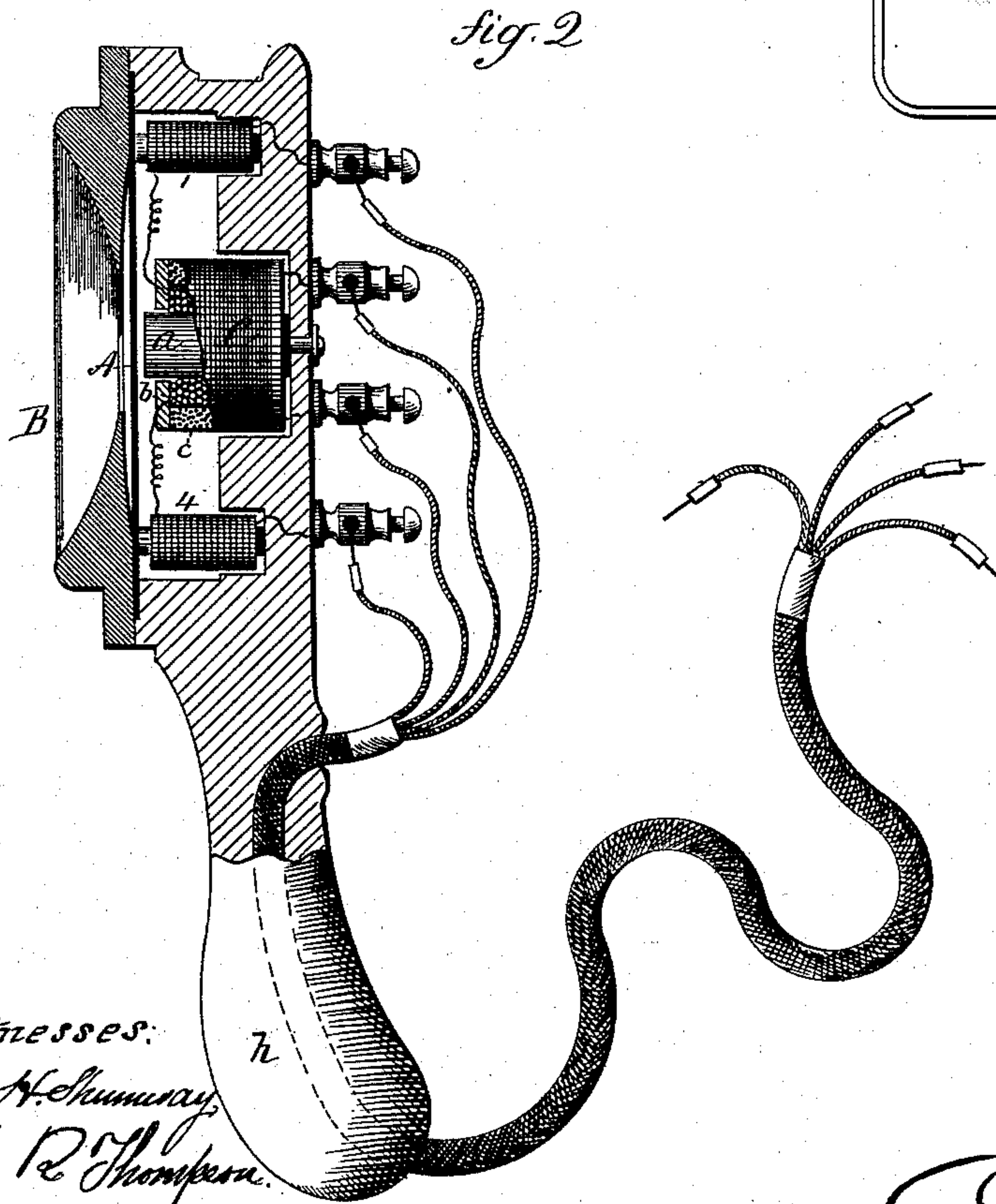
