(No Model.) 3 Sheets—Sheet 1.

E. GRAY.

TELEPHONE CALL BOX.

No. 309,617. Patented Dec. 23, 1884.

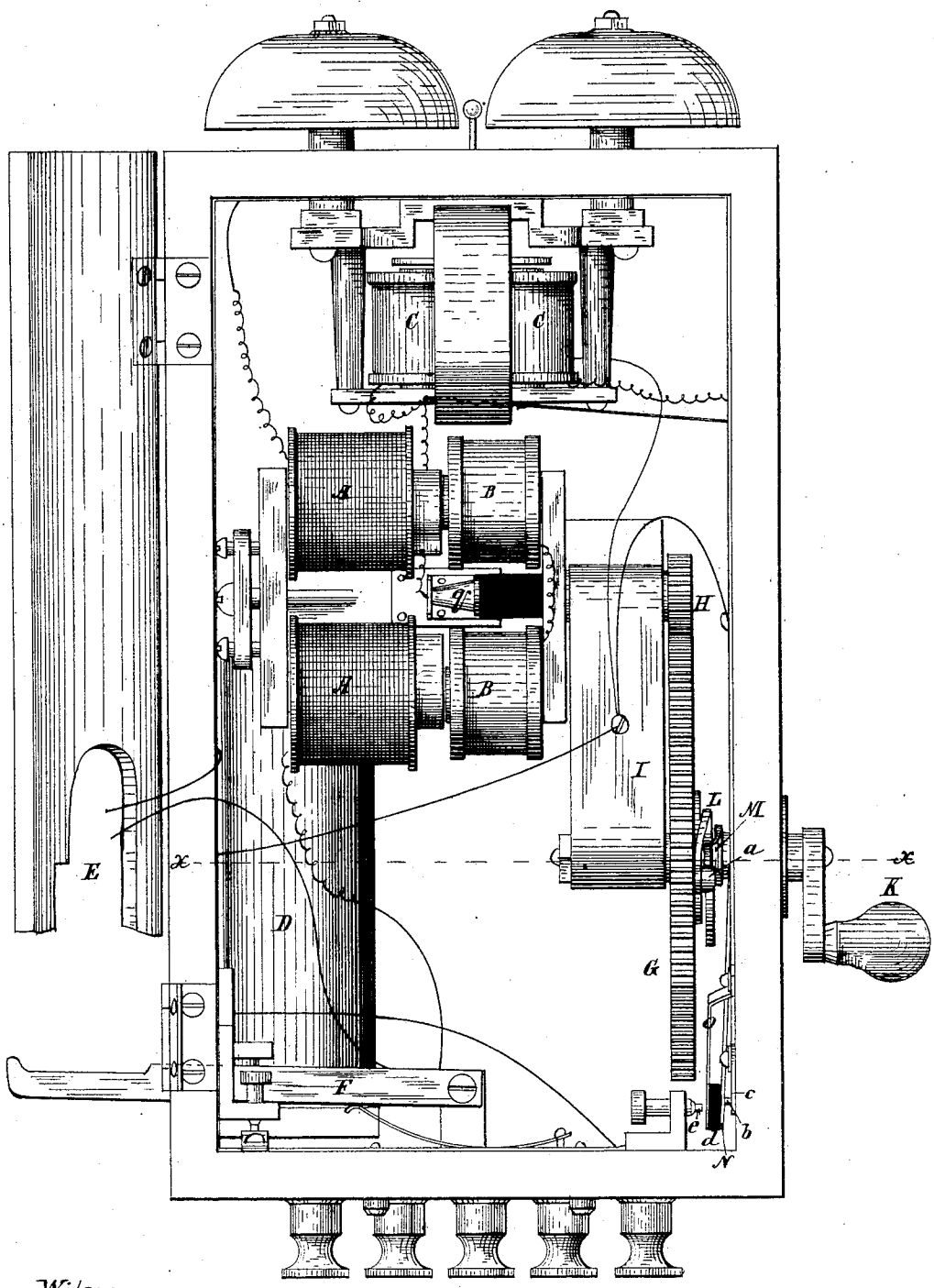

Fig 1

Witnesses.
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Inventor
Elisha Gray
By George P. Barton
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(No Model.) 3 Sheets—Sheet 2.

