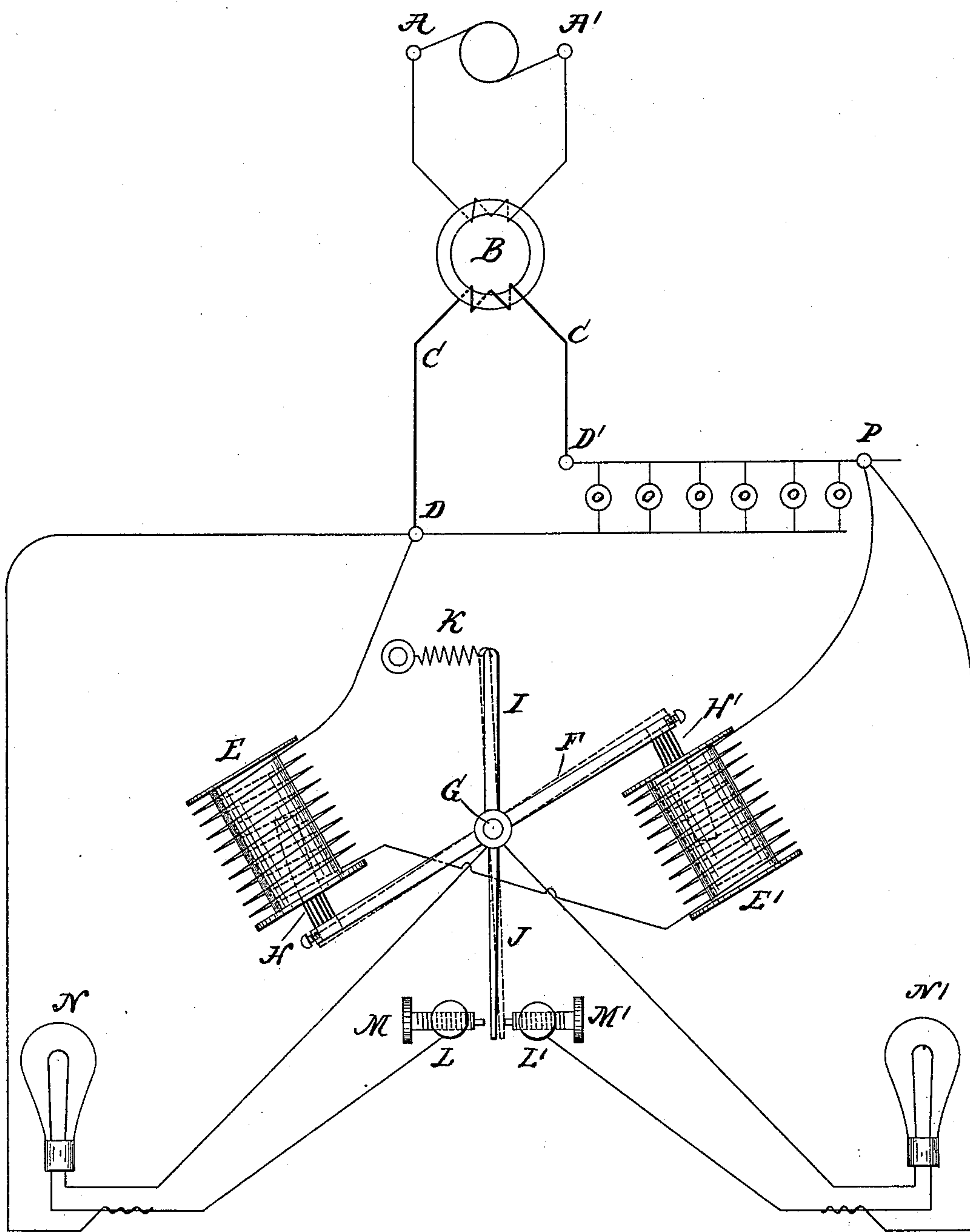


(No Model.)

C. E. KAMMEYER.
POTENTIAL INDICATOR.

No. 464,025.

Patented Dec. 1, 1891.



Witnesses:

Charles R. Chapman
H. M. Day.

Inventor

Carl E. Kammerer.
by
James W. Parker,
Attorney.

UNITED STATES PATENT OFFICE.

CARL E. KAMMEYER, OF EAU CLAIRE, WISCONSIN.

POTENTIAL-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 464,025, dated December 1, 1891.

Application filed May 7, 1891. Serial No. 391,919. (No model.)

To all whom it may concern:

Be it known that I, CARL E. KAMMEYER, a citizen of the United States, residing at Eau Claire, in the county of Eau Claire and State of Wisconsin, have invented a new and useful Improvement in Potential-Indicators, of which the following is a clear and exact specification.

My invention relates to electrical potential-indicators or voltmeters, especially to the kind employed with an alternating current; but the instrument may be readily adapted for use with continuous currents by slight modifications of its mechanism.

