(No Model.) 2 Sheets—Sheet 1.

D. DRAWBAUGH.

TELEPHONE TRANSMITTER.

No. 272,865. Patented Feb. 27, 1883.

Fig. 1.

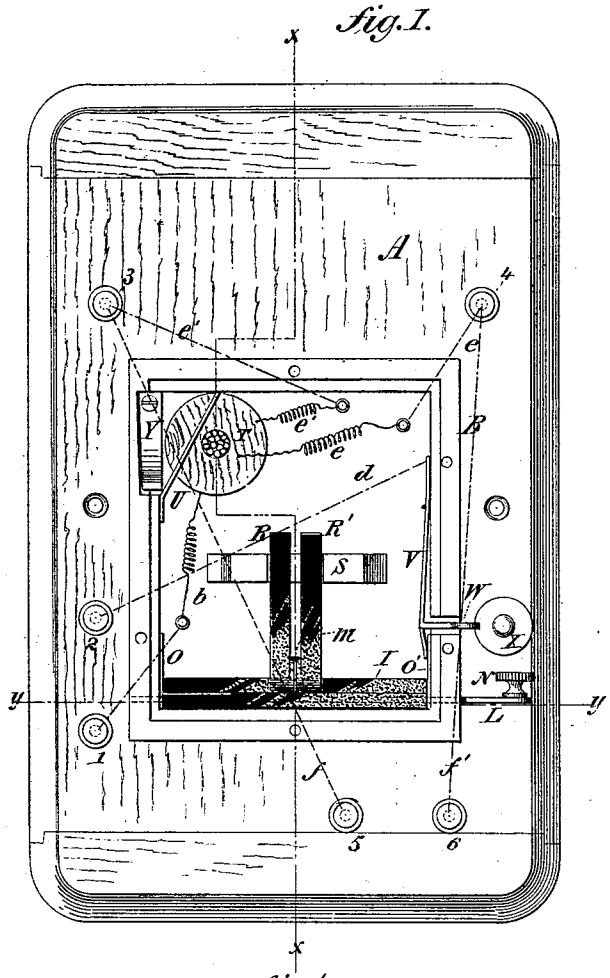


Fig. 7.

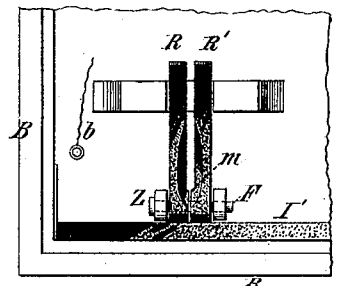


Fig. 2.

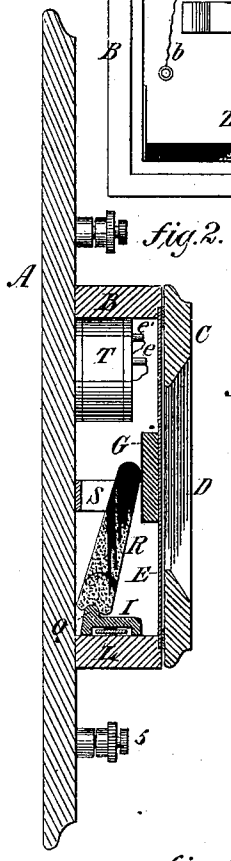


Fig. 3.

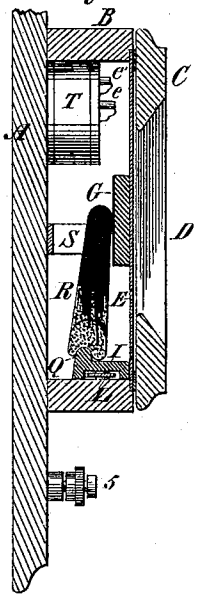


Fig. 6.

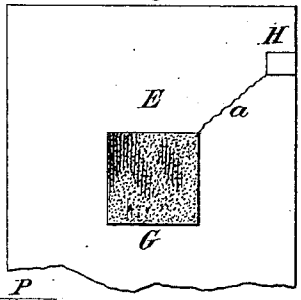


Fig. 4.

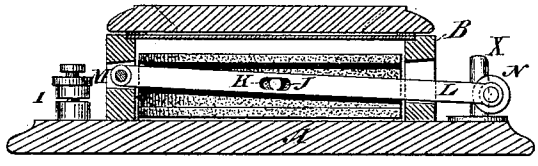
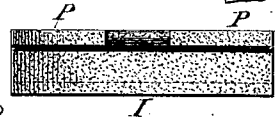


Fig. 5.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 8.

