2 Sheets—Sheet

A. E. DOLBEAR.

Apparatus for Transmitting Sound by Electricit

No. 239,742. **Patented April 5, 188**

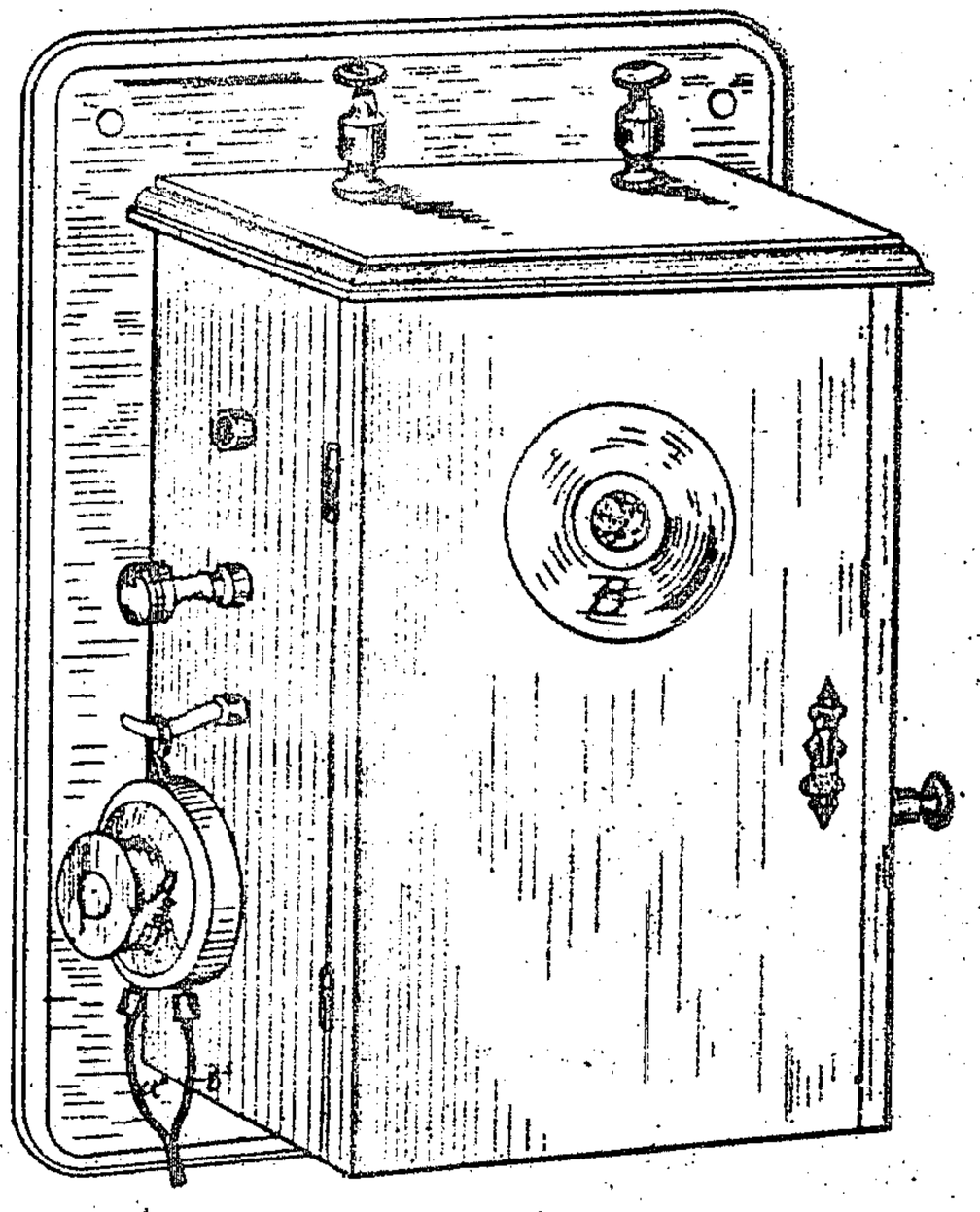

Fig. 1.

