

(Model.)

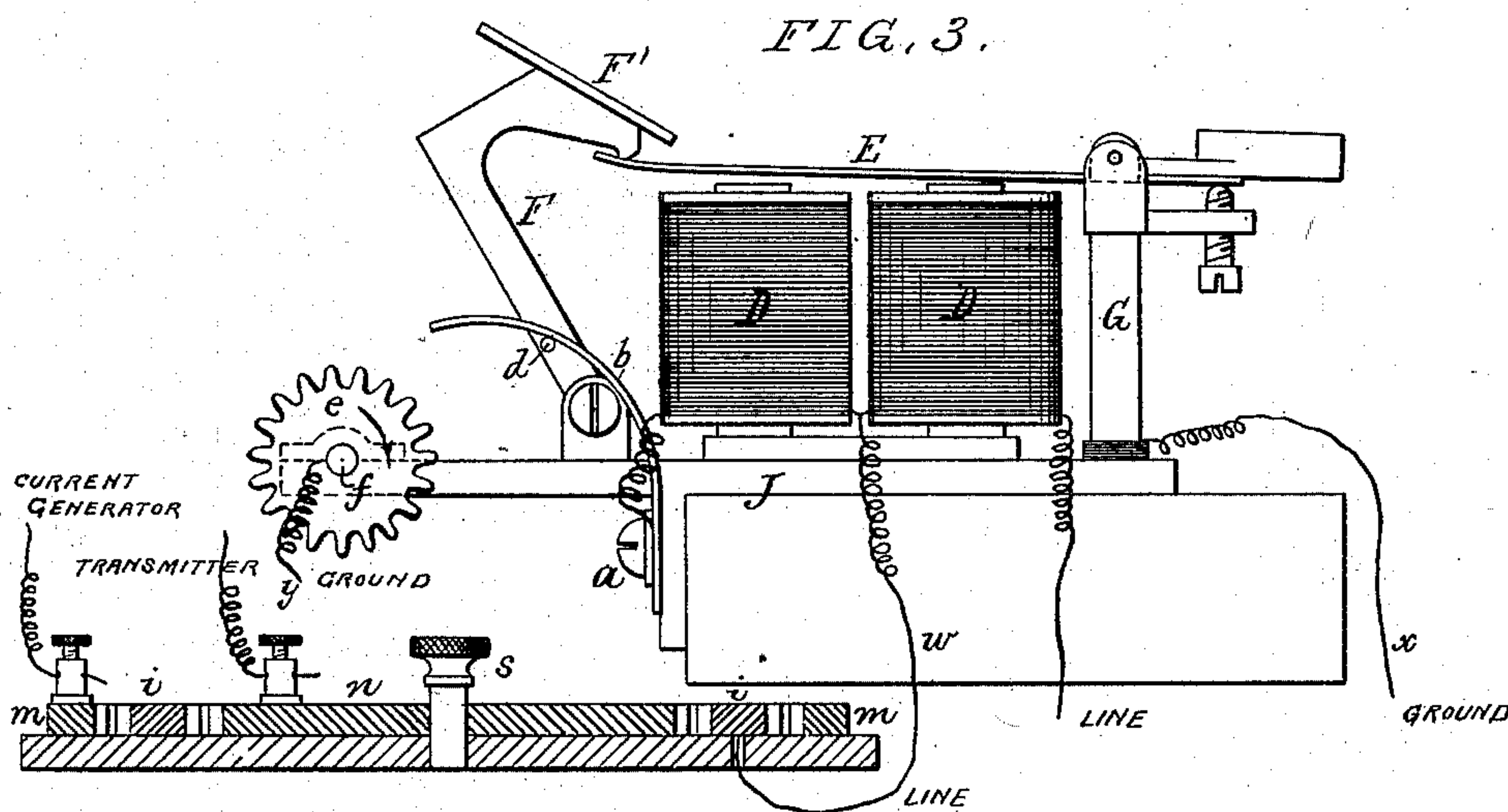
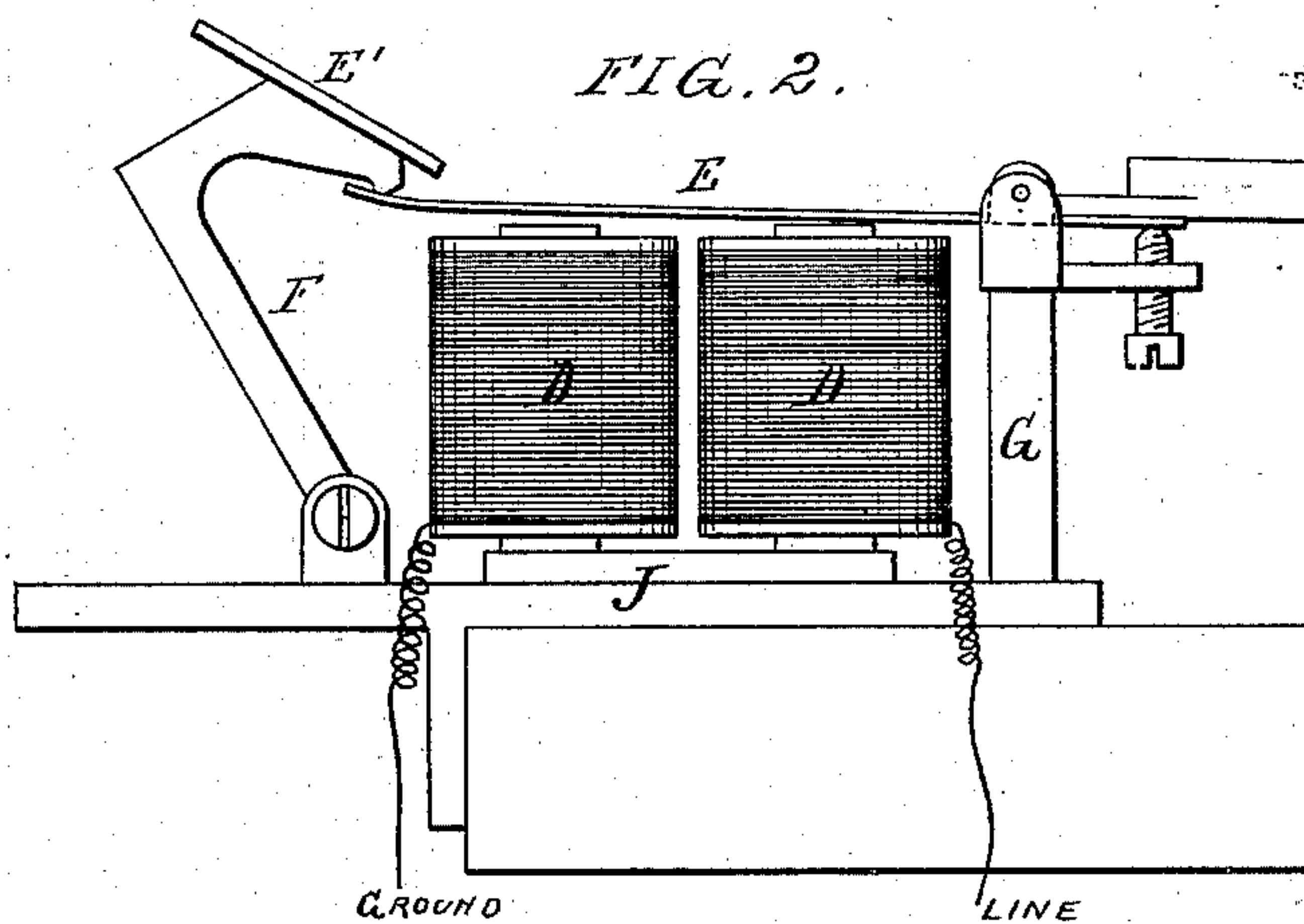
