

L. DE FOREST.
AEROPHONE.

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Patented Oct. 25, 1910.

973,644.

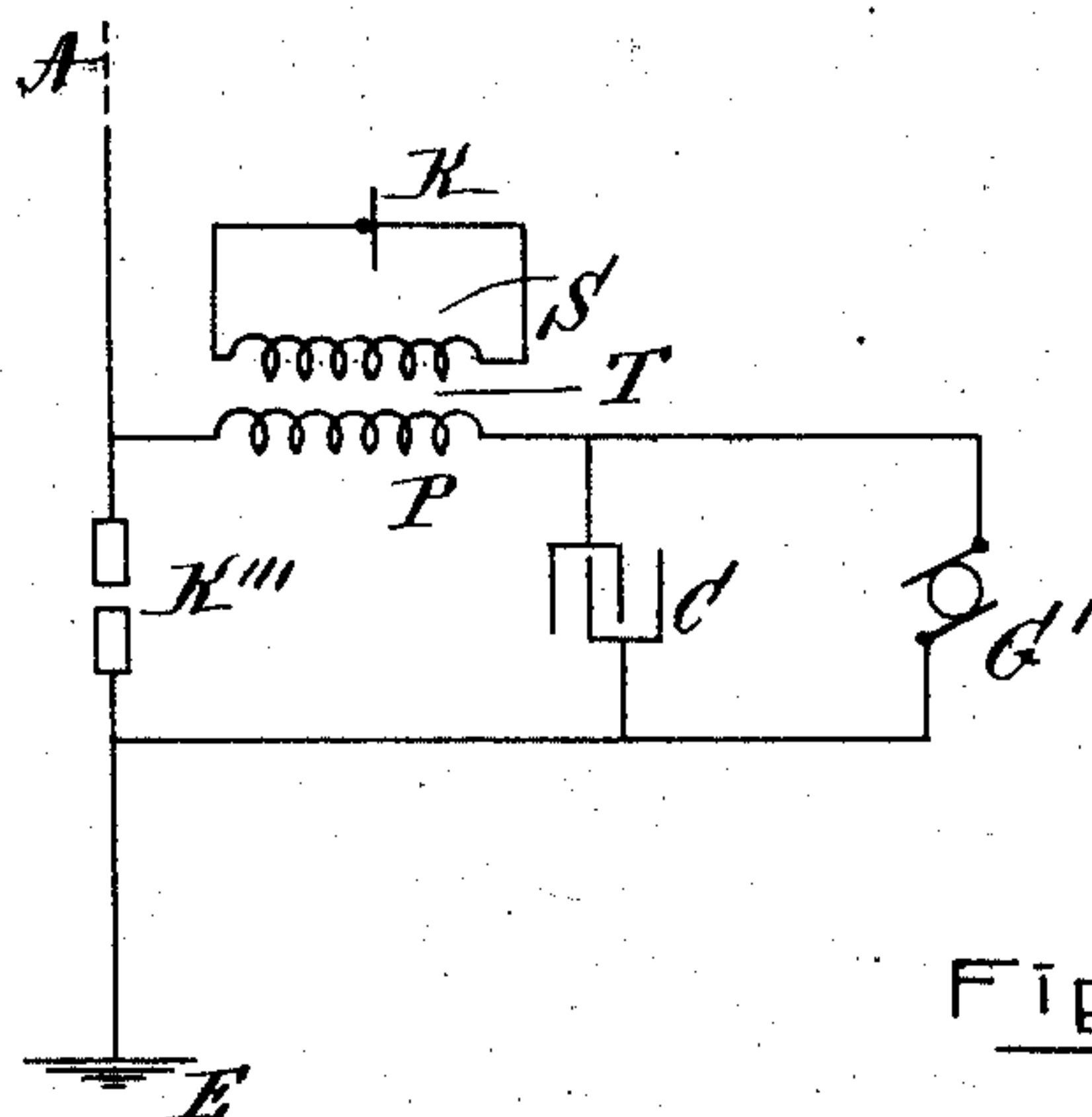


FIG. 1.

