

No. 815,889.

PATENTED MAR. 20, 1906.

E. E. YAXLEY.
TELEPHONE TRANSMITTER.
APPLICATION FILED SEPT. 26, 1905.

Fig. 1.

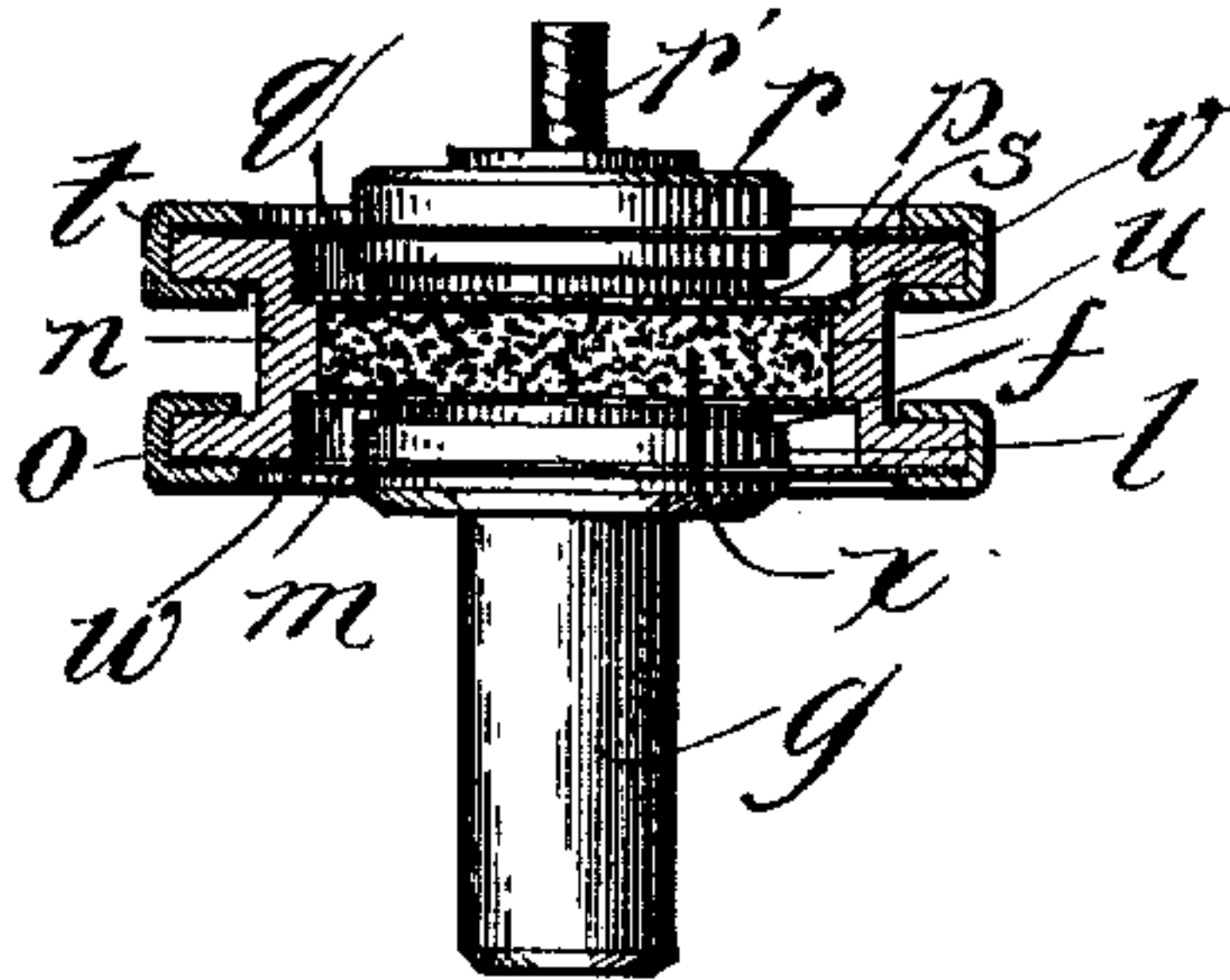
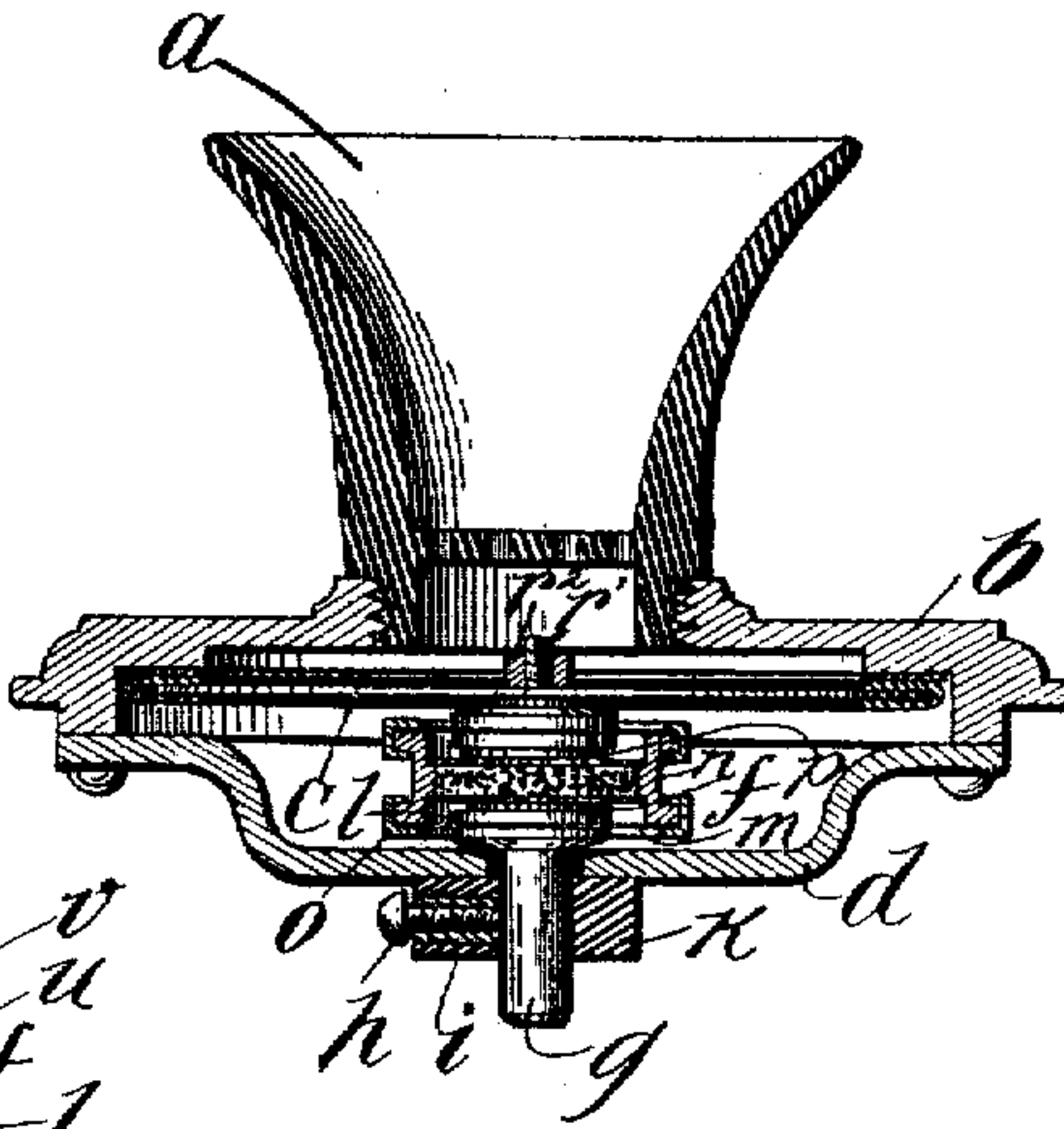