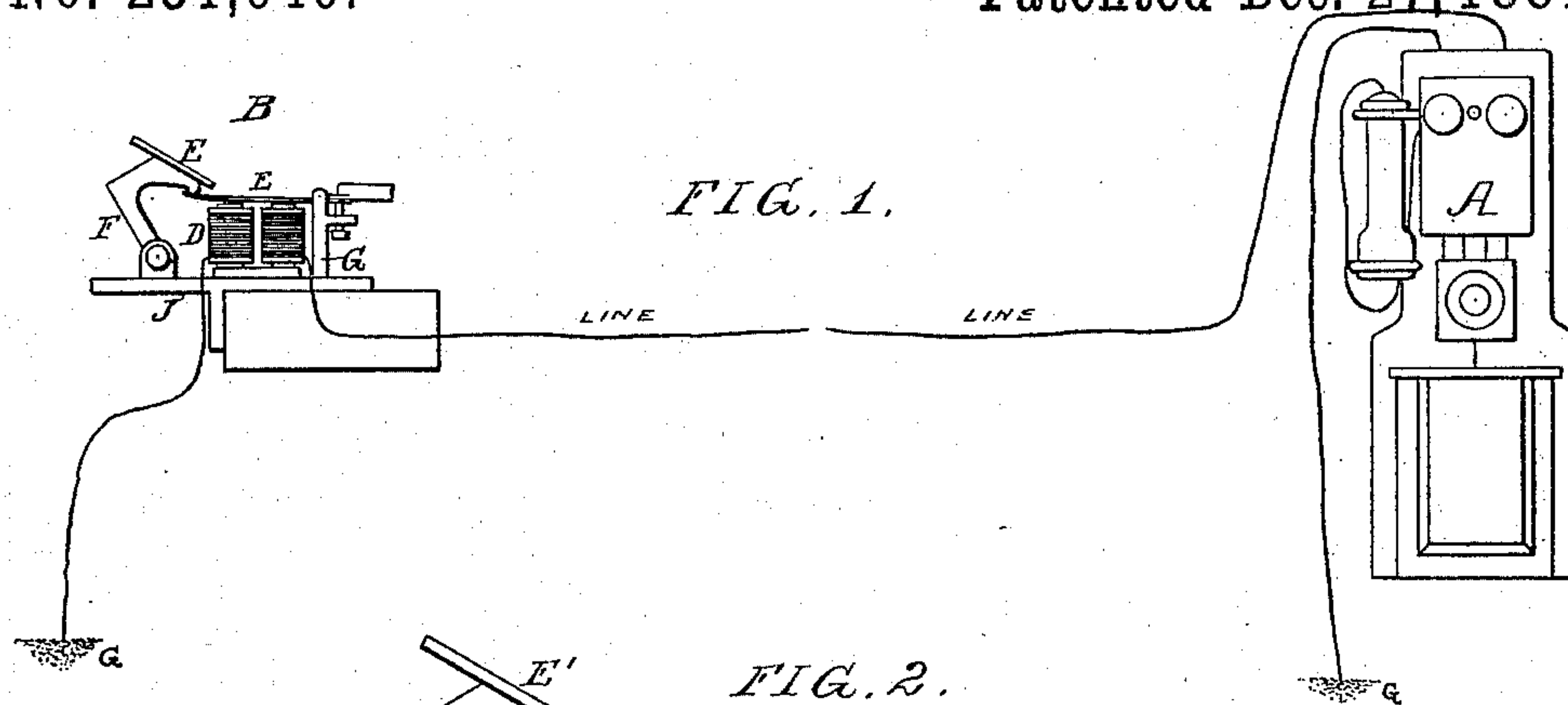
3 Sheets—Sheet 1.

