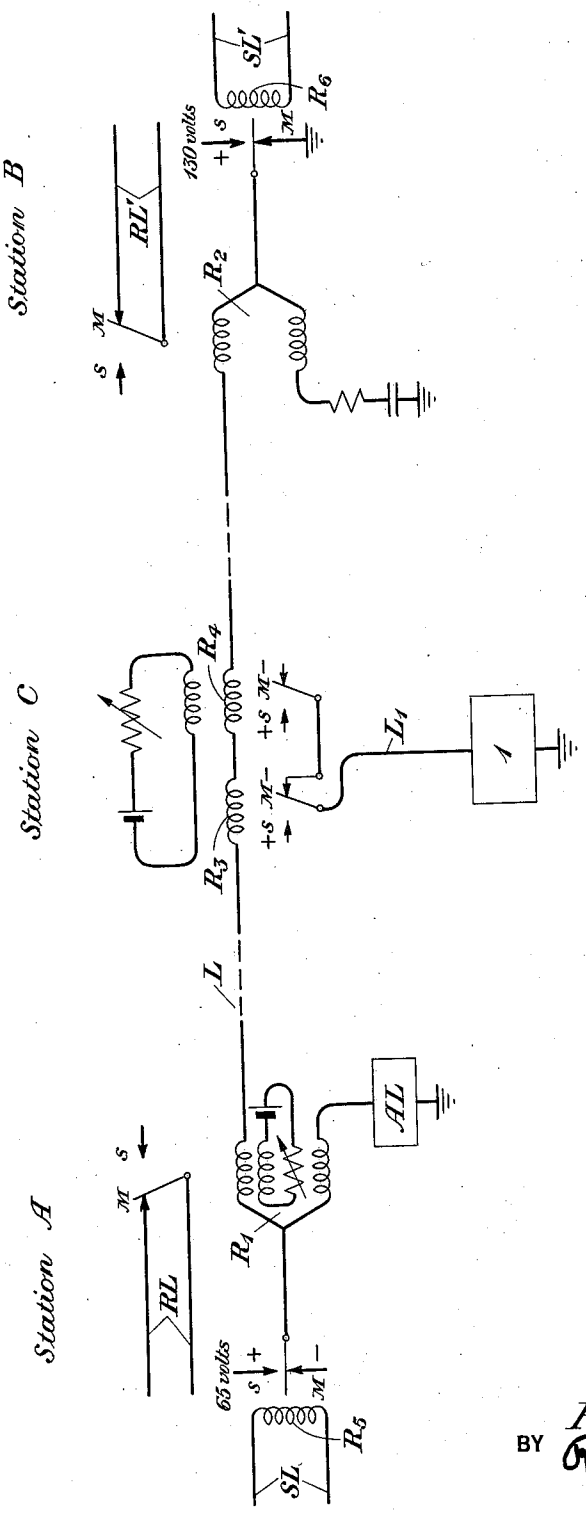
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TELEGRAPH SYSTEM

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TELEGRAPH SYSTEM

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This invention relates to telegraph systems and, more particularly, to means whereby signals which are being transmitted between two stations may be received at an intermediate point between said stations.

The arrangements of the invention are particularly suitable for use with telegraph systems of the so-called polarential type wherein at one end of the line polar signals are received and at the other end of the line differential signals are received. The objects of the invention are accomplished by the insertion of two relays in the line at the intermediate point at which it is desired to receive the signals. One of these relays operates only on polar signals from the polar sending end of the line and the other relay with an electrical bias operates only on signals from the battery and ground end of the line. The contacts of these two relays are connected in series in such a way that open and closed or polar signals may be sent to the intermediate receiving-only station. Other objects and features of the invention will appear more fully from the detailed description thereof hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing in which is shown a circuit diagram embodying a preferred form of the invention.

