

(No Model.)

E. T. GREENFIELD.

TELEPHONE.

No. 252,294.

Patented Jan. 10, 1882.

Fig. 1.

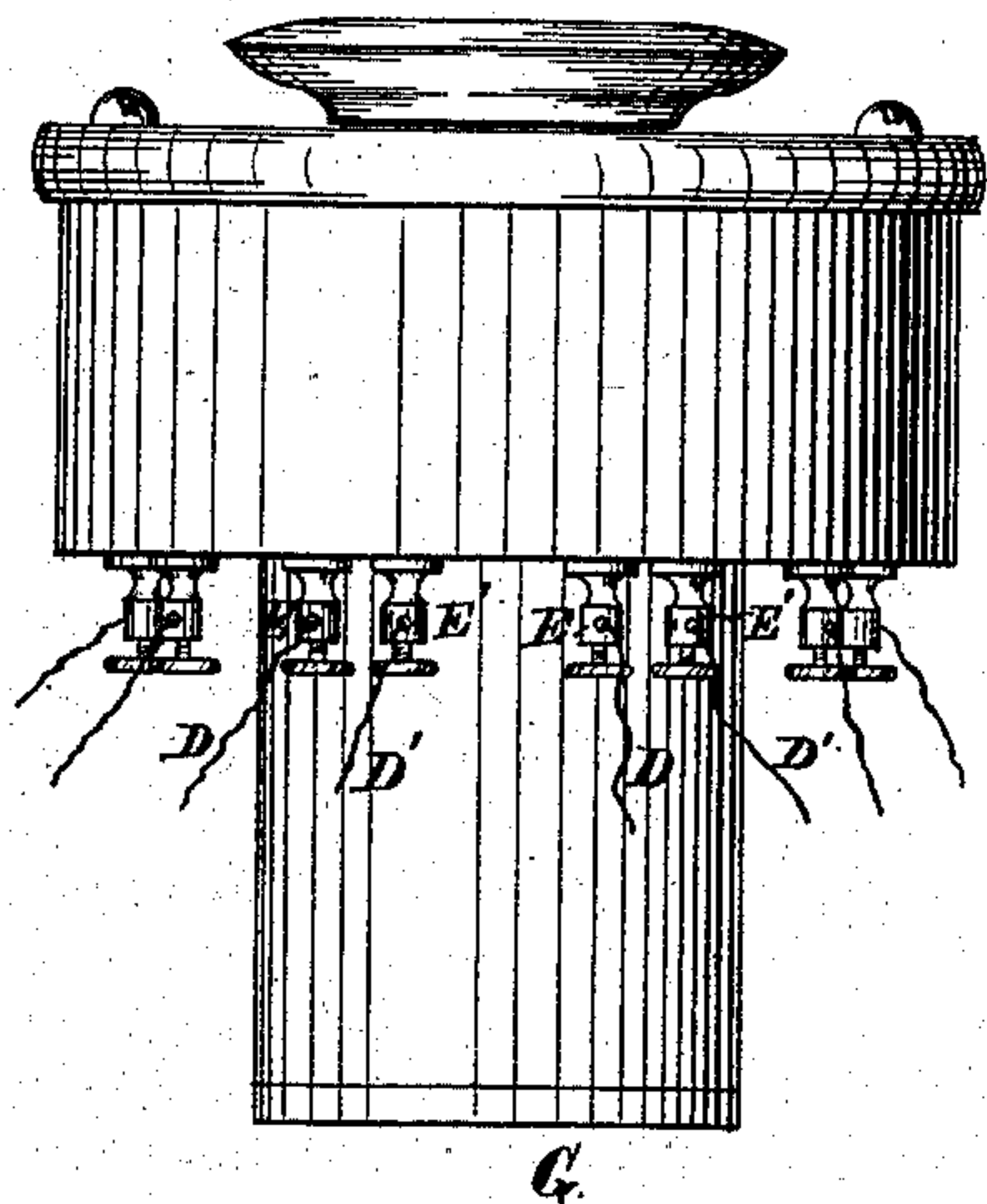


Fig. 2.

