

(No Model.)

2 Sheets—Sheet 1.

W. C. TURNBULL.  
TELEPHONE TRANSMITTER.

No. 336,877.

Patented Feb. 23, 1886.

Fig. 1.

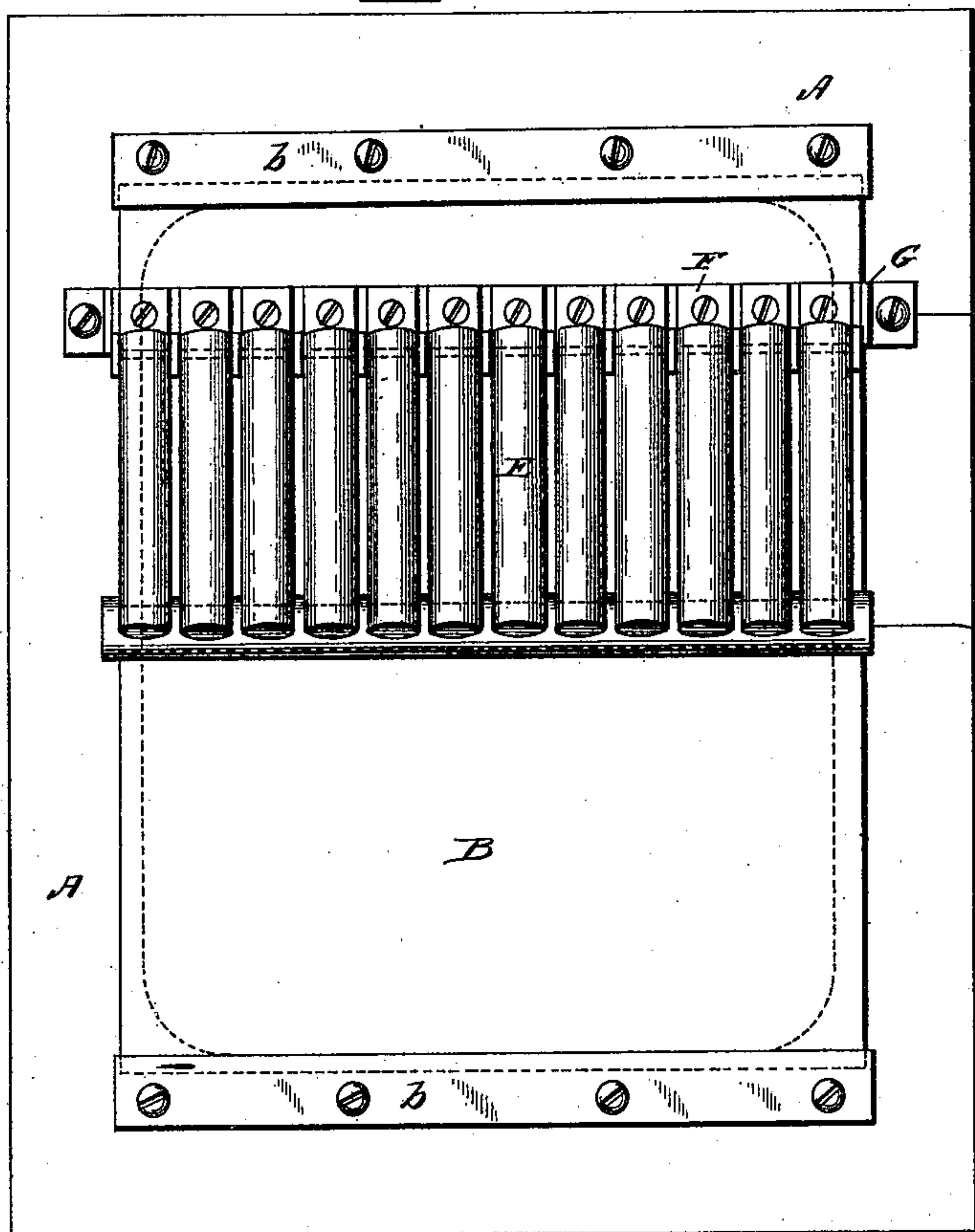


Fig. 2.