E. GRAY.

TELEPHONE CALL BOX.

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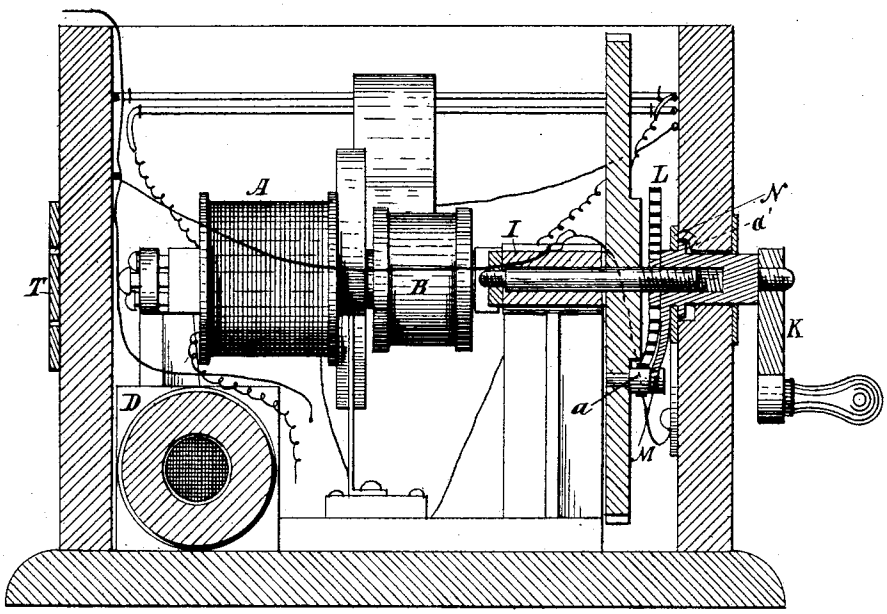
Fig 2



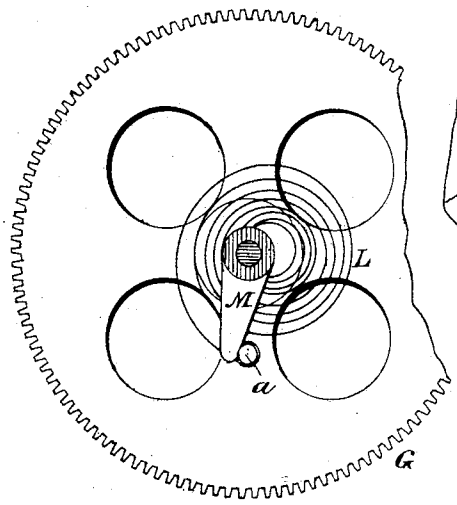


Fig 4

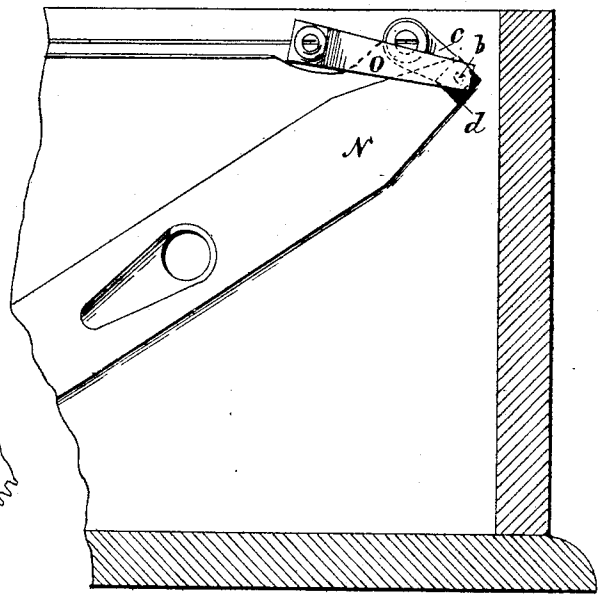


Fig 5

Witnesses

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(No Model.) 3 Sheets—Sheet 3.

