

(No Model.)

F. BLAKE.  
SPEAKING TELEPHONE.

No. 250,126.

Patented Nov. 29, 1881.

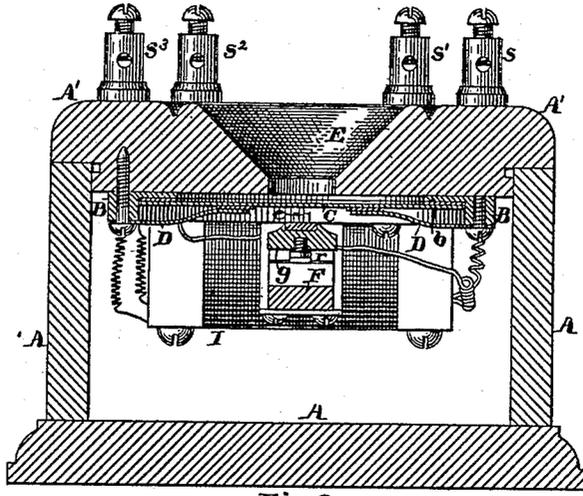


Fig. 3.

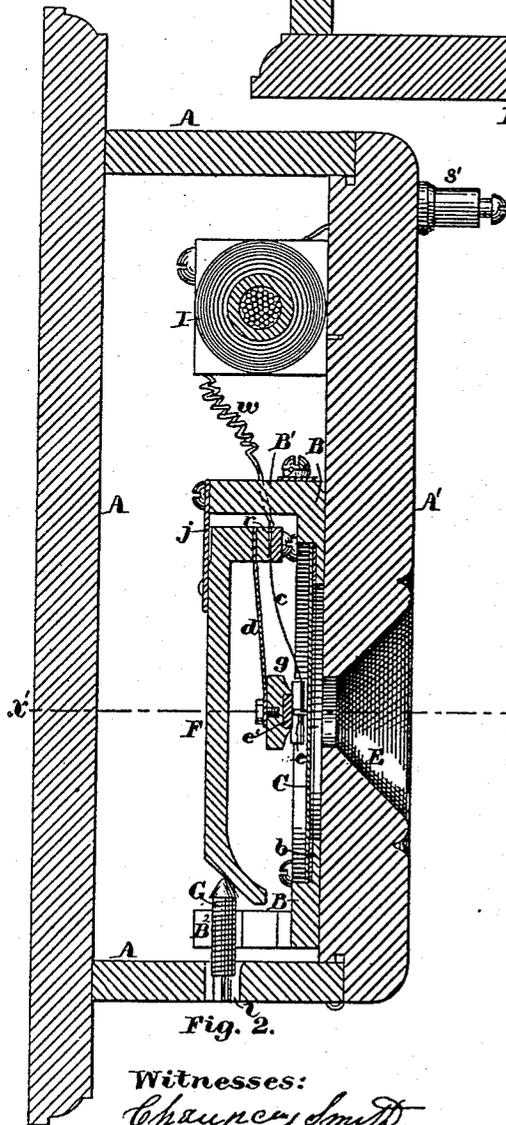


Fig. 2.

Witnesses:  
Chauncey Smith  
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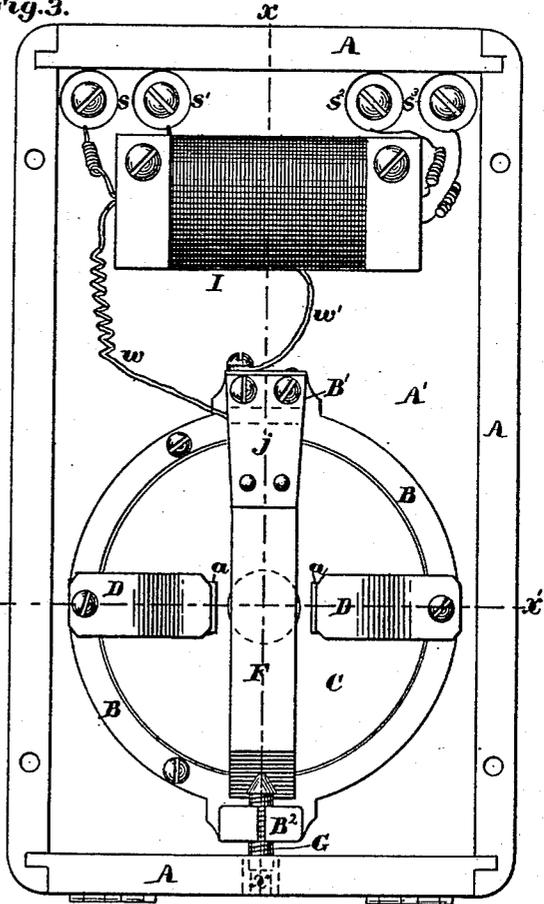


Fig. 1.