Fig. 3

Fig. 2

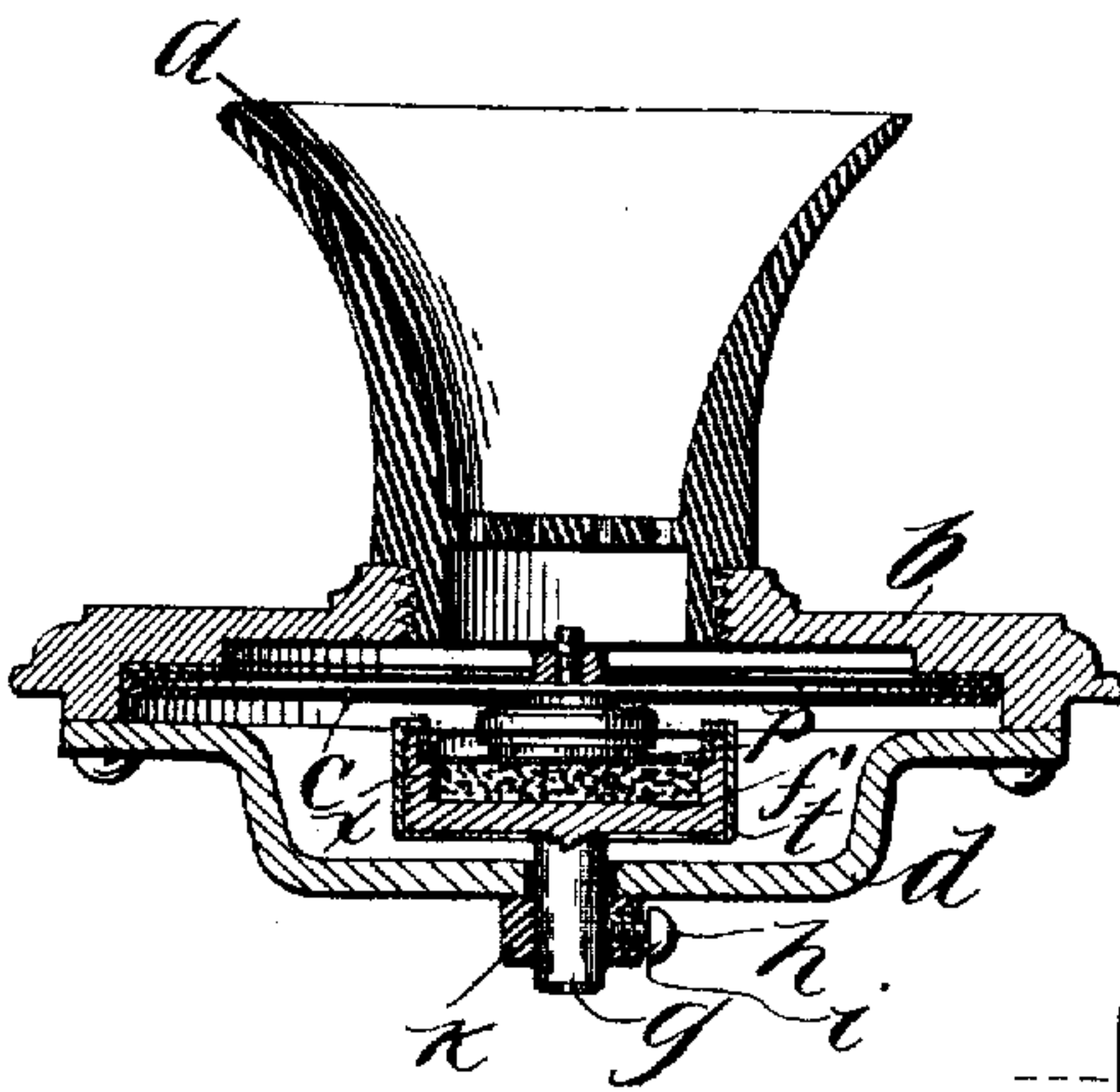


Fig. 5

