

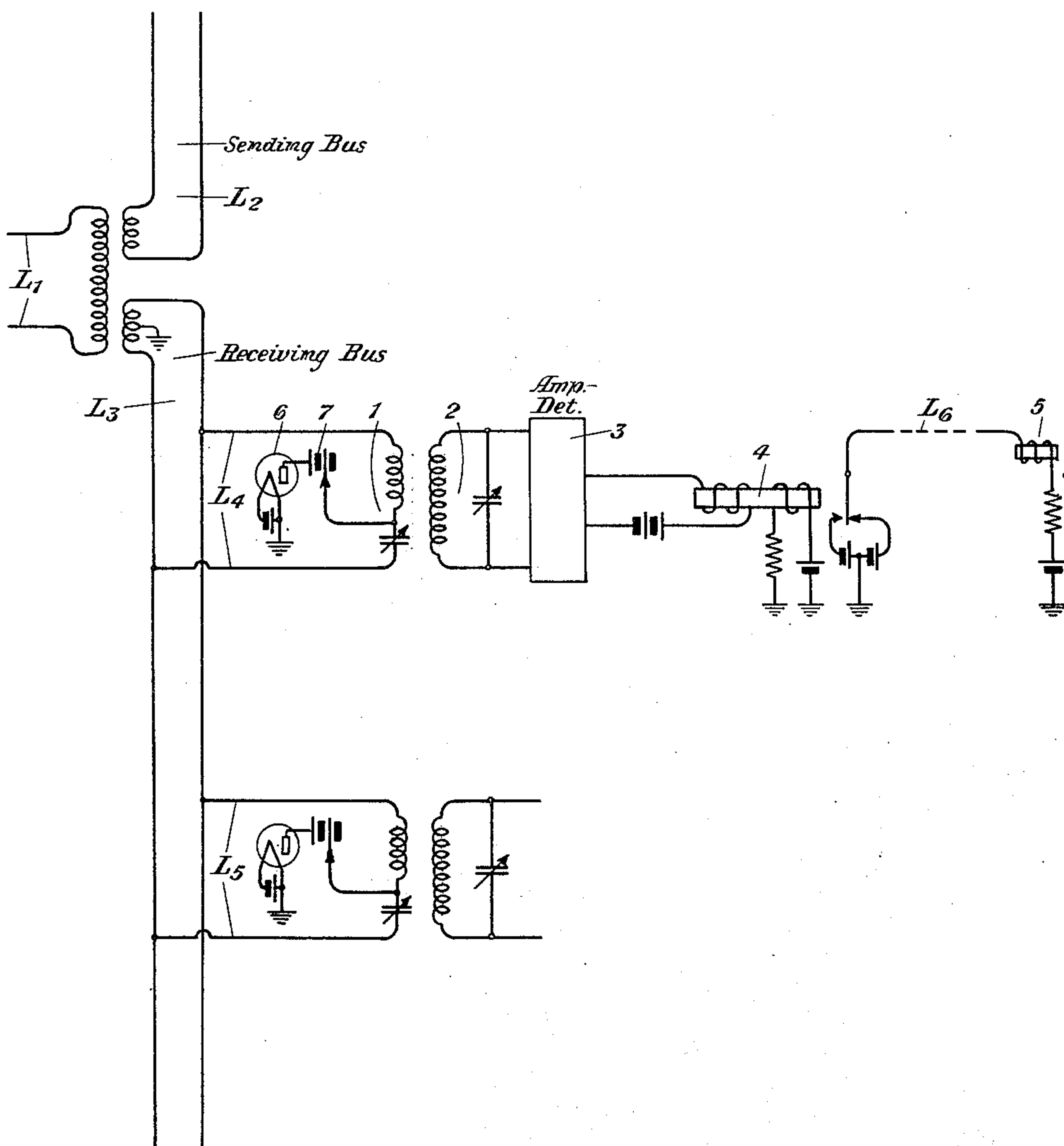
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MEANS FOR REDUCING LIGHTNING INTERFERENCE IN CARRIER TELEGRAPH SYSTEMS

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MEANS FOR REDUCING LIGHTNING INTERFERENCE IN CARRIER TELEGRAPH SYSTEMS

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This invention relates to means for eliminating the effect of lightning interference upon carrier telegraph signals, and particularly to means to prevent the building up of sustained oscillations by the interaction of the tuned circuits of carrier telegraph systems as the result of such interference.

