

(No Model.)

3 Sheets—Sheet 1.

D. DRAWBAUGH.
TELEPHONE REPEATER.

No. 287,111.

Patented Oct. 23, 1883.

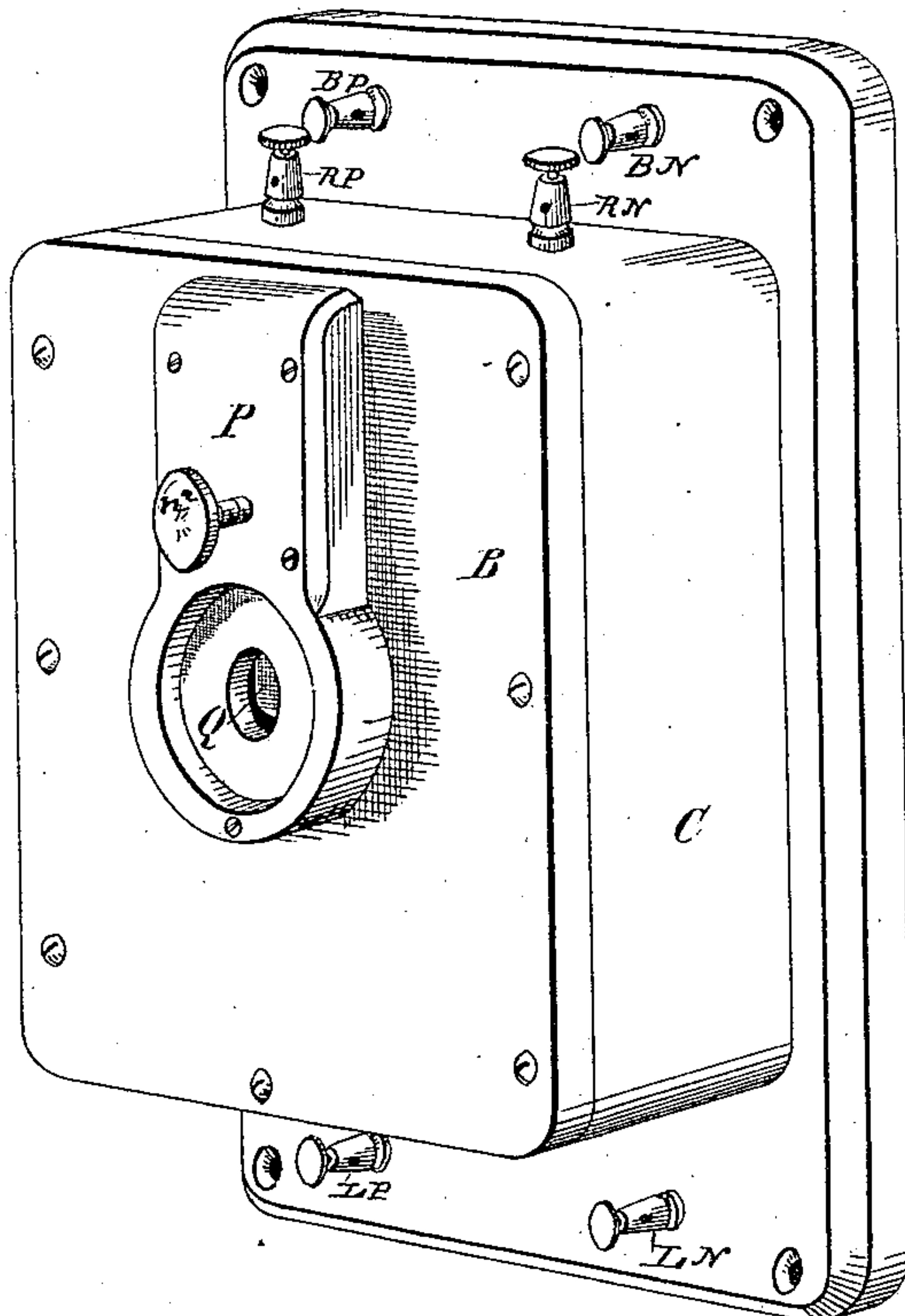


Fig. 1.