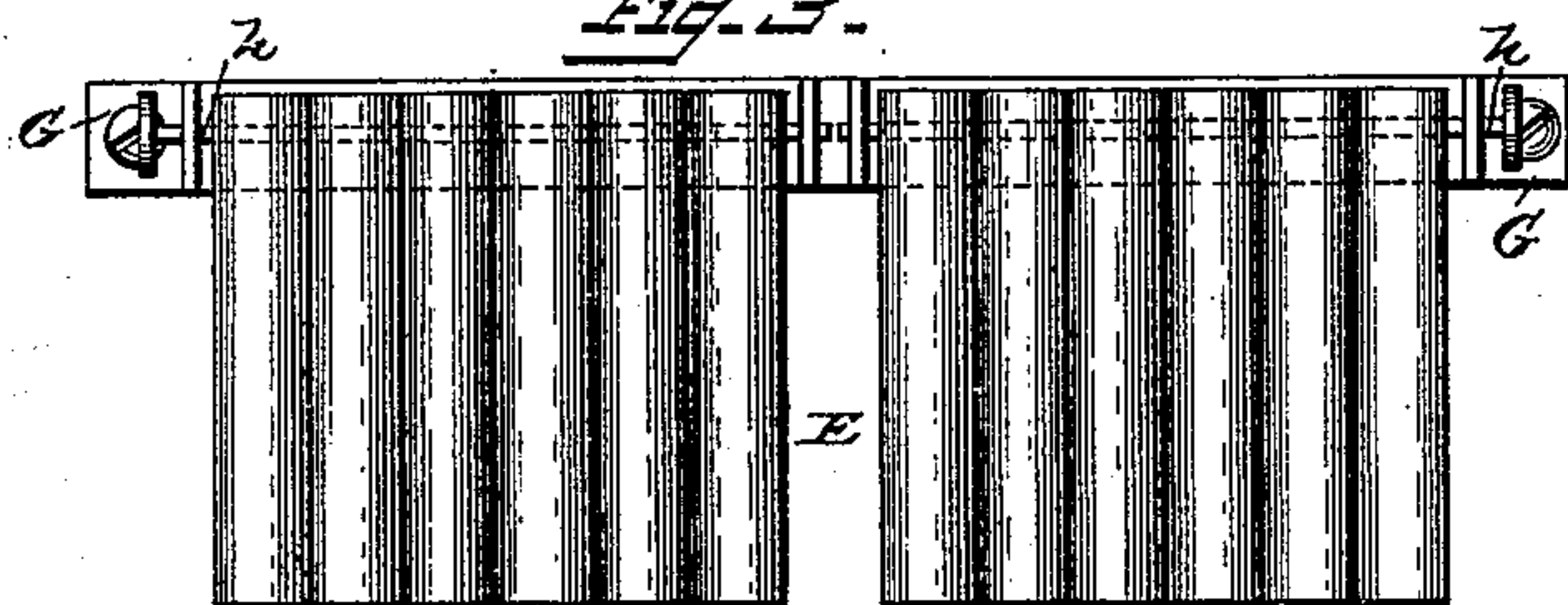


Fig. 3.

