

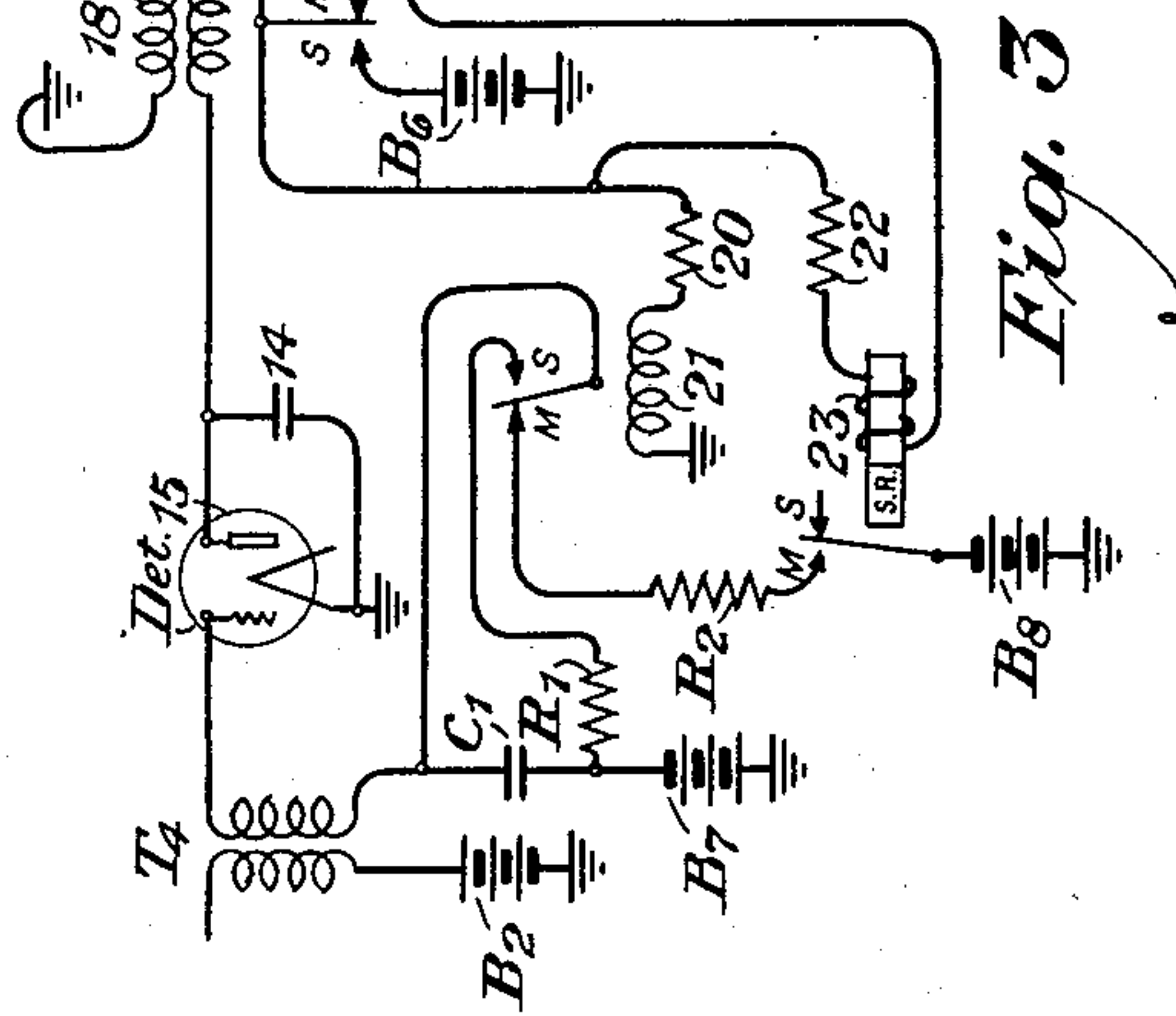
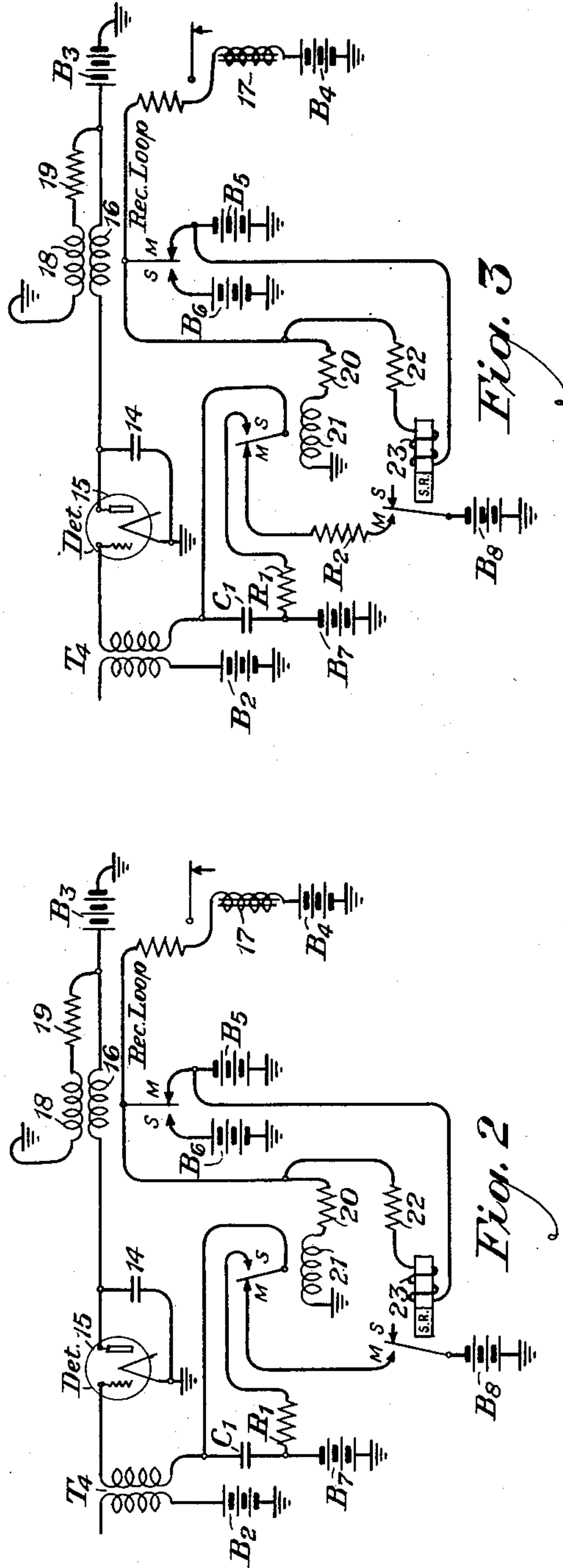
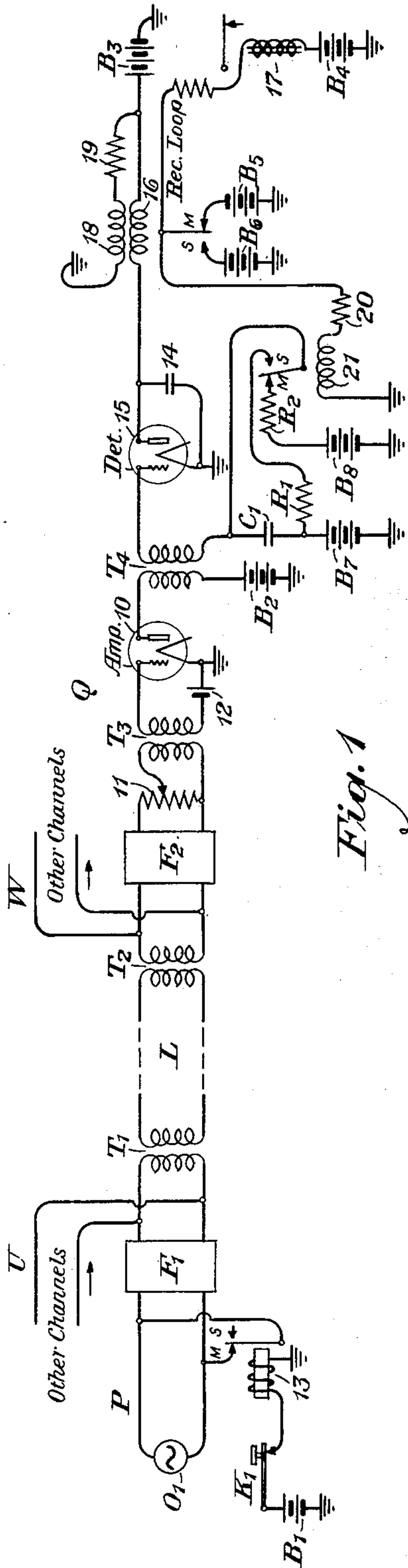
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BIAS CONTROL IN TELEGRAPH COMMUNICATION