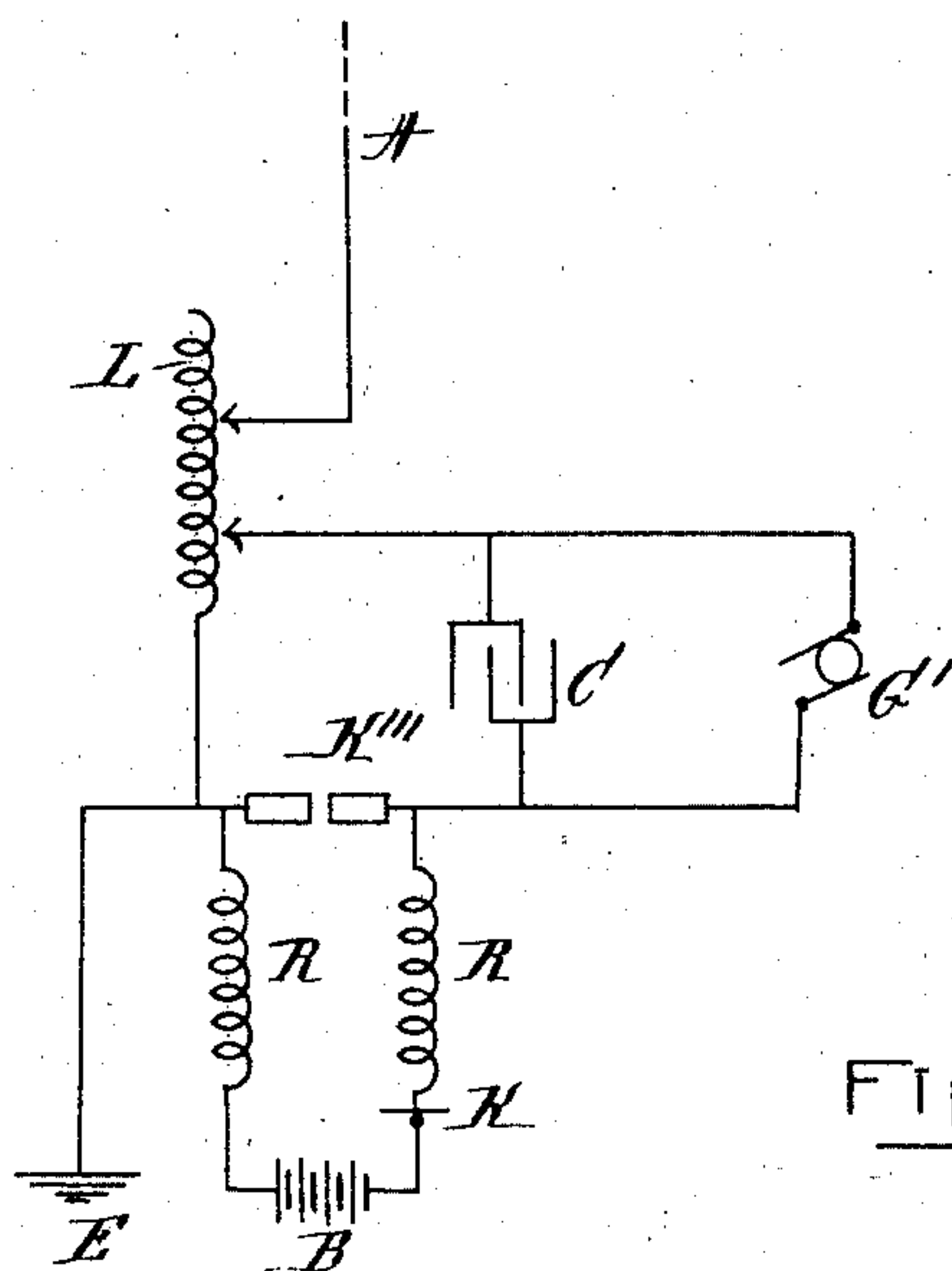


FIG. 2.

WITNESSES=

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Att'y

UNITED STATES PATENT OFFICE.

LEE DE FOREST, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO DE FOREST RADIO TELEPHONE CO., A CORPORATION OF NEW YORK.

AEROPHONE.

973,644.

Specification of Letters Patent.

Patented Oct. 25, 1910.

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To all whom it may concern:

Be it known that I, LEE DE FOREST, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented a new and useful Improvement in Aerophones, of which the following is a specification.