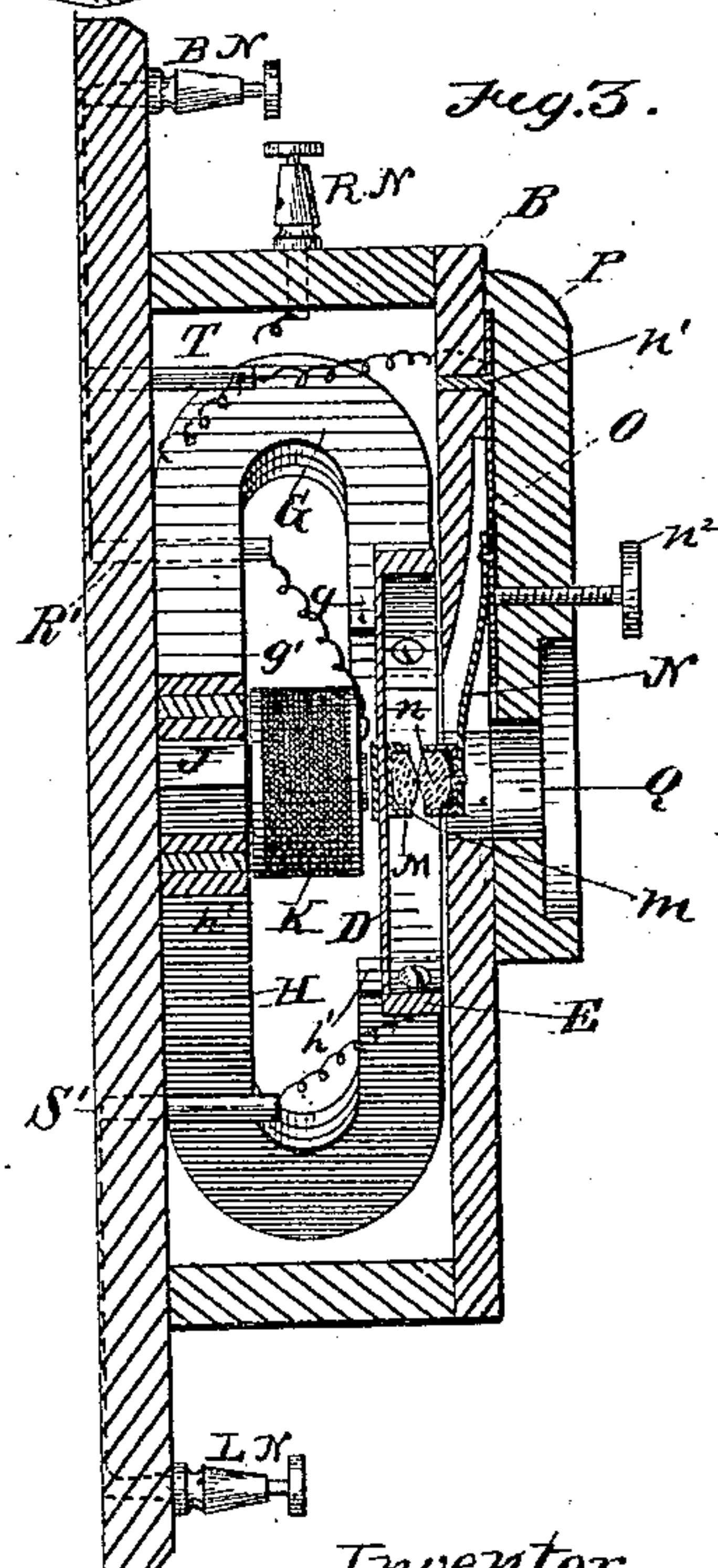


Fig. 3.

