(No Model.)

2 Sheets—Sheet 1.

T. A. EDISON.

SYSTEM OF ELECTRIC LIGHTING.

No. 391,595. Patented Oct. 23, 1888.

Fig. 1.

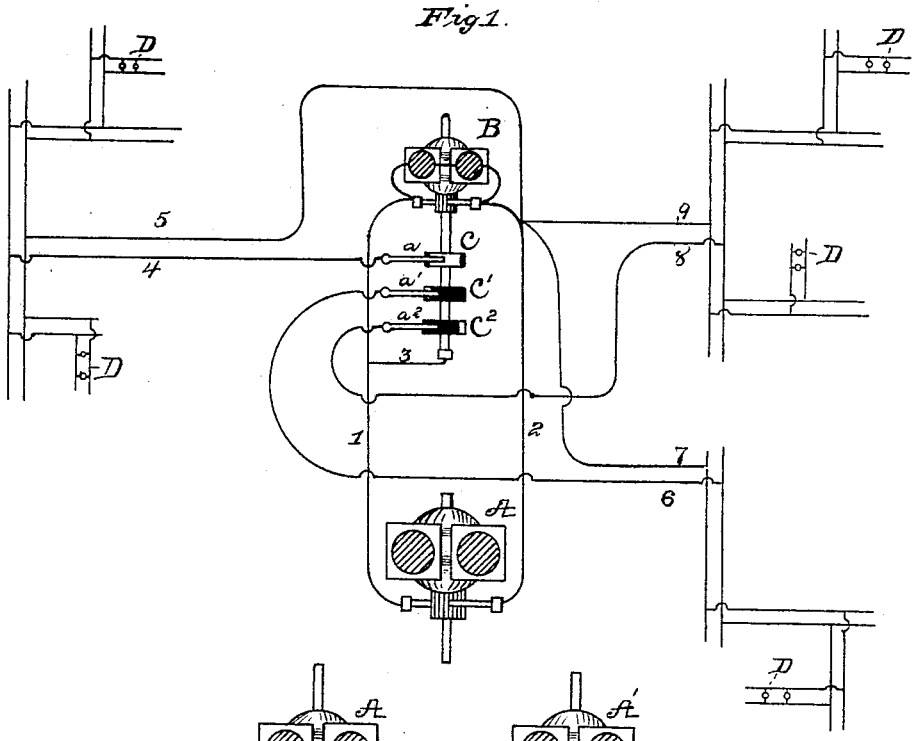
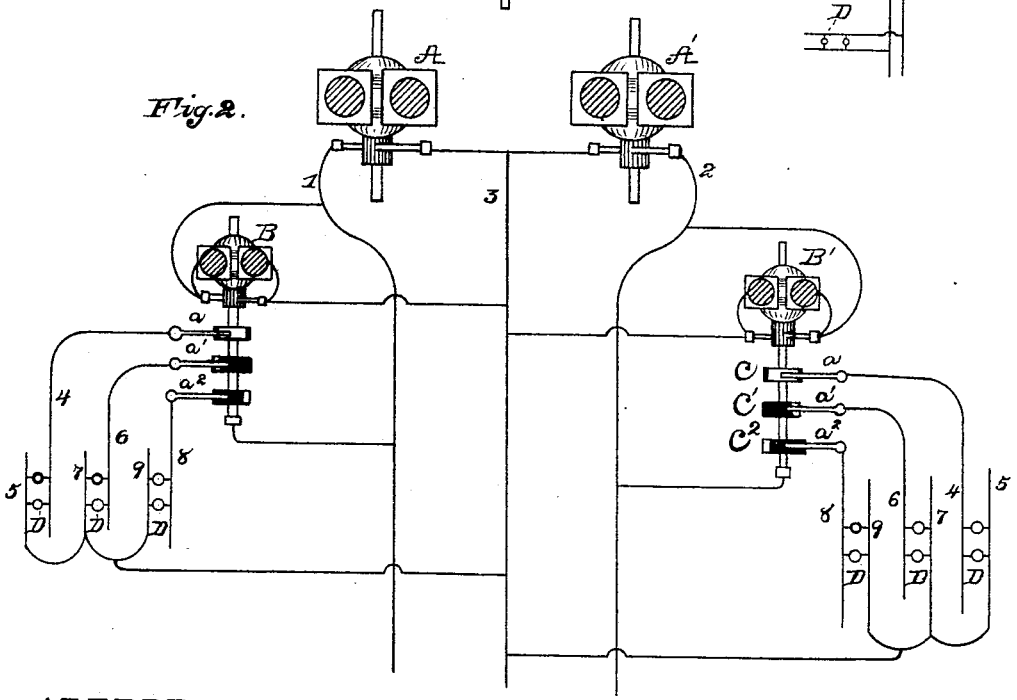


Fig. 2.