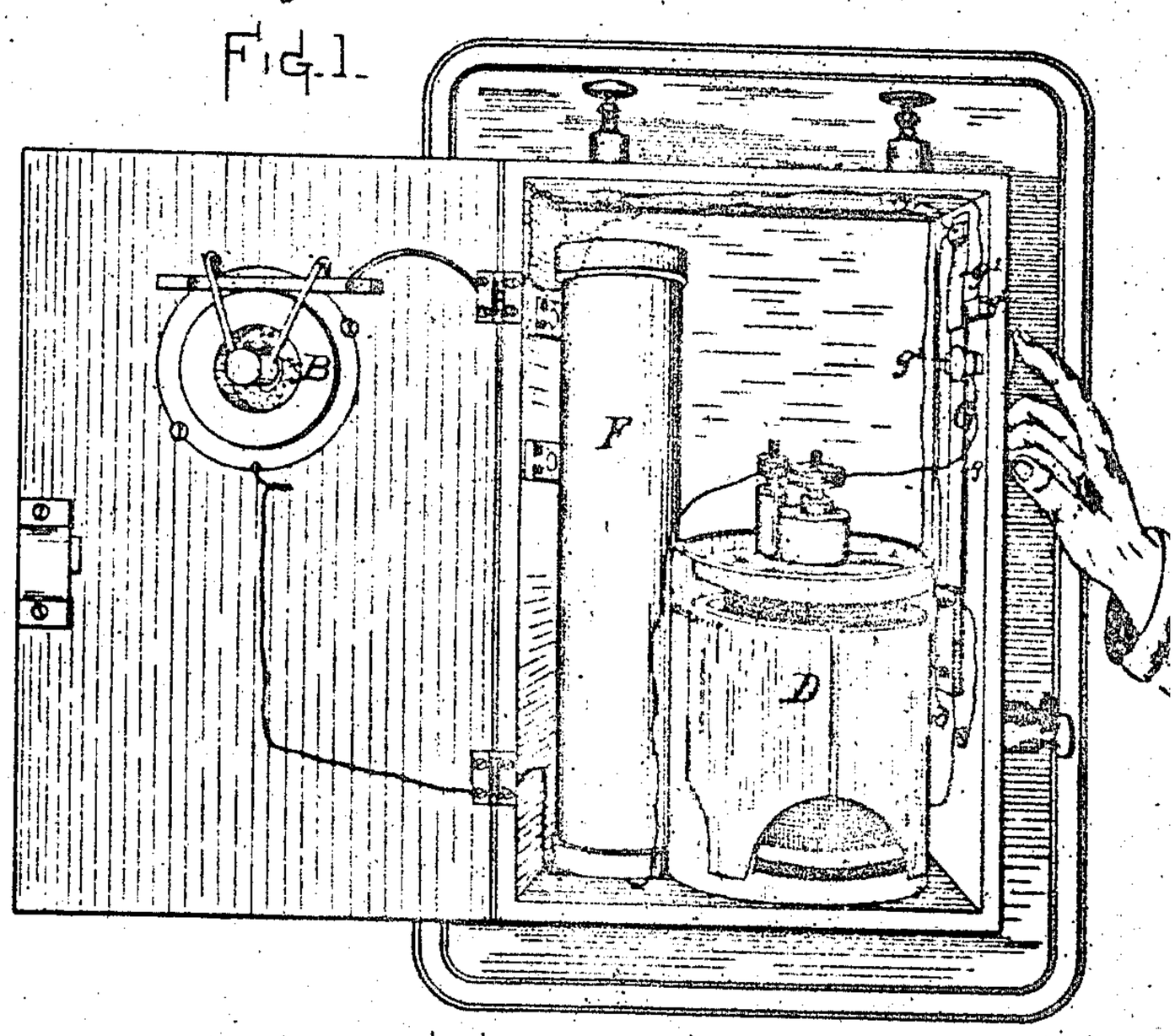

Fig. 2.

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(Model.) 2 Sheets—Sheet 2.

A. E. DOLBEAR.

Apparatus for Transmitting Sound by Electricity.

No. 239,742. **Patented April 5, 1881.**

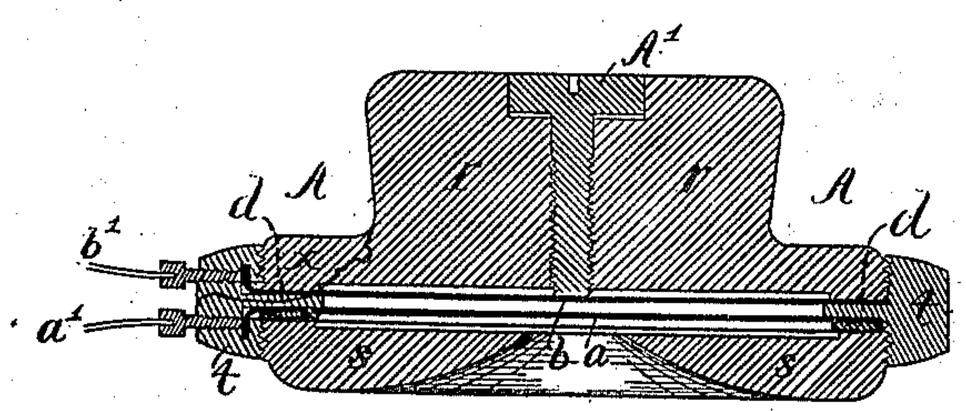

FIG. 3.