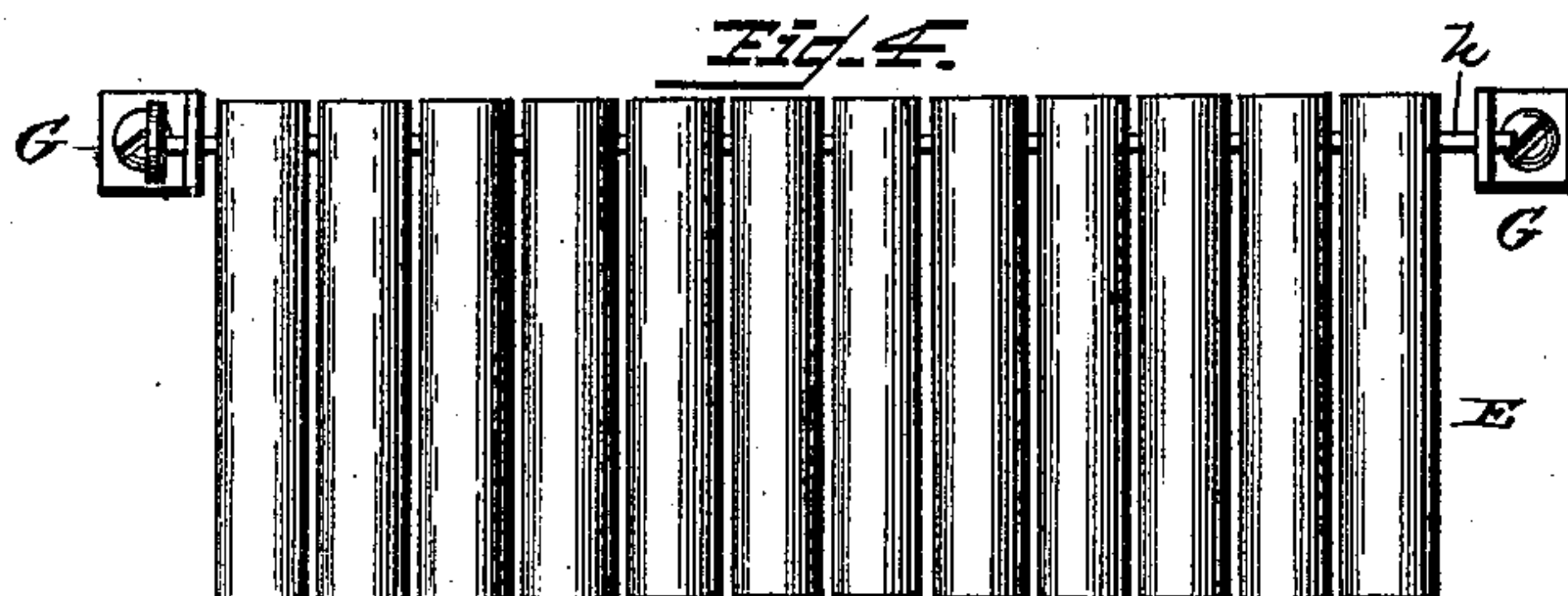
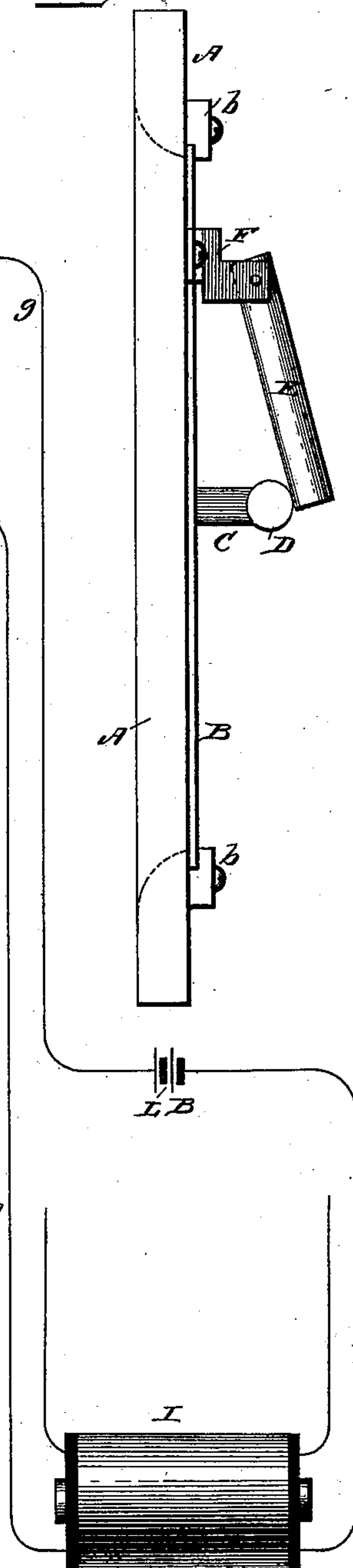


Fig. 4.