In the operation of carrier telegraph systems interference with the reception of signals is frequently produced by voltage surges set up by lightning or other sources extraneous to the transmission lines. While the magnitude of the voltage resulting from lightning may be great relative to that of the signal impulses, such interfering voltages are generally of short duration, in fact, so short that they would not cause the operation of the receiving relay were it not for the presence in the circuits of elements that effectively prolong the duration of such interfering voltages. The elements that effect such prolongation are the tuned circuits of the receiving branches, which, when excited by the interference voltage of great magnitude produce oscillations that are sustained sufficiently long to permit the building up of the operating current of the receiving relay to that value at which the relay will operate.

My invention resides in means for detuning one of the resonant circuits whenever the impressed voltage exceeds a fixed limit, which detuning means comprises a thermionic discharge device.

The invention will be clearly understood from the following description, when read in connection with the attached drawing, showing schematically a form of embodiment of the invention.

In the drawing, the line L_1 represents any form of a transmission circuit over which are transmitted not only currents of frequencies and magnitudes corresponding to the normal signal voltages but also currents resulting from abnormal interfering voltages. The circuit L_1 is connected with the sending bus L_2 and also with the receiving bus L_3 . Bridged across L_3 are a plurality of receiving branches such as L_4 and L_5 , by means of which the various signaling channels are selectively received and the signals are de-

tected. The branch L_4 has connected therewith the series resonant circuit 1 that is coupled to the parallel resonant circuit 2. The latter is connected with the amplifier-detector 3 whose output is in turn connected with one of the windings of the receiving relay 4. That relay controls the transmission of signals over the loop L_6 to the station represented schematically by the relay 5. Other receiving branches such as L_5 would, preferably, contain apparatus similar to that shown in connection with branch L_4 .

In the operation of the system, all voltages, whether normal or abnormal, that are present in the transmission circuit L_1 , will be impressed upon the receiving bus L_3 and in turn upon the branches L_4 and L_5 . If at any instant there is present only the normal signal voltage of the frequency to be received by the branch L_4 , such voltage will cause the flow of current through the series resonant circuit 1, tuned to the signal frequency, which flow of current will produce oscillations in the resonant circuit 2 that will be impressed upon the amplifier-detector 3. The resultant rectified current will cause the operation of relay 4 which in turn will transmit an impulse over the loop L_6 to the station 5. If an abnormal interference voltage is impressed upon the receiving bus L_3 , such voltage will in turn be impressed across each of the receiving branches bridged across L_3 . The interfering voltage will cause current to flow through the thermionic discharge device 6 that may be biased by the source of voltage 7 to operate at any desired value. The operation of that device effectively short-circuits one of the elements of the series tuned circuit and thereby detunes the said circuit and prevents the maintenance of sustained oscillations arising from the shock excitation of the tuned circuit 1 by the abnormal voltage. When the abnormal voltage ceases to exist, the short circuit is removed and the series tuned circuit continues to function as such.

While the invention has been disclosed as embodied in a particular form, it is capable of embodiment in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a carrier telegraph system, the combination with a transmission circuit upon which normal signal voltages and abnormal interference voltages may be impressed, of a resonant circuit, comprising an inductance in series with a condenser, connected therewith, and a thermionic vacuum tube having a cathode, an anode, means to heat said cathode, and means to apply a positive voltage to the said anode, the said vacuum tube being connected to ground from the junction of the said inductance and condenser, to detune the said resonant circuit whenever the voltage impressed by the transmission circuit upon said resonant circuit exceeds a fixed limit.

2. In a carrier telegraph system, the combination with a transmission circuit upon which normal signal voltages and abnormal interference voltages may be impressed of a resonant circuit, comprising an inductance in series with a condenser resonant to the signal frequency, connected therewith, a space discharge device connected to ground from the junction of the said inductance and said condenser, and operable at a predetermined interference voltage to short-circuit one of the elements of said resonant circuit whenever said device operates, means to rectify the received signal impulses, and a relay upon which the rectified impulses are impressed.

In testimony whereof, I have signed my name to this specification this 23rd day of June, 1930.

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