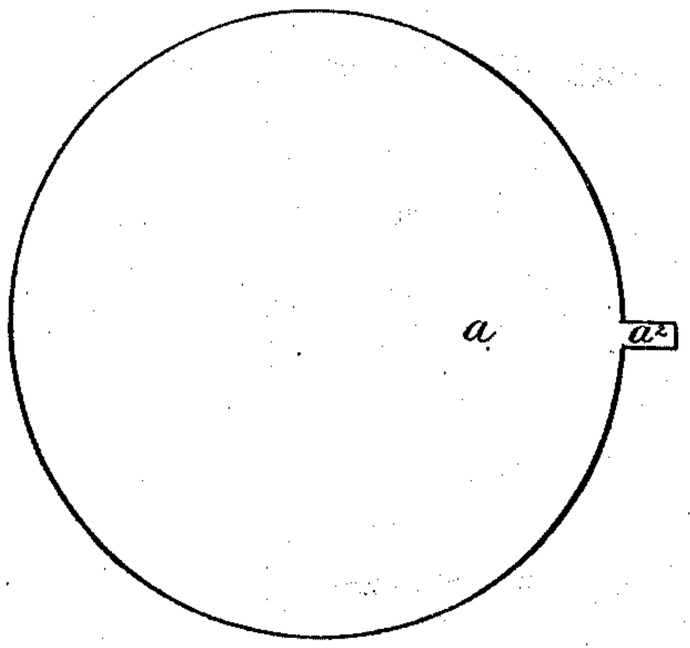

FIG. 4.