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Fig. 5.

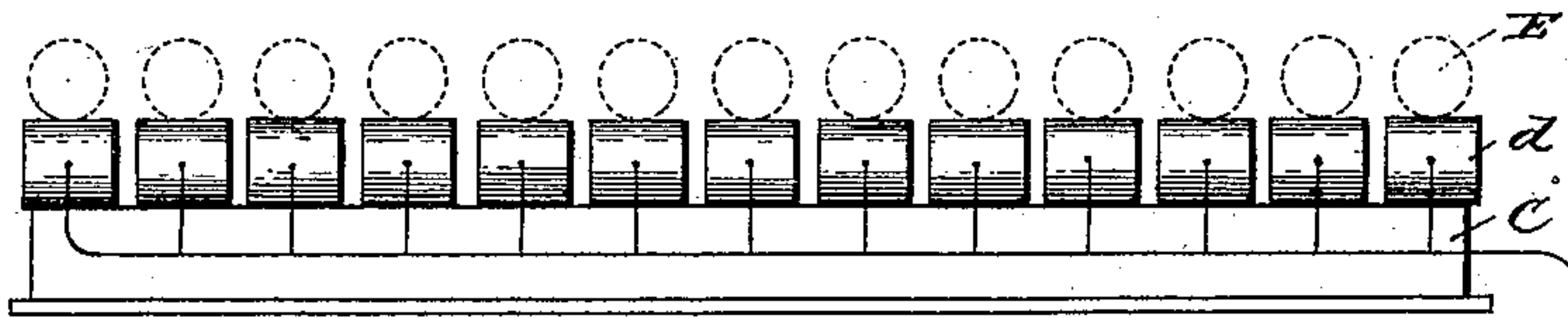


Fig. 7.

