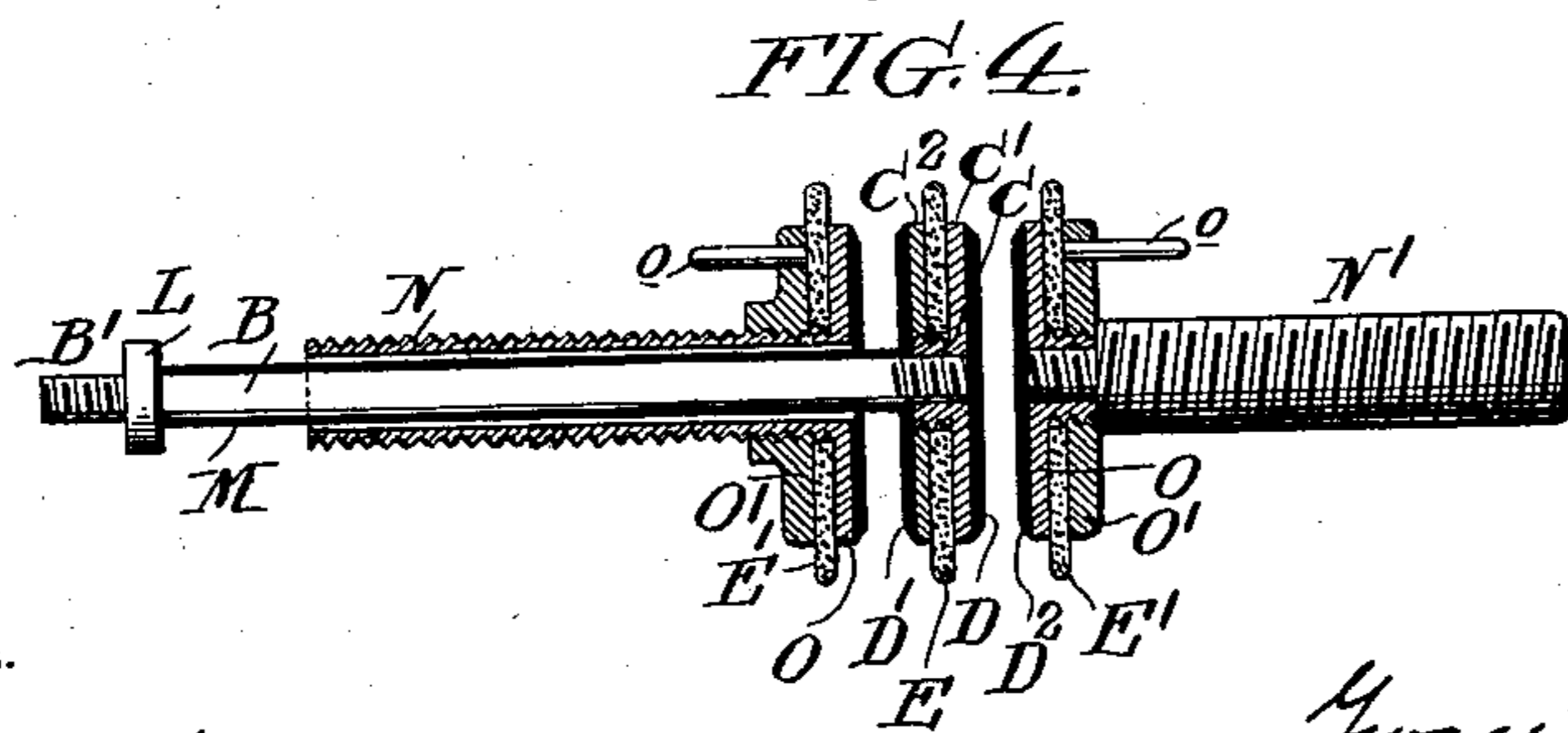
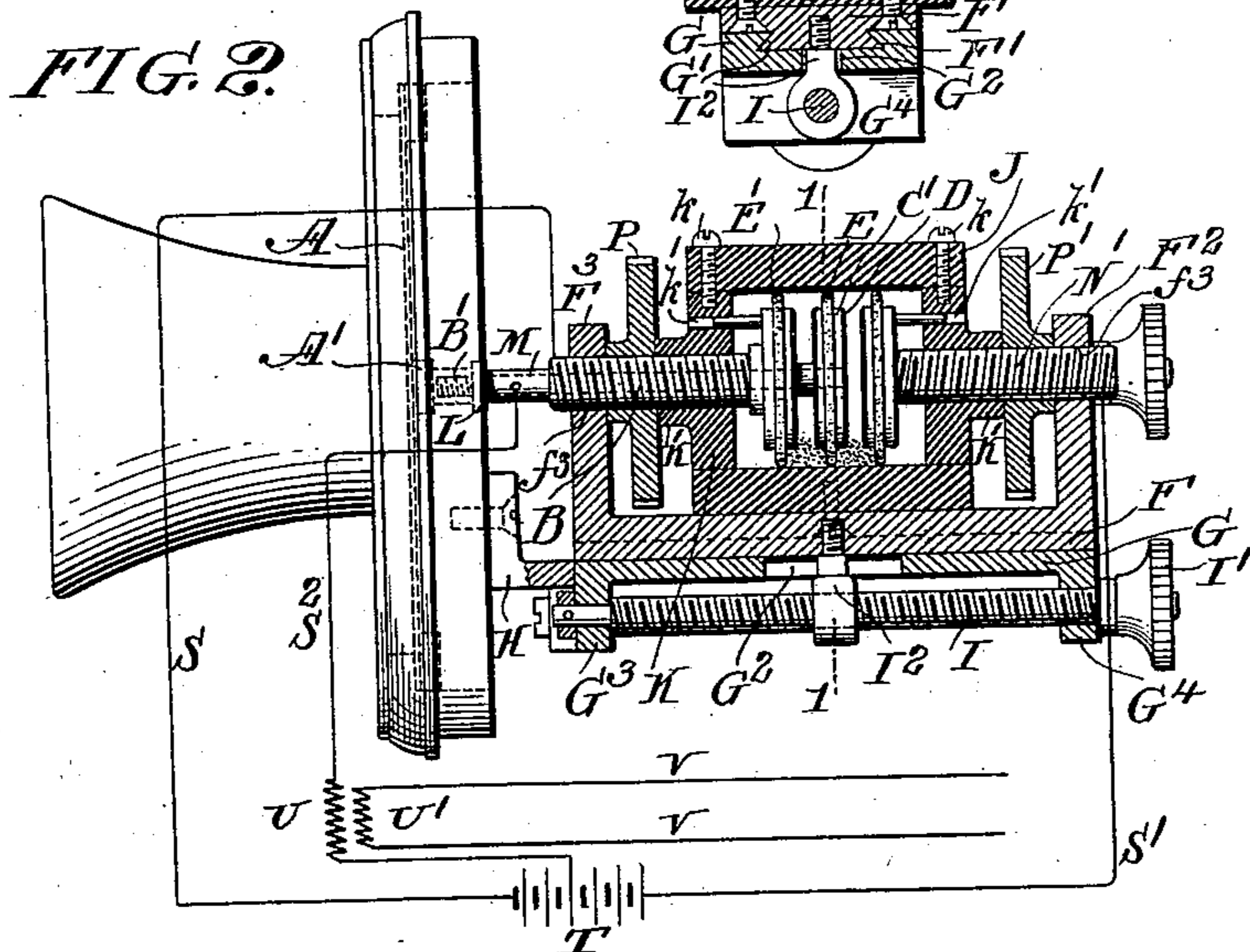
