

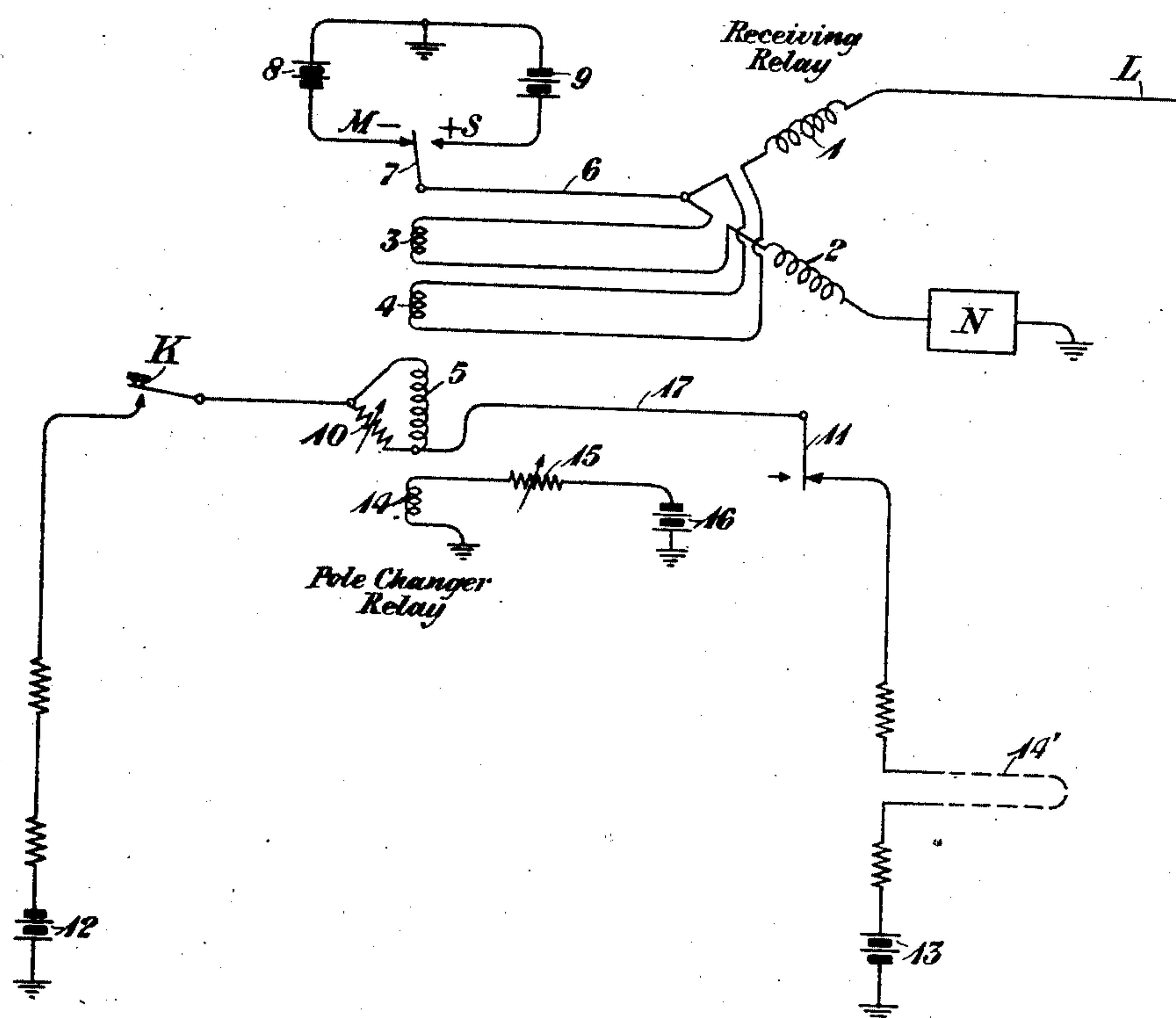
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TELEGRAPH CIRCUITS

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UNITED STATES PATENT OFFICE.

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TELEGRAPH CIRCUITS.

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To all whom it may concern:

Be it known that I, SAMUEL I. CORY, residing at Elmhurst, in the county of Queens and State of New York, have invented certain Improvements in Telegraph Circuits, of which the following is a specification.

This invention relates to improvements in telegraph circuits.

In the half-duplex operation of telegraph systems it is necessary to provide at each terminal station arrangements whereby the distant operator may interrupt or "break" the sending operator at another station in order that a message may be initiated at the distant station. The general problem in this connection is to remove the telegraph circuit from the control of the sending operator when the receiving operator desires to send. This may be accomplished by locking up the transmitter or by switching the line from the transmitter to marking battery and in former arrangements it has been the practice to employ an auxiliary relay for this purpose or in other instances to lock up the transmitter by means of a holding winding bridged directly across the receiving relay contacts. In the arrangements of this invention holding windings for the transmitter are provided connected in the line circuit in exactly the same manner as the windings of the receiving relay, so that the holding operation, and accordingly the "break", is controlled directly by the distant transmitter. The features and details of the invention will appear more fully from the detailed description of its operation hereinafter given.

The invention is illustrated in the accompanying drawing in the figure of which it is shown as applied to the station of a differential duplex grounded telegraph circuit. However it is understood that it is applicable to other types of telegraph circuits either of the open wire or full metallic type.