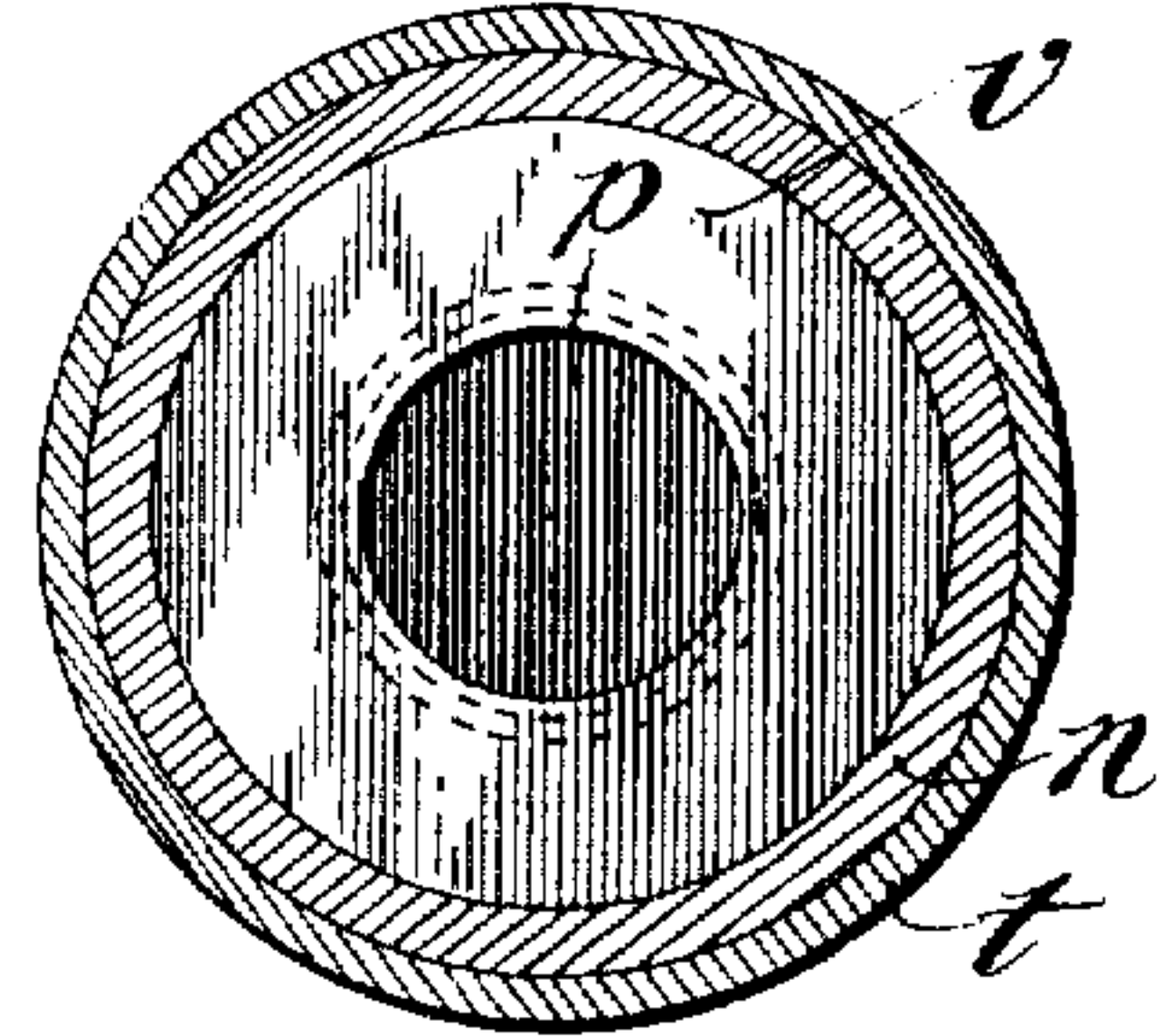
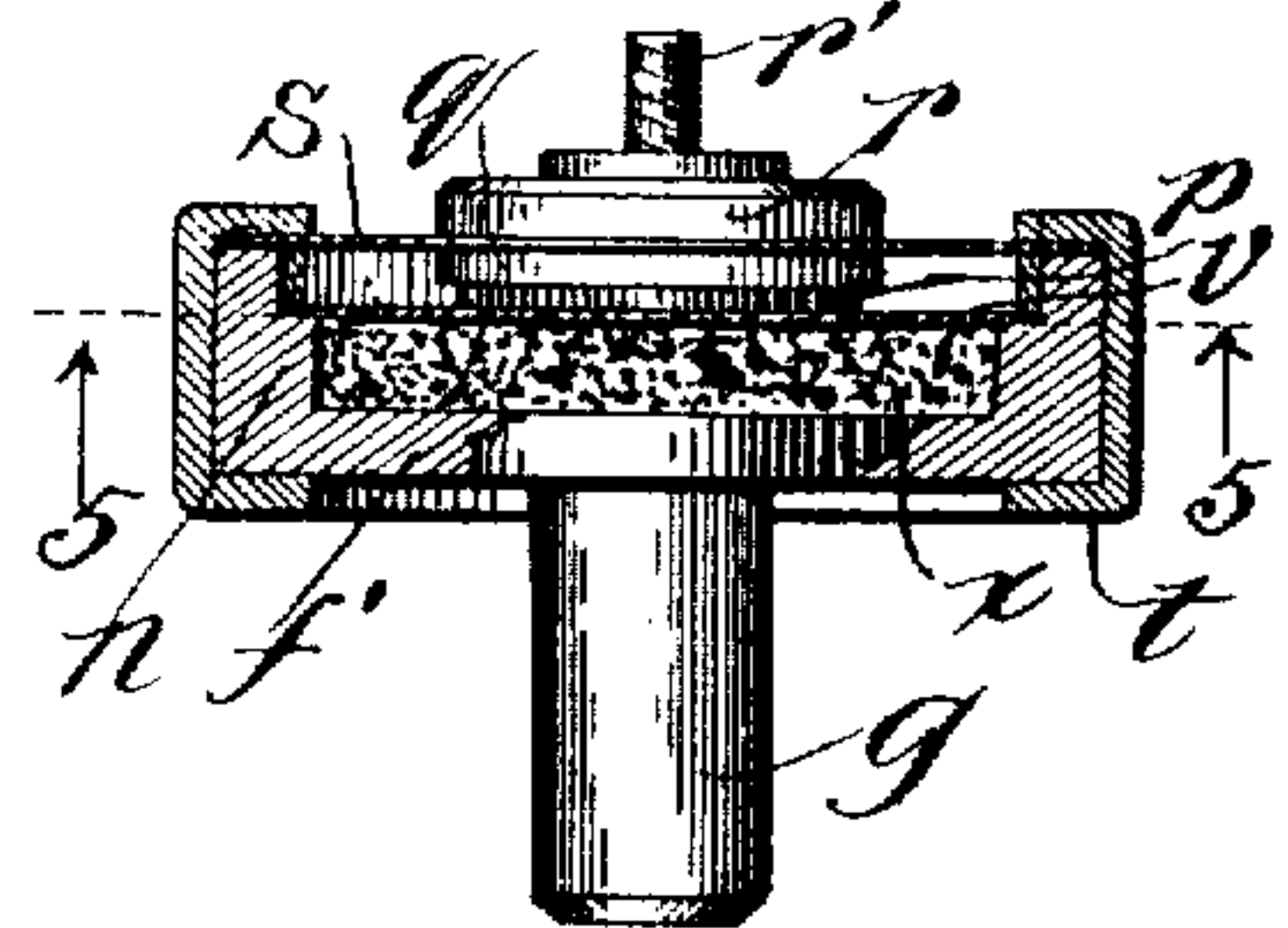


