

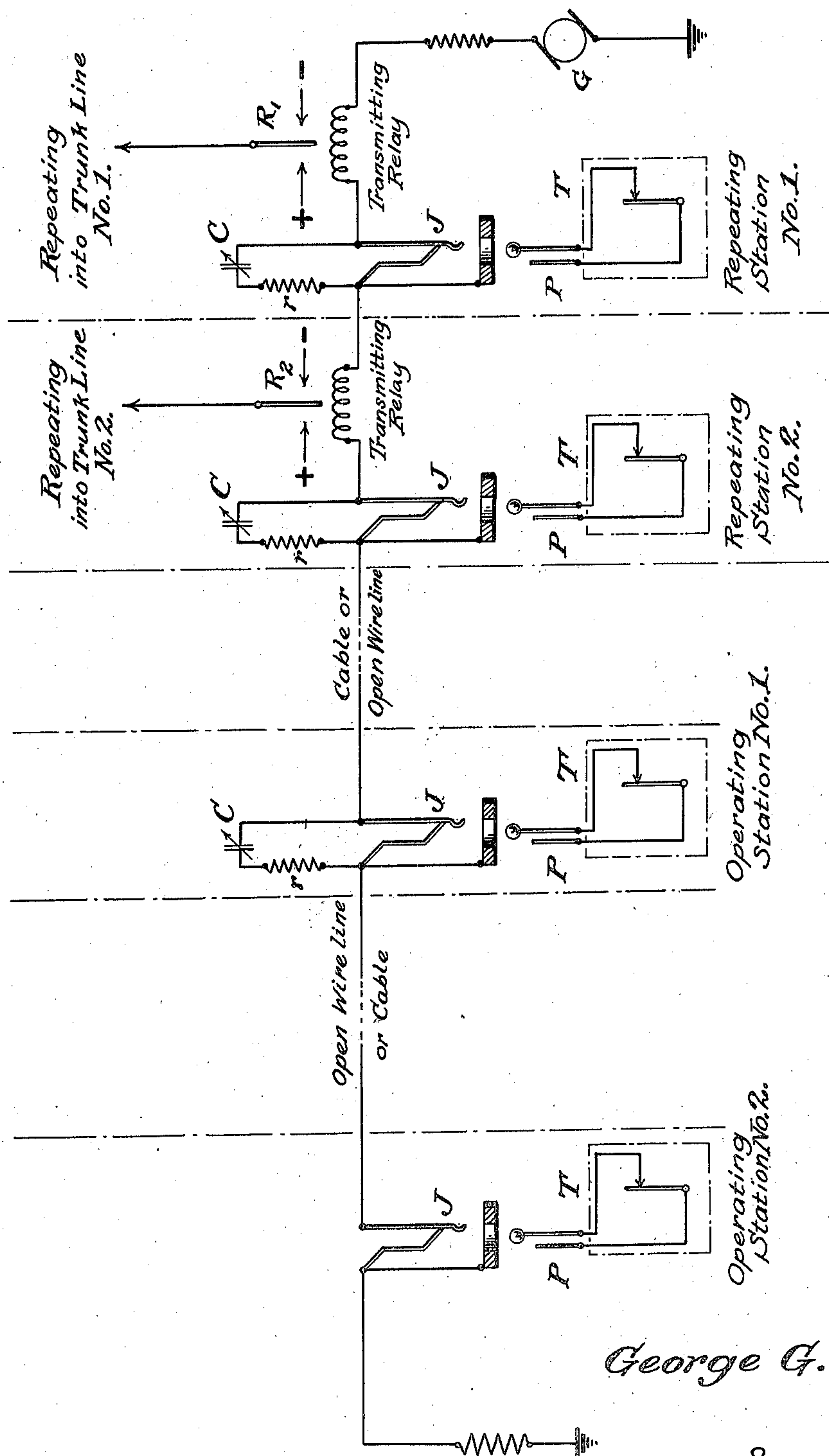
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SHAPING SIGNALS IN SINGLE CURRENT TELEGRAPH CIRCUITS

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SHAPING SIGNALS IN SINGLE CURRENT
TELEGRAPH CIRCUITS

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2 Claims. (Cl. 178—70)

This invention relates to a method of shaping the signals transmitted at various points in a single current circuit so that all of the signals received at one end of the circuit or at a repeating station shall produce the same effect upon the receiving or repeating instrument.

Each point of transmission in a single current circuit represents either an operating station or cut-in facilities at a repeating station. The operating stations may be located at various distances from the repeating station, some closely adjacent and others many miles away. The conductor connecting the stations with the repeater may embody a cable, an open wire or a combination of cable and open wire conductors. Opposite polarities of battery or generator may be applied at each end of the circuit or a battery may be applied at one end of the circuit with the other end connected to ground.

