

(No Model.)

E. THOMSON.  
DISTRIBUTION OF ELECTRIC CURRENTS.

No. 478,722.

Patented July 12, 1892.

Fig. 1.

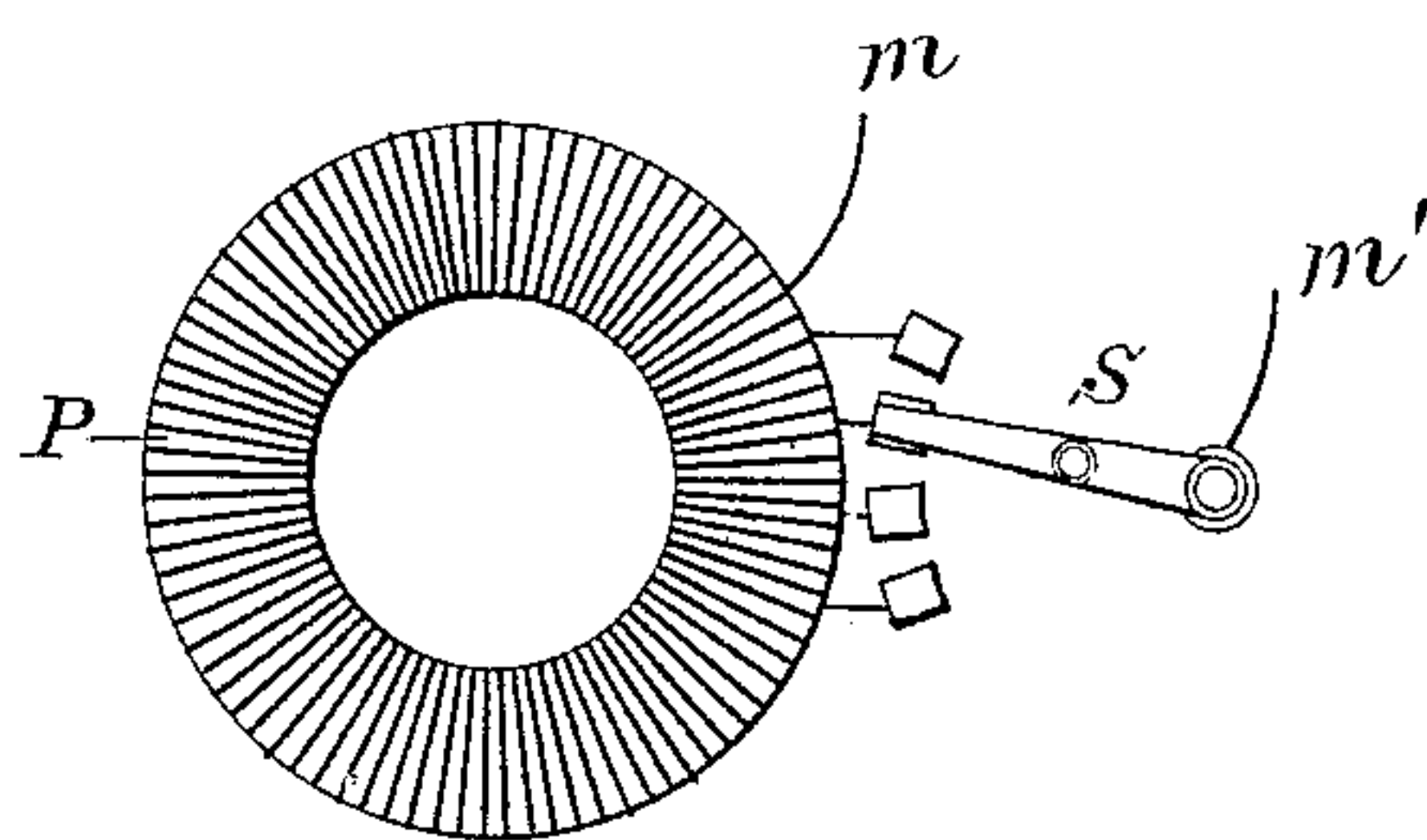
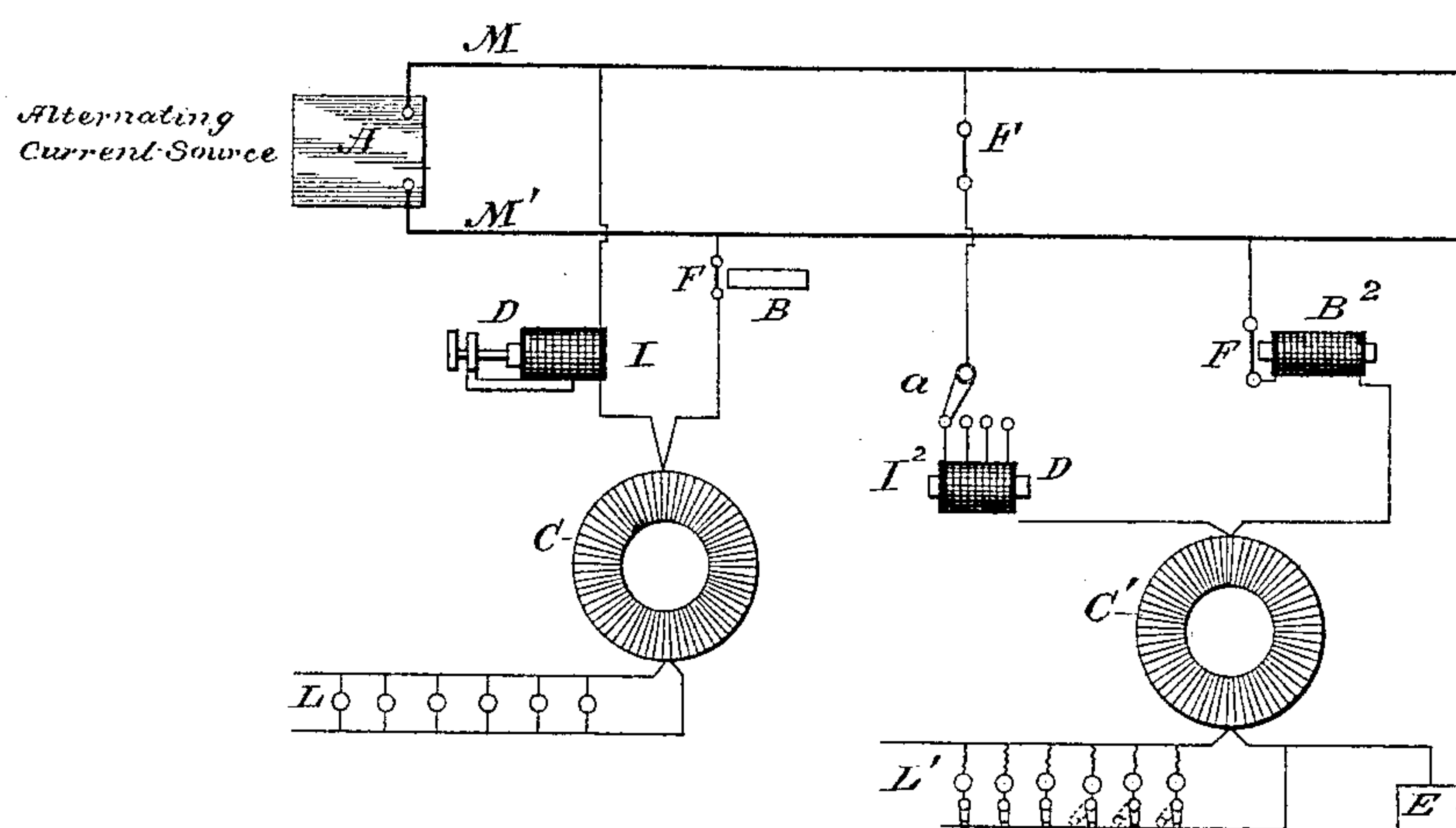