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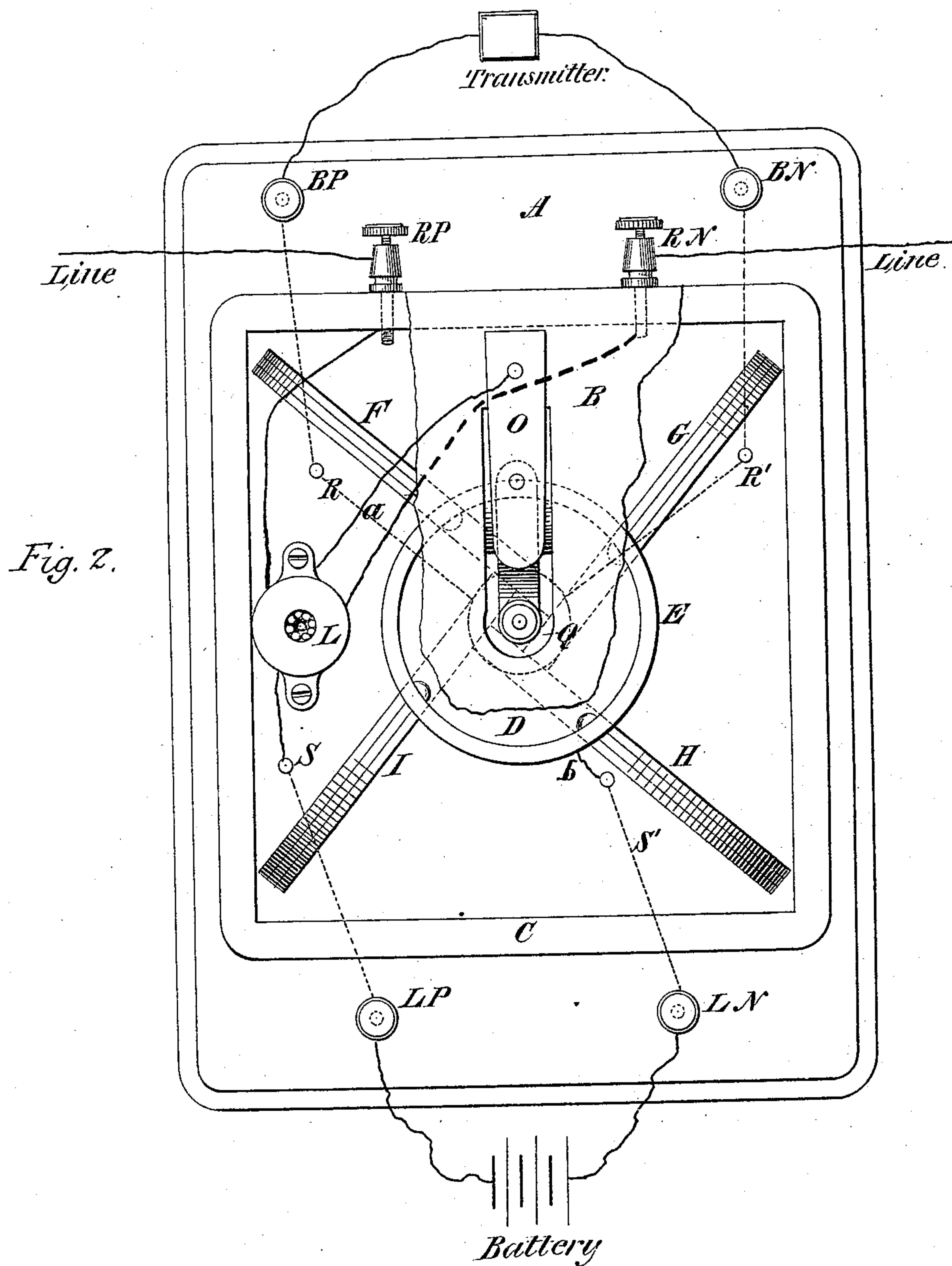
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3 Sheets—Sheet 2.

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WITNESSES:
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3 Sheets—Sheet 3.

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Fig. 4.

