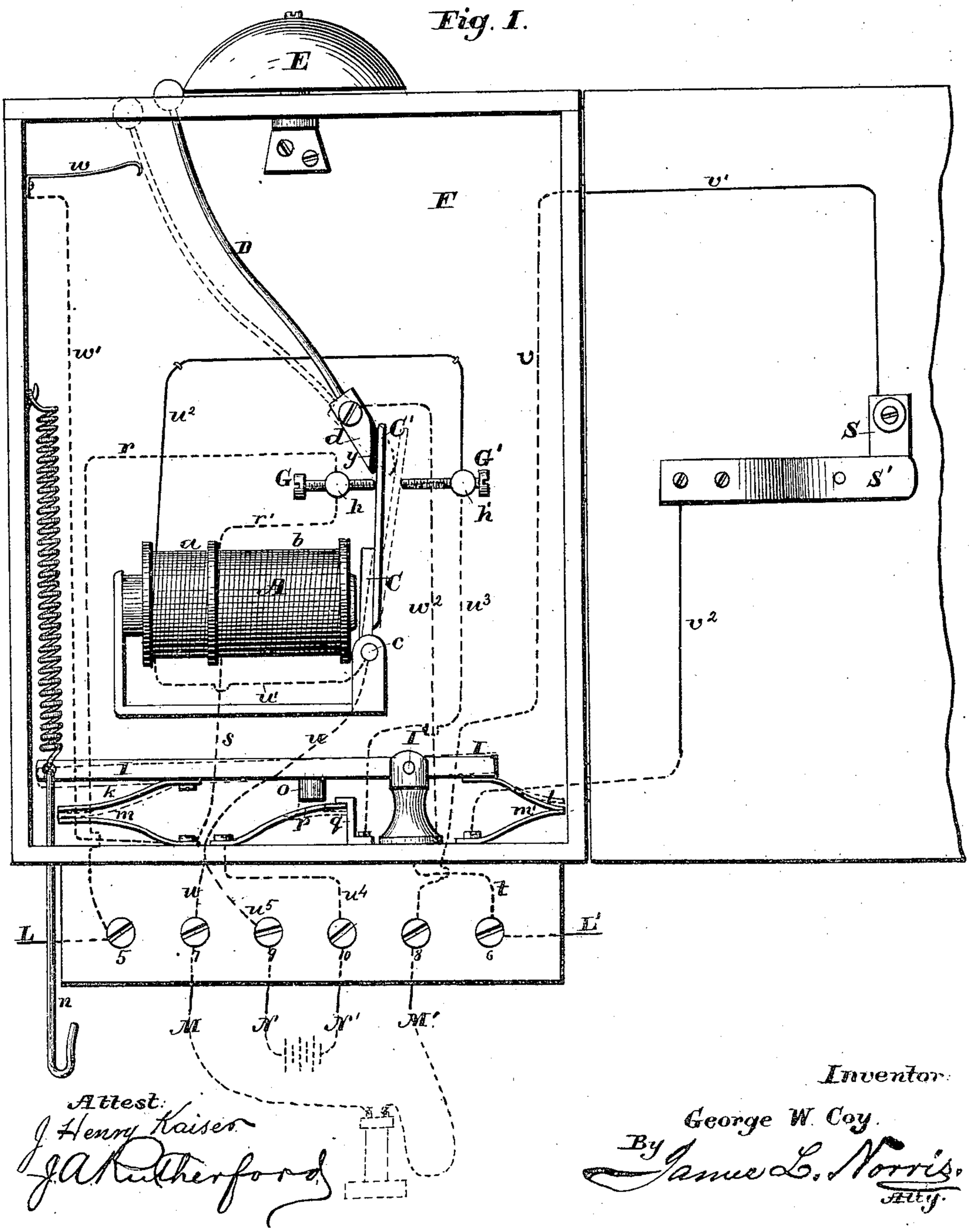
(No Model.) 2 Sheets—Sheet 1.

G. W. COY.

Telephone Signaling Apparatus.

