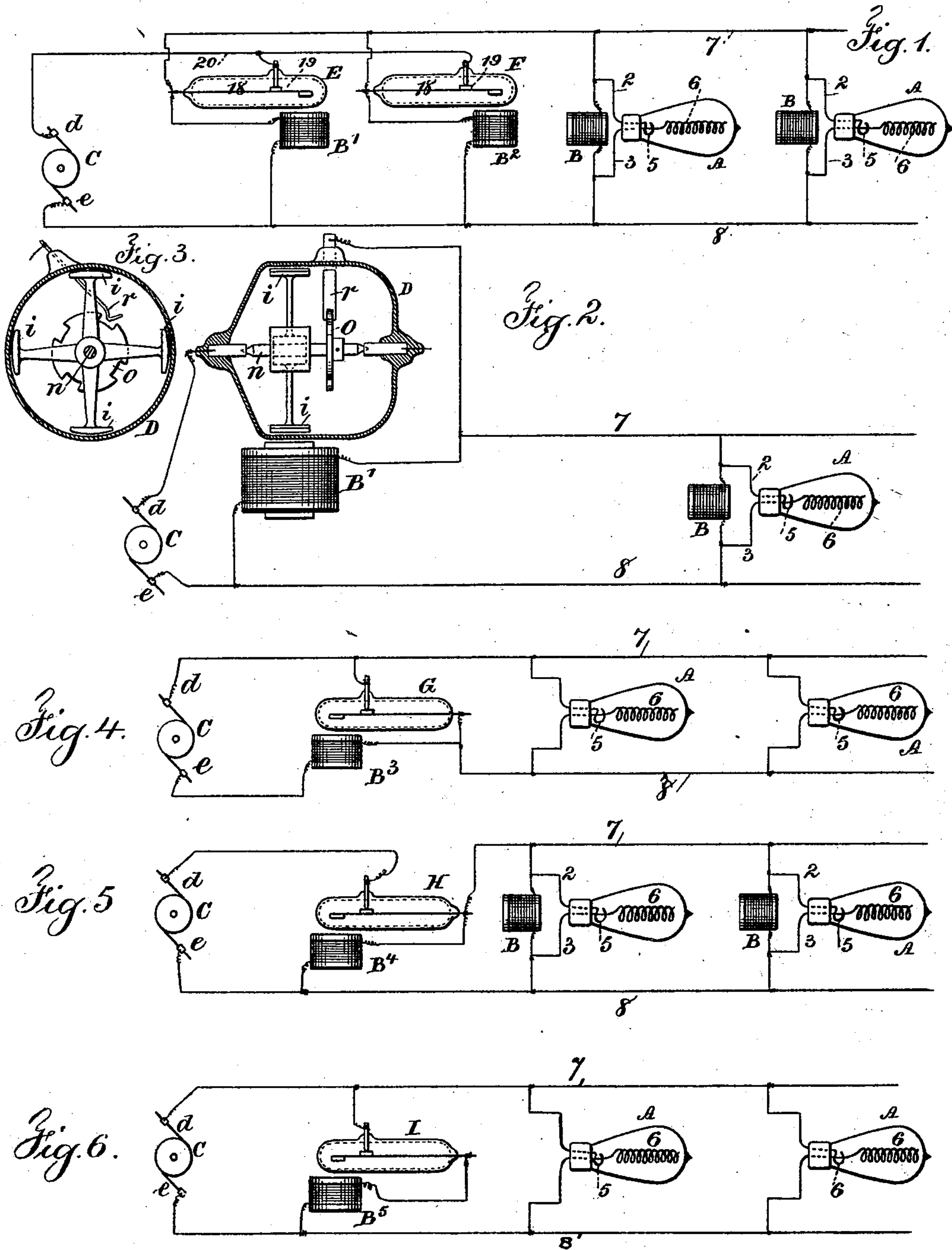


(No Model.)

D. McF. MOORE.
ELECTRIC LIGHTING SYSTEM.

No. 548,128.

Patented Oct. 15, 1895.



Witnesses

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ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 548,128, dated October 15, 1895.

Application filed April 10, 1895. Serial No. 545,168. (No model.)

To all whom it may concern:

Be it known that I, DANIEL MCFARLAN MOORE, a citizen of the United States, residing at the city, county, and State of New York, have invented an Improvement in Electric Lamps and Circuits for the Same, of which the following is a specification.