In order to insure that signals sent from any particular operating station will be repeated without bias, the transmitting relays of the repeater may be adjusted to "line-up" signal impulses sent from that operating station. However, signals from any other operating station in the circuit will be repeated by the transmitting relays with a certain degree of bias, depending upon the electrical distance between the stations.

Moreover, in cases where there is only one operating station in a circuit, it may be impossible to obtain "line-up" signals from this station. Under such conditions it becomes necessary to center the armatures of the repeating relays to "line-up" signals initiated at the repeating station, even though it is realized that signals transmitted from the operating station will be biased somewhat to the marking side as they are repeated by the relays.

The object of my invention is to provide means for so shaping the signals transmitted at the several operating stations that all signals will be unbiased as they leave the contacts of the transmitting relays of the repeater.

In the following description I shall refer to the accompanying drawing which is a diagrammatic illustration of a single current circuit having a plurality of operating stations and repeating stations.

As is known to engineers, it is characteristic of single current circuits that the capacity and/or leakage between the conductor and ground causes a distortion of the wave shape of the signals transmitted over the circuit. For example, if the transmitting relays R_1 and R_2 at the repeating stations at one end of the circuit are adjusted

until the armatures are centered for signals from a make and break means inserted in the line at the same end of the circuit, the relays will be biased to some degree to the "marking" side when signals are transmitted from operating station No. 1 and will be biased to a greater degree to the marking side when signals are transmitted from operating station No. 2.

Again if the transmitting relays R_1 and R_2 are centered to signals sent from operating station No. 1, the relays will be biased to some degree to the "spacing" side when the signals are sent from the repeating stations and they will be biased to some degree to the "marking" side when the signals are sent from operating station No. 2. Likewise, if the transmitting relays R_1 and R_2 are centered to signals from operating station No. 2, they will be biased to some degree to the spacing side when the signals are sent from operating station No. 1 and will be biased to a greater degree "spacing" when the signals originate at the repeating stations. The extent of the bias to "marking" or to "spacing," as the case may be, is dependent upon the time constant of the circuit and upon the amount of capacity and/or leakage between the conductor and ground.

In order to overcome the difficulties above mentioned, I provide means for shaping the signal impulses at the several operating stations so that the signals received at one end of the circuit shall correspond with the signals received from the most distant point. In this manner the transmitting relays at the repeating stations located at one end of the circuit may be adjusted to "line-up" signals from any point in the circuit and hence the signals from all points are unbiased as they leave the contacts of the transmitting relays of the repeaters.

Line jacks J are connected in the line at each station. The transmitters T connected to the plugs at the operating and repeating stations may be of the simplex type or any other suitable make and break signaling device. A shaping network comprising a variable condenser C in series with a resistance r is connected across the tip and sleeve of the jacks at all but the most distant station. Normally the jack is closed at its contacts, thereby short-circuiting the network.

The operation of my uniform signal shaping arrangement is as follows:—Current being first established on the line from the generator G , the transmitting relays R_1 , R_2 at the repeaters are centered to "line-up" signals from the most distant station, i. e., operating station No. 2. The transmitter T at a repeating station is then

plugged in and identical signals are sent into the relays. Without changing the adjustments of the transmitting relays, the value of the capacity across the line-up jack is varied until the signals
 5 from this point leave the relay unbiased or on center. The value of the capacity across the jack is then recorded.

Likewise line-up signals are transmitted from the transmitting jack at the No. 1 operating station. Likewise without changing the adjustments of the transmitting relays, the value of the capacity across the transmitting jack is varied until the signals from this point leave the relays unbiased or on center. This value of the capacity then remains fixed across the transmitting
 10 jack.

If the characteristics of the single current circuit remain the same as they were at the initial "line-up" tests, it will be found that the transmitting relays at the repeater will be centered or unbiased to signals from any station when the condenser is adjusted to the predetermined capacity initially determined for that station. Single current circuits are mainly used to connect stations within the area of a city and its outlying districts and the conductors are therefore mostly in underground cables so that the circuit is permanently established except for the removal of the repeaters for use elsewhere when the circuit is
 20 not in use.

30 I claim:—

1. A single current signaling circuit comprising a plurality of operating stations located at various points in said circuit and a repeating station, signal transmitting devices at said operating stations, a repeater embodying a transmitting relay at said repeating station having contacts adapted to repeat signals into a trunk line, and a signal shaping network at each station which is connected in shunt to the corresponding transmitter when said transmitter is inserted
 5 in said circuit, the electrical constants of each network being so adjusted that signals transmitted from each of said stations cause unbiased signals to operate said relay.

2. A single current signaling circuit comprising a plurality of operating stations located at various points in said circuit and a receiving or repeating station, said operating stations being provided with transmitters, a signal receiving apparatus at the last named station having an actuating magnet adapted to be operated by signals from said operating stations and signal shaping means at each station which is connected in shunt to the corresponding transmitter when said transmitter is inserted in said circuit, the
 15 shaping means at each station being so adjusted that signals transmitted from each of said stations cause unbiased signals to operate said magnet.

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