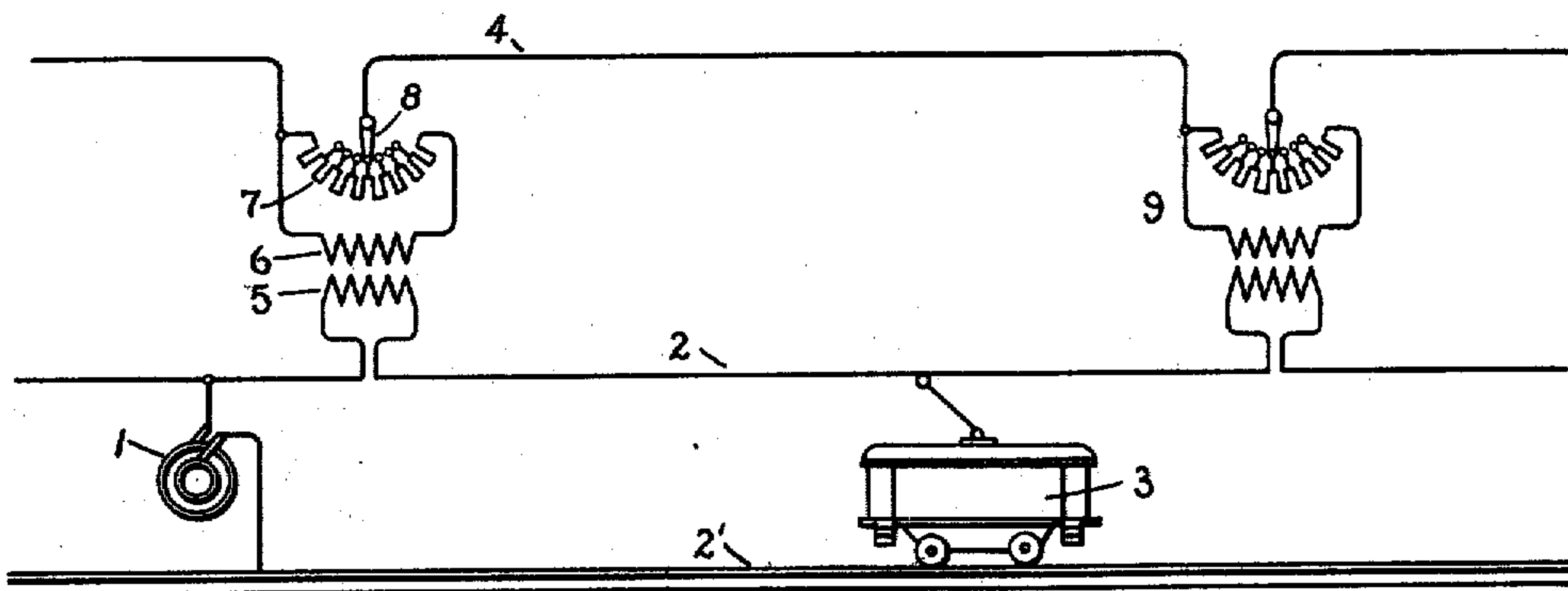


J. B. TAYLOR.
NEUTRALIZING INDUCTIVE DISTURBANCES.
APPLICATION FILED NOV. 20, 1907.

920,097.

Patented Apr. 27, 1909.



Witnesses

J. Earl Ryan
J. Ellis Allen

Inventor:

John B. Taylor

by Allen H. Davis
Att'y

UNITED STATES PATENT OFFICE.

JOHN B. TAYLOR, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

NEUTRALIZING INDUCTIVE DISTURBANCES.

No. 920,097.

Specification of Letters Patent.

Patented April 27, 1909.

Original application filed July 28, 1906, Serial No. 328,162. Divided and this application filed November 20, 1907.
Serial No. 403,013.

To all whom it may concern:

Be it known that I, JOHN B. TAYLOR, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Neutralizing Inductive Disturbances, of which the following is a specification.

This is a division of my application, Serial No. 328,162, filed July 28, 1906.

