

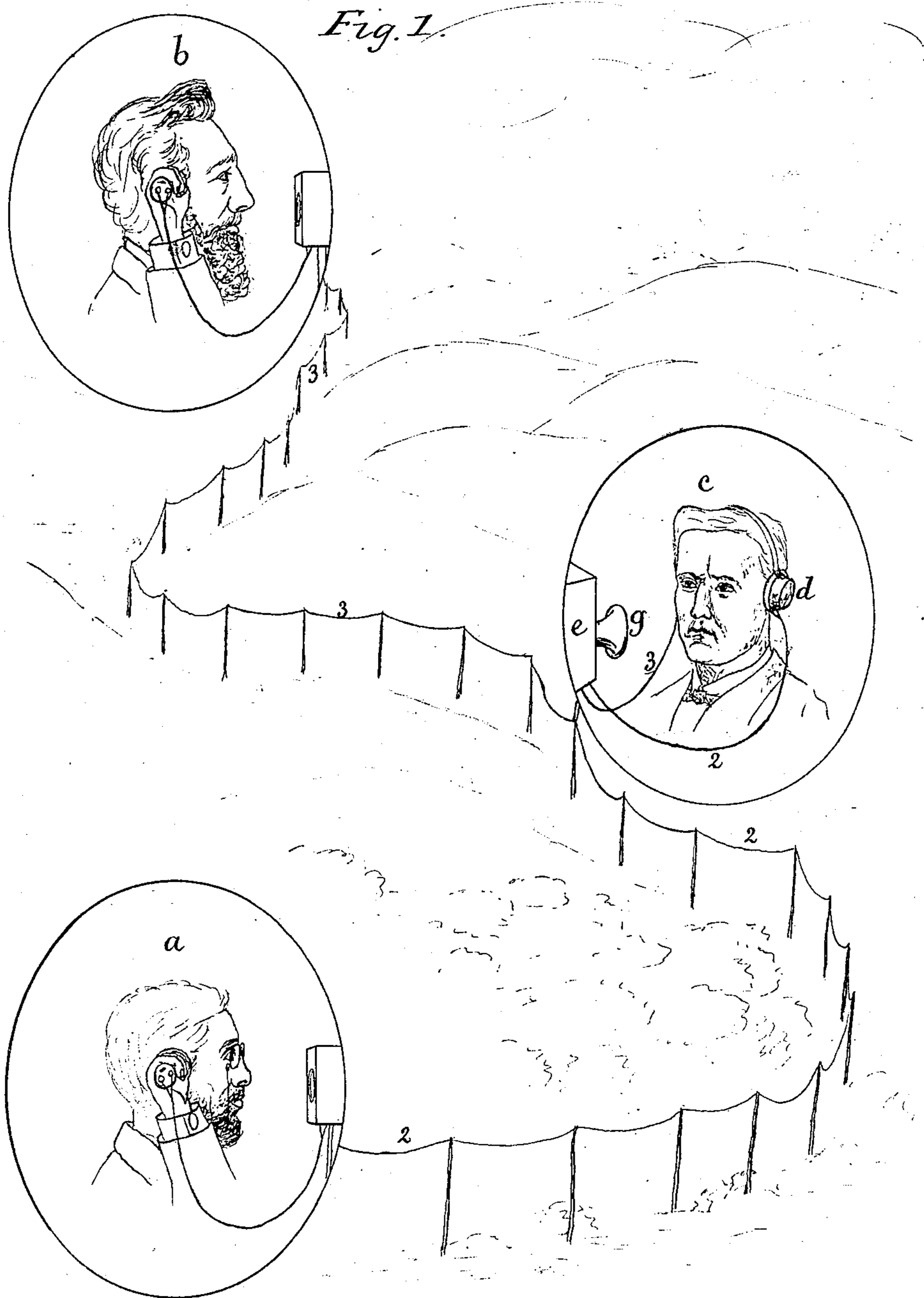
(No Model.)

2 Sheets—Sheet 1.

T. A. WATSON.  
TELEPHONE SYSTEM.

No. 267,387.

Patented Nov. 14, 1882.



Witnesses.

Jos. P. Livermore  
L. F. Connor.

Inventor.

Thomas A. Watson  
by Crosby & Gregory  
Attys.

(No Model.)

