

(No Model.)

2 Sheets—Sheet 1.

W. C. TURNBULL.  
TELEPHONE TRANSMITTER.

No. 339,121.

Patented Mar. 30, 1886.

Fig. 1.

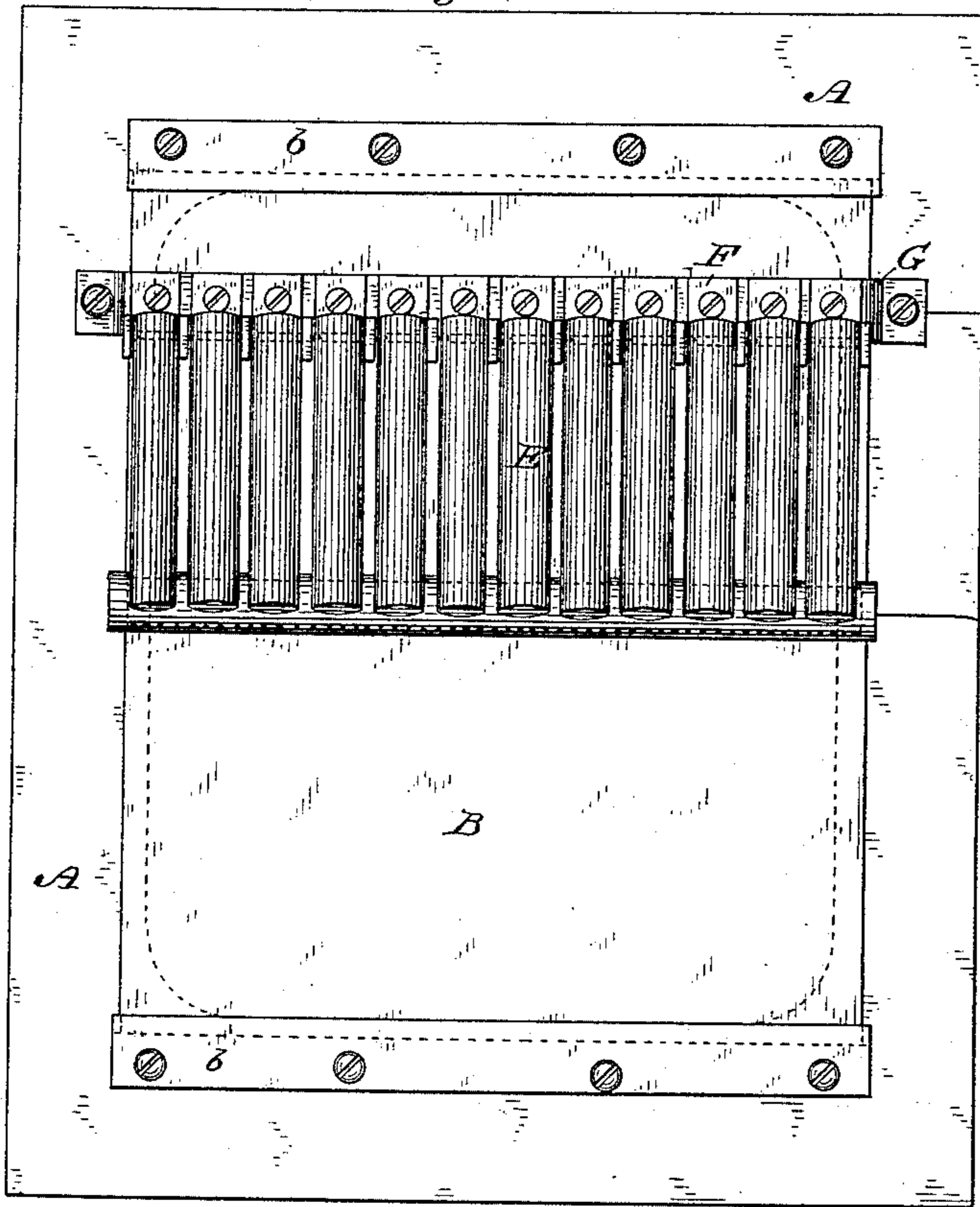


Fig. 2.