Inventor:  
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# UNITED STATES PATENT OFFICE.

FRANCIS BLAKE, OF WESTON, MASSACHUSETTS.

## SPEAKING-TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 250,126, dated November 29, 1881.

Application filed September 15, 1881. (No model.) Patented in England January 20, 1879, in Canada May 28, 1879, in Italy May 20, 1880, in New South Wales July 20, 1880, in Cape of Good Hope August 30, 1880, in Natal September 6, 1880, in Spain November 5, 1880, in Portugal November 10, 1880, and in British Guiana March 23, 1881.

To all whom it may concern:

Be it known that I, FRANCIS BLAKE, of Weston, in the State of Massachusetts, have invented an Improvement in Speaking-Telephones, of which the following is a specification.

The invention has reference to the manner of holding the diaphragm; and it consists of the combination, with the diaphragm, of a ring-seat upon one side thereof adapted to furnish a support for its edges, and one or more flat springs upon the other side, their free ends pressing upon the diaphragm near its center and holding it against said seat.

In my construction the diaphragm rests on the ring-seat and is there held by said springs without being rigidly clamped, and accordingly, besides possessing the advantages of a disk supported at its edges, is free to expand and contract without distorting strains under changes of temperature or accidental warping of the supports, while the said springs, by their length, their positions, or manner of attachment, and the elasticity thereby obtained, besides holding the diaphragm against its ring-seat, dampen prolonged and false vibrations without unduly interfering with the two vibrations, which are impressed by the sound-waves and are to operate the instrument; and as these devices which are employed for this purpose are not the same as those which give the normal pressure between the electrodes, each device can receive the strain most desirable for its special purpose without interfering with the delicacy or amount of pressure suitable for the other. This latter feature is very advantageous in an instrument in which, as in the instrument hereinafter described, the contact between the electrodes is small in area and delicate in pressure.

The manner in which I construct instruments embracing my invention is shown in the drawings hereto annexed, in which—

A represents a box or casing, in which the mechanism of a telephone embracing my improvements is inclosed. This mechanism is for convenience attached to the cover or top of the box A'.

Figure 1 is a plan of the mechanism attached

to the top or cover of the box. Fig. 2 is a section of the box and mechanism, taken through the middle on the dotted line *xx* of Fig. 1, and showing one of the screw-cups for making connections with the exterior circuits. Fig. 3 is a cross-section of the box and mechanism on the dotted line *x' x'* of Figs. 1 and 2, and showing the screw-cups for making connections with the exterior circuits.

B represents a metal ring or frame for holding the mechanism of the telephone. It is screwed to the cover A', as shown, and has two ears, B' B<sup>2</sup>. On the inner surface of the ring B is a narrow ledge or lip, *b*, on which the disk or diaphragm C is placed. This diaphragm is formed, as usual, of a thin iron plate. A lining of paper or other suitable material is placed between it and the ledge or lip, and it is held in place by two springs, D D, attached to the metal rim or ring B, with their free ends pressing upon the back of the diaphragm near its center so as to hold it against the ledge. Thin pads of rubber, *a a*, are placed between the ends of the springs and the diaphragm. By this method of holding the diaphragm in place it is less liable to be distorted by a change of temperature than when held wholly at its circumference.

