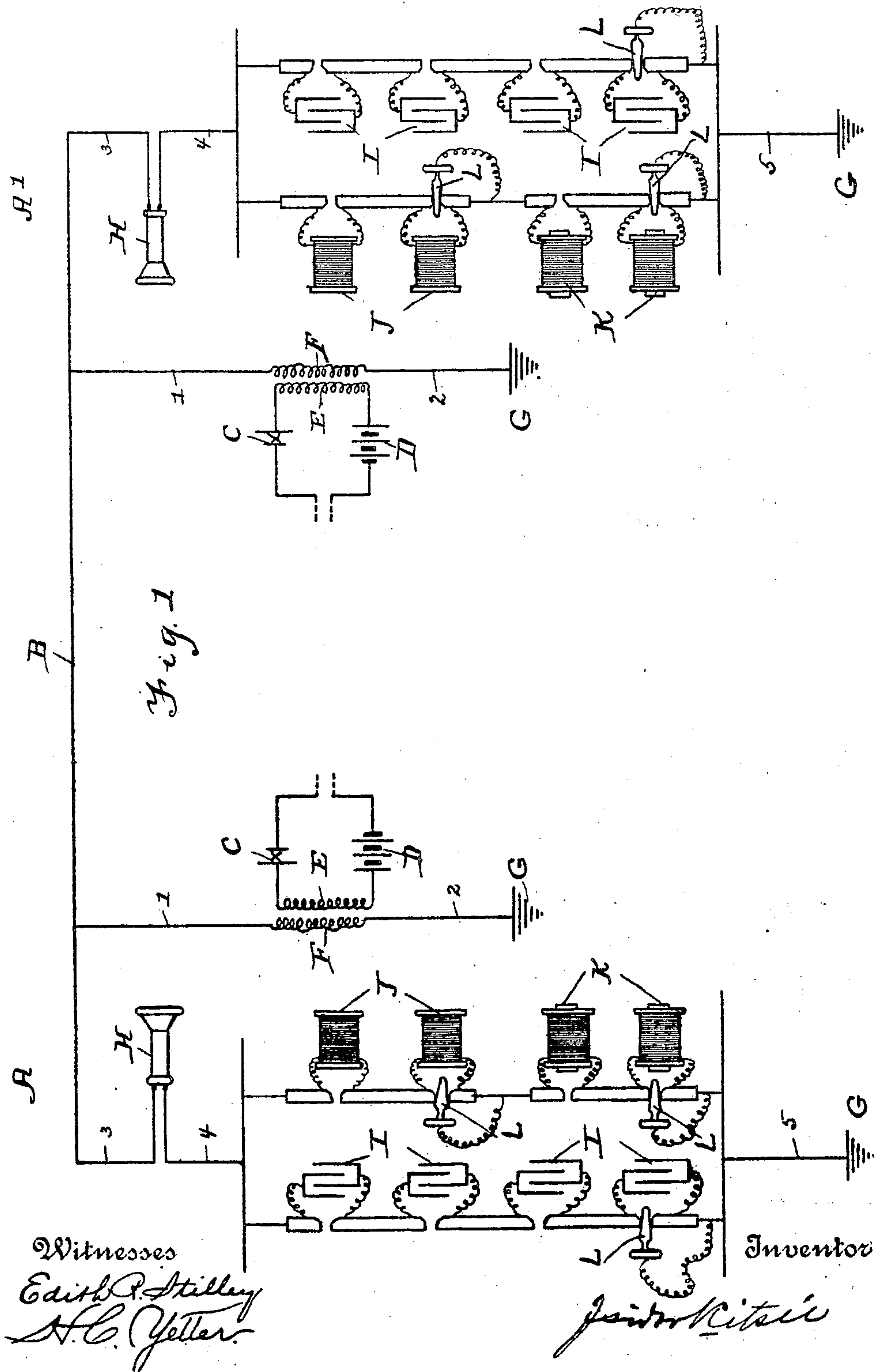


I. KITSEE.
TELEPHONY.

APPLICATION FILED JUNE 30, 1904.