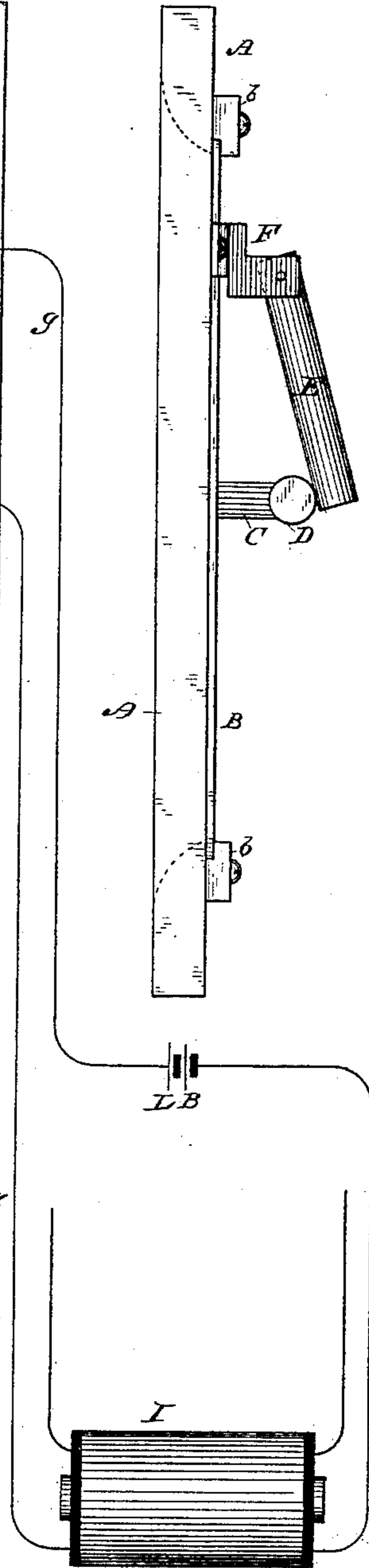


Fig. 3.