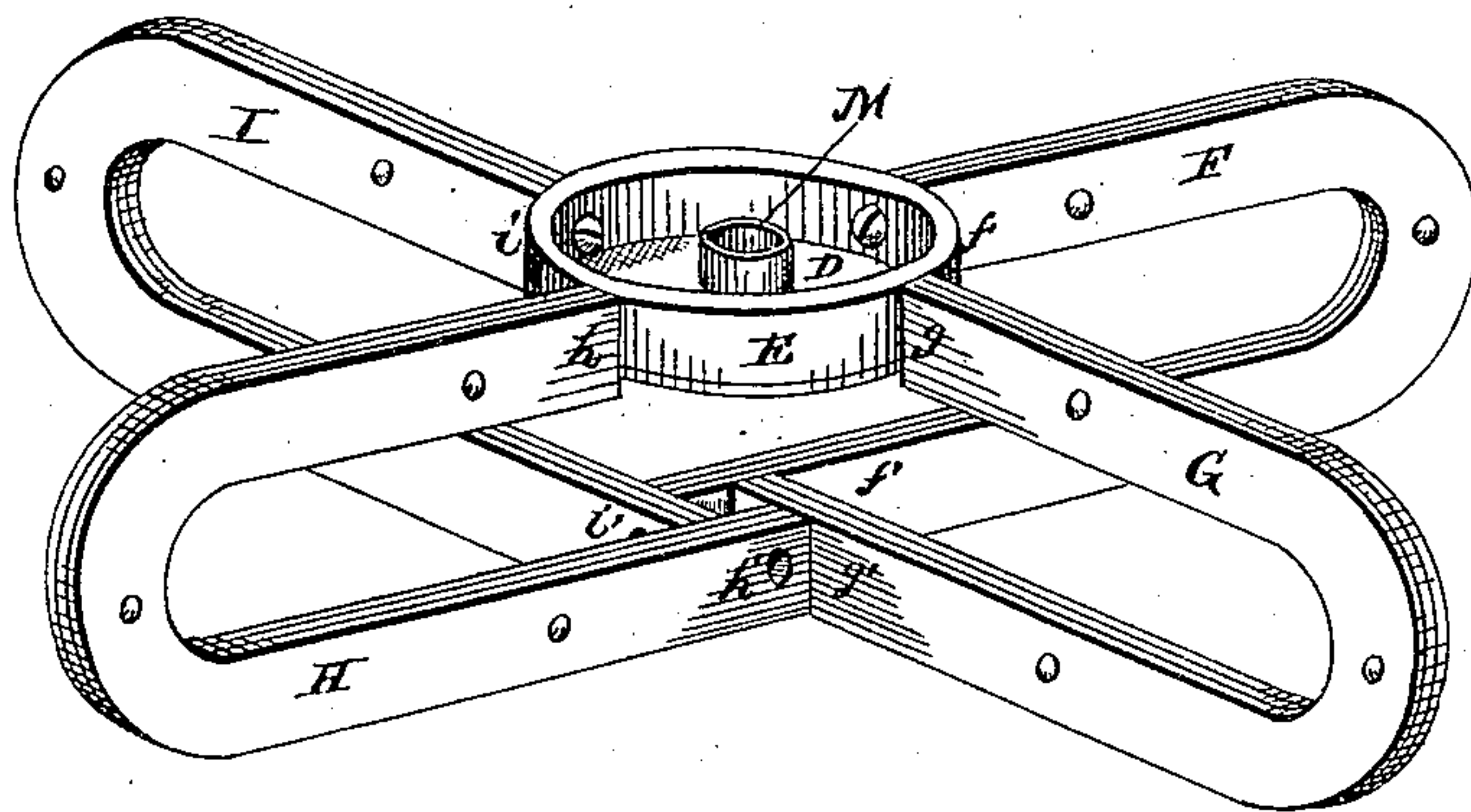


Fig. 5.

