

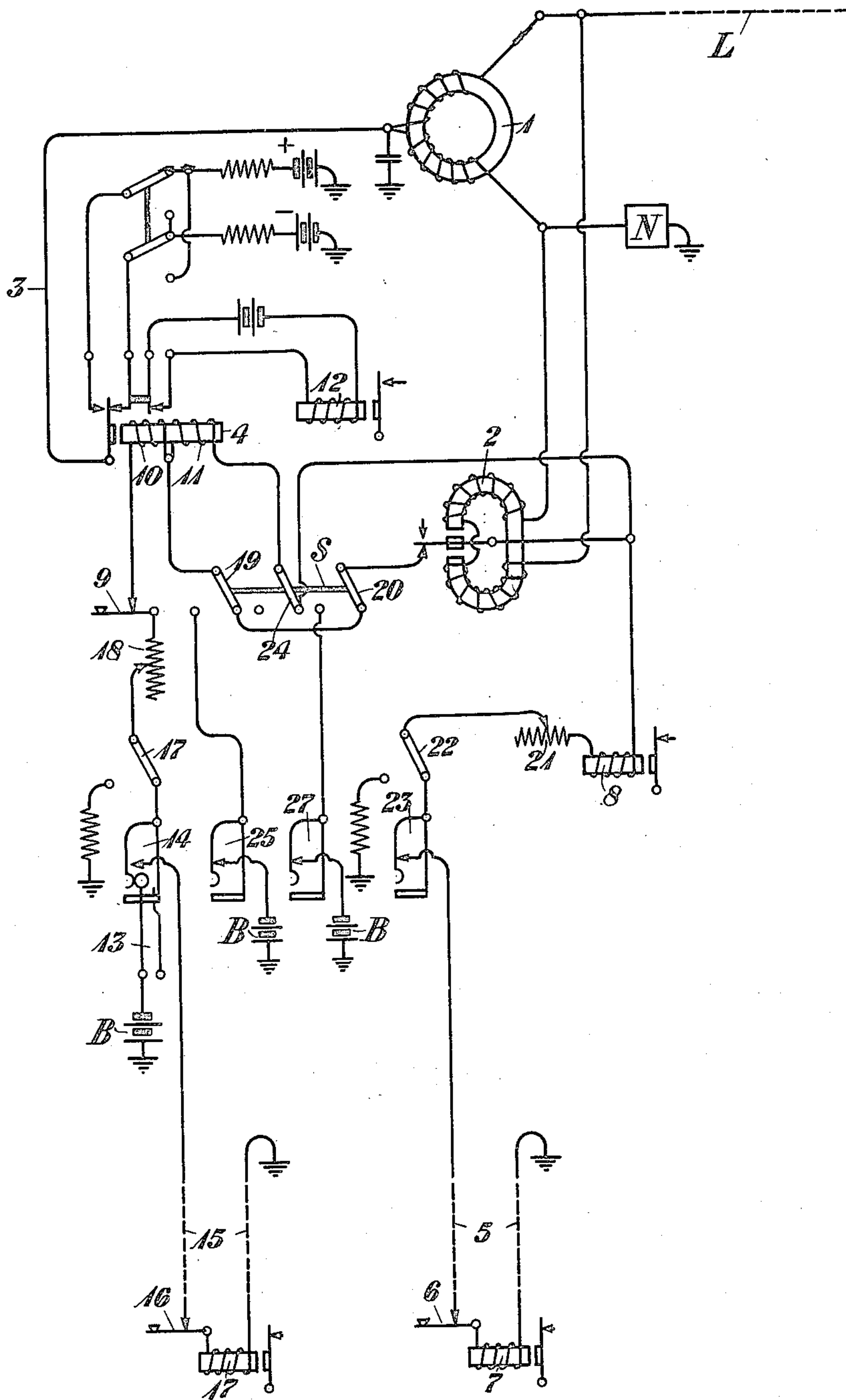
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TELEGRAPH APPARATUS

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TELEGRAPH APPARATUS.

Application filed January 4, 1919. Serial No. 269,601.

To all whom it may concern:

Be it known that I, CECIL E. WALTON, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain Improvements in Telegraph Apparatus, of which the following is a specification.

This invention relates to signaling systems and more particularly to arrangements for transmitting and receiving telegraphic signals.

One of the objects of the invention has reference to the provision of arrangements whereby telegraphic signals may be transmitted and received according to either a full duplex or a half duplex method of operation.

