

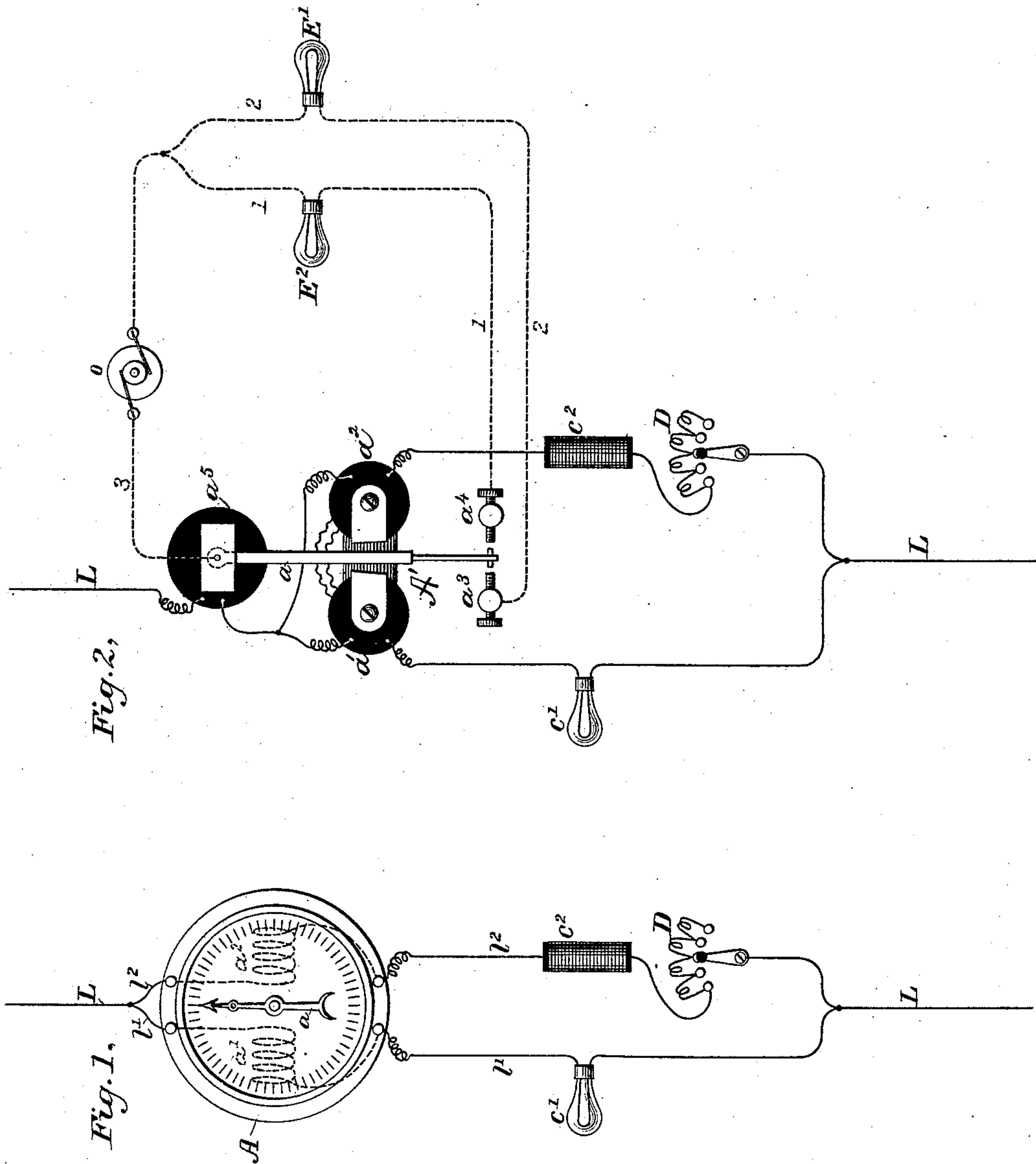
(No Model.)

P. LANGE.

ELECTRICAL CURRENT INDICATOR.

No. 362,451.

Patented May 3, 1887.



Witnesses

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UNITED STATES PATENT OFFICE.

PHILIPP LANGE, OF NEW YORK, N. Y., ASSIGNOR TO GEORGE WESTINGHOUSE, JR., OF PITTSBURG, PENNSYLVANIA.