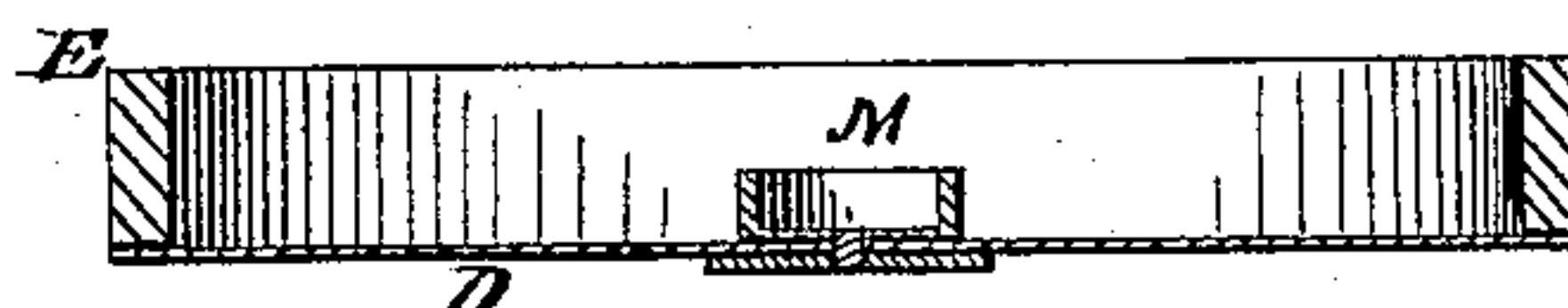


Fig. 6.

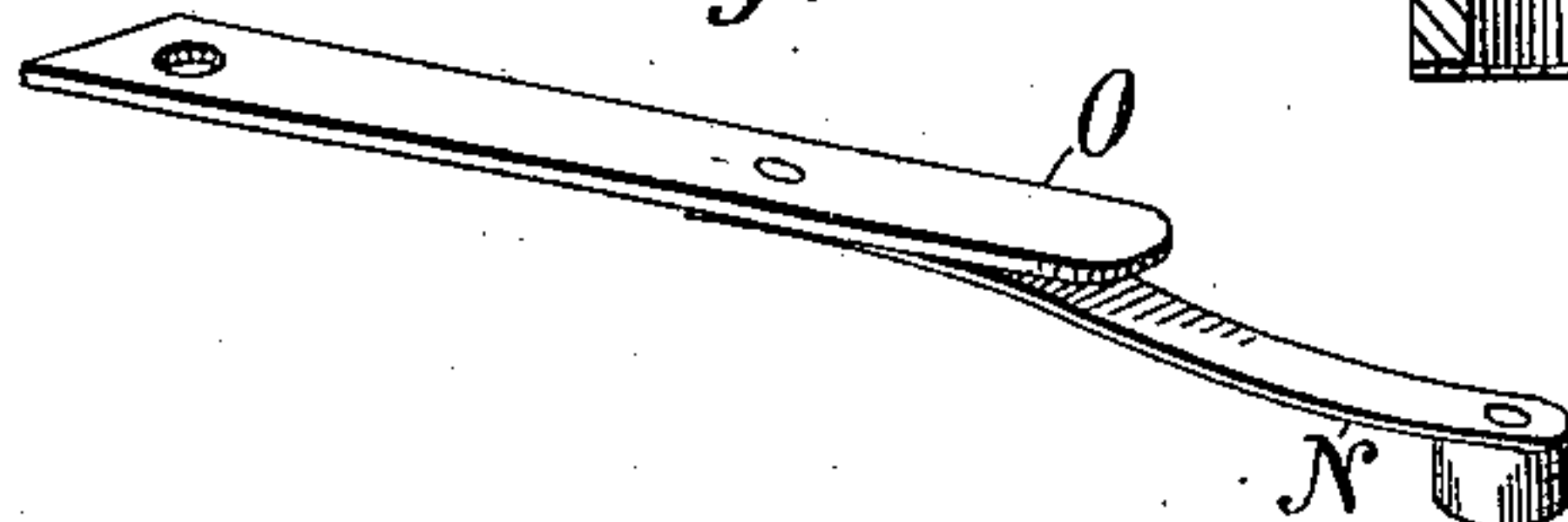
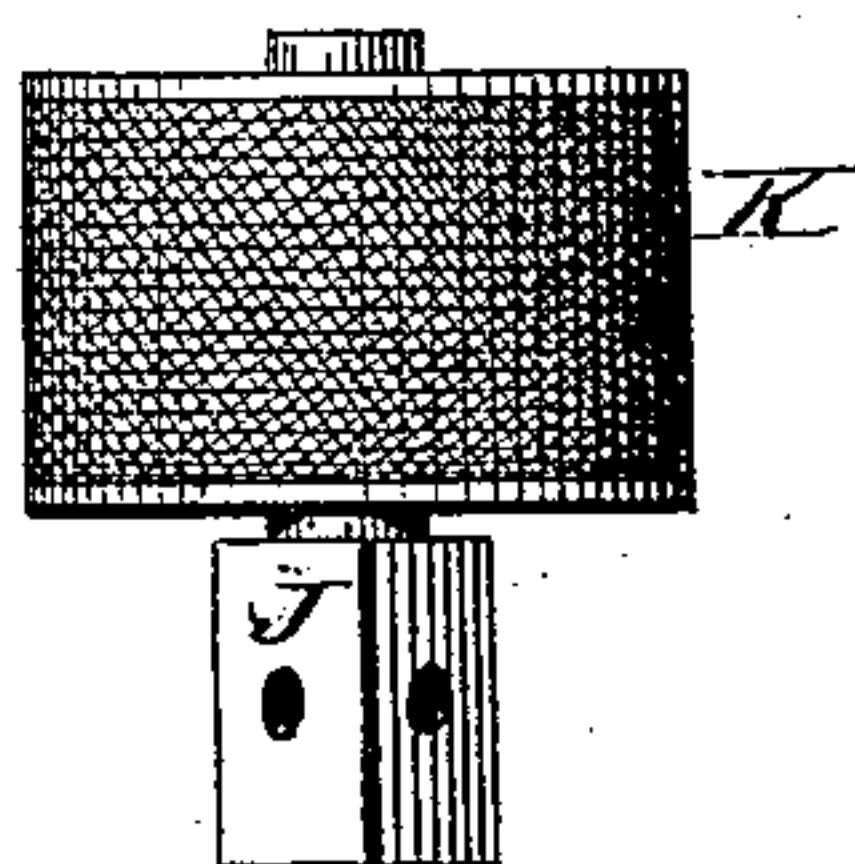


