

(No Model.)

S. D. FIELD.
TELEPHONE RECEIVER.

No. 560,403.

Patented May 19, 1896

Fig. 1.

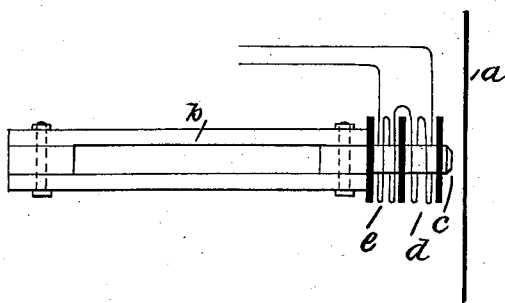
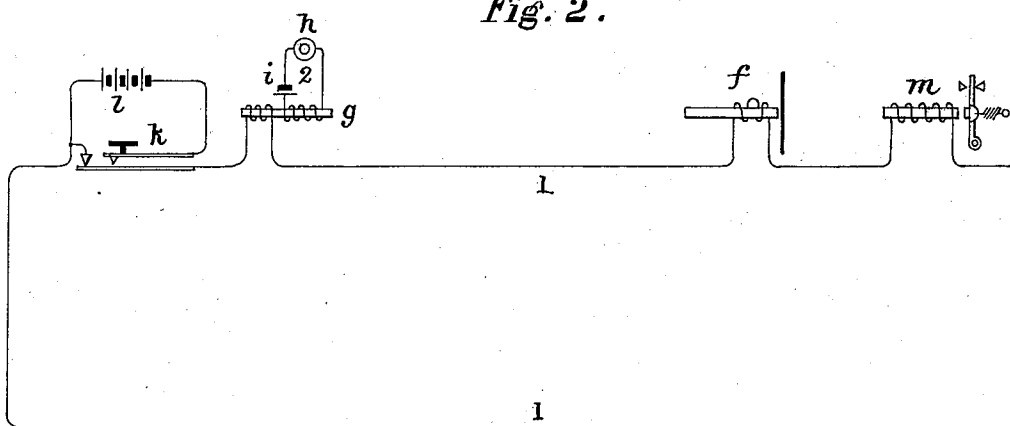


Fig. 2.



Attest.

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UNITED STATES PATENT OFFICE.

STEPHEN D. FIELD, OF STOCKBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE
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TELEPHONE-RECEIVER.

SPECIFICATION forming part of Letters Patent No. 560,403, dated May 19, 1896.

Application filed August 24, 1895. Serial No. 560,420. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN D. FIELD, residing at Stockbridge, in the county of Berkshire and State of Massachusetts, have invented certain Improvements in Telephone-
5 Receivers, of which the following is a specification.

My invention concerns receiving-telephones, and is a telephone adapted to respond
10 to and transform into acoustic vibrations undulatory currents of rapid period, as telephonic currents, but to remain inert when traversed by intermittent currents of slow period. It comprises, in combination with the
15 usual diaphragm and core of magnetic material, two equal reversely-acting windings or helices placed one behind the other upon the core. These helices may be connected serially in a circuit carrying both rapidly and slowly
20 changing currents or in any other suitable manner which insures equal magnetic effects in the two helices.

I have found that slowly intermitting or alternating currents—such, for example, as tele-
25 graphic signaling-currents—may be transmitted through this instrument without producing any detrimental audible sound in it, but that when a telephonic current traverses its coils the diaphragm is affected in the usual
30 way, being thrown into vibration in consonance with the undulations of the telephonic current.

In the operation of my invention the position of the coils is of great consequence. The
35 coil placed on the extreme polar end of the magnet occupies a position of vantage over the coil which is placed behind it. Hence the hinder coil acts upon the pole-piece at a point which for rapidly-changing or vibratory currents is far inferior to the polar end. Consequently for such currents the hinder coil
40 acts slowly, while the front coil acts quickly and independently, producing the desired magnetic changes at the extreme end of the magnet without regard to what the coil behind it may be doing with some other portion of the magnetic core, and the diaphragm, being actuated by the changes in the end only
45 of the magnet, reproduces the sound-vibrations represented by the action of the front coil only on the magnet-pole; but the current

changes occurring in ordinary telegraphy succeed one another so slowly that for them the two coils are practically in one and the same place, each change having time to exercise its
55 maximum effect before the next is made, and, being equal but opposite, the same current passing through both acts in each to neutralize the effect of the other upon the magnet pole-piece surrounded by both. 60

The present invention therefore is based upon and is designed to utilize the discovery that when two similar induction-coils are joined up serially but oppositely in the same
65 electric circuit, said coils being placed upon the core of a magnet in different relative positions with respect to the poles thereof, the coils will, when rapidly-changing currents are traversing the circuit including them, affect
70 unequally the magnetism of the poles of said core, the influence of that coil which occupies the more advantageous position with respect to one of the poles being far greater than that of the other coil upon such pole.

This device is shown in the drawings herewith, of which— 75

Figure 1 presents the construction of the telephone, and Fig. 2 illustrates its use in a circuit carrying both telegraphic and tele-
80 phonic currents.

In the figures the elements only of the telephone are represented, the practical details of construction of such instruments being well known.

The telephone comprises the usual diaphragm *a*, permanent magnet *b*, terminating
85 in a core or pole-piece *c*, of soft iron, and magnetizing-coils surrounding the soft-iron core. Of these windings or helices there are two, designated *d* and *e*, helix *d* being nearer the
90 polar extremity of core *c*. The helices are wound upon the core in opposite directions and serially connected in a circuit, so that their resultant magnetic effect when traversed by constant currents shall be *nil*. 95

In the circuit shown in Fig. 2 the receiving-telephone *f* of this invention has its two helices included in a circuit 1, which includes also the secondary helix of an induction-coil
100 *g*, whose primary helix is in a local circuit 2 with a transmitting-telephone *h* and a source of current *i*, a continuity telegraph-key *k*,

adapted to loop a battery *l* into the circuit, and a telegraph-sounder *m*.

It will be apparent that the key *k* may be manipulated to produce in the circuit telegraphic signaling-currents to which sounder *m* will respond, or that articulate sounds impinging upon the transmitting-telephone *h* will produce in the local circuit 2 an undulatory current which will be repeated, through the medium of induction-coil *g*, into the circuit 1.

I find in practice that the receiving-telephone *f* is not affected in any degree by the slowly periodic currents used in telegraphic signaling in such a circuit, remaining perfectly inert, but that it responds as usual to telephonic currents produced by means of transmitting-telephone *h*, and with an efficiency nearly equal to that of the ordinary receiving-telephone.

The normal equality of the two coils may, of course, be insured by winding both on similar spools with equal lengths of the same size of insulated copper wire.

I claim as my invention—

1. The combination in a telephone, of a diaphragm of magnetic material, a core of magnetic material presented thereto, and two equal reversely-acting windings on the core, one of said windings being nearer the polar extremity of the core than the other, and both being serially connected in the telephone-circuit as described.

2. A telephone having in combination with its diaphragm, permanent magnet, and pole-piece of soft iron, two equal, reversely-acting helices, serially connected in a circuit, one of said helices being nearer the polar extremity of the core than the other as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 20th day of August, 1895.

STEPHEN D. FIELD.

Witnesses:

WILLIAM W. FRENCH,
JOHN CALLENDER.