The present invention relates to certain improvements in a system of electric lighting disclosed in other pending applications filed by me, but more particularly claimed in my application for patent filed July 19, 1895, Serial No. 556,457, as a continuance of the present application as originally filed. In that system I produce luminous effects in a rarefied receiver or other suitable light-giving source by the electric disturbances or vibrations set up in a circuit of induction through interruptions of the current flowing thereon effected in a vacuum.

The present invention relates particularly to arrangements whereby a number of lamps may be operated by a single interrupter or series of interrupters common to said lamps and to arrangements of self-induction coils or similar reactive devices whereby the electric waves or disturbances may be reinforced.

The invention consists, further, in a novel form of lamp adapted to be rendered luminous by electric waves or disturbances operating in or upon a receiver containing a rarefied gas or vapor.

In the accompanying drawings, Figure 1 is a diagram illustrating my invention. Fig. 2 shows the invention as carried out with a modification in the form of circuit-interrupter. Fig. 3 is a side elevation of the rotary interrupter. Fig. 4 illustrates a modification in the connection of the apparatus. Fig. 5 shows a simplified arrangement. Fig. 6 shows another modification in the manner of connecting up the devices to produce energy suitable for operating the lamp.

A is the lamp suitably made for operation by electric waves, vibrations, or disturbances generated in a circuit of induction through sudden interruptions of a current flowing through it. In a general way the lamp may be said to be of the kind heretofore employed when luminous effects are to be produced by the discharge from induction-coils, Leyden jars, or similar devices in so far as it con-

tains a rarefied gas or vapor subjected to the action of electricity conveyed inductively or conductively to it to render it luminous. At the same time it is to be understood that my invention may be carried out by the use of any lamp adapted to be rendered luminous by sudden and repeated electric waves, disturbances, or discharges, such as may be developed, as herein described, by repeatedly interrupting a circuit of induction.

The lamp A shown is a sealed bulb of glass into which circuit-wires 2 and 3 enter and terminate within the bulb, as a ring 5, preferably of aluminum, forming a terminal of wire 2 and a helix or spiral 6, connected to wire 3. These are electrodes suitable for use when the energy for operating the lamp is developed by interruptions of a continuous current in the circuit of self-induction connected as herein described. When an alternating current is used, the terminals should be similar.

C is any suitable generator of electricity connected with the mains or wires 7 8, and in multiple across said mains are placed inductive resistances indicated by the letter B, and through which the current from the generator C may flow. Each resistance B is formed, preferably, of a helix of self-induction and each constitutes a shunt or branch circuit around the terminals of one of the lamps A. It is obvious that any interruption of the current flowing over the mains 7 8 and through the helices B will set up in each helix an extra current, which will act upon the circuit of the lamp to which it is connected independently of the other lamp or lamps.

I have before discovered that if the interruptions of the current-flow in the self-inductive helices be made very abrupt and are repeated with sufficient rapidity the electric disturbances or waves of energy generated in the helices B of self-induction will render the lamps A luminous. These interruptions of the current-flow are preferably made in a vacuum which is as near as possible perfect.

In the diagram Fig. 5 I have illustrated my invention in a simple form. The interrupter of the current from the generator C is indicated at H. In Fig. 1 the interrupters are indicated at F and E. The interrupter is composed, as designated in the latter figure, of a

vibrator-spring 18, adapted to make and break connection with a contact 19. The parts of the interrupter are inclosed in a sealed bulb, preferably of glass, which is exhausted to as high a degree as possible. The interrupter, which may be vibratory or may be rotary, is kept in action by any suitable means and is interposed in the circuit 7 8, so that it will affect both coils B. As a means of operating said interrupter, I may employ an electromagnet B⁴, connected to the circuits, as shown in Fig. 5, so that the interruption of the connection by the magnet pulling down upon the armature connected with spring 18 will de-energize the magnet and allow the spring to return to circuit-closing position, the action being in all respects, so far as the movements of the interrupter are concerned, the same as those of the well-known automatic magnetic vibrator. By placing the magnet B⁴ in the position shown, so as to constitute practically one of the multiple-arc branches across the the circuits 7 8, it is obvious that the electric waves, vibrations, or disturbances generated by the interruption of the flow of current from generator C through magnet B⁴ will flow from the latter in multiple with the waves or disturbances from each coil B, so as to reinforce the effect of the latter on each lamp.

My invention is not limited to any particular voltage of the generator C, but I have obtained good results from an ordinary one-hundred-and-ten-volt continuous-current generator acting upon the coils B, suitably wound or proportioned as to their resistance and self-induction, so as to give a good reaction and extra current.