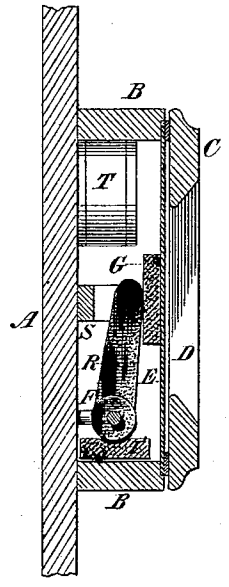


Fig. 10.

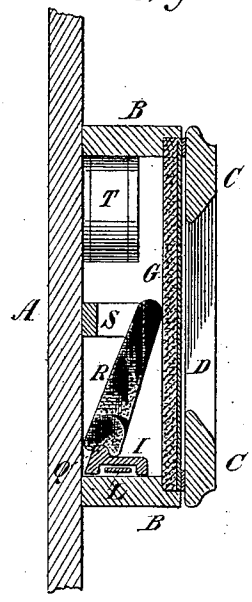
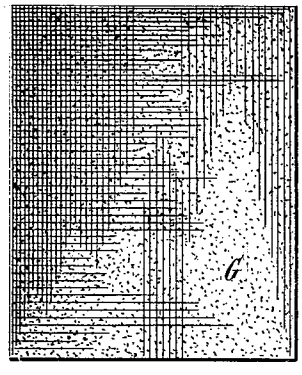


Fig. 9.



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UNITED STATES PATENT OFFICE.

DANIEL DRAWBAUGH, OF EBERLY'S MILL, PENNSYLVANIA.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 272,865, dated February 27, 1883.

Application filed December 5, 1882. (No model.)

To all whom it may concern:

Be it known that I, DANIEL DRAWBAUGH, of Eberly's Mill, Cumberland county, Pennsylvania, have invented a new and useful Improvement in Telephone-Transmitters, of which the following is a specification.

The invention relates to that class of telephones in which the current is modified by changes in resistance of electrodes of carbon or other low conducting material placed in contact and acted upon by the vibrations of a diaphragm or sound-receiving medium.

The invention consists, first, in a novel arrangement of the carbons or low conductors; and, second, in a new means of adjusting the instrument to render it more or less sensitive, whereby it may be employed to transmit a noise produced before it for signaling purposes, so that the same shall be loudly reproduced by the receiving-telephone, and whereby it may immediately be adapted for transmitting articulate speech.

It is a well-known fact that when a microphone is placed in very delicate adjustment the sound transmitted by it will be reproduced by a receiving-telephone with great increase of volume and loudness, especially if the places of contact of the electrodes be reduced to mere points or lines. It is also well known that when the instrument is thus arranged it is not possible practically to transmit articulate speech by it, for the reason that it is exceedingly difficult to keep the electrodes uniformly in such delicate contact. Hence they separate or "break," and this results in the production of sharp, almost explosive sounds in the receiving-instrument. This property of the microphone, I am aware, has been utilized on telephonic lines to cause an ordinary magneto receiving-instrument to emit a loud grating or buzzing sound to attract attention. In my present invention I avail myself of this same property; but, instead of rendering it necessary to have in a transmitting-station one microphone or telephone-transmitter adapted for transmitting speech by the undulatory current, and another microphone with the electrodes in very delicate contact, so as to transmit alarms, I provide a single instrument, which may be adapted to either purpose easily and quickly without opening the inclosing-case or moving or inclining the instrument.

In the accompanying drawings, Figure 1 is a front view of the instrument, with the outer cover and diaphragm removed to show the internal mechanism. Figs. 2 and 3 are vertical sections on the line *x x* of Fig. 1, showing the different positions assumed by the movable carbons in accordance with the two adjustments of the apparatus. Fig. 4 is a horizontal section of the instrument on the line *y y* of Fig. 1, viewed from below. Fig. 5 is a plan view from above of the bottom carbon. Fig. 6 is a rear view of the diaphragm. Fig. 7 is a front view of an arrangement of the carbons which I adopt when the lower carbon is not made movable and adjustable. Fig. 8 is a side view, showing the method of pivoting the intermediate carbons. Fig. 9 shows separately the diaphragm when formed of a carbon plate; and Fig. 10 is a partial sectional view, showing said diaphragm in place.

Similar letters of reference indicate like parts.

A is the back or base board of the instrument. B is the inclosing-case; C, the outer cover, having a mouth-piece orifice, D. The case, backboard, and cover I make preferably of wood.