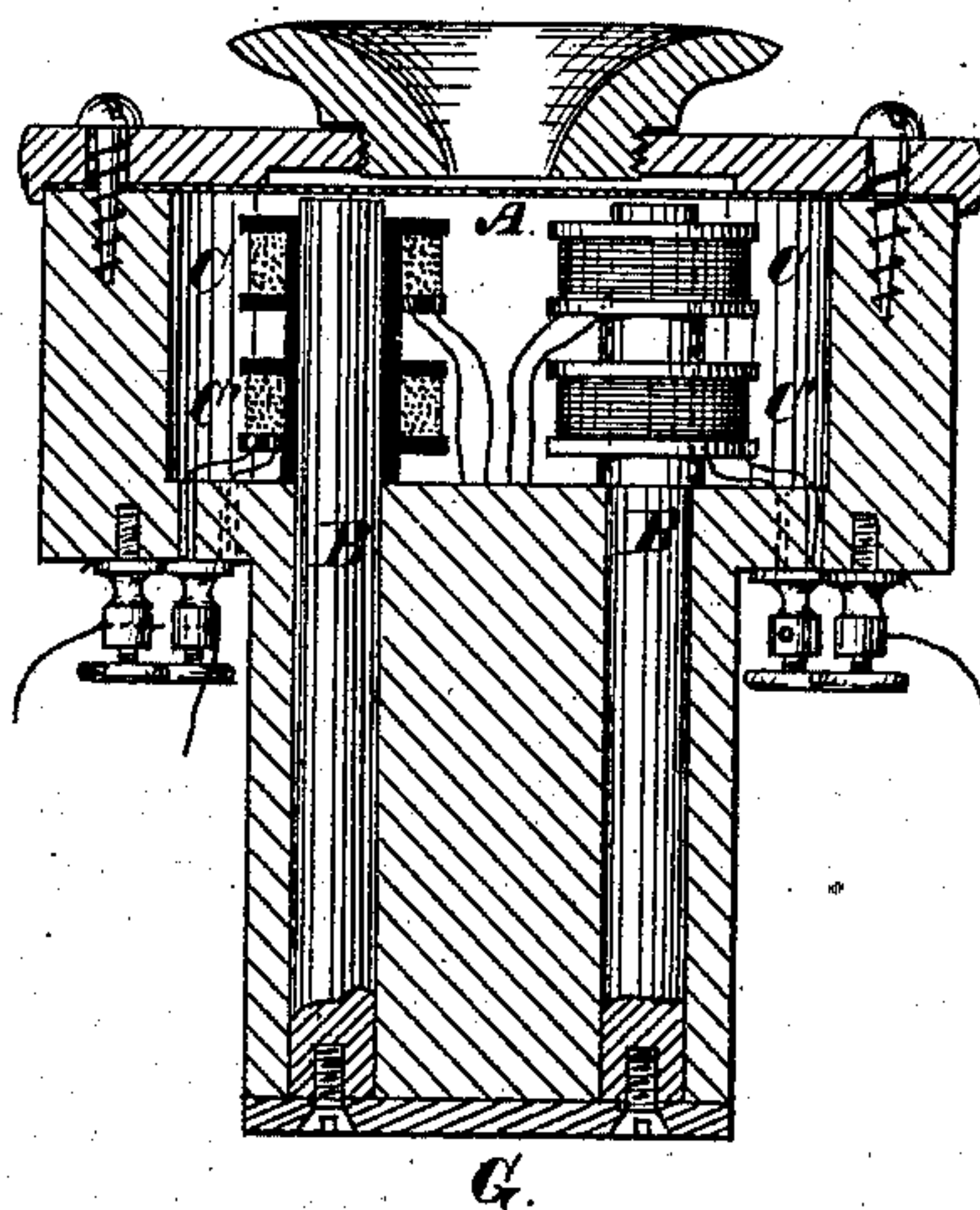
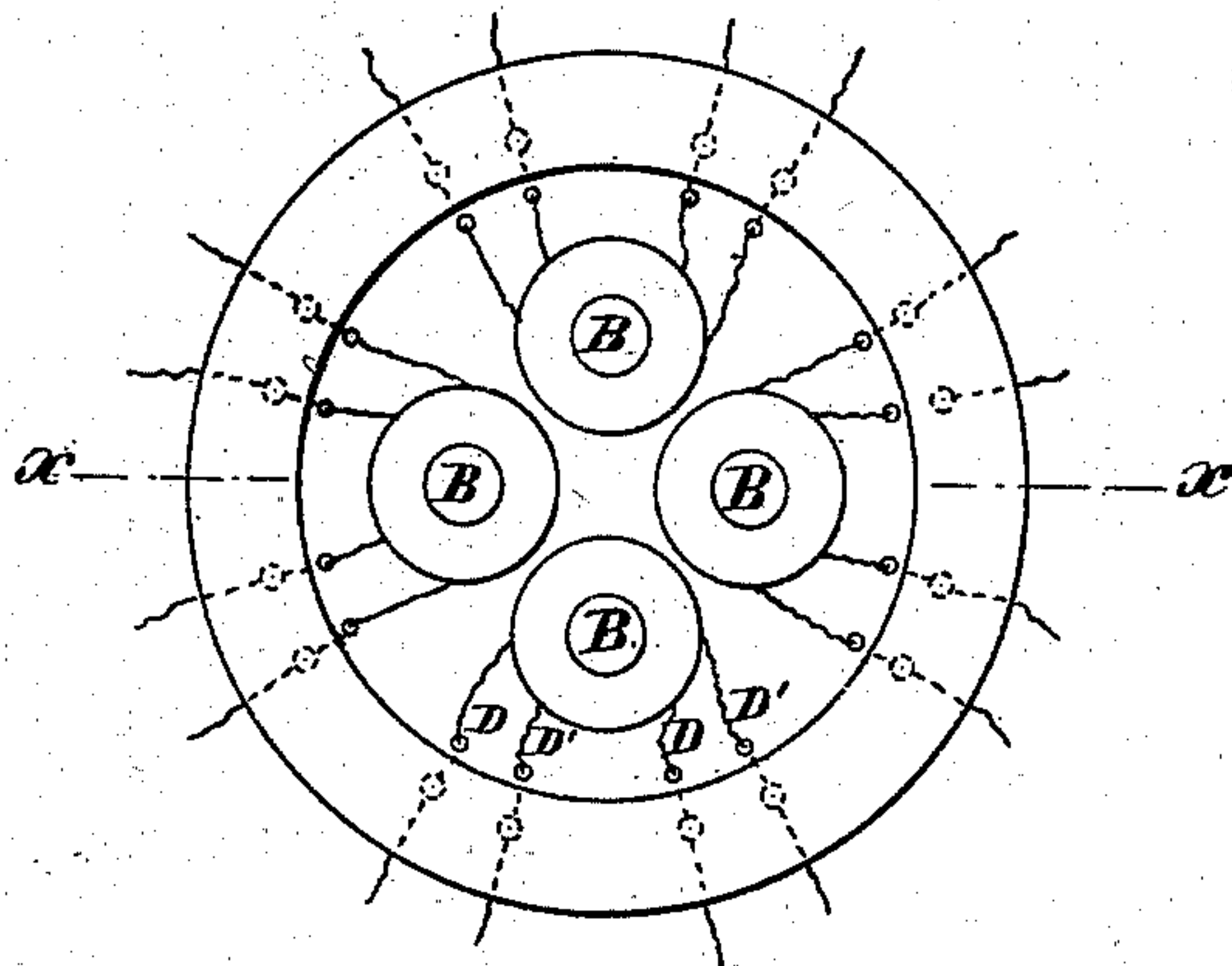