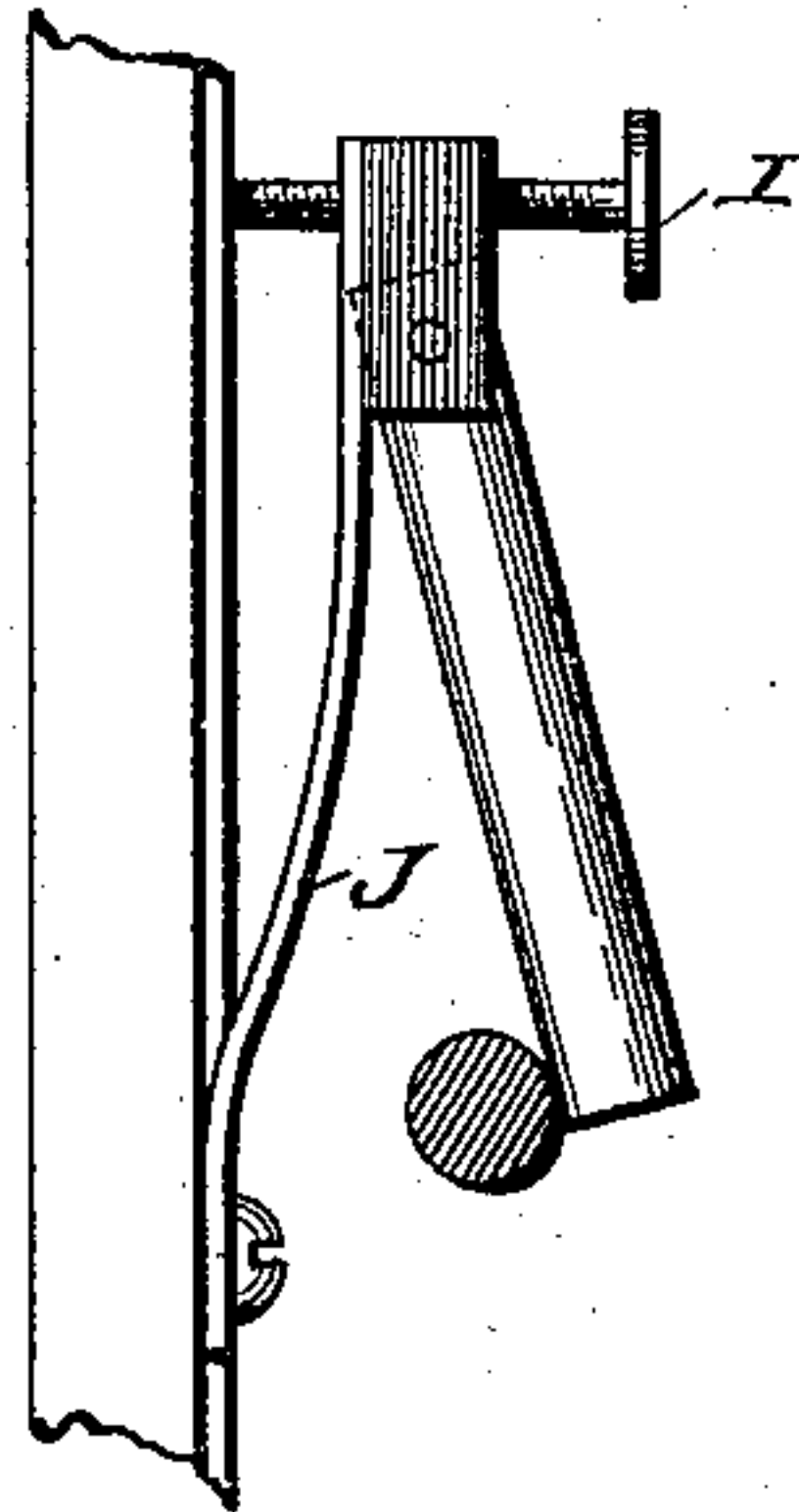
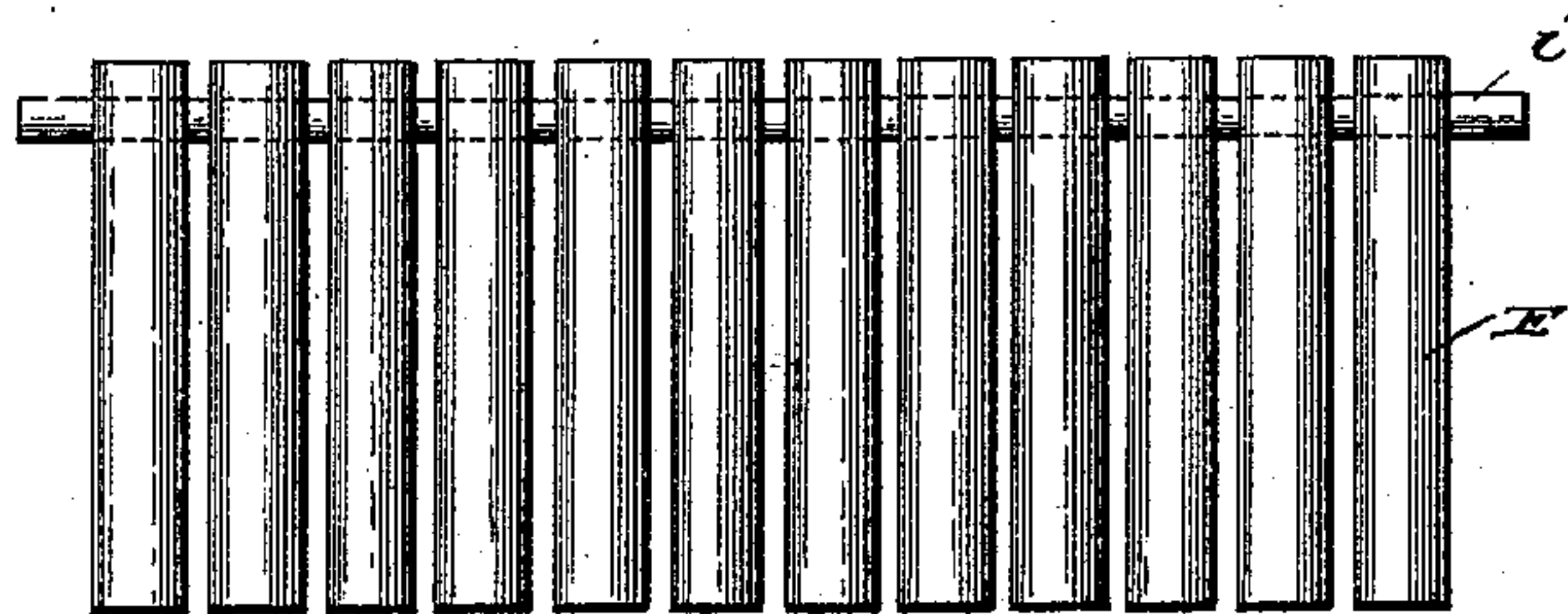


