

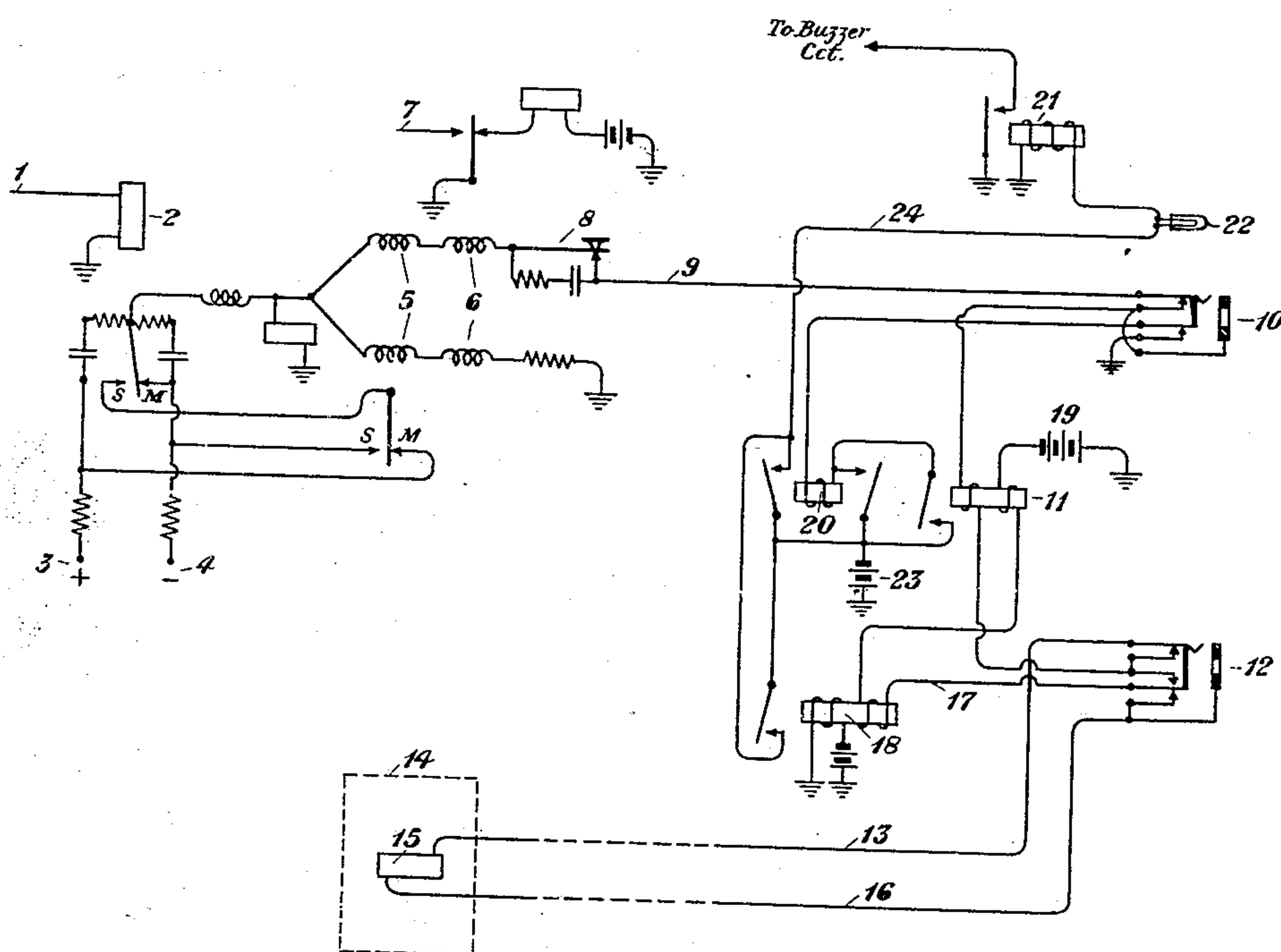
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TELEGRAPH SYSTEM

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TELEGRAPH SYSTEM

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This invention relates to telegraph systems, and more particularly to improvements in telegraph line terminal circuits for indicating at the telegraph board whenever the polarity of the current in a subscriber's loop circuit is reversed.

The accidental reversal of the current in a subscriber's loop circuit is objectionable, particularly in instances wherein printing telegraph equipment is included in the loop circuit. This may be due to the fact that the printing telegraph equipment may include polar relay apparatus and, therefore, the reversal of the loop current would leave the printer in the spacing condition, or in a condition unresponsive to signals, although no indication might be had at the telegraph board at the central office that the signals were not being properly received. While the reversal of the loop current might be particularly objectionable in the case of printing telegraph apparatus, it is pointed out that such reversal of the loop current might be objectionable in many other instances where the operation of other apparatus in the loop was dependent upon current of a certain polarity.

