(No Model.) 2 Sheets—Sheet 1.

E. WESTON.

ELECTRIC LIGHTING SYSTEM.

No. 316,707. Patented Apr. 28, 1885.

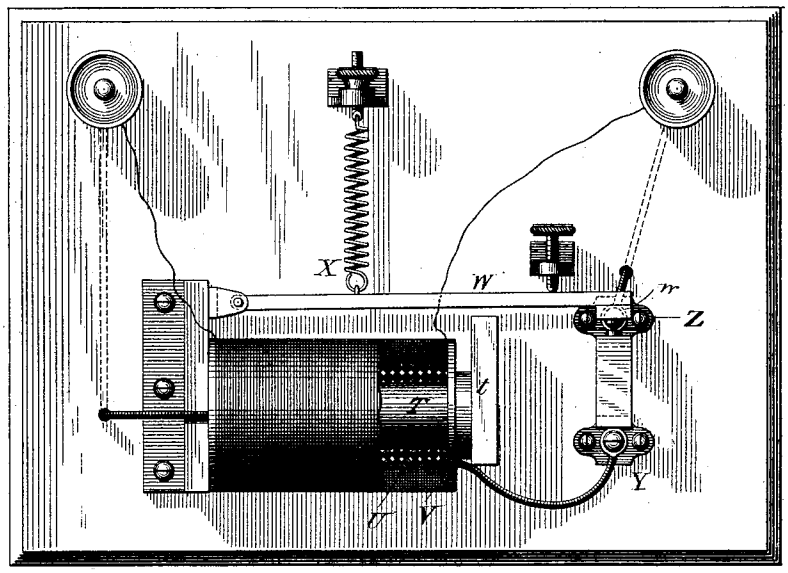
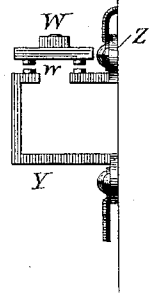


Fig. 1.

Fig. 2.



Attest:

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W. Frisby

Inventor:

Edward Weston
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(No Model.) 2 Sheets—Sheet 2.

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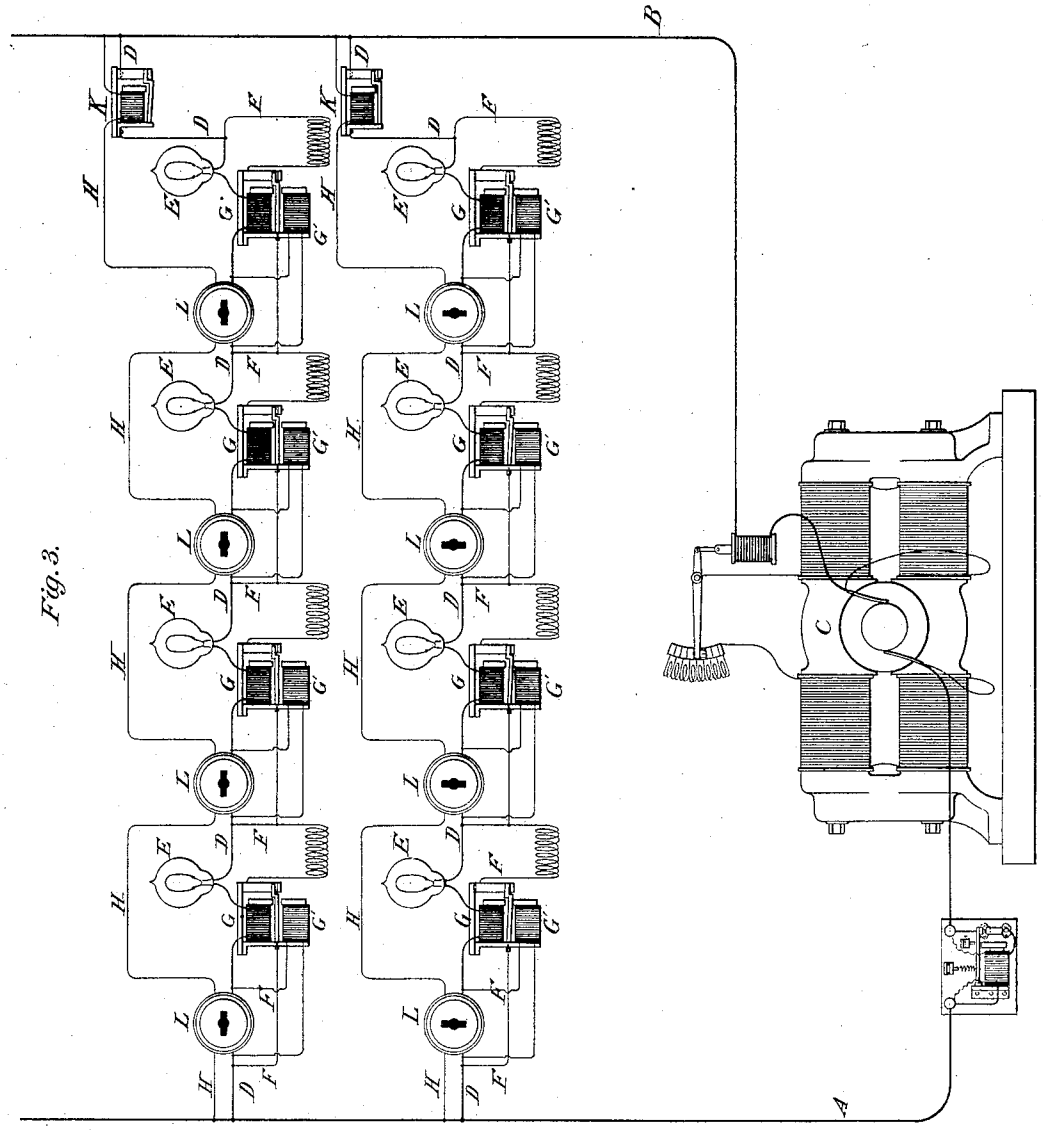