Fig. 4



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TELEPHONE-TRANSMITTER.

No. 815,889.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed September 26, 1905. Serial No. 280,158.

To all whom it may concern:

Be it known that I, ERNEST E. YAXLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Telephone-Transmitters, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone-transmitters of the type employing subdivided or comminuted carbon or equivalent material between the electrodes of the transmitter, and has for its object the provision of an improved construction of transmitter wherein these comminuted or subdivided particles will not pack and in the preferred embodiment of the invention wherein all of the carbon will be subject to agitation while the transmitter is in use, so that said carbon may properly and fully function. In transmitters of the solid-back type, to which this invention is particularly adaptable, a rigidly-mounted electrode is opposed to an electrode that is actuated by the speaking-diaphragm of the transmitter, one or both of these electrodes being made of plate-like carbon. Hitherto one or both of these electrodes projected into a chamber containing the comminuted carbon, which carbon not only contacted with the faces of the electrodes, but also surrounded the periphery of at least one of the electrodes. In this way a portion of the carbon around the periphery of the chamber would not be subject to sufficient agitation upon operation of the speaking-diaphragm and would be liable to become packed, thereby improperly reducing the resistance between the electrodes to prevent the proper variation in resistance in the transmitter-circuit and a consequent proper impression of the voice currents upon the line. This tendency to pack was materially increased by a heating of the carbon particles in the operation of the transmitter, the heated particles that were comparatively quiescent readily packing together.