It is the primary object of the arrangements of the invention to provide a device so associated with the telegraph line terminal at the central office that it will operate whenever the polarity of the current in a subscriber's loop associated therewith is reversed and will operate a signal at the central office, whereby the attendant may be notified that conditions are such that the subscriber is not receiving the signals. Other objects and features of the invention will appear more fully from the detailed description of the invention hereinafter given.

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

In the drawing is shown a section 1 of a telegraph line terminating at a central office and controlling the receiving relay 2. The spacing and marking contacts of the receiving

relay are shown associated with the sources of current of opposite polarity 3 and 4. A break relay 5 and a sending relay 6 are shown. The sending relay 6 controls, in effect, a short circuit 7 to be closed across the output of the oscillator of carrier frequency utilized for sending. This apparatus is not shown. A key 8 may be included in the circuit. As the above described apparatus is well known in the art, no further description thereof will be given.

The telegraph line terminal apparatus includes a number of jacks of which the jacks 10 and 12 are illustrated. The subscriber's loop circuit may be traced as follows: from conductor 9, contacts of jack 10, left-hand winding of relay 11, upper contact of jack 12, conductor 13, winding of polar relay 15 in the printing telegraph apparatus 14 at the subscriber's station, conductor 16, lower contact of jack 12, conductor 17, right-hand winding of relay 11, to battery 19 and ground. The relay 11 is the customary type of relay associated with the telegraph line terminal and may be operated by the subscriber unbalancing the circuit by switching a key, thereby grounding his loop circuit. The operation of relay 11 will close an operating and locking circuit from battery 23 for relay 20, which is released as soon as an attendant plugs into the jack 10 to answer. The operation of relay 20 will close a circuit 24 from battery 23 to light the signal lamp 22. As has been pointed out, this means of signaling is provided so that the subscriber may signal the central office from his station, if desired, and is part of the customary apparatus associated with the telegraph line terminal apparatus. The apparatus 14 in the subscriber's loop has been referred to as printing telegraph equipment including a polar relay 15. This is for purposes of illustration only, and it is to be understood that the arrangements of the invention may be utilized in instances where the subscriber's loop includes other types of apparatus depending in their operation on current of a certain polarity.

It will be seen that if the polarity of the battery 19 should be reversed, the polarity

of current in the subscriber's loop would be reversed and the polar relay apparatus therein would not respond properly. It is pointed out that certain telegraph line terminal circuits are known as east telegraph line terminals and certain others are designated as west telegraph line terminals. It is customary for the battery corresponding to battery 19 to be of one polarity in the case of east apparatus and of another polarity in the case of west apparatus. Sometimes, in cases of emergency, the east apparatus may have to be substituted for the west apparatus, and vice versa, and in such instances there would be a tendency for a reversal of the current in the subscriber's loop. Various other causes might tend to reverse the current in the subscriber's loop and the above case is merely given as an illustration thereof.

In accordance with the arrangements of this invention, there is provided a relay 18 which will have one of its windings in series in the loop circuit. The other winding will be included in circuit with a battery arranged to furnish current opposed and equal in magnetic effect to the normal loop current through the other winding. The relay 18 is adjusted to operate, if the currents in the biasing and loop windings of the relay are aiding, with approximately one-half normal loop current. With this arrangement, the relay will not operate when either marking or spacing signals are being received; provided the loop current is in the correct predetermined condition. If, however, the loop current should be reversed (due, for example, to an emergency battery tap of the wrong polarity being patched into the circuit, or for any other reason) the current through the loop winding of relay 18 will reinforce the current through the biasing winding of the relay and cause it to operate. The operation of relay 18 will connect battery 23 over the contact of relay 18 to conductor 24 and to the signal lamp 22, thereby operating it. This will notify the operator at the central office of the fact that the loop current has been reversed from its proper condition and that the subscriber is not receiving signals.

While the arrangements of the invention have been disclosed as embodied in certain specific arrangements which are deemed desirable, it is understood that they are 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 line terminating at a central office, a loop circuit for extending said line, relay means in said loop circuit at said central office normally unoperated by the transmission of signals over said loop circuit but responsive to a change in the direction of current flow in said loop circuit, and signal-

ing means at said central office controlled by said relay means.

2. A telegraph line terminating at a central office, a loop circuit for extending said line, a relay at said central office having a line winding in series with said loop circuit and a holding winding in a separate circuit, said windings being arranged to have opposing effects when the loop current is in normal direction, and signaling means at said central office controlled by the operation of said relay.

3. A telegraph line terminating at a central office, a loop circuit for extending said line, a relay at said central office responsive to a change in the direction of current flow in said loop circuit, and signaling means at said central office controlled by said relay means, said relay having a line winding in series with said loop circuit and a holding winding having battery current opposed and equal in magnetic effect to the normal loop current in said line winding and said relay being adjusted to operate if the currents in the holding and loop windings are aiding with approximately one-half normal loop current strength.

In testimony whereof, I have signed my name to this specification this 21st day of May, 1928.

DONALD P. LOYE.