

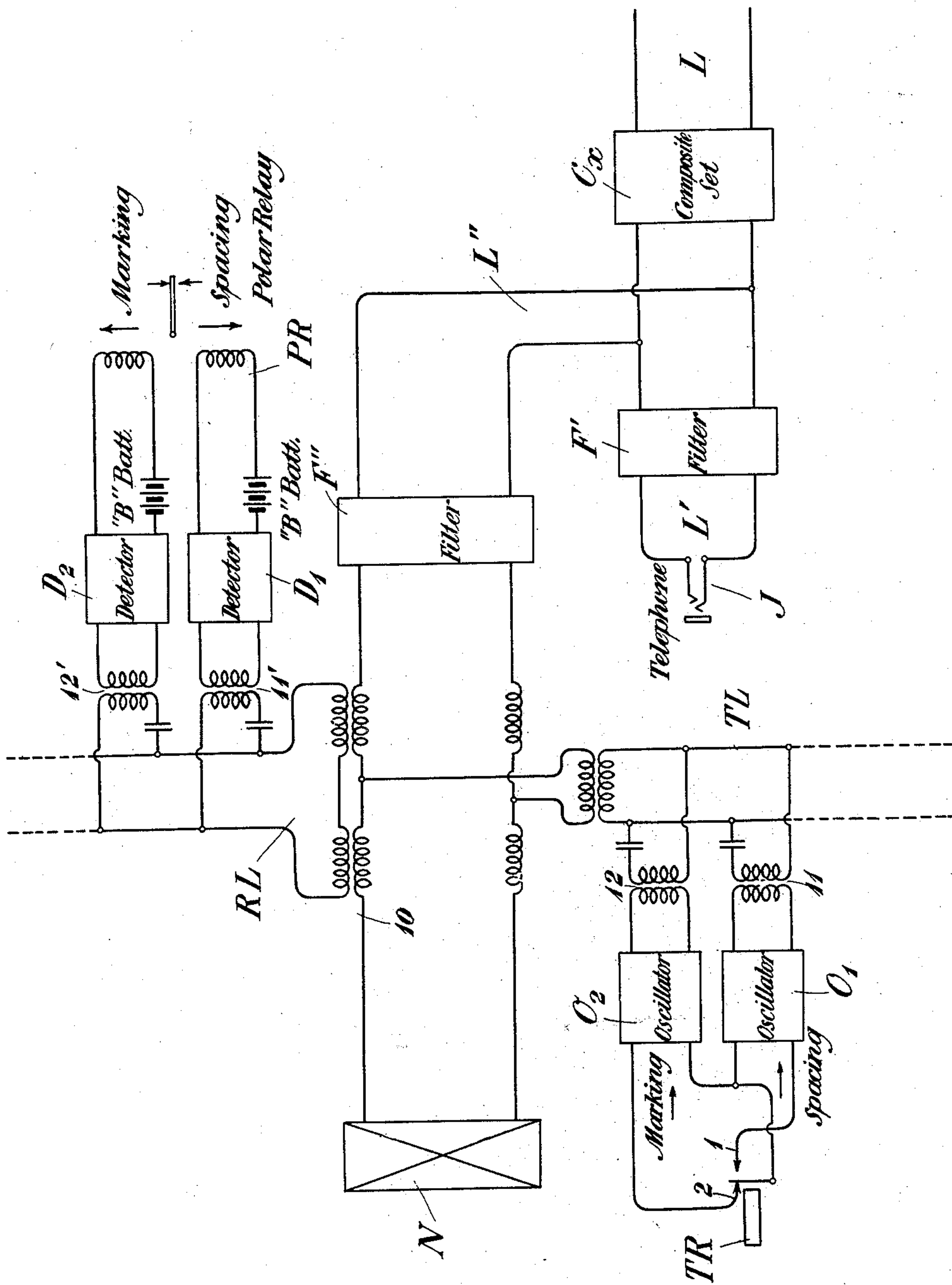
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CARRIER TELEGRAPH SYSTEM

Filed May 8, 1920



INVENTORS

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CARRIER TELEGRAPH SYSTEM.

Application filed May 8, 1920. Serial No. 379,964.

To all whom it may concern:

Be it known that we, RALZEMOND D. PARKER and BAXTER P. HAMILTON, residing at Brooklyn, in the county of Kings and State of New York, respectively, have invented certain Improvements in Carrier Telegraph Systems, of which the following is a specification.

This invention relates to telegraph systems, and more particularly to telegraph systems in which alternating currents are employed for transmission purposes.

One of the objects of the invention is to provide a telegraph system in which alternating carrier currents are used for transmission purposes, instead of direct currents.

Another object of the invention is to provide a telegraph system in which currents of one frequency are used for transmitting marking impulses and currents of another frequency for transmitting spacing impulses.

Another object of the invention is to provide a system in which weather changes, changes in the voltage of the batteries associated with the detector, and other similar changes, produce substantially no change in the bias of the signals.

Other and further objects of the invention will more fully appear from the following description when read in connection with the accompanying drawing, the figure of which illustrates one form of the invention.

