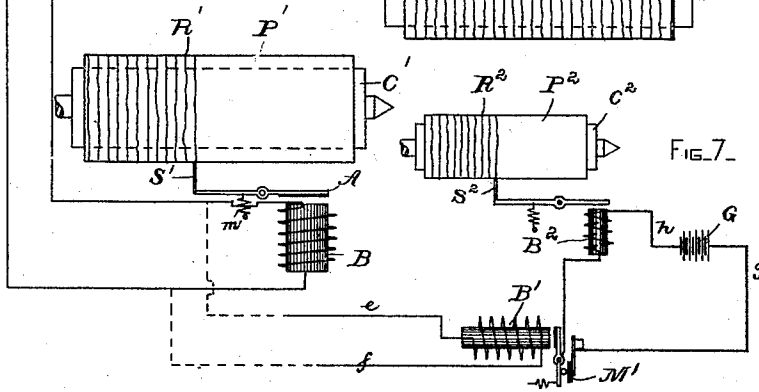
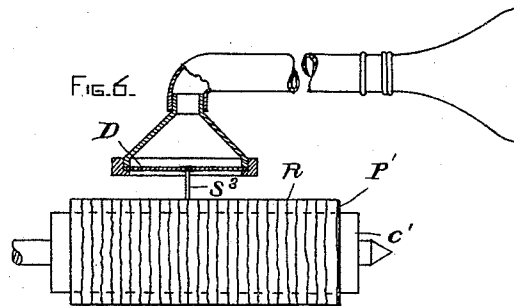
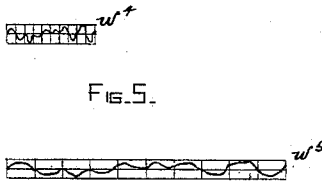
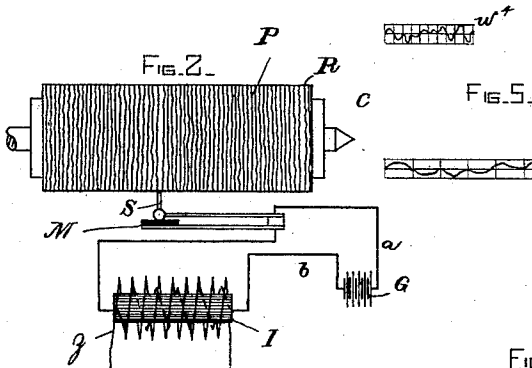
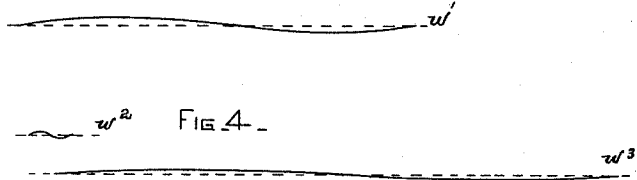
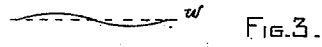
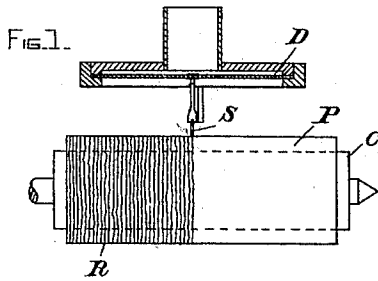


(No Model.)

J. W. GIBBONEY.
TELEPHONY.

No. 463,188.

Patented Nov. 17, 1891.



WITNESSES.

A. F. McDonald.
Benjamin P. Hall.

INVENTOR.

John W. Gibboney

UNITED STATES PATENT OFFICE.

JOHN W. GIBBONEY, OF LYNN, MASSACHUSETTS.

TELEPHONY.

SPECIFICATION forming part of Letters Patent No. 463,188, dated November 17, 1891.

Application filed July 28, 1891. Serial No. 400,917. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. GIBBONEY, a citizen of the United States, and a resident of Lynn, in the county of Essex and Commonwealth of Massachusetts, have invented a new and useful Improvement in the Art of Telephony or Electric Communication, which I have described in the following specification and illustrated in the accompanying drawings.

The object of my invention is, primarily, to enable electric waves or undulations of current to be transmitted to great distances or between points connected by an electric conductor in which there exists so large a self-induction or so great an impedance to variations in the current-flow that the original waves or undulations of current become ordinarily so modified, distorted, or confused that their transmission and recognition at the receiving end of the circuit become difficult, if not impossible.

My invention is intended to make it possible to convey speech or to telephone over much greater distances than has been common heretofore, and to transmit over circuits having a large self-induction or impedance electric-current waves or undulations of changing value in such manner that the record of the waves, though made at a slower rate at the receiving end of the circuit, shall more nearly correspond in character to the original sounds and may be used to reproduce them.

Briefly my invention consists in making a suitable record of the sound-waves or phonogram-record, causing such record to produce corresponding electric waves or undulations of current at a reduced pitch or extended period, transmitting such waves or undulations of current over an electric circuit, and recording such waves at the receiving end of the circuit.

My invention will be understood by reference to the following description and the drawings accompanying the same.

Figure 1 shows an apparatus for producing a sound-record. Fig. 2 shows the application of this record to the production of electric waves, impulses, or undulations of current. Figs. 3, 4, and 5 represent waves of sound and current. Fig. 6 shows sound reproduc-

tion through the agency of an electric-wave record. Fig. 7 is an illustration of one of the ways of obtaining a record at the receiving end of the circuit.