In the drawing is shown a polarential line circuit L interconnecting the stations A and B with an intermediate receiving-only station C connected to the line. At station A is shown a sending circuit SL connected to the sending relay R_5. The armature of the sending relay R_5 is connected to the differentially arranged windings of a polar receiving relay R_1. The upper winding of the receiving relay R_1 is connected to the line L and the lower winding is connected to ground through an artificial line AL. A biasing winding is provided for the receiving relay R_1. This winding biases the relay to marking. The voltage applied to the marking and spacing contacts of the sending relay R_5 will be approximately 65 volts. A receiving circuit RL is shown connected to the armature and marking contact of receiving relay R_1. At station B is shown a sending circuit SL' connected to the sending relay R_6. The armature of the sending relay R_6 is connected to the windings of the receiving relay R_2. The upper winding of the receiving relay is connected to the line L and the lower winding is connected to ground through a resistance and condenser. A receiving circuit RL' is shown connected to the armature and marking contact of the receiving relay R_2. The marking contact of the sending relay R_6 is connected to ground and the spacing contact to battery of approximately 130 volts.

At station C are shown two relays R_3 and R_4. Relay R_3 has only one winding which is connected in line L. Relay R_4 has one winding connected in line L and a biasing winding which biases the relay to marking. The relays R_3 and R_4 have their armatures and contacts connected in series to the line L_1 which leads to the intermediate way station 1.

The manner in which the arrangements of the invention operate will now be described in detail.

To send a marking signal from station A to station B the operation is as follows: The armature of sending relay R_5 will be on its marking contact M which is connected to the negative pole of battery of approximately 65 volts. The armature of sending relay R_6 will be connected to its marking contact which is connected to ground. Current will then flow in the following direction; from ground, marking contact and armature of relay R_6, upper winding of relay R_2, over line L, winding of relay R_4, winding of relay R_3, over line L, upper winding of relay R_1, armature and marking contact of relay R_5, to negative battery. Current will also flow in the following direction; from ground, artificial line AL, lower winding of relay R_1, armature and marking contact of relay R_5, to negative battery. As the upper and lower windings of relay R_1 are differentially arranged the effect of the current in one of these windings will nullify the effect of the current in the other. The current in each winding is approximately 30 mils. As heretofore pointed out relay R_1 is provided with a biasing winding, which biases the relay to marking. The current flow in the biasing winding is about 30 mils. This will hold the armature of the receiving relay on its marking contact. As heretofore pointed out the current flows through the upper winding of relay R_2 in a direction from right to left. This will cause relay R_2 to keep its armature on its marking contact. The foregoing describes the operation of sending a marking signal from station A to station B. To send a marking signal from station B to station A the operation is the same.

When a marking signal is transmitted between stations A and B current will flow through the winding of relay R_4, which is in series in the line L, in a direction from right to left. This current would be approximately 30 mils, and

the relay is so arranged that current flowing through this winding in a direction from right to left would tend to cause its armature to move to its spacing contact. However, this will not take place at this time because relay R_4 is provided with a biasing winding, which biases the relay to marking, and the current flow in the biasing winding is approximately 60 mils. Hence the armature of relay R_4 remains on its marking contact. Current will also flow through the winding of relay R_3 in a direction from right to left. This relay is so arranged that current flowing through its winding in this direction will cause its armature to remain on its marking contact. Hence, when a marking signal is sent from either of stations A or B the armatures of relays R_3 and R_4 will remain on their marking contacts and the intermediate way station I will receive a marking signal.

To send a spacing signal from station A to station B the operation is as follows: The armature of sending relay R_5 will be on its spacing contact to which is connected positive battery of approximately 65 volts. The armature of relay R_6 at station B will be on its marking contact which is connected to ground. Under these conditions current will flow over the following path in the following direction; from positive battery, spacing contact and armature of relay R_5, upper winding of relay R_1, line L, winding of relay R_3, winding of relay R_4, line L, upper winding of relay R_2, armature and marking contact of relay R_6 to ground. Current will also flow from positive battery, spacing contact and armature of relay R_5, through the lower winding of relay R_1, through artificial line AL, to ground. Thus current will flow through the upper and lower windings of relay R_1 and as these windings are differentially arranged the effect in one winding will nullify the effect in the other. As the biasing winding of this relay biases the relay to marking the armature of the relay will remain on its marking contact. At station B the current flows through the upper winding of receiving relay R_2 from left to right. Current flowing in this direction in this relay winding will cause it to move its armature to its spacing contact.

