

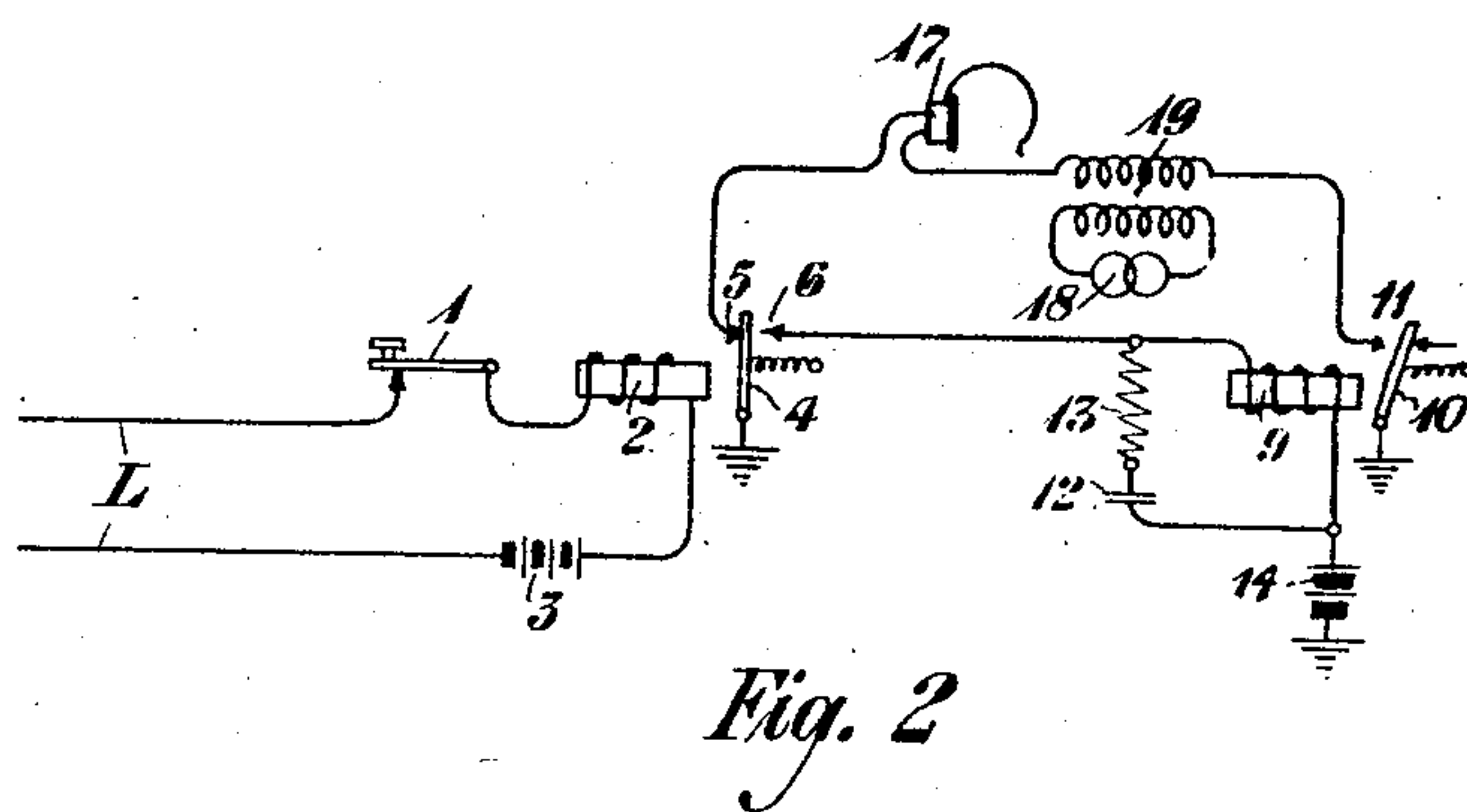
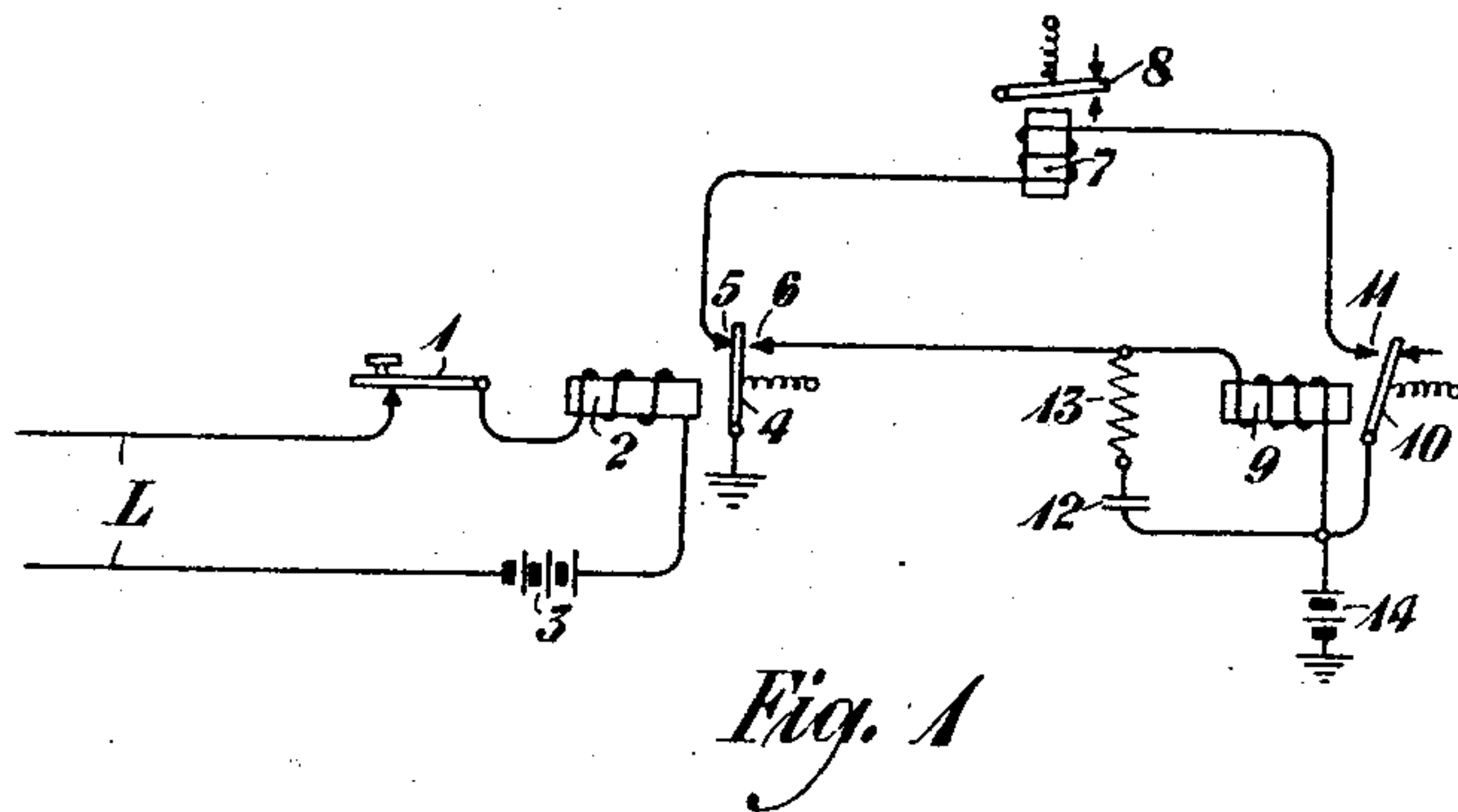
July 7, 1925.

