

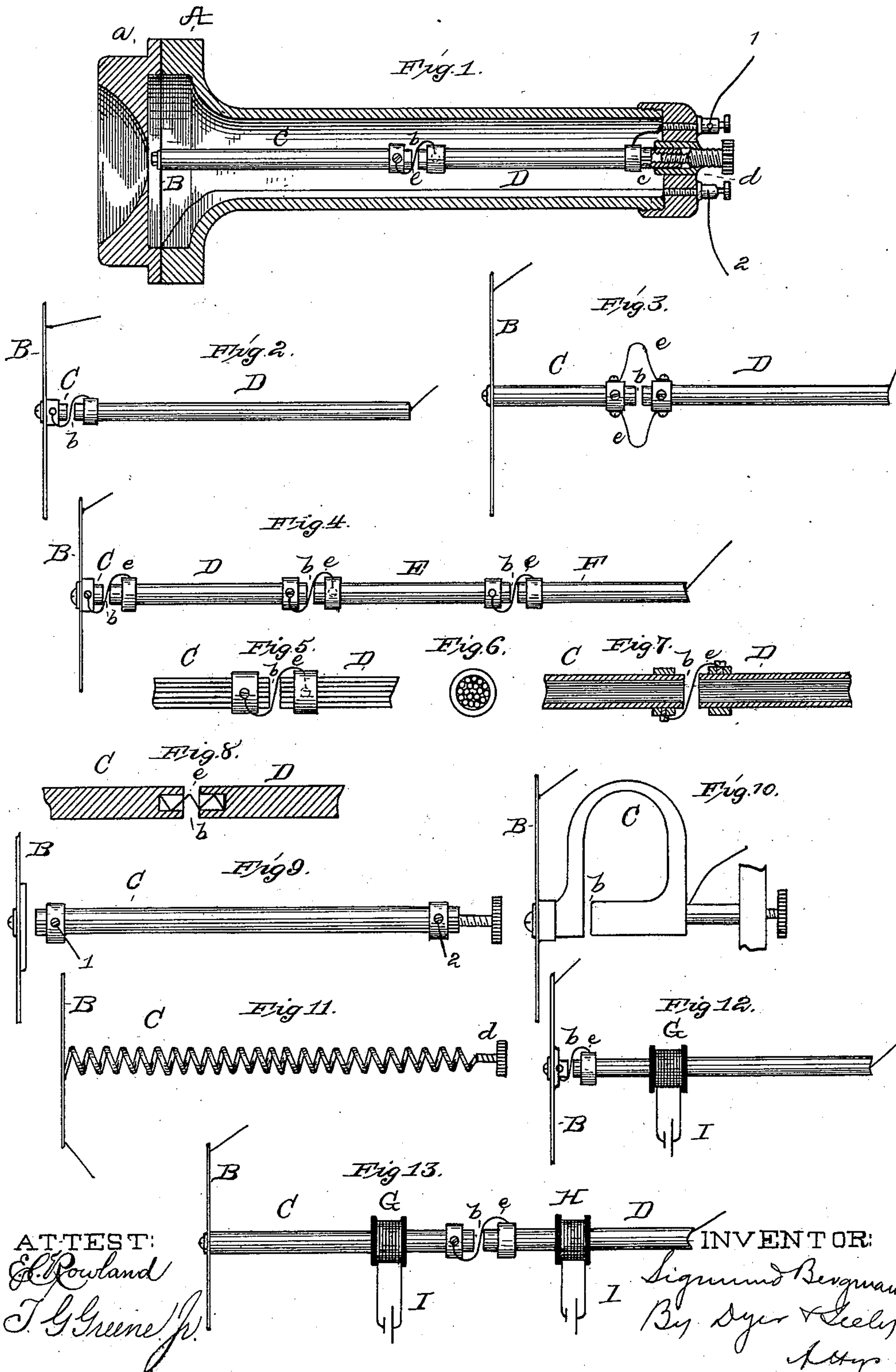
(Model.)

2 Sheets—Sheet 1.

S. BERGMANN.
TELEPHONE RECEIVER.

No. 337,232.

Patented Mar. 2, 1886.



