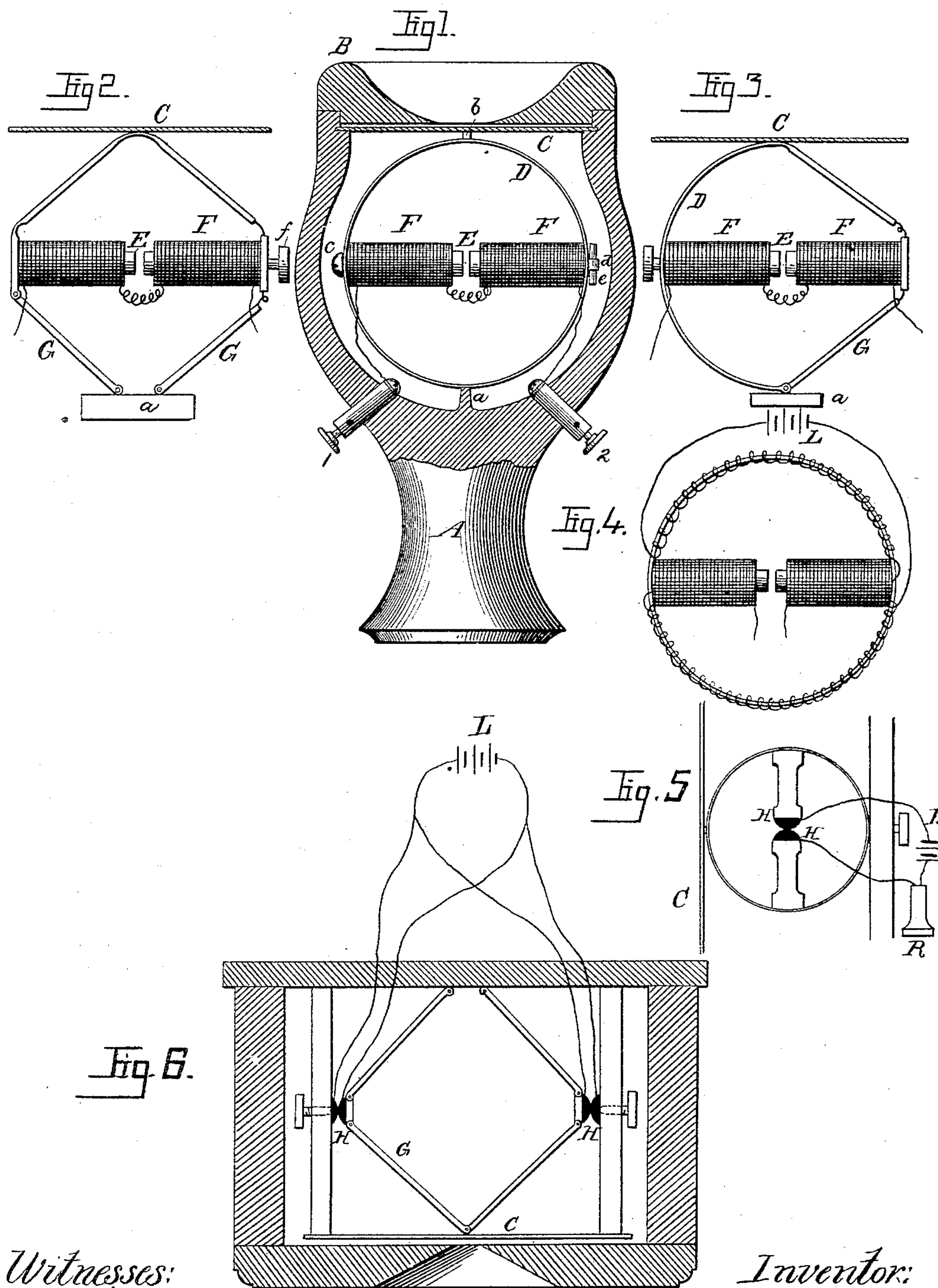


(No Model.)

H. E. WAITE.  
TELEPHONE.

No. 327,625

Patented Oct. 6, 1885



Witnesses:  
John Hinkel  
J. E. Farnsworth.

Inventor:  
Henry E. Waite



# UNITED STATES PATENT OFFICE.

HENRY E. WAITE, OF NEW YORK, N. Y., ASSIGNOR TO CHARLES F. LIVERMORE, TRUSTEE, OF SAME PLACE.

## TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 327,625, dated October 6, 1885.

Application filed April 25, 1884. Serial No. 129,269. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY E. WAITE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telephones, of which the following is a specification.

My invention relates to telephones, and has for its object to improve the construction of such instruments; and it consists in the arrangements and combinations of devices, as more particularly pointed out hereinafter.

Referring to the accompanying drawings, Figure 1 is a view of one form of my improved instrument, partly in section. Figs. 2 and 3 are views representing my invention as applied in various forms. Fig. 4 shows the springs in the form of an electro-magnet. Figs. 5 and 6 show my improvements in the form of a microphone.

