July 1, 1930. J. HERMAN 1,769,431

ELECTRICAL COMMUNICATION RECEIVING APPARATUS

Filed May 28, 1928

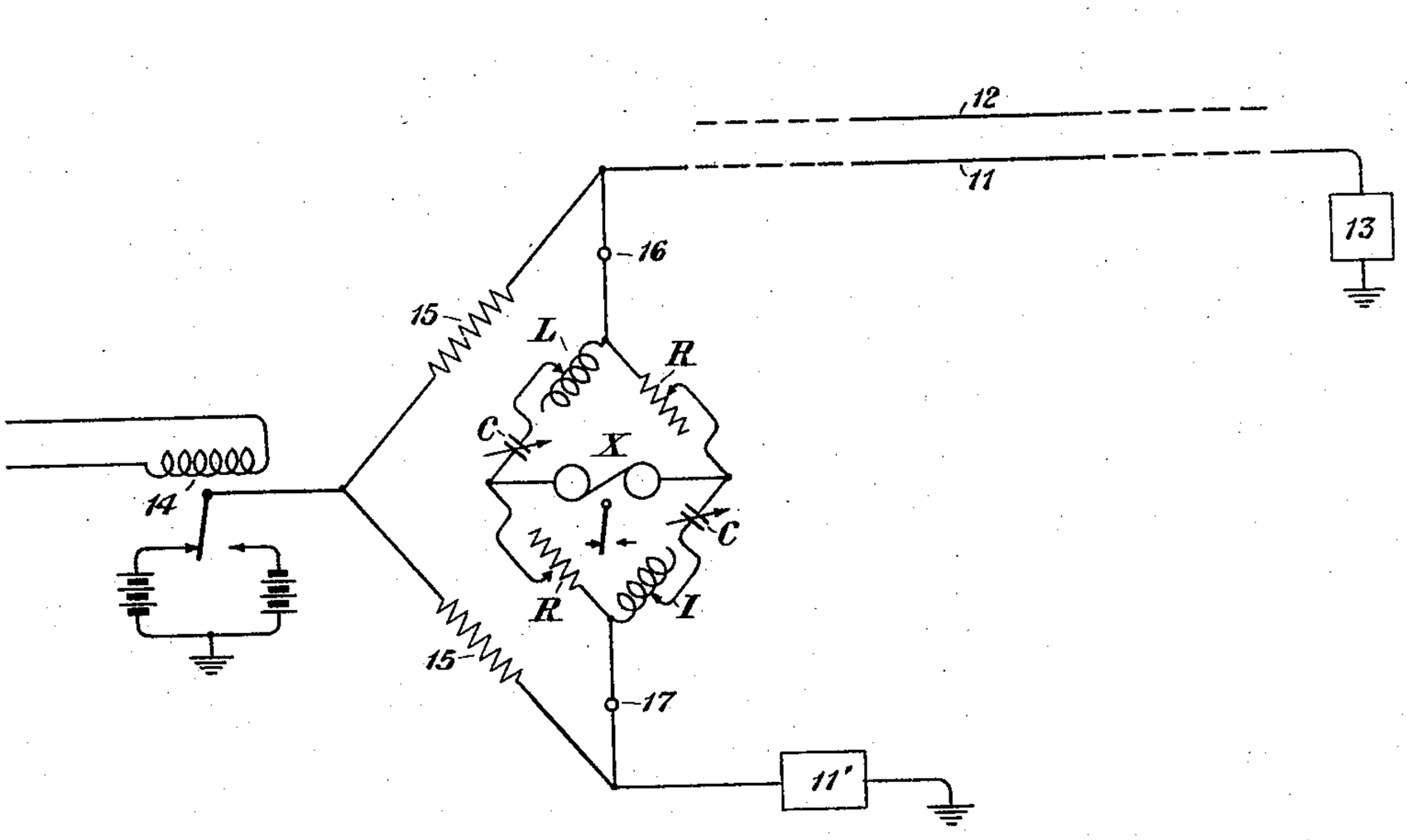

Fig. 1

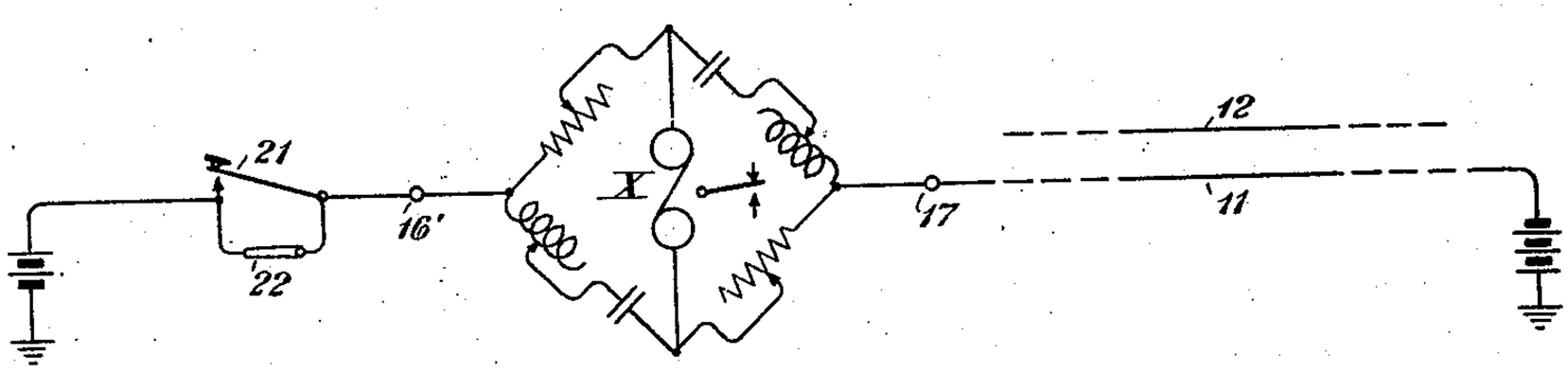

Fig. 2

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UNITED STATES PATENT OFFICE

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ELECTRICAL-COMMUNICATION-RECEIVING APPARATUS

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The principal object of my invention is to provide a new and improved receiver in an electrical communication system that shall not be affected by certain interfering currents induced in the associated circuits. Another object of my invention is to provide a telegraph receiver that shall be unaffected by interfering currents of a particular frequency. Still another object of my invention is to provide a two-terminal telegraph receiving unit that can be connected readily wherever a telegraph receiver is to be used and that shall be specially free from effects due to interfering currents of a particular frequency. These objects and various other objects of my invention will become apparent on consideration of a limited number of examples showing practice according to the invention. It will be understood that the following specification will relate more particularly to these examples, and that the scope of the invention will be indicated in the appended claims.

Referring to the drawings, Figure 1 is a diagram showing the use of my improved receiving apparatus in a polar duplex telegraph system, and Fig. 2 is a diagram showing its use in a normal closed circuit Morse system.

In Fig. 1, the line 11 may be subject to interference by induction from a neighboring power line 12. At each end of the line 11 there is the usual equipment of polar duplex apparatus, indicated at the left in some detail and at the right symbolically by a box 13. The transmitting relay 14 determines the polarity of the transmitted current which divides to the two equal resistances 15, and to the line 11 and the artificial line 11′ which simulates the line 11. Accordingly, in transmission the two points 16 and 17 will be points of equal potential and there will be no effect in the receiving relay X.

Currents transmitted from the apparatus 13 over the line 11 will divide, going partly through the receiving apparatus between the points 16 and 17 and partly through the resistances 15. Direct currents received from the line will be blocked by the condensers C, and hence will flow through the resistances R and the receiving relay X between them.

It will be seen that between the points 16 and 17 there is a Wheatstone bridge, with a series combination of inductance L and capacity C in each of two opposite arms and with a resistance R in each of the other two opposite arms, and with the receiver X in the bridge. Each combination of capacity C and inductance L will be adjusted to be resonant at the frequency of the interfering induction from 12, and each resistance R will be adjusted to equal the resistance component of the inductance L and capacity C at the resonant frequency.