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INVENTOR:

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By Richd. N. Dyer.

Atty.

(No Model.) 2 Sheets—Sheet 2.

T. A. EDISON.

SYSTEM OF ELECTRIC LIGHTING.

No. 391,595. Patented Oct. 23, 1888.

Fig. 3.

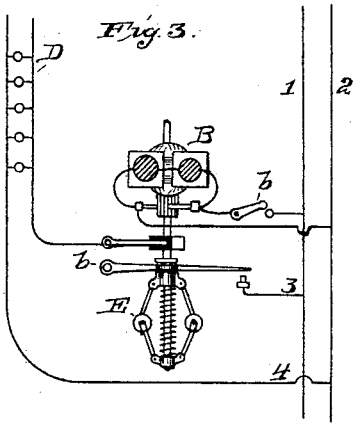


Fig. 4.

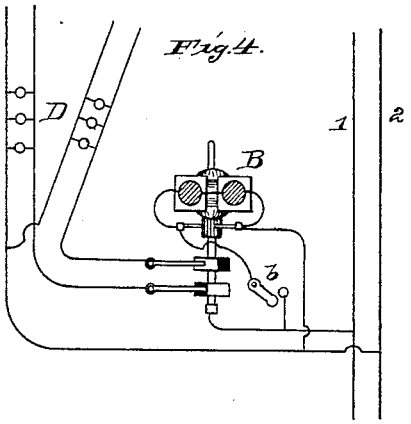


Fig. 5

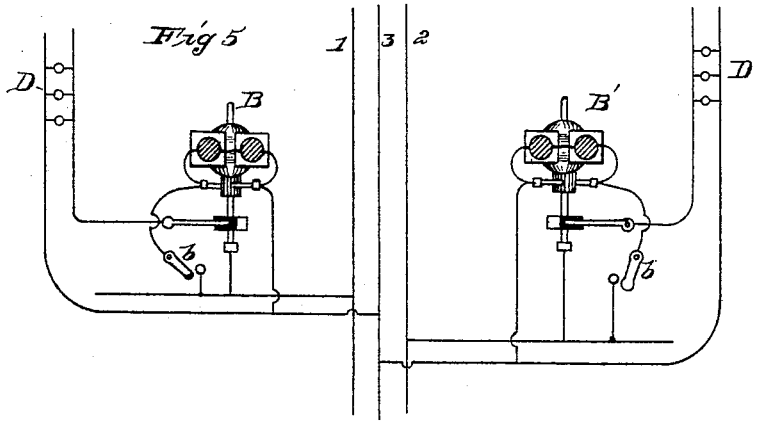
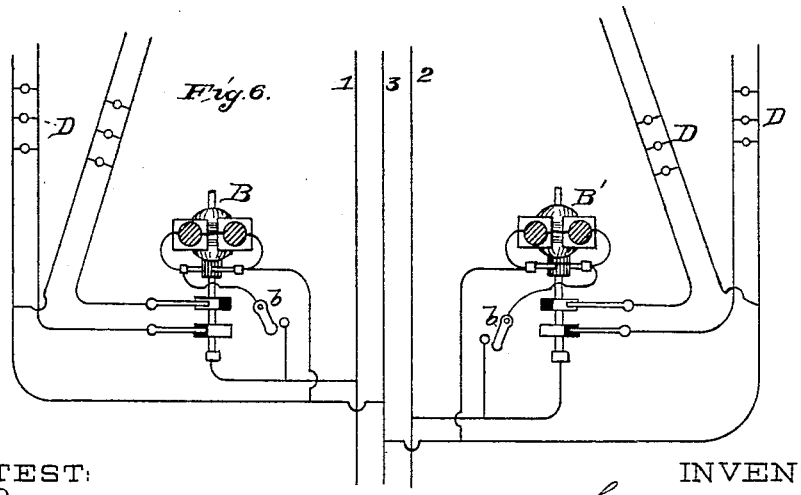


Fig. 6.