Fig. 3.



Witnesses:
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att'y.

UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF BROOKLYN, N. Y., ASSIGNOR OF ONE-HALF TO THE
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TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 252,294, dated January 10, 1882.

Application filed March 22, 1880. (No model.)

To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, of the city of Brooklyn, in the State of New York, have invented a new and useful Improvement in Telephones, of which the following is a specification.

The present invention relates, primarily, to the instrument by means of which a telephonic message is rendered audible at the receiving end of the line; and the object is to provide a simple and efficient apparatus with which a single listener, placed at a central station, can keep watch over a large number of lines connecting with such station; and the invention consists, in a general way, in combining in a single receiving-instrument two or more magnets, electro-magnets, or other equivalent devices, according to the number of the lines to be watched and operated.

The invention is fully illustrated in the accompanying drawings, in which Figure 1 is an elevation of an instrument adapted for connection with eight telephonic lines, there being four magnets or magnetic bars and two helices on each magnet or bar. Fig. 2 is a longitudinal central section of the same, and Fig. 3 is an end view of the instrument with the ear-piece and diaphragm removed.

Prior to the present invention two methods had been adopted at the central telephone-station for effecting communication between the various persons whose lines converge to such station. By the one method any patron of the system desirous of being put into communication with any other person is required to give a signal, by a bell, or drop, or otherwise, at the central station, whereupon the attendant connects a telephone to the line of the person signaling, and through such instrument ascertains with whom he desires communication. Thereupon the second person is "rung up," and the proper connection between the two being effected, the instrument is free for a similar use between other customers; but the time necessarily consumed in making inquiries and obtaining responses and establishing the desired connections renders it impossible for one attendant to serve more than a very limited number of customers, and in a large office great

confusion necessarily prevails, and mistakes are liable to occur. Moreover, the apparatus required in such system, involving, as it does, extra batteries, resistances, and other appliances, is necessarily complicated, expensive, and liable to derangements.

The second method heretofore practiced consists in the use of a special "signal-wire," as it is called, with which the instrument of each of the customers in the system is connected, and which in turn is connected with receiving and transmitting instruments at the central station, such instruments being constantly in the hands of a listener. Aside from the extra cost of this signal-wire, its use is open to the serious objection that if there happens a battery-cross of such wire at any point a certain number of the customers, according to the locality of the disturbance, will be cut off from communication with the central station, and will remain so until the signal-wire can be carefully inspected, step by step, and the place of the cross discovered.