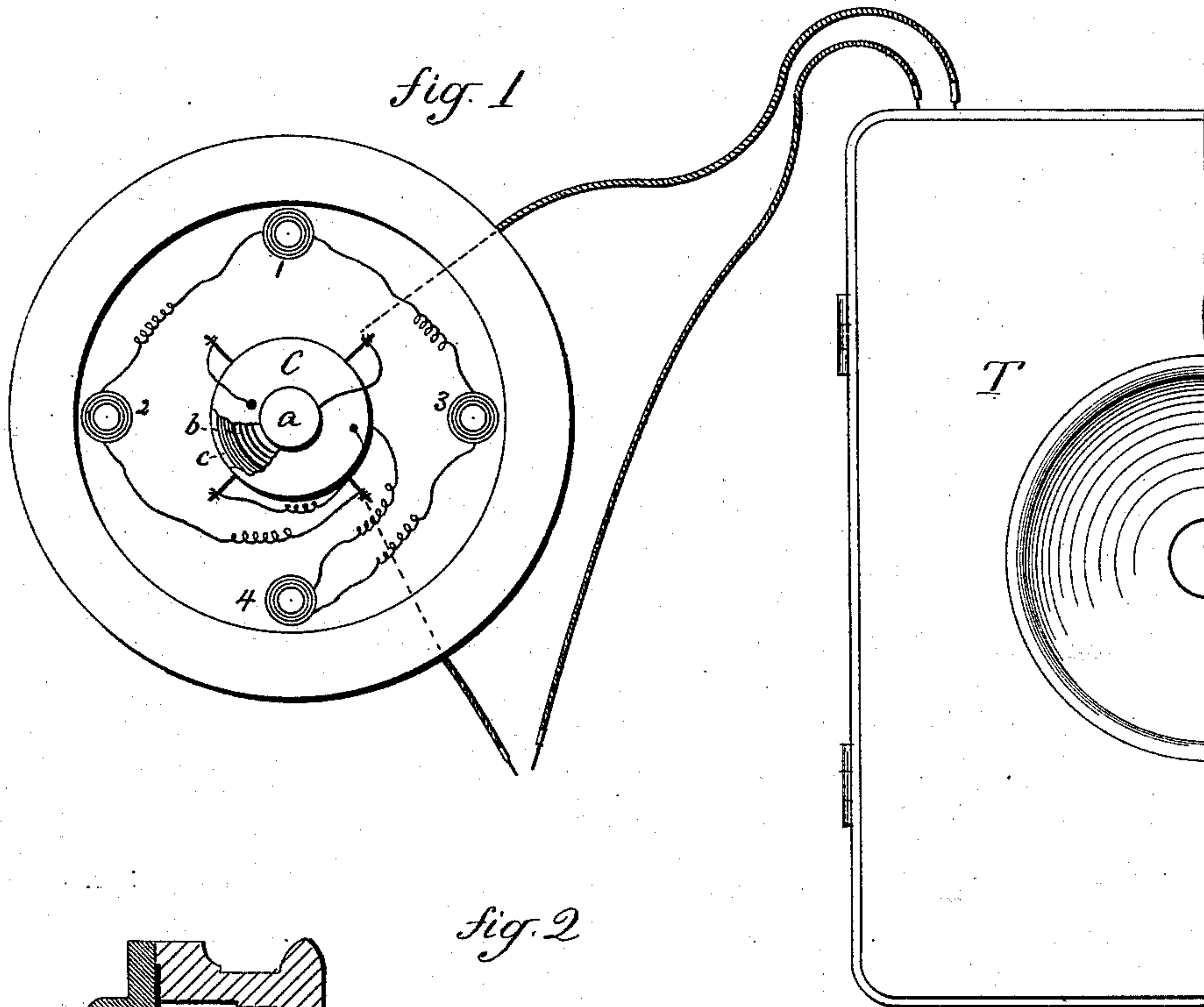