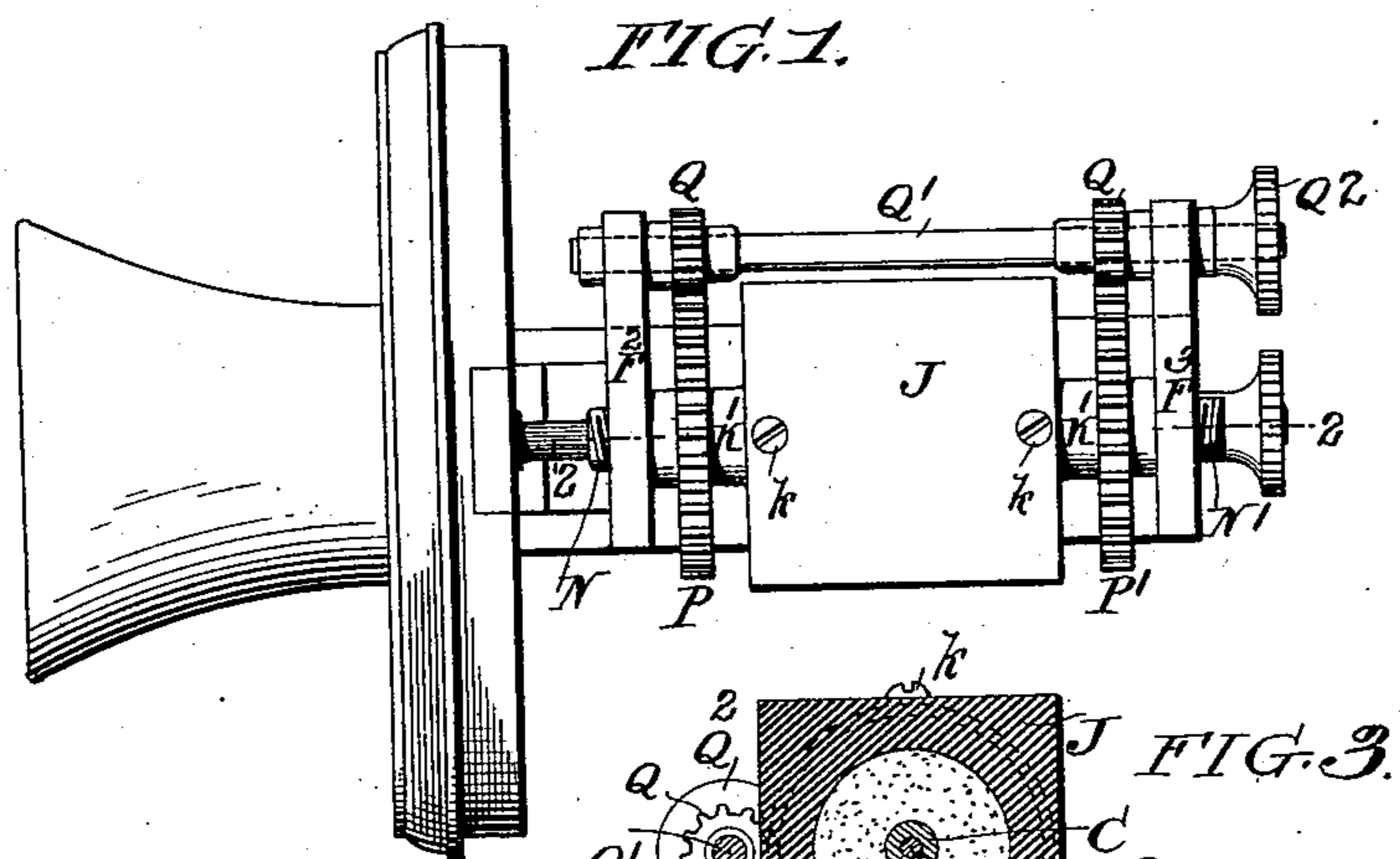