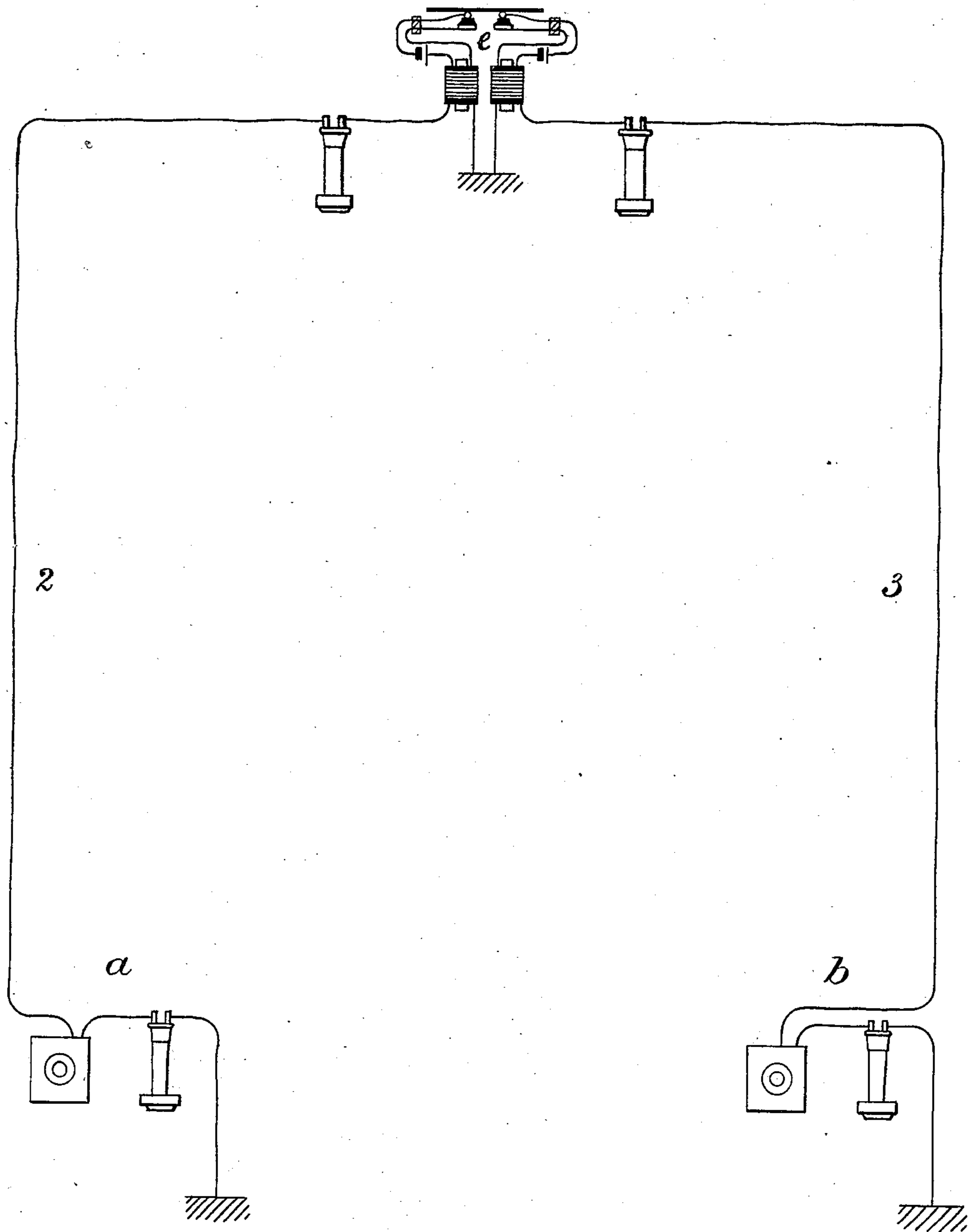
2 Sheets—Sheet 2.

T. A. WATSON.  
TELEPHONE SYSTEM.

No. 267,387.

Patented Nov. 14, 1882.

Fig. 2. c



Attest.  
*E. L. White*  
W. B. Masson

Inventor  
*Thomas A. Watson*  
by *A. Pollok*  
his attorney

# UNITED STATES PATENT OFFICE.

THOMAS A. WATSON, OF EVERETT, ASSIGNOR TO THE AMERICAN BELL  
TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

## TELEPHONE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 267,387, dated November 14, 1882.

Application filed May 27, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. WATSON, of  
Everett, county of Middlesex, State of Massa-  
chusetts, have invented an Improvement in  
5 Telephonic Communication, of which the fol-  
lowing description, in connection with the ac-  
companying drawings, is a specification.

My invention relates to telephonic transmis-  
sion, and has for its object to enable telephonic  
10 communication to be carried on expeditiously  
over distances too great for operating the usual  
telephonic instruments.

Telephones as constituted up to this present  
time have been found not to be available for  
15 use in circuits of much above one hundred  
miles, and consequently the employment of  
telephones for conversing over long distances,  
or over a distance greater than the distance  
limited by the effective power of one tele-  
20 phonic circuit, has been impossible, and the  
usefulness of the telephone as a means of com-  
municating speech has been circumscribed  
within certain bounds and limits.

I have by experiment devised a plan by which  
25 I am enabled to make the present form of tele-  
phone available for conveying speech for any  
desired distance, thus enabling telephonic lines  
of communication to be extended unlimitedly  
as to distance. To accomplish this greatly de-  
30 sired and needed end I have devised a method  
of transmission consisting in dividing such  
distances over which it is desired to transmit  
speech into a number of sections which may  
be independent electric circuits, each of suit-  
35 able length for direct transmission, at the ad-  
joining ends of which I have placed receiving  
and transmitting instruments under the con-  
trol of the operator, the said instruments being  
preferably, for the greatest facility and accu-  
40 racy, so arranged in the circuits as to enable  
the operator at an intermediate station, simul-  
taneously with the sending forward of the tele-  
phonic message toward its destination, also  
to send back to the operator next preceding  
45 him the message just received and sent forward.

