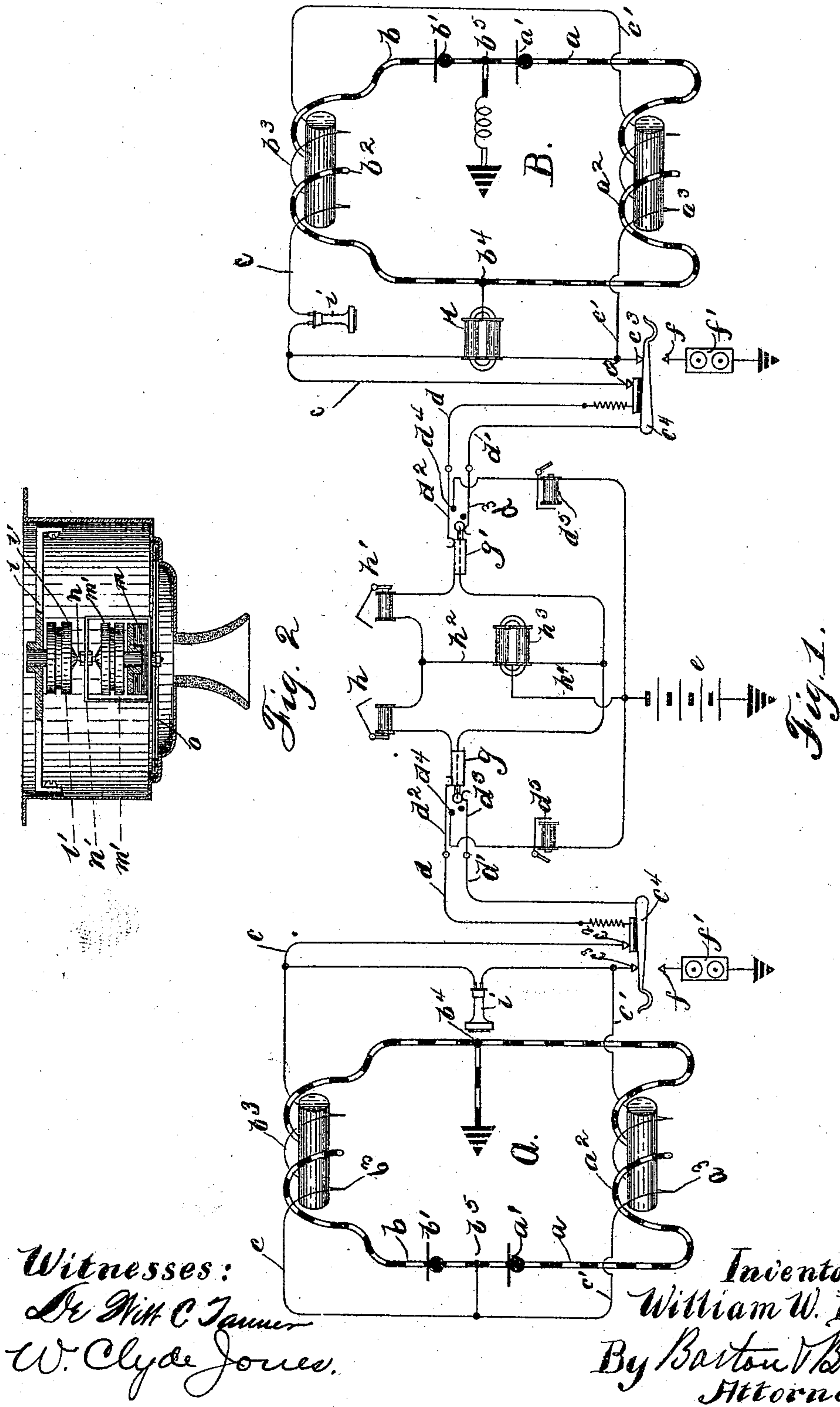


(No Model.)

W. W. DEAN.
LOCAL TRANSMITTER CIRCUIT FOR TELEPHONES.

No. 549,477.

Patented Nov. 5, 1895.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE BELL
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LOCAL TRANSMITTER-CIRCUIT FOR TELEPHONES.

SPECIFICATION forming part of Letters Patent No. 549,477, dated November 5, 1895.

Application filed March 29, 1895. Serial No. 543,662. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, residing in the city of St. Louis and State of Missouri, have
5 invented a certain new and useful Improvement in Local Transmitter-Circuits for Telephones, (Case No. 4,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying
10 drawings, forming a part of this specification.

My invention relates to a local transmitter-circuit for telephones; and its object is to provide improved means for producing in a local transmitter-circuit voice-currents adapted to
15 be propagated over a telephone-line to a distant receiver.

In an application for Letters Patent filed February 21, 1895, Serial No. 539,209, I have described a local transmitter-circuit comprising a closed circuit including the microphone and the primary winding of an induction-coil, the local transmitter-circuit being connected with the telephone-line at two points, to thus include the local transmitter-circuit
20 in the line-circuit in two parallel branches. Current from a charging-battery connected with the line thus traverses the local circuit in two parallel paths, and the operation of the microphone in one of the paths causes a
30 variation of the current in the two paths of the local circuit. I have also illustrated in said application a form of transmitter-circuit in which the microphone and the primary winding of one induction-coil are included in one of the parallel branches, while the primary winding of a second induction-coil is included in a second branch, the actuation of the microphone thus producing opposite effects in the two induction-coils. The secondary windings of the induction-coils are included in series in the telephone-line, the voltages of the two coils being thus added.

In accordance with the present invention I provide two microphones, one in each of the
45 parallel circuits, the two microphones being connected with a common diaphragm or sounding-board, so that as one microphone increases the resistance through its circuit the other microphone decreases the resistance through its circuit, the two microphones thus acting always in opposite directions.

