

(No Model.)

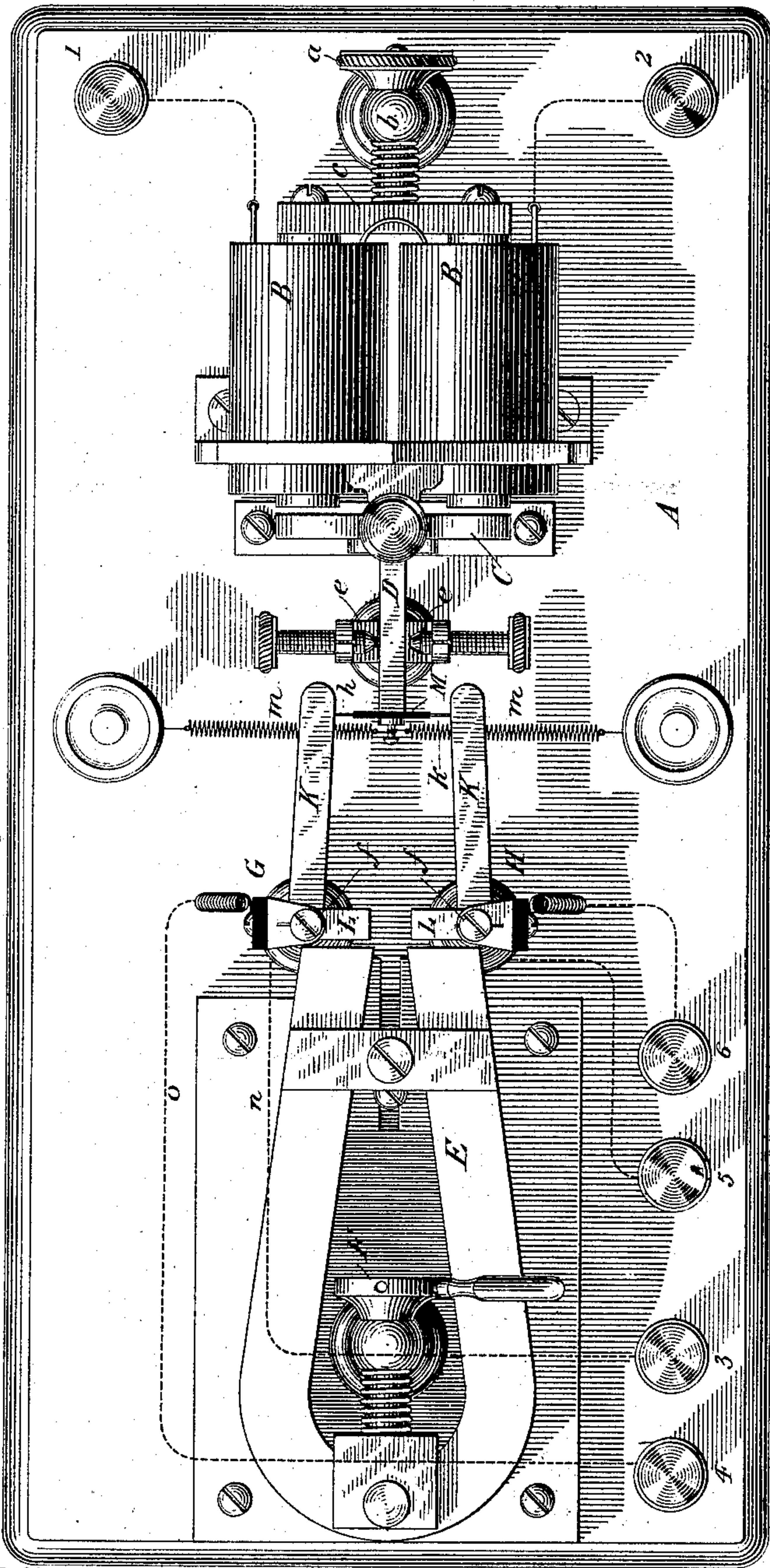
2 Sheets—Sheet 1.

M. G. FARMER.  
TELEPHONE REPEATER.

No. 325,920.

Patented Sept. 8, 1885.