No. 238,360. **Patented March 1, 1881.**

Fig. 1.



Attest:
J. Henry Kaiser
J. A. Rutherford

Inventor:
George W. Coy.
By James L. Norris.
Atty.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

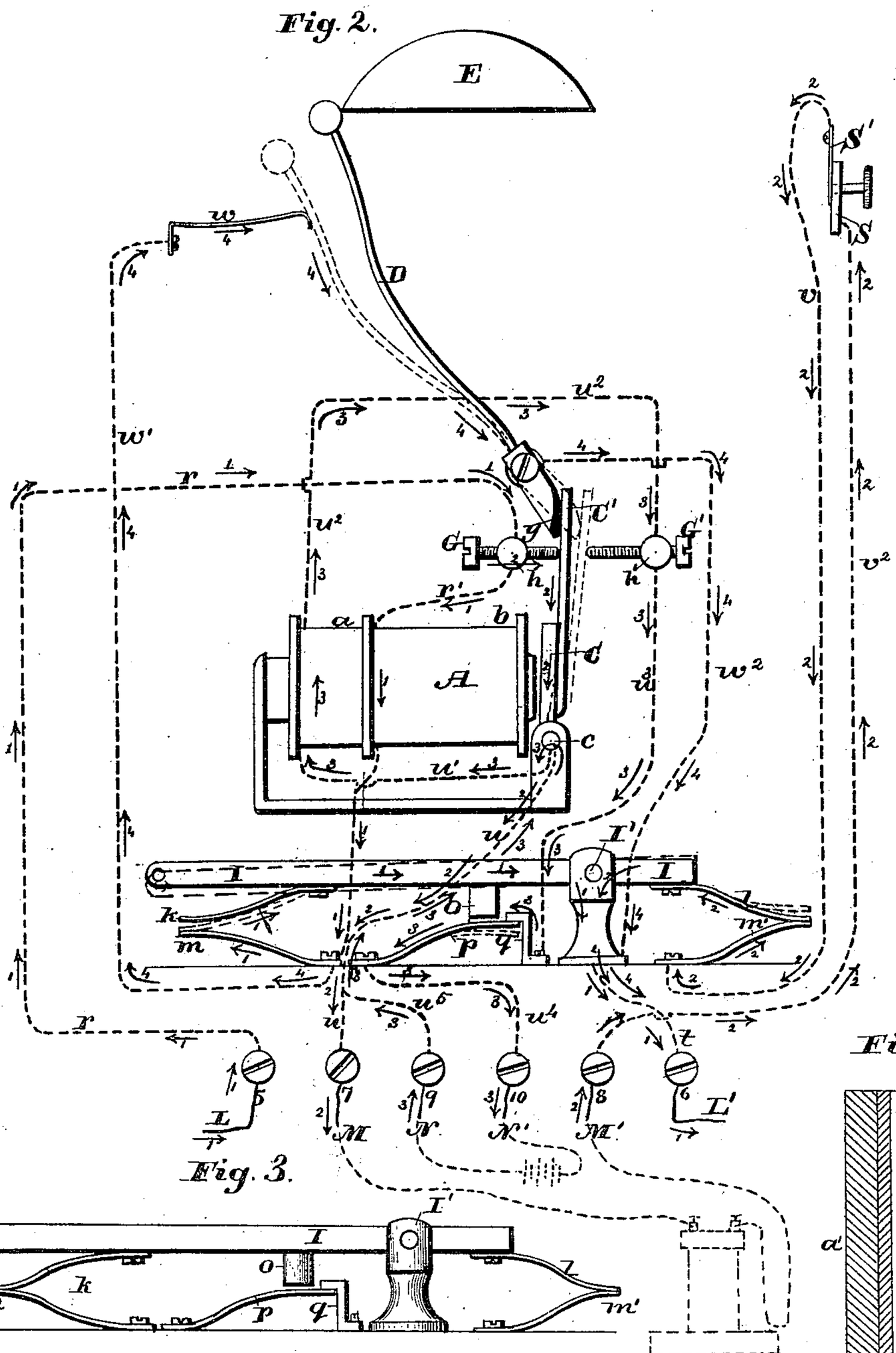
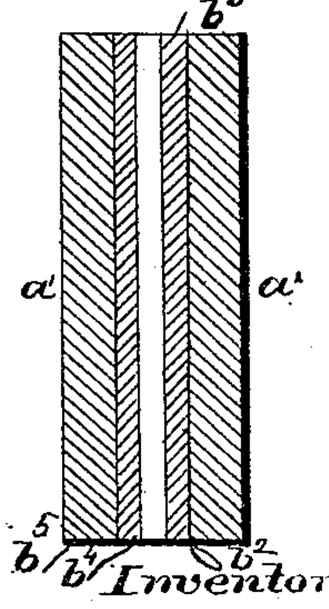


