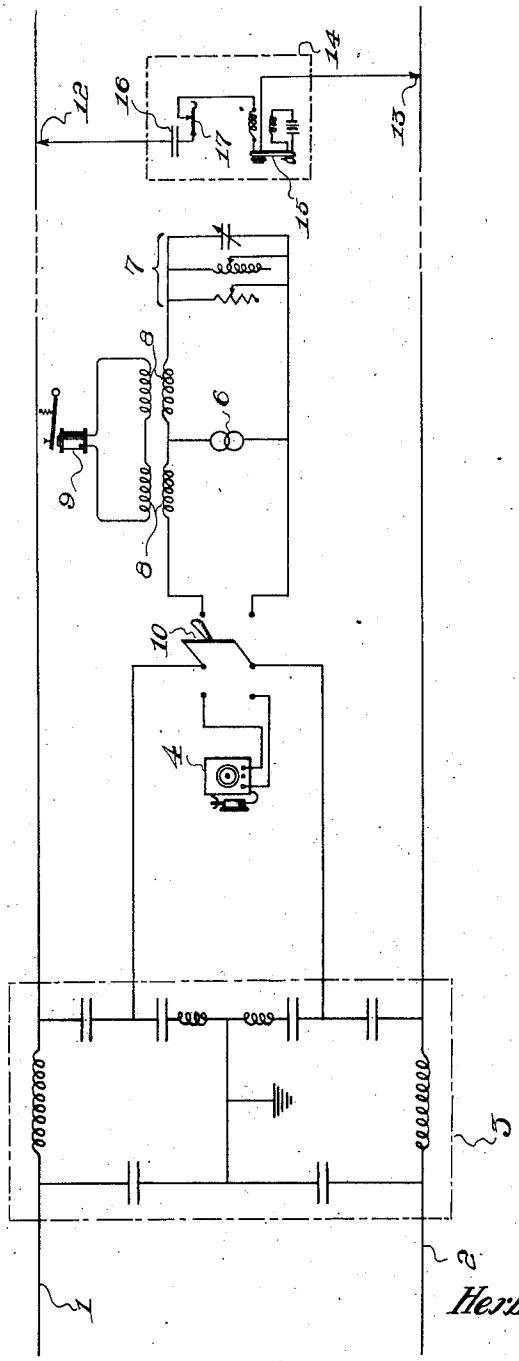
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H. W. DRAKE

COMPOSITE SIGNALING SYSTEM

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COMPOSITE SIGNALING SYSTEM.

Application filed September 23, 1926. Serial No. 137,305.

This invention relates to signaling systems and particularly to those employed to transmit simultaneously a plurality of signals by means of current impulses of different kinds, such, for instance, as direct current Morse impulses and alternating current impulses.

As is well known, in composite systems two lines used in separate telegraph circuits are combined to constitute the two leads of a telephone circuit. The purpose of the present invention is to provide an improved method of signaling over a composite circuit which will enable a lineman to signal the central office from any point along the line where he may be engaged so that he may then tap his portable telephone on the line and report to or receive orders directly from the wire chief. It has heretofore been proposed to signal the central office by sending impulses from an induction coil and battery carried by the lineman to operate a neutral relay located at the central office. This equipment was rather heavy and added very materially to the weight which must necessarily be carried by the lineman. My present invention superposes a signaling current upon the lines at the central station, the circuit arrangement being such that the relay or indicating device is normally unaffected by the signaling current but responds immediately when the lineman unbalances the system by connecting to the line at any point.

In the following detailed description, I shall refer to the accompanying drawing which illustrates in a conventional manner one embodiment of my invention.

1 and 2 are the lines which are used in separate telegraph circuits to carry Morse signals. A composite set within the dotted rectangle 3 comprising the usual arrangement of inductances and condensers, is interposed for the purpose of connecting the telephone instruments or the signaling generator circuit. The latter comprises an alternating current generator 6 of 133 cycles or other suitable frequency, a reactance set or artificial line 7 which is adjusted to exactly balance the characteristics of the lines 1 and 2, the composite set 3, and the primary coils of a transformer 8, the secondary coils being connected to a relay 9 or other electro-responsive device tuned to the frequency of the generator 6. When, therefore, the switch 10 is thrown to the right, to superimpose the signaling current upon the lines 1 and 2, the current from the generator will divide equally between the main line circuit 1, 2 and the artificial line 7. Inasmuch as equal and opposite currents are impressed respectively upon the primary coils of the transformer 8, no current will flow in the secondary circuit of the transformer and the relay 9 will be unaffected.