E is the diaphragm, which may be of metal or a non-conducting material, such as a thin sheet of wood or rubber, or a low conducting material, such as carbon, as more particularly described hereinafter.

G is a piece of carbon cemented or otherwise suitably fastened to the rear side of the diaphragm. When the diaphragm is of wood or other non-conducting material I connect the carbon G, by means of a wire, *a*, to a small contact-piece of metal, H, as shown in Fig. 6. When the diaphragm is of metal or of low-conducting material this wire and contact-piece are unnecessary.

Resting on the lower side or bottom of the inclosing-case B, which serves as a support, is a piece of carbon, I. (Shown separately in Fig. 5.) In the under side of this carbon is formed a groove or channel, in which projects a small pin, J. The pin J enters a slot, K, in the lever L. Said lever, which is of metal or other

suitable material, is pivoted at one end to the side of the box at M. The free end of the lever L protrudes through a horizontal slot in the opposite side of the case, and terminates in a button or knob, N. The inner side of the box or case next adjacent to the ends of the carbon I are lined with pieces of metal O O′, with which the ends of the carbon are in contact. The carbon I should be of such width as to fit neatly between said pieces of metal. The breadth of the carbon, as shown in Figs. 2 and 3, is approximately about two-thirds the depth of the box or case, though I do not limit myself to this exact proportion, as it may be varied within reasonable limits.

On the upper rear corner of the carbon I, I form a ridge, P, square in transverse section, except for a certain distance, Q, at about the middle of its length, where it is rounded, as shown in section in Figs. 2 and 3. The square part of the ridge P thus forms shoulders at each end of the rounded part.

R R′ are two intermediate carbons, alike in shape, and formed as shown in Figs. 1, 2, and 3. The upper ends of these carbons are rounded, so that the curved upper portion, when the carbons are in place, rests against the carbon plate G, which is secured to the diaphragm. The lower extremities of said carbons R R′ are rounded and shouldered, as shown in Fig. 1, and provided with a groove or channel adapted to receive the rounded part Q of the ridge P, as shown in Figs. 2 and 3. When the carbons R R′ are adjusted in place their outer lower sides meet the shoulders formed by the square portion of the ridge P, and they are thus prevented from becoming laterally displaced at their lower ends. Between said carbons R R′, I place a piece of paper or other insulating material, *m*, which may be cemented or otherwise fastened to one of said carbons. The upper ends of the carbons R R′ are prevented from lateral displacement by the wooden bar S, attached to the back board, A, which bar is recessed to receive the carbons, as shown.

Referring now more particularly to Figs. 2 and 3, it will be seen that when the lower carbon I is moved bodily forward by the lever L engaging with the pin J the carbons R R′ assume a more nearly vertical position, as represented in Fig. 3, and that when said lower carbon I is moved backward by the same means the carbons R R′ are more inclined, as shown in Fig. 2.

It will be obvious that in the position of the parts shown in Fig. 3 less of the weight of the carbons R R′ is borne by the carbon G than is the case when the parts assume the position shown in Fig. 2; or, in other words, in the first case the carbons R R′ press less heavily against the carbon G than they do in the second case. There is therefore a much more delicate or more easily-broken contact in the former circumstances than in the latter.

In practice I adjust the light contact as delicately as possible. The heavy contact should be so adjusted as that speech will be transmitted easily without breaks. It is manifestly impossible to lay down any exact angles of the carbons R R′ to the other low conducting blocks to be adopted for securing this result, inasmuch as the shape and size of the instrument and relative proportions of the carbons may vary. Any one skilled in the art of constructing modern carbon telephone-transmitters can, however, easily make adjustments once for all, which will be uniform, or very nearly so, in instruments made of the same dimensions. As the forward and back movement of the free end of the lever L governs the limit of adjustment, it is easy to cut the slot through which the lever L passes in the side of the case to such a length as to restrict the movement of the lever as may be requisite.

T is an induction-coil of the usual well-known construction, secured in any convenient way to the base-board A. The bar U serves to hold it in place.

V is a spring-bar of metal, fastened at one end to the interior of the case, and having its other end normally in contact with the piece O′.

W is an arm of the bar V, which projects through the side of the case; and X is a pin secured to the back board.