The center of the ring and diaphragm is placed opposite the orifice E in the cover A', through which the sounds enter the instrument. On the other side of the diaphragm and at its center is placed one of the electrodes. It is a small metal bar, *e*, one end of which rests against the diaphragm. The other end is brought nearly to a point, and is in contact with the other electrode, *e'*. It is desirable that it should be formed of or plated with some metal, like platinum or nickel, which is not easily corroded. It may be attached directly to the diaphragm; but I prefer to support it independently, as shown, upon a light spring, *c*, which tends to press it away from the diaphragm and toward the opposite electrode. This method of supporting the electrode insures its contact with the other electrode under some circumstances, when otherwise they would be liable to be separated and the circuit broken. The other electrode, *e'*, is formed on a weighted

spring,  $d$ , which is supported on an adjusting-lever,  $F$ , by which the tension of the spring is regulated. This spring must be stronger than the spring  $c$ , which supports the electrode  $e$ , and from its greater strength it tends to keep the electrode  $e$  in contact with the diaphragm. It is made of a piece of a common watch-spring, and it carries at its free end a weight,  $g$ , heavy enough to check very greatly the rate of vibration of the spring. This weight may be of metal, which may serve directly as the electrode; but I have obtained better results by applying to it at the point of contact with the other electrode a piece of gas-coke or a hard-pressed block of carbon, such as is used for electric lights. The employment of the coke or carbon does not, however, constitute a part of any of my inventions further than it contributes a portion of the weight carried by the spring. If the weight is a non-conductor, as it may be, there must be a metallic conductor between the carbon or other electrode used and the spring or some other part of the circuit. The weight must be proportioned to the stiffness of the spring, a stiff spring requiring a heavier weight than a weaker one.

The adjusting-lever  $F$ , to an arm of which one end of the spring  $d$  is attached, is a stiff bar, connected at one end by a stiff spring,  $j$ , to the ear  $B'$  of the ring  $B$ . The other end rests upon an adjusting-screw,  $G$ , placed in the ear  $B^2$  on the opposite side of the ring. The spring  $j$  tends to force the lever  $F$  away from the diaphragm and against the adjusting-screw  $G$ . The ear  $B^2$ , supporting the adjusting-screw  $G$ , is drilled and slotted, as shown in Figs. 1 and 2, to prevent the screw from wearing loose. The part of the lever  $F$  which comes in contact with the screw is inclined to the axis of the screw, as shown, so that when the screw is forced inward it will press the lever toward the diaphragm, and when it is withdrawn the lever will, by the tension of the spring  $j$ , be forced away from the diaphragm. The outer end of the screw extends into a hole,  $l$ , through the casing, and is fitted to receive a key by which it can be turned to adjust the lever to a desired position.

The wires for connecting this transmitting-instrument with the receiving-telephone are marked  $w$  and  $w'$ . I have, however, shown them as connected with the primary circuit of an induction-coil,  $I$ , in connection with which  $s$  and  $s'$  are the screw-cups leading to the battery, while  $s^2$   $s^3$  are screw-cups for connecting

the line-wires with the secondary circuit of the coil  $I$ .

The use of the induction-coil is not essential, and the wires  $w$   $w'$  may go at once to the receiving-instrument. The wire  $w$  is connected directly with the spring-arm  $c$  of the electrode  $e$ , as shown in Fig. 2. The wire  $w'$  is connected with one of the ears of the ring  $B$ , as shown in Fig. 3, which is in metallic connection with the electrode  $e'$ , as shown in Fig. 2.

In applications already pending for patents for improvements in speaking-telephones, the first of which was filed January 3, 1879, I have described and shown precisely the same instrument herein described and shown. The object of the present application is to secure by a division of the said former application of January 3, 1879, a separate patent for the improvements in said instrument which are hereinabove especially referred to as resulting from the method of supporting the diaphragm. All other inventions made by me and embodied in said instrument are herein disclaimed, since they form or will form the subject-matter of claims in said other applications, or in still further applications filed herewith or to be filed hereafter:

I here claim—

1. The combination of a diaphragm in a speaking-telephone with a ring-seat upon one side thereof adapted to furnish a support for its edges and one or more flat springs upon the other side, the free ends of the said springs pressing upon the diaphragm near its center and holding it against the said ring-seat, substantially as described.

2. The combination of the diaphragm  $C$  and the electrodes  $e$  and  $e'$  and spring  $d$  with the ring seat or frame  $B$  on one side and a flat spring,  $D$ , on the other, the free end of the said spring  $D$  pressing against the diaphragm near its center, and the said spring  $d$  carrying the electrode  $e'$ , substantially as described.

3. The combination of the diaphragm  $C$  with the ring seat or frame  $B$  on one side thereof and a flat spring,  $D$ , and pad  $a$  on the other side, the free end of the said spring  $D$ , with the intervening pad,  $a$ , pressing upon the diaphragm near its center, substantially as described.

FRANCIS BLAKE.

Witnesses:

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