If now a lineman disturbs the balance between the main and artificial lines, which he may do without interference with the Morse signals on the lines, by connecting his portable set across the lines as indicated at points 12 and 13, a greater current will then flow on one side of the transformer than on the other and the resultant current in the secondary circuit will operate the relay or other indicating device 9. I have indicated within the dotted line rectangle 14 the usual lineman's set including the telephone transmitter and receiver 15, condenser 16 and switch 17.

As soon as an indication is received at the central office on the relay or indicator 9, the wire chief or attendant throws the switch 10 over to the left, thereby disconnecting the signaling generator and connecting the telephone apparatus 4 to the lines. The lineman is then enabled to converse with the wire chief or attendant at the central office. As soon as the lineman disconnects his portable set from the lines, the attendant at the central office throws the switch 10 back to the right hand position, thereby re-establishing the connection between source of signaling currents and the lines.

I have described this signaling system as especially intended for use by linemen in signaling to the central office, yet it is applicable to other purposes, as for instance, to provide an indication at the central office when excessive leakage develops on the line wires. Other purposes will readily occur to engineers.

I claim—

1. In a composite signaling system, a transmission line, a telephone apparatus, a local circuit comprising two sections, means to connect at will either said telephone apparatus or one of said sections to said transmission line, means included in said other

section to compensate for the connection of said first section to line whereby neutral points are established between said sections, means to apply an alternating signaling current at said neutral points for transmission over said line, a transformer in said local circuit having primary coils disposed upon opposite sides of one of said neutral points, and an electro-responsive device responding to signaling frequency currents connected to the corresponding secondary coils of said transformer.

2. In a composite signaling system, a transmission line, the conductors of which are adapted to form separate telegraph circuits, a local balanced circuit having two sections, one section including means to compensate for the characteristics of the line whereby neutral points are established at the junction of the sections when the local circuit is connected to the line, means to apply signaling currents at said neutral points for transmission over said line, a local telephone apparatus and means to statically connect to the line at will either said local circuit or said local telephone apparatus.

3. In a composite signaling system, a transmission line, the conductors of which are adapted to form separate telegraph circuits, a local balanced circuit having two sections, one section including means to compensate for the characteristics of the line whereby neutral points are established at the junction of the sections when the local circuit is connected to the line, means to apply signaling currents at said neutral points for transmission over said line, a transformer having a primary coil included in each section, an electrically actuated device connected to corresponding secondary coils of said transformer and adapted to be actuated by the signaling frequency currents when the balanced condition of said local circuit is disturbed by an abnormal condition of the line, a local telephone apparatus and means to statically connect to the line at will either said local circuit or said local telephone apparatus.

4. In a composite signaling system, a transmission line, the conductors of which are adapted to form separate telegraph circuits, a local balanced circuit having two sections, one section including means to compensate for the characteristics of the line whereby neutral points are established at the junction of the sections when the local circuit is connected to the line, means to apply signaling currents at said neutral points for transmission over said line, a transformer having a primary coil included in each section, an electrically actuated device connected to corresponding secondary coils of said transformer and adapted to be actuated by the signaling frequency currents when the balanced condition of said local circuit is disturbed, a portable telephone apparatus provided with means for connecting to the line at any desired points to thereby cause an unbalanced condition of said local circuit, a local telephone apparatus and means to statically connect to the line at will either said local circuit or said local telephone apparatus.

5. In a composite signaling system, a transmission line having its conductors forming separate telegraph circuits, a local circuit including two primary coils of a transformer switching means for connecting said circuit to said line, means in said local circuit including one of said primary coils to compensate for the connection of the line when connected thereto, whereby neutral points may be established to divide said local circuit into two sections, one of said neutral points being at the junction between said coils, means to apply alternating signaling currents at said neutral points, an electromagnetic device connected to the secondary coils of said transformer and responsive to the frequency of said signaling currents only when said balanced condition becomes unbalanced, a telephone apparatus, and a switch device operable at will to connect said telephone apparatus to the line and to simultaneously disconnect said local circuit from the line.

In testimony whereof I affix my signature.

HERBERT W. DRAKE.