1,544,638

J. M. FELL

TELEGRAPH SIGNALING SYSTEM

Filed July 12, 1921



Inventor.
J. M. Fell.
BY *g. c. for*
ATTORNEY

Patented July 7, 1925.

1,544,638

UNITED STATES PATENT OFFICE.

JOHN M. FELL, OF HACKENSACK, NEW JERSEY, ASSIGNOR TO AMERICAN TELEPHONE AND TELEGRAPH COMPANY, A CORPORATION OF NEW YORK.

TELEGRAPH SIGNALING SYSTEM.

Application filed July 12, 1921. Serial No. 484,120.

To all whom it may concern:

Be it known that I, JOHN M. FELL, residing at Hackensack, in the county of Bergen and State of New Jersey, have invented certain Improvements in Telegraph Signaling Systems, of which the following is a specification.

This invention relates to telegraph signaling systems, and particularly to means for automatically opening a local circuit when the line circuit is not in use.

In the so-called closed type of line circuit when signals are not being transmitted by any of the stations connected with the line circuit, the keys are closed and current flows through the said circuit thereby energizing the line relays which are connected in series with the line circuit. This energization of the line relays keeps their armatures in an operated position thereby closing the local circuit, which permits the flow of current therethrough and keeps the signal indicating device in the said local circuit in an operated position.