Fig. 3.

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UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

ELECTRIC-LIGHTING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 316,707, dated April 28, 1885.

Application filed October 11, 1884. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, a subject of the Queen of Great Britain, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric-Lighting Systems, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

In United States Patents Nos. 304,882 and 304,884 I have shown and described a system of electrical distribution to which my invention is applicable. By reference to the accompanying drawings I will describe the said system so far as is necessary to an understanding of the nature and objects of my present invention.

Figure 1 is a plan view of the circuit-controlling apparatus to which my invention mainly relates. Fig. 2 is an end view of a portion of the same. Fig. 3 is a diagram illustrating the system in which the same is or may be used.

A and B are the main-circuit wires from a dynamo-electric machine, C. Between these wires are a number of cross-circuits, D, in each of which a given number of translating devices—such as incandescent lamps E—are included in series. Around each lamp is a shunt-circuit, as F, including a resistance equal to that of a lamp, and in circuit with the lamps or in any way arranged to be operated by an interruption of the circuit through the same are electro-magnets G, which, when demagnetized, operate circuit-closers and complete the resistance-circuits F. Each lamp is also provided with a manual switch, L, connected with the circuit D, and containing two independent sets of contacts, one set in the lamp-circuit, the other in a supplemental cross-circuit, H, and the parts of the switches are so constructed that when one of these sets of contacts is electrically connected the other will be disconnected. In each lamp-circuit is a switch controlled by an electro-magnet, K, in the corresponding supplemental or controlling circuit, H, and with each cut-out magnet G is an additional magnet, G′, in a shunt around the contact-points of the manual switch in the circuit D. The circuits H are of very high resistance. The circuits including the magnets G′ are also of high resistance, so that but a small proportion of current will at any time pass through them. When all the lamps in this system are in operation, the switches L are turned so that the lamp-circuit contacts are connected, and the controlling-circuit contacts disconnected. The resistance-circuits will be interrupted as the magnets G are energized and lift their armatures. The controlling-circuits H being interrupted, the magnets K are inactive. If, now, any lamp be turned out the resistance-circuit around it is at once closed, and a break in the controlling-circuit is also closed. When all the lamps of a series are thus turned out, the controlling-circuit is completed, the magnet K in the same is energized, and the lamp-circuit interrupted. In practice I use devices varying in certain details from those described, but operating on the same general principle. When no current is produced by the machine, the armatures drop from the magnets G and the magnets K.