(No Model.)

G. F. PAYNE.  
TELEPHONE.

No. 600,990.

Patented Mar. 22, 1898.



Witnesses.

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H. ...

Inventor.

George F. Payne  
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# UNITED STATES PATENT OFFICE.

GEORGE F. PAYNE, OF PHILADELPHIA, PENNSYLVANIA.

## TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 600,990, dated March 22, 1898.

Application filed August 21, 1897. Serial No. 648,983. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE F. PAYNE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Telephones, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of telephone-transmitters, and has for its object to increase the amplitude of the electrical undulations or vibrations, and more especially to produce electrical undulations which will be in more perfect accord with the sonorous vibrations which actuate the diaphragm than has heretofore been practicable, the result being to produce a transmitter capable of transmitting a telephonic current through great resistance and impedance on the line and consequently to great distance.

Generally speaking, my invention consists in providing two relatively central electrode-faces (preferably secured together as one electrode-button) and two relatively lateral electrode-faces, making one pair stationary and securing the other pair firmly to the diaphragm, so as to vibrate with it and move in each vibration synchronously toward one and away from the other fixed-electrode face, granular carbon being placed between each opposite pair of fixed and movable electrodes, and the pressure on the granular-carbon bodies being simultaneously varied, one being compressed as the other is relieved of pressure. In the construction shown the outer lateral electrodes are stationary and the central electrodes, or electrode with two faces, is attached to and moves with the diaphragm, and the stationary electrodes are adjustable both together and independently with respect to the movable-electrode faces, and, as shown, the two lateral electrodes are connected with two branches, while the central electrode-button is connected to the third branch of a three-wire primary circuit, the central branch having in it an induction-coil in proper relation to the coil of the secondary circuit. While any substantially rigid connection between the diaphragm and the moving electrode will give good results, in my transmitter I find

that a direct connection in a straight line from diaphragm to electrode is by far the best and that it is important that the connection should be light and that its weight and that of the electrode should not be permitted to support itself on the diaphragm, but should be independently supported, so that it shall not tend to distort the diaphragm; but the support must be one which will not offer appreciable frictional resistance to the movement of the electrode.