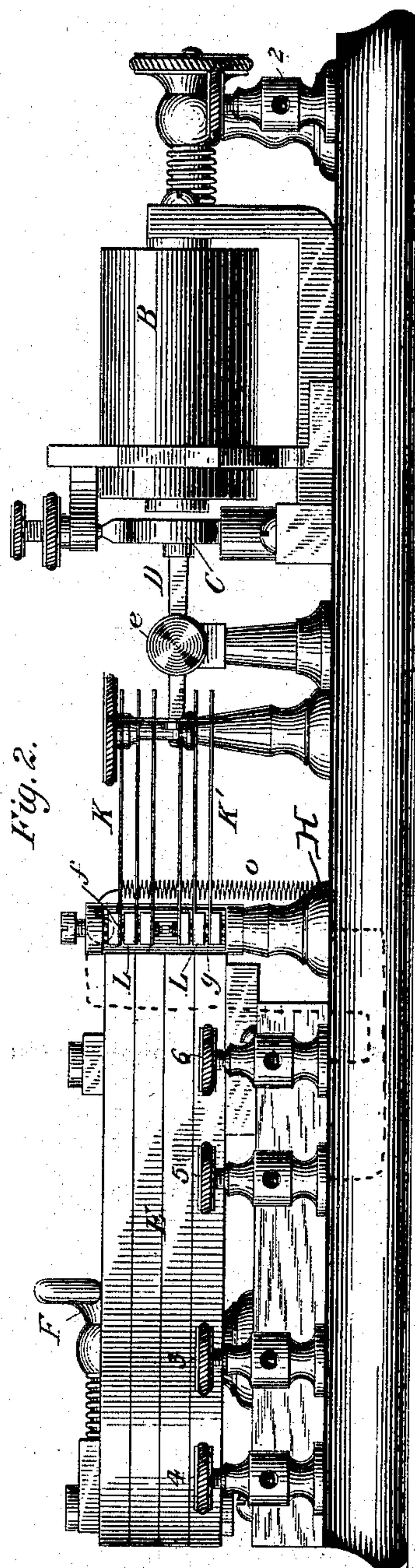
Fig. 1.



Witnesses

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Fig. 2.