The object of my invention is to provide a cheap, reliable, simple, and efficient instrument or apparatus for indicating the difference of potential or the electro-motive force of an electric current, and especially to indicate a change in the strength of current by means of a visual signal.

My invention is illustrated in the annexed drawing, wherein I have shown diagrammatically and by conventional symbols the arrangement and relations of the parts of my invention.

A A' represent the two poles of an alternating-current dynamo connected to the primary coil of a transformer B. The secondary coil C of the transformer is connected to the terminals or binding-posts D D'.

E E' are a pair of helices or solenoids wound with insulated wire.

F is a lever pivoted at G. At each end of the lever F is attached a laminated soft-iron armature H and H', extending each a certain distance into one of the helices E E'. The lever F is provided near its center with two projecting arms I and J, the end of I being attached to an adjustable retractive spring K.

L and L' are two binding-posts carrying adjustable contact-screws M M'.

N and N' are two incandescent lamps of any desired candle-power.

O O O represent a number of incandescent lamps supplied by the transformer B.

The operation of my invention is as follows: The current, starting from, say, the terminal D, flows in series through the helices E E', returning by means of the binding-post P and the circuit to the opposite terminal D'.

The cores H H' become magnetized and are

drawn into the hollow core of E and E'. The tension of the spiral spring K is now adjusted until the contact-arm J stands about half-way between the contact-points M M'. The two signal-lamps N and N' are also connected to the terminals D D', as shown in the drawing, and while the contact-arm J is in the position shown the two lamps N and N' will be in series with each other, as clearly indicated, and being of the same voltage as the lamps on the circuit proper N and N' will not burn at their proper candle-power, but will be approximately only one-fourth of their normal candle-power. As long as the strength of current remains normal the contact-arm J will remain in the position shown. Should the electro-motive force fall below a desired point, the spring K will overpower the force of the magnetizing-coils E E' and the lever F will swing on its pivot G until the end of J makes contact with the end of M'. This position of the lever F and arms I and J is indicated by the dotted lines in the drawing. J and M' being in contact, the lamp N' is short-circuited, causing the lamp N to burn at its full candle-power, thereby calling attention to the fact that the difference of potential or electro-motive force of the transformer B has changed. Should the electro-motive force of the transformer B rise above a desired point, the cores H and H' will be drawn farther into the magnetizing-coils E and E'. The arm J making contact with M, the lamp N is short-circuited, allowing the lamp N' to receive the full pressure of the current, and by burning at its normal candle-power calling attention to the fact that the electro-motive force has risen beyond the point for which the apparatus had been adjusted. It will be observed that the construction is such that during the operation of the device the lamps N and N' are constantly in circuit, except when the signal is being given, when one of them will be short-circuited. The circuit through the lamps, however, is never in any case broken, and the self-induction of either lamp being practically nothing the sparking is reduced to a minimum. The lamps could be colored, if desired, so as to indicate by the color of the lamp burning brightly whether the voltage was too high or too low.

This device can be used of course, as will

be apparent, in a multitude of ways and with various kinds of apparatus. I have shown it, however, upon a local circuit derived from a transformer, and for the purpose of this device the transformer and generator are one and the same and are included in the general title of "generators" as being the source of the current to be indicated. If the device were connected with a direct-current machine or storage-battery, modifications could be made. A single solenoid or magnet would be sufficient under certain circumstances, easily apprehended by one skilled in electricity.

I claim—

1. The combination of an electric generator with translating devices in series with each other, a circuit-closer, and connections whereby either one of them may be short-circuited, said circuit-closer responsive to changes in the current delivered.

2. The combination of a generator with translating devices in series with each other, a circuit-closer adapted to short-circuit either of them, said translating devices in multiple are with the generator, and an electro-magnetic device responsive to changes in the potential between the mains and adapted to control such circuit-closer.

3. The combination of a generator with translating devices in series with each other, a circuit-closer adapted to short-circuit either of them, said translating devices in multiple

are with the generator, and a magnetic device responsive to changes in the potential between the mains and adapted to control such circuit-closer, said device consisting of solenoids with armatures and a pivoted circuit-closing lever.

4. The combination of a generator with translating devices in series with each other, a circuit-closer adapted to short-circuit either of them, said translating devices in multiple are with the generator, and a magnetic device responsive to changes in the potential between the mains and adapted to control such circuit-closer, said device consisting of solenoids with armatures and a pivoted circuit-closing lever and a retracting-spring to oppose the action of such solenoids.

5. In an electrical-current or volt indicator, one or more solenoids, each having a laminated armature and pivoted contact-lever, in combination with adjustable contact-points and two signal-lamps in series with each other receiving current from the same source as the helices or solenoids, the contacts being so arranged as to short-circuit either lamp should the electro-motive force rise above or fall below a desired point, all arranged substantially as described, and for the purpose set forth.

CARL E. KAMMEYER.

Witnesses:

W. EMMERSON SMITH,
A. IRVINE.