A further object of the invention has reference to the provision of means whereby, when the system is operated on a half duplex basis, the sounders in the local loop circuit may be operated under the control of a polar receiving relay by varying the resistance in the local loop circuit, so that the transmitting pole changer which is also included in the loop circuit may not be affected by the operation of the polar receiving relay.

Still another object of the invention has reference to the provision of a system in which the control of the pole changer will be rendered more direct by the elimination of the auxiliary control relay which has been necessary heretofore to prevent the pole changer from responding to the polarized receiving relay.

A further object of the invention is to so arrange the apparatus of the signaling set that the main line sounder and the loop sounder will both operate when signals are being transmitted and will be located in such proximity to each other that the operator may monitor simultaneously on both sounders to determine whether or not the pole changer is properly repeating the signals to the line.

The above objects, as well as other objects more fully hereinafter appearing, are secured by providing a pole changing relay in the loop circuit, said pole changing relay comprising a low resistance winding normally included in the local circuit and a high resistance winding normally short circuited by the contact of the receiving polar relay, the high resistance winding being in-

cluded in the local circuit when the polar relay is operated in response to received signals. The additional resistance thus introduced in the local circuit is sufficient to operate the sounders therein without permitting the pole changer to retract its armature. This is due to the fact that the ampere turns of the pole changing relay with only the low resistance winding in circuit are made substantially equal to the ampere turns when both windings are included in circuit.

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

Referring to the drawing a line circuit L is shown terminating in the usual duplex set comprising balanced impedance coil 1, artificial line N and a polar receiving relay 2 bridged across neutral points of the line and artificial line with respect to the transmitting circuit 3. The transmitting circuit is under the control of a pole changing relay 4 included in a local circuit and adapted to control the transmission of positive or negative signaling currents to the line L. A switch S is provided for the purpose of changing the circuits from a half duplex arrangement to a full duplex arrangement. When operating on a half duplex basis the switch S will be in the position shown in the drawing and the windings of the pole changing relay 4 will be included in a local circuit with a source B and a local subscriber's loop 5, containing a sending key 6 and a sounder 7. A sounder 8 and a key 9 are also included in the local circuit for the use of the operator at the main station. The pole changing relay has a low resistance winding 10 and a high resistance winding 11, the latter being normally short circuited over the contact of the polar relay 2. A local circuit sounder 12 is provided which is under the control of the pole changer relay 4.

The apparatus may now be more fully understood from a description of the operation thereof which is as follows: Assuming the apparatus is to be operated on a half duplex basis the switch S is thrown to the right as shown and battery from source B is connected to a local circuit including

the pole changer relay 4 by inserting the plug 13 in the jack 14, thereby disconnecting the loop circuit 15, which is provided with a key 16 and sounder 17 for the sending operator at a local station when transmitting upon a full duplex basis. A circuit now extends from battery B over the contacts of plug 13 and jack 14, switch 17, resistance 18, key 9, winding 10 of pole changer 4, blades 19 and 20 of switch S, over the closed or marking contact of polar relay 2, sounder 8, resistance 21, switch 22, normal contact of jack 23 and through the key 6 and sounder 7 of loop 5 to ground. The high resistance winding 11 of the pole changer 4 is also included in the circuit above traced by a connection extending over the blade 24 of the switch S but said winding is normally short circuited over the closed or marking contact of the polar relay 2.

When a signal is received from the line L the polar relay 2 shifts its armature, thereby opening the short circuit about the high resistance winding 11 and including said high resistance winding in the local circuit, thereby reducing the current flow sufficiently to cause the sounders 7 and 8 to retract their armatures. The pole changer 4 is not deenergized by this reduction in the current flow since a sufficient number of turns are provided in the winding 11 so that the ampere turns under the low current condition now existing will be substantially equal to the ampere turns under the higher current condition existing when only the low resistance winding 10 is included in the local circuit. This renders the pole changer 4 independent of the polar relay 2, without necessitating the provision of an auxiliary controlling relay for maintaining the pole changer in its normal condition when the local circuit is opened and closed by the polar relay, as in systems heretofore used.

Signals may be transmitted by operating either key 6 or key 9, thereby opening the local circuit and deenergizing the pole changer 4 which permits its armature to retract and send current of opposite polarity to the line L, at the same time opening the circuit of the sounder 12. The sounder 12 as well as the sounders 7 and 8 in the local circuit are operated in response to the signal thus transmitted. It will be remembered that when signals were being received the main line sounder 12 was not operated since the pole changer 4 was unaffected by such signals, and only the sounders in the local circuit were operated. The sounders 8 and 12 are in close proximity at the main station and the operator is thereby enabled to monitor upon both sounders while sending by means of the key 9 to determine whether or not the pole changer 4 is properly repeating the signal to the line L.