In Fig. 1, D is a diaphragm supported in the usual manner in phonographic apparatus and carrying a stylus S, bearing upon a phonogram-blank P upon a cylinder C. It is well known that if sound-waves act upon the diaphragm D it will be set into vibration and a corresponding sound-record cut into the rotating phonogram-blank P.

In the practice of my invention I take the phonogram-record P and substitute for the stylus S a follower S, Fig. 2, which controls a variable-resistance transmitter or its equivalent M in an electric circuit *a b* from a generator G; this circuit passing likewise around an induction-coil I by preference. If now the cylinder P be rotated at the same rate as when the record was made, electric waves, impulses, or undulations of current will pass over the line *c d* to the further end of the circuit; but if this circuit be of considerable length or have a large amount of self-induction or impedance and the electric waves are rather quick in character, it is well known that their transmission becomes difficult and even impossible, because they are smoothed out, obliterated, or distorted in such manner that they cannot be recognized as representing faithfully the original impulse. I obviate this difficulty by rotating the cylinder C at a reduced rate from the normal or the rate at which the record was made, whereby the electric impulses or undulations of current, while having a character corresponding to the sound-waves, are prolonged in period or produce an electric wave which would correspond to a sound-wave of reduced pitch. These waves may be passed over the circuit *c d*, and because of their slowness are transmitted with greater fidelity than would be the case were they made to correspond in period with the pitch of the sound-wave. These waves of current are at the receiving end of the circuit passed through a magnet B, whose armature operates or controls the movements of a stylus S', reproducing upon a phonogram-blank P' upon a cylinder C' a record R', corresponding to the electric waves

transmitted over the line $c d$. If now the stylus S' , Fig. 2, be replaced by the follower S^3 , Fig. 6, and the cylinder C^2 revolved at the same rate as when the electric-wave record was put upon it, the sound produced would correspond in pitch to the pitch or period of the electric waves which produced the record; but if its speed of rotation be increased to a suitable amount, the sounds emitted may be made to coincide in pitch with the original sound used in making the initial record at the sending-station, as will be readily understood. Supposing, for instance, the wave w , Fig. 3, represents a sound-wave impressed upon the phonogram-blank P . If the cylinder C , Fig. 2, be rotated at one-half its normal speed, the electric wave produced in the circuit $c d$ would be represented by the wave w' , Fig. 3. The relative speed of rotation imparted to the cylinder C is always made that which is necessary to avoid the induction and impedance troubles in the line $c d$, which may be a long cable. Thus in Fig. 4 the ratio may be $w^2 : w^3 :: 1 : 15$, or even more. I do not wish to be understood as confining myself to any limit in this respect.

In Fig. 5 w^4 illustrates a complex wave, and w^5 shows the wave of current corresponding thereto, which wave would, however, be extended over a period three or more times as great, retaining, however, a corresponding amplitude. It is of course evident that the longer the wave w^5 is made with respect to the wave w^4 , the less it will be modified in transmission over the circuit $c d$ and the more nearly accurate will be the reproduction from the phonogram P^2 when revolved at the proper speed. Such a speed of transmission will be selected, of course, as will give satisfactory results in any given instance.

It may sometimes be desirable to relay the current at the receiving end of the line, and the slowness of the period of the waves renders this an easier matter than ordinarily. Thus in Fig 7 the current between the lines $c d$ passes through a magnet B' , operating a variable circuit-controller M' , controlling a local circuit gh from a current source G , this current passing about a magnet B^2 , operating the stylus S^2 , bearing upon the phonogram-blank B^2 upon the cylinder C^2 . The record R^2 would correspond in character to that upon the cylinder P' .

My invention will be found useful also in cases where it is desired to transmit intelligence secretly over an electric circuit, because upon communication being established with the line surreptitiously instruments and appliances similar in nature to those herein described would be required to be used before the messages could be understood.

What I claim as my invention is—

1. The method of telephoning, consisting in making a record of the sound-waves, causing such record to produce slower electric waves, impulses, or undulations of current of corresponding shape or character, transmitting such slow electric waves or undulations of current over an electric circuit, and recording such waves at the receiving end of the circuit.

2. The improvement in the art of telephony, consisting in producing a phonographic record of the sound-waves, transmitting electrical waves, impulses, or undulations of current corresponding to such sound-waves in amplitude, but having a reduced rate of vibration or pitch, and recording such waves at the receiving end of the circuit.

3. The herein-described improvement in the art of electric communication, consisting in making a suitable record of the waves or vibrations, operating a variable-current transmitter by the agency of this record to produce electric waves of a corresponding character, but slower period or rate of change, transmitting such electric waves over an electric circuit, and operating a recorder responsive to such waves at the receiving end of the circuit.

4. The method of reproducing sounds at a distance, consisting in first making a phonographic record of the sound, then operating an electric circuit-controller through the agency of such record to set up electric waves or undulations of current corresponding in character to the sound-waves, but having a greater period, transmitting such electric waves over a circuit for operating a recorder to produce a record of such waves, and afterward operating a mechanism responsive to the electric-wave record for producing audible sounds.

5. The method of electrical communication, consisting in making a record of sound-waves, operating an electric circuit-controller by the agency of said record to produce slower electric waves or electric waves representing sound-waves of lower pitch and corresponding in character to said sound-waves, making a record of said electric waves by operating a recorder responsive to such waves, and reproducing the original sound by operating said electric-wave record at a speed greater than that at which such record was made.

Signed at Lynn, Massachusetts, July 24, 1891.

JOHN W. GIBBONEY.

Witnesses:

JOHN T. BRODERICK,
BENJAMIN B. HULL.