2 SHEETS—SHEET 1.

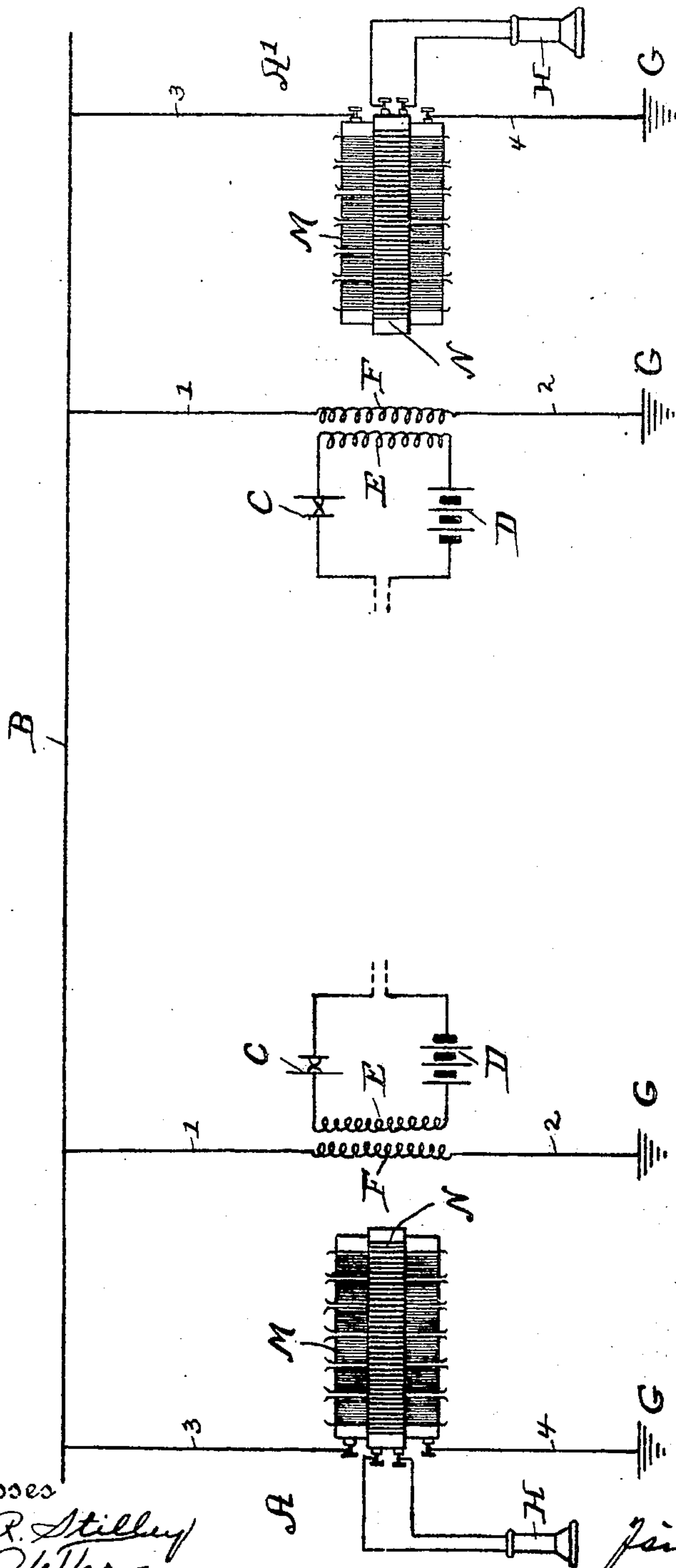


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2 SHEETS—SHEET 2.

Fig. 2.



Witnesses
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TELEPHONY.

No. 800,855.

Specification of Letters Patent.

Patented Oct. 3, 1905.

Application filed June 30, 1904. Serial No. 214,732.

To all whom it may concern:

Be it known that I, ISIDOR KITSEE, of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Telephony, (Case No. 196,) of which the following is a specification.

My invention relates to an improvement in telephony, and has more special reference to the arrangement of the telephonic devices in the transmitting-line.

In long-distance transmission the self-inductance, capacity, and resistance of the line greatly retard the transmission of speech, and notwithstanding all improvements made heretofore in such transmitting-line long-distance transmission is still inadequate for practical purposes. More so is this the case where only one line is employed and the ground is used as a return. To the retardation and distortion of the double line must in a single line be added the inductive influence of the neighboring wires, as well as the difference of potential of the ground near the terminals, and it can be said that, whereas the electrical properties of the line itself greatly retard the sound-waves, the inductive influence and the difference of potential of the ground drown the waves generated by the transmitting device, for the reason that the waves of the external disturbances overreach in strength the weak waves generated by the telephonic transmitting device. To overcome these difficulties in the one-line transmission, I had recourse to various devices in which the generated impulses were capable of inducing secondary impulses of unusual high potential, and to do this it was necessary to have the secondary of a very large number of turns of very fine wire. In fact, I produced devices in which the secondary consisted of over ten thousand turns of No. 40 wire.

