(No Model.)

J. H. HOWARD.

TELEPHONE.

No. 459,214. Patented Sept. 8, 1891.

FIG. 2.

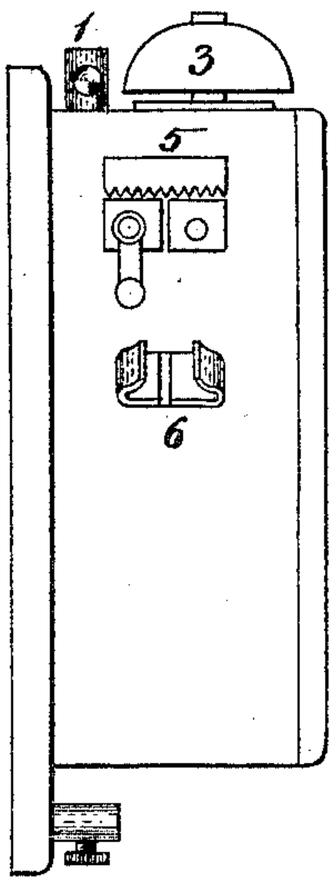

FIG. 1.

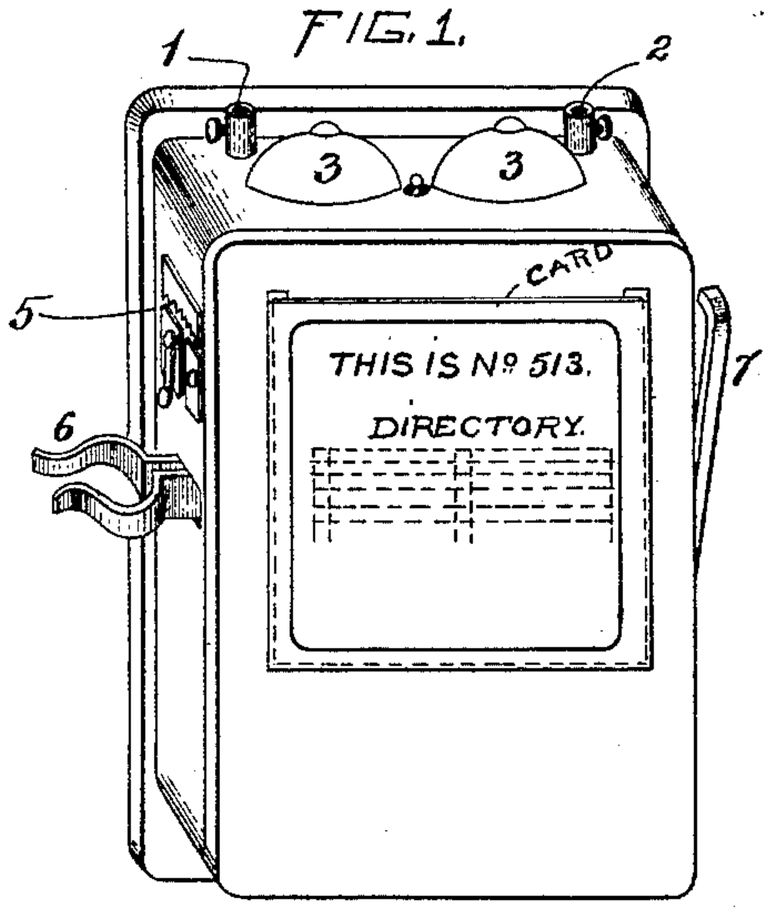

FIG. 3.

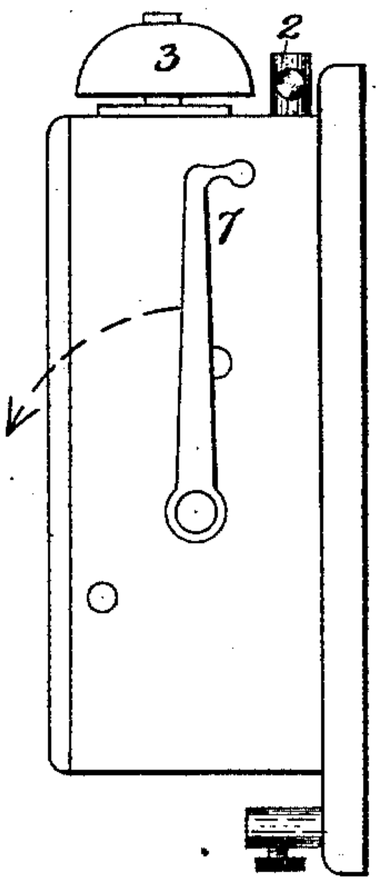

FIG. 4.