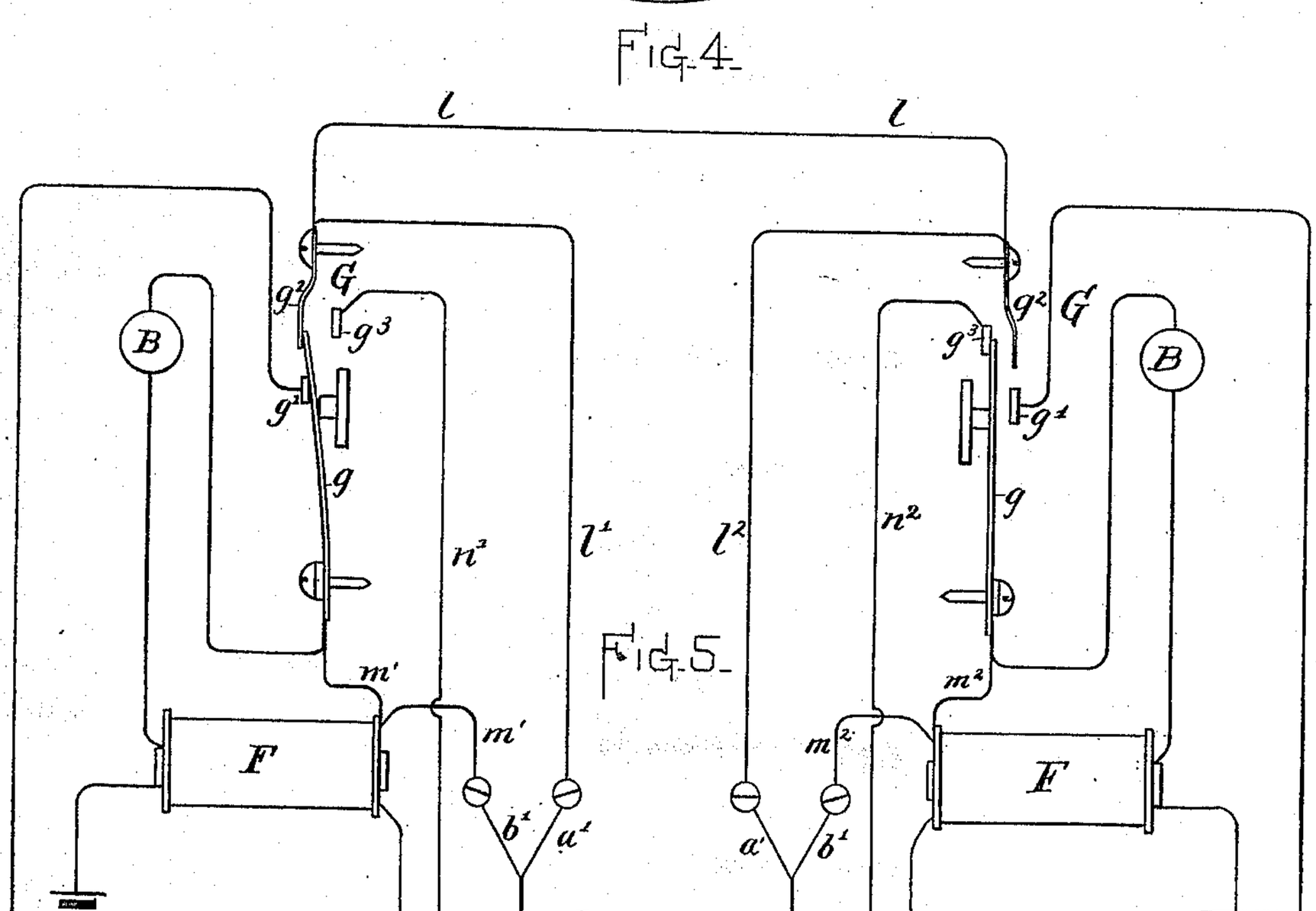

FIG. 5.

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UNITED STATES PATENT OFFICE.

AMOS E. DOLBEAR, OF SOMERVILLE, MASSACHUSETTS.

APPARATUS FOR TRANSMITTING SOUND BY ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 239,742, dated April 5, 1881.

Application filed October 11, 1880. (Model.)

To all whom it may concern:

Be it known that I, AMOS E. DOLBEAR, of Somerville, in the county of Middlesex and State of Massachusetts, have invented a new Apparatus for Transmitting Sound by Electricity, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, making a part hereof, in which—

Figures 1 and 2 are two views of the best form of apparatus for practicing my invention. Fig. 3 is a cross-section, enlarged, of the receiver shown in Fig. 1. Fig. 4 is a plan of one of the plates. Fig. 5 is a diagram illustrating the system.

My invention consists, mainly, in a new mode of transmitting articulate and other sounds by an open circuit.

It also consists in new apparatus for this purpose.

My receiver is based upon the well-known principle that one terminal of an open circuit will attract the other terminal when both are charged; and my invention consists, mainly, in the arrangement of the enlarged terminal of the secondary coil of an induction-coil so that it will be vibrated toward and from the other terminal by variations in the electric state of the coil, and in such a manner as to reproduce sound-vibrations of all qualities, including articulate speech, when the primary circuit of the induction-coil contains a suitable transmitter.

Another feature of my invention relates to the system of connecting two or more receivers and two or more transmitters for practical use; and it consists in the combination of two induction-coils, two receivers, and two transmitters in a novel manner, fully described below.

The best form of my receiver is that shown in elevation in Fig. 1, and in cross-section in Fig. 3.

In Fig. 3 the case of the receiver A is shown as made up of three pieces—a back piece, *r*, an ear-piece, *s*, and an annular connecting-piece, *t*, for connecting the pieces *r* and *s* together.

a b are thin elastic plates, preferably of iron, forming terminals of the secondary coil of an induction-coil. These plates are securely fastened about the edges and brought very near to each other, but not in contact, a thin annulus, *d*, lying between them. This is best effected by forming a thin flange, *d*, on the interior of the connecting-piece, *t*, and placing the terminals *a b* on opposite sides of this flange. The ear-piece *s* of the case holds the terminal *a* in place with the proper tension around the edge to insure mass vibrations of that terminal. The terminal *b* is held in place by the back piece, *r*, of the case. Each of the plates *a* and *b* is formed with a small tongue, a^2, (see Fig. 4,) with which the binding-screws are connected, as shown.

As the section-plane in Fig. 3 will pass through but one of the binding-screws, (that for the wire *a'*,) the receiver is shown broken away at *x*, in order to show the binding-screw for the wire *b'*. Both are shown in Fig. 1. One of the binding-screws connects with plate *a*, the other with plate *b*. By the use of the tongues an even pressure around the whole edge of the plate is possible.

