No. 669,471. Patented Mar. 5, 1901.

E. E. YAXLEY & C. C. CADDEN.

TELEPHONE KEY.

(No Model.) (Application filed Sept. 22, 1899. Renewed Jan. 5, 1901.)

2 Sheets—Sheet 1.

Fig. 1.

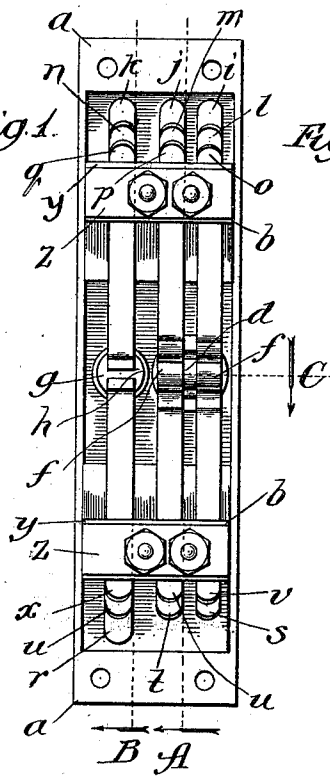


Fig. 2.

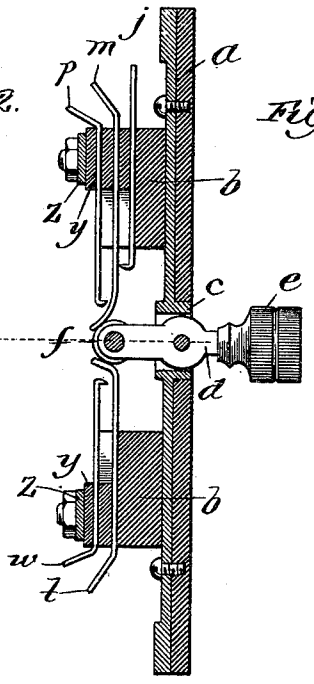


Fig. 3.

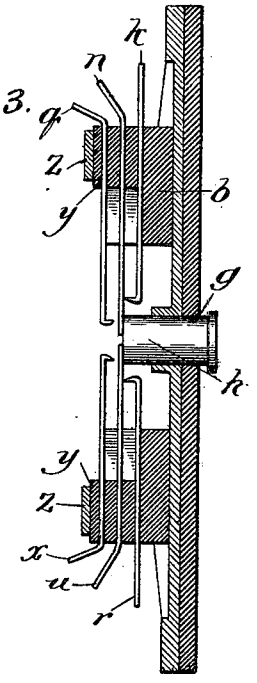


Fig. 4.

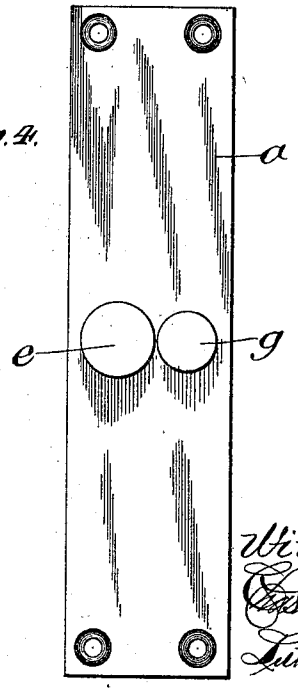
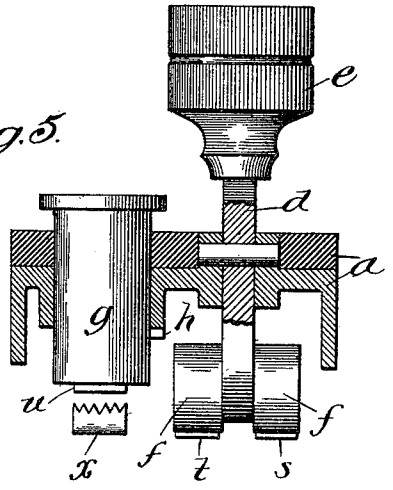


Fig. 5.