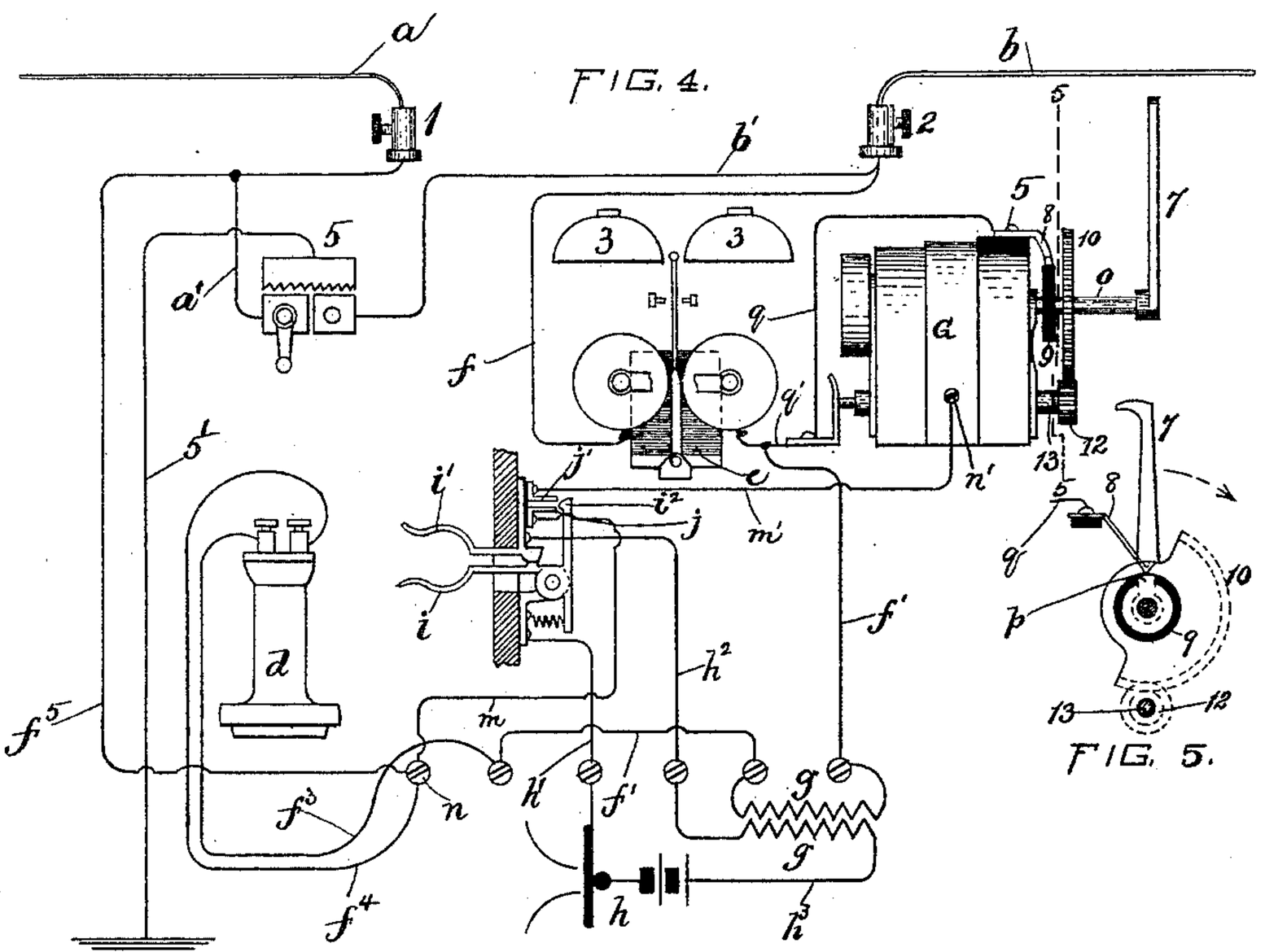

FIG. 5.