In Fig. 1 I have illustrated the way in which two interrupters may act in conjunction and the waves or disturbances generated in their actuating magnets may be conducted in common to the circuits 7 8 for operation upon the lamps. Each interrupter and its magnet are connected to the circuit in substantially the same way as that shown in Fig. 5, as will be obvious from inspection of the diagram.

In Fig. 4 I have shown another arrangement of the vibrator-magnet, and the coils B in shunt around the lamps are omitted. The magnet B³, in Fig. 4, is in the main circuit, as is obvious, and the waves or disturbances of self-induction generated by interruption of the current-flow through it circulate through the generator C, to and from the mains 7 and 8, for action upon the lamps A.

In the arrangement shown in Fig. 6 the circuit of induction which is interrupted and which discharges to the lamps is that of the generator alone. Although the magnet B⁵ is in the circuit when the current flows, yet it is in such position that upon interruption of that circuit its path of discharge is broken, leaving the self-induction of the generator C as the only effective agent for the production

of the waves or disturbances suitable for acting on the lamps.

Figs. 2 and 3 illustrate a modification of my invention wherein a rotary interrupter is used. The bulb D, exhausted to the highest degree practicable, contains a shaft *n*, rotating on suitable bearings therein and carrying armatures *i* of an electric motor, the field or actuating magnet of which is the magnet B'. The commutator of said motor consists of the spring *r*, engaging with the commutator or interrupter-wheel *o* within the vacuum, said commutator being so arranged that it will close the circuit of the magnet B' to cause the latter to attract the armatures, but will open the circuit as the armatures approach the magnet, whereupon the momentum will bring the commutator around to close circuit and attract the succeeding armature. The interrupter which generates the waves or disturbances for operation on the lamp consists of the spring *r* and wheel *o*, as will be obvious, the circuit arrangement being substantially the same as that shown in Fig. 5.

The electrical action of the apparatus, Fig. 2, in generating the waves or disturbances for action on the lamp A is obviously the same as already explained.

I do not, of course, limit myself to any particular form of rotary interrupter, but prefer to employ one such as described, wherein the rotation is produced by the action of an extra magnet the self-induction of which generates the waves or disturbances by which the lamp is operated.

The generation of electric waves or disturbances by repeated interruptions in a vacuum of a circuit of induction in the manner and by the means herein described and the employment of such disturbances to generate light in a rarefied gas or vapor or other equivalent lamp are not herein claimed, as they form the subject of claims in my application filed July 19, 1895, Serial No. 556,457, as a continuance of the present application.

What I claim as my invention is—

1. The combination with a number of electric lamps each consisting essentially of a rarefied receiver adapted to be rendered luminous by electric undulations or disturbances, of a generator in a circuit common to such lamps, a shunt or branch of self-induction around each lamp, and means for rapidly interrupting the current of said generator, as and for the purpose described.

2. The combination with lamps, substantially such as described, connected in parallel to suitable mains, of a self-induction branch around each lamp, a generator connected to said mains, and means for continuously producing repeated interruptions of the flow of current from said generator over the mains.

3. The combination with lamps, substantially such as described, connected in parallel to suitable mains, of a self-induction branch

around each lamp, a generator connected to said mains, and means for continuously producing, in a vacuum, repeated interruptions of the flow of current from said generator
5 over the mains.

4. The combination with a number of lamps, substantially such as described, connected in multiple to a suitable main, a self-induction branch around each lamp, a generator connected to the main, an independent circuit or
10 circuits of self-induction connected to the mains, and means for producing repeated interruptions of connection of said generator both with the latter circuit or circuits and
15 with the main, as and for the purpose described.

5. In a system of lighting, substantially such as described, the combination of a main circuit, a lamp or lamps consisting essentially
20 of a rarefied receiver connected thereto, and means for repeatedly interrupting the flow of current through said branch for the purpose specified, a self-inductive branch around the lamp for generating electric waves or disturbances whereby the lamp may be lighted.
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6. The combination with a source of electric energy, circuit connections and lamps, of a circuit breaker, an inclosing exhausted bulb, and means for rotating the circuit breaker, substantially as set forth.

7. The combination in an electric lamp having an exhausted or partly exhausted bulb, of two terminals, one in the form of a convoluted conductor and the other in the form of a ring around the wire leading to the convoluted
35 conductor, substantially as set forth.

8. The combination in an electric lamp, having an exhausted or partly exhausted bulb, of two terminals one in the form of a convoluted conductor and the other in the form of an
40 aluminum ring around the wire leading to the convoluted conductor, substantially as set forth.

Signed by me this 5th day of April, 1895.

D. MCFARLAN MOORE.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.