In practicing my invention the carbon particles have only contact with the opposed faces of the transmitter-electrodes, and if, as is preferred, the particles of carbon are in-

closed in a space of greater diameter than one of the electrodes the chamber for the electrodes is desirably so constructed that not only are the particles immediately in front of the electrode subject to agitation, but those that lie beyond the electrode are also subject to agitation.

In the preferred embodiment of the invention the transmitter includes at least one movable carbon electrode and an inclosed chamber for the comminuted carbon, at least one wall of which is flexible and extended in substantially the same plane with the inner face of the carbon electrode, mechanical contact being maintained between said carbon electrode and said flexible wall portion. The flexible wall portion is desirably of insulating material, preferably mica, and is of ring-form, the inner edge of the ring being of slightly less diameter than the carbon electrode or button, and the button and ring of mica are made concentric, so that the ring slightly overlies the button, the inner balance of the button being in direct contact with the carbon particles through the aperture in the ring. The mica ring is sufficiently resilient, so as to maintain its engagement with the periphery of the carbon button. By this construction the carbon button has the desired contact with the particles of carbon within the chamber, while the flexible ring with which the button is faced serves to agitate the particles of carbon that are not directly faced by the carbon electrode. I preferably, though not necessarily, employ two carbon buttons as electrodes for the transmitter and associate each with a ring of mica, as above described, the particles of carbon being interposed between the two rings of mica. As the mica rings are preferably not mechanically secured to the carbon buttons, the said carbon buttons are so mounted that pressure is maintained upon the mica rings to effect and maintain the required engagement of the carbon buttons with the mica rings. The form of this mounting preferably includes a supplemental ring or diaphragm of mica for each carbon button and which is mechanically associated with the carbon button and an extension of the carbon-chamber in a way hitherto practiced in connection with granular carbon transmitters.

I will explain my invention more fully by reference to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view of the preferred form of transmitter constructed in accordance with my invention. Fig. 2 is a view of a modification of the form shown in Fig. 1. Fig. 3 is an enlarged view showing the carbon-chamber and parts immediately associated therewith as employed in the structure shown in Fig. 1. Fig. 4 is an enlarged view showing the carbon-chamber and parts immediately associated therewith as employed in the structure shown in Fig. 2. Fig. 5 is a view in cross-section on line 5 5 of Fig. 4.

Like parts are indicated by similar characters of reference throughout the different figures.

The transmitters shown in Figs. 1 and 2 are of familiar type, each including a mouthpiece *a*, a casing *b*, to which the mouthpiece is screwed, as illustrated, a speaking-diaphragm *c*, operated by sound waves passing through the mouthpiece and held in position by any suitable means, this speaking-diaphragm being preferably insulated from the transmitter-casing. A bridge *d* is mounted upon each transmitter-casing and supports an electrode, which in Figs. 1 and 3 is in the form of a plate of carbon *f* and in Figs. 2 and 4 a metallic part *f'* of the carbon-chamber. The electrode *f* is provided with a metallic stem *g*, that is held in position by means of a set-screw *h*, passing through a metallic bushing *i*, contained within a plate of insulating material *k*, that is fast with respect to the bridge *d*.

