

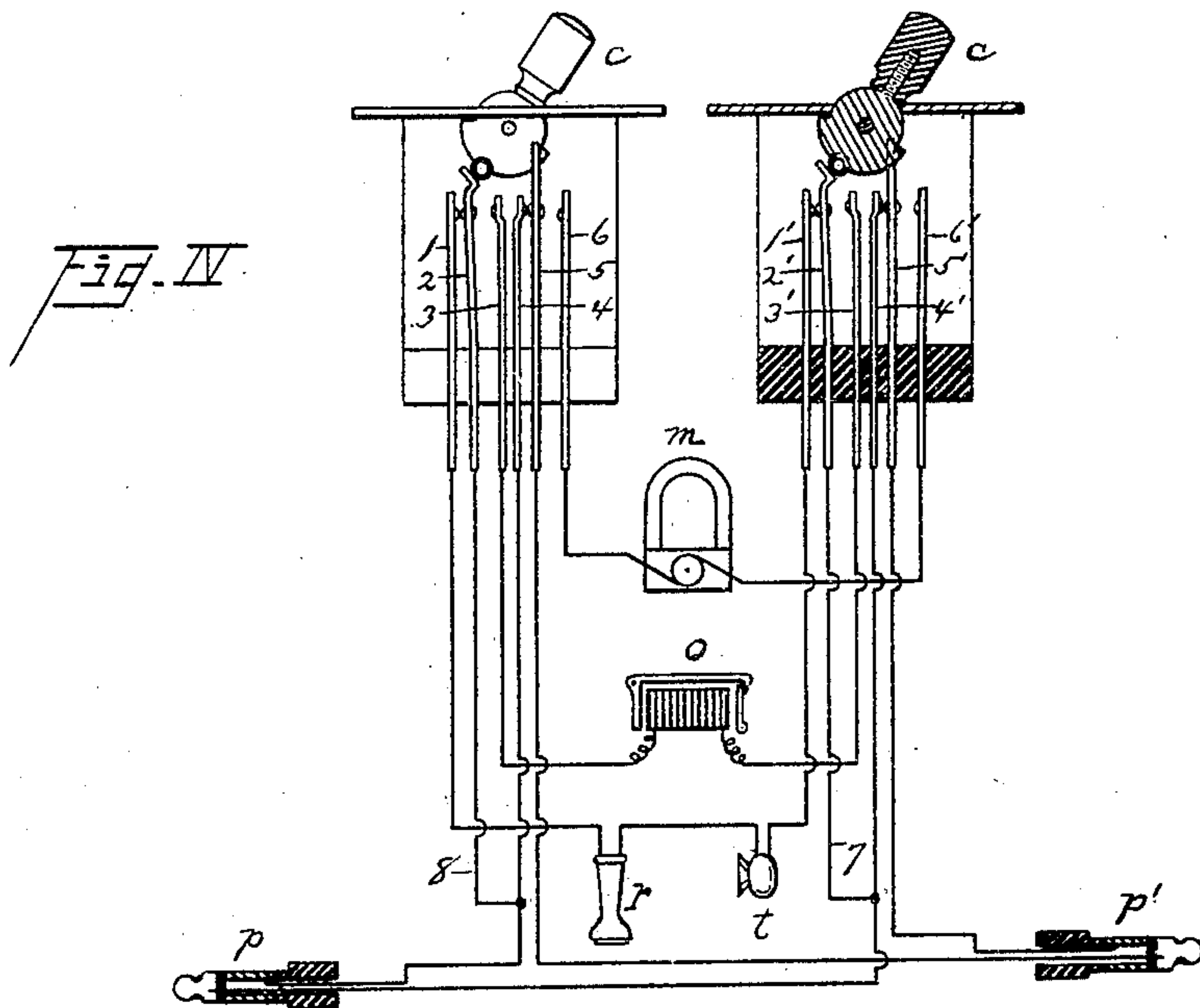
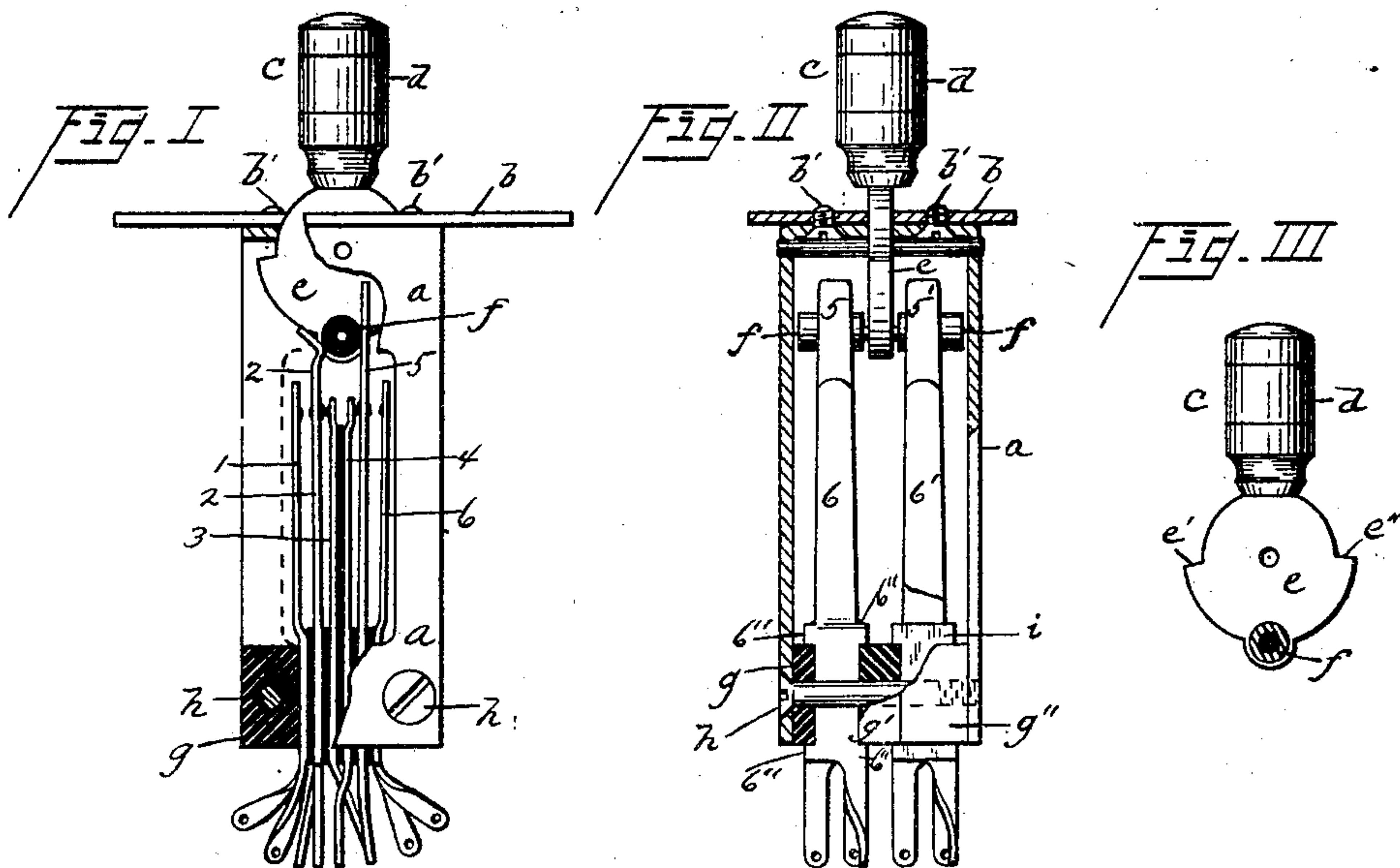
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C. H. NORTH.
RINGING AND LISTENING KEY.