Fig. 3.

Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE W. COY, OF MILFORD, CONNECTICUT, ASSIGNOR OF TWO-THIRDS TO JAMES G. SMITH, OF HACKENSACK, NEW JERSEY, AND CHAS. E. BUELL, OF NEW HAVEN, CONNECTICUT.

TELEPHONE SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 238,360, dated March 1, 1881.

Application filed September 29, 1880. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. COY, a citizen of the United States, residing at Milford, in the county of New Haven and State of Connecticut, have invented new and useful Improvements in Signaling and Circuit-Changing Apparatus for Telephone-Stations, of which the following is a specification.

The object of this invention is to secure secrecy and prevent interruption of communication between stations in a telephone-circuit, to dispense with the ground-wires heretofore used at stations in effecting secrecy-connections, and to simplify the construction of the station apparatus. The combined call-bells and secrecy-switches which have heretofore been employed have depended largely upon complicated mechanical moving parts, which are subject to wear and liable to become out of order.

My invention is simplified in its mechanical construction, and depends for its operation upon the action of the electric currents by means which are not liable to become out of order. It requires no attention and accomplishes perfectly the object of debarring stations not in communication from disturbing those which are, by inadvertently calling or from eavesdropping, and by its peculiar construction makes it impossible for the persons using telephones to leave the circuit interrupted by their neglect to properly hang up their telephones.

In the accompanying drawings, Figure 1 is a front elevation of a station apparatus constructed according to my invention, the door of the casing being left open. Fig. 2 is a diagram illustrating the circuits at the station. Fig. 3 is a detached view of the switch-lever, showing its position at the moment of changing circuit from line to telephonic circuit. Fig. 4 is a central longitudinal section of a modified form of electro-magnet.

The letter A indicates a duplex electro-magnet, having separate helices *a b* coiled upon the same core. The armature C of this magnet is pivoted, at *c*, in the frame which supports the magnet, and has extending from it a lever, C′, which, when attracted by the magnet, strikes the tail *d* of a bell-hammer lever, D, and causes the hammer to strike the bell E, which is mounted upon top of the box or casing F, which incloses the magnet.

G G′ are adjusting-screws, tapped in metallic posts *h h′*, projecting from the back wall of the box, said screws serving to regulate the throw of lever C′.

The letter I designates a metallic lever arranged under the magnet and pivoted to a metallic post, I′, projecting from the bottom of the box. This lever is provided with two leaf-springs, *k* and *l*, projecting obliquely downward from its lower side, and arranged to, at proper times, come in contact with similar springs, *m* and *m′*, projecting obliquely upward from the bottom of the box. At one end of this lever is connected a telephone-hook, *n*, extending downward through an aperture in the bottom of the box, and between the end of the lever and its fulcrum or pivot it is provided with an insulated downward-projecting stud, *o*, which is arranged to strike a bent spring, *p*, rising from the bottom of the box, and throw said spring out of contact with a metallic bracket, *q*, also secured to the bottom of the box. A suitable spring causes the lever to rise when the weight of the telephone is removed from its hook.