It will readily be seen that the bridge will be in balance for currents of the resonant frequency so that they will have null effect on the receiving relay X.

For other frequencies than the resonant frequency the bridge will be out of balance and the received currents will be effective in the receiving relay X.

The receiving apparatus between the points 16 and 17 in Fig. 1 may be regarded as a receiving unit adapted to be used as a receiver in any ordinary telegraph system, and adapted to be adjusted to give null effect for received currents of a particular frequency. In Fig. 2 I have indicated a normal closed circuit Morse system with a transmitting key at 21 with the associated switch 22 to be opened when transmitting at this station. The associated receiving apparatus at this station lies in the circuit between the points 16′ and 17′ and is the same as between the points 16 and 17 in Fig. 1 and operates in the same way. The impedance elements of the bridge between the points 16′ and 17′ may be adjusted the same as for Fig. 1 with respect to a particular interfering frequency of current so that it will have null effect on the receiving relay X, but direct current impulses and currents of other frequencies will be effective on this relay.

I claim:

1. In combination, a line of a communication system subject to interfering currents of a certain frequency, a Wheatstone bridge connected to the line so as to impress received voltages across two of the vertices of the said

bridge, a receiving device connected across the other two vertices of the said bridge, a series inductance-capacity combination in each of two opposite arms of the said bridge, each said combination being resonant to currents of the interfering frequency, and a resistance in each of the other two arms of the said bridge of the same value as the resistance component of either inductance-capacity combination at resonance frequency, whereby the said receiving device will be in balance with respect to currents of the said interfering frequency.

2. Electrical communication receiving apparatus to give null effect for a particular interfering frequency, consisting of a Wheatstone bridge with one pair of opposite arms resonant at that frequency and with resistances in the other two arms and with a receiving device in the bridge.

3. Electrical communication comprising a line and receiving apparatus to give null effect at a particular interfering frequency, consisting of a Wheatstone bridge and a receiving device as the bridging element between two opposite vertices thereof, the arms of the bridge comprising resonant combinations and adjusted for balance to receive signaling impulses at the resonant frequency, said line being connected to impress received voltages across the remaining two opposite vertices of the bridge.

In testimony whereof, I have signed my name to this specification this 25th day of May 1928.

JOSEPH HERMAN.