E. GRAY.

TELEPHONE CALL BOX.

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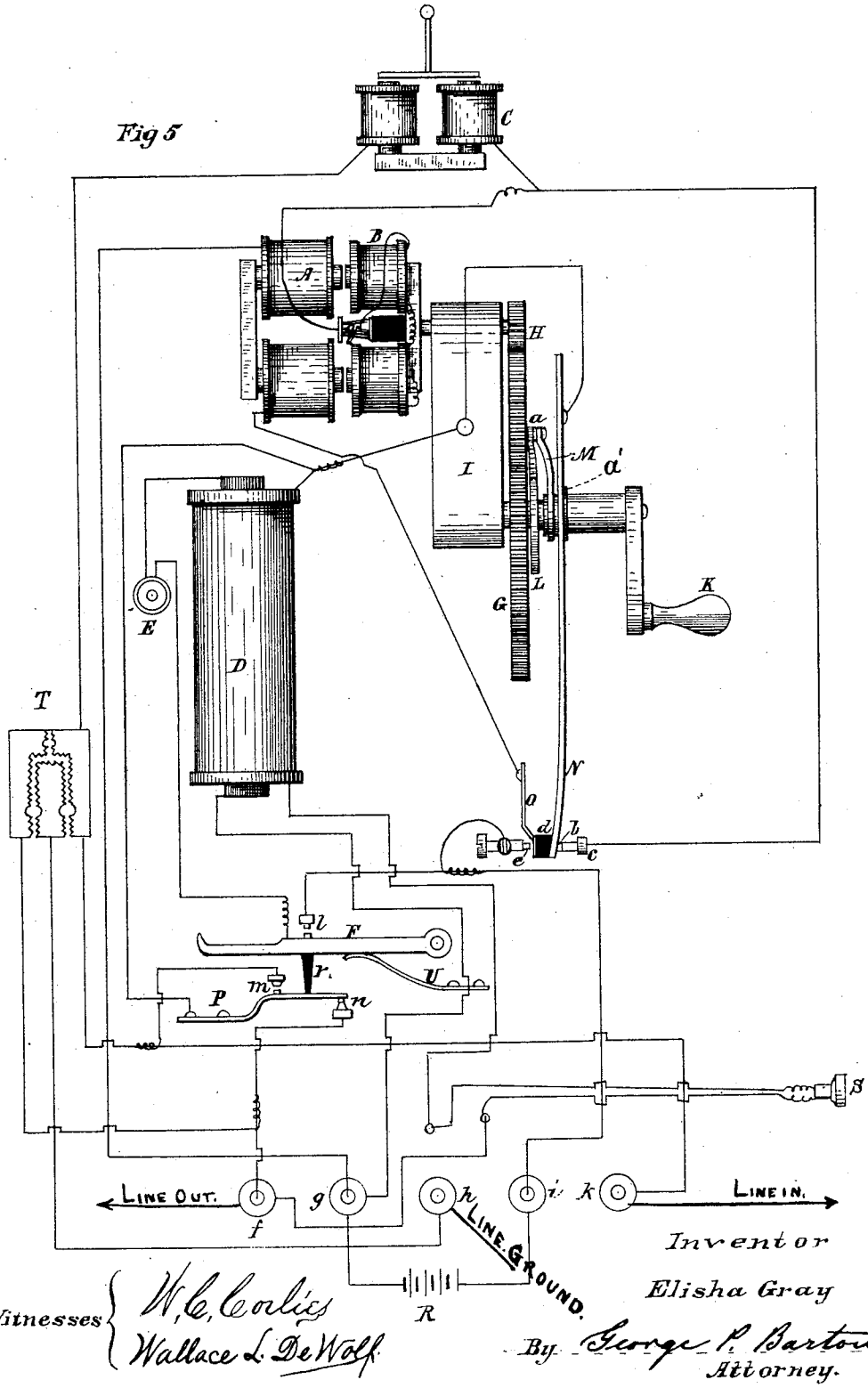
Fig 5