By placing the repeating-operator in com-  
munication with both the sections or circuits  
at the same time, as by having a telephone con-  
50 nected with each circuit at each ear, and by  
placing transmitters in each of the circuits in

such position that the words of the repeating-  
operator will affect both, the said operator  
will, after some practice, be able to regulate a  
conversation to prevent confusion, in case both  
parties should try to speak at once, and at 55  
other times will repeat the words of one com-  
municant immediately upon receiving them,  
so that the other party will hear them and re-  
ply, if necessary, the conversation being car-  
ried on in a somewhat similar manner to one 60  
between persons using different languages and  
employing an interpreter, but with much great-  
er rapidity and facility.

If desired, two separate telephones may be  
used—one in each circuit at each ear of the re- 65  
peating operator—and two separate transmit-  
ters placed in proper proximity to the said op-  
erator or compound telephones and transmit-  
ters may be used—such as invented by me and  
described in a former application, filed April 70  
29, 1880, to which reference may be had.

The drawings show an intermediate and two  
terminal stations of a line of communication  
divided into two sections, the whole line being  
supposed to be in the neighborhood of two 75  
hundred miles long.

Figure 1 is a diagram illustrating the inven-  
tion, showing two terminal and one intermedi-  
ate station; and Fig 2 is also a diagram show-  
ing the construction and connections of the 80  
transmitter at the intermediate or repeating  
station.

It will be readily understood that the elec-  
tric circuit can be continuous, the said sections  
being merely divisions thereof, over which the 85  
speech will be transmitted with distinctness and  
a single receiving and transmitting instrument  
used, which will serve for both the sections  
on either side of it; but I prefer to have the  
sections entirely independent circuits, as there 90  
can then be no confusion arising from indistinct  
sounds, which might pass for a distance of two  
or more sections of a continuous circuit.

The communicants at the terminal stations  
a b of the line of communication are provided 95  
with the usual telephonic instruments, the cir-  
cuit-wire, 2 from a, being shown as passing  
through a receiving-telephone, d, and one sec-  
ondary coil of the microphone-transmitter e of  
the intermediate or repeating operator's sta- 100

tion *c*, while the circuit-wire 3, from station *b*, passes through another secondary coil in the transmitter *e'* and another receiving-telephone similar to the one *d*, but at the other ear of the operator at the station *c*.

The compound transmitter *c* may consist of two separate transmitters, of any usual construction, inclosed in a single case in proper position to receive the sound equally from the single mouth-piece *g*, the separate transmitters preferably having independent batteries and induction-coils, as shown in Fig. 2. This arrangement makes a single line of communication of the two sections between *a c* and *b c*, as far as the transmission of sound from the station *c* is concerned, for, although when considered as electrical circuits the two sections are entirely independent and the sound is electrically transmitted only the length of one section, the voice of the repeating operator affects both circuits exactly as much as it would either one alone, so that he is heard equally well by the communicants at the other ends of both the sections between which he is placed. When there are more than one intermediate stations each operator will hear the next one repeat the words he has just spoken, but will not hear and be disturbed or confused by the repetition of the operator at the second station from him. By this method a communication can be sent either by short sentences, if there be only one or two sections, or preferably word by word if there be a large number of sections, and, if desired, the words may be recorded by a stenographer at the other end of the line, such operation requiring no more time than an ordinary dictation. When sending a message the communicant at one end of the line, as at *a*, will say one word and will then immediately hear it repeated from the next station, and so be able to correct it, if wrong, and upon hearing will wait just a moment for the first repeating operator to hear the next one repeat it, when he may send the next word, the whole communication thus requiring but slightly more

than three times as long as it would to clearly deliver the words in the usual manner, and there being no more likelihood of causing confusion or mistake.

Where a line consists of but two or three or a small number of sections, the conversation may be carried on between the parties in the usual manner, short sentences being sent and then answered; but when the line consists of a large number of sections it is preferable to use trained operators at the terminal stations as well as the intermediate ones and to send the messages word by word, the parties communicating either writing their messages or dictating them to the operator, as most convenient.

It is obvious that this method of communication is also applicable in any case in which it is impossible to transmit directly from one point to another by a continuous circuit, but is possible to have two or more circuits arranged in adjoining series, so that a single operator can control two of the said series simultaneously.

I claim—

1. The combination, with a telephone-line passing through an intermediate station, of telephonic apparatus at said station, comprising a battery-transmitter connected with the branches of the line on both sides of said station and a separate receiver in each branch, substantially as described.

2. The combination, with distinct lines of communication or the contiguous sections of a telephone-line, of transmitting apparatus common to said lines or sections, and independent receiving apparatus for each line or section, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS A. WATSON.

Witnesses:

JOS. P. LIVERMORE,  
G. W. GREGORY.