(Model.)

C. E. BUELL.  
Telephones.

No. 232,675.

Patented Sept. 28, 1880.



Witnesses:

J. H. Hummer,  
A. R. Thompson.

Chas. E. Buell,  
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Wm. E. Earle.



# UNITED STATES PATENT OFFICE.

CHARLES E. BUELL, OF NEW HAVEN, CONNECTICUT.

## TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 232,675, dated September 28, 1880.

Application filed July 2, 1880. (Model.)

*To all whom it may concern:*

Be it known that I, CHARLES E. BUELL, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Telephones; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a plan view of the interior of the telephone and transmitter in connection; Fig. 2, a sectional view of the telephone.

This invention relates to telephones which are adapted to the reproduction of sonorous waves or vibrations by means of electrical impulses traversing a conducting-circuit.

The object of my invention is to increase the sensitiveness of receiving-telephones; and a further object of my invention is to construct and arrange receiving-telephones in such a manner as to afford their double use as the induction apparatus of a battery-transmitter; and my invention consists in the construction hereinafter described, and particularly recited in the claims.

Although the accompanying drawings represent my improvements as grouped in one instrument, it is obvious that parts may be used in telephones which differ in the detail of their construction from the one shown.

A is the diaphragm in contact with the end of the core of each of the electro-magnets 1 2 3 4, the contact being at or near the edge of the diaphragm.

The actuating-magnet of the telephone is in the form of an induction-coil, and is an electro-magnet. The soft-iron core *a* is contained within a helix, *b*, of low resistance, which, when charged as the primary coil of the inductorium, acts to magnetize the core *a*. The electro-magnet thus formed is surrounded by a helix, *C*, of fine insulated wire of suitable resistance, and this inclosing-helix serves as the inducing-helix of a receiving-telephone and as the secondary helix of an induction-coil of a variable transmitter.

The primary helix *b* forms part of a local circuit, in which is included the transmitter *T* of any of the ordinary carbon or other trans-

mitters depending for their operation upon variable resistance. The electro-magnets 1 2 3 4 are also included in the same local circuit, and connected in relation to the primary coil *b*, so as to cause the cores of the several electro-magnets at the edge of the diaphragm *A* to be of an opposite magnetic polarity from that of the core *a* of the inducing-magnet *C*.

The secondary coil *c* forms part of the main circuit. These parts are arranged in a case which is provided with a mouth-piece, *B*, and a handle, *h*, through which the flexible conductors for main and local circuits may pass to connect with their respective helices.

The contact of the light iron diaphragm with the mass of iron of the cores 1 2 3 4 contributes to its inductive mass without adding to its weight or impeding its vibrations, and when these cores are charged in an opposite polarity to the core of the inducing-magnet the diaphragm is rendered responsive to the slightest inductive effect exerted through the varying magnetic condition of the core *a* of the inductorium *C*.

The employment of electro-magnets, as placed at the outer edge of a telephone-armature wholly separated from the central inducing-magnet and included in the same normally-closed electric circuit with the primary helices of the inducing-magnet, and producing opposite magnetic polarity, as shown, results in the following-named advantages: Shortened magnetic cores can be used, which will respond more rapidly to variations of magnetic induction, and by being charged by an opposite polarity in the same normally-closed circuit with the inducing-magnet they serve to hasten the dissipation of the retained magnetism, which is present in the inducing-magnet when its closed circuit's tension is varied, a dissipation of retained magnetism, which otherwise is prolonged in its cessation and an obstacle to distinctness of articulation, and the employment of an induction apparatus as the actuating-magnet of a receiving-telephone dispenses with the inducing-coil in the combination heretofore used with variable transmitters employing local batteries, and with advantageous results.

I claim—

1. The combination, with the armature of a

telephone which responds to variations of magnetic induction, of an initial inducing-magnet, and one or more supplemental magnets arranged in contact with, or in inductive proximity to, the outer edge of the armature and wholly separated from the initial inducing-magnet, and exerting an opposite polar effect therefrom upon the armature.

2. The combination, with an inducing electro-  
10 magnet of a telephone, of one or more electro-

magnets included in the same normally-closed electric circuit therewith, and arranged to produce secondary pulsations in an opposite direction thereto, when the tension of the including circuit is varied, and with means for varying the circuit's tension, as shown.

CHARLES E. BUELL.

Witnesses:

JOHN E. EARLE,  
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