Other features of my invention by which the efficiency of the transmitter is greatly promoted will be best understood as described in connection with the drawings, in which my invention is illustrated in what I believe to be its best form, and in which—

Figure 1 is a side view of my transmitter; Fig. 2, a central longitudinal section thereof; Fig. 3, a cross-section on the line 1 1 of Fig. 2, and Fig. 4 an enlarged and partly-sectional view of the electrodes and connected parts.

A is the diaphragm, to which is secured the threaded stud A', preferably, as shown, by being cemented or otherwise attached to its inner face, the formation of a hole in the diaphragm being avoided. Into this stud screws the end B' of a light metal rod B, which is covered with a non-conducting jacket (indicated at M) and which is best made of a light hard-rubber tube extending between a button L and the carbon-face D', hereinafter described.

To the outer end of the rod C is attached the hub of a metal (brass) disk C', a similar disk C<sup>2</sup> screwing into the hub, as shown, and a light felt washer E being clamped between the disks C' and C<sup>2</sup>, so as to project beyond their edges and fit into the carbon-box to be hereinafter described.

D and D' indicate the carbon faces of the disks C' and C<sup>2</sup>, and the whole structure constitutes the movable electrode of the transmitter.

F is a metal slide dovetailed into and sliding upon the fixed frame G, as shown at F' G', the slide F having arms F<sup>2</sup> and F<sup>3</sup>, which are perforated, as shown at f<sup>2</sup> f<sup>3</sup>, to afford bearings to the adjusting-screws N and N'. The frame G is slotted, as shown at G<sup>2</sup>, and through this slot extends a stud I<sup>2</sup>, fastened

to the slide F and having a nut, in which screws the threaded rod I, said rod having bearings in the lugs G<sup>3</sup> and G<sup>4</sup> of the frame G, and a thumb-wheel I', by which it is turned  
5 to move the slide backward or forward on frame G.

J is a box preferably made, as shown, of a hard-rubber block having a cylindrical hole bored or cast through it, the ends of the hole  
10 being closed by plugs K K, secured in place by screws k.

N is an externally-threaded hollow rod having bearings in the arm F<sup>3</sup> of the slide and in a central perforation formed through a plug K and a hub extension thereof, (indicated at K'.) On the end of this rod is secured the brass disk O, faced with carbon D<sup>2</sup> and perforated to give passage to rod and tube B M, which, it will be seen, pass through the rod N  
20 without touching it. Their weight and that of the movable electrode are prevented from distorting the diaphragm A by being supported on the box through the washer E. A felt washer E' is secured on the back of disk O, most conveniently as shown by means of a disk O', also secured to rod N, o indicating a steady-pin which enters a perforation k' in head K and prevents the electrode and the threaded rod N from turning. The other stationary electrode is made up in substantially the same way and is secured to a threaded rod N', having its bearings in the arm F<sup>2</sup> of the slide and the other plug K; but obviously the rod N' need not be hollow, and the plate  
30 O and its carbon facing in this electrode are not perforated. The three electrodes lie parallel to each other in the box J, their washers E and E' E' fitting into the box, so that granular carbon placed in the box between the movable and fixed electrodes will be separated and so that the carbon will not spread out behind the washers E' of the fixed electrodes.

P P are gear-wheels having threaded hubs screwing upon the rods N and N', the wheels  
45 being fitted between the hubs K' of plugs K and the arms F<sup>2</sup> and F<sup>3</sup> of the slide. By turning these wheels the rods N and N' are made to move in or out and adjust the stationary carbons with reference to the movable one. Preferably the rods N and N' are threaded in opposite directions and the two gears P P actuated simultaneously by the rod O', having the gears Q Q, attached to it and turned by the thumb-wheel Q<sup>2</sup>.

F is the battery of the primary circuit, from which extend three wires S, S', and S<sup>2</sup>, connected, respectively, with inner and outer stationary electrodes and with the movable electrode.

U indicates an induction-coil in the wire S<sup>2</sup>, and U' a coacting coil in the secondary circuit V V.

Of course my construction can be modified in many ways without departure from my invention, and it will be understood that I do  
65 not restrict myself to specific forms and con-

structions shown, except where they are specifically referred to in my claims.

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

1. In a telephone-transmitter, the combination of two relatively central and two relatively lateral electrode-faces, one pair being movable and one rigid in the supporting-frame, granular conducting material situated between the adjacent central and lateral electrode-faces, a diaphragm and a positive connection between the two movable electrode-faces whereby they are moved synchronously with the diaphragm and so as to simultaneously relax the pressure on one mass of granular material and increase it on the other mass.

