of the current flowing in the coils of the electromagnet. The interrupter may, as before, work between two contacts, thereby doubling the number of interruptions of the circuit for a given rate of vibration.

By operating the interrupter by means of an alternating current I am enabled to dispense with the use of the circuit making and breaking devices of the circuit-changer H. (Shown in Fig. 1.) As to the power for operating such circuit-changer, it is to be remarked that an electric motor might be employed which should derive its power from the same source as the wires 10 10, being placed, however, by preference, in shunt to said wires, as will be obvious to electricians.

I do not limit myself to the use of a direct or continuous current in the circuit of induction which traverses the interrupter, for such current might be an alternating current and in this case might be taken from the same mains which supply alternating current to the interrupter actuating-magnet.

I do not make specific claim herein to the combination, with the actuating-magnet for the interrupter, of a source of alternating currents supplying the said magnet over a circuit independent of that including the interrupter, as this is claimed specifically in an application of even date filed by me.

What I claim as my invention is—

1. The combination with an interrupter working in a sealed receptacle, of a pair of actuating-magnet poles arranged at opposite sides of an armature carried by said interrupter, and means for energizing said magnets in alternation, as described, over a circuit independent of the interrupter.

2. The combination with an interrupter loosely pivoted in a sealed receptacle, of an armature borne thereby, and a pair of actuating-magnet poles arranged on opposite sides thereof, said magnet being in a circuit independent of the interrupter-contacts,

3. The combination, substantially as described, of an interrupter working in a sealed receptacle and carrying an armature within said receptacle, a pair of magnet-poles exterior to the same and arranged on opposite sides of said armature, and means for energizing said magnets in alternation as described to cause a positive movement of the interrupter in both directions.

Signed at New York, in the county of New York and State of New York, this 22d day of November, A. D. 1895.

DANIEL MCFARLAN MOORE.

Witnesses:

WM. H. CAPEL,  
D. H. DECKER.