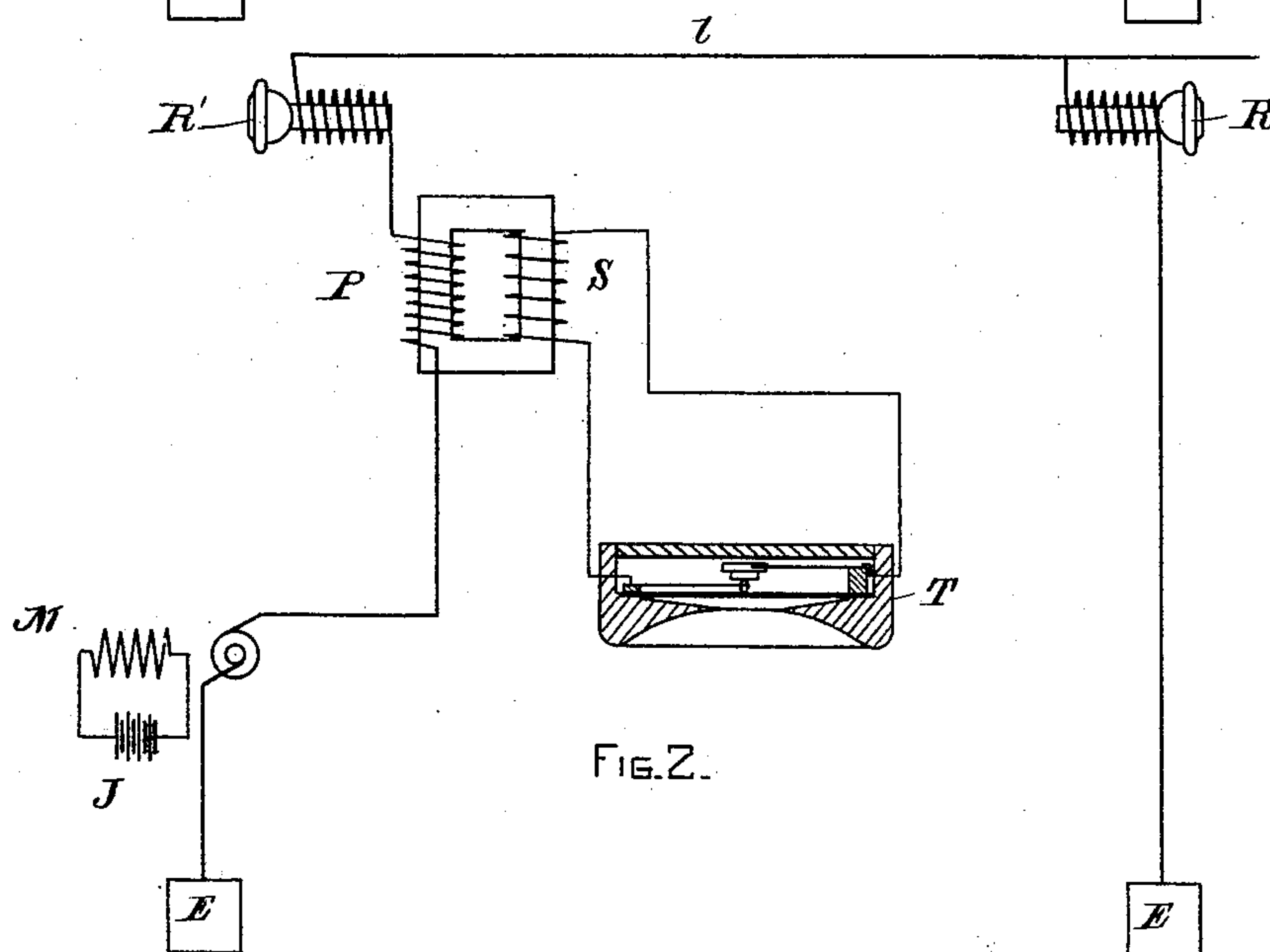