In Figs. 1 and 3 the stem *g* carries a cup *l*, in which is seated the button of carbon *f*, constituting one electrode of the transmitter, a mica ring or diaphragm *m* being secured between the cup *l* and the balance of the stem *g*, this diaphragm *m* in turn being clamped upon the flange of the metallic chamber *n* by the clamp *o* in a manner similar to that now employed for mounting transmitter-electrodes, this construction being the construction that I prefer for imparting to this electrode an adjustable mounting in connection with the improvement of my invention. The companion carbon electrode *p* is mounted in a cup *q*, that is secured to an enlargement *r*, carried by a screw *r'*, that is secured to the speaking-diaphragm *c* by means of a nut *r''*. A ring or diaphragm of mica *s* is interposed between the elements *q* *r*, and said ring is clamped upon a flange of the casing *n* by means of a clamp *t*, all similar to the construction now employed for the mounting of such electrodes and connecting the same with the speaking-diaphragm, the diaphragm *s* serving to afford the flexible mounting for the carbon electrode associated therewith in accordance with the preferred embodiment

of my invention and for the purpose that has been set forth. The chamber *n* is provided with an annular inset or shoulder *u*, upon which are seated rings *v* *w*, composed, preferably, of mica, and which are concentric with each other and with the carbon buttons *f* *p*, the ring-openings being of a slightly smaller diameter than the diameter of the opposed buttons *f* *p*. The diaphragm *s* holds the button *p* against the diaphragm *v*. The rings *v* *w*, where they engage the carbon-plates, are maintained in firm spring-like engagement therewith, so that the particles *x* of carbon interposed between the diaphragms *v* *w* do not escape. By this construction the carbon particles are prevented from getting upon the sides of the electrodes and are therefore not liable to pack, while by extending the carbon particles beyond the electrodes and confining them by the flexible diaphragms *v* *w* the effect of agitation is imparted to all of the carbon, whereby requisite resistance is afforded between the electrodes and which is always properly varied to cause production of voice currents that correspond very accurately to the speaking voice.

Fig. 5 while taken on line 5 5 of Fig. 4 shows in face view the position of each diaphragm *v* *w* with respect to the associate carbon button or electrode, and parts associated with the speaking-diaphragm found in Figs. 2, 4, and 5, that are similar in construction and association to parts found in Figs. 1 and 3, are given similar characters of reference.

In Figs. 2 and 4 but one movable electrode, the electrode *p*, coupled with the speaking-diaphragm, is employed, the companion electrode *f'* being the base of the metallic chamber *n*. This movable diaphragm is associated with the diaphragm *s* to produce a structure operating the same as the structure described in connection with Figs. 1 and 3, the particles of carbon *x* being interposed between the electrodes *f'* *p* in Figs. 2 and 4 and finding access to the electrode *p* through the aperture in the diaphragm *v*, as has already been set forth in connection with Figs. 1 and 3.

The desired pressure to be exerted by the diaphragms *m* *s* upon the diaphragms *v* *w* (which diaphragms may be termed "aper-tured diaphragms") may be regulated by sliding the stem *g* in and out, which regulation may be made permanent by means of the set-screw *h*.

It will be seen that the diaphragms *v* *w* lie substantially in the planes of the inner faces of the electrodes. It will also be seen that the diaphragms *v* *w* permit the particles of conductive material to extend beyond the faces of the electrodes—that is, these particles of conductive material present an area to the electrodes that exceeds the inner faces of the electrodes.

The diaphragms, it will be seen, are thin

as compared with the electrodes and the parts upon which they are immediately mounted, whereby space is afforded on the outside of the chamber of which the diaphragms form a part, which space being unfilled with comminuted material and being otherwise unoccupied affords much freedom to the electrodes in their operation.

The particles of comminuted carbon or other material between the electrodes do not fully occupy the space provided for them between the electrodes to afford room within which this comminuted carbon may expand.

It is obvious that changes may readily be made in the embodiments of my invention herein shown without departing from the spirit of the invention; but,

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode moved by the speaking-diaphragm, the said subdivided material having access to the electrode moved by the speaking-diaphragm through the aperture in the diaphragm forming a part of said chamber.

2. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode moved by the speaking-diaphragm, the said subdivided material having access to the electrode moved by the speaking-diaphragm through the aperture in the diaphragm forming a part of said chamber, and a spring device for holding the electrode actuated by the speaking-diaphragm in engagement with the said apertured diaphragm.

3. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode moved by the speaking-diaphragm, the said subdivided material having access to the electrode moved by the speaking-diaphragm through the aperture in the diaphragm forming a part of said chamber, and an additional resilient diaphragm serving to maintain the electrode moved by the speaking-diaphragm in engagement with the said apertured diaphragm.

