

(No Model.)

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MEANS FOR PREVENTING THE INTERFERENCE WITH SPEECH ON
TELEPHONE CIRCUITS BY INDUCED OR OTHER CURRENTS.

No. 464,529.

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Fig. 1

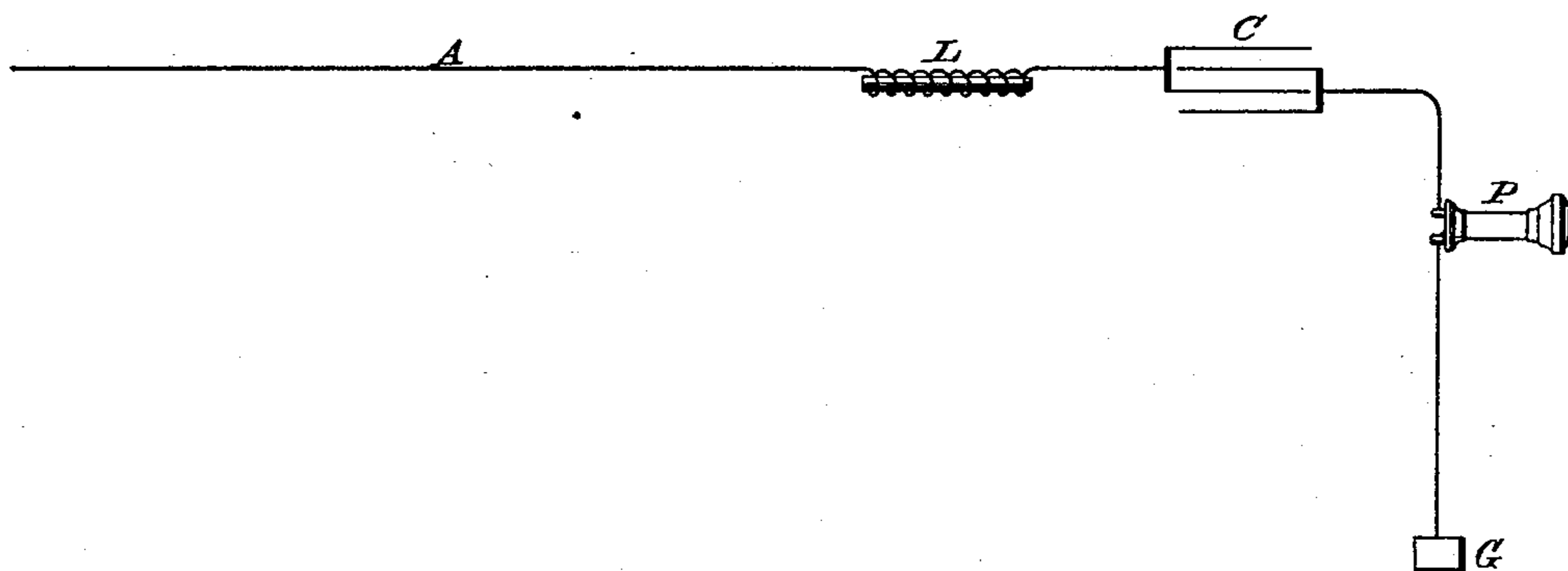


Fig. 2