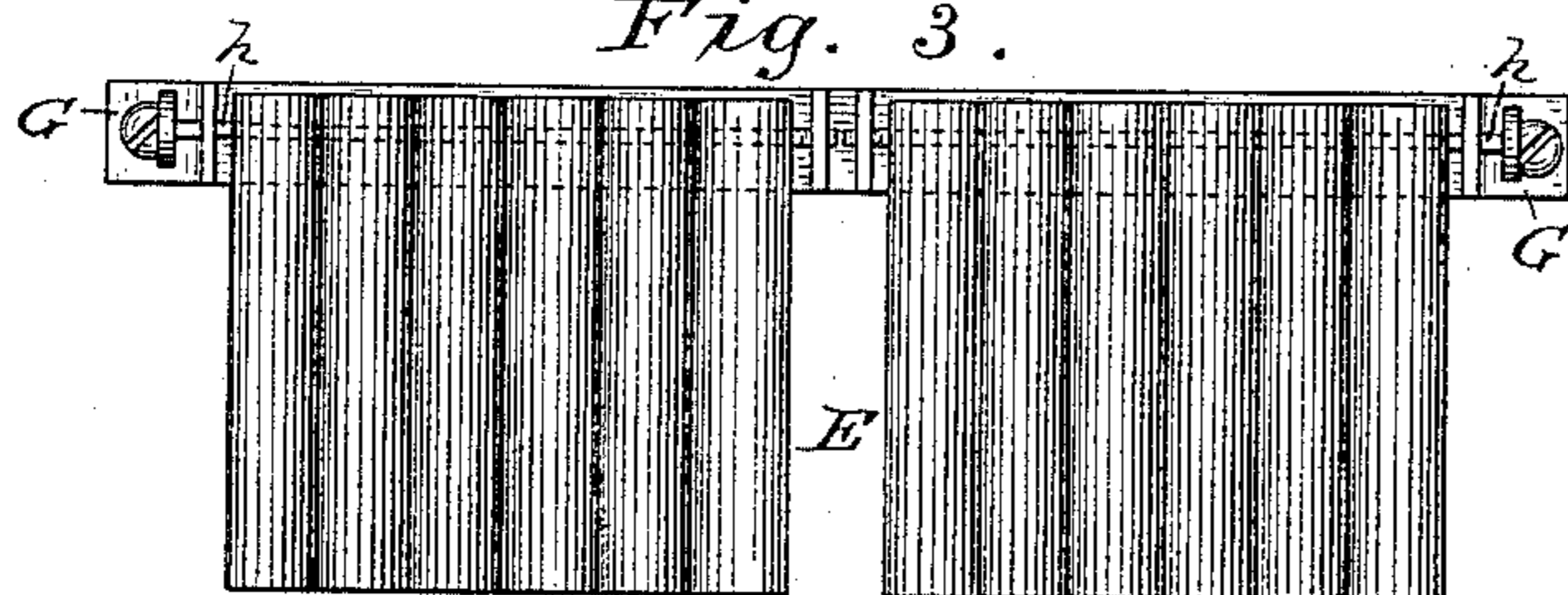
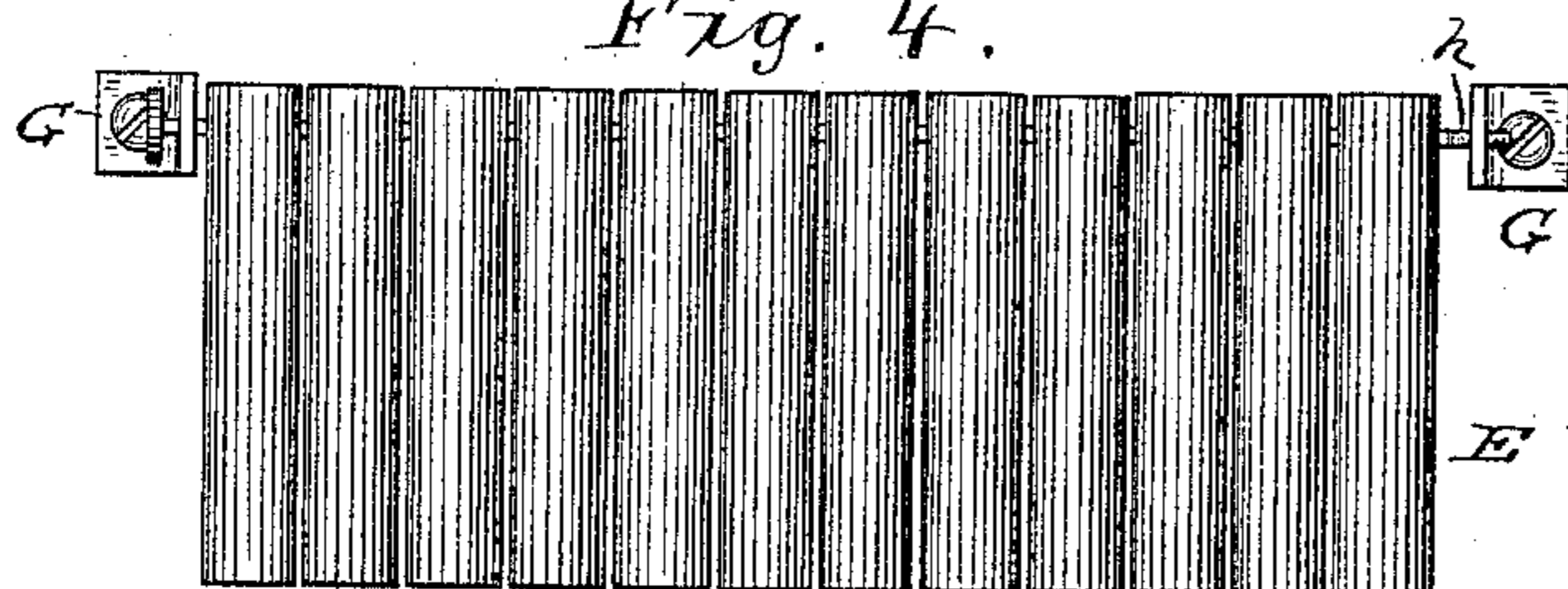