Fig. 2.

ATTEST:

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# UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO THE  
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## DISTRIBUTION OF ELECTRIC CURRENTS.

SPECIFICATION forming part of Letters Patent No. 478,722, dated July 12, 1892.

Original application filed December 6, 1886, Serial No. 220,850. Divided and this application filed July 26, 1890. Serial No. 360,012. (No model.)

*To all whom it may concern:*

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Swampscott, in the State of Massachusetts, have invented a certain new and useful Distribution of Electric Currents, of which the following is a specification.

My invention relates to systems of distribution in which the electric lamps or other translating devices are fed with electric current through the intervention of transforming or converting appliances primarily operated by means of an electric current flowing on a main or distributing circuit.

My invention is especially applicable to those systems of distribution wherein the current on the main or distributing circuit is a vibratory, pulsatory, or rapidly-varying current of any kind adapted to set up by induction directly on the local circuit or circuits the currents for operating the lamps or other devices.

I have herein shown my invention as applied in a system wherein alternating electric currents are used on the main circuit, and have also shown the local or separate circuits inductively supplied with alternating currents, as feeding the electric lamps or other devices in multiple arc. The transforming or converting appliances are preferably fed in multiple arc from the main distributing wires, upon which an approximately constant potential is maintained by an desired means.

The object of my invention is to provide for an automatic cutting off of the current supplied to the apparatus in case by any accident a short circuit is established in the secondary or local circuit either in the coils of a generating portion of the apparatus supplying the local circuits or upon the local wires themselves.

My invention consists, essentially, in placing between the main-circuit feeding-wires and the converting or transforming appliance a suitable cut-out device of any kind adapted to work automatically by the increased current flowing from the main to the transformer appliance when the electric reaction or counter electro-motive force in such

circuit is lowered through the establishment of a short circuit in the secondary conductor.