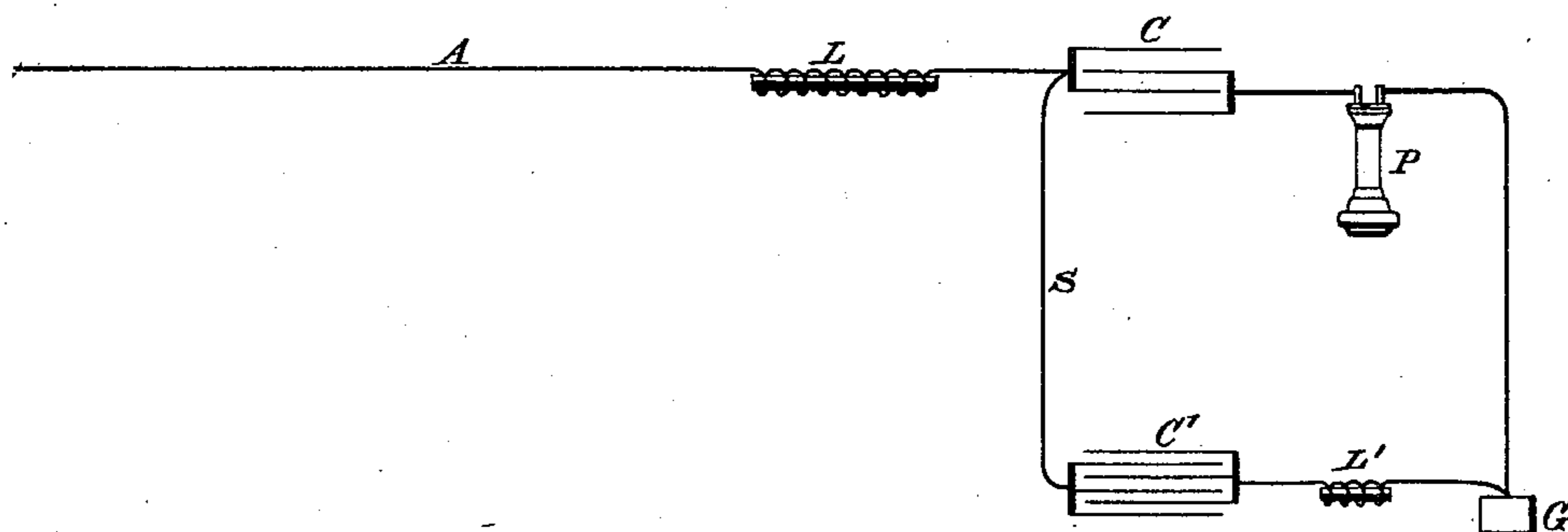
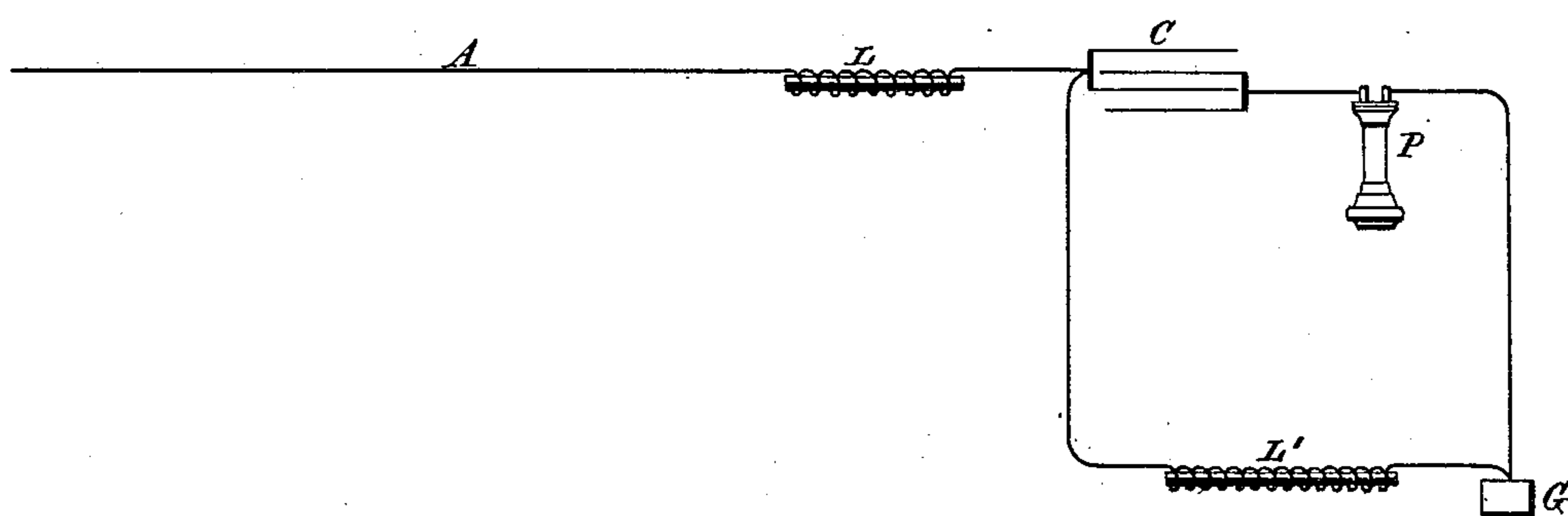


Fig. 3



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MEANS FOR PREVENTING THE INTERFERENCE WITH SPEECH ON TELEPHONE-CIRCUITS BY INDUCED OR OTHER CURRENTS.

SPECIFICATION forming part of Letters Patent No. 464,529, dated December 8, 1891.