In telegraph systems in which signals are received by means of a sounder, the maintenance of the local circuit in a closed condition is not objectionable since it merely causes the armature of the sounder to be held fixed against one of its contacts. However, in those systems in which the signaling impulses are rendered audible by a tone, as in wireless telegraphy, it is necessary to open the local circuit when the line is not in use to prevent the emission of a continuous tone by the tone producing device. The reception of signals by audible tones possesses advantages over previous known methods, which renders it desirable to adopt it for use in connection with wire lines.

It is the object of this invention to provide an arrangement whereby the local circuit may be opened during the period in which signals are not being transmitted over the line circuit, even though the line circuit is closed and the line relays connected therewith are energized.

This invention will be better understood from the following description when read in connection with the attached drawing of which Figure 1 shows a local circuit adapted to be opened when the line circuit is not in use and Fig. 2 shows a local circuit arranged for the reception of telegraph signals by tones.

In Fig. 1, the line circuit L has connected therewith a key 1 in series with the line relay 2 and the line battery 3. The armature 4 of relay 2, which is grounded, is adapted to move between a front contact 5 and a back contact 6. 7 represents any type of signal indicating device, such as a sounder, having an armature 8 associated therewith and having its winding connected between the contact 5 of relay 2 and contact 11 of the control relay 9. The winding of the control relay 9 is connected between a source of current 14 and contact 6 of relay 2. Connected in parallel with the said winding is a condenser 12 and a resistance 13. Although the element 13 is represented as a resistance, it is to be understood that an inductance might be used therefor without varying the scope of this invention. Connected also with the source of current 14 is the armature 10 of the relay 9, which is adapted to connect the source of current 14 with the indicating device 7 through the contact 11. The source of current 14 is shown grounded but it will be apparent that the ground connections could be removed from the said source and from the armature 4 of relay 2 and the said source and the said armature could be strapped together by a conductor other than the earth. Other stations connected with the line L have preferably the same circuit arrangement as that described above.

Having in mind the foregoing description of the parts of this invention and of the circuit in which they are embodied, the invention will be clearly understood from the following description of the mode of operation of the circuit: Let it be assumed that signals are not being transmitted over the line circuit L, which, as stated before, is of the normally closed type in which all of the keys are closed when the circuit is not in operation, thereby permitting the current to flow through the windings of the line relays causing their energization. The flow of current through the winding of relay 2 causes its armature 4 to touch its contact 5 in the manner shown in Fig. 1. Since the circuit of the winding of the sounder 7 is open at contact 11, no current will flow through the sounder, consequently its armature will be in a released position. Let it be assumed that the key, such as 1, at any of the stations connected with the line L is opened for the transmission of signals. The open-

ing of the line circuit causes the relay 2 to release, thereby permitting its armature 4 to fall back and touch the contact 6. When this occurs, current will flow from the battery 14, through the winding of the control relay 9, to ground through the armature 4. Simultaneous with the flow of current through the winding of relay 9, the condenser 12, which is connected in parallel therewith, will be charged by current from the source 14. The flow of current through the winding of relay 9 will cause its armature 10 to touch contact 11, thereby connecting a source of current 14 with the winding of the sounder 7. Current will not flow through the winding of the sounder from the said source, since the circuit is now open at contact 5. If the transmitting key connected with the line L is now closed, relay 2 will be energized and will cause the armature 4 to touch contact 5, thereby permitting a flow of current from battery 14 through the winding of the sounder to ground through armature 4. This flow of current through the winding of the sounder 7 is rendered possible by the fact that the armature 10 does not drop back and open its contact 11 as soon as armature 4 opens contact 6, because the energy stored up by the condenser 12 will discharge through the winding of the control relay 9 as soon as the armature 4 moves away from contact 6. This discharge of current through the winding of relay 9 keeps the relay energized and maintains its armature in contact with contact point 11. By properly proportioning the magnitude of the elements of the circuit containing the condenser, the resistance (or inductance) and the winding of the control relay, the rate of flow of current from the condenser 12 through the winding of the relay may be so governed that the armature 10 will be maintained in contact with the contact point 11 throughout the period of time required for the armature 4 to move between its contact points during the operation of the transmitting key in the line circuit for the transmission of signals. When, however, the operator at the transmitting station stops the sending of signals and closes his key, the armature 4 will remain in contact with the contact point 5, which will keep the circuit of the winding of the relay 9 open for a greater length of time than is required to discharge the energy of the condenser 12 through the winding of the control relay 9. Therefore, when the current from the said condenser falls below a certain value, the armature 10 will drop back and open the circuit through the sounder 7, thereby releasing its armature.