Fig. 4.



WITNESSES

Ed. A. Newman.  
Al. C. Newman.

INVENTOR  
Wm. C. Turnbull,  
By his Attorneys  
Caldwin, Hopkins & Ryba

(No Model.)

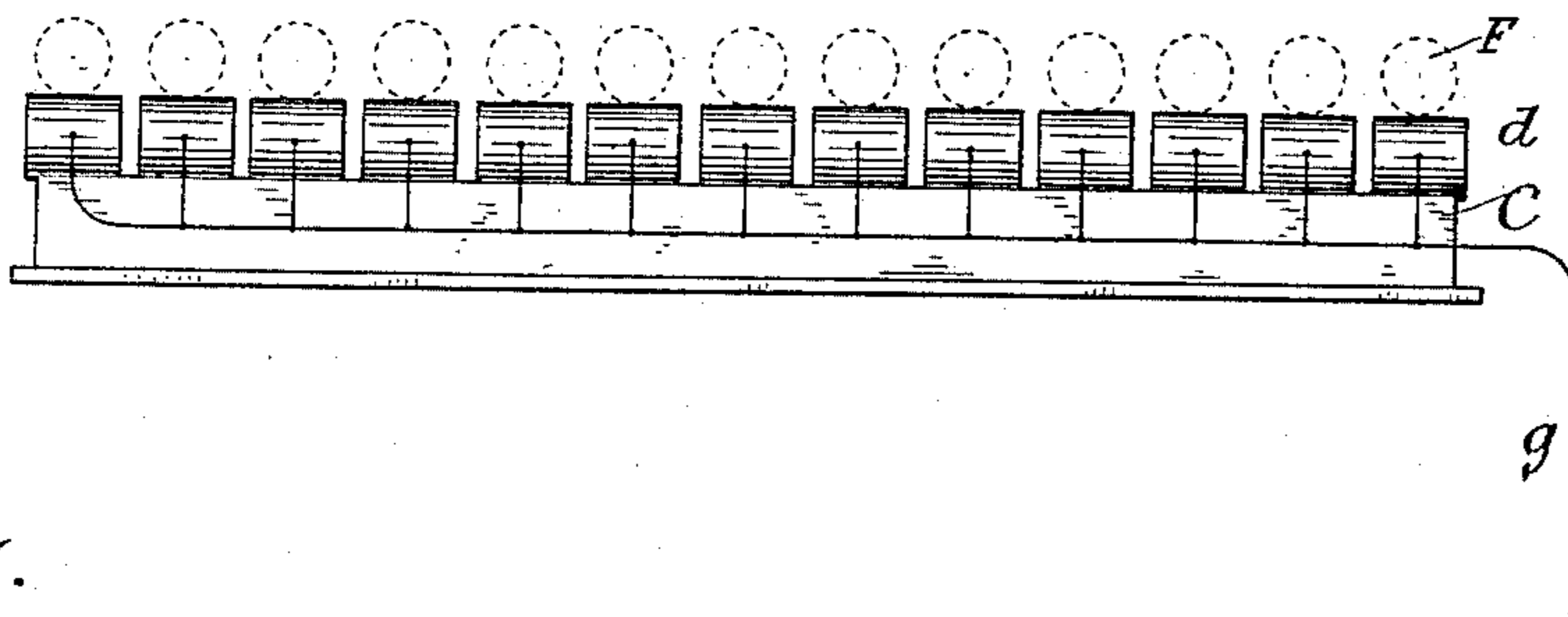
2 Sheets—Sheet 2.