In order to change the circuit from a half duplex to a full duplex circuit the switch S may be thrown to the left and the plug 13 withdrawn from jack 14. The circuit of the high resistance winding 11 of the pole changer 4 is now opened at the blade 24 of switch S so that this winding no longer takes any part in the operation. The low resistance winding 10 of the pole changer is now included in a local transmitting circuit including loop 15 as follows:

From battery B, over the normal contact of jack 25, blade 19 of switch S, winding 10 of pole changer 4, key 9, resistance 18, switch 17, normal contact of jack 14 and through the sending key 16 and sounder 17 of the sending operator's loop 15 to ground. Signals may be transmitted by operating any of the keys in this circuit, the pole changer responding thereto to repeat the signals to the line L without affecting the receiving relay 2. The receiving relay 2 controls a local circuit which may be traced from battery B over the normal contact of jack 27, blade 20 of switch S, contact of polar relay 2, sounder 8, resistance 21, switch 22, normal contact of jack 23 and through the key 6 and sounder 7 in the loop 5 of the receiving operator to ground. Signals received from the line L will open and close the circuit above traced to operate the sounders 7 and 8 and these signals may be received at the same time signals are being transmitted from the loop 15. The operator at the main station may also simultaneously send and receive by means of the key 9 and the sounder 8. By throwing the switches 17 and 22 to the left the loops 5 and 15 may be disconnected and the local circuits be restricted to the main station so that sending will be under the control of the key 9 and signals will be received by the sounder 8 only.

The arrangement above described provides a simplified arrangement of a telegraph set which will be found efficient in its operation and which may be readily maintained, and while the invention has been shown embodied in what is considered a preferable arrangement it will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from that illustrated without departing from the spirit of the invention as defined in the following claims.

What is claimed is:

1. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay being included in a local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to vary the resistance of said local circuit while maintaining the circuit through said indicating means closed, where-

by said indicating means may be actuated and said transmitting relay prevented from actuation by the operation of said receiving relay, and means in said local circuit for
 5 operating said transmitting relay to transmit signals to said line.

2. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay
 10 being included in a local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to vary the resistance of said transmitting relay while maintaining the
 15 local circuit through said indicating means closed, whereby said indicating means may be actuated and said transmitting relay prevented from being actuated by the operation of said receiving relay, and means in
 20 said local circuit for operating said transmitting relay to transmit signals to the line.

3. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay
 25 having a low resistance and a high resistance winding, said low resistance winding being included in a local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to include said high resistance
 30 winding in said local circuit to operate said indicating means without actuating said transmitting relay, and means in said local circuit for operating said transmitting relay to transmit signals to said line.
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4. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay having a low resistance and a high resistance
 40 winding, said low resistance winding being included in a normally closed local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to include said
 45 high resistance winding in said local circuit to operate said indicating means without actuating said transmitting relay, and means

to open and close said local circuit to operate said transmitting relay to transmit signals to the line. 50

5. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay having a low resistance and a high resistance
 55 winding, said low resistance winding being included in a normally closed local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to include
 60 said high resistance winding in said local circuit to reduce the current therein by an amount sufficient to actuate said indicating means, the windings of said transmitting relay being so proportioned that the ampere-
 65 turns with both windings in circuit shall be substantially equal to the ampere-turns when only the low resistance winding is in circuit, and means in said local circuit for operating
 70 said transmitting relay to transmit signals to the line.

6. In a signaling system, a line circuit, a receiving relay and a transmitting relay associated therewith, said transmitting relay having a low resistance and a high resistance
 75 winding, said low resistance winding being included in a normally closed local circuit controlled by said receiving relay, indicating means in said local circuit, means controlled by said receiving relay to include
 80 said high resistance winding in said local circuit to reduce the current therein by an amount sufficient to actuate said indicating means, the windings of said transmitting relay being so proportioned that the am-
 85 pere-turns with both windings in circuit shall be substantially equal to the ampere-turns when only the low resistance winding is in circuit, and means to open and close
 90 said local circuit to operate said transmitting relay to transmit signals to the line.

In testimony whereof, I have signed my name to this specification this twenty-third day of December, 1918.

CECIL E. WALTON.