Application filed May 22, 1891. Serial No. 393,690. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM STANLEY, Jr., residing at Pittsfield, in the county of Berkshire and State of Massachusetts, and JOHN F. KELLY, residing at New York, in the county and State of New York, both citizens of the United States, have invented certain new and useful Improvements in Means for Preventing the Interference with Speech on Telephone-Circuits by Induced and other Currents, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

It is a well-known fact that the self-induction and capacity of an electric circuit over which a current of a given periodicity or number of waves per unit of time is flowing may be adjusted relatively to each other and to the said current so that only the dead resistance of the circuit will be opposed to the passage of such current. In general, if n be used to denote the number of complete waves of the current per second, L , the co-efficient of self-induction of the circuit, and M , its capacity in microfarads, then any line that possesses the necessary values of L and M in the equation

$$n = \frac{10^3}{2\pi \sqrt{LM}}$$

(the mathematical expression of the law, in which the other factors are constants that need not be considered [herein]) will offer no other opposition to a current of n waves than that of ohmic resistance. It is obvious, however, that for all other frequencies an opposition other than that of ohmic resistance will appear, for higher frequencies, due to an unbalanced self-induction, for lower, to an unbalanced capacity. It is clear, moreover, that as the capacity introduced continues to neutralize the self-induction to some extent for all frequencies that all rates above the normal will get through more readily than if no capacity were present, although the farther they are from the normal the less will they be helped. It is otherwise with lower frequencies. Here the opposition is due to the capacity, the new element introduced into the

circuit, and for rates a certain amount below the normal, the opposition offered by the unbalanced condenser is greater than that previously afforded by the self-induction alone.

Our present invention consists in a means of lessening or preventing the interference with the reproduction of articulate speech in telephones, which is caused by induction from neighboring telegraph-lines or electric light or power circuits, which are based or dependent upon the above law.

In carrying out our invention we interpose in the circuit, between the receiving-phone and the line, a self-induction coil and a condenser to which such values are given that they will operate to hinder to the greatest possible extent the propagation of current waves of a frequency below a certain predetermined limit, but permit the speech-producing currents which are of much higher frequency to pass without material opposition. This invention may be carried out in various ways, as we shall now explain by reference to the accompanying drawings.

Figures 1, 2, and 3 are diagrams of several of the ways in which the invention is or may be carried into effect. They will be explained in detail in their order.

In Fig. 1, let A designate any telephone-line and P a receiving-phone connected therewith, the line being grounded at G . If the line A be in inductive proximity to an alternating current lighting, or power, or other circuit over which currents of a comparatively low number of waves are passing, the disturbance produced in the phone by induction may be so great as to practically prevent the intelligible transmission of speech. To arrest or oppose the disturbing currents, we introduce into the circuit between the receiver and the line a given self-induction and capacity, or, in other words, a self-induction coil L and a condenser C . The relative values of these devices may be readily adjusted by varying the length of the coil and the size of the condenser, so as to hinder to a very great extent the propagation of waves of a frequency below a predetermined limit, while checking to but a slight extent or even favoring those corre-

sponding to and producing speech, so that telephonic communication may be carried on without serious interference from those induced or leakage currents that now so frequently render such communication impossible. In Fig. 2 this arrangement is modified by the addition of a shunt S from line to ground around the condenser and the receiver, which is so adjusted as to capacity and self-induction by means of a condenser C' of comparatively large capacity and a self-induction coil L of comparatively low self-induction as to possess a high degree of receptivity for long waves. In Fig. 3 is shown a similar arrangement, except that the shunt S is arranged to have a high self-induction and low resistance, which would tend to shunt the long waves and oppose the short. So in various ways there may be placed in the circuit a means of hindering the propagation of long waves in the coils of the receiving-phone, while not checking those corresponding to sound-waves, and such long waves may be shunted around the said receiver by a circuit of high receptivity for such waves or of a low degree of receptivity for those corresponding to articulate speech.

What we claim as our invention is—

1. An electrical signaling system comprising a circuit and a receiving-instrument combined therewith which is responsive to currents of both low and high frequency, the said receiving-instrument being placed in a portion of the circuit which is adapted by the ad-

justment of its self-induction and capacity to oppose the passage of current-waves below a certain frequency, as set forth.

2. The combination, with a telephone-line and a receiver contained therein, of a self-induction coil and a condenser adjusted or adapted to hinder or check current-waves below a predetermined frequency and inserted in the circuit between the receiver and the line, as set forth.

3. The combination, with a telephone-line and a receiver contained therein, of a self-induction coil and a condenser for hindering or checking current-waves below a predetermined frequency in their passage to the receiver, and a shunt-circuit around said condenser and receiver of high receptivity for such waves, as herein set forth.

4. The combination, with a telephone-line, of two branches at the receiving end, one branch including a telephone-receiver and adapted by the adjustment of its self-induction and capacity to oppose the passage of current-waves below certain frequency, the other branch being of high receptivity for such currents, as set forth.

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