APPLICATION FILED SEPT. 14, 1901.

NO MODEL.



Witnesses:

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RINGING AND LISTENING KEY.

SPECIFICATION forming part of Letters Patent No. 754,935, dated March 15, 1904.

Application filed September 14, 1901. Serial No. 75,388. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. NORTH, a citizen of the United States of America, and a resident of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ringing and Listening Keys, of which the following is a specification.

My invention relates to improvements in a combined ringing and listening key for telephone-switchboards, and has for its object the provision of a switching device of this type of extremely simple, compact, and durable construction. In devices of this character it is the most common requirement that a number of them be assembled upon the table before the operator, and in consequence the space occupied by each should be as restricted as possible. It is important, moreover, that the movable parts in a key of this character be preserved from wear or deterioration, since the efficiency of the telephone service so largely depends upon the accuracy and certainty with which the complicated switching connections are effected. The above features I have carefully considered in constructing the present device.

Still another point sought to be improved upon herein is the manner of mounting the various contact-springs so that they practically form an integral structure while maintaining the required electrical dissociation of the contact parts.

Before undertaking an extended explanation of the construction I may briefly refer to my improved key as being of the vertical type, wherein the various terminal springs are mounted in insulating-blocks which engage shoulders or projections provided upon the lower ends of the said springs and clamp them firmly together between their spacing-insulators, the contact-making ends of said springs extending upwardly in position to be brought into engagement by means of actuating-rollers mounted upon the lower end of the pivoted operating-lever.

The accompanying drawings will be referred to more clearly to explain the details of construction, of which—

Figure I is a side view in elevation, par-

tially broken away, illustrating a key made in accordance with my invention. Fig. II is a view similar thereto in front elevation. Fig. III is a detail of the operating-lever and its actuating-rollers, and Fig. IV is a somewhat diagrammatic view showing the cord-circuits and the key when thrown to the listening-in position, said key being represented by its two laterally-displaced halves to make apparent one manner of connecting the key in its controlled circuit.

Throughout the drawings the same character of reference is employed to indicate the same part.

In the original pen-and-ink drawings filed herewith, above referred to, I have shown in full size the preferred embodiment of my invention. Reference thereto will sufficiently indicate how small and compact is a key of this type, whereby the minimum of surface space is required therefor upon the operator's table. A rectangular frame of metal *a* contains the several switch parts. At its top the guard-plate *b* is secured to this frame by means of screws *b'*, inserted from beneath, and through an opening in the plate, with which it forms at all times a dust-proof joint, extends the upper portion of the operating-lever *c*. This lever comprises an insulating-handle *d*, a pivoted body *e*, whose upper portion is semicircular to accommodate it to the guard-plate opening and which is also provided with stops *e' e''*, accurately limiting the movement of the lever. Mounted at its lower end are the rollers *f f'*, of insulating material, rotatably secured thereon and positioned between the elongated pairs of springs *2 2' 5 5'*, with which they may alternatively be actuated into engagement. The rollers are perfectly free upon their shafts, being retained thereon solely by their engagement with frame *a*.

The several pairs of springs *1 1'* to *6 6'* are each formed with double pairs of laterally-extending shoulders, as *6''*, near their lower ends. (See Fig. II.) These springs are assembled as shown, with spacing-insulators of mica *i* similarly shaped and disposed therebetween, and the assembled springs and insulators are forced within the channeled and

closely-fitting insulating-blocks $g g''$, a third block g' being interposed between each set of the paired springs, in which position the laterally-extending shoulders upon the springs and mica insulators engage the top and bottom surfaces of the blocks and rigidly secure the inclosed parts in position.

Screws h are inserted through the lower portion of the frame a and the inclosed blocks $g g' g''$, thus making of the whole substantially a unitary structure. The several parts are thus locked rigidly and permanently in a base-piece which is united with the upright frame inclosing the springs, said springs being tightly wedged near their lower ends within the grooved blocks.

Whenever the lever c is moved to either side of its median position, springs $2 2'$ or $5 5'$ will be flexed, causing them, respectively, to disengage their normal contacts $3 3'$ or $4 4'$ and establish circuit with the outer springs $1 1'$ or $6 6'$.

Springs $2 2'$ have their upper ends bent at an angle with the bodies thereof, Fig. I, and stop e' is so adjusted that when the handle d is moved to the right rollers $f f'$ ride upon the angularly-extending ends, which pressing substantially in the line of the lever's pivotal mounting temporarily retain it in this position. This is the listening-in position.

Springs $5 5'$ preferably are straight and are merely flexed into temporary engagement with the outer pair of springs $6 6'$, while the lever is held in its opposite position.

The diagram of Fig. IV will now make perfectly plain one application of the device just described. Therein the key is shown in the first or listening-in position, wherein circuit may be traced from the tip of the answering-plug p of the cord-circuit, conductor 7, springs $2' 1'$, through the operator's instruments $t r$, springs $1 2$, conductor 8 to the sleeve of said plug p . Similarly, if the lever be moved to the opposite or ringing position, thus disengaging springs $5 5'$ from $4 4'$ and flexing them into engagement with springs $6 6'$, as already explained, current is sent from the magneto m over the circuit connected with plug p' , which may be traced from the right side of said magneto to springs $5' 6'$, to the sleeve of the plug p' , thence over the line of a connected subscriber to the tip of the plug, springs $5 6$, and the left side of the magneto.