The result is to greatly increase the change of current through the two parallel paths. Thus movement of one microphone to increase the resistance of its path causes an
55 increased current through the other path; but the microphone in this second path is simultaneously actuated to decrease the resistance through the second path. The current flowing through the second path is thus increased
60 through two causes—first, the increase of resistance in the first path, and, second, the decrease of the resistance in the second path.

I will describe my invention more in particular by reference to the accompanying
65 drawings, in which—

Figure 1 is a diagrammatic view illustrating my invention. Fig. 2 is a view of the duplex microphone which I employ in practicing my invention.

Like letters refer to like parts throughout the several figures.

In Fig. 1 I have illustrated a local transmitter-circuit in heavy lines, the circuit comprising two branches *a* and *b*. In the branch
75 *a* is provided a microphone *a'* and the primary winding *a*² of an induction-coil. In the branch *b* is provided a microphone *b'* and the primary winding *b*² of an induction-coil. The secondary windings *a*³ and *b*³ of the induction-coils are included in series in the telephone-circuit, being connected by conductors
80 *c* and *c'* with contact-points *c*² *c*³, against which the switch-hook *c*⁴ rests when the telephone is removed therefrom to close circuit
85 through the limbs *d* *d'* of the telephone line, which extends to the central station and terminates in the line-springs *d*² *d*³ of a spring-jack. The line-spring *d*² normally rests upon a contact *d*⁴, connected through an indicator
90 *d*⁵ and battery *e* to ground. At the subscriber's station is provided a contact *f*, connected to ground through a bell *f'*. The hook *c*⁴ normally rests upon contact *f* to close the circuit of the battery *e* through indicator *d*⁵. 95

When the subscriber removes his telephone from its hook, the hook *c*⁴ breaks contact with the contact *f*, thus opening the circuit of the battery *e* through indicator *d*⁵, whereby the signal for connection is conveyed to the
100 operator, who connects the line of the calling subscriber with the line of the called sub-

scriber by means of plugs $g g'$, inserted in the spring-jacks, as illustrated. In one of the strands of the cord-connectors are provided clearing-out indicators $h h'$, and between the
 5 strands is provided a bridge h^2 , containing a retardation-coil h^3 , from the center of which extends a conductor h^4 to the pole of the battery e .

The receiver i of subscriber A is provided
 10 in a bridge between the two conductors $c c'$. The local transmitter-circuit of subscriber A is connected to ground at a point b^4 and is connected at the point b^5 with conductors $c c'$. The apparatus and connections of sub-
 15 station B are similar to those of sub-station A and have been indicated by corresponding reference-letters. I have illustrated the receiver i of sub-station B as included in series with the secondaries of the induction-coils,
 20 instead of in parallel therewith, as shown in sub-station A. The point b^5 of the local transmitter-circuit at sub-station B is shown connected to ground, while the point b^4 is connected to the middle of a retardation-coil k ,
 25 connected in a bridge between the conductors $c c'$. I omit further description of the telephone system illustrated, as this forms no part of the present invention and has been fully described in the application above referred to.

It will be noted that current from battery e passes to the point b^5 of the local transmitter-circuit of sub-station A over the two limbs of the telephone-line in parallel, the current
 35 then passing in parallel through the two branches a and b of the local circuit to ground. As the subscriber at sub-station A talks into his transmitter, the resistance through the microphone a' is increased simultaneously
 40 with the decrease of resistance through the microphone b' . The current flowing through the branch a is thus decreased, due to the increase of resistance through the microphone a' , and, further, to the decrease of resistance
 45 through the branch b . The current through branch b is increased, due to the decrease of resistance through the microphone b' and the increase of resistance through the branch a . Changes of current-strength are thus pro-
 50 duced in the primaries $a^2 b^2$ of the induction-coils, which induce currents in the secondaries $a^3 b^3$, the secondaries being wound in such a direction that the voltages of the secondary windings will be added.

55 In Fig. 2 I have illustrated a form of trans-

mitter comprising two microphones operated by one diaphragm. Upon the supports l and m are provided carbon buttons l' and m' , the ends thereof being opposed. Between the
 60 opposed faces of the carbons is provided a pin n , carried upon a bracket n' , mounted upon the diaphragm o . As the diaphragm vibrates the contact between the pin n and the carbon buttons l' and m' is varied, the pin making
 65 more intimate contact with button m' and a simultaneously weakened contact with button l' , and vice versa. The contact-pin n and button l' may be included in one of the
 70 branches of the local transmitter-circuit, as the branch a , while the pin n and button m' may be included in the other branch b of the local circuit.

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

1. The combination with a local transmitter circuit comprising two parallel branches, of two induction coils having their primaries included one in each of the branches of said
 80 transmitter circuit and their secondaries in the telephone line, a microphone included in each of the branches of said transmitter circuit and means for simultaneously increasing the resistance through one of the microphones as the resistance through the other
 85 microphone is decreased, and a source of current connected with said telephone line adapted to direct current through said branches in parallel; substantially as described.

2. The combination with a local transmitter circuit comprising two parallel branches, of two induction coils having their primaries included one in each of the branches of said
 90 transmitter circuit and their secondaries included in series in the telephone line, a microphone included in each of the branches of said transmitter circuit, means for increasing the resistance through one of the microphones simultaneously with a decrease of re-
 95 sistance in the other microphone, and a source of electricity connected with said telephone line adapted to direct current through said branches in parallel; substantially as described.

In witness whereof I hereunto subscribe my
 105 name this 25th day of March, A. D. 1895.

WM. W. DEAN.

Witnesses:

EUGENE DEVINE,
 THOS. E. FLAHERTY.