W. C. TURNBULL.  
TELEPHONE TRANSMITTER.

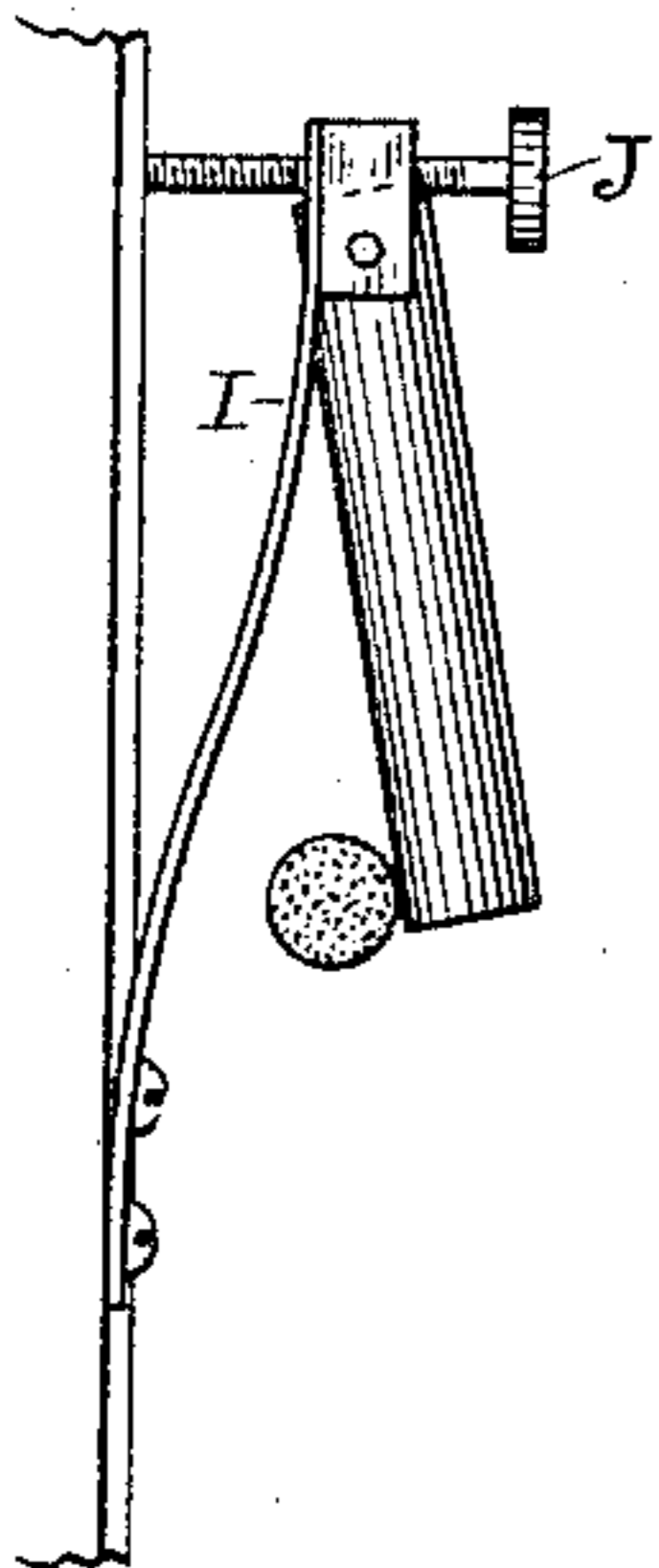