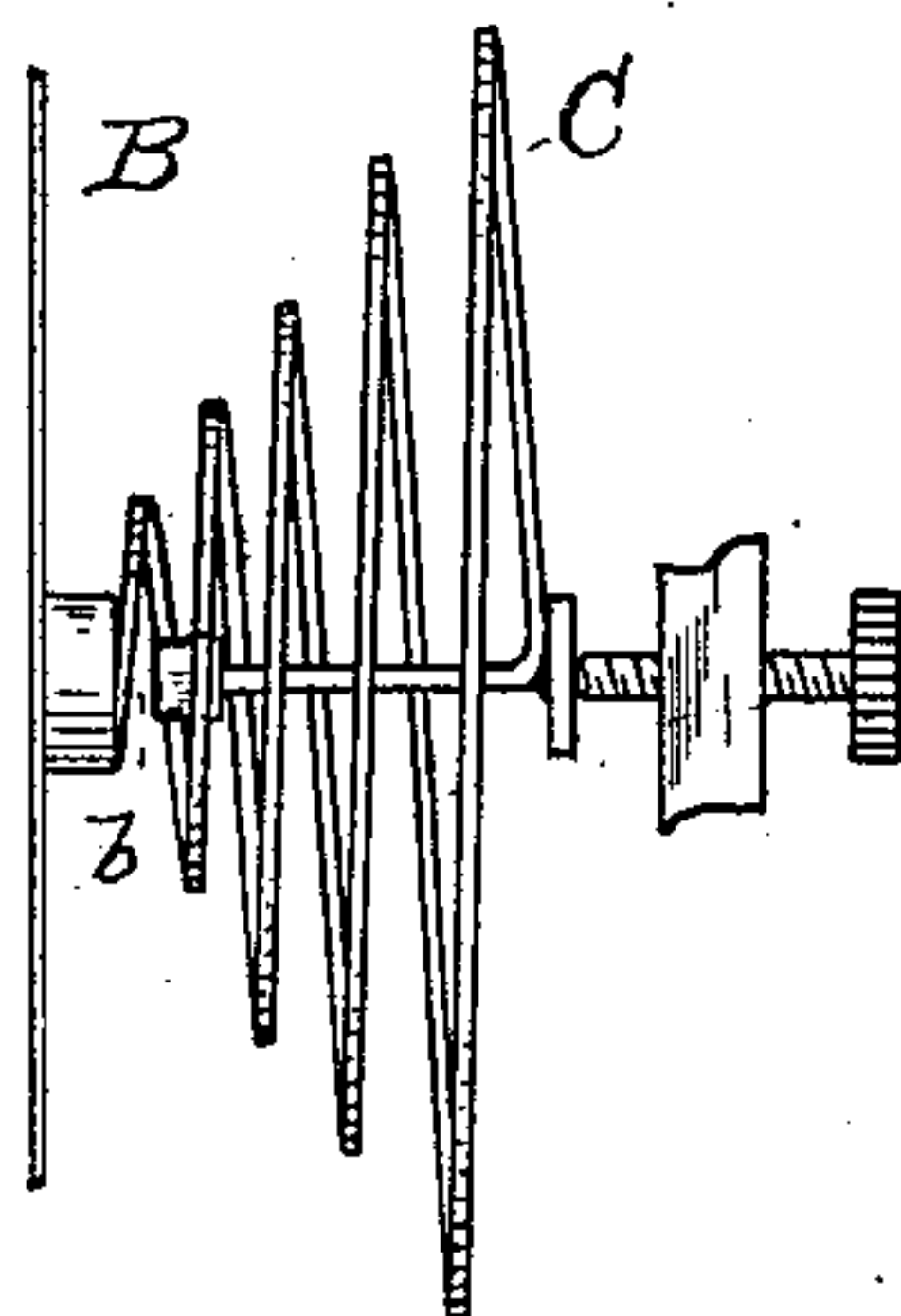
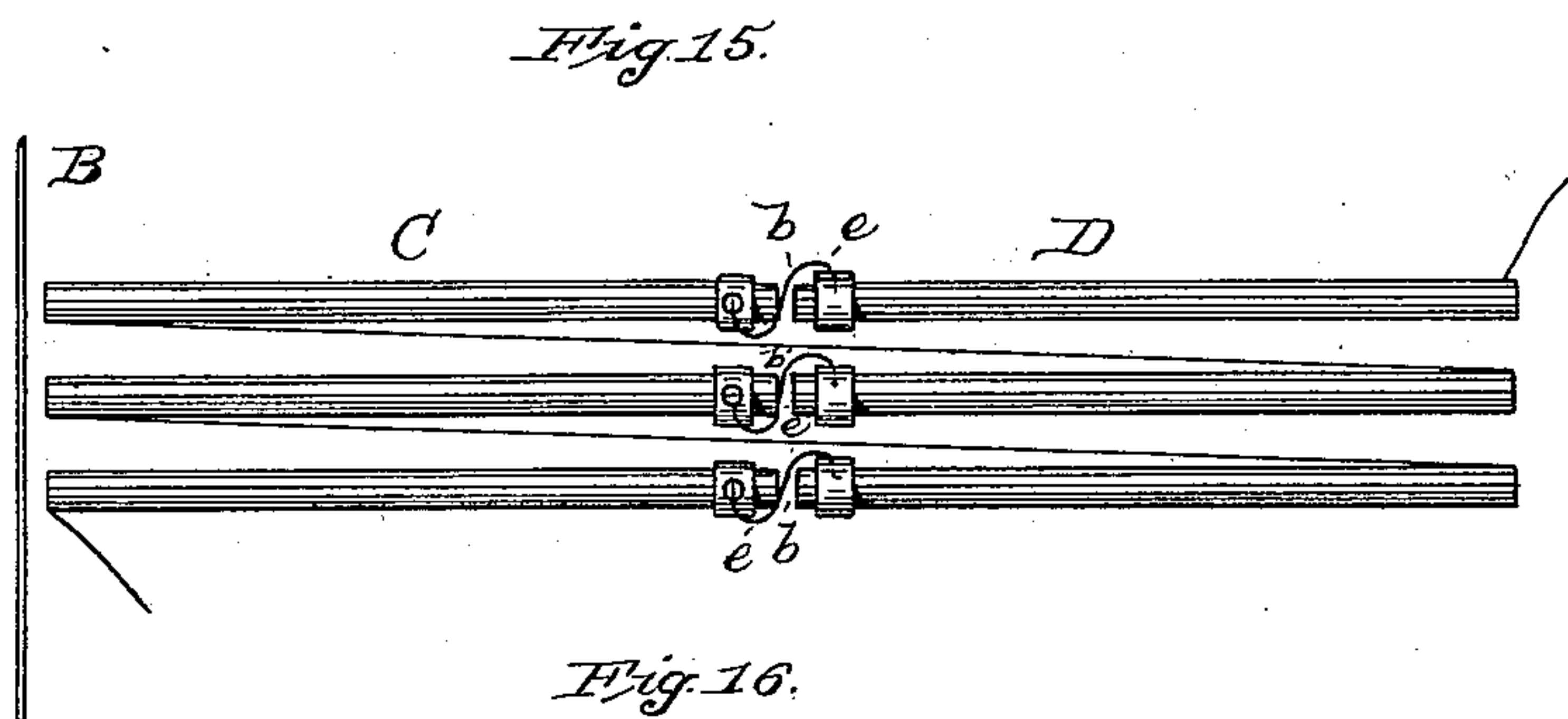
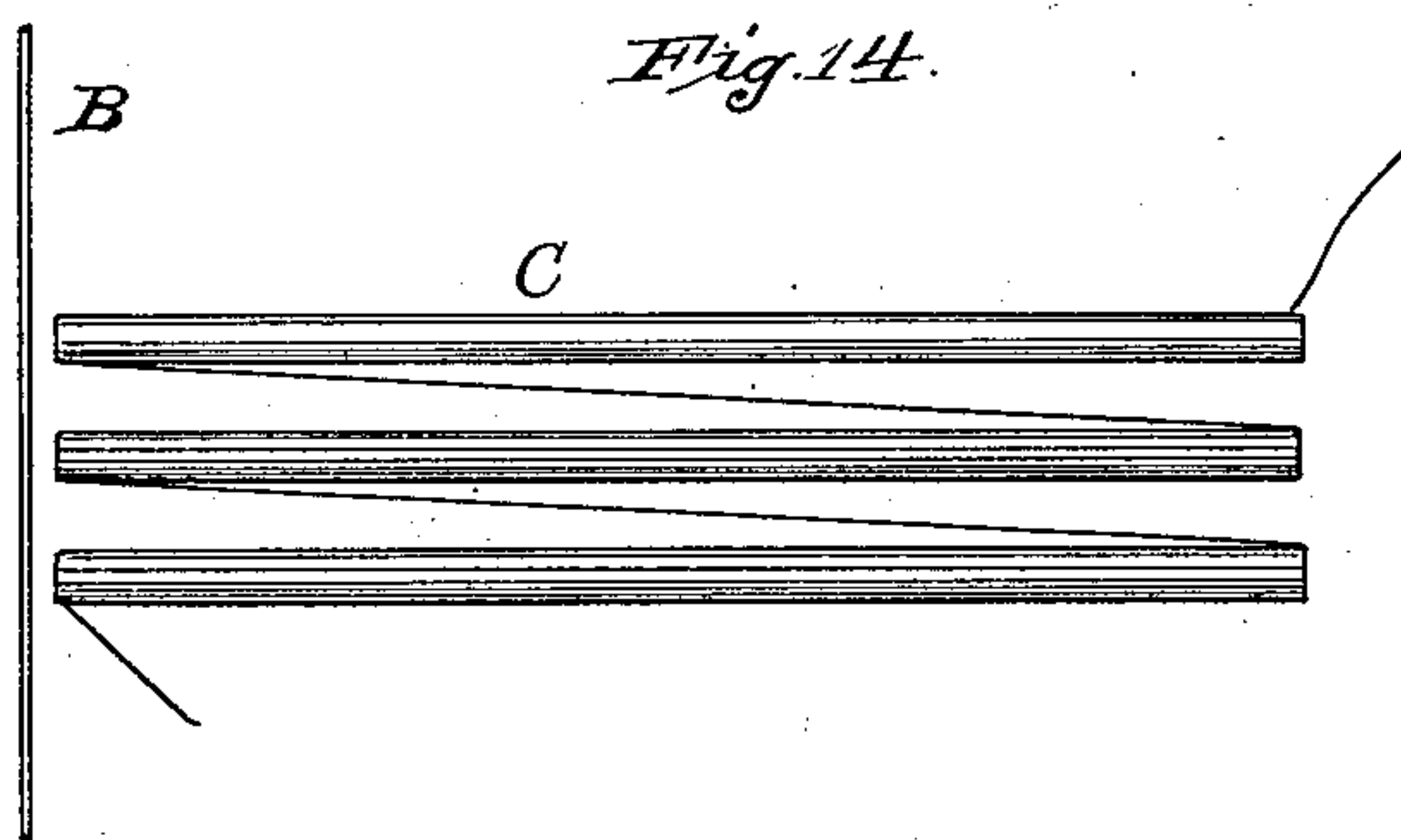
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ATTEST:
E. A. Rowland
J. G. Greene Jr.