2. In a telephone-transmitter, the combination of two relatively central and relatively lateral electrode-faces, one pair being movable and one rigid in the supporting-frame, granular conducting material situated between the adjacent central and lateral electrode-faces, a diaphragm, a positive connection between the diaphragm and the two movable electrode-faces whereby they are moved synchronously with the diaphragm and so as to simultaneously relax the pressure on the mass of granular material and increase it on the other mass and means for adjusting the stationary electrodes with respect to the movable electrodes.

3. In a telephone-transmitter the combination with two electrodes rigid with respect to the diaphragm of a third electrode having two carbon-faces both firmly secured to the diaphragm so as to move back and forward with it, said electrode being situated between the stationary electrodes, and granular carbon situated between the moving and each of the stationary electrodes.

4. In a telephone-transmitter the combination with two electrodes rigid with respect to the diaphragm of a third electrode having the carbon-faces both firmly secured to the diaphragm so as to move back and forward with it, said electrode being situated between the stationary electrodes, granular carbon situated between the moving and each of the stationary electrodes and means for adjusting each of the stationary electrodes to and from the moving electrode.

5. In a telephone-transmitter, the combination with the diaphragm of a perforated electrode adjacent thereto, a rod extending from the diaphragm through and movable in the perforated electrode, an electrode secured to said rod and granular conducting material situated between the electrodes.

6. In a telephone-transmitter the combination of an electrode-box as J, one or more fixed electrodes situated therein, one or more movable electrodes also situated in said box and secured to the diaphragm and an elastic washer extending out from the periphery of

the movable electrode or electrodes and serving at once to support the same and to form partitions in the box.

5 7. In a telephone-transmitter the combination with two electrodes stationary with respect to the diaphragm of a third electrode secured to the diaphragm so as to move back and forward with it and situated between the stationary electrodes, granular carbon situated between the moving and each of the stationary electrodes and means for simultaneously adjusting the two stationary electrodes longitudinally.

15 8. In a telephone-transmitter the combination with two electrodes stationary with respect to the diaphragm of a third electrode secured to the diaphragm so as to move back and forward with it and situated between the stationary electrodes, granular carbon situated between the moving and each of the stationary electrodes, means for adjusting each of the stationary electrodes to and from the moving electrode and means for simultaneously adjusting the two stationary electrodes longitudinally.

30 9. In a telephone-transmitter the combination of an electrode-box as J adapted to contain granular carbon, two stationary electrodes, a moving electrode situated between the stationary electrodes and attached to the diaphragm and a light washer secured to the moving electrode and adapted to form a partition in the box to prevent the mixing of the carbon on its two faces.

35 10. In a telephone-transmitter the combination of an electrode-box as J adapted to contain granular carbon, two stationary electrodes, a moving electrode situated between the stationary electrodes and attached to the diaphragm, a light washer secured to the moving electrode and adapted to form a partition in the box to prevent the mixing of the carbon on its two faces and similar washers attached to the two stationary electrodes and acting to hold the carbon to the front thereof.

45 11. In a telephone-transmitter the combination of an electrode-box as J adapted to contain granular carbon; two stationary electrodes secured to and adjustable with the box, a moving electrode attached to and moving with the diaphragm said electrode being situated in the box between the stationary elec-

trodes and granular carbon contained in the box and situated between the moving and the stationary electrodes.

55 12. In a telephone-transmitter the combination of an electrode-box as J adapted to contain granular carbon, two stationary electrodes each independently adjustable in the box, a moving electrode attached to and moving with the diaphragm, said electrode being situated in the box between the stationary electrodes and granular carbon contained in the box and situated between the moving and the stationary electrodes.

65 13. In a telephone-transmitter the combination of an electrode-box as J adapted to contain granular carbon, two stationary electrodes each independently adjustable in the box and both adjustable with the box, a moving electrode attached to and moving with the diaphragm said electrode being situated in the box between the stationary electrodes and granular carbon contained in the box and situated between the moving and the stationary electrodes.

75 14. In a telephone-transmitter the combination of two stationary electrodes situated directly in line with the diaphragm and the one nearest said diaphragm having a perforation formed through it with a rod attached to the diaphragm and extending directly therefrom through the perforated electrode and a moving electrode situated between the stationary electrode and secured to the rod aforesaid and granular carbon situated between the moving and stationary electrodes.

80 15. In a telephone-transmitter the combination of two stationary electrodes situated directly in line with the diaphragm and the one nearest said diaphragm having a perforation formed through it with a conducting insulated rod attached to the diaphragm and extending directly therefrom through the perforated electrode and a moving electrode situated between the stationary electrode and secured to the rod aforesaid and granular carbon situated between the moving and stationary electrodes.

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Witnesses:

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