Witnesses { W. C. Corlies / Wallace L. DeWolf

Inventor
Elisha Gray
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UNITED STATES PATENT OFFICE.

ELISHA GRAY, OF HIGHLAND PARK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

TELEPHONE CALL-BOX.

SPECIFICATION forming part of Letters Patent No. 309,617, dated December 23, 1884.

Application filed January 3, 1881. (No model.)

To all whom it may concern:

Be it known that I, ELISHA GRAY, of Highland Park, in the county of Lake and State of Illinois, have invented certain new and useful Improvements in Telephone Call-Boxes, of which the following is the specification.

The telephone call-box in use prior to my invention contained a permanent magnet in combination with an electro-magnet, which, when revolving with its poles in the magnetic field of the permanent magnet, generated electric currents for signaling. In another form the electro magnet or armature, instead of being revolved, was torn forcibly away from the poles of the permanent magnet, and when released was drawn back by the permanent magnet. In both instances the shunt around the electro magnet or armature was held open while the box was being used for signaling. This was done by pressure of the hand upon a push-button connected with a key in the shunt.

My improvements consist in substituting for the permanent magnet an electro-magnet charged with the local battery, made common to both transmitter and the said electro-magnet; and also in an automatic shunting device for changing the circuit of the stationary electro-magnet and the revolving electro-magnet.

In my application, filed May 11, 1881, No. 33,046, I have claimed the revolving electro-magnet and the specific mechanism of the automatic shunting device, as herein described. I therefore limit myself in this application to the general or broad claims upon the automatic shunting device.

In the drawings, Figure 1, Sheet 1, is a front elevation of a telephone call-box embodying my improvements. Fig. 2, Sheet 2, is a transverse section thereof upon line X X of Fig. 1. Fig. 3 shows the flat spring or switch in detail. Fig. 4 is a detail elevation of large gear-wheel, coil-spring, and arm. Fig. 5, Sheet 3, is a diagram of the connections and circuits.

Similar parts are indicated by like letters of reference in the respective figures.

A is the stationary electro-magnet. B is the revolving electro-magnet. C is the electro-magnet of the bell. D is the induction-coil. E is the telephone-transmitter. F is the telephone-switch. G is the gear-wheel. H is the pinion-wheel. I is the metallic supporting-frame. K is the crank. L is the coil-spring. M is the arm. N is the flat spring or switch. O is a spring or switch for closing the local circuit through the stationary electro-magnet. P is a spring auxiliary to the telephone-switch, and is insulated from the switch-lever by rubber stud *r*. R is the battery. The arm M is attached to the hub of the crank, and is held normally against stop *a* by the coil-spring L in the position shown in Fig. 4. Contact-point *b* of the switch N normally rests against the metallic point or plate *c*. Insulating-block *d* is attached to switch N. One end of spring O may be secured rigidly to the box, while its other end rests upon insulating-block *d*, and when switch N is separated from contact-point *c* spring O is brought into contact with contact-point *e*. The inner end of the hub of the crank is provided with a thread, which turns upon the end of the shaft of the gear-wheel G while the crank is turning through one revolution, or rather until the arm M is carried from one side of the stop *a* to the other side of said stop. The hub of the crank is during this first revolution carried inwardly by the action of the screw on the shaft of the wheel G, the amount of inward motion thus communicated being determined by the pitch of the screw. The hub of the crank is provided with a collar, *a'*, against which the switch N rests, and when the crank is first set in motion and drawn toward the large gear-wheel the flat spring or switch N is pressed by said collar *a'* toward the large gear-wheel, and thus the contact of point *b* and plate or point *c* is broken and at the same time the insulating-block *d* carries spring O against contact-point *e*. The shunt of the revolving armature B is thus opened at the point *b*, and also the circuit of the local battery R is closed through the stationary electro-magnet A.