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UNITED STATES PATENT OFFICE.

SIGMUND BERGMANN, OF NEW YORK, N. Y.

TELEPHONE-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 337,232, dated March 2, 1886.

Application filed December 31, 1884. Serial No. 151,619. (Model.)

To all whom it may concern:

Be it known that I, SIGMUND BERGMANN, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Telephone-Receivers, of which the following is a specification.

The object I have in view is to produce a telephone-receiver which will be simple in construction, effective in operation, and will maintain its adjustment in use.

The main feature of my invention consists in the employment of one or more magnets acting upon a diaphragm or other sound-producing body, and so arranged and connected that the current passes axially through them, an adjusting device being provided to vary or regulate the extent of the space through which the force is exerted. I have found that when this is done the vibrations of the diaphragm correspond with the variations in the axial current, and sound is produced in accordance with the vibrations at the transmitter, the action being due, in my opinion, to variations in magnetic intensity. I have obtained the best results by arranging two or more magnets in line, with their ends in close proximity, such ends being connected by suitable conductors of the current. The magnets are connected in circuit, the current passing through them from end to end, or from center to ends, or ends to center in both directions. The diaphragm-piston or other suitable sound-producing body may carry one of the magnets, or it may have a soft-iron armature attached to it, if it is of mica or other insulating material; or the diaphragm may itself be of soft iron and act as an armature or carry one of the magnets. A single magnet may be used, in which case the diaphragm can be arranged as an armature opposite the end of the magnet, or, if of insulating material, have an armature attached to it and arranged opposite the end of the magnet; or, if a construction is employed which permits of movement of the diaphragm by variations in the force of the magnet, such diaphragm may be connected directly to the magnet. An adjusting device will be employed, which may be a contrivance for moving the magnet to vary the distance at the attracting point or points.

The invention is illustrated in the accompanying drawings, in which Figure 1 is a sec-

tional view of a telephone-receiver embodying the invention; and Figs. 2 to 16, inclusive, views of parts of the telephone-receiver, showing modified forms of the instrument.