Fig. I shows the normal position of the springs, in which position circuit may then be traced directly through the cord-circuit from the tip of plug p , springs $4' 5'$, to the sleeve of the calling-plug p' , thence through the connected circuit to the tip of said plug, springs $5 4$, to the sleeve of the answering-plug p , while the clearing-out annunciator o is bridged into circuit between the springs $2 3$ and $2' 3'$.

The action of the key is seen to be simple and positive. Since the rollers $f f'$ freely revolve when brought into engagement with the

springs, there is no tendency to wear or cut the engaging parts as in some types of key, while the springs are but slightly bent to make and break contact. Hence the efficiency of this switching device will continue indefinitely.

The described manner of mounting the contact-springs will be found highly desirable in electrical apparatus wherein the maximum of strength, simplicity, and compactness is desired. The springs themselves may be so closely assembled in this type of key that the square area required therefor on the operator's table is less than the throw of the operating-lever shown herein. This is due to the fact that the springs are mounted in but slightly-separated parallel and vertical planes, being parted only by the thin strips of insulating material disposed therebetween. The enlarged cam part ordinarily mounted between and widely separating the opposing sets of contact-making springs, moreover, is herein displaced by the small intervening roller parts carried near the end of an oscillating lever, also mounted in a vertical plane cutting the center of the device, but pivoted well above the springs to afford sufficient play to flex the said springs.

Having now described the embodiment of my invention, I claim as new, and desire to secure by these Letters Patent, the following:

1. In a switching-key of the class described, the combination with a plurality of contact-making springs closely mounted in parallel, vertical planes, of an operating-lever pivotally mounted above the said springs to oscillate therebetween, and an interposed roller part carried thereon near its lower end to lie between the springs, which it is adapted to flex into and out of contact when oscillated by the lever, substantially as set forth.

2. In a switching-key of the class described, the combination with the channeled mounting-block, of a plurality of contact-making springs closely mounted therein in parallel, vertical planes, an operating-lever pivotally mounted at a distance above the springs, and an interposed roller part carried thereon near its end to lie between the springs, which it is adapted to flex into and out of engagement when oscillated by the lever, substantially as set forth.

3. In a switching-key of the class described, the combination with a plurality of sets of springs closely mounted in parallel, vertical planes, of an operating-lever pivoted midway between said sets of springs and at a distance above them, and an interposed roller part carried thereon near its lower end in position to lie between the springs, which it is adapted to flex into and out of contact when oscillated by the lever, substantially as set forth.

4. In a switching device of the class described, the combination of a plurality of contact-making springs, of thin spacing-insulators separating the same, paired engaging shoulders provided on the springs and insulators, a

channeled insulating-block shaped to receive the assembled group of springs and insulators, a second, opposing block securely mounting all of the parts within the channeled supporting part through the medium of their engaging shoulders, and suitable switching mechanism associated with the said springs, substantially as set forth.

5. In a ringing and listening key, the combination with a vertical frame *a*, of channeled insulating-blocks disposed in the lower portion thereof, paired vertical contact-springs *1 1'* to *6 6'* and spacing insulating-strips *i* clamped in the channeled blocks, an oscillating lever *c* and actuating-rollers *f* provided thereon and disposed between springs *2 2'* and *5 5'*, all mounted within the frame and adapted to effect the several switching changes demanded of the key, substantially as set forth.

6. In a switching device substantially as set

forth, the combination with a supporting-frame, of a plurality of contact-springs mounted therein, an operating-lever and actuating-rollers mounted thereon and retained in position by the adjacent frame.

7. In a ringing and listening key, the combination with a plurality of vertically-mounted contact-springs, of an upright frame inclosing and supporting the same, an oscillating operating-lever mounted within said frame, and a roller-actuating part for the springs disposed thereon, adapted to flex said springs into and out of engagement with each other, substantially as set forth.

Signed at Cleveland, this 12th day of September, A. D. 1901, in the presence of two subscribing witnesses.

CHARLES H. NORTH.

Witnesses:

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