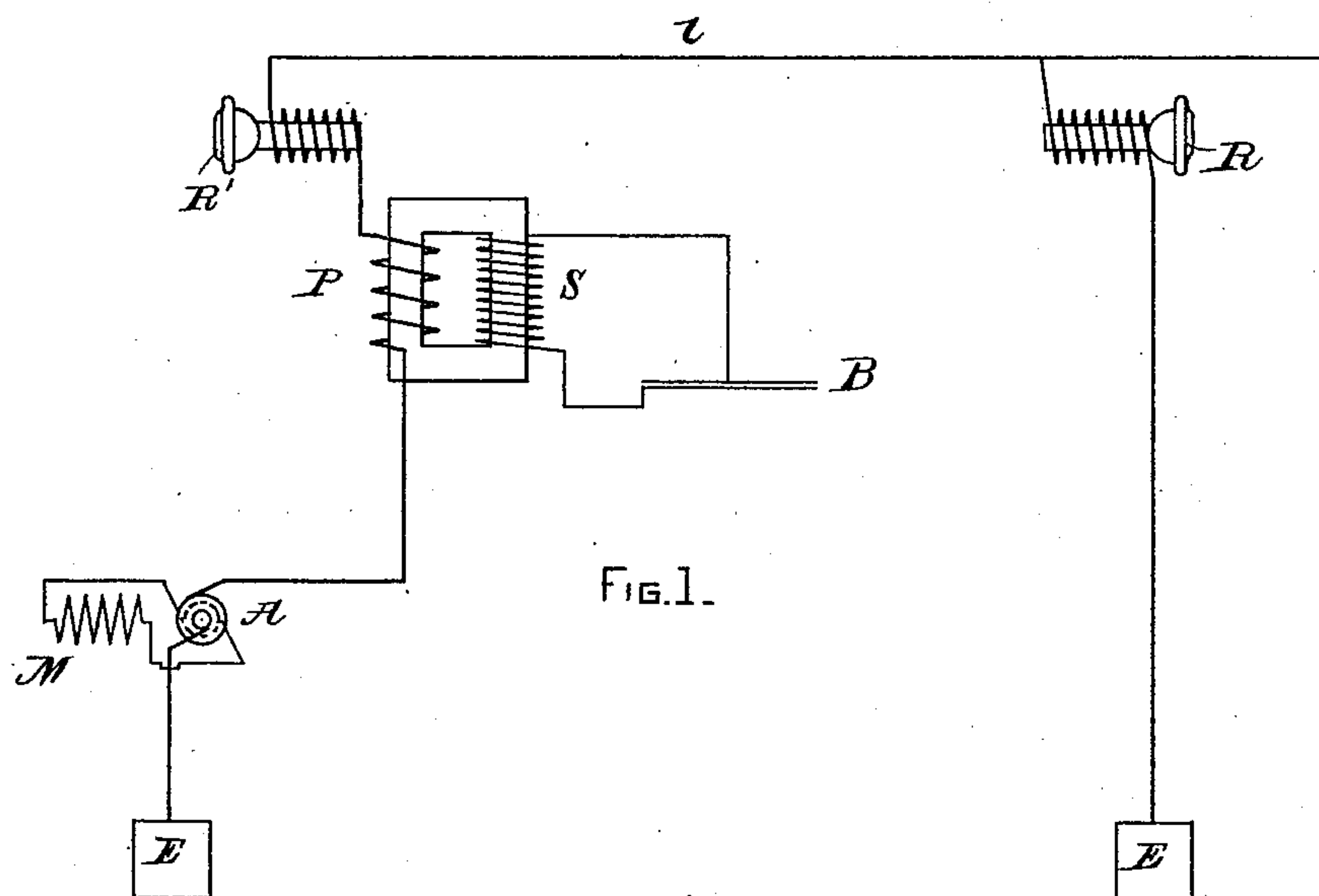