When a spacing signal is sent from station A to station B current flows through the winding of relay R_3 in a direction from left to right. Current flow in this direction in the relay winding will cause it to move its armature to its spacing contact. This will cause the intermediate way station I to receive a spacing signal. Current also flows through the winding of relay R_4 in series in the line in a direction from left to right. This would tend to keep its armature on its marking contact.

When a spacing signal is sent from station B to station A the operation is as follows: The armature of relay R_5 at station A will be on its marking contact. The armature of relay R_6 at station B will be on its spacing contact. The spacing contact of relay R_6 is connected to positive battery of approximately 130 volts. Under these conditions current will flow over the following path in the following direction; from positive battery, spacing contact and armature of relay R_6, upper winding of relay R_2, line L, winding of relay R_4, winding of relay R_3, line L, upper winding of relay R_1, armature and marking contact of relay R_5, to negative battery. Current will also flow from ground, through artificial line AL, lower winding of relay R_1, armature and marking contact of relay R_5, to negative battery. Due to the fact that the battery connected to the spacing contact of relay R_6 is 130 volts the current flow through the upper winding of relay R_1 will be of the order of 90 mils. and will be in a direction to cause the armature of said relay to move to spacing. The direction of current flow in the lower winding and in the biasing winding of relay R_1 would tend to cause the armature to move to marking. However, the current in each of these two last mentioned windings is only of the order of 30 mils. Hence the current of 90 mils. in the upper winding of relay R_1 would prevail and cause it to move its armature to its spacing contact.

When a spacing signal is thus sent from station B to station A current will flow through the winding of relay R_3 from right to left. This will cause the armature of relay R_3 to remain on its marking contact. Current will also flow through the winding in series in line L of relay R_4 in a direction from right to left. This would tend to move its armature to its spacing contact. Due to the fact that the battery connected to the spacing contact of relay R_6 is of the order of 130 volts the current through this winding of relay R_4 is of the order of 90 mils. As heretofore pointed out, the current in the biasing winding of relay R_4, which is biased to marking, is only 60 mils. Hence relay R_4 will move its armature to its spacing contact and the intermediate way station I will receive a spacing signal.

While certain voltage values, such as 65 volts and 130 volts, and certain current values, such as 30 mils. 60 mils. and 90 mils. have been utilized to describe the invention, it is understood that these values are for purposes of illustration only and that other values might be utilized. While the invention has been disclosed as embodied in certain specific forms which are deemed desirable, it is understood that it is capable of embodiment in many and other widely varied forms without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. A telegraph system comprising two stations each of which includes a transmitting relay and a receiving relay, a polarential line circuit interconnecting said stations, an intermediate station connected to said line circuit, two relays at said intermediate station having windings in said line circuit so arranged that one of said relays will respond only to polar signals sent from the polar sending end of said line circuit and the other of said relays will respond only to signals sent from the battery and ground end of said line circuit, and signal responsive means controlled jointly by said relays.

2. A telegraph system comprising two stations each of which includes a transmitting relay and a receiving relay, a polarential line circuit interconnecting said stations, an intermediate station connected to said line circuit, two relays at said intermediate station having windings in said line circuit so arranged that one of said relays will respond only to polar signals sent from the polar sending end of said line circuit and the other of said relays will respond only to signals sent from the battery and ground end of said line circuit, signal responsive means at said intermediate station and circuit arrangements controlled jointly by the contacts of both of said relays for controlling said signal responsive means.

3. A telegraph system comprising two stations

each of which includes a transmitting relay and a receiving relay, a polarential line circuit interconnecting said stations, an intermediate station, a first and a second relay at said intermediate station, each of said relays having a winding included in said line circuit, the polarity of said windings being such that signal current transmitted over said line circuit in one direction will tend to cause the first relay to operate to marking and the second relay to operate to spacing, biasing means only for said second relay sufficiently strong to overcome the effect of current transmitted over said line circuit in said first mentioned direction when the signals originate at one end of said line circuit, and means for increasing the current transmitted over said line circuit in said direction sufficiently to overcome the effect of said biasing means when the signals originate at the other end of said line circuit.

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