C. M. ROOT.

ANNUNCIATOR AND OPERATING TABLE FOR TELEPHONE LINES.

No. 251,640.

Patented Dec. 27, 1881.



Witnesses:

D. M. Deemer

James F. Tobin

Inventor:
Charles M. Root
by his attorneys

Howson and Jones

(Model.)

3 Sheets—Sheet 2

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FIG. 4.

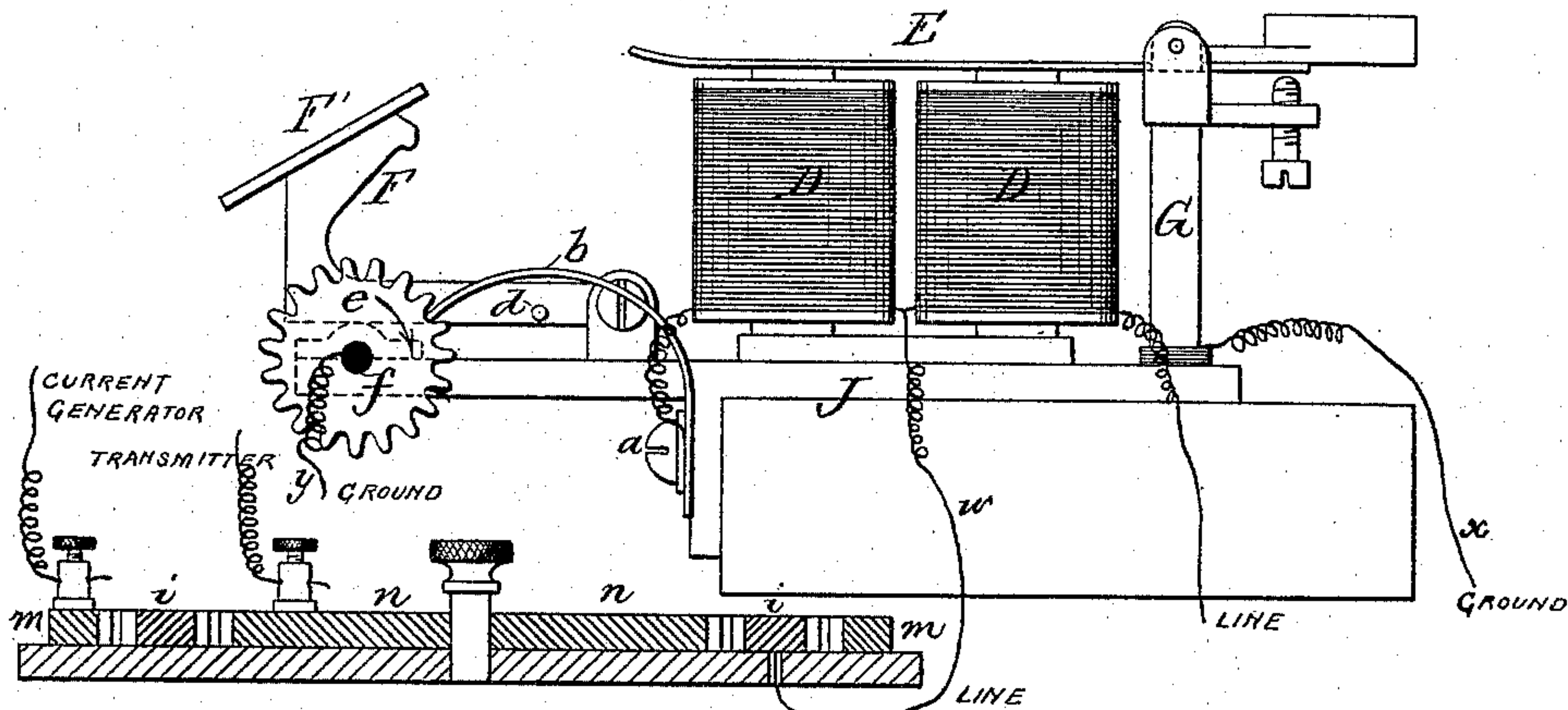


FIG. 5.

