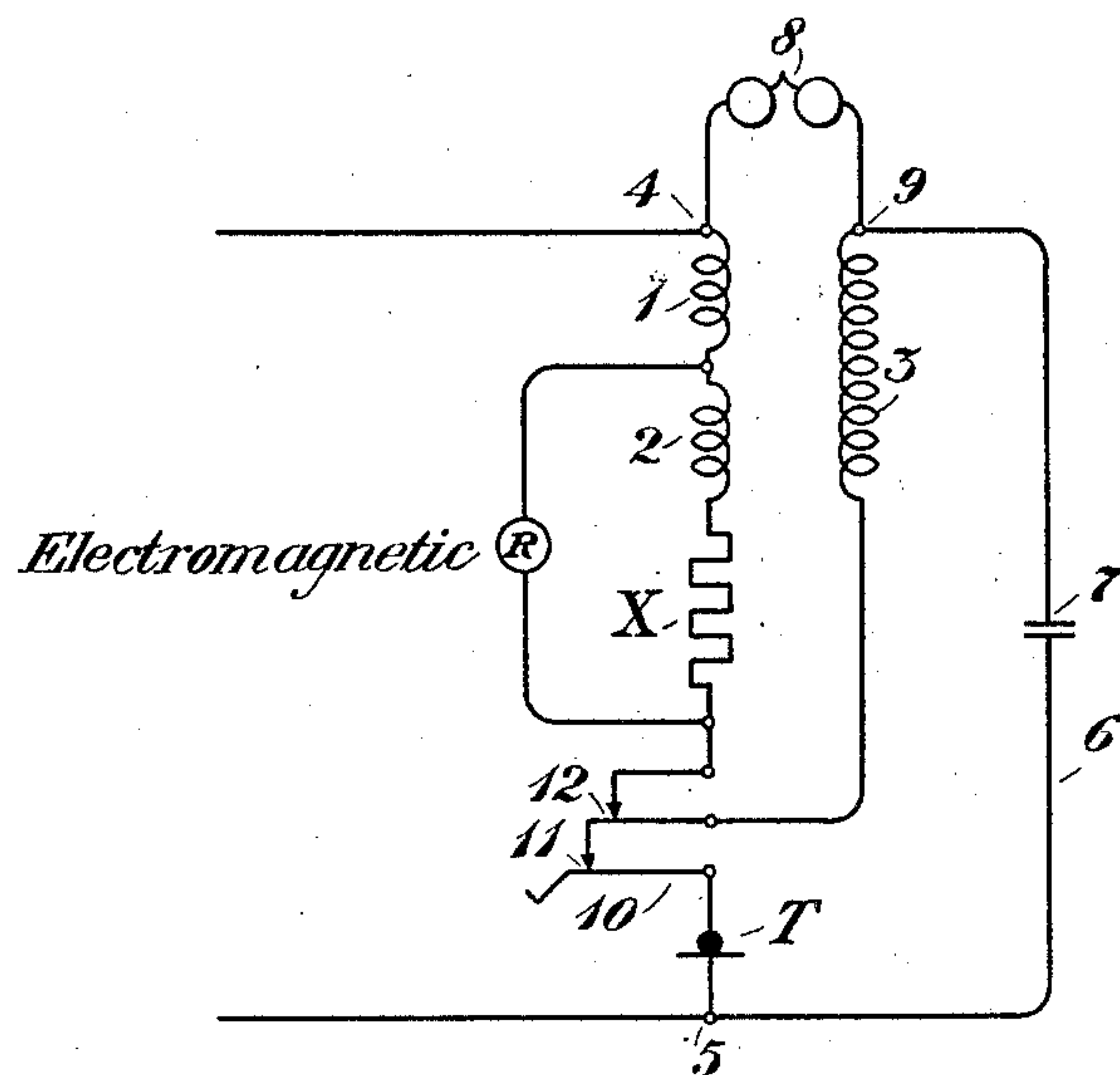


W. H. MARTIN.
SUBSTATION CIRCUITS.
APPLICATION FILED DEC. 19, 1918.

1,357,296.

Patented Nov. 2, 1920.



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WILLIAM H. MARTIN, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

SUBSTATION-CIRCUITS.

1,357,296.

Specification of Letters Patent.

Patented Nov. 2, 1920.

Application filed December 19, 1918. Serial No. 267,517.

To all whom it may concern:

Be it known that I, WILLIAM H. MARTIN, residing at New York, in the county of Bronx and State of New York, have invented certain Improvements in Substation-Circuits, of which the following is a specification.

This invention relates to substation telephone circuits and more particularly to substation circuits of the anti-side tone type.

One of the objects of the invention is to so arrange an anti-side tone set of the type in which an electromagnetic receiver is employed, that when the direct current path through the transmitter and receiver is opened by means of the switch-hook, an undesirable click will not be produced in the receiver. Other and further objects of the invention will, however, more fully appear in connection with the detailed description of the invention hereinafter given.

The objects of the invention as herein disclosed are secured by so arranging the contacts of the switchhook that when the switchhook is operated to open the circuit, the direct current path through the receiver and transmitter will be opened an instant before the connection between the receiver and an auxiliary path including a condenser is opened, so that the energy stored up in the receiver and transformer will have an opportunity to gradually discharge through the auxiliary circuit.