In starting up the machine a certain time is required for the magnetization of the field-magnets and the development of the proper electro-motive force. During this interval the electro-motive force is gradually rising, and there will be a point at which the strength of current is just sufficient to move the various armatures in the system, but not with sufficient force to prevent them from vibrating. As a result, the armatures, instead of being positively moved, are raised either just enough to make a poor contact with their stops or are raised and dropped a number of times before the current has gained the requisite strength for operating them properly. This is particularly true of the armatures of the cut-outs K.

To prevent this is the object of my invention, and I use for accomplishing this a switch or circuit controller operated by an electro-magnet. The magnet is surrounded by two coils, one composed of a few turns of coarse wire, the other of a considerably greater number of turns or layers of fine wire, the two coils being such as to offer a very low and a comparatively high resistance, respectively.

The circuit-controlling devices and the coarse-wire coil are included in the main circuit of the machine, and the fine-wire coil is

in a bridge connecting the two terminals of the switch. A spring acting in opposition to the magnet keeps the main circuit broken until the current in the fine-wire coil is sufficient to close it. By this means the circuit will be interrupted, except through the fine wire of the controlling-magnet, when the machine is not in operation.

If the machine be started up, the circuit-controller will not at first be affected; but when the electro-motive force has risen to the proper degree the fine-wire coil of the circuit-controlling magnet will operate the circuit-closer, so that the main circuit will be closed and the current flow through the coarse-wire coils. All the circuit-closers of the system will be positively and properly operated by this current.

The circuit-controlling apparatus is shown in Fig. 1. T is a core, with a pole-piece, *t*. U is a coil of two layers of coarse wire; V, a surrounding coil of very fine wire. W is an armature-lever, adjusted by spring X. Two arms or brackets, Y Z, are secured to the insulating base, and have contact-points that are bridged by a plate, *w*, carried by the armature-lever. A wire from one of the binding-posts, set in the base or plate supporting the several parts of the apparatus, connects with the arm Z. A second wire from the other binding-post connects with arm Y through the coarse coil U. The ends of the fine-wire coil V connect with the binding-posts, to which also the main circuit-wires are connected when the apparatus is connected with a line. By the proper proportion of the coils and adjustment of the spring X the main circuit will remain open until that electro-motive force is developed which is sufficient for causing the positive action of the circuit making and breaking devices connected with the system.

I am aware that an electrical controlling device operated by a current and acting to throw the current onto a circuit outside of or distinct from that through the device when the desired strength of current has been obtained is not new, and I do not claim such an arrangement of devices.

What I claim as my invention is—

1. The combination, in a system of electrical distribution with translating devices and electro-magnetic switches or circuit-controllers in derived circuits, of an electro-magnetic circuit-controller in the main circuit adjusted or adapted to complete the main circuit when the proper electro-motive force for positively operating the other circuit-controllers has been developed by the generator, as and for the purpose set forth.

2. The combination, in a system of electrical distribution with incandescent lamps, circuit closers or controllers and electro-magnets for operating the same, all included in cross or multiple circuits, as described, of an electro-magnetic circuit-controller in the main circuit, adjusted or adapted to be brought into operation and complete the main circuit when the electro-motive force developed by the generator is sufficient for positively actuating the other devices connected with the circuit, as herein set forth.

3. The combination, in a system of electrical distribution with incandescent lamps, circuit closers or controllers, and electro-magnets for operating the same, all included in cross or multiple circuits, as described, of a switch in the main circuit operated by an electro-magnet with two coils, one of high resistance in a constantly-closed bridge between the terminals of the switch, the other of low resistance in the circuit controlled by the switch, these devices being constructed and adjusted in substantially the manner set forth.

In testimony whereof I have hereunto set my hand this 2d day of October, 1884.

EDWARD WESTON.

Witnesses:

HENRY A. BECKMEYER,

RICHARD W. BLOEMEKE.