It is believed that the present invention provides a far simpler and more economical mode of doing the work, effecting a marked saving of time, and providing a ready and certain means of detecting and remedying any crosses that may occur in the lines.

Referring to the drawings, there is there shown a telephonic receiver, which is substantially like the well-known Bell instrument, except that while having but a single diaphragm it contains a multiplicity of magnets and coils, the coils equaling in number the lines which are to be operated.

A represents the diaphragm; B B, the different magnets; C C and C' C', the coils; and D D, the line-wires, which pass through the binding-screws E E, and D' D' ground-wires passing through the binding-screws E' E'.

The various line-wires pass through some form of switch-board (not shown in the drawings) before reaching the binding-screws of the receiver. When the instrument and conductors are properly arranged for action a simple vocal call sent over any one of the lines will be rendered audible to the "listener-on" through the common diaphragm A, whereupon it is only

necessary for the attendant at the switch-board, receiving his instructions from the listener on, to connect the lines of the two customers between whom the desired communications are
 5 to take place, the wires of such customers being of course disconnected for the time being from the listening-instrument. The extreme simplicity of this mechanism compares most favorably with a system which employs call-
 10 bells or drops with the complicated concomitants of batteries, resistances, &c.

If at any time any one of the line-wires or conductors becomes crossed with any other wire, whether it be another wire in the same
 15 system or not, the fact is instantly revealed to the listener at the central station; and in order to ascertain which particular line is in trouble it is only necessary for the switchman to disconnect the several lines one by one from the
 20 listening-instrument. The moment he disconnects the line which is crossed the listener becomes aware of the fact by the cessation of the sounds which previously had apprised him of the fact of the existence of the difficulty. Under
 25 this system the disturbance caused by a cross is limited to the particular line where the cross occurs, and this fact, coupled with the prompt ascertainment of the existence and of the location of the difficulty, is manifestly a great ad-
 30 vantage as compared with the operation of a system in which a cross disturbs all the customers who connect with the same signal-wire, and in which, when a cross occurs, there may be required a prolonged search to locate it.
 35 Moreover, if a break occurs in any one of the lines connected with this compound receiving-instrument, it cuts off from the central station only the one customer who is served by such line, while in the case of the system using a
 40 signal-wire a break in such wire is liable to cut off the majority of the customers.

In order to secure compactness of construction, two or more helices may be arranged on each of the magnets used, as clearly shown in
 45 Fig. 2, these several coils being respectively connected with the separate line-wires.

The several magnets may be connected together by means of an iron yoke or bridge-piece, G. The use of such bridge-piece serves to
 50 strengthen the action of the magnets on the diaphragm, and also distributes the electric impulse communicated to any one of them equally on all sides of the axial line of the instrument, and thus secures greater uniformity of action
 55 upon the diaphragm than would otherwise result. If, however, no bridge-piece or yoke G be used, (and its use is not regarded as indis-

pensable,) the magnets will be entirely independent of each other.

Instead of using a separate binding-screw 60 for each of the ground-wires, it is plain that these several wires may be twisted together and passed through a single binding-screw, and thence to the earth.

It is also plain that the principle involved in 65 this invention would be applicable to the use in the receiver of other devices than magnets or electro-magnets connected with the line-wires for giving vibration to the common plate, or other instrumentality whereby sonorous vi-
 70 bration is communicated to the air, or the sound-waves passed along the wires to the receiver are amplified.

The instrument above described, while intended primarily as a receiving-instrument, 75 may also be used as a multiple transmitter, being capable of transmitting simultaneously as many messages as there are separate line-wires or conductors; but for this purpose it is preferred to use a battery-current in connection 80 with induction-coils, as set forth in a separate application therefor filed by me contemporaneously herewith.

What is claimed as new is—

1. A telephone provided with two or more 85 magnets or equivalent devices, arranged to connect with two or more independent line-wires, substantially as described.

2. The combination, in a telephone, of two or more independent helices, arranged upon 90 the same magnet or bar and connecting with separate line-wires, substantially as and for the purpose set forth.

3. The combination of two or more independent line-wires with one receiving-telephone, for 95 the purposes set forth.

4. The combination of two or more telephonic conductors with one telephone by means of a plurality of magnets or equivalent devices, substantially as described. 100

5. The combination of two or more magnets or equivalent devices, arranged in a single telephone, and provided with independent helices connecting with separate line-wires, and a yoke connecting the poles of the magnets, substan- 105 tially as described.

6. The combination, in a telephone, of two or more independent helices connecting with independent line-wires, substantially as and for the purposes set forth.

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Witnesses:

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