ELECTRICAL CURRENT-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 362,451, dated May 3, 1887.

Application filed August 17, 1886. Serial No. 211,111. (No model.)

To all whom it may concern:

Be it known that I, PHILIPP LANGE, a subject of the Emperor of Germany, but having declared my intention of becoming a citizen of the United States, residing in New York, in the county and State of New York, have invented certain new and useful Improvements in Electrical Indicators, of which the following is a specification.

My invention relates to the class of devices employed for indicating the strength of the current employed in operating systems of electrical distribution.

The object of the invention is to provide accurate and reliable means for measuring or indicating the electro-motive force of a current upon an electric circuit; and it consists, in general terms, in the following organization of apparatus:

A galvanometer is constructed with two equal and opposing coils, and currents of the same strength do not affect the needle, but an excess of current in either coil will occasion a corresponding deflection. One of the galvanometer-coils is connected in circuit with a carbon resistance—an incandescent lamp, for instance—while in the circuit of the other there is included a metallic resistance. These two resistances are equal under the influence of currents of a certain electro-motive force. If the electro-motive force is kept constant, the galvanometer will not show any deflection; but an increase of electro-motive force will send a stronger current through both circuits. This will reduce the resistance of the carbon circuit without decreasing the resistance of the metallic circuit. Thus more current will pass through the carbon side of the instrument and a corresponding deflection of the needle is occasioned. A decrease in the electro-motive force will deflect the needle in the opposite direction.

Instead of a galvanometer, a pair of electromagnets differentially wound may be employed, and these may act upon a polarized armature after the manner of a polarized relay. The movements of the armature may be employed for controlling two circuits which may be used to work indicating devices—such, for instance, as signal-lamps.

In the accompanying drawings, Figure 1 is

a diagram illustrating the application of the invention to a galvanometer, and Fig. 2 its application to a polarized relay.

Referring to the drawings, in Fig. 1 A represents a galvanometer having two equal and opposing coils, a' and a'' . The needle a is acted upon by these coils. The two coils are respectively connected in branch conductors l' and l'' of a main conductor, L, which may be any suitable portion of any desired system of electric distribution. A carbon resistance—such, for instance, as an incandescent electric light, c' —is included in the conductor l' , together with the coil a' . In like manner a metallic resistance, c'' , is included in the conductor l'' , together with the coils a'' . An adjustable artificial resistance, D, is also included in this circuit, and this resistance is so adjusted that with a normal current upon the line L the two coils will have equal effects upon the needle a . An increase, however, of the electro-motive force will cause a greater amount of current to traverse both circuits, and such increase will cause the carbon resistance to become heated, and thus its resistance will be reduced, whereupon an excess of current will traverse the coil a' , and thus the galvanometer-needle a will be correspondingly deflected.

In Fig. 2 the galvanometer is replaced by a relay, A', having its opposing coils a' and a'' included in two lines, l' and l'' , respectively. The polarized armature a is provided with two contact-stops, a^3 and a^4 , respectively, constituting terminals of circuits derived from a battery or generator, o . One pole is connected with the armature a by a conductor, 3, and the other pole is connected by conductors 1 and 2 through any suitable form of indicating devices—such, for instance, as a red light, E', and a blue light, E''.

The polarization of the armature a may be conveniently secured by leading the conductor L through a coil, a^5 , surrounding the armature or its support.

I claim as my invention—

1. An electrical indicator consisting of two opposing coils, an armature acted upon thereby, two branch circuits including said coils, respectively, a carbon resistance in one circuit, and a metallic resistance in the other circuit.

2. An electric indicator consisting of two

equal and opposing coils, an armature acted upon thereby, branch circuits respectively including said coils, a carbon resistance included in one branch circuit, a metallic resistance included in the other branch circuit, and an adjustable resistance also included in the last-named circuit.

3. The combination of a differentially-wound polarized relay, branch circuits including the coils of said relay, a carbon and a metallic resistance respectively included in the branch

circuits, local circuits controlled by the action of said relay, and indicating devices included in said local circuits, substantially as described.

In testimony whereof I have hereunto subscribed my name this 13th day of August, A. D. 1886.

PHILIPP LANGE.

Witnesses:

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