In general, any conductor which is carrying current induces an electromotive force in neighboring conductors. This induced electromotive force may or may not be considered a disturbance, depending on its magnitude and the use to which the conductor is put. In the most common case where this disturbance becomes a serious matter, as in the case of telephone or telegraph lines which are exposed to alternating current transmission lines, the disturbance may be due to electromagnetic induction, depending on the relative locations of two circuits, and the current carried by the conductor.

In general, a "balanced" single-phase, or polyphase, transmission line gives little trouble to neighboring conductors, and by suitable transpositions the disturbance can be either entirely eliminated, or reduced to such a point that it is no longer a serious matter. As soon, however, as the transmission line becomes unbalanced (a line is balanced only so long as the algebraic sum of the currents in the conductors equals zero, and the algebraic sum of the potentials also equals zero) it is impossible to neutralize the inductive action by transpositions.

The simplest and typical case of an unbalanced system, which may cause disturbance on telephone or telegraph lines, is the single-phase trolley. In this case a single conductor is connected to one terminal of an alternating-current generator; return circuit being formed through the earth, or what amounts to the same thing, through rails laid on the surface of the earth. In such a case it is, obviously, impossible to transpose the working conductor, or trolley with the rails, and while there may be certain positions in which a conductor (such as a telegraph line) would be equally affected by current in trolley and rails, it is difficult to find this position and impracticable to suspend

the telegraph or telephone lines at such a point.

The object of the present invention is to provide means for neutralizing the effect of electromagnetic induction in a signaling conductor such as a telegraph or telephone line located in proximity to an alternating current transmission line.

It consists in means for producing an electromotive force sufficient to counterbalance that induced in the signaling conductor.

The accompanying drawing is a diagram showing a mode of neutralizing the effect of electromagnetic induction.

In the figure there is shown an alternating current generator 1, which simply for the sake of illustration is represented as a single phase generator supplying current to a transmission line 2, such for instance as an overhead conductor conveying current to a trolley car 3. The return is through the earth or the rails 2'. In inductive proximity to this line is a signaling conductor 4, such for example as a telegraph or telephone wire. Under such circumstances, the electromotive force induced in the telegraph wire is proportional to the current in the trolley line and also to the distance through which this current flows. In order to counterbalance or neutralize this inductive effect, there is provided in the figure a current transformer whose primary 5 is connected in series with the trolley line, while its secondary 6 is closed upon itself through a resistance 7. One end of said resistance is connected with the telegraph wire, which is cut at this point. The other end of said wire is connected to a switch lever 8, by means of which more or less of the resistance can be cut into series with the telegraph wire, causing a greater or less proportion, respectively, of the electromotive force induced in the secondary coil 6 to be thrown upon the telegraph wire. By winding the secondary coil in the proper direction, this impressed electromotive force will counterbalance the electromotive force due to electromagnetic inductance. It will of course be understood that the proper ratio must be selected between the primary and secondary coils 5, 6, and the proper value given to the resistance in series with the telegraph wire.

A single transformer might be sufficient in case the load were concentrated at a particular point. In the typical case of the railway, however, the load is continually
5 changing its position, so that a single transformer will not serve. In such a case, a number of transformers should be inserted, preferably at equal distances, as indicated by the apparatus shown at 9. It is obvious
10 that this construction will only approximately neutralize the inductive action, but that exact neutralization will be more nearly realized in accordance with the increase in the number of transformers employed.

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

1. Means for neutralizing electromagnetic inductive disturbances between parallel
20 aerial conductors, comprising a transformer having one coil in series with the conductor

carrying the inducing current, the other coil being in circuit with the other conductor, and a resistance in circuit with said last named coil.

2. Means for neutralizing electromagnetic
25 inductive disturbances between parallel aerial conductors, comprising a transformer having one coil in series with the inducing conductor, a resistance in closed circuit with the other coil, and having one end connected
30 with one terminal of the other conductor, and means for adjustably connecting the other terminal of said conductor with said resistance.

In witness whereof, I have hereunto set
35 my hand this 18th day of November, 1907.

JOHN B. TAYLOR.

Witnesses:

BENJAMIN B. HULL,
HELEN ORFORD.