A convenient cut-out apparatus adapted to my invention consists of a fusible wire or safety-strip which shall fuse through the increased current flowing through it, as well understood in the art.

In the accompanying drawings, Figure 1 is a diagram of a system of electric distribution wherein my invention is shown applied. Figure 2 shows a modification in the means for adjusting the current in the primary.

A represents an alternating-current generator or source suitably placed to supply mains  $M M'$  with alternating currents, from which mains connections are made to the primaries of transformers  $C C'$  in the ordinary and well-known manner. These transformers are constructed with a primary of fine wire and a secondary of coarse wire to supply in multiple arc or otherwise incandescent lamps  $L L'$  or other devices with currents of lower tension or pressure than those on the mains  $M M'$ .

In the circuit of the primary wires from the mains  $M M'$  to the induction-coils I introduce a self-inductive coil consisting of a coil with a movable and adjustable iron-wire core  $D$  in its axis, whose purpose is to permit an opposing action of varying degree, according to the position of the core  $D$  in the coil I, to be exerted as a check upon too great vigor of the impulses or too great electro-motive force in the mains. Putting the core  $D$  into the coil causes a high self-induction acting to oppose the impulses and cut down their force. At  $I^2$ , Fig. 1, the same purpose is fulfilled by dividing the coil into sections, as indicated at  $I^2$ , which permanently surround the core  $D$ , and providing a switch-arm  $a$ , whereby one or more of such sections of coil may be included in the permanent circuit. This adjusting device is only applicable when the load or number of lights at  $L$  is constant, and will not when an adjustment has been given suffice when such number is diminished without requiring a new adjustment. This is owing to the fact that the volume of current passing from the mains  $M M'$  through each



primary branch will vary in proportion to the lights used at L nearly, and the reaction of I will be greater as the current in it is increased, whereas it should remain the same or it should be given a greater reactive effect as the load or current is diminished. In such cases it is best to vary the primary of the induction-coil itself by providing a switch S, Fig. 2, which shall make contact with pieces connected to sections of the primary coil P, so that these sections in circuit may be increased or diminished at will. An adjustment being given so as to secure with M M' at a given potential the requisite electro-motive force in the secondary, no change need be made during changes of the number of lights used in the secondary circuit.

The system shown, with the adjusting devices described and applied in the manner set forth, is not herein claimed, as it forms the subject of claims in my prior application filed December 6, 1886, Serial No. 220,850, of which application my present specification is a division.

To provide for the case of an accidental short-circuit of the secondary either within its coils or upon the local line, as well as for an accidental short-circuit of the primary coil itself, I propose to apply to the circuit passing through the primary branch of the converter or transforming device a suitable cut-out device, which will operate to open such circuit by the action of the undue current flowing therein on the occurrence of either of the contingencies named. A suitable cut-out device consists of a fuse F, which will fuse with excess of current flowing in its circuit, such fuse being applied in the branch leading to each converter, as indicated. To provide for the rupture of the arc, which might tend to follow and be maintained after the melting of the fuse, any means for rupturing said arc may be employed—such, for instance, as a permanent magnet B or an electro-magnet B<sup>2</sup>, as shown and as claimed in my patent, No. 401,608, dated April 16, 1889. The cut-out device F may be applied at one or both sides of the transformer, as indicated.

What I claim herein as my invention is—

1. In a system of electric distribution wherein the translating devices are fed from

main distributing-circuits through transformers or converting appliances, the combination, with such transformers, of automatic cut-out apparatus in the branches leading from the distributing-mains to said converters.

2. The combination of a main or principal circuit, a local or independent circuit, an induction apparatus between the two, and fusible plug in the connection from the main to the induction apparatus, as and for the purpose described.

3. The combination, substantially as described, of a main or principal circuit, two or more local independent circuits, induction apparatus between said local circuits and the main circuit and supplied in multiple arc from the latter, and fusible plugs in the multiple-arc connections, as and for the purpose described.

4. The combination of a main or principal circuit carrying rapidly-varying electric currents, induction apparatus fed in multiple arc from the same, local circuits fed by the induced currents set up by such induction apparatus, and fusible plugs in the connections from the main, as and for the purpose described.

5. The combination of a main or principal circuit supplied with current from a suitable source, local independent circuits containing incandescent lamps or other translating devices and supplied with current produced through the operation of the current flowing in the main or principal circuit independently of the local circuit, and fusible plugs in the main-circuit connections, as and for the purpose described.

6. In an alternating-current system as described, a safety wire or strip to cut off a primary branch when a great excess of current flows and a reactive coil or section of primary conductor whose parts are adjustable, as described, to compensate for moderate increase of potential between the two feeding-mains.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 23d day of July, A. D. 1890.

ELIHU THOMSON.

Witnesses:

JOHN W. GIBBONEY,  
DUGALD MCKILLOP.