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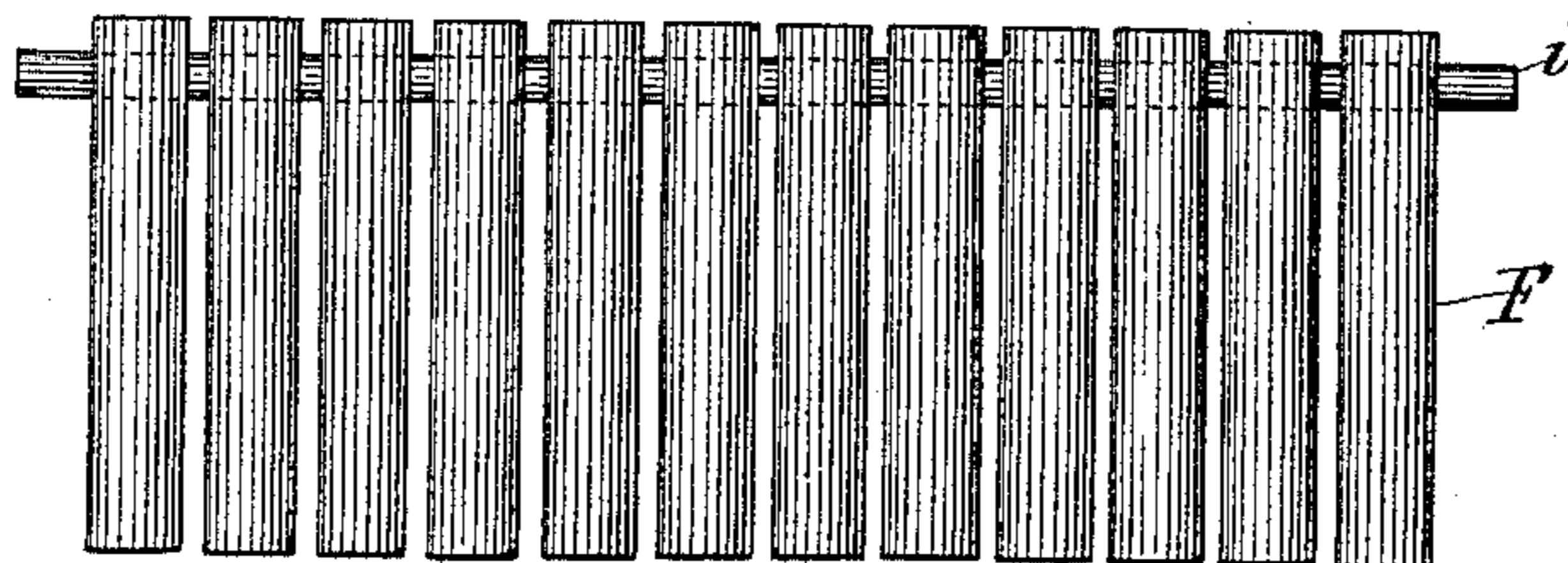
*Fig. 5.*