The letters L L′ designate the main line connecting with binding-posts 5 and 6; M M′, the telephone-wires connecting with posts 7 and 8, and N N′ the local-battery wires connecting with posts 9 10. From the binding-post 5 a wire, *r*, leads to the metallic post *h*, and from this post a wire, *r′*, connects with one terminal of the coil *b*, and from the other terminal of the coil a wire, *s*, leads to the leaf-spring *m* on the bottom of the box. From the post 6 a wire, *t*, leads to the metallic post I′, which supports the metallic lever I. From the post 7 a wire, *u*, leads to the pivot *c* of the armature C, and from said pivot a wire, *u′*, leads to one terminal of the short coil *a*, and from the other terminal of the coil a wire, u^2, leads to the metallic post *h′*. From the post *h′* a wire, u^3, leads to the bracket *q*, and from the spring *p*, which is normally in contact with this bracket, a wire, u^4, leads to post 10. From post 9 a wire, u^5, connects, through wire *u*.

with the pivot of the armature. From post 8 a wire, *v*, leads to the upper hinge of the box, and a wire, *v'*, leads from the hinge to a plate, S, arranged upon the inner surface of the box-door. From a spring, S', secured to the door and bearing upon the plate a wire, v^2, leads to the lower hinge, and a wire, v^3, leads from the hinge to the spring *m'* upon the bottom of the box.

The letter *w* indicates a metallic plate, preferably elastic, secured to the wall of the casing, and lying in the path of the metallic bell-lever, so as to form a rest or stop for said lever when it falls away from the bell. From this plate *w* a wire, *w'*, leads to the spring *m*, and from the bell-lever or its metal pivot a wire, w^2, leads to the post I'.

The spring S' is arranged to be thrown out of contact with plate S by means of a suitable push-button. (Not shown in the figure.)

When the apparatus is in its normal condition, and the telephone upon its hook, the weight of the telephone depresses the lever I, holding the springs *m* and *k* in contact with each other, and the springs *l* and *m'* are separated. The circuit is then, as indicated by the arrows No. 1, Fig. 2, from the line to post 5, thence over wire *r* to post *h*, thence over wire *r'* to coil *b*, through said coil over wire *s* to spring *m*, over spring *k*, lever I, post I', and wire *t* to post 6, and thence over the line. When the circuit is thus closed the armature is attracted by the magnet and the lever C' is in contact with screw G, the stud *o* drives spring *p* away from bracket *q*, thus breaking the circuit of the local battery, as will presently appear. Now, when the subscriber desires to communicate with the central office, he takes his telephone off its hook, allowing the lever I to rise, separating the springs *m* and *k* and bringing the springs *l* and *m'* together. At the same time the stud *o* leaves spring *p* and allows it to rise and come in contact with bracket *q*. The circuit is now from the line, say, to post 5, over wire *r* to post *h*, and thence, as indicated by arrows No. 2, Fig. 2, over screw G, lever C', armature C, wire *u*, to post 7, through wire M to telephone, thence over wire M', wires *v* and *v'*, plate S, spring S', wires v^2 and v^3, springs *m'* and *l*, lever I, post I', wire *t'*, to line. At this time the circuit of the local battery is closed from battery to post 9, thence, as indicated by arrows No. 3, Fig. 2, over wires u^5 and *u* to armature-pivot *c*, thence over wire *w'* to coil *a*, thence over wire w^2 to post *h'*, thence over wire w^3 to bracket *q*, and spring *p* and wire w^4 to post 10, and thence back to battery over wire N'. By operating the push-button to separate spring S' from plate S the main circuit may now be broken to sound a bell at the central office. An answer having been received from the central office and the subscriber put into communication with another, the main battery is cut out of the line, as usual, at the said central office, and the local circuit of the station alone vitalizes the cores of the magnet through coil *a* to retain the armature in contact with screw G, this position of the armature being necessary to retain the subscriber's telephone in the main circuit.