Fig. 6.



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# UNITED STATES PATENT OFFICE.

WILLIAM C. TURNBULL, OF BALTIMORE, MARYLAND.

## TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 336,877, dated February 23, 1886.

Application filed January 23, 1886. Serial No. 189,552. (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 do not broadly claim a multiple gravity-contact telephone.

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 E 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 E, 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  
 5 contact between it and the swinging electrodes are kept of a uniform resistance. Such a construction gives a clear and distinct articulation.

Instead of employing a single bar-electrode *D* mounted upon the diaphragm, I may employ a series of pieces of carbon, *d*, preferably  
 10 cylindrical, each independently mounted on the block *C*, and having a corresponding pendent electrode, *E*, resting upon it. All the blocks *d* are connected, as clearly shown, in the  
 15 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  
 20 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  
 25 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 *J*, mounted on the frame. These springs normally press the bar or frame carrying the electrodes toward the diaphragm;  
 30 but it may be adjusted away from the diaphragm by means of the screws *I*, which pass through the springs and bear upon the frame, as will be obvious.

35 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  
 40 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  
 45 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 Semal, No. 50 309,742, and I do not therefore claim such construction.

I am aware that in the patent of Hopkins, No. 238,902, both the diaphragm and the electrode resting against it have been adjusted  
 55 bodily to vary the pressure between the electrodes, and I do not therefore claim such subject-matter.

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  
 60 block, and I do not claim such subject-matter.

In another application filed by me July 7, 1885, No. 170,355, I have shown an instrument corresponding in part with that herein  
 65 shown and described; but the subject matter claimed in said application is hereby disclaimed in this case. This application is a division of a case filed by me April 18, 1885, and numbered 162,691, and I hereby disclaim  
 70 herein any subject-matter claimed in said application.

I claim as my invention—

1. The combination of the diaphragm, the electrode carried thereby, the pivoted pendent  
 75 carbon electrode or electrodes which make contact with the electrode of the diaphragm, and a carbon pivot or bearing on which said carbon electrodes are mounted.

2. The combination, in a telephone-transmitter, of a swinging, hinged, or pivoted carbon  
 80 electrode and a carbon pin or bearing on which it is hinged.

3. The combination of the diaphragm, a series of pivoted pendent swinging electrodes  
 85 formed of cylindrical pieces of carbon which are bored or perforated at their ends to form their bearings, the carbon rod on which said electrodes are pivoted, and an opposing electrode upon which they rest by gravity.  
 90

In testimony whereof I have hereunto subscribed my name.

WILLIAM C. TURNBULL.

Witnesses:

ANSON S. TAYLOR,  
 E. C. DAVIDSON.