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INVENTOR:

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

SYSTEM OF ELECTRIC LIGHTING.

SPECIFICATION forming part of Letters Patent No. 391,595, dated October 23, 1888.

Application filed August 7, 1884. Serial No. 139,961. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a certain new and useful Improvement in Systems of Electric Lighting, (Case No. 628,) of which the following is a specification.

The object I have in view is to produce a system of electric lighting wherein high-tension currents can be used upon the main conductors or feeders and incandescing electric lamps located in independent multiple-arc circuits and requiring a continuous current of lower tension can be supplied, enabling the use of smaller conductors and making it possible to economically supply lamps at greater distances from the source of electrical energy than when a simple multiple-arc arrangement is employed.

The invention is based upon the discovery that the electrical energy consumed by an incandescing electric lamp may be controlled independent of the tension of the current and the resistance of the lamp (provided the tension of the current is greater than the lamp requires when constantly in circuit) by interrupting the flow of current to the lamp, and the light can be made to appear constant to the eye by making such interruptions of the current with sufficient rapidity. Thus an incandescing lamp requiring when constantly in circuit a current of definite tension to maintain it at normal incandescence may be supplied from a circuit having a current of two or more times that tension, provided the circuit through the lamp is interrupted, so that current will flow for only a fraction of the time through the lamp, that fraction being inversely the number of times the tension used is a multiple of that required when the lamp is constantly in circuit, or approximately that proportion.

In carrying out my invention for a general system I propose to run the circuit of high tension to one or more points within the district intended to be supplied, and there divide the current between two or more circuits containing incandescing electric lamps or other translating devices by means of a rapidly-acting circuit-controller, which will throw the current first through one lamp-circuit and then through another, keeping each lamp-circuit complete for a fraction of the time only. This circuit-controller is preferably a revolving shaft carrying circuit-controlling wheels upon which rest suitable springs or brushes, and this shaft is preferably operated by an electro-dynamic motor located in the high-tension circuit. Each lamp-circuit will be broken at a number of points to reduce the spark. The high-tension circuit may be a simple circuit or a compound circuit—such as is used in my compensating system—and in the latter case each part of the compound circuit will be treated the same as a simple circuit. The points at which the high-tension current will be divided may be centers of consumption, from which main conductors will run to house-circuits in the vicinity, the locality being divided between two or more circuits of main conductors, according to the tension used; or the lamps of each building may be divided between two or more circuits and a motor working a commutator and placed in the high-tension circuit be located in the building itself.

Instead of dividing the lamps of a house between two or more circuits, they may be placed in one circuit, and a local circuit-controlling motor may be used in the house, which will interrupt the flow of current to the desired extent. The economy of this last arrangement would be dependent upon the fact that the numerous local circuit-controlling motors would not work synchronously. All of these arrangements are adapted for use with a compound or compensating high-tension circuit as well as with a simple high-tension circuit, and the different arrangements may be used together in the same system, if desired.

Each circuit-controlling motor is preferably provided with a speed-governor controlling the lamp circuit or circuits controlled by such motor, and closing such lamp circuit or circuits only after the motor has attained normal speed, and breaking such circuit or circuits when the speed drops below the normal limit. This will prevent the breaking of the lamps, and is especially applicable to local motor circuit-controllers in houses, but may also be used to advantage on motors at stations to prevent damage when the lamp-switches are closed before the motors attain normal speed.

In the accompanying drawings, forming a

part hereof, Figure 1 is a view, principally in diagram, of a system with a simple high-tension circuit embodying the invention; Fig. 2, a similar view, the high-tension circuit being a compound circuit; Fig. 3, a similar view showing local circuit-controlling motor controlling a single lamp-circuit; Fig. 4, a similar view with local circuit-controlling motor controlling two circuits; and Figs. 5 and 6, views showing the arrangements of Figs. 3 and 4 applied to a compensating system.