The circuits in the instrument proceed as follows: Starting from one pole of the battery, the current enters at the binding-post 1, and passes by the wire *b* to the primary of the induction-coil T, thence to the metal contact-piece Y, thence to the contact-piece H on the diaphragm, and by the wire *a* to the carbon G, or, if the diaphragm is of metal, directly from contact-piece H to the diaphragm, and along the latter to carbon G. From carbon G the current passes to the carbons R R′, thence to the carbon I, thence to the piece O′, thence to the spring-bar V, and thence by a wire, *d*, on the back of the base-board A, and shown in Fig. 1 in dotted lines, to the binding-post 2, and thence to the other pole of the battery. The secondary circuit from the induction-coil proceeds by wires *e e* (dotted lines on back of case) to binding-posts 3 and 4, to which are connected the terminals of the main or line wire. Connected with said binding-posts 3 and 4 are branch wires *f f′*, (dotted lines back of case,) which connect with the binding-posts 5 and 6, to which posts a receiving-telephone may be attached.

The operation of the instrument is as follows: For signaling purposes the parts are adjusted as shown in Fig. 3—that is, with the carbons R R′ in very light contact with the carbon G. Sounds now made before the diaphragm cause the vibration of the latter, and result in either a rapid series of makes and breaks of the circuit between the carbons R R′ and carbon G or in a modification of the current so long as it remains continuous through carbons R R′ and G, whereby the sounds produced are greatly augmented in loudness and volume in the receiving-instrument. Both, or either of these results may occur.

When it is desired to use the apparatus for

transmitting speech the lever L is pushed back, thus sliding the carbon I to the rear, and causing the carbons R R′, as shown in Fig. 2, to lean at greater angle and more heavily against the carbon G. The instrument is then used as a telephonic transmitter of articulate speech in the ordinary way.

I do not limit myself to a low-conducting block, G, attached to a diaphragm of other material, conducting or non-conducting, as before described, as I have enlarged said carbon-block G, and made the same sufficiently thin to serve as a diaphragm, as shown in Figs. 9 and 10, securing it in the case in the same way as is the diaphragm shown in Figs. 2 and 3.

It is obvious that the wire *a* and contact-piece H will not then be necessary, inasmuch as the current will pass between the contact-piece Y and carbons R R′ directly over or through the diaphragm, as already described in the case of a diaphragm of metal. This arrangement has given good results; but I prefer the separate block of carbon attached to a diaphragm of other material, as here shown, because the same is cheaper and more easily constructed.

The purpose of the peg X is to hang a receiving-instrument upon.

In the form of my device shown in Fig. 7 the lower carbon I′ is fastened immovably in the case, and consequently the adjusting-lever L and pin J are omitted. This carbon is simply a thin bar of material without the groove and ridge provided in the carbon I, but having a shallow channel or groove on its upper surface. The carbons R R′, instead of being supported directly by the carbon I′, are merely in contact with it at their lower ends, and are supported by a bar of metal, F, fastened at one end to the back board, A, and then bent at right angles to serve as a pivot and pass through slots in the carbons R R′, as shown in Fig. 8. Washers *h h* are placed on the pivot F to keep the carbons from lateral displacement.

I claim as my invention—

1. In a telephone, three blocks, plates, or pieces of low conducting material placed in successive contact, and arranged between the diaphragm or sound-receiving surface and a support, the intermediate block being held in contact with the outer blocks by gravity, in combination with a means of moving one or more of said blocks so as to alter the relative proportions of the weight of the intermediate block respectively supported by the outer blocks, and hence the initial pressure between the adjacent blocks of the series, substantially as described.

2. In a telephone, three blocks, plates, or pieces of low conducting material placed in successive contact, and arranged between the diaphragm or sound-receiving surface and a support, the intermediate block being in contact with the outer blocks, in combination with a means of moving one or more of said blocks so as to vary the angles included between the faces of the intermediate block and the adjacent surfaces of the outer blocks, substantially as described.

3. In a telephone, the combination of, first, a diaphragm; second, a plate, block, or piece of low conducting material attached to or vibrating with said diaphragm; third, an intermediate plate, block, or piece of low conducting material of elongated form, substantially as shown, placed in an inclined position, with its upper end resting against the first-mentioned block or piece, and in contact therewith, and its lower end in contact with, fourth, a piece or block of low conducting material resting on a support not attached to or vibrating with the diaphragm, substantially as described.

4. In a telephone, the combination of the diaphragm E, low conducting piece G, low conducting pieces R R′, low conducting piece I, pin J, lever L, and a support for said lever L and piece I, substantially as described.

DANIEL DRAWBAUGH.

Witnesses:
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M. W. JACOBS.