The arrangement shown in Fig. 2 is, in general, similar to the arrangement shown in Fig. 1, excepting that the circuit has been arranged for the reception of signals by means

of an audible tone. The same parts in both figures have the same designating numerals. In Fig. 2, a receiver 17 and a source of variable E. M. F. 18, which is coupled with the circuit of the receiver 17 by means of the transformer 19, constitutes the receiving element of the local circuit. In the arrangement shown in Fig. 2, when signals are not being transmitted over the line L, the circuit of the receiver 17 will be opened at contact point 11, thereby preventing the constant emission of tone by the receiver 17 which is fixedly coupled by means of the transformer 19 with a source 18, which is continuously producing an available E. M. F. When, however, any key of the line circuit L is open, the armature 4 will drop back against its contact 6, thereby energizing the control relay 9 in a manner clearly described in connection with the arrangement shown in Fig. 1. The armature 10 will be drawn against contact 11, thereby grounding one side of the receiver circuit. When the said transmitting key is closed, armature 4 will be moved against its contact 5, thereby completing the circuit of the receiver 17 through the ground, which will cause the production of tone by the said receiver until the said transmitting key is again opened to mark the end of a signaling impulse, which, as described above, will allow the armature 4 to drop back against contact 6. During the time in which the armature 4 was in contact with the contact point 5, the relay 9 remained energized as a result of the flow of current from the condenser 12, so that its armature 10 did not move away from contact 11.

It will thus be seen that by means of a reservoir of energy, such as the condenser 12, of proper proportions, having in circuit therewith either an inductance or a resistance 13 and the winding of relay 9 to control the rate of flow of energy therefrom, the control relay 9 may be maintained energized through a period of time in which the circuit connecting it with its primary source of current is open. By the practically continuous energization of the control relay during the period of the reception of signals, the circuit containing the signal indicating device is maintained in suitable condition for the proper reception of signals. With the termination of the sending of signals over the line and the closing of the said line circuit in the usual manner, the control relay becomes deenergized at the end of a predetermined period of time, and the local circuit through the indicating device is opened, even though the line relay 2 remains energized. This opening of the circuit prevents the continuous production of tone by the receiver 17. The use of a circuit such as shown in Fig. 2 renders possible the reception of signals by means of

an audible tone and avoids a defect inherent in the use of closed circuits heretofore devised, viz, the continuous production of tone by means of the signal receiving device when the line circuit is not being used for the transmission of signals. Although armatures 4 and 10 and the source of current 14 are shown grounded it will be apparent that the ground connections could be removed and the said parts strapped together by a conductor other than the earth.

Although this invention has been disclosed as having a particular form and arrangement of parts, it is to be understood that it is capable of embodiment in other forms and arrangements without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a telegraph signaling system, the combination of a line circuit of the normally closed type, a line relay responsive to signals transmitted from the said circuit and having an armature adapted to move between the front and back contacts, a signal indicating device, one side of which is connected with the front contact of the line relay, a source of energy for the said indicating device, a control relay adapted to be energized when the armature of the line relay touches its back contact to partially establish the operating circuit of the said signal indicating device, and a condenser adapted to discharge through the said control relay when the said armature of the line relay opens its back contact so as to

maintain the partially established circuit of the said indicating device throughout the period of movement of the armature of the line relay between its front and back contacts during the transmission of signals over the said line circuit.

2. In a telegraph signaling system, the combination of a line circuit of the normally closed type, a line relay whose armature moves between front and back contacts, a control relay, the winding of which is connected between the back contact of the said line relay and one side of a source of direct current, the other side of which is effectively connected with the armature of the line relay, whereby the said control relay will be operated when the armature of the line relay touches its back contact, a condenser connected in parallel with said winding of control relay, an indicating device having a source of variable current associated therewith connected between the front contact of the said line relay and a contact of the said control relay, whereby the circuit of the said indicating device will be maintained in closed condition during the period of the reception of signals over the said line circuit and will be opened upon the termination of the reception of the said signals and the restoration of the line circuit to its normally closed condition.

In testimony whereof, I have signed my name to this specification this 11th day of July 1921.

JOHN M. FELL.