The invention may now be understood from the following description when read in connection with the accompanying drawing, the figure of which illustrates a circuit arrangement of a preferred embodiment of the invention.

The substation of this invention comprises, among other elements, a transmitter T, an electromagnetic receiver R, an auxiliary resistance X and a three winding transformer including windings 1, 2 and 3. The transmitter T and the receiver R are arranged in series with winding 1 of the transformer, the three elements being bridged across the line terminals 4 and 5. The receiver R is shunted by a path including winding 2 of the transformer and the auxiliary resistance X which, in practice, may be incorporated in the winding 2. An auxiliary path 6 is arranged in shunt with the transmitter T, said auxiliary path including winding 3 of the transformer and a con-

denser 7 to prevent the passage of a direct current through this auxiliary circuit. The ringer 8 is connected from the line terminal 4 to the terminal 9 of the winding 3. In order to control the direct current path the switchhook 10 is provided, said switchhook controlling contacts 11 and 12, the former of which opens the direct current circuit by disconnecting the transmitter 10 from the parallel paths through resistance X and receiver R. Contact 12 controls the connection of said paths to the auxiliary path 6. The contacts of the switchhook are so arranged that contact 11 is opened before contact 12.

The arrangement of the transmitter, receiver, auxiliary resistance, line and transformer above described results in an anti-side tone substation circuit of the general type disclosed in certain patents granted to George A. Campbell under date of January 22, 1918, and the general theory and operation of the anti-side tone circuit is fully disclosed in said patents. Furthermore, as the specific arrangement of the fundamental elements of the substation is fully disclosed in an application of K. S. Johnson, Serial No. 210,265, filed January 4, 1918, it is thought to be unnecessary to describe the detailed operation of the circuit except in so far as it relates to the prevention of clicks in the electromagnetic receiver. The operation whereby undesirable clicks are prevented is as follows:

Normally, direct current flows from the line to terminal 4, through the winding 1 and thence in parallel both through electromagnetic receiver R, and through winding 2 and auxiliary resistance X in series, thence over switchhook contacts 12 and 11, through the transmitter 10 to terminal 5 and back to the line. Since condenser 7 is included in the auxiliary path 6 no direct current flows through this path. Upon operating the switchhook 10, as for instance to recall the operator, the contact 11 is first opened, the contact 12 remaining closed for an instant so that the energy stored up in the electromagnetic receiver and transformer winding has an opportunity to discharge over the contact 12 and through the winding 3 and condenser 7. As this discharge is gradual and may take place before the contact 12 opens, no undesirable click results in the receiver R.

While this arrangement is illustrated in what is believed to be its most desirable form, it will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from what is illustrated without departing from the spirit of the invention as defined in the following claims.

What is claimed is:

10 1. In a substation set, a transmitter and a receiver connected in circuit so that direct current flows through both instruments, an auxiliary path over which variable current can flow from the receiver to the line, 15 and a circuit controller so arranged as to open the direct current path through the transmitter and receiver before opening the connection between the receiver and auxiliary path, whereby the energy stored in the 20 receiver may discharge through the auxiliary path.

2. In a substation set, a transmitter and a receiver connected in circuit so that direct current flows through both instruments, 25 an auxiliary path including a condenser in shunt with the transmitter, and a circuit controller so arranged as to open the direct current path through the transmitter and receiver before opening the connection between the receiver and auxiliary path, 30 whereby the energy stored in the receiver may discharge through the auxiliary path.

3. In a substation set, a transmitter and a receiver connected in circuit so that direct 35 current flows through both instruments, an auxiliary path including a condenser in shunt with the transmitter, a transformer including a winding in series with the transmitter and receiver, and a winding in said 40 auxiliary path, and a circuit controller so arranged as to open the direct current path

through the transmitter and receiver before opening the connection between the receiver and auxiliary path, whereby the energy stored in the receiver may discharge through 45 the auxiliary path.

4. In a substation set, a transmitter and a receiver connected in circuit so that direct current flows through both instruments, an auxiliary resistance in shunt with the re- 50 ceiver, an auxiliary path including a condenser in shunt with the transmitter, a transformer including a winding in series with the transmitter and receiver and a winding in said auxiliary path, and a circuit 55 controller so arranged as to open the direct current path through the transmitter and receiver before opening the connection between the receiver and auxiliary path, whereby the energy stored in the receiver 60 may discharge through the auxiliary path.

5. In a substation set, a transmitter and a receiver connected in circuit so that direct current flows through both instruments, an auxiliary resistance, an auxiliary path in- 65 cluding a condenser in shunt with the transmitter, a transformer including a winding in series with the transmitter and receiver, a winding in said auxiliary path, said auxiliary resistance and a third winding of said 70 transformer being arranged in series-shunt relation with said receiver, and a circuit controller so arranged as to open the direct current path through the transmitter and receiver before opening the connection be- 75 tween the receiver and auxiliary path, whereby the energy stored in the receiver may discharge through the auxiliary path.

In testimony whereof I have signed my name to this specification this 17th day of 80 December 1918.

WILLIAM H. MARTIN.