In the drawing is shown a telegraph line L and a terminal station therefor at which is provided a network N for balancing the line L. Associated with the line L and network N in the usual manner are the differentially arranged windings 1 and 2 of a receiving relay. The armature and contacts 11 of the receiving relay are included in the loop circuit 17. At the station there is also provided a pole changer relay which has

four windings, 3, 4, 5, and 14. The winding 5 is directly in the loop circuit 17 and under control of the key K exercises primary control over the armature 7 of the pole changer which cooperates with the marking and spacing contacts M and S and the oppositely poled batteries 8 and 9 respectively whereby impulses may be transmitted over conductor 6 to the line L. The loop circuit 17 also includes the batteries 12 and 13 and a local subscriber's circuit 14, if desired. The winding 5 is illustrated as shunted by a variable resistance 10 for the purpose of controlling the effect of the loop current. The winding 14 of the pole changer is a biasing winding and tends to oppose the effect of winding 5. It is included in a circuit with a variable resistance 15 and the battery 16. The windings 3 and 4 of the pole changer are connected differentially into the line L in a manner similar to the receiving relay windings 1 and 2. These windings act as holding windings to prevent the operation of the pole changer relay when receiving as will appear from the following description of the operation of the arrangements.

In considering the operation let it be assumed that the key K at the near station is closed as shown and that the key at the distant station is also closed. The armatures of both pole changers will then be on their marking contacts. The current in the loop circuit 17 flows through winding 5 in such direction as to hold the armature 7 on the marking contact. The effect of the biasing winding 14 is to oppose to some extent the effect of winding 5. The current from the pole changer relay at the near station will flow through the windings 3 and 4 differentially. Accordingly it will be seen that the pole changer will not be affected in its operation by the presence of windings 3 and 4 in the line, provided the line is balanced by the artificial line N. The current flowing over the line L from the distant station may be considered as flowing in series through windings 3 and 4 so that they will aid each other in effect. These windings under the above conditions are so poled that their effect on the pole changer relay would be to aid the biasing winding 14, or in other words to tend to move the armature to the spacing contact. However this will not occur as the windings are so adjusted that the

effect of winding 5 will be greater than the combined effect of windings 3, 4, and 14. The windings 3 and 4 however have a greater effect than that of winding 14 above
 5 for reasons following. The windings may be adjusted to operate with the above effect by adjusting their ampere turns. In practice the relative ampere turn effects might be as follows: winding 5=10, windings 3
 10 and 4=4, winding 14=1, although other ratios may be used if desired.

If the distant operator desires to break, he does so by opening his key in the usual manner. The current through the receiving relay windings 1 and 2 and the holding windings 3 and 4 at the near station will then be reversed. This will open the loop circuit 17 at the armature and contacts 11 of the receiving relay and thus
 15 cause the operating winding 5 to have no effect. With a reversal of current the effect of windings 3 and 4 will now be to hold the armature 7 against the marking contact M. As the effect of these windings
 25 will overcome that of the biasing winding 14, the latter will have no effect. Accordingly the sending operator at the near station will have no effect over the pole changer and will close his key to allow the distant
 30 operator to send.

While the invention has been disclosed in certain specific arrangements which are deemed desirable, it is understood that it is capable of embodiment in many and widely
 35 varied arrangements without departing from the spirit of the invention as defined in the appended claims.

What is claimed is:

1. In a duplex telegraph system, a line,
 40 a terminal station therefor, a balancing artificial line circuit at said station, receiving relay windings connected in said line and artificial line circuits, said receiving relay windings being arranged in series with re-
 45 spect to currents coming in over said line and being differentially arranged with respect to outgoing currents applied to said line, a pole changer, and holding windings for said pole changer, said holding wind-
 50 ings being connected in said line and artificial line circuits in a manner similar to said receiving relay windings.

2. In a duplex telegraph system, a line,
 55 a terminal station therefor, a balancing artificial line circuit at said station, a pole changer relay, and holding windings for

said relay, said windings being connected serially in said line and artificial line circuits with respect to currents coming in over said line and being differentially ar-
 60 ranged with respect to outgoing currents applied to said line.

3. In a duplex telegraph system, a line, a terminal station therefor, a balancing artificial line circuit at said station, a polarized
 65 pole changer relay, a loop circuit, an operating winding for said pole changer included serially in said loop circuit, a biasing winding for said pole changer, and holding windings for said pole changer, 70
 said holding windings being included serially in said line and artificial line circuits with respect to currents coming in over said line and differentially arranged with respect to the outgoing currents applied to said
 75 line.

4. In a duplex telegraph system, a line, a terminal station therefor, a balancing artificial line circuit at said station, a polarized
 80 pole changer relay, a loop circuit, an operating winding for said pole changer included serially in said loop circuit, a biasing winding for said pole changer, and holding windings for said pole changer, said holding winding being included serially in
 85 said line and artificial line circuits with respect to currents coming in over said line and being differentially arranged with respect to outgoing currents applied to said line, the effect of said operating winding
 90 being greater than the combined effect of all of said other windings and the effect of said holding windings being greater than the effect of said biasing winding.

5. In a duplex telegraph system, a line,
 95 a terminal station therefor, a balancing artificial line circuit at said station, a receiving relay at said station having a winding so associated with said line and said artificial line as to receive signals coming in
 100 over said line and to be unaffected by signals transmitted out over said line from said station, a transmitter, and a holding winding for said transmitter, said holding winding being arranged with respect to said
 105 line and artificial line in exactly the same manner as said receiving relay winding.

In testimony whereof, I have signed my name to this specification this 15th day of March, 1922.

SAMUEL I. CORY.