*Fig. 7.*



*Fig. 6.*



WITNESSES

*Ed. A. Newman,*  
*Al. C. Newman,*

INVENTOR  
*Wm C. Turnbull*  
By *his Attorneys*  
*Baldwin, Hoffkins & Payson.*

# UNITED STATES PATENT OFFICE.

WILLIAM C. TURNBULL, OF BALTIMORE, MARYLAND.

## TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 339,121, dated March 30, 1886.

Application filed April 18, 1885. Serial No. 162,691. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM C. TURNBULL, of Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Telephonic Transmitters, of which the following is a specification.

The object of my invention is to provide a telephone-transmitter having a large capacity for transmitting electrical undulations corresponding with the waves produced by sound, and at the same time one which will not require special adjustment, but will always remain in good working condition.

My invention relates to the general class of gravity contact telephones.

I am aware that heretofore it has been proposed to employ a series of pivoted carbon contact-arms or electrodes carried upon a frame or bar supported by the case of the instrument, and projecting from said bar toward the transmitting diaphragm, and resting by gravity on a transverse bar carried by a post or support projecting from the diaphragm, as shown in the patent of Olmsted, No. 252,132, of January 10, 1882. In that arrangement, however, the bar upon which the series of carbon electrodes or arms are pivoted is in the same plane with the transverse bar carried by the diaphragm. There is, therefore, in such an arrangement a tendency for the transverse bar carried by the diaphragm in its vibration to rub along the under faces of the pivoted carbon arms which lie upon it. Such an arrangement is objectionable, because this grating or scraping action will interfere with the purity of the sounds transmitted.

I am also aware that it has been proposed to employ two carbon arms, which stand upon or are supported at their lower ends and lean against a carbon-contact on the diaphragm, as shown in the patent of Drawbaugh, No. 272,865, of February 27, 1883.

I am also aware that heretofore it has been proposed to make a transmitter having one electrode on the diaphragm and the other electrode carried by an arm pivoted in rear of the diaphragm and in rear of the face of the electrode carried by the diaphragm, as shown in the patent of Main, No. 249,190, of November 8, 1881.

I do not, therefore, broadly claim a multiple gravity contact telephone, nor any of the subject-matter set forth in the several patents referred to.

In the accompanying drawings, Figure 1 is an inside view of a door of an ordinary transmitting telephone-box, showing the transmitting contacts and the induction coil and circuits in diagram. Fig. 2 is a side view of the same. Figs. 3 and 4 are detail views showing different ways of mounting the carbon contacts or electrodes. Fig. 5 is a detail view of still another modification. Fig. 6 is a detail view of another modification, and Fig. 7 a detail view of electrode adjusting devices.

A is the door of an ordinary telephone-transmitter box, or the frame in which the diaphragm B is mounted. The diaphragm is rectangular in shape, and is confined at the top and bottom only by cleats or straps b. I preferably make the diaphragm of wood, but of course any other suitable material may be employed. A block, C, also preferably of wood, and extending transversely across the diaphragm, is secured thereto, as clearly illustrated in Fig. 2, and by the dotted lines in Fig. 1. This block carries the diaphragm-electrode D, which is in Fig. 1 shown as a continuous carbon rod. The opposing swinging pendent electrodes E, which rest lightly by gravity in contact with the bar D, are in Fig. 1 each shown as mounted on a bearing-pin carried by a metal bracket, F, all the brackets being bolted to a common metal cross-bar, G, which is secured at each end to the frame A. It will be perceived that the pendent swinging electrodes F are mounted upon a hinge or pivot bearing located in a vertical plane between that of the diaphragm and the outer face of the carbon electrode or rod D, so that the ends of the pendent electrodes rest lightly by gravity upon the bar D.

The drawings show a full-sized instrument, and I prefer to employ twelve pendent electrodes, as illustrated. Such a number of cylindrical polished carbon pendants resting upon the cylindrical polished carbon electrode or bar D give a resistance in the circuit most favorable for the transmission of speech. By mounting each pendant in an independently-

removable bracket any one of the pendants may be changed without interfering with the others. As the diaphragm B is unconfined at the side edges and the electrode D extends entirely across the diaphragm, the amplitude of vibration of the diaphragm is the same at all points in the transverse line in which the carbon D is secured on the diaphragm. I therefore obtain a large variation of contact and a corresponding increase in the amplitude of the electric waves or undulations. As the pendent electrodes are supported by bearings located above the electrode D, and only slightly in front thereof, the vibration of the electrode D causes variations of contact between itself and the pendent electrodes without producing any grating or scraping action.

I have found that by employing a cylindrical rod D and cylindrical pendants F, and polishing them so that they have a smooth hard surface, I eliminate entirely from the surface any disturbing influence, which would arise from the contacts of the surfaces where ordinary unpolished carbon is employed.

*g* represents the primary circuit of the induction-coil I, one pole of the local battery L B being connected with the rod G, which supports the pendants, and the other with the electrode D.