The operation of the apparatus at all the other stations is as follows: Supposing them to be in normal condition when the main battery is taken off the line, as soon as the said battery is taken off, the cores of the magnet cease to be vitalized by the coils *b*, and the armature falls back in contact with screw G'. It is now impossible for the subscriber to put his telephone into circuit, for there is no current on the main line to vitalize the magnet through coils *b*, and the circuit of the local battery is shunted from the coil *a*, said local circuit being closed as follows: from battery over wire N to post 9, thence over wires u^5 and *u* to pivot *c*, over armature C, lever C', and screw G' to post *h'*, (this being a shorter route than over wire *w'*, coil *a*, and wire w^2,) and from post *h'*, over wire w^3, bracket *q*, spring *p*, wire w^4, to post 10, and back to battery over wire N'. Thus the coil *a* cannot be caused to vitalize the cores.

The taking the telephone off its hook at a station between two others which are in communication, while allowing the lever I to rise and separate the springs *m* and *k*, does not break the main-line circuit, but simply causes it to take the route, as indicated by arrows No. 4, Fig. 2, from spring *m*, over wire *w'*, plate *w*, bell-lever D, and wire w^2 to post I', and thence it flows over wire *t* to the line. The tail of the bell-lever is faced with hard rubber or other insulating material, as shown at *y*, in order to insulate it from the armature-lever C'.

The springs *k* and *m* and *l* and *m'* should be so bent that when the lever I rises the springs *l* and *m'* will come in contact with each other before the springs *k* and *m* become separated; otherwise the main circuit will be momentarily broken and the bell tapped at the central office. This arrangement prevents the bell from being rung by persons taking off the telephone inadvertently or without intention of calling.

Instead of the magnet A, having the separate coils *a* and *b*, I may use a magnet such as shown in section at A', Fig. 4.

The coil *a'* is continuous, and its entire length is traversed by the main-line battery-current; but the local battery is to be connected to a loop, b^2, so that its current will traverse only a certain number of the inner layers of the coil indicated by b^3 and terminating at b^4. The main line connects with b^5 and b^4 both, thus traversing the whole coil; or the lever C' may be pivoted between its ends and provided with two armatures arranged on opposite sides, a main-line magnet being arranged to attract one, and a magnet in a local circuit to attract the other, both, however, moving the lever in the same direction.

I do not, of course, confine myself to the

particular devices and arrangements thereof as now shown and described; but

I claim—

1. In a telephone-station apparatus, the combination, with an automatic circuit-changing device, a main circuit, and a local circuit, of two electro-magnets, or their equivalent, arranged to each independently operate an armature controlling said circuit-changing device, a switch provided with contacts arranged to connect the main circuit with one of said magnets and disconnect the local circuit from the other magnet by one movement, and by another movement to shunt the main circuit from its connected magnet and connect the local circuit with the other magnet, substantially as described, whereby the said automatic circuit-changing device may be brought under the control of the main and local circuits alternately, for the purpose set forth.

2. In a telephone-station apparatus, the combination, with a circuit-changing device, a main circuit, and a local circuit, of two electrical helices, each provided with a soft-iron core arranged to operate an armature controlling said circuit-changing device, a switch and contacts, as shown, arranged to connect the main circuit with one of said helices and disconnect the local circuit from the other helix by one movement, and by another movement to shunt the main circuit from its thus-connected helix and connect the local circuit with the other, and a short circuit arranged to be closed by the operation of said armature when released by the magnets, and divert the local circuit from the helix of its magnet, substantially as and for the purpose set forth.

3. In a telephone-station apparatus, the combination, with the main-line connections, helix *b*, and armature C, controlling a circuit-changer, the lever I, springs *m k* and *l m'*, and the connecting-wires *r*, *r'*, and *s*, of a suitable auxiliary circuit leading from the spring *m* around the magnet, and forming an intermediate connection between the main-line connections, substantially as described, whereby when the said helix is disconnected from the main circuit said circuit is maintained.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE W. COY.

Witnesses:
JAMES T. HIGBY,
JOHN W. FOWLER.