Fig. 7.



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UNITED STATES PATENT OFFICE.

DANIEL DRAWBAUGH, OF EBERLY'S MILL, PENNSYLVANIA, ASSIGNOR TO
THE PEOPLE'S TELEPHONE COMPANY, OF NEW YORK.

TELEPHONE-REPEATER.

SPECIFICATION forming part of Letters Patent No. 287,111, dated October 23, 1883.

Application filed January 26, 1881. (No model.)

To all whom it may concern:

Be it known that I, DANIEL DRAWBAUGH, of Eberly's Mill, Cumberland county, State of Pennsylvania, have invented a new and useful Improvement in Telephone-Repeaters, of which the following is a specification.

The object of this invention is to enable telephone-messages to be automatically repeated over a series of circuits successively, and in this way over greater distances than it is now practicable to transmit articulate speech by means of a single circuit.

To this end the invention consists, first, in the automatic repeating-instrument, substantially as herein described; secondly, in combining two or more lines or circuits by means of said instrument or instruments; and, thirdly, in the several mechanical devices and combinations embodied in said instrument, as hereinafter set forth.

In the accompanying drawings, Figure 1 is a perspective view of the instrument and its inclosing-case. Fig. 2 is a plan view of the instrument from the front, with a portion of the outer cover broken away to show the interior. Fig. 3 is a vertical section. Fig. 4 is a perspective view of the permanent magnets, the diaphragm, and their connections detached. Fig. 5 is a transverse section of the diaphragm and its supporting-ring. Fig. 6 is a perspective view of the adjusting-spring detached. Fig. 7 is a view of the helix and its core.

Similar letters of reference indicate like parts.

D is a diaphragm, preferably of thin sheet-metal, secured in any suitable way at its edges to a ring, E, also of metal, so that its middle portion is capable of vibration.

F, G, H, and I are four permanent magnets having their similar poles, *f g h i*, in magnetic contact with the ring E, and their other similar poles, *f' g' h' i'*, in magnetic contact with a soft-iron core, J, which core J also carries an insulated coil or helix, K.