Instead of supporting the pendants upon independent brackets, as shown in Figs. 1 and 2, an arrangement such as that shown in Fig. 3 may be employed, in which the twelve pendants are divided into groups, each group being pivoted upon a metal bar, *h*, mounted in lugs on the common supporting-bar G; or the pendants may be supported as illustrated in Fig. 4, in which they are all strung upon a metal rod, *h*, which is supported at each end by brackets G G, mounted on the frame; or the pendants may be supported as shown in Fig. 6, in which a carbon bar, *i*, mounted in brackets, as illustrated in Fig. 1, may have the pendent electrodes strung upon it. The carbon pivot will not oxidize, and the surfaces of contact between it and the swinging electrodes are kept of a uniform resistance. Such a construction gives a clear and distinct articulation, and the carbon pivot is preferably a metallic one.

Instead of employing a single bar electrode D, mounted upon the diaphragm, I may employ a series of pieces of carbon, *d*, preferably cylindrical, each independently mounted on the block C, and having a corresponding pendent electrode, F, resting upon it. All the blocks *d* are connected, as clearly shown, in the primary circuit *g*. If desired, of course, some means for adjusting the contacts of the telephone may be employed—that is, the bar or frame carrying the pendent electrodes may be adjusted to vary the angle of the pendants to the electrode carried by the diaphragm. I do not, however, limit my invention to any such device. Obviously a

great many different forms may be used—as, for instance, an arrangement such as that shown in Fig. 7 may be used. In that figure the bar or frame on which the pendent electrodes are hinged may be supported at each end in the ends of plate-springs I, mounted on the frame. These springs normally press the bar or frame carrying the electrodes toward the diaphragm; but it may be adjusted away from the diaphragm by means of the screws J, which pass through the springs and bear upon the frame, as will be obvious.

In another application filed by me July 7, 1885, No. 170,355, I have shown an instrument corresponding in part with that herein shown and described; but the subject-matter claimed in said application is hereby disclaimed in this case.

I am aware of the well-known form of Hughes' transmitter, in which the vertical carbon pencil is supported at top and bottom by a carbon block; and I do not claim such subject-matter.

I am aware of British Patent No. 3,551 of 1884, and do not claim any subject-matter disclosed therein.

I am aware of British Patent No. 3,551 of 1884, which shows in Figs. 1 and 2 a microphone having several pairs of electrodes; but the instrument has no diaphragm. On the contrary, the pairs of electrodes are independently disturbed by the sound-waves.

I am also aware that a suspended electrode, carried by an elastic support so as to rest in contact with the electrode on the diaphragm by gravity has been used—as, for instance in the patent of Hopkins, No. 238,902.

I am also aware that it has been proposed to suspend an electrode by means of a thread or cord and have it rest in contact with an electrode carried by the diaphragm, as shown, for instance, in the patent of Sémal, No. 309,742, and I do not therefore claim such construction.

I am aware of British Patent No. 2,265 of 1881, which shows, broadly, a wooden diaphragm confined at the side edges and having electrodes arranged transversely across the diaphragm on which pivoted pendent electrode rest by gravity, and I do not therefore claim such subject-matter.

In a division of this application, filed by me January 21, 1886, I have shown and described an instrument like that herein shown; but I hereby disclaim in this case any subject-matter claimed in said divisional application.

I claim as my invention—

1. The combination of the transmitting-diaphragm secured at the top and bottom and free at its side edges, the transverse carbon electrode carried thereby, and a series of pendent carbon electrodes resting by gravity on the electrode carried by the diaphragm, substantially as and for the purpose set forth.

2. The combination of the diaphragm confined at the top and bottom and free at its side edges, the carbon electrode carried thereby and arranged transversely across its face, and a series of carbon electrodes which rest  
5 by gravity on said transverse carbon electrode.

In testimony whereof I have hereunto subscribed my name.

WILLIAM C. TURNBULL.

Witnesses:

S. A. MORSE,  
GEO. McCAFFRAY.