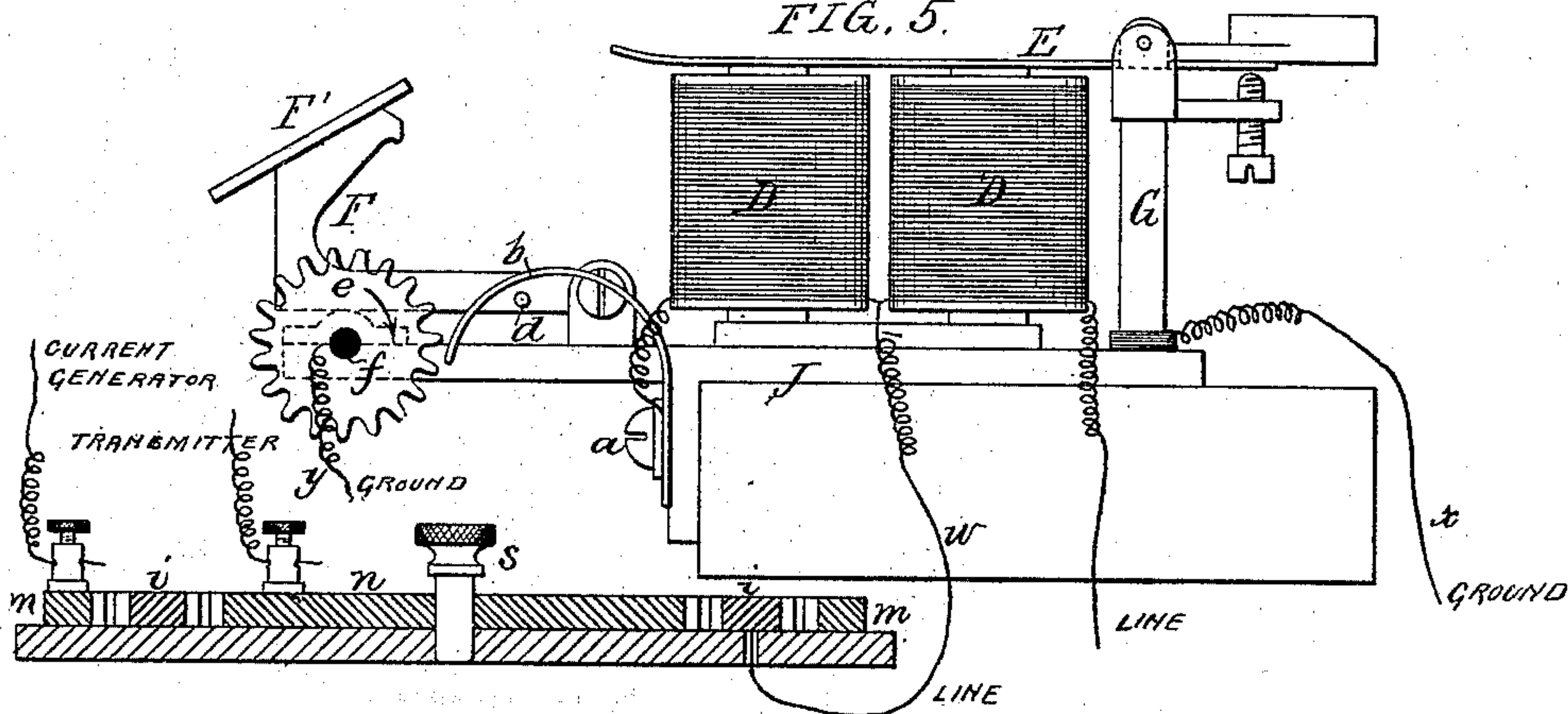