Referring to the drawing, L designates a transmission circuit such as an ordinary telephone line. The line L may be composited in the well known manner for the transmission of Morse signals by means of the composite set C_x, schematically indicated in the drawing. For making telephone connections the line L terminates in a jack J. Where it is desired to use the telephone line L as a circuit for the transmission of carrier currents a branch L' may be provided, and in order to separate the carrier frequencies from the ordinary telephonic frequencies, filters F' and F'' are included in the branch L' leading to the jack J and the carrier branch L'' respectively. These filters may be of the general type illustrated in the U. S. Patent issued to George A. Campbell 1,227,113, dated May 22, 1917. The filter F' is designed to transmit currents within the telephone range while excluding currents of

higher or lower frequency depending upon whether the carrier current channels are above or below the telephone range. The filter F'' on the other hand, is designed to transmit currents within the carrier range and to suppress currents of telephonic frequency. If the carrier currents are above the telephonic range the filter F'' may be a so-called high pass filter. A carrier receiving branch RL is associated with the circuit L'' through a balanced transformer arrangement 10 and the circuit L'' is balanced in the well known manner by means of a network N. A carrier transmitting branch TL is connected to the midpoint of the line windings of the transformer 10 so that the circuits TL and RL may be substantially conjugate.

In order to transmit telegraph signals a pair of oscillators O₁ and O₂ are indicated. These oscillators may be any suitable source of alternating current, but are preferably vacuum tube oscillators of well known type. The oscillators generate currents of different frequencies, the oscillator O₁ generating a frequency used for a spacing signal, and the oscillator O₂ generating a frequency which is used for the marking signal. These oscillators are associated through tuned circuits 11 and 12 with the transmitting circuit TL. A transmitting relay TR is provided for controlling the transmission of the marking and spacing frequencies, the armature of said relay being so arranged that when in one position a circuit will be closed rendering the oscillator O₂ active and when in the other position a circuit will be closed rendering the oscillator O₁ active. As illustrated, when the relay TR is energized, the circuit of the oscillator O₂ is closed so that the marking frequency is transmitted and when the transmitting circuit DR is de-energized, the oscillator O₁ is rendered active to transmit the spacing frequency.

The carrier receiving apparatus associated with the receiving channel RL comprises two detectors D₁ and D₂ which may be of any well known type, but are preferably detectors of the well known vacuum tube or audion type, which, as is well known, control by means of a grid the flow of current in an output circuit including a so-called "B" battery. These detectors are connected by means of tuned circuits 11' and 12' to

the receiving channel RL, and include in their output circuits separate windings of a polar relay PR. The armature of the polar relay is shifted to the lower position in response to the spacing frequency and to the upper position in response to the marking frequency.

The operation is as follows: As the transmitting relay TR is operated, its armature operates between the contacts 1 and 2 to alternately render the oscillators O_1 and O_2 active, thereby alternately transmitting spacing and marking frequencies to the circuit TL. These frequencies are transmitted to the midpoints of the windings of the transformer 10, and due to the balanced relation of the circuit are substantially without effect upon the local receiving circuit RL, the energy of the two frequencies being divided between the network N and the circuit L'' , so that signaling currents of the marking and spacing frequencies are transmitted from the circuit L'' over the line L to operate receiving apparatus at the distant station. Similar marking and spacing frequencies transmitted over the line L from the distant station pass into the circuit L'' through the filter F'' and are transmitted through transformer 11 to the receiving circuit RL. Currents of spacing frequency are selected by the tuned circuit 11', and act upon the detector D_1 to cause a pulse of current to flow through lower winding of the polar relay PR so that its armature is shifted to the spacing contact. When currents of marking frequencies are received they are selected by the tuned circuit 12' and act upon the detector D_2 to produce a pulse of current in the upper winding of the polar relay PR thereby shifting its armature to the marking contact.

It will be obvious that the general principles herein disclosed may be embodied in many other organizations widely different from those illustrated, without departing from the spirit of the invention, as defined in the following claims.

What is claimed is:

1. In a telegraph system, a transmission circuit, receiving apparatus associated therewith, said receiving apparatus including a current responsive relay and its armature, and means responsive to currents of one frequency only to produce energy to shift said armature in one direction to register a marking signal, and means responsive to currents of another frequency only to produce energy to shift said armature in the opposite direction to register a spacing signal.

2. In a telegraph system, a transmission

circuit, a telegraph transmitter and a receiver associated with said line, said receiver including a current responsive relay and its armature, means controlled by said transmitter for transmitting currents of one frequency only in response to a marking signal, and means for transmitting currents of another frequency only in response to a spacing signal, means associated with said receiver and operating in response to the currents of spacing frequency to produce energy to shift said armature in one direction to register a marking impulse, and means responsive to currents of spacing frequency to produce energy to shift said armature in the opposite direction to register a spacing signal.

3. In a telegraph system, a transmission circuit, a transmitting channel and a receiving channel associated with said line in such a manner as to be substantially conjugate with respect to each other, a transmitting apparatus associated with the transmitting channel and comprising means for transmitting one frequency only for marking signals and another frequency only for a spacing signal, and a receiving apparatus associated with said receiving channel, said receiving apparatus including a current responsive relay and its armature, said receiving apparatus comprising means responsive to one frequency to produce energy to shift said armature in one direction for registering a marking signal and responsive to another frequency to produce energy to shift said armature in the opposite direction for registering a spacing signal.

4. In a telegraph system, a transmission circuit, a telegraph transmitter and a telegraph receiver associated therewith, a pair of oscillators controlled by said telegraph transmitter, one of the said oscillators being rendered active to supply currents of one frequency only to the transmission line in response to a marking signal, and the other oscillator being rendered active by said transmitter to supply currents of another frequency only to the transmission line in response to a spacing signal, and a pair of detectors associated with said telegraph receiver, one of said detectors being responsive to currents of marking frequency to actuate said receiver to register a marking impulse, and the other detector being responsive to currents of spacing frequency to actuate said receiver to register a spacing impulse.

In testimony whereof, we have signed our names to this specification this 7th day of May 1920.

RALZEMOND D. PARKER.
BAXTER P. HAMILTON