WITNESSES:
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UNITED STATES PATENT OFFICE.

JAMES H. HOWARD, OF MEDFORD, MASSACHUSETTS.

TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 459,214, dated September 8, 1891.

Application filed March 3, 1891. Serial No. 383,630. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. HOWARD, of Medford, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Telephones, of which the following is a specification.

This invention has for its object to provide an improved construction and arrangement of the Bell telephone, which shall enable the hanging up of the receiver to cut the telephone out of the circuit, and which will also allow the current on the primary circuit to pass around the Siemens armature when the armature is not in use, thus avoiding the resistance of the armature-coils.

The invention consists, chiefly, in the improved hook or crotch on which the receiver is hung when not in use, whereby the current on the primary circuit is diverted from the telephone or is allowed to flow therethrough when the receiver is disengaged from its hook.

The invention also consists in the improved device for actuating the Siemens armature and the improved attachments thereto, whereby the current is carried around said armature without encountering the resistance of the armature-coils, all of which I will now proceed to describe and claim.

In the accompanying drawings, forming a part of this specification, Figure 1 represents a perspective view of a telephone-box provided with my improvements, neither the receiver nor transmitter being shown. Fig. 2 represents a view of one side, and Fig. 3 of the opposite side, of the same. Fig. 4 represents a diagram showing the relations of the various parts provided with my improvements. Fig. 5 represents a section on line 5 5 of Fig. 4.

The same letters and numerals of reference indicate the same parts in all the figures.

Referring for the present to Fig. 4 of the drawings, a and b represent the two main-line wires, ending in the terminals 1 and 2, respectively.

a' and b' represent the two usual connecting-wires, having the usual switch c, which in Fig. 4 is shown open.

5 represents the usual lightning-arrester, having the usual ground-wire $5'$.

d represents the telephone-receiver, which is the usual Bell-telephone form, its body or outer surface being of a non-conducting material. When the receiver is off its hook and the telephone is in use, it will be seen that the current follows the main line b, the wire f connected therewith, through the bell-magnet e to wire f', through the induction-coil g, connecting-wires f^2 and f^3, receiver d, wire f^4, wire f^5, and so on to the main line a, with which the wire f^5 connects at 1. When the receiver is in this position, the secondary or induced current may be traced from the microphone or transmitter h through wire h' to a terminal connected with one arm i of the hook or crotch which supports the receiver d when the same is hung up, from said arm i to the other arm i' of said hook, thence by wire h^2 through the induction-coil g, and by wire h^3 to the transmitter h.

From the foregoing it will be seen that when the telephone is in actual use for speaking or hearing the armature is cut out of the circuit and the current does not have to encounter the resistance of the coils of said armature. When the receiver is hung upon its hook or crotch, the arm i of said hook is moved away from the other arm i', thus breaking the contact between said arms and opening the secondary circuit. At the same time the projection i^2, attached to the arm i, makes contact between the two terminals j and j', to which the wires m and m' are respectively connected. The wire m is connected with a terminal n, to which the wires f^4 and f^5 are also connected. The wire m' is connected to the Siemens armature G at n'.

The Siemens armature G is provided with a crank-shaft o, upon which is mounted a toothed segment 10, meshing with a gear 12, affixed to the armature-shaft 13. On the outer end of the crank-shaft o is a crank or lever 7, by which the same is adapted to be rotated. To the other end of the crank-shaft o is attached a reacting coil-spring, which is so arranged as that when the lever or crank 7 is moved by the operator in the direction shown by the arrow in Fig. 5 the said spring will act to automatically reverse said movement, and will rotate the crank-shaft o in the opposite direction when the lever 7 is released,

thus bringing said lever back to its normal position. (Shown in the drawings.) It will be seen that the toothed segment 10, meshing with the gear 12, will rotate the armature-shaft in one direction when the crank or lever 7 is being moved in the direction of the arrow in the drawings and will rotate said armature-shaft in the opposite direction during the backward movement, above described, caused by the coil-spring.