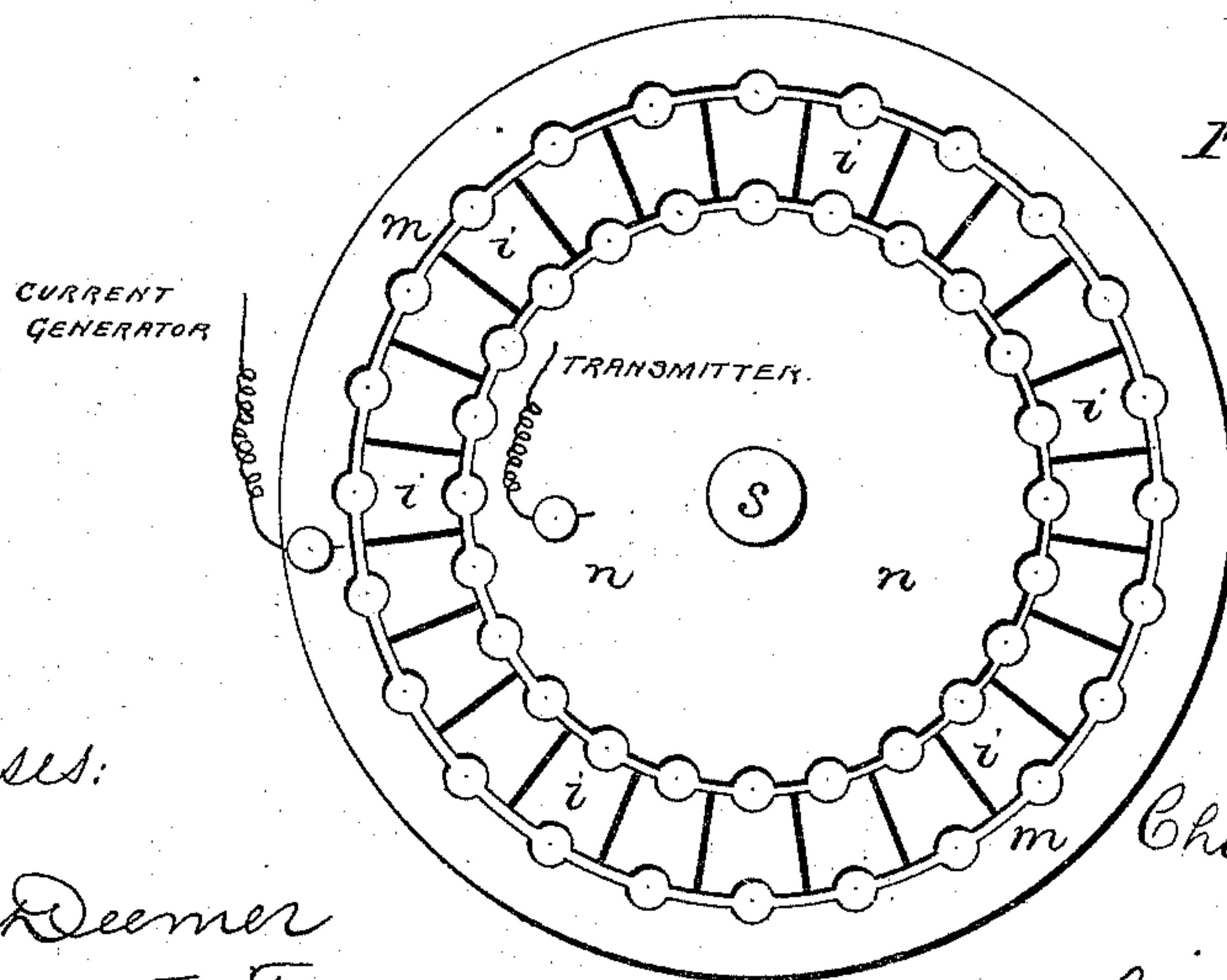