My invention relates to wireless telephone systems for transmitting and receiving vocal or other sounds, including articulate speech, by electro-magnetic waves.

The object of my invention is to produce a wireless telephone or aerophone in which a resistance device is varied by and in accordance with the air vibrations accompanying vocal or other sounds, and thereby correspondingly varies the amplitude of continuously transmitted trains of electromagnetic waves; and in which said waves, so varied as to amplitude, develop in a receiving system electrical oscillations correspondingly varied and thereby correspondingly vary the amplitude of the current in a telephone receiver.

My invention may best be understood by having reference to the drawings which accompany and form a part of this specification, and which illustrate conventionally two systems of circuits whereby my invention may be carried into effect.

In the drawings, Figures 1 and 2 are diagrams of aerophone transmitting systems.

In the figures, $G' G'$ are direct current generators which create in their respective circuits $C P K'''$ and $C L K'''$ electrical oscillations, the frequency of which may be regulated in the well known manner by adjusting the electrostatic time constant of the condenser charging circuit. K''' is an arc of the general type commonly known as the "singing arc."

In Fig. 1, T is a transformer, the primary P of which is included in the oscillating circuit and whose secondary S is closed through a resistance device K , herein represented as a carbon microphone, preferably of the kind used in circuits carrying currents of amplitudes large compared to the amplitudes of the currents which are modified by the usual granular carbon transmitter in ordinary wire telephony.

In Fig. 2, the resistance device K is included in an auxiliary circuit which is conductively connected to the oscillating circuit through the resistances $R R$, and which

includes the battery B . The oscillating circuits of Figs. 1 and 2 may be associated with the radiating conductor A , which is earthed at E , in any suitable manner.

In Fig. 1, the association is shown as direct and in Fig. 2 as indirect, being in the latter case an inductive association through the auto-transformer L .

The operation is as follows: The variations produced in the resistance of the device K in Fig. 1, by varying the resistance of the secondary circuit of the transformer T , produce variations in the impedance of the primary P , and hence variations in the amplitude of the oscillations developed in the system and in the waves radiated therefrom. In Fig. 2 the variations are produced by varying the current of the auxiliary energizing circuit containing the battery B , resistances R, R , and transmitter K . In Fig. 1, the windings of the transformer T should be so arranged that a very small difference of potential is developed at the terminals of the secondary thereof. In Fig. 2, the resistance of the arc K''' being small, the difference of potential developed across the terminals of the auxiliary circuit is comparable to the electromotive force of the battery B .

As is well understood, the spark frequency of the oscillations developed in a "singing arc" circuit may be made higher than the more essential frequencies which make up the complex voice waves, and said oscillations result in the radiation of electromagnetic waves having similar spark frequency. The electromagnetic waves develop oscillations in a receiving antenna of any suitable type thereby producing in a local telephone circuit a current varying at a rate equal to the spark frequency of the transmitted waves. Any variation in the amplitude of the currents in such local telephone circuit, will produce a corresponding variation in the sound emitted by the telephone receiver included therein and therefore if, by any of the variable resistance transmitters herein shown, or by any other means, the amplitude of the transmitted waves be modified in a manner corresponding to the voice waves, the telephone will reproduce sounds simulating those produced at the transmitting station.

I claim:

1. In a system for transmitting articulate speech by free and unguided electro-magnetic waves, an elevated conductor for ra-

diating said waves a singing-arc circuit connected to and operating to create high frequency electrical oscillations in said elevated conductor, and means associated with said
5 circuit for varying the amplitude of the oscillations therein by and in accordance with sound waves.

2. In a system for transmitting articulate speech by free and unguided electromagnetic waves, an elevated conductor for radiating said waves, a singing arc circuit
10 connected to and operating to create high frequency electrical oscillations in said elevated conductor, means for varying the am-

plitude of the oscillations in said circuit by 15
and in accordance with sound waves and a transformer inductively associating said means with said circuit, the windings of said transformer being so arranged that a relatively small difference of potential is de- 20
veloped at the terminals of the secondary thereof.

In testimony whereof, I have hereunto subscribed my name this 5th day of Nov. 1906.
LEE DE FOREST.

Witnesses:

L. M. HODGINS,
J. M. BUTLER.