The connections and circuits will be easily understood by reference to diagram, Fig. 5. The binding-posts *f g h i k* are for the line and

ground connections. *f* and *k* are for the line. *h* is for the ground of the lightning-arrester T, and *g* and *i* are for the battery. The contact-points *l m n* of switch F are so arranged that when the receiving-telephone S is hung on the switch its weight will bring the switch-lever down against the tension of spring V, thus breaking contact at points *l* and *m*, while a new contact is made at the point *n*, as shown in the drawings. The circuit of the main line is thus closed through the bell-magnet C, and the shunt of low resistance around the revolving armature is also closed, while the circuit of the local battery is held open. The circuit of the main line may be traced as follows: from the binding-post K to right plate of lightning-arrester T, thence through electro-magnet C to metallic plate *c*, and thence by switch N to metallic supporting-frame I, thence to auxiliary spring P, thence to contact-point *n*, and thence to the binding-post *f*, as shown. The circuit of the telephone-line is thus normally closed through the circuit of the bell-magnet C. When the crank is turned, as before described, contact is broken at contact-points *b c*. The currents generated in the wire of electro-magnet B will then find outlet at one end through stop *q*, electro-magnet C, and binding-post K, and at the other end through metallic supporting-frame I, and thence to auxiliary spring P, and from contact-point *n* to binding-post *f*. Thus when the crank K is in motion the revolving armature is included, with the bell-magnet C, in the main circuit, while the current of the local battery is directed through the stationary electro-magnet A.

The circuit of the local-battery through the stationary electro-magnet may be traced as follows: from positive pole of the battery R to binding-post *i*, thence to contact-point *e*, and by spring O and connection through magnet A, and thence to binding-post *g* and to the negative pole of the battery R. When the receiver S is removed from the lever of switch F, the circuit of the local battery is closed through the primary of the induction-coil, and the main circuit or telephone-line circuit is directed through the receiving-telephone S and the secondary of the induction-coil D, while the bell-magnet C is cut out in the usual manner.

It is evident that the automatic device for opening the shunt of the revolving electro-magnet may be applied to telephone-boxes in which a permanent magnet is used instead of the stationary electro-magnet. In like manner the stationary electro-magnet may be applied to boxes having the ordinary push-key.

There are other mechanical devices which might be used with the crank for automatically opening the shunt of the revolving armature and directing the local circuit through the stationary electro-magnet. For example, the arm M can easily be provided with contact-points, and so constructed that when revolved the shunt-circuit will be broken and the local battery closed through the stationary electro-magnet.

In case a permanent magnet is used it is only necessary to provide for automatically opening the shunt. This may be done by connecting the circuit of the shunt through contact-points on the arm M and stop *a*. These points would be separated automatically by turning the crank.

I claim—

1. The combination, with a magneto or dynamo electric machine, of a main circuit and a shunt or short circuit around said machine, and means for automatically breaking such short circuit upon and continuously during the operation of the machine.

2. The combination, in a dynamo or magneto electric machine, of a main circuit, a shunt of low resistance around the coils of the armature, a key in said shunt, and mechanism whereby said key is automatically opened upon and continuously during the operation of the machine, said key being closed and held closed automatically when and while the machine is not in operation.

3. The combination of the driving-shaft of a dynamo or magneto electric machine, a sleeve mounted thereon in such manner as to have a determinate longitudinal movement thereon, and a circuit-breaker automatically operated by the longitudinal movement of the sleeve.

ELISHA GRAY.

Witnesses:
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B. ROYALL.