(No Model.)

J. W. GIBBONEY.
TELEPHONY.

No. 481,529.

Patented Aug. 23, 1892.



WITNESSES.

A. F. Macdonald.
John J. Broderick

INVENTOR.

John W. Gibboney

UNITED STATES PATENT OFFICE.

JOHN W. GIBBONEY, OF LYNN, MASSACHUSETTS.

TELEPHONY.

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To all whom it may concern:

Be it known that I, JOHN W. GIBBONEY, a citizen of the United States, residing at Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Improvement in Telephony, of which the following is a specification.

The present invention relates to a method of setting up waves in an electric circuit in response to vocal sounds or other mechanical impulses transmitted to the apparatus which corresponds to the ordinary transmitters in telephone systems.

It consists, briefly, in putting on the line a set of pulsations or alternations of current from a suitable source, which are made to pass through the turns of a coil in inductive relation, as in transformers or induction coils, to another coil or coils, the current in which latter coil or coils is made to vary by a change in inductive capacity, or change of resistance, or self-induction, or changes of these effects jointly to a greater or less extent brought about by the vibrations of the voice, as in speech transmission, or other mechanical impulses imparted to the transmitter or diaphragm provided therefor.

The changes of capacity, self-induction, resistance, or both, or all, which correspond to the changes of sound, act inductively to vary the primary currents traversing the line, and may therefore affect distant instruments placed in series therewith or placed in such connection that they may respond to the variations. Such an instrument is an ordinary telephone-receiver.

The invention will be understood by reference to the accompanying drawings. It may be here remarked that the invention is applicable to existing systems of telephonic communication and dispenses with the use of batteries; but it is not the purpose of the present invention to describe such a system, but to describe the invention in its broad form, leaving further extensions thereof to subsequent applications.

In Figure 1 is shown a line L, connecting a telephone-receiver, as at R, with apparatus consisting of a receiver R' in circuit with a coil P and an alternating-current generator or generator of alternating or varying impulses, as at A. The earth-plates E E serve to return

current or complete the circuit, but may manifestly be replaced by a metallic wire. The alternating-current generator A may produce impulses of such high period as to be above the limit of audition, or it may produce waves of such low period as not to give loudly audible sounds in the receiver R or R', or in either case may make an audible sound of so feeble a character as not to interfere with the speech-waves in the receivers. In inductive relation to the coil P, as when wound upon a common core or wound parallel to the coil P, is a secondary coil S, which is combined with an arrangement for receiving the waves of the voice and increasing or diminishing in accordance with the vibrations of the voice the inductive effect of the coil P in the magnetic circuit of the coil S. If the coil S be of very fine wire, so that the currents flowing in it are of considerable potential, two plates forming the surfaces of a condenser or static telephone-transmitter, as at B, may be used, one of them being a diaphragm to receive the vocal waves or to be talked against, and the other being fixed, so that as the diaphragm flexes or moves it approaches more or less closely to the other plate and changes the static capacity of the dielectric layer between. The changes result in varying in accordance with the changes of the waves of the voice the induction between the coils S and P, so as to modify the original wave by the superposition of the vocal waves. If, as stated, the original waves are but slightly audible or inaudible waves, the vocal waves retain their characteristic of audibility and may be transmitted to the line and carried to a receiver or receivers R R' in the same circuit or a circuit in inductive relation thereto. In characterizing the original waves as "slightly audible" or "inaudible" I of course desire to convey the idea that they do not seriously affect the transmission of speech or are not annoying.

There are other ways of accomplishing the result than by the use of the static transmitter B. For example, in Fig. 2 the arrangements are the same as in Fig. 1, with the exception that the secondary coil S is of quite low resistance or consists of but few turns of insulated conductor and has in its circuit an ordinary carbon transmitter T for receiving the vocal waves; or, in case the secondary cir-

cuit S is of still lower resistance, the transmitter T may have a conducting-diaphragm forming one pole and a metallic button of good conductivity resting thereon forming the other pole. In fact, with sufficiently few turns in this coil electrodes of pure silver may be used in the transmitter, or, again, electrodes of silver amalgamated with mercury may be used, the variation of resistance in the circuit of the coil S being due to the variations of section in the mercury or the variation in the contact-resistance between the two surfaces, one moved by the diaphragm and the other resting against the first. It is evident that any well-known form of transmitter which varies the resistance of the circuit by the sound of the voice may be inserted into the circuit of the coil S and subserve the purposes of the invention, it only being necessary to adapt the number of turns of the coil S to the normal resistance of the transmitter itself. Instead of varying resistance, of course the movement of an iron core in a coil or the movement of a coil over an iron core accomplished by the voice might be used to vary the self-induction in the circuit of the coil S, and thus modify the waves of current induced in it from the primary P, which induced waves react upon the primary P and cause the transmission of corresponding waves to the line and to the receivers on the line.