The adjustment of the instrument is effected by the screw A'; and this screw, by contact upon the back plate, *b*, prevents any vibrations of that plate which interfere with the proper vibrations of the front plate, *a*.

My system requires electricity of a very high electro-motive force, and this is best obtained by means of a secondary coil with a high resistance, the best results having been obtained from four or five thousand ohms of No. 36 copper wire.

Transmitters such as are in common use will answer with my receiver; but the best form of transmitter is that shown in the drawings, (which is not here described, as it forms the subject of an application for a patent filed by me May 31, 1880.)

The main advantages of my new system over all others known to me are, that it is not appreciably affected by ordinary induced currents on the line, it has no magnet to deteriorate, the adjustment is more simple and is not affected by barometric and hygrometric variations, and it lacks the fine-wire helix of the common receiver, which is very liable to get out of repair. It is very efficient also on very long lines.

The best system for the practical use of my invention is illustrated in the diagram, Fig. 5, and the best form of apparatus is that shown in Figs. 1 and 2. In these figures, A repre-

sents the receivers, B the transmitters, D the batteries, F the induction-coils, and G switches.

The transmitter B and battery D are in the circuit with the primary coil of the induction-coil F, and this circuit is completed, when the transmitter is to be used, by throwing over the member *g* of switch G until it makes contact with the member *g'*, thereby completing the battery-circuit through the transmitter and primary coil. The electricity induced in the secondary coil affects the plates in the distant receiver by means of that branch of wire *m'* which extends from one end of the secondary coil to member *g* of switch G, members *g* and g^2 of switch G, the line-wire *l*, which is a continuation of member g^2 of switch G, wire l^2, which is a branch of line-wire *l*, receiver-wires *a' b'*, wire m^2, members *g* g^3 of switch G, wire n^2, to earth, thus cutting out the receiver at the sending-station (on the left of the diagram) and the secondary coil on the right of the diagram.

When the sending-station is at the right of the diagram, the switch G at the right will be arranged as is the switch G at the left, and the receiver at the left is electrified by means of wire *l'*, receiver-wires *a' b'*, (at the left of the diagram,) wire *m'*, members *g* g^3 of switch G, (at the left of the diagram,) wire *n'*, to earth.

The switch G is composed of two springs, *g* g^2, and two stops, *g'* g^3, arranged as shown, so that when spring *g* is brought in contact with stop *g'* it will also be in contact with spring g^2, and when spring *g* is in contact with stop g^3 it will be out of contact with both spring g^2 and stop *g'*. One end of the secondary coil on the left of the diagram is connected with spring *g* on the left of diagram by means of one branch of wire *m'*, and with receiver-wire *b'* on the left of diagram by means of the other branch of wire *m'*, and one end of the secondary coil on the right of the diagram is connected with spring *g* on the right of diagram by means of one branch of wire m^2, and with receiver-wire *b'* on the right of the diagram by means of the other branch of wire m^2.

I am aware of the apparatus mentioned as used by Dr. Wright in "Ferguson's Electricity," published by William and Robert Chambers, of London and Edinburgh, in 1867, pages 258 and 259, in which two sheets of paper silvered on one side were placed back to back and connected with the two ends of an induction-coil, the primary circuit of which contained a Reis transmitter; and I disclaim that apparatus. My receiver differs from it in that the sounds transmitted are reproduced by the mass vibrations of one of the terminals, while in the Wright receiving apparatus the sound produced was mainly, if not altogether, due to molecular motion, and not to mass vibrations. Moreover, Wright's sheets of silvered paper were so arranged that each would damp any mass vibrations of the other; and in his apparatus any slight mass vibrations, even if not wholly damped, would be necessarily so irregular as to be worthless as a means of reproducing sounds. The fact, also, that the mass vibrations of each sheet damped those of the other sheet would make all the mass vibrations worthless for this purpose.

I am also aware of English Patents No. 4,934 of 1877 and No. 2,396 of 1878, and disclaim all therein shown.

What I claim as my invention is—

1. The receiver above described, consisting of the plates *a b*, mounted in case *r s t*, and separated by the annulus *d*, in combination with induction-coil F, substantially as described.

2. In combination, two induction-coils, the primary of each containing a battery, D, and transmitter B, and the secondary circuits, each containing receiver A, by means of switches G, consisting of members *g g' g² g³*, whereby the receiver at the sending-station and coil at the receiving-station are switched out of the line, substantially as described.

AMOS E. DOLBEAR.

Witnesses:
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J. R. SNOW.