FIG. 6.



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(Model.)

3 Sheets—Sheet 3.

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FIG. 7.

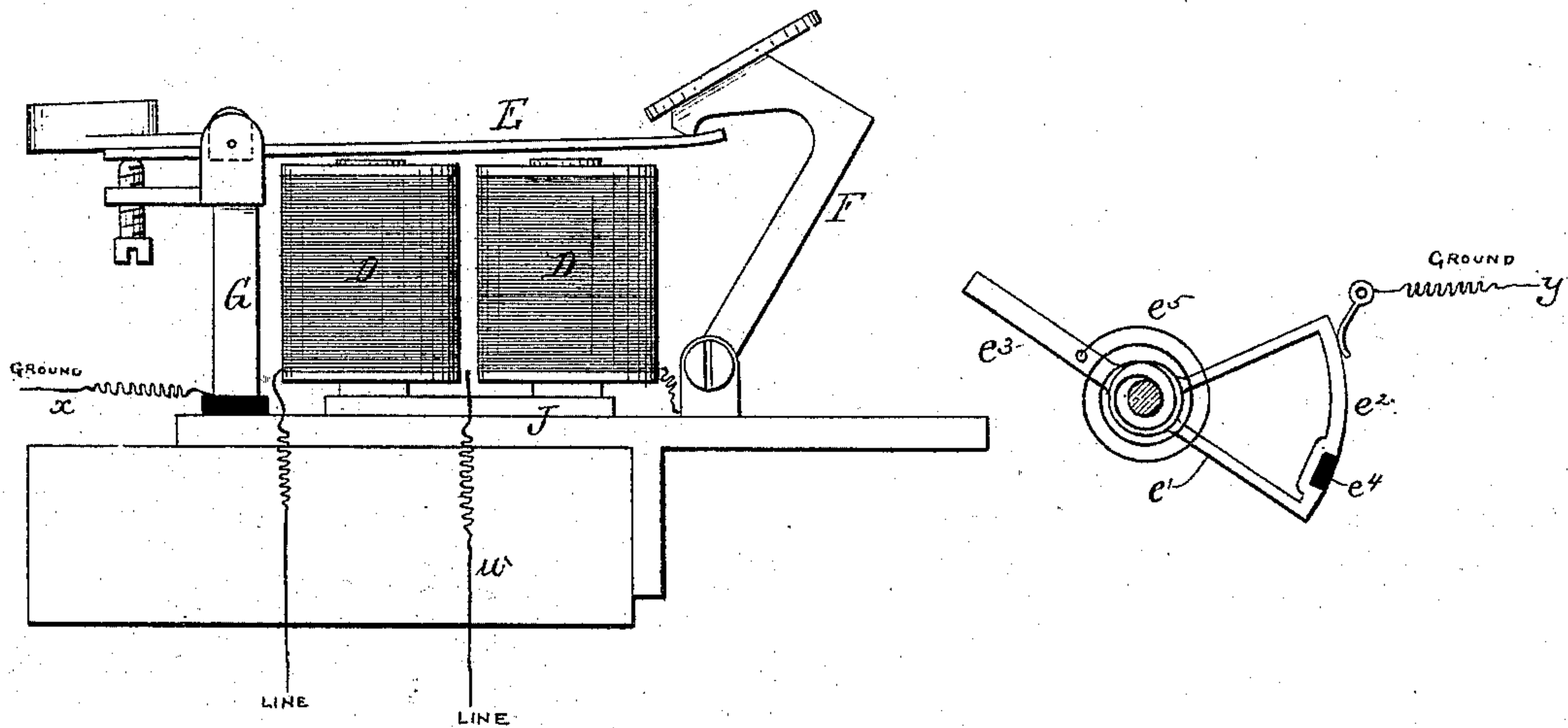
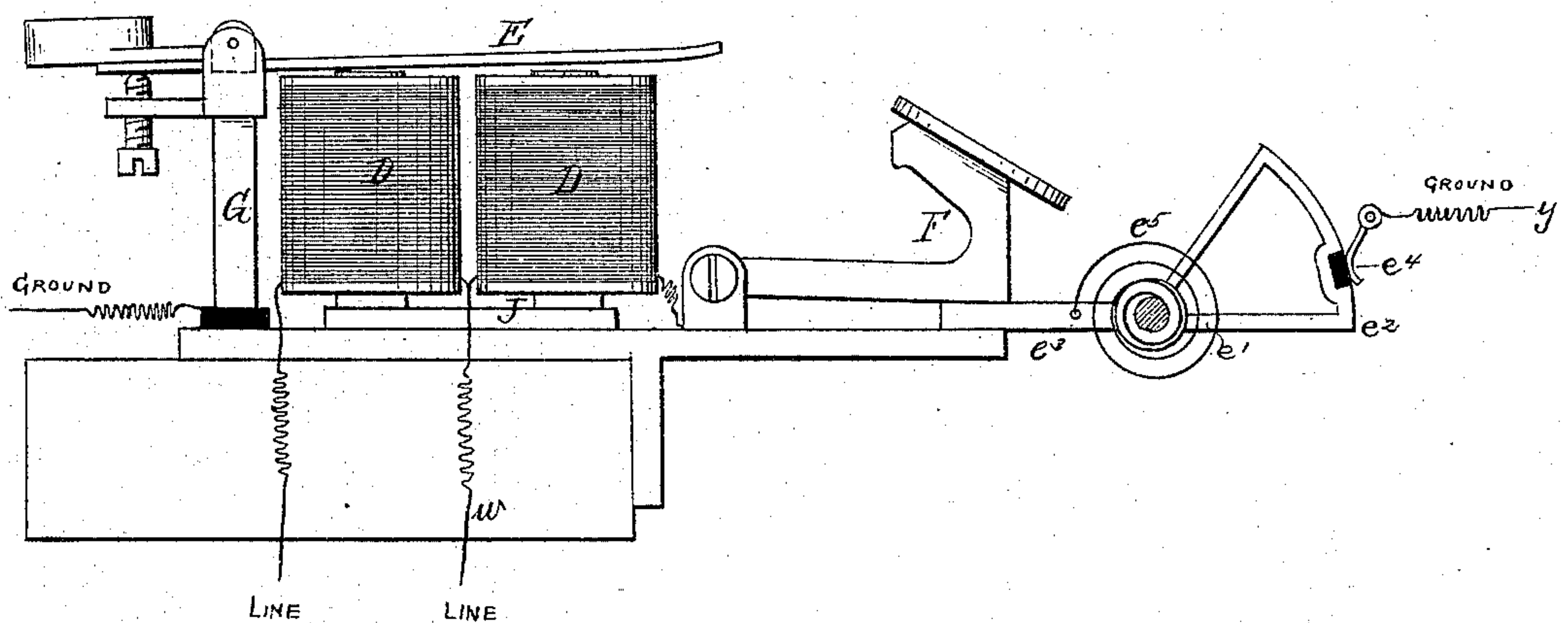


FIG. 8.



Witnesses

David S. Williams

James F. Johnson

Inventor,

Charles M. Root

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UNITED STATES PATENT OFFICE.