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BIAS CONTROL IN TELEGRAPH
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4 Claims. (Cl. 178—88)

This invention relates to the control or prevention of telegraph signal bias in telegraphic communication systems due to changes in the intensity of the received telegraph currents and
5 has for its object the substantial reduction of such bias in a manner and by means which shall be automatic in action. More particularly, the object of this invention is to make the method and means for controlling such bias applicable
10 to telegraphic communication systems operated with current for the spacing condition and no current for the marking condition.

A means and method of controlling signal bias due to changes in the intensity of the received
15 telegraph currents is disclosed in United States Patent 1,886,803, dated November 8, 1932, in the name of Joseph Herman. Said means and method are specifically restricted to communication systems operated with current for the marking
20 condition and no current for the spacing condition, and are, in fact, inoperable with systems operated with current for the spacing condition and no current for the marking condition, for reasons hereinafter stated. Telegraphic
25 communication systems of the latter type are well known and an example of such a system is disclosed in United States Patent 1,857,258 in the name of W. T. Rea.

In this invention I propose to disclose means
30 for applying a device similar to that disclosed in the Herman patent to telegraphic communication systems operated with current for the spacing condition and no current for the marking condition. In the Herman invention, the gain of
35 a vacuum tube detector is caused to vary approximately inversely with the intensity of the incoming signal by a condenser shunted by a resistance in the grid circuit of said detector. When current is being received the grid of the vacuum tube
40 is at a positive potential and grid current flows through the shunted resistance. The condenser is thereby charged to a negative potential which will be large for signals of high intensity and small for signals of low intensity. When the in-
45 coming current ceases to flow the shunt is removed from the condenser by a relay, in order that the condenser may maintain its charge until the next pulse of signaling current flows.

In systems using no current for the marking
50 condition long intervals of no incoming carrier current are certain to occur and during these intervals the condenser, although the resistance no longer shunts it, will gradually lose its charge due to leakage through the vacuum tube, the
55 insulation of the wiring, and the insulation of

the condenser itself. If the decrease in the voltage across the condenser is appreciable, the detector gain will increase and the next signals received will be repeated into the receiving loop heavily biased to spacing. If the marking interval is extremely long the voltage across the
60 condenser will decrease to such an extent that the detector plate current will be permitted to increase, operating the receiving relay to the spacing condition and thus sending a false signal
65 into the loop circuit.

One of the primary objects of the arrangements of my invention is to prevent the introduction of large spacing bias and false spacing signals during the reception of a long marking interval when no carrier current is incoming.
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While this invention will be pointed out with particularity in the appended claims, the invention itself, both as to its further objects and features, will be better understood from the detailed description hereinafter following when read in connection with the accompanying drawing which shows several embodiments of the invention given merely for the purpose of illustration.
75 Figure 1 is a circuit diagram showing an embodiment of the invention. Figs. 2 and 3 are modifications thereof. Similar reference characters have been used to denote like parts in all of the figures.

Referring to Fig. 1, there is shown at P a station
85 for transmitting carrier telegraph signals and at Q there is a corresponding receiving station. At the sending station there is shown an oscillator O_1 to be used for one signaling channel. A key K_1 controls a circuit containing battery B_1 and
90 relay R_1 , the contacts of which are so arranged that when K_1 is operated the armature goes to the marking position M and closes a short circuit placed across the output of the oscillator O_1 . When, however, K_1 is not operated, the armature
95 goes to the spacing position, opening the short circuit across the oscillator circuit. This oscillator circuit is shown associated by means of transformer T_1 to the transmission line L. Also, it is understood that additional channels may
100 be used for signaling on this same line, these additional channels being shown as feeding in at U. In order to maintain proper separation between these various channels it will be desirable to have in each such channel a suitable filter,
105 such as F_1 , shown in the channel for oscillator O_1 .

At the receiving end of the line L the messages over the various channels are separated into their respective channels by means of suitable filters, one of which is shown at F_2 , the other channels
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being indicated by W. The output of the filter F_2 may then go through transformer T_3 to a vacuum tube amplifier 10, the output of which, through transformer T_4 , is impressed on the detector 15. The gain of the amplifier would in general, be controlled by a potentiometer 11 and the amplifier itself would be supplied with power from battery B_2 . The characteristic of the amplifier could be controlled in a well known manner by a negative grid battery 12. The detector, the plate circuit of which is supplied with power from B_3 , controls the relay 16 to give signals in accordance with those transmitted over the line and relay 16 in turn controls the receiving loop comprising a sounder 17 in series with a battery B_4 . It will be observed that when the armature of 16 is at marking position, battery B_5 is connected in series with B_4 to operate the sounder 17, whereas, when on the spacing contact, battery B_6 is introduced to neutralize B_4 , all this being a well known connection in telegraph circuits. Adjustment of the relay to operate with no bias for signals of normal intensity is made by the biasing coil 18 of the relay 16, this coil being supplied with an adjustable direct current from battery B_3 through resistance 19. The input circuit of the detector 16 contains a negative battery B_7 for the grid of the detector, and condenser C_1 in series with the battery. During a spacing interval polar relay 21, which is controlled by the armature of relay 16, is in the spacing condition and resistance R_1 is thereby shunted across condenser C_1 . The grid of detector 15 becomes positive when carrier current is incoming from the line. Grid current therefore flows from the detector grid through the secondary of transformer T_4 , resistance R_1 and battery B_7 to ground. The potential drop across resistance R_1 due to the flow of this grid current is impressed on condenser C_1 causing it to charge to a negative potential whose magnitude depends upon the intensity of the incoming carrier signal. Since condenser C_1 is in series connection in the grid circuit, its potential will be added to that of battery B_7 and will serve to vary the gain of the detector approximately inversely as the intensity of the received carrier signal.