To the diaphragm D, and at its center, is attached a metal cup, M, containing a block, *m*, of low-conducting material, said low-conducting material being preferably gas carbon. A similar block of low-conducting material, *n*, is supported in a metal cup arranged on the end of a metal spring, N. The spring N is suit-

ably riveted to flat spring O, which is secured to the cover B of the box or case by means of a screw, *n'*. Secured to the front of the cover B is a piece, P, Fig. 1, against the inner side of which piece the flat spring O normally rests. Through said piece P passes an adjusting-screw, *n''*, by means of which the springs N and O can be moved more or less inward, and the initial pressure between the carbons *n* and *m* may thus be regulated. An opening, Q, is provided through the cover B and outer piece, P, which opening affords sufficient space for the free movement of the spring N and its carbon.

It will be obvious that the arrangement as described combines in one apparatus the essential features of a magneto receiving-telephone and carbon-transmitter, the magnets F G H I, the core J, coil K, diaphragm D, and ring E, united, being, in fact, a magneto receiving-instrument when properly placed in telephonic circuit; and the diaphragm D, carbons *m* and *n*, and the means of adjusting the initial pressure between said carbons, with the necessary supporting devices, being, in fact, a carbon-transmitter, and capable of operating as such in the well-known manner when suitably connected with a telephonic circuit and battery. The diaphragm D, however, is common to both instruments, and hence it is clear that any movements which may be imparted thereto through the action of the electro-magnet J K must also influence the carbons *m* and *n*, so as correspondingly to modify an electric current passing through them. The consequence, therefore, is this: supposing the electro-magnet J K to be connected in one telephonic circuit, so that it would cause the diaphragm D to reproduce the speech uttered into a transmitting-instrument in said circuit, then the same vibrations of the said diaphragm D will cause modifications in another telephonic circuit which passes through the carbons *m n*, and the current thus modified will reproduce speech in the receiving-instrument of said second circuit. In this way the apparatus acts as a relay or repeater, taking speech from one circuit and sending it into another circuit. The principal practical advantage of this lies in the possibility of thus transmitting speech over longer distances than it is possible to do

when only one circuit is used, whether said circuit be directly from the battery or derived from the secondary of an induction-coil.

The arrangement and connection of the circuits in and with the instrument is as follows: On the upper portion of the back board, A, of the instrument are binding-posts BN BP, to which are connected the terminals of the line from which speech is to be taken. From said binding-posts extend wires along the back of the base-board A, which wires connect with posts inside the box or case C. Connecting with said posts R R' are the terminals of the helix or coil K. The current, therefore, entering at the post BP passes through the coil K and out of the instrument at the post BN. It energizes the electro-magnet and affects the diaphragm D, so as to cause said diaphragm to reproduce speech uttered into the transmitter on the line which is connected with the binding-posts BN and BP.

The circuits in the transmitting part of the instrument are as follows: Proceeding from the battery, the current goes to the binding-post LP, thence by a wire on the back of the base-board to the post S inside the case, thence to the primary of the induction-coil L, thence to the spring O by a wire, *a*, Fig. 2, thence through the spring O, spring N, carbons *m n*, diaphragm D, and ring E, thence by wire *b*, Fig. 2, to the post S', and thence by a wire back of the case, as shown in Fig. 3, to the binding-post LN, which connects with the battery. The ends of the secondary wire of the

induction-coil L lead to the binding posts RP RN on the case C, which posts connect with the terminals of the line in which speech is to be repeated.

I am aware that telephone-repeaters have hitherto been constructed containing a diaphragm, an electro-magnet influencing same, and a circuit-governor influenced by said diaphragm, and this construction I do not broadly claim.

I claim as my invention—

1. The combination of one or more permanent magnets, an electro-magnet, and a diaphragm, one pole or group of like poles of said permanent magnets being in contact with the core of the electro-magnet, and the other pole or group of like poles being magnetically connected with the diaphragm, and blocks of low-conducting material, one of which is attached to or governed by the movements of said diaphragm, and the other block being held in yielding contact with the first block, the said low conductors and diaphragm being arranged in an independent electrical circuit, substantially as described.

2. The combination of the magnets F G H I, core J, coil K, diaphragm D, ring E, carbons *m n*, springs N O, and means of supporting said parts, substantially as described.

DANIEL DRAWBAUGH.

Witnesses:

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WILLIAM BLACKSTOCK.