With reference more particularly to Fig. 1, A is a dynamo or magneto-electric machine operated by a water-wheel, steam-engine, or other prime motor and having a high electro-motive force—for instance, three hundred volts. From this machine extends the high-tension circuit 1 2, and included in this circuit is the distant electro-dynamic motor B. The shaft of this motor carries three circuit-controlling wheels, C C′ C^2, the periphery of each of which is one-third metal and two-thirds insulation. Upon these wheels rest brushes or springs a a' a^2. The wheels C C′ C^2 are so arranged upon the motor-shaft or the brushes a a' a^2 are so arranged to bear upon the wheels that when one brush is on metal the other two brushes are on insulation. The motor-shaft is connected by conductors 3 with one side of the high-tension circuit 1 2, while between the brushes a a' a^2 and the other side of circuit 1 2 extend lamp-circuits 4 5, 6 7, and 8 9, in which are included incandescing electric lamps D. The circuits 4 5, 6 7, and 8 9 form a locality at a central point in which the motor B is located. The lamps D require, when constantly in circuit, an electro-motive force of one hundred volts to maintain normal incandescence. The energy of circuit 1 2 is divided between the three lamp-circuits by the circuit-controller, each lamp-circuit being completed for one-third of the entire time, and the motor has a sufficiently high speed to make the incandescence of the lamps constant to the eye. Other motors may be arranged in circuit 1 2, controlling lamp-circuits the same as motor B.

In Fig. 2 is shown the invention applied to a system wherein the high-tension circuit is a compound circuit composed of main conductors 1 2 and a compensating conductor, 3, supplied by two machines, A A′, each having, for illustration, an electro-motive force of three hundred volts. The motors B B′ are on opposite sides of the compound circuit and control each three lamp-circuits, as shown.

In Fig. 3 the high-tension circuit 1 2 extends to the houses, and house-circuits 3 4 are taken directly therefrom. The motor B controls the house-circuit, keeping it complete for a fraction of the time, that fraction depending upon the tension of the current in 1 2. A speed-governor, E, also controls the lamp circuit, closing the lamp-circuit when the motor attains normal speed and opening it when the speed drops below the normal limit. This feature is applicable to all locations of the circuit-controlling motors. A hand-switch, b, is used to stop and start the motor when desired.

In Fig. 4 the motor B is a local house-motor and the lamps are divided between two circuits, while in Figs. 5 and 6 the arrangements of Figs. 3 and 4 are shown applied to a compound high-tension circuit.

What I claim is—

1. The combination of two or more branch circuits, each containing a translating device or devices requiring current of a certain tension when constantly in circuit, and a main circuit on which is maintained a current of higher tension than that so required by the translating devices, each of said branch circuits being connected with the main circuit through a circuit-controller, which rapidly opens and closes the circuit alternately, substantially as set forth.

2. The combination of two or more branch circuits, each containing a translating device or devices requiring current of a certain tension when constantly in circuit, and a main circuit in which is maintained a current whose tension is as many times that so required for the translating devices as there are branch circuits, each of said branch circuits being connected with the main circuit through a circuit-controller, which rapidly opens and closes the circuit alternately, substantially as set forth.

3. The combination of two or more branch circuits, each containing a translating device or devices requiring current of a certain tension when constantly in circuit, a main circuit having a current of higher tension than that so required by the translating devices, and a circuit-controller for each of said branch circuits by which it is rapidly closed and opened alternately, said circuit-controllers being arranged to keep each circuit closed during such a fraction of the entire time as one is of the number of the branch circuits, substantially as set forth.

4. The combination, with a high-tension supply-circuit, of a translation-circuit containing incandescing electric lamps or other translating devices, and connected with said supply-circuit and a circuit-controller operated by the current and acting to rapidly interrupt the flow of current in the translation-circuit, substantially as set forth.

5. The combination, with a high-tension supply-circuit, of a translation-circuit connected therewith, and a circuit-controller operated by an electro-dynamic motor and acting to rapidly interrupt the flow of current in the translation-circuit, substantially as set forth.

6. The combination, with a high-tension supply-circuit, of a translating-circuit connected therewith through a continuously-acting circuit-controller which keeps the translation-circuit complete for a portion of the time only, and another circuit-controller for the trans-

lation-circuit closing such circuit only after the circuit-controller has attained normal speed, substantially as set forth.

7. The combination, with a high-tension supply-circuit, of a translation-circuit connected therewith, a circuit-controller operated by an electro-dynamic motor and keeping the translation-circuit complete for a portion of the time only, and another circuit-controller for the translation-circuit operated by the speed of the motor and acting to close the translation-circuit only after the motor has attained normal speed, substantially as set forth.

This specification signed and witnessed this 16th day of July, 1884.

THOS. A. EDISON.

Witnesses:
ALFRED W. KIDDLE,
EDWARD C. ROWLAND.