4. A telephone-transmitter including a

speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of said electrode moved by the speaking-diaphragm, the said subdivided material having access to the electrode moved by the speaking-diaphragm through the aperture in the diaphragm forming a part of said chamber.

5. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber.

6. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, and a spring device for holding the companion electrode in engagement with the said apertured diaphragm.

7. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, and an additional resilient diaphragm serving to maintain the companion electrode in engagement with the said apertured diaphragm.

8. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a companion electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of said companion electrode, the said subdivided material having ac-

cess to the companion electrode through the aperture in the diaphragm forming a part of said chamber.

9. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm.

10. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, and a spring device for holding the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm.

11. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, and an additional resilient diaphragm serving to maintain the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm.

12. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a companion electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of said companion electrode, the said subdivided material having access to the companion electrode through the aperture in the diaphragm forming a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm.

13. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a spring device for maintaining the electrode actuated by the speaking-diaphragm in engagement with said apertured diaphragm associated therewith.

14. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, a spring device for holding the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a spring device for maintaining the electrode actuated by the speaking-diaphragm in engagement with said apertured diaphragm associated therewith.

15. A telephone-transmitter including a

speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, an additional resilient diaphragm serving to maintain the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a spring device for maintaining the electrode actuated by the speaking-diaphragm in engagement with said apertured diaphragm associated therewith.

16. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a companion electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of said companion electrode, the said subdivided material having access to the companion electrode through the aperture in the diaphragm forming a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a spring device for maintaining the electrode actuated by the speaking-diaphragm in engagement with said apertured diaphragm associated therewith.

17. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a diaphragm carrying the electrode actuated by the speaking diaphragm and

serving to maintain this electrode in contact with the said apertured diaphragm associated therewith.

18. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, a spring device for holding the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a diaphragm carrying the electrode actuated by the speaking-diaphragm and serving to maintain this electrode in contact with the said apertured diaphragm associated therewith.

19. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including an apertured resilient diaphragm engaging the inner face of the electrode companion to the electrode moved by the speaking-diaphragm, the said subdivided material having access to said companion electrode through the aperture in the diaphragm forming a part of said chamber, an additional resilient diaphragm serving to maintain the companion electrode in engagement with the said apertured diaphragm, said chamber being also provided with an apertured diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a diaphragm carrying the electrode actuated by the speaking-diaphragm and serving to maintain this electrode in contact with the said apertured diaphragm associated therewith.

20. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a companion electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of said companion electrode, the said subdivided material having access to the companion electrode through the aperture in the diaphragm form-

ing a part of said chamber, said chamber being also provided with an apertured resilient diaphragm engaging the face of the electrode actuated by the speaking-diaphragm, the subdivided material having access to this electrode through the aperture in said latter apertured diaphragm, and a diaphragm carrying the electrode actuated by the speaking-diaphragm and serving to maintain this electrode in contact with the said apertured diaphragm associated therewith.

21. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber, and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including thin apertured resilient diaphragms lying close to the planes of the inner faces to said electrodes, said subdivided material having access to the electrodes through the apertures in the diaphragm.

22. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber, and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including thin apertured resilient diaphragms engaging the electrodes and lying close to the planes of the inner faces of said electrodes, said subdivided material having access to the electrodes through the apertures in the diaphragms.

23. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a second electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of and engaging said electrode moved by the speaking-diaphragm, the said subdivided material having access to the electrode moved by the speaking-diaphragm through the aperture in the diaphragm forming a part of said chamber.

24. A telephone-transmitter including a speaking-diaphragm, an electrode actuated thereby, a companion electrode, a chamber and subdivided material within said chamber interposed between and in contact with said electrodes, said chamber including a thin apertured resilient diaphragm lying close to the plane of the inner face of and engaging said companion electrode, the said subdivided material having access to the companion electrode through the aperture in the diaphragm forming a part of said chamber.

In witness whereof I hereunto subscribe my name this 23d day of September, A. D. 1905.

ERNEST E. YAXLEY.

Witnesses:

G. L. CRAGG,
LEON STROH.