E. F. GEHRKENS.

POTENTIAL INDICATOR.

APPLICATION FILED APR. 8, 1912.

1,100,723

Patented June 23, 1914

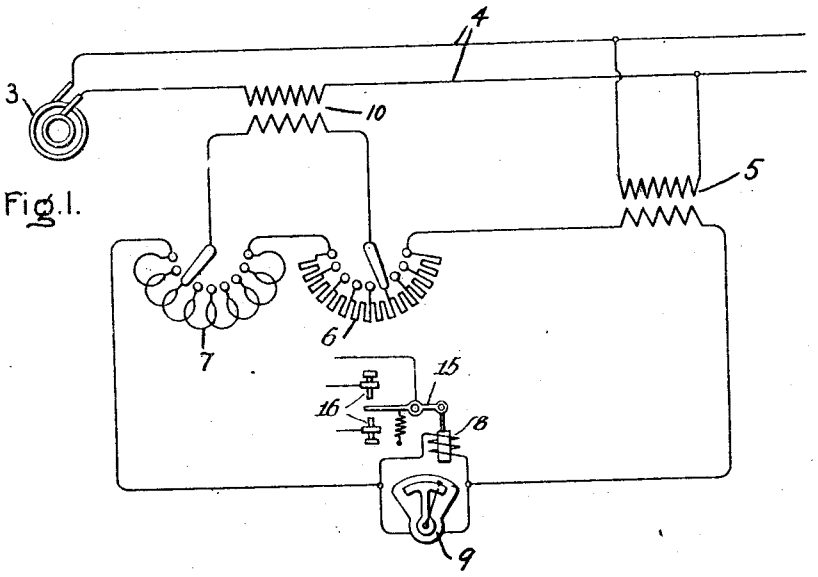
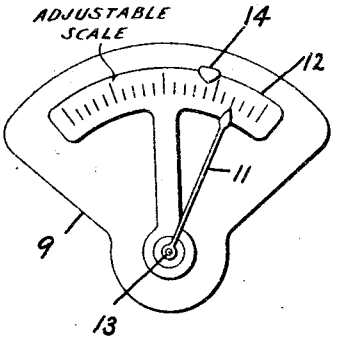


Fig. 1.

Fig. 2.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD F. GEHRKENS, OF PITTSFIELD, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

POTENTIAL-INDICATOR.

1,100,723. Specification of Letters Patent. Patented June 23, 1914.

Application filed April 8, 1912. Serial No. 689,141.

To all whom it may concern:

Be it known that I, EDWARD F. GEHRKENS, a citizen of the United States, residing at Pittsfield, county of Berkshire, State of Massachusetts, have invented certain new and useful Improvements in Potential-Indicators, of which the following is a specification.

My invention relates to apparatus for indicating the voltage at some predetermined distant point on the line of an electric transmission circuit, and particularly to line drop compensators, consisting of a resistance and a reactance in series.

The objects of my invention are generally to simplify the installations where such compensators are used and more specifically to provide a novel form of indicating voltmeter to be used in connection with such apparatus.

In the type of line drop compensators in general use at the present time, a resistance and a reactance are connected in series. A number of taps are brought out from both resistance and reactance to independent and separate dial switches so that the amount of resistance and reactance in the circuit can each be separately adjusted in proportion to that of the line on which the compensator is used. These compensators are used in connection with other apparatus to indicate the voltage at some predetermined distant point on the line, one common type of compensator being used with automatic voltage regulators and another with an indicating voltmeter. The compensators for use with automatic voltage regulators are usually provided with a contact making voltmeter for controlling the regulator. The resistance of the contact making voltmeter is relatively small compared with the resistance of the indicating voltmeter and it has not been found feasible to connect both types of voltmeter to the same compensator. It has accordingly been customary under the present practice whenever desirable to include in the station equipment an indicating voltmeter which will give the voltage on the line at the point for which the automatic regulator is compensated, to provide the indicating voltmeter with a separate compensator, so that two compensators are employed. By my invention the use of the additional compensator for the indicating voltmeter is dispensed with and the switchboard wiring of the station is thereby much simplified.

For a further understanding of my invention, reference may be had to the accompanying drawings wherein—

Figure 1 represents diagrammatically, apparatus embodying the features of my invention, and Fig. 2 is a view of the indicating voltmeter of my invention.

In Fig. 1 a generator 3 supplies current to mains 4 of an electric distribution system. A potential transformer 5 is arranged at the station end of the line and has its secondary connected in series with a resistance 6 and a reactance 7. Included in this circuit is the usual contact making voltmeter 8. The contact making voltmeter includes a movable contact member 15, responsive to changes in the voltage of a predetermined point of the electric installation, coöperating between two fixed contacts 16. This contact making voltmeter is used to control an automatically operated feeder voltage regulator, which is not shown in the drawings, whereby a constant voltage is maintained at the center of distribution. In parallel with the contact making voltmeter is my improved type of indicating voltmeter 9. This instrument is adapted to indicate the voltage at the point of distribution of the system and the peculiarities of its construction will be later described. A number of taps are brought out from both resistance and reactance to independent and separate dial switches and these switches are connected respectively to the ends of the secondary coil of the current transformer 10.

The voltmeter 9 has the usual indicating pointer 11 and is provided with an adjustable scale 12 which is adapted to be adjusted about a pivot pin 13. The adjustable scale is provided with a rider 14, which may be set at the voltage which is normal for the point on the line for which the compensator is adjusted.

In the operation of this apparatus, the resistance 6 and reactance 7 are separately adjusted in proportion to the resistance and reactance of the line on which the compensator is to be used. After this adjustment the voltage across the contact making voltmeter 8 will be constant for a constant voltage at the point of distribution. The former voltage will, however, be less than the latter by an amount equal to the drop through the

compensating device and the connections, due to the current flowing in the contact making voltmeter, and this is true for all loads on the line. In order, therefore, to indicate the normal voltage at the point of distribution, I use the indicating voltmeter 9 with the adjustable scale, which scale can be set so as to indicate the correct normal voltage. The scale setting can readily be done after the compensating device is properly adjusted. In practice this scale will be empirically adjusted, that is, a man at the desired point of the line will read the voltage at that point and will telephone back to the station what the voltage is and the adjustable scale of the indicating voltmeter will then be set by the station attendant accordingly. The voltmeter will then indicate the voltage of the system at the point of distribution for which the compensator is adjusted regardless of the drop in the line or the power factor of the load.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with an electric installation of a line drop compensator, a contact making voltmeter operatively connected to the compensator and responsive to changes in the voltage of the installation, and an indicating voltmeter having an adjustable scale and operatively connected to the compensator for indicating the value of such voltage.

2. The combination with an electric installation of a line drop compensator, and a contact making voltmeter and an indicating voltmeter having an adjustable scale connected in parallel with each other and in series relation with the compensator, whereby said contact making voltmeter is responsive to predetermined changes in the voltage of the installation and the indicating voltmeter is adapted to indicate the value of such voltage.

3. The combination with an electric distribution system of a line drop compensator, means operatively connected to said compensator and responsive to predetermined changes in the voltage at a predetermined point in said system, and an indicating voltmeter having an adjustable scale and operatively connected to the compensator for indicating the value of such voltage.

In witness whereof, I have hereunto set my hand this fifth day of April, 1912.

EDWARD F. GEHRKENS.

Witnesses:
HERBERT W. ANDREWS,
MAGNUS UNGER.