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HALF DUPLEX ALTERNATING CURRENT TELEGRAPH SYSTEM.

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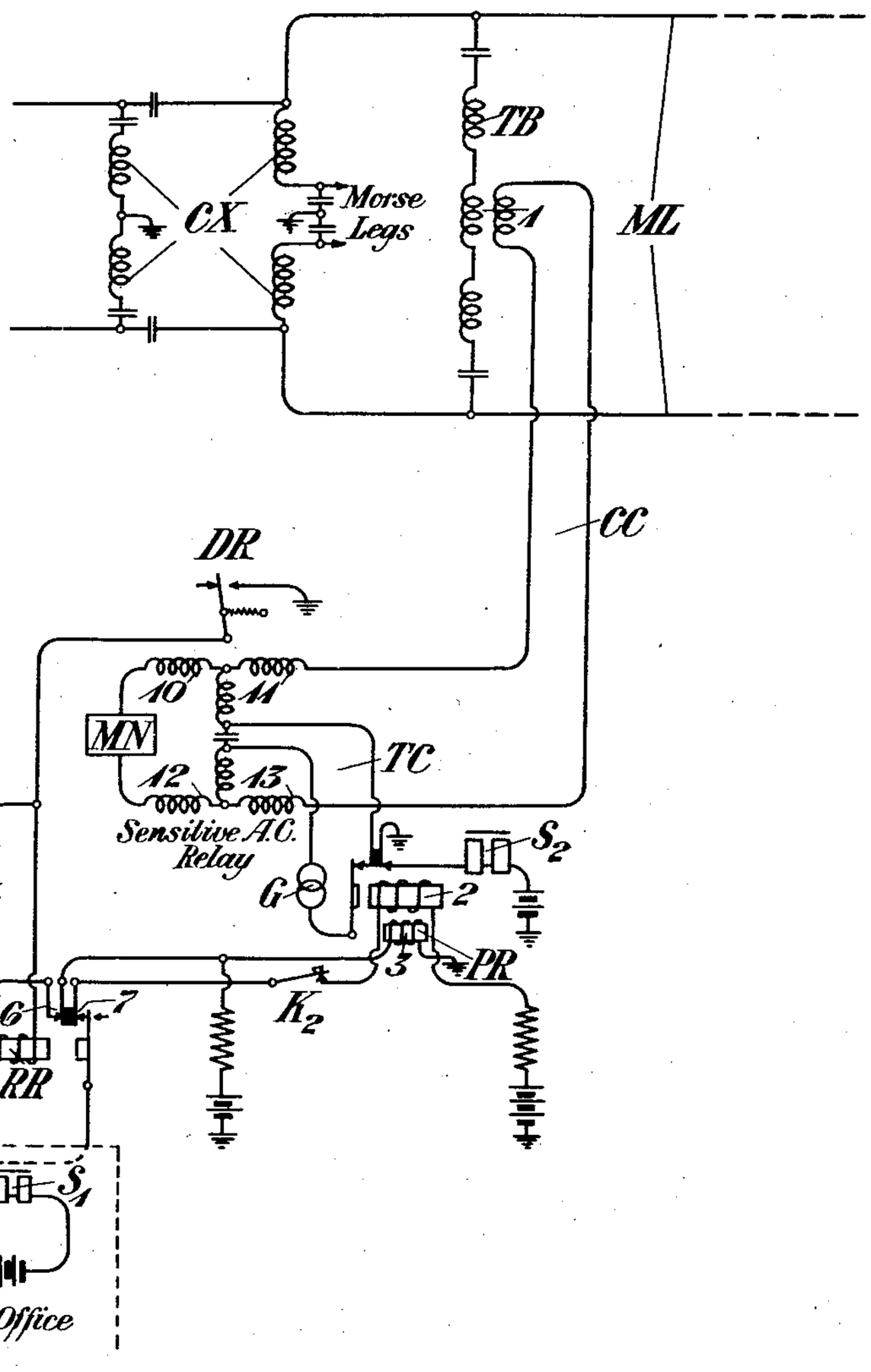
1,391,006. Patented Sept. 20, 1921.



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HALF-DUPLEX ALTERNATING-CURRENT TELEGRAPH SYSTEM.

1,391,006. Specification of Letters Patent. Patented Sept. 20, 1921.

Application filed September 8, 1919. Serial No. 322,268.

To all whom it may concern:

Be it known that I, RALZEMOND D. PARKER, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Half-Duplex Alternating-Current Telegraph Systems, of which the following is a specification.

This invention relates to signaling circuits and more particularly to telephone lines composited for Morse or other telegraph operation, and provided with arrangement for superposing carrier current signaling channels thereon.

One of the principal features of this invention resides in the provision of an alternating current signaling channel for a transmission line, so arranged as to be operated upon a half duplex basis by means of standard telegraph equipment such as is now used for transmitting Morse signals.