CHARLES M. ROOT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO HOWARD C. ROOT, OF SAME PLACE.

ANNUNCIATOR AND OPERATING-TABLE FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 251,640, dated December 27, 1881.

Application filed September 12, 1881. (Model.)

To all whom it may concern:

Be it known that I, CHARLES M. ROOT, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Annunciators and Operating-Tables for Telephone-Lines, of which the following is a specification.

The main object of my invention is to so construct a telephone-annunciator and to so combine the line-wire and ground-connections therewith that a subscriber calling the central office will know whether his signal has been received there, or whether the line or instrument is defective in some particular which
15 prevents the transmission of the signal, a further object being to provide simple and efficient means for answering the call, and to dispense with the use of the usual plugs or spring-jacks for maintaining ground-connections.
20 These objects I attain in the manner which I will now proceed to describe, reference being had to the accompanying drawings, in which—

Figure 1, Sheet 1, is a diagram showing a telephone-instrument and the annunciator
25 therefor at the central office; Fig. 2, an enlarged view of said annunciator as ordinarily constructed; Fig. 3, a view of my improved annunciator and its connections; Figs. 4 and 5, Sheet 2, views similar to Fig. 3, but with
30 some of the parts in different positions; Fig. 6, a plan view of the operating-table used in connection with the annunciator; and Figs. 7 and 8, Sheet 3, views of a modification of part of my invention.

35 In Fig. 1, A represents the call-box of the usual Bell telephone apparatus, and B the annunciator at the central office, said annunciator comprising an electro-magnet, D, with armature E, and a pivoted arm, F, carrying a
40 plate, F', the latter having a number corresponding with the number of the instrument with which the annunciator is connected. The normal position of the arm F is that indicated in Fig. 2, the upper hooked end of the arm en-
45 gaging with the armature E, and being retained thereby until a call is sent over the line, when the armature is attracted and the arm F released and allowed to fall, so as to expose the numbered plate F'. Usually the line is
50 carried from the electro-magnet to the ground,

and as long as this ground-connection is maintained and a current sent over the line the bell on the call-box A will ring, the ground-connection being broken by the operator at the central office prior to answering the call. The
55 main objection to this arrangement is that it affords no means whereby the subscriber can definitely determine whether or not his signal or call has been received at the central office. For instance, the line may be short-circuited
60 by an accidental ground-connection between the telephone and the central office, in which case, although the bell on the call-box A would continue to ring during the time that the call was being sent, the signal would not reach the
65 central office at all, the subscriber, however, being ignorant of the disturbing condition, and hence likely to charge the operator at the central office with inattention or neglect in failing to answer the call. To remedy this ob-
70 jection I propose to so construct the annunciator that the ground-connection will be automatically broken after the call has been continued for a certain length of time, the bell on the call-box ceasing to ring, so that the caller
75 will at once know that his signal has been received; or, if the bell does not cease ringing after the lapse of the stated time, the subscriber will know that the line or instrument is not in working condition, and can notify the
80 proper officer to have it attended to.

Figs. 2, 3, and 4 show the annunciator as constructed for carrying out my invention, the magnets D, armature E, and annunciator-arm F being the same as usual, with the exception
85 that the post G, to which the armature is hung, is insulated from the frame J and has a ground-wire, x. The line, instead of being carried from the magnet D to the ground, as in the usual instrument, is connected to the frame J at a, at
90 which point a spring, b, is also connected to the frame, this spring being acted upon by a pin, d, on the annunciator-arm in such a manner that the spring is held up, as shown in Fig. 3, when the arm is raised; but when the arm
95 falls, as shown in Fig. 4, the spring is permitted to come into contact with one of the teeth of a wheel, e, which is mounted on a shaft, f, the latter extending in front of a row of annun-
100 ciators, and being rotated in the direction of

the arrow by clock-work or similar means, so that the contact between the spring *b* and the toothed wheel *e* is of limited duration, the rotation of the wheel soon freeing the spring and permitting it to assume its normal position, as shown in Fig. 5.

The shaft *f* is insulated from the frame *J* and has a ground-connection, *y*, and a wire, *w*, extends from the junction-wire of the magnets *D* to a block, *i*, forming part of an operating-table, the construction of which will be understood on reference to Fig. 6. This operating-table consists of an outer annular plate, *m*, an inner plate or disk, *n*, and an intermediate annular plate composed of a series of blocks, *i*, each insulated from the others, and each connected to one of a series of annunciators in connection with which the operating-table is to be used.

The outer plate, *m*, is connected to a suitable current-generator, and the inner plate, *n*, is connected to a transmitter, both the outer and inner plates being separated or insulated from the intermediate plate; but any one of the blocks *i* composing the latter plate can be connected with either of the plates *m* or *n* by inserting a plug, *s*, into the space between said plate and the block *i*.