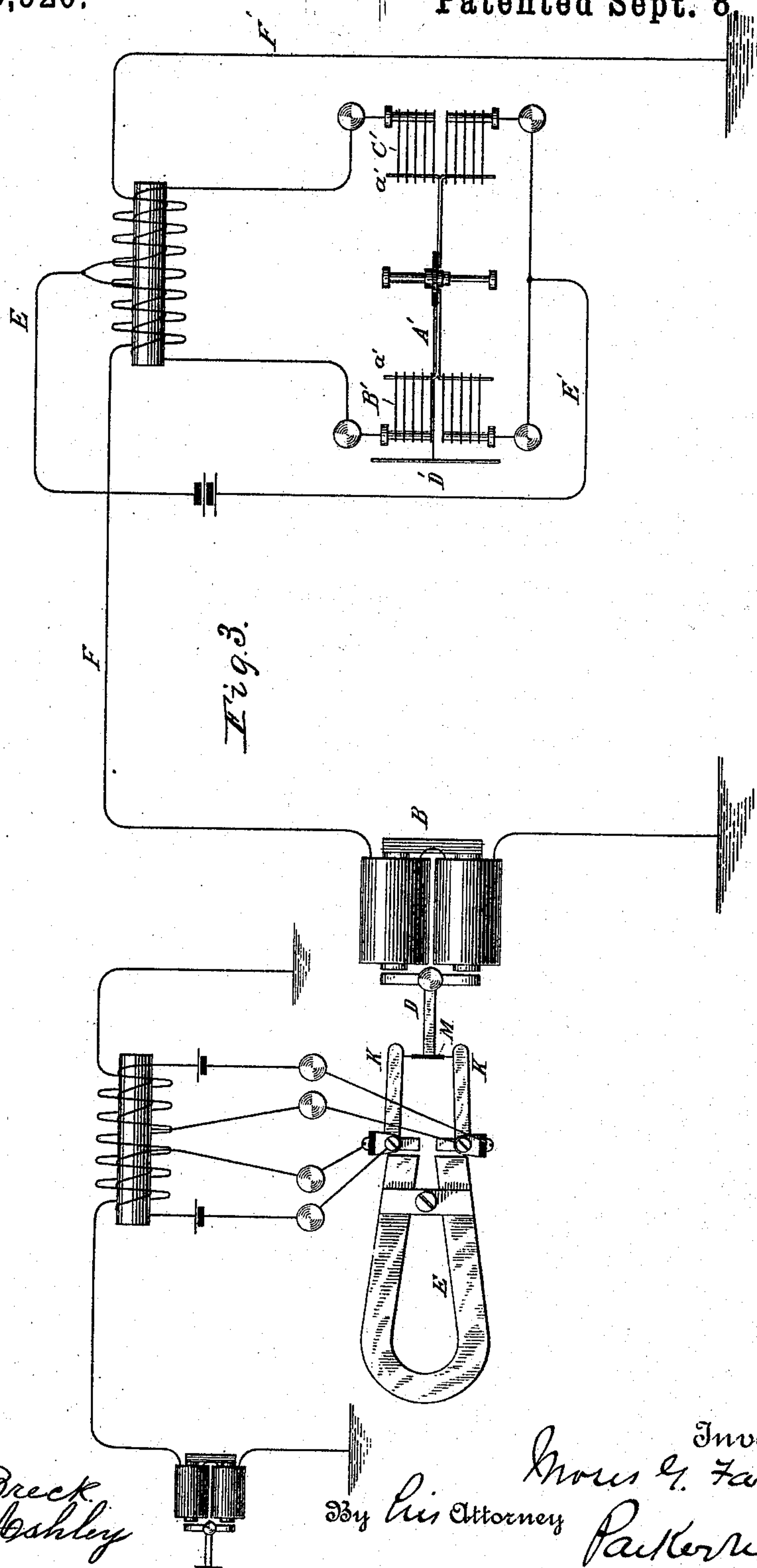
Inventor

Moses G. Farmer  
By his Attorney  
Parker W. Page.

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# UNITED STATES PATENT OFFICE.

MOSES G. FARMER, OF NEWPORT, RHODE ISLAND.

## TELEPHONE-REPEATER.

SPECIFICATION forming part of Letters Patent No. 325,920, dated September 8, 1885.

Application filed January 8, 1885. (No model.)

*To all whom it may concern:*

Be it known that I, MOSES G. FARMER, a citizen of the United States, and a resident of Newport, in the county of Newport and State of Rhode Island, have invented certain new and useful Improvements in Telephone-Repeaters, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

My invention consists in a repeater for use in telephone-circuits for reproducing in one circuit the signals transmitted over another, the instrument being constructed and adapted for uses analogous to those of the ordinary telegraphic repeaters.

Inasmuch as the invention resides chiefly in the mechanical construction of the repeating apparatus, I will explain the same by reference to the accompanying drawings, in which—

Figure 1 is a plan view of the repeating apparatus; Fig. 2, a side elevation of the same with certain parts removed; and Fig. 3, a diagram of the circuits and arrangement therein of the apparatus in a telephone system.

The repeating apparatus is mounted on any suitable form of base, A, and is composed of the parts described below.

B is a sensitive electro-magnet, before the poles of which is pivoted a polarized armature, C. The magnet or armature is provided with the usual means of adjustment, such as an adjusting screw, *a*, passing through post *b* and connected with the cross-bar or back armature *c*.

From the center of the armature C extends at right angles a light arm or bar, D, on either side of which is an adjustable stop, *e*, by means of which the vibration or play of the armature is limited.

Facing the electro-magnet B is a permanent magnet, E, resting on a suitable support and adjustable by means of a screw, F. Close to one pole of this magnet is a post, G, mounted on the base A, and at the other pole is a corresponding post, H. Each post is properly formed for holding two pins, *f g*, in vertical line. These pins serve as bearings for light metallic blades K K', to each of which is attached an iron or steel armature, L, at right angles. The pins *f g* may pass through the armatures, and the armatures are separated

from one another by washers. The attractive force of the magnet exerted upon the armatures L tends to draw the blades K K' together. They are held apart, however, by an insulating-plate, M, carried by the arm D, in the edges of which plate are inserted metal strips *h h'*, upon which the blades K K' make contact. Adjustable spiral springs *m m* are connected to opposite sides of the bar D for adjusting its position.