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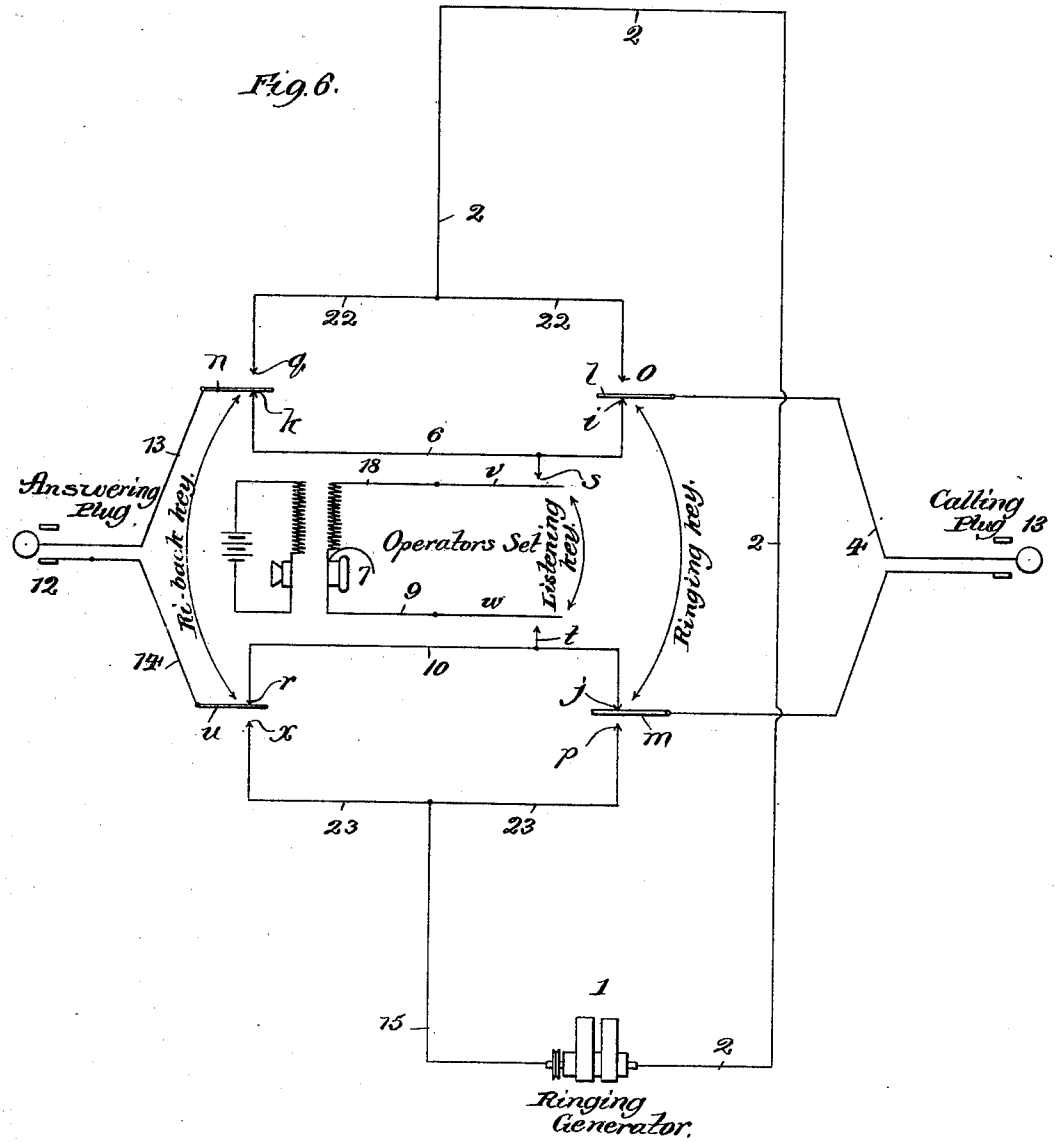
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TELEPHONE KEY.

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2 Sheets—Sheet 2.

Fig. 6.



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UNITED STATES PATENT OFFICE.

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TELEPHONE-KEY.

SPECIFICATION forming part of Letters Patent No. 669,471, dated March 5, 1901.

Application filed September 22, 1899. Renewed January 5, 1901. Serial No. 42,256. (No model.)

To all whom it may concern:

Be it known that we, ERNEST E. YAXLEY and CHARLES C. CADDEN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Telephone-Keys, of which the following is a specification.

Our invention relates to an improvement in the class of key devices employed on telephone-switchboards for ringing up and speaking to subscribers, and commonly located on the hinged lid of the table portion of a switchboard.

In the accompanying drawings, Figure 1 is a bottom plan view of our improved key device; Fig. 2, a section taken at the line A on Fig. 1 and viewed in the direction of the arrow; Fig. 3, a section taken at the line B on Fig. 1 and viewed in the direction of the arrow; Fig. 4, a top plan view of the key device; Fig. 5, a section taken at the line C on Fig. 1 viewed in the direction of the arrow and enlarged, and Fig. 6 a diagram of the circuits in which our improved key device is employed.

The body *a* of the key device, as shown, is composed of a rectangular plate of insulating material, as hard rubber, faced on its under side with a laterally-flanged metal plate carrying at opposite sides of its transverse center blocks *b b*, of insulating material, each containing a transverse row of slots, shown as three in number, for retaining the contacts hereinafter described, each slot in one block coinciding with a slot in the other block. In a metal thimble *c*, lining an opening formed through the body at its center, is pivotally supported to adapt it to be turned on its pivot lengthwise of the body a metal key *d*, having a knob *e* of insulating material on its outer end and rollers *f f* of insulating material (hard rubber) journaled at opposite sides of its inner end. In an opening through the body *a*, adjacent to the key *d*, is contained a depressible or "push" key *g*, of insulating material, carrying a stop *h* to limit its outward throw.