The operation of the device is as follows: When a call is sent over the line from a subscriber to the central office the circuit is completed through the magnet *D*, and through the frame *J*, annunciator-arm *F*, armature *E*, and insulated post *G*, to the ground at *x*, as shown in Fig. 3. The armature being thereby attracted to the magnet, the annunciator-arm *F* is released and falls, thereby cutting out the ground-connection *x* and shunting the circuit to the spring *b*, and thence through the wheel *e* and shaft *f* to the ground at *y*, as shown in Fig. 4. The bell on the call-box *A* of the telephone continues to ring as long as this circuit is complete; but the revolution of the wheel *e* soon releases the spring *b* from contact therewith, thereby breaking the circuit, as shown in Fig. 5. As soon as the circuit is broken the bell on the call-box *A* ceases to ring, and the subscriber knows that his signal has been properly received at the central office. The operator at the central office then proceeds to answer the call by inserting the plug *s* between the outer or current plate, *m*, of the operating-table and the block *i* corresponding with the line over which the call was sent. The current passes from the plate *m* through the plug to the block *i*, and thence through the wire *w*, magnet *D*, and line to the call-box, the bell of which is thus rung in answer. The operator then shifts the plug *s* from the space between the block *i* and the outer plate, *m*, to the space between said block *i* and the inner or transmitter plate, *n*, the line being then in condition for the transmission of speech between the central office and the subscriber, in order that the instructions of the latter may be received. Connections are afterward made in the usual way between the subscriber's line and that of any

other subscriber with whom the first may wish to communicate. The raising of the annunciator-arm *F* again grounds the line through the connection *x*, in readiness for a further call.

When a subscriber calls the central office and the bell on the call-box does not cease to ring after the expiration of the stated period, it will indicate that the line or instrument is out of order, and that a failure to answer the call is not due to the inattention or neglect of the operator at the central office, who is thus relieved from much of the unjust censure which is caused by the present method of making connections at the annunciator, prompt attention, moreover, being called to defects in the line or telephone-instrument, so that said defects can be at once attended to. The advantages of this feature of my invention are enhanced when two or more telephone-instruments are worked on a single line, for in this case when there is a defect in the line it will be indicated to any one making a call, and the annoyance of all of the subscribers on the line by prolonged attempts to signal the central office on the part of one of the subscribers will be prevented.

The operating-table above described is a simple and compact device, which permits the prompt answering of a call, the insertion of a single plug being all that is necessary to connect the line with the current generator or the transmitter, the usual cord-connections and spring-jacks and independent ground-plugs being entirely dispensed with.

Straight plates instead of annular plates may be used in making the operating-table, if desired, although the annular plates are preferred on the score of greater compactness.

Other means than that shown of breaking the circuit through the line *y* may be employed. For instance, each wheel *e* may be combined with simple escapement mechanism, and may be set in motion by the tension of the spring *b* acting thereon, the speed of movement being regulated by the escapement mechanism, and the movement ceasing as soon as the spring leaves the wheel.

In Figs. 7 and 8 of the drawings I have shown another modification of my invention, in which the spring *b* and wheel *e* are dispensed with, the said wheel *e* being replaced by a lever, *e'*, one arm, *e²*, of which is in the form of a segmental enlargement, having in its periphery a block, *e⁴*, of insulating material. This lever is acted upon by a light spring, *e⁵*, the tendency of which is to retain the lever in the position shown in Fig. 7. When the arm *F* of the annunciator falls, however, it drops onto the end of the arm *e³* of the lever, and the weight of the arm *F* overcomes the tension of the spring *e⁵* and causes a movement of the lever to the position shown in Fig. 8, the ground-wire *y* being then cut out by the insulated block *e⁴*. During the time that the lever *e'* is being moved from one position to the other the current passes to the ground

through the arm *F*, the lever, and the wire *y*, and on the restoration of the arm *F* to its elevated position the spring *e*⁵ restores the lever to the position shown in Fig. 7.

5 I claim as my invention—

10 1. The combination of a telephone-annunciator, a line-wire, a permanent ground-connection, a ground-connection having an automatic circuit-breaker therein, and means, substantially as described, whereby on the fall of the annunciator-arm the current is shunted from the permanent ground-connection to the connection having the automatic circuit-breaker, as set forth.

15 2. The combination of the annunciator, the line-wire, the ground-connection *x*, the ground-connection *y*, the shaft *f* and its toothed wheel *e*, and the spring or arm *b* under control of the annunciator-arm and adapted to complete the
20 circuit between the line-wire and the ground-connection *y*, as set forth.

3. The within-described telephone operating-table, comprising the current-plate *m*, transmitter-plate *n*, and intermediate plate composed of blocks *i*, insulated from each other 25 and from the plates *m* and *n*, and each connected to the line-wire, as set forth.

4. The combination of the annunciator, the line-wire, the operating-table comprising the current-plate *m*, transmitter-plate *n*, and intermediate insulated blocks, *i*, the wires *w*, 30 whereby the blocks *i* are connected to the respective lines, and the circuit-making plug *s*, as set forth.

In testimony whereof I have signed my name 35 to this specification in the presence of two subscribing witnesses.

CHAS. M. ROOT.

Witnesses:

HARRY DRURY,
HARRY SMITH.