The base A contains six binding-posts, by means of which the connections are made. Posts 1 and 2 are then connected with the magnet B, and to them the incoming line-wires are connected.

Post 3 is connected by wire *n* with the post G, and post 4 by wire *o* with the pin *f* in post G, which pin is insulated from the post. The circuit from wires *n* to wire *o* is therefore made from the pin *f* through blades or strips K, the metal edge of plate M on the arm D, thence through blades K' back to the post G. Posts 5 and 6 are similarly connected with the post H.

Referring now to Fig. 3, which is a diagram illustrative of the manner of operating and using the above-described apparatus, a transmitter is used consisting of a lever, A', pivoted at its center and divided into two parts, which are insulated from each other. Upon bars *a'* on the ends of this lever rest pivoted metal strips B' C'. The vibration of the lever, which is produced by the vibration of a diaphragm, D', connected with it, varies the contact-pressure between the strips B' C' and the bars *a'*, so that if the strips be connected up in branches of a circuit, E', and these branches carried in opposite directions around the core of an induction-coil, magnetic changes will take place corresponding to the vibrations of the lever, and impulses of current will be developed in the secondary coil and line-wire F'. These impulses, acting upon the magnet B, produce vibrations of the lever or arm D; but a movement of arm D produces with the blades or strips K K' the same effect as lever A' with the strips B C, so that if the strips K K' of each post G H be included in separate circuits or branches of a circuit that pass around the core of an induction-coil, the magnetic conditions of the core will be dis-



turbed by the vibrations of the arm D, and current impulses reproduced in the line H' corresponding to those received by magnet B from the line F, but stronger. In the same way these reproduced impulses may again be repeated, and loud and distinct signals or words transmitted over long lengths of wire.

The moving metallic parts, such as the blades K K', the plates *h k*, and even the arm D, I prefer to make very light, using, preferably, aluminium.

The purpose of the permanent magnet is solely to maintain a certain degree of pressure between the strips K K' and the plates *h k*. In consequence of the use of a number of strips K K' the magnet is much more practicable than springs or similar means, as the force exerted upon the armature is more uniform. It is very desirable to use a number of strips, K K', instead of single strips, as better contact is assured. By using two sets of strips for each circuit or branch the operation of the device is greatly improved, as the change in contact-resistance takes place at two points in the circuit simultaneously.

I do not claim, broadly, herein the multiple contacts; but

What I claim is—

1. A telephonic repeater consisting of an electro-magnet having a polarized vibrating armature and connected with one circuit, in combination with pivoted strips or blades held in contact with a projection from the armature and connected with a second circuit, as set forth.

2. A telephone-repeater consisting of an electro-magnet having a vibrating armature and connected with one circuit, in combination with pivoted strips or blades carrying armatures, a permanent magnet acting upon said armatures for holding the strips in contact

with a projection from the vibrating armature, and circuit-connections through said strips, as set forth.

3. A telephonic repeater consisting of an electro-magnet having a polarized vibrating armature and connected with one circuit, in combination with two sets or groups of pivoted strips or blades bearing upon a projection from the polarized armature, and circuit-connections through said strips, as set forth.

4. The combination, with an electro-magnet, a vibrating polarized armature pivoted in face of the poles of the magnet, an arm extending from the center of the armature, and two insulated metal plates carried by said arm, of two sets of pivoted strips or blades carrying armatures, a permanent magnet acting upon the armatures to hold the strips in contact with the insulated plates carried by the vibrating arm, and circuits connecting with the strips or blades in the manner specified.

5. The combination, with an electro-magnet, a vibrating polarized armature pivoted in face of the poles of the magnet, an arm extending from the center of the armature, and two insulated metal plates carried by said arm, of two sets of pivoted strips or blades carrying armatures, a permanent magnet acting upon the armatures to hold the strips in contact with the insulated plates on the vibrating arm, circuits through the pivoted strips, and an induction-coil the primary coil of which is formed by the wires of said circuits, as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 30th day of December, 1884.

MOSES G. FARMER.

Witnesses:

A. BOURNE,  
WILLIAM B. HEATHERTON.