Other and further features of the invention will be more fully understood from the following description when read in connection with the accompanying drawing, the figure of which illustrates a circuit diagram embodying one form of the invention:

In the diagram ML designates a telephone transmission line provided with composite apparatus CX at its terminal station, for superposing Morse signals upon the line. The composite apparatus is of the usual and well-known form and need not be described herein. In order to provide an alternating carrier current signaling channel, a tuned branch TB is bridged across the main line ML, said tuned branch having associated therewith a carrier circuit CC, coupled thereto through the transformer 1. Included in said carrier circuit CC are the four windings 10, 11, 12 and 13, of a differential alternating current receiving relay DR. A transmitting circuit TC is bridged across the midpoints of the windings of the differential relay DR, so that by the provision of a balancing artificial line or network MN energy from the transmitting circuit TC will not effect the receiving relay DR. The transmitting circuit TC includes an alternating current generator G and a contact controlled by the armature of the relay PR, which may be the standard pole changing relay employed in half duplex Morse systems. As is well understood, this pole changing relay includes a main coil 2 inserted in the loop extending to the subscriber's office and an auxiliary coil 3 controlled by a receiving relay RR in such a manner as to prevent the armature of the relay PR from opening the sending circuit TC in response to received signals. The relay RR is of course controlled by the differential receiving relay DR. The relay RR is arranged to open and close the loop extending to the subscriber's office, which loop contains a key K_1 and a relay 4 for operating a sounder S_1 at the subscriber's office. At the main terminal station a sending key K_2 is provided for use by the operator at such station, and a sounder S_2 is also provided at said station, the sounder being controlled by the armature of the pole changing relay PR.

Further details of the apparatus may now be understood from the operation which is as follows:

Signals may be transmitted either by operating the key K′ at the subscriber's office, or by operating the key K_2 at the main terminal station. When the subscriber's loop is opened in response to either of these operations, the coil 2 of the pole changing relay is deënergized. Since the relay RR is normally energized by current applied through the resistance 5, the coil 3 of the pole changing relay PR is normally short-circuited by the ground connection over the contact 6 of the relay RR, consequently the opening of the subscriber's loop causes the armature of the pole changing relay PR to fall off and open the transmitting circuit TC, at the same time actuating the sounder S_2. The sounder S_1 at the subscriber's office is operated by the opening of the subscriber's loop. In the normal condition of the circuit, alternating current energy is transmitted through the generator G from the circuit TC to the midpoints of the windings of the differential relay DR. This energy divides between the artificial line MN and the transformer 1, without affecting the relay DR. From the transformer 1 the alternating current energy is transmitted through the tuned branch TB and over the main line ML to the distant station. The interruption of current from the generator G by the opening of the circuit TC, just described, actuates the receiving apparatus at the distant station.

The operation of the receiving apparatus at the distant station, which is similar to

that illustrated in Fig. 1, may be understood from a description of the operation taking place at the station of Fig. 1, in response to signals received from the distant station. Normally alternating current is then received from the distant station over the main line ML, said alternating current being selected by the tuned branch TB and transmitted through the transformer 1 to the circuit CC. This energy flows serially through the four windings of the relay DR, thereby holding its armature to the left, as shown in the drawing. As soon as this received alternating current energy is interrupted by the actuation of a key at the distant station, the armature of the relay DR is drawn to the right by a spring and the relay RR is short-circuited by the ground connection over the make contact of the relay DR. Relay RR is therefore deënergized and by opening contact 6 removes the short-circuit from about coil 3 of the pole changing relay, so that said relay is energized to hold up the armature of the pole changing relay. At the same time the contact 7 of relay RR is opened, thereby opening the subscriber's loop to actuate the sounder S_1 at the local subscriber's office. This also results in opening the circuit of the coil 2 of the pole changing relay PR, but since, as just described, the coil 3 is at the same time energized, the pole changing relay does not respond to the received signal to actuate the transmitting circuit TC and cannot transmit the same signal back to the sending station. The sounder S_2 does not respond to received signals, but is merely for the purpose of checking transmitted signals.

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 signaling system, a transmission circuit, means for signaling by carrier currents over said circuit, comprising a differential receiving relay, a transmitting circuit including a source of carrier current, said transmitting circuit being so arranged that transmitted energy does not affect the differential receiving relay, a subscriber's loop, a transmitting key therein, a sounder associated therewith and controlled by said receiving relay, a pole changing relay responsive to said key, for controlling said carrier currents, and means to prevent the actuation of said pole changing relay by said receiving relay, in response to received signals.

2. In a signaling system, a transmission line, means to signal over said line by carrier currents comprising a differential receiving relay, a source of carrier current signaling energy so arranged that energy may be transmitted to the line, without affecting said differential receiving relay, a normally closed subscriber's loop, a sending key therein, and a sounder associated with said loop, means whereby said differential receiving relay, in response to received signals, may open said loop to actuate said sounder, a pole changing relay associated with said loop in such a manner as to be responsive to said sending key, said pole changing relay operating to control the transmission of carrier current energy from said carrier source to said transmission line, and means to prevent the actuation of said pole changing relay when the subscriber's loop is opened by said receiving relay to actuate the sounder associated with said loop.

3. In a signaling system, a transmission line, means to signal over said line by carrier currents comprising a differential receiving relay, a source of carrier current signaling energy so arranged that energy may be transmitted to the line without affecting said differential receiving relay, a normally closed subscriber's loop, a sending key therein and a sounder associated with said loop, means whereby said differential receiving relay in response to received signals may open said loop to actuate said sounder, a pole changing relay having one coil in said subscriber's loop, whereby said pole changing relay in response to the actuation of said sending key may control the transmission of carrier current energy from said carrier source to said transmission line, and a locking coil for said pole changing relay, having its circuit so arranged that said relay is energized under the control of the differential receiving relay when said differential receiving relay opens the subscriber's loop to actuate the sounder associated therewith.

In testimony whereof, I have signed my name to this specification this 5th day of September, 1919.

RALZEMOND D. PARKER.