During a marking signal the armature of relay 21 rests on the marking contact M. Condenser C_1 is thereby disconnected from resistance R_1 and connected through resistance R_2 to battery B_8 . The value of resistance R_2 is of the order to magnitude of the leakage resistance of the grid circuit. The voltage of battery B_8 and the value of resistance R_2 are so proportioned that when during a long marking signal the voltage impressed on the grid of the detector tube drifts due to leakage, it will drift toward a voltage slightly lower than that required for receiving signals of normal intensity; hence, after a long marking signal, although the beginning of the next train of signals may be slightly biased to spacing, they will not be biased as greatly as they would have been had the voltage of the detector grid drifted to a lower value, nor will the detector grid voltage be allowed to drift to so low a value that the current in the plate circuit operates the receiving relay to spacing.

Fig. 2 shows a variation of the circuit above described. A slow release relay 23 is controlled from the armature of relay 16. Relay 23 remains in the spacing position S except during very long marking intervals. Hence during normal marking signals when relay 21 operates to marking resistance R_1 is merely removed from its shunt

connection across condenser C_1 . However, when an extremely long marking signal occurs, relay 23 will release and since relay 21 is already operated to marking battery B_8 will be applied to the grid circuit of detector 15. The voltage of battery B_8 is slightly lower than that normally used on the grid circuit for receiving signals of normal intensity. It will be noted that when relay 23 releases the grid potential is brought immediately to the value of the potential of battery B_8 .

Fig. 3 shows another arrangement of my invention which combines the features shown in Figs. 1 and 2. When, during a long marking interval, relay 23 releases, it connects battery B_8 through resistance R_2 to the detector grid circuit. Resistance R_2 is of the order of magnitude of the leakage resistance of the detector input circuit. In the arrangement here described when relay 23 releases the grid potential will not immediately assume the value of the potential of battery B_8 but will drift toward that potential.

While this 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. In a telegraph communication system comprising a vacuum tube at the receiving end, means for reducing changes in bias of telegraph signals due to changes in received current, said means comprising a network in the input circuit of the vacuum tube, said network including an element for the storage of energy and a path permitting leakage of said energy, an auxiliary charging circuit for said element for the storage of energy, and means controlled by the output of said vacuum tube for opening the leakage path when no current is arriving and for connecting said charging circuit to said element for the storage of energy.

2. In a carrier current communication system, a vacuum tube detector at the receiving end normally with a negative bias on the grid and adjusted to give an electron current from filament to grid on receipt of carrier current, a resistance in series in the input circuit to give an additional negative bias to the grid, a condenser in parallel to the resistance to store energy from said grid current during reception of carrier current, a switch in the resistance branch to be opened by the output of the vacuum tube circuit when no current is being received whereby the bias on the grid is maintained by the energy in the condenser, and means controlled by the operation of said switch for preventing substantial dissipation of the energy stored in said condenser.

3. In a carrier current communication system, a vacuum tube detector at the receiving end normally with a negative bias on the grid and adjusted to give an electron current from filament to grid on receipt of carrier current, a resistance in series in the input circuit to give an additional negative bias to the grid, a condenser in parallel to the resistance to store energy from said grid current during reception of carrier current, a switch in series with the resistance to be opened by the output of the vacuum tube circuit when no current is being received whereby the bias on the grid is maintained by the energy in the condenser, and slow releasing means operated when current ceases to flow in the output of the vacuum tube circuit for preventing substantial dis-

sipation of the energy stored in said condenser.

4. In a carrier current communication system, a vacuum tube detector at the receiving end normally with a negative bias on the grid and adjusted to give an electron current from filament to grid on receipt of carrier current, a resistance in series in the input circuit to give an additional negative bias to the grid, a condenser in parallel to the resistance to store energy from said grid current during reception of carrier current, a switch in the resistance branch to be opened by

the output of the vacuum tube circuit when no current is being received whereby the bias on the grid is maintained by the energy in the condenser, and slow releasing means operated when current ceases to flow in the output of the vacuum tube circuit for connecting to said condenser and grid circuit a resistance and a battery, said last mentioned resistance being of the order of magnitude of the leakage resistance of said detector input circuit.

WILTON T. REA.

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