In the three slots of one of the blocks *b* are confined, respectively, the three upper spring-metal contact-strips *i*, *j*, and *k*. In the slots of this same block are also confined and insulated by spacing-strips from the upper contacts the three intermediate spring-metal contact-strips *l*, *m*, and *n*, shown downwardly bent at their outer ends, the strips *l* and *m* being downwardly curved toward their inner ends to enable the rollers *f f* of the key *d* the better to ride upon them. The contact-strip *n* projects at its straight inner end underneath the key *g*. In the same slots are also confined and insulated by spacing-strips from the intermediate contacts the three spring-metal contacts *o*, *p*, and *q*, shown downwardly bent at their outer ends and upturned at their inner ends, where they respectively meet the contacts *l m n*.

In one of the three slots in the block *b*, near the opposite end of the body *a*, is confined a contact-strip *r*, like and coincident with the strip *k* and projecting under the key *g*. Below the plane of the strip *r* in the three slots are the contact-strips *s*, *t*, and *u*, like and coinciding, respectively, with the strips *o*, *m*, and *n*, and below the strips *s t u* in the respective slots and insulated from them are confined the strips *v*, *w*, and *x*, like and respectively coinciding with the strips *o p q*.

The several contact-strips in each block *b* are confined in place by an insulating-strip *y*, extending across the base of the block transversely of the slots and covered by a metal strip *z*, fastened by nuts on screws passing through the retaining-strips into the block.

With the key *d*, which forms the listening and ringing-up key in the inoperative vertical position in which it is shown and in which it is yieldingly held by the curved ends of the spring-contact strips, between which it extends, the intermediate strips *l m* on the "ringing-up" side of the device contact at their inner ends with the adjacent ends of the strips *i j* above them, and the strip *u* then also contacts at its inner end with the strip *r* above it, while the strips *o* and *p* are out of contact with the strips *l* and *m* above them, and the strips *v* and *w* are similarly out of contact with the strips *s* and *t* above them.

The key *g* is the "ring-back" key and bears always against the inner ends of the contact-strips *n* and *u*, which are normally out of contact with the strips *q* and *x*, re-

spectively, below them to be brought into contact with them by depressing the key.

By turning the key *d* on its pivot against the inner ends of the strips *s t*, where it stays (and which is its normal position) to contact them, respectively, with the strips *v w*, the operator's listening-circuit is closed, and by turning it in the opposite direction against the inner ends of the strips *l m*, whence they spring it back when released to the vertical inoperative position, it contacts them, respectively, with the strips *o p* to close the operator's ringing-up or calling circuit.

In the use of our improved device the two upper contact-strips *i j* are respectively connected with the strips *s t*, which are connected with the strips *k* and *r*, and the strips *n* and *u* are connected with the operator's answering-plug. The contact-strips *l m* are connected with the operator's calling-plug, and the strips *o p* are connected with the ringing-generator. The contact-strips *v w* are connected with the operator's set. The strip *k* is connected with the strip *j*, and the strip *r* is connected with the strip *i*. Each of the strips *n* and *u* is connected with the operator's answering-plug, and each of the strips *q* and *x* is connected with the ringing-generator for connection with the operator's answering-plug.

The circuit connections are traced in Fig. 6 as follows, with most of the contact-strips of our key device represented by arrow-points: From one side of the ringing-generator (indicated at 1) leads a wire 2, having a branch 22, connected at one end with the strip at *o* and at its opposite end with the strip *q*. The operator's calling-plug (indicated at 3) is connected from one side by a wire 4 with the strip *l* and from its opposite side by a wire 5 with the strip *m*. A wire 6 connects the strips *i* and *k* with the strip *s*. The operator's set (indicated at 7) is connected from one side by a wire 18 with the strip *v* and from its opposite side by a wire 9 with the strip *t*. A wire 10 connects the strip *j* and the strip *r* of the ring-back circuit with the strip *t*. The operator's answering-plug (indicated at 12) is connected from one side by a wire 13 with the strip *n* and from its opposite side by a wire 14 with the strip *u*. From the opposite side of the generator 1 leads a wire 15, having a branch 23, connected at one end with the strip *p* and at its opposite end with the strip *x*.

What we claim as new, and desire to secure by Letters Patent, is—

In a key device for telephone-switchboards, the combination of a lever terminating at one end in rollers of insulating material, and contact-strips placed horizontally in groups on opposite sides of said lever, the group on one side consisting of two spring-contact strips having their free ends curved downward and extending in the path of said rollers, contact-strips arranged above and insulated from but normally in contact with said spring-contact strips, and contact-strips below said spring-contact strips, insulated from and normally out of contact with them, and the group on the opposite side consisting of two spring-contact strips having their free ends curved downward and extending into the path of said rollers, and contact-strips below the last-named spring-contact strips and insulated from them, whereby turning the lever in one direction actuates one group causing two contacts to be broken and two to be completed, and turning the lever in the opposite direction causes two contacts to be made.

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In presence of—
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