Referring more particularly to Fig. 1 of the drawings, in any suitable case, A, is fixed a mouth-piece, B, having a diaphragm, C, of any suitable material, magnetic or non-magnetic, supported in the usual manner. A ring or hoop, D, of some elastic material, preferably magnetic, is supported between the lug or projection *a* on the case, and a bearing, *b*, on the diaphragm.

On opposite sides of the ring are secured inwardly-projecting arms or cores E E, surrounded by the helices or coils F F, the terminals of which are connected to binding-posts 1 and 2. The arms or cores are shown as being attached by a screw, *c*, passing through the hoop or ring and entering the end of the arm, and by a head, *d*, formed on the end of one of the arms, and having a pin or bolt, *e*, passing through the head. Any other suitable means may be used for securing the arms to the hoop, those shown, however, being simple, cheap, and effective.

The hoop or ring and its arms may be either a permanent magnet or an electro-magnet, and the coils may be wound in any desired direction.

The operation of the instrument is apparent. Any vibrations in the diaphragm will operate upon the hoop or ring to flatten or elongate it, and thereby bring the ends of the projecting arms, which form the poles of the magnets, nearer to or farther from each other, thereby

causing variations in the current in the helices or coils surrounding them. On the other hand, when used as a receiver, which is the preferred manner of using the form shown in Fig. 1, the variations in the current passing through the helices F F vary the magnetic condition of the poles E E, causing them to attract or repel each other, as the case may be, with varying force, and the hoop or ring is thereby elongated or flattened, causing the diaphragm to move in accordance therewith. By this construction it will be seen that a very slight variation in the current will be felt and distinguished in the diaphragm, as the movement of the poles of the projecting magnetic arms is magnified by means of the springs of the hoop or ring, one end or side of which is fixed, as shown, so that the elongation or contraction of the hoop at the sides causes the point connected to the diaphragm to move twice as much as either of the sides.

The spring or hoop may be made of very flexible and elastic material, so as to be easily affected by very slight changes in the power of the magnets. The hoop need not be in the form of a perfect ring, as it is evident other forms would embody my invention; but I have found the ring shape to be practicable and successful.

Various forms of embodying my invention are shown, which are desirable in some instances, and which do not depart from the spirit thereof. In Fig. 2, instead of the elastic hoop or ring, a sort of toggle-lever arrangement is used, the cores E E, carrying the helices, being supported and connected to the diaphragm C and standard or plate *a* by means of rigid arms G, connected by hinges or springs to the cores and supports. An adjusting-screw, *f*, is shown in this figure for varying the initial relation of the cores with reference to each other.

Fig. 3 shows a combination of the hoop or ring and the toggle-lever, and requires no special description.

In Fig. 4 the hoop or ring is shown as having a helix wound entirely around it and the projecting cores.

In Fig. 5 the ring or hoop is provided with inwardly-projecting arms, carrying upon their ends blocks of carbon or other suitable electrodes, H H, which are in contact with each



other, and this contact is varied by the changes in the form or contour of the hoop produced by the vibrations of the diaphragm C, and the current from the battery L is varied by the change of resistance at the electrodes, and affects the receiver R in said line in a well-known manner.

Fig. 6 shows the toggle-levers applied to a battery-transmitter having multiple contacts, in which the diaphragm C operates to vary the contact between the electrodes H H, which may be connected up in multiple or any other series or relation as desired.

Other modifications and arrangements will suggest themselves which embody my invention, the gist of which consists in connecting with the diaphragm a hoop, ring, or toggle mechanism carrying projecting arms, having means for varying the currents flowing through the helices or electrodes in the manner heretofore set forth.

I am aware that it is not broadly new to connect a diaphragm of a telephone to a hoop, which hoop is affected by a magnet or magnets in the line-circuit, and make no claim to such construction.

What I claim is—

1. The combination, in a telephone, of a case, a diaphragm, a yielding support, substantially as described, connected to the diaphragm and case, projections upon the support extending

therefrom at opposite sides parallel with the diaphragm, and current-varying devices carried upon said projections for controlling the current going to line, substantially as described.

2. A telephone embodying in its construction a case, a diaphragm, a yielding support extending from the case to diaphragm, substantially as described, projections upon said support parallel to the diaphragm, carrying electrodes, and adapted to vary the condition of the current in the circuit passing through the electrodes, substantially as described.

3. The combination, in a telephone, of a case, a diaphragm, toggle-levers connecting the diaphragm and case, and means connected with the levers for controlling the current on the line, substantially as described.

4. The combination, in a telephone, of a case, a diaphragm, toggle-levers connecting the diaphragm and case, and electrodes connected to the levers and adapted to vary the current in the line passing through said electrodes, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY E. WAITE.

Witnesses:

WM. H. WOODHULL,  
C. SPARMAN.