In some of my experiments in which I used a one-line conductor connecting two cities about two hundred and fifty miles apart I employed such high-wound inductoriums; but, whereas I was able to drown all the "inductive noise" on the line from the ground, as well as from neighboring wires, and whereas the speech could be distinctly heard at the receiving-station if only an ear-phone was inserted in the line at that station, speech could not be distinguished if alike high-wound inductoriums were inserted at both ends of the line. These experiments were repeated on an overhead line of greater length than above and with alike results, showing that the generated

high impulses are capable of overcoming resistance, capacity, and self-inductance of the line, as well as inductive influence from neighboring lines or the ground, but that they cannot overcome the resistance and inductance of the high-wound coil. If at one of the stations the secondary was shunted when the speech was transmitted from the other station, and vice versa, communication could be carried on between these stations and the speech was distinct and clear; but as soon as the shunting was omitted no speech could be heard in the receiver. These experiments necessitate a change in the arrangement of the devices as employed by me in telephonic circuits, and in the accompanying drawings I illustrate two of the preferred modes of arrangement.

In the drawings, Figures 1 and 2 are diagrammatic views embodying my invention.

In both figures, A and A' are the two stations connected together by the line of transmission B. In Fig. 1 each of the stations is provided with the transmitting device, consisting of the microphone C, the battery D, and the primary E of the inductorium, the secondary F of which is connected through wire 1 with the line of transmission B and through wire 2 with the ground G. The receiving device consists of the receiver proper, H, connected through wire 3 with the line B and through wire 4 to what in reality is an artificial line, consisting of the condensers I, the non-inductive resistances J, and the inductive resistances K, each provided with means L to shunt one or more of each of these devices. This artificial line is connected through wire 5 with the ground G. In Fig. 2 each of the stations is provided with the transmitting device alike to the transmitting device in Fig. 1; but in Fig. 2 the receiving device consists of the secondary M of an inductorium connected through wire 3 with the line of transmission B and through wire 4 with the ground. The primary N of this inductorium is connected to the receiver proper, H.

I will first describe the circuit as illustrated in Fig. 1. As will be seen, the high-wound secondary instead of being connected in series as to the line of transmission is connected in multiple arc as to said line and to the ground. The primary of this inductorium and the telephonic microphone are of the usual type as employed to-day, and I have omitted to illustrate the other necessary mechanical devices in desk-phones or alike devices, as the same

are well understood and do not need further description here. The, with the aid of the microphonic transmitter, produced variation in the flow of the current in the primary induces, as is well known, corresponding impulses in the secondary; but as the transmitting-station is provided with a second ground the impulses would divide in accordance with the resistance of the line and would almost entirely flow through the receiver H of its own station were it not that between the receiver H and the ground a resistance, inductance, and capacity are inserted about equal to the electrical condition of the line. The transmitted impulses will therefore divide and will flow partially through the aerial and partially through the artificial line.

In my experiments I have found that the employment of such an artificial line allows the transmitting and receiving of speech through high-tension impulses, whereas, otherwise, when the secondary is inserted in series in said line the impulses are "choked up," so to speak, and cannot be distinguished in the receiver of the receiving-station.

It is unnecessary for me to give further in detail the construction of an artificial line, as the same is well understood by persons versed in the art and the same has to differ in accordance with the different electrical properties of the line.

In the course of my experiments I have found that if an induction-coil is made in a manner so as to be able to be regulated in accordance with the resistance and inductance of the line and is substituted for the artificial line, as employed in Fig. 1, and if the receiver is connected to the primary of said inductorium the artificial line can be entirely dispensed with, and the inductorium for all practical purposes will take its place.

The employment of the artificial line or the employment of the inductorium in lieu of same can be left to the judgment of the person in charge in each and every case, as both of these devices fulfil the requirements nec-

essary to transmit high-tension impulses and to receive the same with the aid of telephonic devices.

I have illustrated the secondary M as to consist of a series of sections, but have not illustrated the manner in which these sections may be connected in series or multiple arc, as it is obvious that such connections can be made in accordance with well-defined rules.

Wherever I speak in this specification or in the claims following same of a "high-tension secondary" I understand under it a secondary which is able to develop induced impulses in intensity far in excess of the impulses induced in the common telephonic inductorium and wherein such generation necessitates the employment of a coil of such construction as would naturally act in a telephonic line more as a "choking-coil" when idle.

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

1. In telephony, a transmitting-line connecting two stations to each other, means to transmit over said line high-tension impulses, said means connected in multiple arc as to said line, said line also provided with an artificial line at each terminal and receiving devices connected in series with said line.

2. In telephony, a line of transmission connecting electrically two stations with each other, each station provided with a transmitting device adapted to develop high-tension currents, the secondary of said devices connected to the line and ground respectively, an artificial line at each station, said artificial line connected to the line and ground respectively and receiving devices inserted between the line proper and said artificial line.

In testimony whereof I hereby sign my name, in the presence of two subscribing witnesses, this 28th day of June, A. D. 1904.

ISIDOR KITSEE.

Witnesses:

EDITH R. STILLEY,
H. C. YETTER.