It will be understood that my invention permits the use of any potential in the coil P and the line, and permits, also, the use of current of any desired potential on the secondary or transmitter circuit, and this is in fact one of the main features of my invention. It also dispenses with batteries, feeding current through the transmitter, and the generator A, feeding the alternating impulses or other impulses, may of course be located at any convenient point far away from the transmitters, if need be. The field-magnets of the alternating-current or varying-current generator A may also be excited in any suitable manner—such, for instance, as by a separate winding upon its armature, as shown in Fig. 1, in which the field-magnet M is shown connected to brushes on a commutator for delivering currents suitable for such purpose or by a battery, as indicated at J, Fig. 2.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The method of transmitting speech, consisting in passing over the line-waves of alternating current or varying current of slight audibility in the receivers and superposing thereon waves of current corresponding to vocal waves, substantially as described.

2. The method of transmitting speech, consisting in putting upon the line alternating or pulsating waves of current inaudible, or nearly so, in receivers and inductively superposing waves of current corresponding to the vocal waves received by a transmitter.

3. The method of transmitting speech, con-

sisting in passing over a line or circuit, including the receivers and transmitting devices, waves of electric current incapable or nearly incapable of producing audible tones in the receivers, and modifying the induction between the line transmitter-coil and a local coil in inductive relation thereto through the agency of voice-waves.

4. The method of transmitting speech along a line having receivers and transmitters, consisting in producing induction between a pulsating or alternating current in the line of such rate as not to produce strongly-audible tones or sounds in the receiver and a local circuit in inductive relation to a coil in the line and modifying the resistance, capacity, or self-induction of such local circuit by the vocal waves received by the transmitter.

5. In combination with a telephone-line having receivers thereon of means for producing in said line varying or alternating current impulses of such period as not to produce strongly-audible tones or sounds in receivers, and means, such as a local coil in inductive relation to a coil in the line, for superimposing undulations inductively transferred from the local coil to the line-coil, the local coil being provided with a telephone-transmitter in its circuit, whereby the capacity or the resistance of its circuit may be varied by the waves of the voice communicated to said transmitter.

6. In a telephone system in which alternating or varying impulses are passed over the line, an induction-coil the primary of which is in the line and the secondary of which is local to the transmitter and connected to the said transmitter, whereby the variations of resistance, capacity, or self-induction set up in the transmitter by the voice-waves are inductively transferred to the primary coil in the line to vary its current or superimpose the vocal undulatory current on the alternating or varying line-current.

7. The combination, in a telephone system, of an induction-coil provided with a primary coil of many turns traversed by alternating or varying impulses of current, and also provided with a secondary coil of few turns locally connected through a transmitter, whereby the resistance of said local coil-circuit is varied, as described, and for the purpose specified.

8. The combination, in a telephone apparatus, of a source of alternating or varying electric current, a line-circuit connected to said current source, a transformer or inductorium the primary coil of which is in said line-circuit or inductively related thereto, and a secondary circuit for said transformer, whose resistance, capacity, or self-induction is adapted to be modified by sound-waves, as set forth.

9. The method of telephoning, consisting in passing over a circuit an alternating current or a current periodically changing in value and inductively modifying said current in correspondence with sound-vibrations.

10. The method of telephoning, consisting in passing over a circuit an alternating current or a current of changing value, passing said current through a coil of an inductorium, and varying the counter-induction of said inductorium by the agency of sound-vibrations. 5

ing the counter-induction of said device by the agency of sound-vibrations, whereby the said current is made to flow over said line in impulses or waves corresponding to the sound-vibrations. 15

Signed at Lynn, Massachusetts, February 4, 1892.

JOHN W. GIBBONEY.

Witnesses:

ALEX. F. MACDONALD,
JOHN T. BRODERICK.

11. The method of telephoning, consisting in feeding the line with an electric current of periodically rising and falling potential, passing said current through a counter-inductive device included in the line-circuit, and vary-