9 represents a disk mounted on the crank-shaft *o*. Said disk is of metal, and is in metallic contact with its shaft, but has its periphery covered with a non-conducting material, with the exception of one comparatively small portion *p*, where the metal is not covered. When the crank-shaft *o* is in its normal position, the exposed surface *p* of the periphery of the disk 9 will be in such position that the end of a spring contact-plate 8 will press thereon, said contact-plate 8 being therefore in metallic contact with the frame-work of the armature. The contact-piece 8 is suitably mounted on a fixed support and is shown in the drawings as mounted on an insulating-plate on the armature, said piece 8 being insulated from the armature by said piece of insulating material. The piece 8 is connected by a wire *q*, a wire *q'* connecting with the bell-magnet *e*. When the lever or crank 7 is moved downwardly, the disk 9 is rotated and the end of the plate 8 passes onto the insulating material on the periphery of said disk, contact between said plate 8 and the armature being thus broken.

From the foregoing it will be seen that when the receiver *d* is on its hook the current comes over the main line *b*, wire *f*, through the bell-magnet *e*, wires *q'* and *q* to contact-piece 8, and disk 9, through the frame of the armature to wire *m'*, through terminal *j'*, contact-maker i^2 and terminal *j* to wire *m*, and thence through wire f^5 onto the main line *a*. It will thus be seen that the current avoids the resistance of both the armature and the telephone-receiver when the latter is upon its hook and the armature is at rest, both being cut out of the circuit by my improved devices. The bell is caused to ring by moving the crank or lever 7, as already described, said movement cutting the wire *q* and contact-piece 8 out of the circuit, the current then passing through the wire *q'* and contact-spring q^2, through the coils of the armature, and so onto the wire *m'* in the usual way, the said apparatus and its operation being well understood and needing no further description here.

I prefer to arrange the devices above described as shown in Figs. 1, 2, and 3; but I do not limit myself to this arrangement. In said figures I show the bells 3 3 and the terminals 1 and 2 arranged on the top of the box, the switch *c* and lightning-arrester 5 and the hook or crotch 6 on one side thereof, and the crank or lever 7 on the other side. The transmitter *h* may be arranged in any suitable relation to the said box.

I claim—

1. The combination, with an electric circuit and a Siemens armature included therein, of a crank-shaft adapted to be partially rotated in one direction and then in the other direction to operate the armature-shaft, a spring contact-piece, a disk on the said crank-shaft and in electrical connection with the armature-shaft, the said disk having one small portion of its periphery uncovered and the remainder of said periphery covered with a suitable insulating material, the spring contact-piece pressing upon the periphery of said disk, whereby it will be in electrical connection with the armature-shaft when the said crank-shaft is at rest in its normal position, and when said crank-shaft is being moved to operate the armature-shaft the said spring contact-piece will be out of electrical connection with the armature-shaft and a connection between the said spring-contact and one of the main wires of the circuit and the usual connections between said main wires and the armature and its shaft, so that when the above-described devices are in their normal position the coils of the armature will be cut out of the main circuit and when said devices are being moved to operate the armature the loop consisting of the spring contact-piece and its connection will be cut out from said circuit, as set forth.

2. The improved attachment to a Siemens armature, consisting of a crank-shaft mounted in suitable relation to the shaft of the armature, a segmental gear mounted on the said crank-shaft meshing with a gear on the armature-shaft, a crank or lever adapted to rotate said crank-shaft, and a reacting coil-spring on said crank-shaft, whereby the same is rotated in the contrary direction when the said crank or lever is released, a disk on the crank-shaft having the greater portion of its periphery insulated, a contact-spring bearing on said periphery, and connections between the said spring and the bell-magnet, as set forth.

3. The hook or crotch for a telephone-receiver, having the fixed arm *i'*, the movable arm *i*, the former being connected with one wire and the latter with the other wire of the secondary or transmitter circuit, the spring adapted to bring the two arms *i i'* into contact with each other when the receiver is withdrawn from the hook, thus closing the secondary circuit, the extension or cross-piece i^2 on the arm *i*, the contact-pieces *j j'*, between which the piece i^2 is adapted to make electrical connection when the receiver is hung upon the crotch or hook and thus close the primary circuit on the wires *m* and *m'*, cutting out the receiver from said circuit, said contact-piece i^2 being moved with the

arm *i* on the withdrawal of the receiver from its crotch to break the circuit over the wires *m* and *m'*, thus causing the primary current to pass over the wires f^3 and f^4, and including the receiver in said circuit, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses, this 14th day of February, A. D. 1891.

JAMES H. HOWARD.

Witnesses:
EWING W. HAMLEN,
C. F. BROWN.