In Fig. 1, A is the case, having mouth-piece *a* and diaphragm B. CD are two magnetized steel bars. These bars are arranged in line, with their adjoining ends in close proximity, leaving a space, *b*, for mechanical movement, between them. One bar is attached to the diaphragm, and the other is supported by a sleeve, *c*, which is adjusted from the end of the case by a screw, *d*, so as to increase or decrease the attractive space *b*. The adjoining ends of the magnet-bars CD are connected by a conductor, *e*, suitably arranged to permit free movement longitudinally of the bars. The binding posts (or circuit-connections) 1 2 are connected, one with the outer end of bar D, through adjusting-sleeve *c*, and the other with the outer end of bar C, through the diaphragm. If the diaphragm is made of insulating material, the circuit-connection from 2 will run to its center, where the bar C is secured thereto. The current of the circuit flows from 1 through magnet-bar D, conductor *e*, magnet-bar C, and diaphragm to 2, or in the reverse direction. The effect is to vibrate the diaphragm and translate the telephone-current vibrations into articulate speech. The effect is modified by adjusting the screw *d* and varying space *b*.

In Fig. 2 the magnet C is shown as quite short. This short magnet may be a soft-iron armature, or be omitted if the diaphragm is of iron, and the current may still be conducted across space *b*.

In Fig. 3 the conductor *e*, which is shown in Fig. 1 as a spiral, is shown as composed of outwardly-bent pieces.

In Fig. 4 four magnets, C D E F, are shown. These may be mounted in a tube to keep them in line, or be otherwise suitably supported.

In Figs. 5 and 6 the magnet-bars CD are shown as of a number of steel wires bunched together, while in Fig. 7 such bars are shown as tubular.

In Fig. 8 the bars CD are shown as bored out at adjoining ends, and the conductor *e* rests within the bored ends.

In Fig. 9 one magnet-bar, C, is used, the

circuit-connections 1 2 being made with opposite ends. The diaphragm has an armature, which, however, is not necessary if the diaphragm is of iron. The current does not pass
5 to the diaphragm or the armature carried by it, which is a construction that may be used when more than one magnet are employed.

In Fig. 10 a horseshoe or U magnet, C, is employed. The diaphragm is supported upon
10 one pole, and the other pole is brought close to the first, leaving the space *b* for mechanical action. No conductor across space *b* is used, but the current passes around through the back of the magnet. The back of the magnet is
15 made thin and elastic, so that the adjustment provided for can be made.

In Fig. 11 the magnet C is a steel spring magnetized. One end of the spring is connected directly to the diaphragm. The other
20 end runs to an adjusting sleeve and screw, *d*. The current acts upon this spring-magnet similar to the bar-magnet; but the spring permitting mechanical movement can be attached directly to the diaphragm.

25 In Figs. 12 and 13 are shown spools G H, in circuit with local batteries I, to produce the magnetization if the bars are of soft iron, or to better maintain it if the bars are of steel.

In Fig. 14 a number of magnet-poles are
30 shown as presented to the diaphragm, each being the end of a single magnet. In Fig. 15 double magnets are shown. In either case the magnet-poles facing the diaphragm will preferably be arranged in a circle around the center of the diaphragm.

In Fig. 16 the magnet is a conical spring, with one end secured to the diaphragm and the other end carried through its center, so that the poles will be close together. This is
40 like Fig. 10, with the back of the magnet thrown into a conical spring.

Where two or more magnets are used, I find I get the best effects if opposite polarities are brought together, although the instrument
45 works when the same polarities are in proximity.

The conductors *e* may be springs which oppose the pressure of the adjusting-screw, and they may be made of steel and polarized, although this is not necessary.

I do not claim herein the method indicated by the description, such method being covered by an application for patent of even date herewith, and entitled "an improvement in tele-
50 phones."

What I claim is—

1. In a telephone-receiver, the combination, with a diaphragm or other sound-producing body, of one or more magnets, circuit-connections for bringing such magnet or magnets
60 axially into circuit, and an adjusting device varying the space through which the force is exerted, substantially as set forth.

2. In a telephone-receiver, the combination, with a diaphragm or other sound-producing
55 body, of two or more magnets arranged in line and having circuit-connections, whereby the current is passed through said magnets axially, substantially as set forth.

3. In a telephone-receiver, the combination, 70 with a diaphragm or other sound-producing body, of a magnet attached thereto, one or more other magnets arranged in line with the first magnet, a conductor or conductors connecting the magnets together, and circuit-connections bringing the magnets axially into cir-
75 cuit, substantially as set forth.

4. In a telephone-receiver, the combination, with a diaphragm or other sound-producing body, of a magnet secured thereto, one or
80 more other magnets arranged in line with the first magnet, circuit-connections bringing such magnets axially into circuit, and an adjusting device varying the space or spaces through which the magnetic force is exerted, substan-
85 tially as set forth.

This specification signed and witnessed this 11th day of December, 1884.

SIGMUND BERGMANN.

Witnesses:

WM. H. MEADOWCROFT,
THOS. G. GREENE, Jr.